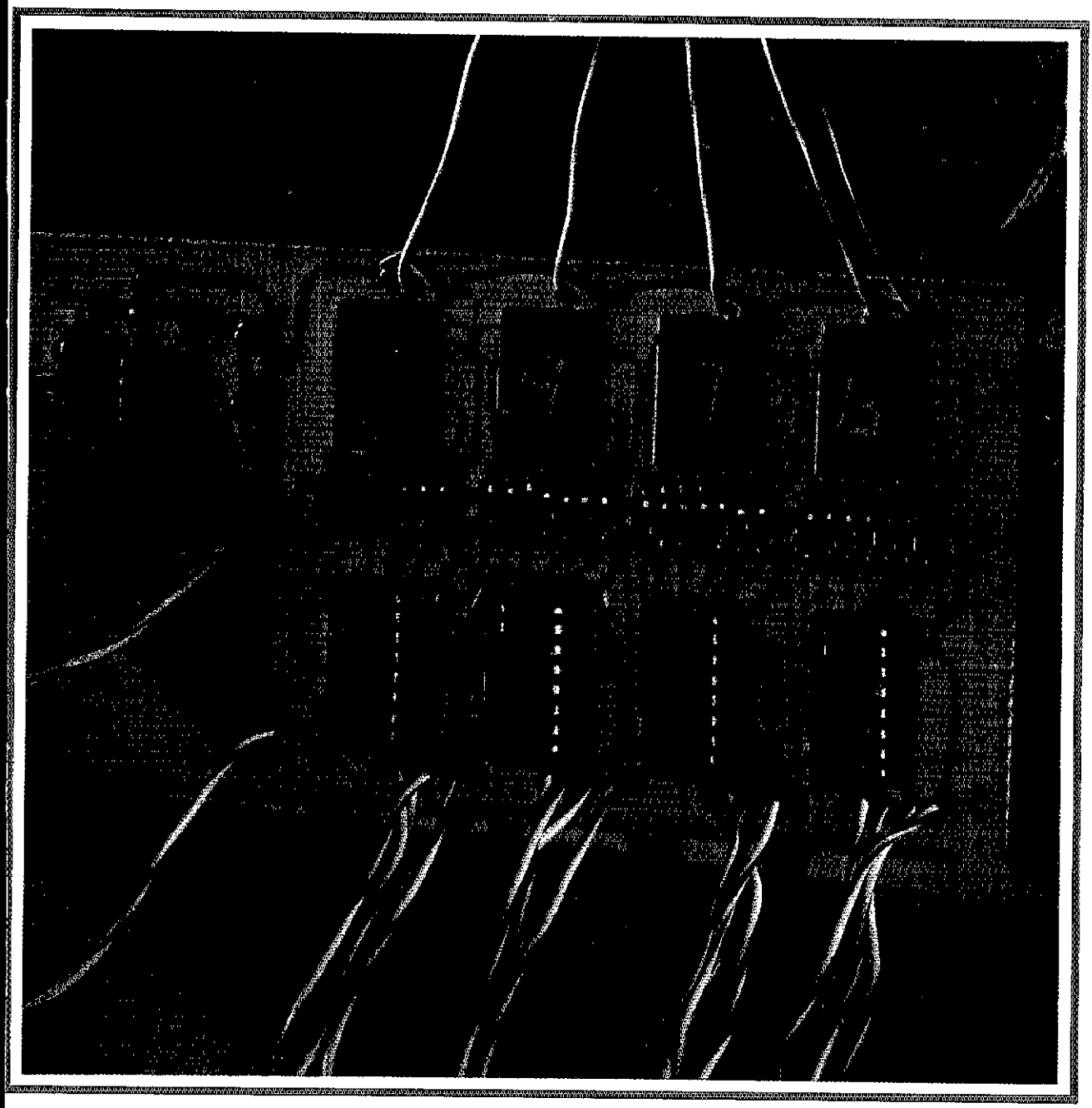
QST

devoted entirely to Amateur Radio

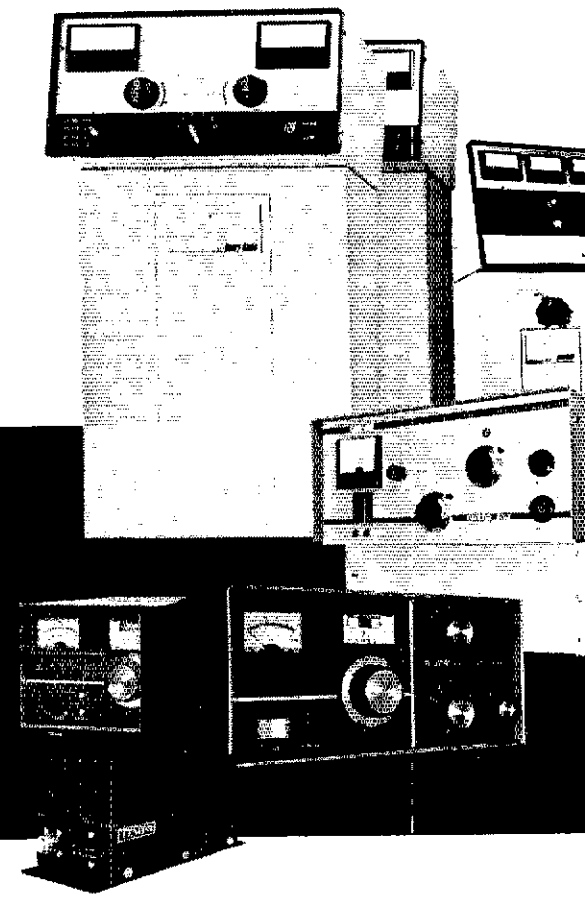
February 1976 $1.00



Amateurs Conduct Unique "Operation Vietnamese Refugee"

Page 11

Henry Radio has the amplifier you want



Never before has one company manufactured such a broad line of amateur amplifiers, both vacuum tube and solid state, for HF, VHF and UHF; fixed station and mobile; low power and high power. Take your pick from 20 models...the world's finest line of amateur amplifiers.

2K-4. . .
THE "WORKHORSE"
The 2K-4 linear amplifier offers engineering, construction and features second to none, and at a price that makes it the best amplifier value ever offered to the amateur. Constructed with a ruggedness guaranteed to provide a long life of reliable service, its heavy duty components allow it to loaf along even at full legal power. If you want to put that strong clear signal on the air that you've probably heard from other 2K users, now is the time. Move up to the 2K-4. Floor console or desk model ..$995.00

3K-A COMMERCIAL/MILITARY AMPLIFIER
A high quality linear amplifier designed for commercial and military uses. The 3K-A employs two rugged Eimac 3-500Z grounded grid triodes for superior linearity and provides a conservative three kilowatts PEP input on SSB with efficiencies in the range of 60%. This results in PEP output in excess of 2000 watts. In addition, the 3K-A provides a heavy duty power supply capable of furnishing 2000 watts of continous duty input for either RTTY or CW with 1200 watts output. Price...$1250.00

4K-ULTRA
The 4K-ULTRA is specifically designed for the most demanding commercial and military operation for SSB, CW, FSK or AM. The amplifier features general coverage operation from 3.0 to 30 MHz. Using the magnificent new Eimac 8877 grounded grid triodes, vacuum tune and load condensers, and a vacuum antenna relay, the 4K-ULTRA represents the last word in rugged, reliable, linear high power RF amplification. 100 watts drive delivers 4000 watts PEP input. This amplifier can be supplied modified for operation on frequencies up to about 100MHz. Price...$2950.00

TEMPO 6N2
The Tempo 6N2 brings the same high standards of performance and reliability to the 6 meter and 2 meter bands. Using a pair of advanced design Eimac 8874 tubes, it provides 2,000 watts PEP input on SSB or 1,000 watts input on FM or CW. The 6N2 is complete in one compact cabinet with a self-contained solid state power supply, built-in blower and RF relative power indicator. Price...$795

TEMPO 2002
The same fine specs and festures as the 6N2, but for 2 meter operation only. ...$695.00

TEMPO 2006
Like the 2002, but for 6 meter operation. ..$695.00

TEMPO T-2000
LINEAR AMPLIFIER
The brand new T-2000 linear is the perfect companion for the Tempo ONE. It is compact, reliable, and priced right. Uses two Eimac 8873 grounded grid triodes cooled through a large heat sink. The T-2000 offers a full 2 KW PEP input for SSB operation and provides amateur band coverage from 80—10 meters. Provides a built-in solid state power supply, built-in antenna relay, a relative RF power indicator, and built-in quality to match much more expensive amplifiers. $795.00

K-2000
LINEAR AMPLIFIER
The new K-2000 is the perfect companion for Kenwood's TS-520...matched for style and circuitry. The same specifications as the T-2000...$795.00

TEMPO VHF/UHF AMPLIFIERS
Solid state power amplifiers for use in most land mobile applications. Increases the range, clarity, reliability and speed of two-way communicatios. FCC type accepted also.

please call or write for complete information

Henry Radio

11240 W. Olympic Blvd., Los Angeles, Calif. 90064 213/477-670
931 N. Euclid, Anaheim, Calif. 92801 714/772-920
Butler, Missouri 64730 816/679-312

Now...more than ever---
the TEMPO line means solid value

Tempo VHF/ONE

the "ONE" you've been waiting for

No need to wait any longer — this is it! Whether you are already on 2-meter and want someting better or you're just thinking of getting into it, the VHF/ONE is the way to go.

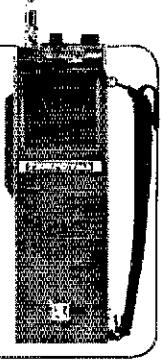
• Full 2-meter band coverage (144 to 148 MHz for transmit and receive. • Full phase lock synthesized (PLL) so no channel crystals are required. • Compact and lightweight — 9.5" long x 7" wide x 2.25" high. Weight — About 4.5 lbs. • Provisions for an accessory SSB adaptor. • 5-digit LED receive frequency display. • 5 KHz frequency selection for FM operation. • Automatic repeater split — selectable up or down for normal or reverse operation. • Microphone, power cord and mounting bracket included. • Two built-in programmable channels. • All solid state. • 10 watts output. • Super selectivity with a crystal filter at the first IF and E type ceramic filter at the second IF. • 800 Selectable receive frequencies. • Accessory 9-pin socket. • $495.00

TEMPO SSB/ONE

SSB adapter for the Tempo VHF/One

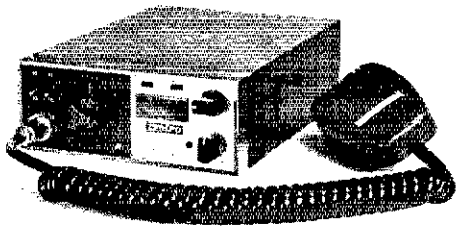
• Selectable upper or lower sideband. • Plugs directly into the VHF/One with no modification. • Noise blanker built-in. • RIT and VXO for full frequency coverage. • $225.00

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

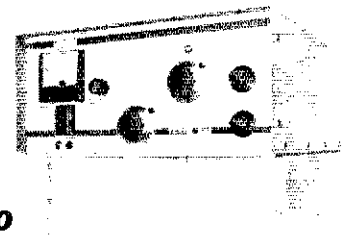
FMH-MC for Marine & Commercial service also available.



TEMPO/CL 146A

. . .a VHF/FM mobile transceiver for the 2 meter amateur band. It is compact, ruggedly built and completely solid state. One channel supplied plus two channels of your choice FREE

144 to 148 MHz coverage • Multifrequency spread of 2 MHz • 12 channel possible • Metering of output and receive • Internal speaker, dynamic microphone, mounting bracket and power cord supplied. A Tempo "best buy" at $239.00.

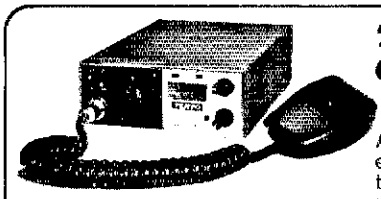


TEMPO 6N2

The Tempo 6N2 meets the demand for a high power six meter and two meter power amplifier. Using a pair of Eimac 8874 tubes it provides 2000 watts PEP input on SSB and 1000 watts input on CW and FM. Completely self-contained in one small desk mount cabinet with internal solid state power supply, built-in blower and RF relative power indicator. $795.00

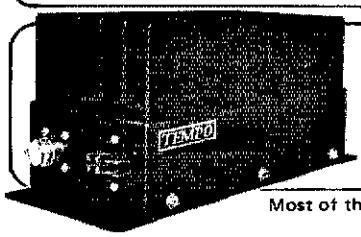
The Tempo 2002.. 2 meters only $695.00

The Tempo 2006.. 6 meters only $695.00



TEMPO CL 220

As new as tomorrow! The superb CL-220 embodies the same general specifications as the CL-146A, but operates in the frequency range of 220-225 MHz (any two MHz without retuning). At $299.00 it is undoubtedly the best value available today.



TEMPO

VHF/UHF AMPLIFIERS

Solid state power amplifiers for use in most land mobile applications. Increase the range, clarity, reliability and speed of two- way communications.

VHF (135 to 175 MHz)				UHF (400 to 512 MHz)			
Drive Power	Output	Model No.	Price	Drive Power	Output	Model No.	Price
2W	130W	130A02	$199	2W	70W	70D02	$270
10W	130W	130A10	$179	10W	70W	70D10	$250
30W	130W	130A30	$189	30W	70W	70D30	$210
2W	80W	80A02	$169	2W	40W	40D02	$180
10W	80W	80A10	$149	10W	40W	40D10	$145
30W	80W	80A30	$159	2W	10W	10D02	$125

FCC Type accepted models also available.

Most of the above products are available at dealers throughout the U.S.

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.

Two kinds of experts appreciate Collins: People who buy it, and people who sell it.

Every Collins Distributor is a real pro at answering questions and solving problems.

He'll show you how to operate specific equipment, discuss peripheral gear, check everything out when you get it, even help with installation. And he'll be there to support your needs for years to come.

Get in touch with the distributor in your area. (And ask for a copy of Collins Amateur Equipment Catalog.) Or contact Amateur Radio Marketing, Collins Radio Group, Rockwell International, Cedar Rapids, Iowa 52406. Telephone 319/395-4507.

ALABAMA
Birmingham — Ack Radio Supply Company

ARIZONA
Phoenix — **Amateur RadioElectronics

ARKANSAS
De Witt — Moory Electronics Company

CALIFORNIA
Anaheim — Henry Radio Co., Inc.
Burlingame — *Ham Radio Outlet
Los Angeles — *Henry Radio Co., Inc.
San Diego — *Gary Radio Inc.
San Jose — Quement Electronics

COLORADO
Denver — *C. W. Electronic Sales Company

FLORIDA
Miami — Amateur Radio Center, Inc.
Miami Springs — **Argon Electronics Company
Orlando — Amateur Electronics Supply
Pensacola — *Grice Electronics, Inc.

GEORGIA
Atlanta — *Ack Radio Supply

HAWAII
Honolulu — *Honolulu Electronics

ILLINOIS
Chicago — Erickson Communications
Peoria — Klaus Radio Inc.

INDIANA
Indianapolis — Graham Electronics Supply, Inc.
Terre Haute — *Hoosier Electronics, Inc.

KANSAS
Overland Park — *Associated Radio Communications, Inc.

LOUISIANA
Metairie — *Thomas J. Morgavi Electronics

MARYLAND
Wheaton — *Electronics International Service Corp.

MICHIGAN
Ann Arbor — Purchase Radio Supply
Muskegon — Electronics Distributors, Inc.

MINNESOTA
Minneapolis — *Electronic Center, Inc.

MISSISSIPPI
Jackson — **Coker Electronic Service

MISSOURI
Butler — Henry Radio Company
St. Louis — *Ham Radio Center
St. Louis — *MidCom Electronics, Inc.

NEW HAMPSHIRE
Concord — Evans Radio, Inc.

NEW JERSEY
Maple Shade — **Communications Service Company
Mount Holly — **RCM Electronics

NEW YORK
Amsterdam — Adirondack Radio Supply, Inc.
Farmingdale, L.I. — *Harrison Radio Corporation
New York — *Barry Electronics
New York — Harvey Radio Company
Valley Spring — Harrison Radio Company

NORTH CAROLINA
Asheville — Freck Radio & Supply Company
Otto — *Slep Electronics Company

OHIO
Cleveland — Amateur Electronic Supply
Columbus — **Central Communications

OKLAHOMA
Ponca City — **Starks Avionics & Communications Service

OREGON
Portland — *Portland Radio Supply Company

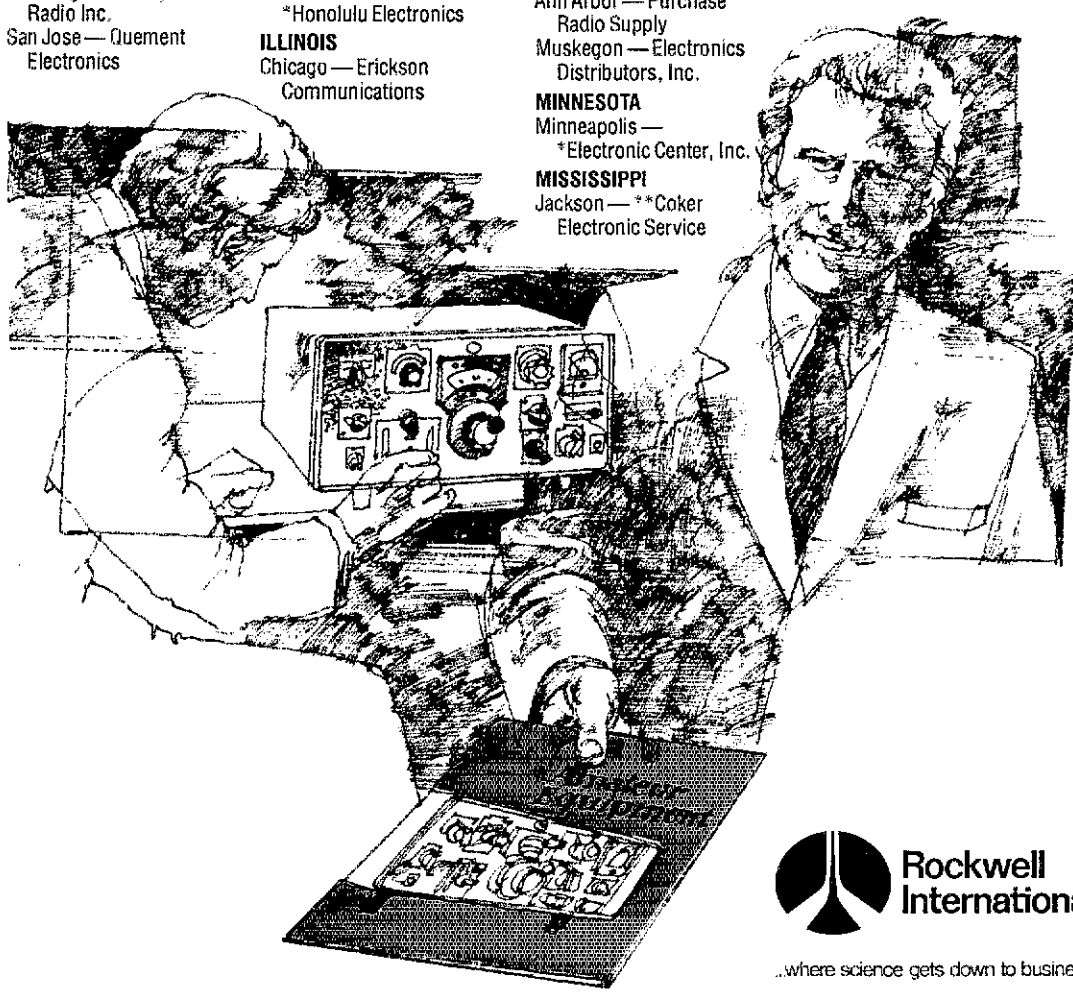
PENNSYLVANIA
Drexel Hill — Kass Electronic Distributors
Trevose — *Hamtronics

TEXAS
Abilene — *Howard Radio
Dallas — *Electronic Center, Inc.
Garland — *Teco, Inc.
Houston — *Madison Electronics Supply

WASHINGTON
Seattle — *ABC Communications
Spokane — *HCJ Electronics
Tacoma — C & G Electronic Company

WISCONSIN
Milwaukee — *Amateur Electronic Supply

*DISTRIBUTORS/SERVICE AGENCIES
**SERVICE AGENCIES ONLY



Rockwell International

...where science gets down to business

February 1976
Volume LX Number 2

Published monthly as its official journal by the American Radio Relay League, 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 $9.00 per year postpaid, U.S. funds, U.S. & Possessions; $10.00 in Canada; $10.50 elsewhere. Single copies $1.00. 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.

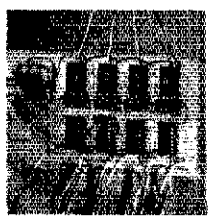
Second-class postage paid at Hartford, Conn. and at additional mailing offices. Postmaster: Form 3579 requested.

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.

THE COVER

As the LED display indicates, this is a timely project for 1976. See page 18.



Contents

American Ham Spirit, you either have it; or you don't.

The hams at Dentron have it. That's why we pack so much excitement into the products we build.

If you're an excited ham who loves to operate all bands, why not complete your station with the 160 meter Top Bander™? 160 meters is only a step away from 80 with this remarkable 160 meter transverter. Designed to bring simple, low cost 160 meter capability to any amateur station equipped for 80 meter CW, SSB, or AM operation. Just "plug in and play" and you're on 160 meters with 100 watts transmit power and a super sensitive receiver.

And coupled with the 160AT Skymaster™, tuning your present antenna or long wire is a snap.

There is only one Super Tuner™ and only one Super Super Tuner™. Excited Dentron customers around the world have discovered why the Super Tuner™ and Super Super Tuner™ are the only antenna tuners on the market that will match **EVERYTHING** between 160 and 10 meters, whether it be balanced line, coax cable, random or long wire.

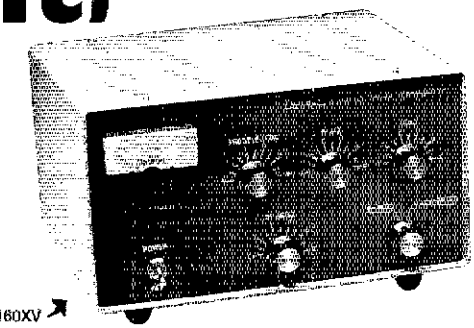
For the ham on the go the 80-10 Skymaster™ offers portability for tuning that random or long wire antenna. With Dentron Skymatcher™ you don't have to miss out on the fun of ham radio if you live in a motel or condominium.

Its Finally here! The Dentron Dual, In-line Watt meter. If you're a perfectionist as we are, you have certain requirements for your station. Naturally you'll want to monitor both forward and reflected wattage simultaneously. Tired of constant switching and guesswork? Upgrade!

- Reverse scale 0-200 watts
- Forward scale 0-200 and 0-2000 RFWatts
- Meter accuracy ±5%
- Frequency coverage — 1.7 through 30mcs.

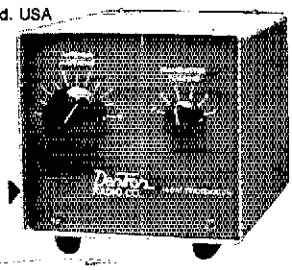
Dentron manufactures antennas because our customers deserve better performance. There have been too many compromise antennas for too long. We know how much time the average antenna takes to assemble, that's why we do the work before we ship to you. What a Dentron antenna **DOES NOT** include is 2 large plastic bags of parts, 5 pages of instructions and many hours of assembly.

With the Skymaster™, Skyclaw™, Mobile Topbander™, all band doublet and new Trim-Tenna™ 20 meter beam, you'll be proud of their fine appearance and performance and thrilled with the few minutes it takes to assemble them.

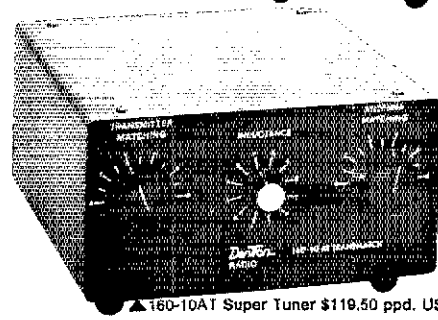


160XV
Top Bander $199.50 ppd. USA

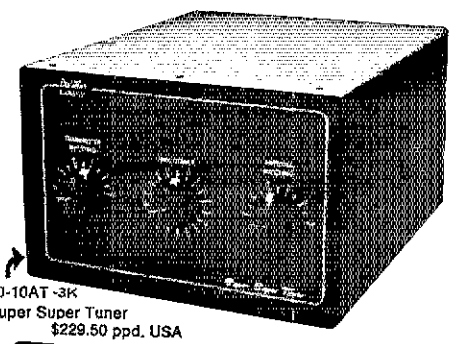
2 MHz MARS unit
$229.50 ppd. USA



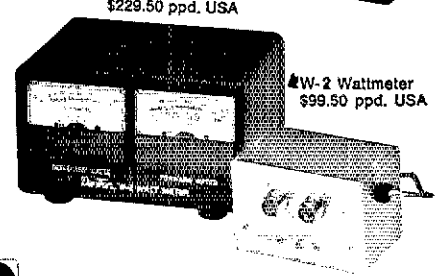
160AT Skymatcher
$59.50 ppd. USA



160-10AT Super Tuner $119.50 ppd. USA

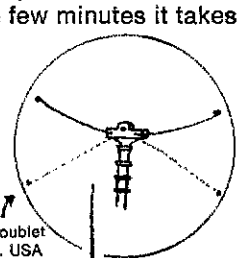


160-10AT -3K
Super Super Tuner
$229.50 ppd. USA

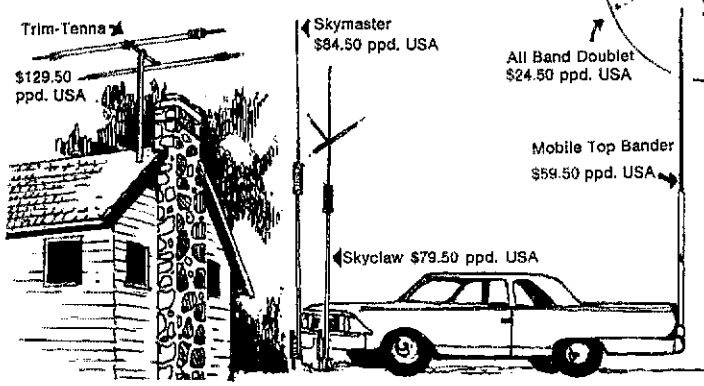


W-2 Wattmeter
$99.50 ppd. USA

CATCH THE EXCITEMENT FROM DENTRON . . .
all Dentron products are made in the USA.
From Dentron Radio or your Favorite Dealer.

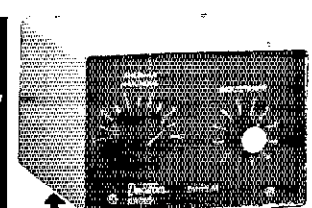


All Band Doublet
$24.50 ppd. USA

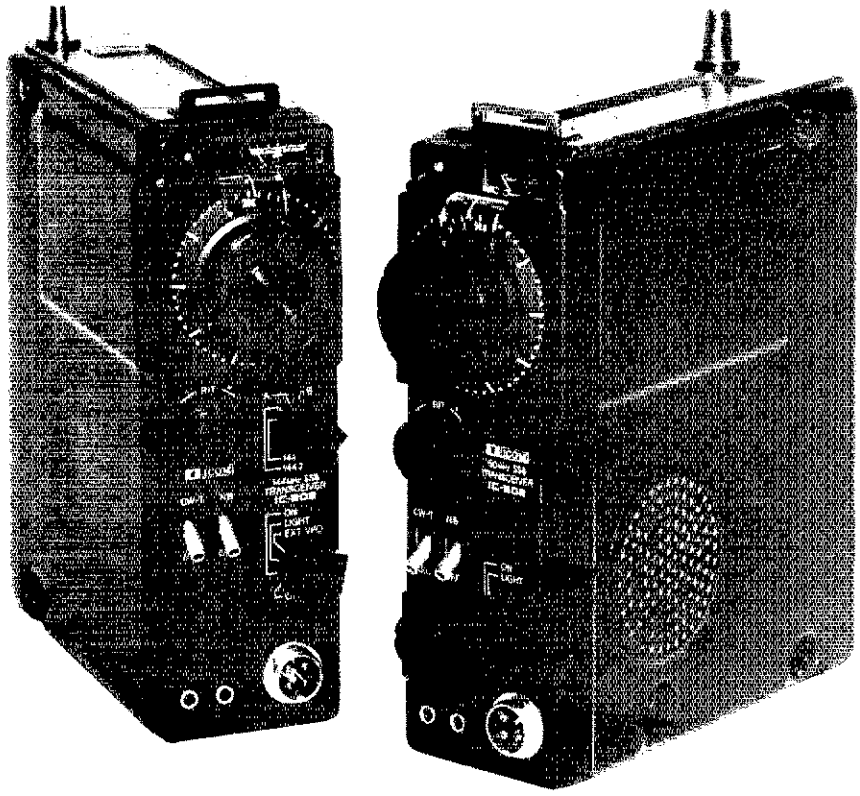


BANKAMERICARD master charge

DenTron
Radio Co., Inc.
2100 Enterprise Parkway
Twinsburg, Ohio 44087
(216) 425-3173



80-10AT Skymatcher $59.50 ppd. USA

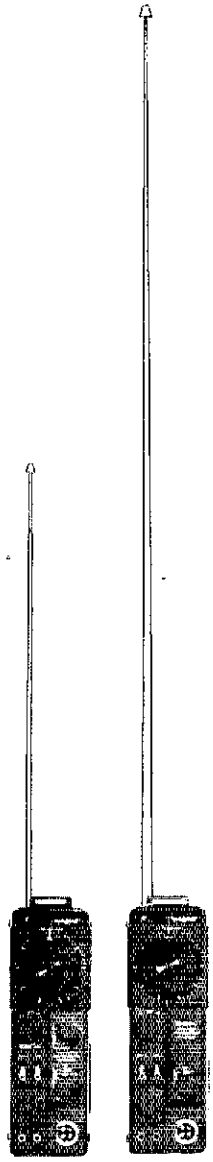


Hold it!

Take hold of SSB with these two low cost twins. ICOM'S new portable **IC-202** and **IC-502** put it within your reach wherever you are. You can take it with you to the hill top, the highways, or the beach. Three portable watts PEP on two meters or six!

Hello, DX! The ICOM quality and excellent receiver characteristics of this pair make bulky converters and low band rigs unnecessary for getting started in SSB-VHF. You just add your linear amp, if you wish, connect to the antenna, and DX! With the **202** you may talk through OSCAR VI and VII! Even transceive with an "up" receiving converter! The **IC-502,** similarly, makes use of six meters in ways that you would have always liked but could never have before. In fact, there are so many things to try, it's like opening a new band.

Take hold of Single Side Band. Take hold of some excitement. Take two.



IC-202
2 Meter SSB • 3 Watts PEP • True IF Noise Blanker
Switched Dial Lights • Internal Batteries • 200KHz
VXO Tuning • 144.0, 144.2 + 2 More! • RIT!

IC-502
6 Meter SSB • 3 Watts PEP • True IF Noise Blanker
Switched Dial Lights • Internal Batteries • 800KHz
VFO • RIT!

VHF/UHF AMATEUR AND MARINE COMMUNICATION EQUIPMENT

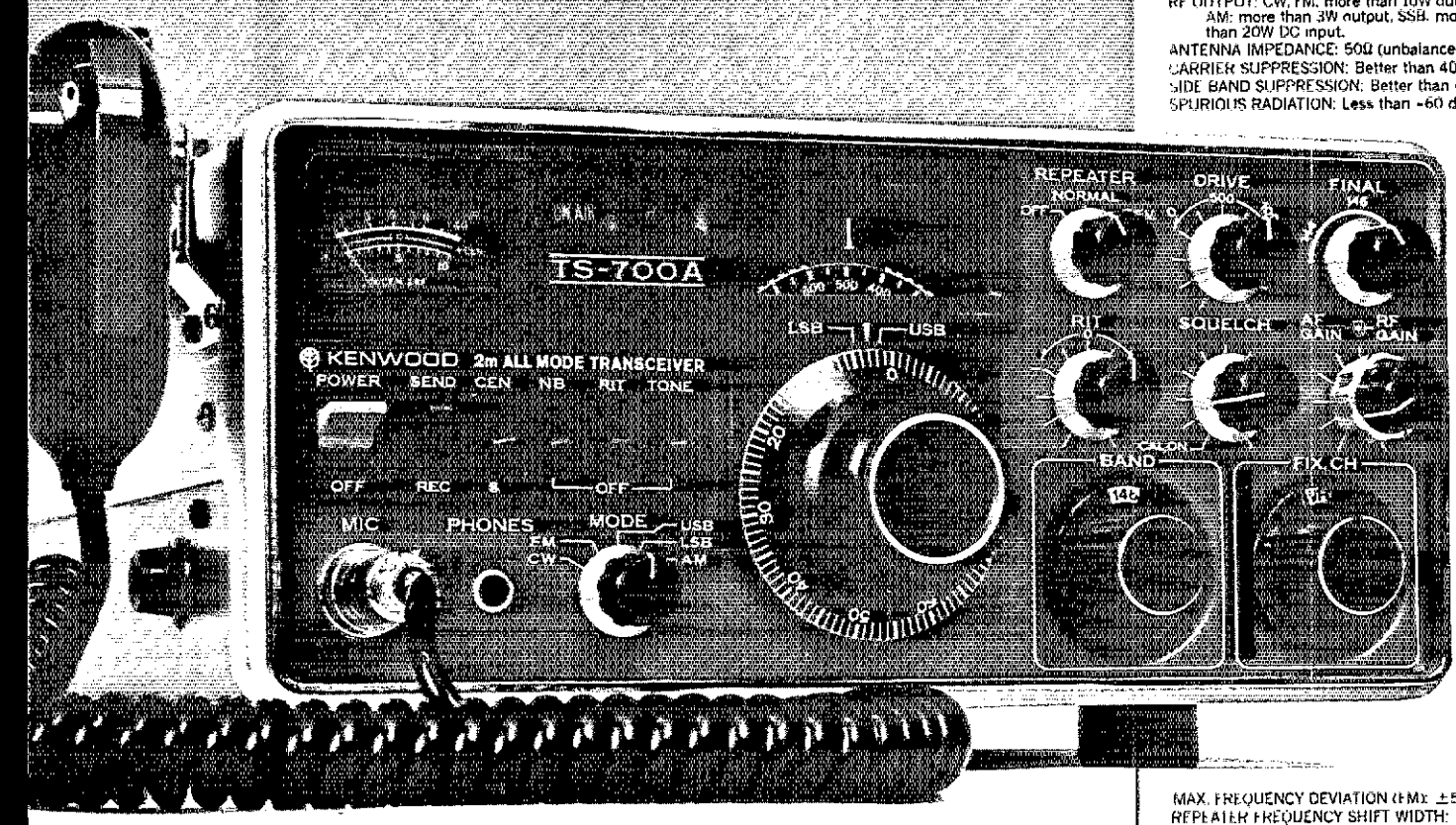
Distributed by:

ICOM

ICOM WEST, INC.
Suite 3
13256 Northrup Way
Bellevue, Wash. 98005
(206) 747-9020

ICOM EAST, INC.
Suite 307
3331 Towerwood Drive
Dallas, Texas 75234
(214) 620-2780

When you get tired of compromises...



TS-700A Specifications

TRANSMIT/RECEIVE FREQUENCY RANGE: 144-148 MHz
MODE: SSB, FM, CW, AM
RF OUTPUT: CW, FM: more than 10W output AM: more than 3W output, SSB: more than 20W DC input.
ANTENNA IMPEDANCE: 50Ω (unbalanced)
CARRIER SUPPRESSION: Better than 40 dB
SIDE BAND SUPPRESSION: Better than 40 d
SPURIOUS RADIATION: Less than -60 db

MAX. FREQUENCY DEVIATION (FM): ±5 kH
REPEATER FREQUENCY SHIFT WIDTH: 600 kHz
TONE BURST TIME: 0.5-1.0 sec.
MODULATION: Balanced modulation for SSB Variable reactance frequency shift for F Low power modulation for AM.
MICROPHONE: Dynamic microphone, 500Ω
AUDIO FREQUENCY RESPONSE: 400-2600 within -9 db
RECEIVING SYSTEM: SSB, CW, AM: Single-superheterodyne, FM: Double-superheterodyne.
INTERMEDIATE FREQUENCY: SSB, CW, AM: 10.7 MHz, FM: 1st IF:... 10.7 MHz, 2nd ... 455 kHz.
RECEIVING SENSITIVITY: SSB, CW: S/N = 1 dB or better at 0.25μV, 20 dB noise quieting = Less than 0.4μV, AM: S/N = 10 dB or better at 1μV.
IMAGE RATIO: Better than 60 dB
IF REJECTION: Better than 60dB
PASS-BANDWIDTH: SSB, CW, AM: More than 2.4 kHz at -6 dB, FM: More than 12 kHz at -6 dB.
RECEIVER SELECTIVITY: SSB, CW, AM: Less than 4.8 kHz at -60 dB, FM: Less than 24 kHz at -60 dB.
SQUELCH SENSITIVITY: 0.25μV
AUDIO OUTPUT: More than 2W at 8Ω load (10% distortion)
RECEIVER LOAD IMPEDANCE: 8Ω
FREQUENCY STABILITY: Within ±2 kHz du one hour after one minute of warm-up and within 150 Hz during any 30 minu period thereafter.
POWER CONSUMPTION: Transmit mode: 9 (AC 120/220V), 4A (DC 13.8V), max. Receive mode (no signal): 45W (AC 12 220V), 0.8A (DC 13.8V).
POWER REQUIREMENTS: AC 120/220V, 50/60 Hz, DC 12-16V (13.8V as referer
DIMENSIONS: 278 (W) x 124 (H) x 320 (D)
WEIGHT: 11 kg
SUGGESTED PRICE: $700.00

Prices subject to change without notice

KENWOOD'S TS-700A finally fulfills the promise of 2-meters...more channels, more versatility, tunable VFO, SSB-CW and, best of all, the type of quality that has placed the Kenwood name out front.

- Operates all modes: SSB (upper & lower), FM, AM, and CW
- Completely solid state circuitry provides stable, long lasting, trouble-free operation
- AC and DC capability. Can operate from your car, boat, or as a base station through its built-in power supply
- 4 MHz band coverage (144 to 148 MHz) instead of the usual 2
- Automatically switches transmit frequency 600 KHz for repeater operation. Just dial in your receive frequency and the radio does the rest... Simplex repeater reverse
- Or do the same thing by plugging a single crystal into one of the 11 crystal positions for your favorite channel
- Outstanding frequency stability provided through the use of FET-VFO
- Zero center discriminator meter
- Transmit/Receive cabability on 44 channels with 11 crystals
- Complete with microphone and built-in speaker
- The TS-700A has been thoroughly field-tested. Thousands of units are in operation throughout Japan and Europe

The TS-700A is available at select Kenwood dealers throughout the U.S. For the name of your nearest dealer, please write.

Available at select Kenwood dealers throughout the U.S.

Kenwood... pacesetter in amateur radio

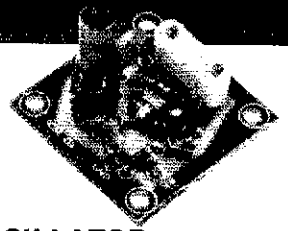
TRIO-KENWOOD COMMUNICATIONS INC.

116 East Alondra / Gardena, California 90248

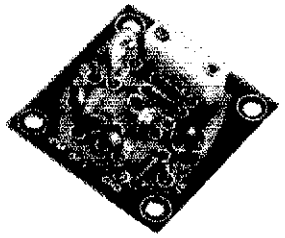
for the experimenter!

INTERNATIONAL CRYSTALS & KITS

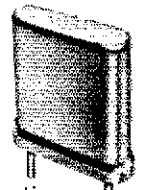
OSCILLATORS • RF MIXER • RF AMPLIFIER • POWER AMPLIFIER



OX OSCILLATOR
Crystal controlled transistor type. 3 to 20 MHz, OX-Lo, Cat. No. 035100. 20 to 60 MHz, OX-Hi, Cat. No. 035101
Specify when ordering.
Price $3.95 ea.

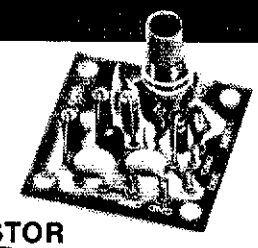


OF-1 OSCILLATOR
Crystal controlled transistor type. 3 to 20 MHz, OF-1, Lo, Cat. No. 035108. 20 to 60 MHz, OF-1, Hi, Cat. No. 035109
Specify when ordering.
Price $3.25 ea.

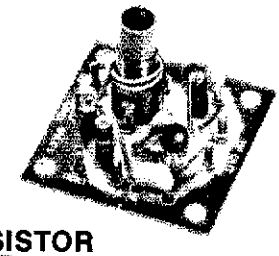


EX CRYSTALS
(HC 6/U HOLDER)

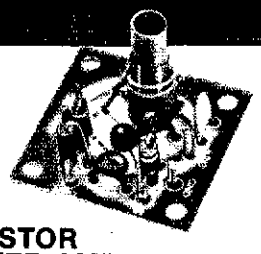
Cat. No.	Specifications
031080	3 to 20 MHz — For use in OX OSC Lo Specify when ordering $4.95 ea.
031081	20 to 60 MHz — For use in OX OSC Hi Specify when ordering $4.95 ea.
031300	3 to 20 MHz — For use in OF-1L OSC Specify when ordering $4.25 ea.
031310	20 to 60 MHz — For use in OF-1H OSC Specify when ordering. $4.25 ea.



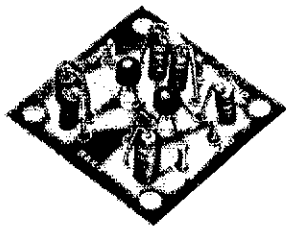
MXX-1
TRANSISTOR
RF MIXER
A single tuned circuit intended for signal conversion in the 30 to 170 MHz range. Harmonics of the OX or OF-1 oscillator are used for injection in the 60 to 179 MHz range. 3 to 20 MHz, Lo Kit, Cat. No. 035105. 20 to 170 MHz, Hi Kit, Cat. No. 035106
Specify when ordering.
Price. $4.50 ea.



SAX-1
TRANSISTOR
RF AMP
A small signal amplifier to drive the MXX-1 Mixer. Signal tuned input and link output. 3 to 20 MHz, Lo Kit, Cat. No. 035102. 20 to 170 MHz, Hi Kit, Cat. No. 035103
Specify when ordering.
Price $4.50 ea.



PAX-1
TRANSISTOR
RF POWER AMP
A single tuned output amplifier designed to follow the OX or OF-1 oscillator. Outputs up to 200 mw, depending on frequency and voltage. Amplifier can be amplitude modulated. 3 to 30 MHz, Cat. No. 035104
Specify when ordering.
Price $4.75 ea.



BAX-1
BROADBAND AMP
General purpose amplifier which may be used as a tuned or untuned unit in RF and audio applications. 20 Hz to 150 MHz with 6 to 30 db gain. Cat. No. 035107
Specify when ordering
Price $4.75 ea.

Shipping and postage (inside U.S., Canada and Mexico only) will be prepaid by International. Prices quoted for U.S., Canada and Mexico orders only. Orders for shipment to other countries will be quoted on request. Address orders to: M/S Dept., P.O. Box 32497, Oklahoma City, Oklahoma 73132.

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

Directors

Canada
RONALD J. HESLER, VE1SH
P.O. Box 418, Sackville, NB E0A 3C0
Vice-Director:

Atlantic Division
HARRY A. McCONAGHY, W3SW
8708 Fenway Dr., Bethesda, MD 20034
Vice-Director: Jesse Bieberman, W3KT
RD 1, Box 66, Valley Hill Rd., Malvern, PA 19355

Central Division
PHILIP E. HALLER, W9HPG
6000 S. Tripp Ave., Chicago, IL 60629
Vice-Director: Edmond A. Metzger, W9PRN
1520 South Fourth St., Springfield, IL 62703

Dakota Division
GARFIELD A. ANDERSON, W0KE
5820 Chowen Avenue South, Minneapolis, MN 55410
Vice-Director: Tod A. Olson, W0IYP
232 Heather Lane, Long Lake, MN 55356

Delta Division
MAX ARNOLD,* W4WHN
612 Hogan Rd., Nashville, TN 37220
Vice-Director: Malcolm P. Keown, W5RUB
213 Moonmist, Vicksburg, MS 39180

Great Lakes Division
RICHARD A. EGBERT, W8ETU
6479 Red Fox Rd., Reynoldsburg, OH 43068
Vice-Director: William E. Clausen, W8IMI
1615 Scottsdale Ave., Columbus, OH 43220

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

Midwest Division
PAUL GRAUER, W0FIR
Box 190, Wilson, KS 67490
Vice-Director: Claire Richard Dyas, W0JCP
2933 Dudley St., Lincoln, NE 68503

New England Division
JOHN C. SULLIVAN, W1HHR
Whitney Road, Columbia, CT 06237
Vice-Director: John F. Lindholm, W1DGL
P.O. Box 1695, Bristol, CT 06010

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

Pacific Division
J. A. "DOC" GMELIN, W6ZRJ
10835 Willowbrook Way, Cupertino, CA 95014
Vice-Director: William W. Eitel, WA7LRU
Box 120, Dayton, NV 89403

Roanoke Division
L. PHIL WICKER, W4ACY
4821 Hill Top Road, Greensboro, NC 27407
Vice-Director: Donald B. Morris, W8JM
1136 Morningstar Lane, Fairmont, WV 26554

Rocky Mountain Division
CHARLES M. COTTERELL W0SIN
430 S. Swadley St., Lakewood, CO 80228
Vice-Director: Maurice D. Carpenter, K0HRZ
1310 South Tejon St., Denver, CO 80223

Southeastern Division
LARRY E. PRICE, W4DQD
P.O. Box 2067, Georgia Southern Branch, Statesboro, GA 30458
Vice-Director: Bev B. Cavender, K4VW
P.O. Box 1083, Lake Placid, FL 33852

Southwestern Division
JOHN R. GRIGGS,* W6KW
1273 13th St., Baywood Park, Los Osos, CA 93402
Vice-Director: Jay A. Holladay, W6EJJ
5128 Jessen Dr., La Canada, CA 91011

West Gulf Division
ROY L. ALBRIGHT,* W5EYB
107 Rosemary, San Antonio, TX 78209
Vice-Director: Jack D. Gant, W5GM
521 Monroe, NW., Ardmore, OK 73401

*Members Executive Committee

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

Canadian Division
Alberta — Don Sutherland, VE6FK, 425 24th Ave. N.E., Calgary, Alta. T2E 1X2
British Columbia — H. E. Savage, VE7FB, 4553 West 12th Ave., Vancouver 8, B.C.
Manitoba — Steven Fink, VE4FQ, 14 Grandcrest St., Winnepeg, Manitoba R2V 2X2
Maritime — Aaron D. Solomon, VE1OC, 8 Crichton Park Road, Dartmouth, NS
Ontario — Holland H. Shepherd, VE3DV, 3016 Cowan Cres., Ottawa, K1V 8L1
Quebec — Lawrence P. Dobby, VE2YU, 157 Sedgefield Ave., Point Claire, P.Q. H9R 1N8
Saskatchewan — Percy A. Crosthwaite, VE5RP, R.R. 3, Saskatoon, S7K 3J6

Atlantic Division
Delaware — Roger E. Cole, W3DKX, 345 E. Roosevelt Ave., New Castle 19720
Eastern Pennsylvania — George S. Van Dyke, Jr., W3HK, 4607 Convent Lane, Philadelphia 19114
Maryland-D.C. — Karl R. Medrow, W3FA, 718 W. Central Avenue, Davidsonville 21035
Southern New Jersey — Charles E. Travers, W2YPZ, State Police Drive, Trenton 08628
Western New York — Richard M. Pitzeruse, *K2KTK, 4043 Howlett Hill Rd., Syracuse 13215
Western Pennsylvania — Donald J. Myslewski, K3CHD, 359 McMahon Rd., N. Huntingdon 15642

Central Division
Illinois — Edmond A. Metzger, W9PRN, 1520 South 4th St., Springfield 62703
Indiana — Michael P. Hunter, WA9EED, 701 Bohs Court, Beech Grove 46107
Wisconsin — Roy Pedersen, K9FHI, 510 Park St., Juneau 53039

Dakota Division
Minnesota — Franklin B. Leppa, *K0ZXE, 2021 Swan Lake Rd., Duluth 55811
North Dakota — Mark J. Worcester, WA0WLP, 1523 N. 20th St., Bismarck, ND 58501
South Dakota — Ed Gray, WA0CPX, Rt. 3, Salem 57058

Delta Division
Arkansas — Sid Pokorny, W5UAU, P. O. Box 4071, Horseshoe Bend 72512
Louisiana — Robert P. Schmidt, W5GHP, 5100 Press Dr., New Orleans 70126
Mississippi — William L. Appleby, WB5DCY, 28 Linda Lane, Long Beach 39560
Tennessee — O. D. Keaton, WA4GLS, Rt. 1, Medearis Dr., Old Hickory 37138

Great Lakes Division
Kentucky — Ted H. Huddle, W4CID, 604 Amanda Furnace Drive, Ashland 41101
Michigan — Allen L. Baker, W8TZZ, 4145 Eighth Street, Newport 48166
Ohio — Henry R. Greeb, W8CHT, 6580 Dry Ridge Road, Cincinnati 45247

Hudson Division
Eastern New York — Gary J. Ferdinand, WA2PJL, Sunset Trail, Clinton Corners, 12514
N.Y.C. & Long Island — John H. Smale, WB2CHY, 530 South 15th St., Lindenhurst 11757
Northern New Jersey — William S. Keller, III, WB2RKK, 27 Albright Circle, Madison 07940

Midwest Division
Iowa — Max R. Otto, W0LFF, 733 W. Benton St., Iowa City 52240
Kansas — Robert M. Summers, K0BXF, 3045 North 72nd, Kansas City 66109
Missouri — B. H. Moschenross, WA0FMD, 2412 Saint Robert Lane, St. Charles 63301
Nebraska — Claire R. Dyas, W0JCP, 2933 Dudley, Lincoln 68503

New England Division
Connecticut — John J. McNassor, W1GVT, 218 Berlin Ave., Southington 06489
Eastern Massachusetts — Frank L. Baker, Jr., W1ALP, 65 Beechwood Rd., Halifax 02338
Maine — Edward B. Bristow, WA1MUX, 54 Lee St., Lincoln 04457
New Hampshire — Robert Mitchell, W1SWX, Box 137-A, Chester 03036
Rhode Island — Ronald H. Simonton, K1GMW, 100 Suffolk Dr., North Kingstown 02852
Vermont — Joel Breakstone, WA1PSK, Box 231, Johnson, VT 05656
Western Massachusetts — Percy C. Noble, W1BVR, Bailey Rd., P. O. Box 5, Lanesboro 01237

Northwestern Division
Alaska — Roy Davie, KL7CUK, Star Route - Montana Creek, Willow 99688
Idaho — Dale Brock, WA7EWV, 1508 Alder Drive, Lewiston 83501
Montana — Harry A. Roylance, W7RZY, Box 621, Harlowton 59036
Oregon — Dwight J. Albright, W7HLF, 1678 Orchard Home Dr., Medford, OR 97501
Washington — Mary E. Lewis, W7QGP, 10352 Sandpoint Way, N.E., Seattle 98125

Pacific Division
East Bay — Charles R. Breeding, K6UWR, 3130 Raleigh Ct., Fremont 94536
Nevada — John D. Weaver, W7AAF, 1501 N. 22nd St., Las Vegas 89101
Pacific — J. P. Corrigan, KH6GQW, P. O. Box 698, Kaneohe 96744
Sacramento Valley — Norman A. Wilson, WA6JVD, Route 1, Box 730, Woodland 95695
San Francisco — Charles K. Epps, W6OAT, 35 Belcher St., San Francisco 94114
San Joaquin Valley — Ralph Saroyan, W6JPU, 6204 E. Townsend Ave., Fresno 93702
Santa Clara Valley — James A. Maxwell, K6AQ, P. O. Box 473, Redwood Estates 95044

Roanoke Division
North Carolina — Charles H. Brydges, W4WXZ, 4901 Tiffany Ave., Winston-Salem 27104
South Carolina — Richard H. Miller, WA4ECJ, 1509 Highland Ave., Camden 29020
Virginia — Robert L. Follmar, W4QDY, 1057 Dune St., Norfolk 23503
West Virginia — Mrs. Kay Anderson, W8DUV, 209 Childers Court, Huntington 25705

Rocky Mountain Division
Colorado — Clyde O. Penney, WA0HLQ, 1626 Locust St., Denver 80220
New Mexico — Edward Hart, Jr., W5RE, 1909 Moon N.E., Albuquerque 87112
Utah — Elvin N. Greene, W7EU, 4326 Hermosa Way, Salt Lake City 84117
Wyoming — Joseph P. Ernst, W7VB, 502 Ryan St., Thermopolis 82443

Southeastern Division
Alabama — James A. Brashear, Jr., WB4EKJ, 3002 Boswell Drive, Huntsville 35811
Canal Zone — Roderick J. Isler, KZ5PI, 352 Aviation Det. Box H, Albrook AFB, APO NY 09825
Georgia — Alpheus H. Stakely, K4WC, 2220 Lyle Road, College Park 30337
Northern Florida — Frank M. Butler, Jr., W4RKH, 323 Elliott Rd., S.E., Fort Walton Beach 32548
Southern Florida — Woodrow Huddleston, K4SCL, 219 Driftwood Lane, Largo 33540
West Indies — David Novoa, KP4BDL,* P. O. Box 22758, University Station, San Juan PR 00931

Southwestern Division
Arizona — Marshall Lincoln, W7DQS, Box 1490, Wickenburg 85358
Los Angeles — Eugene H. Violino, W6INH, 2839 Canada Blvd., Glendale 91208
Orange — William L. Weise, W6CPB, 1753 Iowa St., Costa Mesa 92626
San Diego — Arthur R. Smith, W6INI, 4515 Melisa Way, San Diego 92117
Santa Barbara — D. Paul Gagnon, WA6DEI, 1791 Hedon Cir., Camarillo 93010

West Gulf Division
Northern Texas — L. E. Harrison, W5LR, 40 Los Robles Dr., Arlington 76011
Oklahoma — Cecil C. Cash, W5PML, 1802 Smith Ave., Lawton 73501
Southern Texas — Arthur R. Ross, W5KR, 132 Sally Lane, Brownsville 78521
*Official appointed to act temporarily in the absence of a regular official.

THE AMERICAN RADIO RELAY LEAGUE, INC.

"It Seems to Us..."

Amateur Radio and Sister Cities International

At its September meeting the League's Executive Committee formally approved a document called the *Cooperative Understanding Between the American Radio Relay League and Sister Cities International.* What makes this especially significant is that only once before in League history has such a "Cooperative Understanding" been undertaken, and that was in 1940 with the American Red Cross. (That 1940 action was recently reaffirmed by ARC and ARRL.) The benefits of a formal relationship with the Red Cross are obvious; perhaps less obvious are the advantages that can be derived from a formal liaison between the ARRL and Sister Cities International (SCI). Indeed, many members may not yet be familiar with SCI, so this month we will briefly describe the Sister Cities program in general, and explain why the League gave its endorsement to the "Cooperative Understanding."

Sister Cities International is the principal program of the Town Affiliation Association, which was founded in order to foster better international understanding and cooperation through sister city relationships. This led to the idea of a "Sister City pair;" this is simply a formal agreement between two cities — one in the U.S., and one overseas — to exchange things, ideas, and people in a wide variety of cultural, youth, educational, municipal, professional, and technical projects. When the program began there were no more than a dozen Sister City pairs. Today there are over 500 U.S. cities that have established affiliations with over 700 cities in some 70 nations throughout the world. This phenomenal growth indicates the original idea was sound, and that its full potential is just now being realized.

We believe that once you, as an amateur, become involved with your local Sister Cities group, you will be "hooked." A driving force behind Sister Cities people is a desire to find concrete, tangible methods to move toward abstract goals one step at a time. These people (and amateurs, too!) are aware that creating international friendship and good will is not something that happens overnight, but something that takes place over an extended period of time, through perserverance and conviction. Amateurs, through their day-to-day QSOs, have done much to break down international barriers, and we believe that the Sister Cities program can provide new opportunities to do so.

How can amateur radio best be utilized in the Sister Cities program? One idea is to conduct regular skeds between amateurs in your town and its Sister City. Perhaps, if third-party agreements are in force between the two countries, your respective mayors can get together on the air to exchange greetings; local press coverage would add prominence to the event and provide good publicity for amateur radio. Perhaps, if there is no amateur radio club in your Sister City, your club could help its amateurs start one. These are merely a few suggestions, as there are many ways for amateur radio to express itself through the Sister Cities program; the number is limited only by your imagination. By all means, contact your local Sister Cities officials. Hq. has a list of cities that are members of SCI and can tell you who to contact in your particular city. If your town does not have an active Sister Cities program, write to us for information on how to start one. The important thing is for *you* to make the first move!

No one can deny that amateur radio needs more international exposure; and Sister Cities International is one way to obtain it. It is an opportunity to introduce amateur radio to a new group of conscientious, civic-minded individuals; a brand new avenue through which we can show city officials, both here and abroad, the benefits and advantages of amateur radio. And we must never lose sight of the fact that these are the very people who may some day determine the fate of amateur radio. Maybe, through the Sister Cities program, we will one day have additional reciprocal operating agreements with other countries. Maybe, through the Sister Cities program, another country will allow its amateurs to handle noncommercial, third-party traffic. Maybe, at the next international frequency conference, there will be a few more delegates who have been favorably impressed by amateur radio through the Sister Cities program. No, it won't happen overnight, but we can all do our part to make it happen sooner. The "Cooperative Understanding" is a beginning. — *K1FHN*

League Lines...

Postal rates have gone up. Now is the time to update those envelopes that you have on file with your QSL Bureau, so that your cards will be delivered promptly.

OSCAR users should keep s.a.s.e. on file with the OSCAR QSL Bureau, c/o WA1EHF, 564 Stillman St., Bridgeport, CT 06608. For further information on the OSCAR QSL Bureau or the OSCAR program in general, send an s.a.s.e. to ARRL Hq.

You may recall reading newspaper accounts last summer of the plight of Chuck McCracken, WB6QJX, a blind diabetic with kidney failure and partial paralysis. After consulting with his doctors he decided to terminate his kidney dialysis treatment rather than continue the agony he was undergoing. He remained active on the air, and amateur radio made his last days more bearable. Now a trust fund has been established to benefit his family and, in particular, to provide for the continuing education of his children. Those wishing to donate to the fund may send their checks, payable to the McCracken Family Fund, to the Sun-Telegram, Public Service Department, 399 North D Street, San Bernardino, CA 92401.

Eagle-eyed W7PGY has spotted an error on page 10 of the 1976 Handbook. FCC application and renewal fees are four dollars, not nine.

Our membership services department needs additional people, one of them to be hired by March 1. If you are an active licensed amateur; have education or experience in public relations, writing, teaching or similar fields; are looking for a full-time permanent job; and can tolerate modest pay at the start, please contact Perry Williams, W1UED, ARRL Hq., 225 Main Street, Newington, Conn. 06111; 203, 666-1541.

The enthusiastic response to the "new look" in QST has been most gratifying to the staff -- many thanks to all of those who have taken the trouble to write.

An ARRL RFI packet is ready for distribution. It contains organization hints for interference committees, an interference committee plan for your community, sample publicity, the Vanik bill, and the RFI Task Group action plan. If you'd like a copy, please send a 10 x 13 envelope, self-addressed, bearing 68¢ postage if you want return by first-class mail or 45¢ by third-class shipment.

When writing to Hq., please limit your requests to one per sheet of paper. Sometimes we receive letters which must be routed to as many as five departments for action, which results in unnecessary delays and confusion. Once in awhile, too, we receive s.a.s.e. with no indication as to what is desired!

How are you doing on Bicentennial WAS? There's plenty of interest in the award, judging from the on-the-air activity during the first few days of January. If you're in a rare state you can help our DX friends qualify by getting on for the ARRL DX Contest this month and next; rules in December QST, page 61.

Amateur Radio will be represented at the IEEE Electro 76 program in Boston, May 12. There will be an amateur radio symposium titled "Present and Future Trends in Communications Equipment Design." Panel moderator is W1CER, while speakers include W7ZOI, W1SL, W2FMI, W1JAA, and W1CF. Locale is the Hynes Auditorium, Sheraton Boston.

We'd like to update a registry of all those who have complete files of QST, from Volume One Number One. Please send name and call to ARRL Hq., and indicate whether you would be willing to make your files available to other interested amateurs for study and research purposes.

Quote-of-the-month, from WB6KAP: "The aim of every DXpedition should be to leave behind a convert, to foster native interest in amateur radio in each country, to leave behind one operating station in each country visited, not just to work 7000 stations from a hotel room and then depart for another ten years, leaving bitterness and envy among the local inhabitants. The emphasis in the next three years should be on international friendship and on favorably influencing the telecommunications authorities in each country."

Operation Vietnamese Refugee

A New Twist in Public Service Communication

By George Hart,* W1NJM

There are hams everywhere working quietly to make a good name for amateur radio. Last May one came to light in the person of Jim Bullington, K4LSD, an employee of the U.S. Department of State. Jim discovered that the thousands of Vietnamese refugees pouring into the states following the demise of South Vietnam were in need of communication. They were being housed in shelters hastily provided in a number of military and naval reservations, usually without telephones or in any case without adequate communications facilities. Most of them were strangers in a strange land, unable to speak or read the language, unused to our customs, and as often as not separated from their families and relatives in the frenzy to flee their homeland. The State Department, which had primary responsibility for their welfare, housed them temporarily in unused Army, Navy-Marine Corps and Air Force facilities. But, among other things, communications assistance was needed. K4LSD seized on the prospect of enlisting the aid of amateurs and consulted ARRL.

Since all this happened in the middle of a Board meeting which was considering FCC's crucial (to amateurs) Docket 20282, League officers and staff had a few other things on the hook, but the task of looking into the situation was quickly delegated and we were off and running into a series of negotiations the like of which have probably never been experienced before in amateur radio.

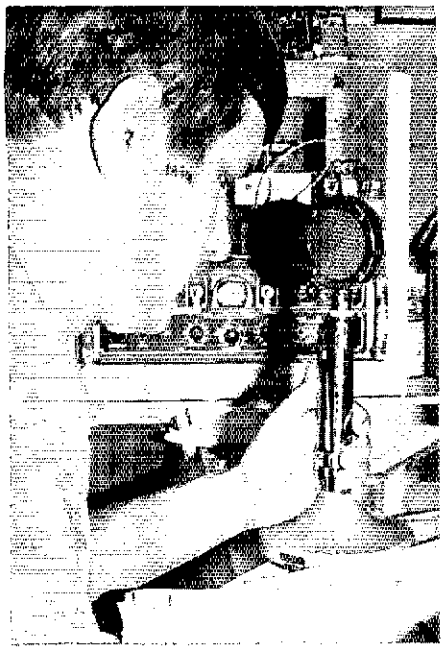
San Diego SEC W6INI (now SCM) discussing refugee message handling with interpreter Sharon Truong at the Camp Pendleton (Calif.) refugee center amateur station. *(Photo by WB6AKR)*

Fort Chaffee, AR

The immediate problem at hand was the refugee camp being set up at Fort Chaffee, AR, an army installation in the Ft. Smith area. At the suggestion of K4LSD, contact was made with Capt. Howard Mills, WA3ECE. At the same time, Arkansas SCM Pokorny, W5UAU, and retired marine officer Leland Smith, W5KL (formerly W4YE, GA SCM) were also contacted. SCM Pokorny contacted amateurs in Fort Smith and nearby communities to alert them to the need, which seemed primarily for communications with Camp Pendleton (CA) and Eglin AFB (FL). Formal details concerning why, when, what and where were worked out in an early meeting, and the "how" started to take effect.

Within hours, amateurs in the Ft. Smith area were on the job. WA5s FMJ

*Communications Manager, ARRL.



WA9EZV/KG6 transmits a Vietnamese refugee message to amateur operators stateside. *(U. S. Air Force Photo)*

FMK ZEK and WB5HHM visited the camp to make preliminary contact the very next day, and within two days had passes which permitted them to arrange for a building and to get antenna work started. Initial contact with camp authorities was not without its rough spots, but as soon as a few of the formalities were worked out, the operation seemed to receive the highest priority. A building was provided, antennas were strung, equipment was obtained, office equipment and utilities were supplied and publicity was disseminated by the Vietnamese newspaper *Tan Dan* (The New Arrival). All the above represented a great deal more effort and coordination than this short paragraph describing it might indicate, of course.

However, within a few days the station was operational, using the Alma Amateur Radio Society's call WB5KEP. It was almost the end of May. The station used equipment supplied by civil defense in Conway, AR, and by ex-SCM W5VWH, and was operated on 80, 40 and 20 meters by local hams. Messages were originated through interpreters supplied by the State Department, sometimes based on information lacking completeness. The base computer was some help in supplying missing information, but not always. On received messages, delivery was effected quickly if building and room number were given; otherwise, computer research had to be attempted and delivery might not be effected for several days. Many problems arose, and quite a few messages had to be refused because of lack of essential information. Originators used what information they had, but if this wasn't sufficient for delivery the message had to be processed a number of different ways before being ultimately delivered or "filed." The Refugee Locator Service located at the camp was a great help and was always willing to take up the search for people hard to find from addresses given.

Most of the traffic was handled through NTS nets (AR Teenage Net, AR CW Traffic Net, Razorback SSB Net, RN5 Daytime and Evening, etc.). The work at the camp was done by six young hams, traveling back and forth at their own expense every day to keep the station in operation. They were WA5ZEK, WB5s CQK FMJ FMK HHL and HHM. Older amateurs from around the area all had families and jobs to worry about, but assisted with handling the traffic from the Fort station. They were, mostly, W5s EIJ UAU, K5AO, WB5s CQK IGF. Air Force and Army MARS were also involved. There were approximately 500 messages originated and 100 incoming.

WA5KEP was closed on Aug. 15 because the operators had to get ready to go back to school, but at this writing traffic is still being handled into the Fort by amateurs in the area. Traffic being originated by amateur radio has ceased because of lack of manpower.

Indiantown Gap, PA

An unlikely name for a military reservation, but there it is, located in the beautiful Blue Mountains of Eastern PA, variously referred to as Fort Indiantown Gap, Indiantown Gap Military Reservation, or just "The Gap."

Things started to happen at The Gap early in May when WA3IWX, who had contact with a Vietnamese-American organization, advised SCM W3FBF that a refugee camp was to be established there. W3FBF contacted Dauphin County EC WA3KKN, who in turn contacted Lebanon County EC WA3REY, and the two of them visited the camp to offer amateur services. Since the Viets were not scheduled to start arriving until May 28, there was ample time. WA3REY (Tom) was familiar with the camp from reserve training, and succeeded in obtaining use of a building outside the security area, to be shared with MARS. With the help of ARRL headquarters and through the courtesy of the manufacturers, HAL interface gear for RTTY and Yaesu gear for hf operation were obtained on loan and a station was established. WA3QYY operated this station for a week.

Meanwhile, WA3REY got up some bilingual message forms and obtained interpreter assistance, with the intention of distributing the forms in the refugee area; but no messages were originated, through a misunderstanding of how the forms were to be used. So Tom got together with a psychological officer, devised another bilingual form and, with the help of WA3THB and loudspeaker-equipped Jeeps, solicited messages throughout the camp. Some 600 messages collected the first day were evidence of the need for the service, and many more were originated during an ensuing period of six weeks. Because of the inability to recruit volunteer operators for the camp amateur station, much of the traffic was moved through MARS, some by teletype from WA3UKZ to W3CUL/VR, WA3QYY, WA3TZO and the many fine operators of the Pennsylvania Phone Net. WA3UKZ alone punched tape for at least 2000 such messages.

WA3IWX handled approximately 500 "health and welfare" messages on behalf of the Vietnamese-American Refugee Assn., an organization of Vietnamese-American families, whose principal activity during this time was trying to reunite Vietnamese families scattered among the various camps. They were having little success, so WA3IWX offered his communications services. Much favorable publicity resulted, although some of the traffic was difficult or impossible of delivery because of addressing faults.

Traffic into Indiantown Gap is continuing as of this writing (mid-October), but little if any traffic is being originated because of lack of personnel. It is expected that the camp will close as cold weather descends (anything below 70°F is frigid to the Vietnamese), probably before the end of November, and the refugees still there will be relocated.

Camp Pendleton, CA

This was one of the larger refugee camps, constituting a continental reception center for refugees being flown in from staging areas in Guam and Hawaii. The amateur operation was a model of amateur cooperation and coordination by area amateurs under the direction of SCM Huvar, W6BGF, and his SEC (now SCM) Art Smith, W6INI. Art, a former Marine officer himself, was particularly effective on getting things done at the camp.

The wheels started turning early in June when SCM Huvar was contacted by an officer at the camp. Cy and Art visited the camp on July 1 and conferred with a number of officers involved in the refugee situation, one of them an old friend of Art's. They also visited the refugee area and made preliminary plans with the cooperation of Marine Corps personnel, MARS and the Red Cross.

The following day Cy and Art visited the Palomar Radio Club and recruited six volunteer operators and technicians. Equipment loans were lined up and on

CÁC MÃ SỐ VÀ NỘI DUNG BẢN TIN

****

QUÍ VỊ HÃY CHỌN CÂU NHẮN TIN MUỐN GỬI ĐI THEO MÃ SỐ Ở CỘT BÊN MẶT, RỒI GHI MÃ SỐ VÀO MẪU, VÀ ĐIỀN TIN MUỐN NHẮN Ở ĐẰNG SAU MÃ SỐ ẤY.

MÃ SỐ	Ý NGHĨA MÃ SỐ TRONG BẢN NHẮN TIN
BA (3)	- TÔI HOÀN TOÀN KHOẺ MẠNH, ĐỪNG LO
SÁU (6)	- MỌI NGƯỜI ĐỀU BÌNH YÊN, SẼ VIẾT THƯ NGAY.
MƯỜI HAI (12)	-ANH (CHỊ) CÓ BÌNH YÊN KHÔNG? MONG TIN ANH(CHỊ).
MƯỜI BA (13)	- .....CÓ BÌNH YÊN KHÔNG? XIN CHO BIẾT TIN.

CODE NUMBERED MESSAGES

SELECT THE MESSAGE FROM THE LEFT COLUMN THAT YOU WANT TO SEND; THEN WRITE THE MESSAGE CODE NUMBER ON THE MESSAGE FORM. PUT FILL-IN THE BLANK INFORMATION AFTER THE CODE NUMBER

CODE NUMBER	MESSAGES
THREE (3)	- I AM PERFECTLY ALRIGHT, DON'T WORRY.
SIX (6)	- EVERYONE SAFE, I WILL WRITE SOON.
TWELVE (12)	- ARE YOU SAFE ? ANXIOUS TO HEAR FROM YOU.
THIRTEEN (13)	- IS ..... SAFE ? PLEASE ADVISE.

A section of the ARL numbered message list translated into Vietnamese, as published and circulated at Indiantown Gap by WA3REY, to assist refugees in originating traffic.

July 6 section nets were notified and volunteer operators requested. On July 10 an antenna pole was set and a room for operation of the station was obtained, with the help of WA6UGG and WB6CMK, both from MARS at the camp. On July 11 some equipment was installed and some inverted V antennas erected, and later a beam was installed and first contacts made. Things were developing in an orderly fashion.

By July 23 the station, W6IAB was in operation with a 4-band beam and three inverted Vs for hf and 2-meter fm unit operating through Palomar Repeater WR6AII. Sixteen volunteers were signed up to handle the operating. Refugees at the camp were advised that the station was in operation and messages could be sent free of charge to other camps and elsewhere in the states. The station operated for six hours on each of three days per week. Traffic was routed via NTS and other stations, since direct contact with the other camps was unreliable. W6GBF notes that up to the time the 14 amateurs involved in the operation on a volunteer basis had logged 2760 travel miles and put in 250 man hours.

Cy's final report on the operation states that by Oct. 1 traffic had all but ceased to flow, so the station was to be closed on approximately Oct. 15, with W6INI doing the final "honors." The camp itself was due to be phased out about the end of October, with all refugees being relocated to Fort Chaffee. Meanwhile, arrangements were made to handle traffic via W6YDK in San Diego via MARS at Pendleton. Cy lists the following section amateurs (not already mentioned) who assisted in handling traffic at W6IAB: W6s IPP PZU QGU, K6s AM KX NC UV, WA6s DMB HXB ODQ, WB6s GYB PVH TQF. Section amateurs who loaned or were instrumental in obtaining equipment (not already mentioned) were W6s GIC JSL SLF. Mileage logged was just over 4,000 miles, man hours just over 450.

Eglin Air Force Base, FL

This was the smallest of the several mainland bases, and Air Force MARS handled the bulk of outgoing communications. NTS was involved in handling much incoming traffic. SCM W4RKH works at the base and has filed a concise report on amateur involvement. Much of what follows is directly quoted from his wrap-up.

AF-MARS established a station at the camp as soon as it was opened (May 2), operating on hf and vhf MARS frequencies. It was decided not to try to set up a ham station also. However, starting about May 20 large quantities of inquiry traffic started appearing on area NTS nets. At first most of this was from WA3IWX in Levittown, PA, but starting in June WB5KEP/5 in Ft. Chaffee, AR, started routing traffic to Eglin and WA3UKZ, W3CUL/VR and W3ACJ originated messages from Ft. Indiantown Gap, PA. Most of the traffic came via NTS through QFN, the Florida cw net. W4RKH received traffic for the camp on the Northern Florida Phone Net via 2-meter fm from QFN stations in the immediate area.

Replies to inquiry messages were handled using commercial facilities or AF-MARS. MARS solicited originations at first but this was gradually phased out as the demand fell off. W4RKH reports that he handled 257 incoming messages from late May through mid-August, all from Indiantown Gap, the Vietnamese-American Refugee Assn., or Ft. Chaffee. Other stations in the area who handled incoming traffic were W4WNY (127), WA4IWW (20), and WB4SFU (10). WB4PGQ carried many incoming messages into the camp for delivery, since camp officials would not take them over the telephone. It is estimated that he traveled over a thousand miles at his own expense to perform this function. Frank also mentions K3HQX, WA3KOC and WA3JST as having been active from Indiantown Gap. The Eglin camp was closed on Sept. 1.

Meanwhile, Back at Headquarters . . .

Throughout the development of amateur facilities at the four U.S. mainland camps, headquarters maintained contact with the State Department, with FCC, with MARS and with the American National Red Cross Office of Disaster Services, which was very much involved. Close contact was also maintained every step of the way with amateurs doing the leg work at all four camps.

The headquarters' role climaxed in a personal contact visit to Washington by W1NJM and WA1FCM in mid-June. Among agencies contacted were the U.S. State Department, where a small informal conference was held with State and Defense Department personnel; included among the conferees was K4LSD, our original State Department contact. Next came the American National Red Cross, where another small conference ensued in the Office of Disaster Services, mostly on the subject of undelivered and undeliverable refugee messages. Two of the three MARS branches (Navy and Air Force) were visited. And also, of course, FCC's Amateur and Citizens Division, where some of the legal aspects of refugee traffic handling were discussed. A side benefit to this discussion was contact with W3DXA, a legal assistant to the division. It developed that John, W3DXA, was a former marine officer and a personal acquaintance of Camp Pendleton's commandant. He offered to contact the commandant to put in a plug for support of amateurs trying to set up, and promptly followed through with it. Subsequent developments at Pendleton indicate that the contact was helpful.

At the headquarters level, things were humming along refugee traffic lines for several weeks. There were telephone calls to and from SCMs, SECs, ECs, directors, government officials, military people involved at the camps, traffic handlers with problems, and equipment manufacturers, in an effort to get things started, keep them going, keep informed, and assist as possible.

How Did We Do?

For an operation that descended on an unsuspecting amateur public service fraternity as suddenly as an earthquake,

WA3REY, EC for Lebanon County, Pa., did most of the leg work at Indiantown Gap Military Reservation, Pa. Here he is at the amateur setup checking teletype copy. *(Photo by WA3REY)*

not too badly. However, there were difficulties. One thing about emergencies is that no matter how much planning you do, you cannot predict what is going to come up. Tornadoes, hurricanes, earthquakes, fires, civil disturbances — these we can sometimes handle in stride. But who would have dreamed that the stream of Vietnamese refugees arriving stateside in such great numbers in May of '75 would require emergency communications involving amateurs? We had to act promptly, in unaccustomed ways, meet special circumstances never planned for in contact with many people we don't ordinarily "do business" with in emergency situations. We ran into such problems as ethnic prejudice, contradictory views and actions and confusion as to who is doing what, where, when, how — some common, some unusual. The desirability of "hot lines" between the refugee camps was paramount almost from the start, but no lasting circuits capable of handling large loads were formed. Messages originated often contained insufficient addresses or were garbled because of unfamiliarity with Vietnamese names and some of the terminology. Operators grinding out traffic were irked by lack of replies to messages sent and we had back- and-forth on this subject with the Red Cross, MARS and others.

Yes indeed, there were problems; WA3REY, in his final report on the Indiantown Gap operation, went into some detail on principles and methods that should have been observed (but weren't), things that might be remembered "next time." Well, we don't expect a repetition of these circumstances very soon; *nevertheless*, some useful lessons were learned from the operation — particularly lessons concerning official contact which can and should be remembered for the future, contact with officials we don't ordinarily contact and who have no notion of appreciation of our value. There are ways to do it and ways not to do it. More on this later, and elsewhere.

But as usual, generally speaking, amateurs came out of the operation looking like the public servants they are, rising to the challenge to everyone's satisfaction but their own. Special kudos belong to those who did the quarterbacking at each camp -- W5UAU and WB5FMJ at Fort Chaffee, W6GBF and W6INI at Camp Pendleton, WA3REY at Indiantown Gap, and W4RKH at Eglin AFB. But good quarterbacking is not effective without a team, and that team deserves all the credit for amateur radio's part in trying to make reception of Vietnam refugees a little less harrowing than it might otherwise have been. QST

50 Years Ago

February, 1926

□ No special license is required to operate in the new phone segment 3500-3600 kc., but you need a letter of authorization from the district RI.

□ The eminent Dr. Greenleaf Pickard has conducted extensive experimentation on wave propagation, and flatly states, "the short waves, unlike the long, do not remain vertical after leaving the transmitter, but after travelling 20 or 30 miles are in a large part twisted around so that they are horizontal."

□ A lot of new B-battery eliminators are coming on the market, and Technical Editor Kruse presents the results of an extensive Hq. lab evaluation. For a simple c.w. receiver he says it's not worth the investment, but a primarily-phone (broadcast) receiver with speaker uses enough juice to make battery replacement more expensive.

□ A *QST* landmark is disappearing — DX is now sufficiently commonplace, and QSL card exchange now adequately fills the need for documentation, so that space devoted to "Calls Heard" can no longer be justified.

□ "SNY" was the call sign used by President Maxim in pre-1912 days, and we are treated to a picture of the early station with an 8-inch spark coil and a Tuska-designed loose coupler.

□ DeForest is producing a new "H" tube to help us get down to very short wavelengths with up to 150 watts; the filament connections come out the side of the glass to reduce internal capacitance.

□ Radio engineering is a fascinating field, says the technical editor, but true design and research are accomplished by those with formal education and degrees; a "practical" approach is not enough.

25 Years Ago

February, 1951

□ The Government's earmarking of special band segments for amateur civil defense communication came as the magazine was on press, but the editor considered it sufficiently important to insert a special page announcement during the binding. It caps months of effort by the League to assure our being of service in the event of another war.

□ W6DPU adds some new refinements in the continuing search for an "ideal" electronic key, but it still uses 7 tubes and takes up a good portion of the operating table.

□ Hum and ignition noise are two disadvantages of the Q5er design, and Doug Jordan shows us some modifications to remedy these handicaps and attain full selectivity from the 453 surplus units.

□ The longer the mobile antenna, the better for 75 meters, says W4IBZ — so he loops a 12-foot whip from rear bumper to rooftop front.

□ If you snagged super-rare DX 3A2AB you'll be especially interested in the background story of W9SRB's hamming during his furlough in Monaco.

□ W2SNY at Cornell has done considerable work with tropo scatter, some at 3000 Mc., and he shares some of the results with us along with advice to v.h.f. enthusiasts for its application.

□ The new SCM for San Diego W6YYM, is hailed as the only woman in the field organization. Her picture which brightens an otherwise dull page has the same pleasant smile we've seen around Hq. — from W1YL of course. — *W1RW*

Danger Lurks!

Everybody worries about getting electric shocks from his equipment. Reduce your worries by learning from this article.

By Howard M. Berlin,* K3NEZ

An integral part of ham radio is the subject of electrical safety. Unfortunately, the FCC only examines us in areas of code proficiency, regulations, technical standards, and electronic theory. However, the examinations do not cover any knowledge of safety practices. The ARRL in *The Radio Amateur's Handbook* only scratches the surface. With the increasing use of electrical instruments in medicine, many groups have made the subject of electrical safety a major program effort. With this in mind, the article will treat some of the hazards of electricity in the ham shack and the recommendations for higher standards within our own ranks.

The Physiological Effects

The physiological effects of electricity are primarily a function of current applied – not the voltage.[1] As shown in Table I, approximately 1 mA applied externally is required before any physical sensation is noted. As the current is increased, pain is introduced, and there is involuntary contraction of the muscles. In the average person, the muscular contractions reach the "can't let go" threshold at 11 to 16 mA. At about 100 mA, cardiac fibrillations can occur. It is interesting to note, however, that with currents greater than 100 mA, there is a tendency for muscular contraction to be so rapid and forceful that one is involuntarily jerked away from contact with the electrical source. Thus high currents are often not as lethal as moderate currents.

The primary factor causing improper stimulation of the heart muscle is the local current density (current/area). Since the human body acts as a volume conductor, current flows from the point of contact with the electrical source to the exit point – usually the soles of the feet. But tissues with the smallest specific resistivities will conduct the greatest amount of current. Many studies have been done on the effect of frequency on the ventricular fibrillation threshold in animals, and interestingly enough, the greatest hazard occurs at the power line frequency of 60 Hz, as shown in Fig. 1.[2]

The AC Power Line

In most of the newer built homes, the electrical outlets which have a polarized J-wire socket are wired according to the National Electrical Codes. Fig. 2 shows a diagram of the 3-wire, 120-volt ac system. The third or "ground" wire is tied to the neutral wire, usually at the distribution panel, and is ideally at ground potential. However there are distributed resistances and capacitances in the power line (just as in your transmission line to the antenna) which may create a return path from the "hot" wire back through the ground lead. As shown in Fig. 3, a leakage current flows in the third wire as a result of the

*2 Colony Blvd., Apt. 123, Wilmington, DE 19802.

[1] This and all subsequent footnotes will appear at the end of this article.

Fig. 1 – Threshold current required to induce ventricular fibrillation in a dog as a function of frequency. Maximum hazard occurs near power line frequency of 60 Hz.

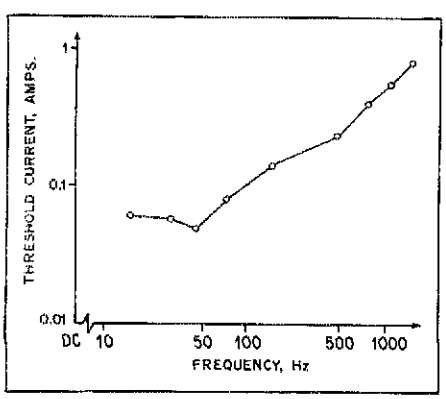
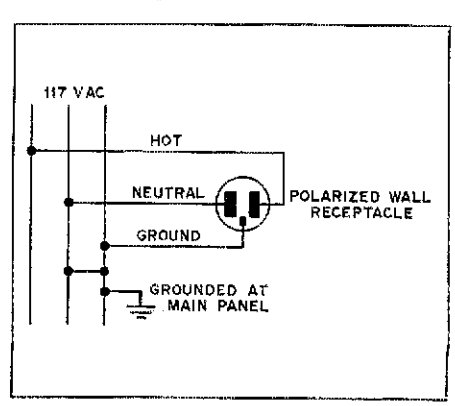


Table I

Effects of 60-Hz current following through the average human body with 1 second contact

Current Intensity	*Physiological Effect*
1 mA	Threshold of perception
5 mA	Accepted as maximum harmless current intensity.
10-20 mA	"Let-go" current before sustained muscular contraction.
50 mA	Pain, possible fainting, exhaustion, mechanical injury; heart and respriatory functions continue.
100-300 mA	Ventricular fibrillation will start, but respiratory center remains intact.
6 A	Sustained myocardial contraction, followed by normal heart rhythm. Temporary respiratory paralysis. Burns if current density is high. Depending on voltages involved, death can result.

Fig. 2 – Typical single phase, 120 V ac house electrical wiring system.



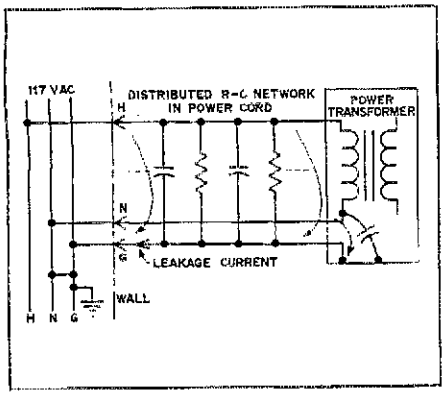
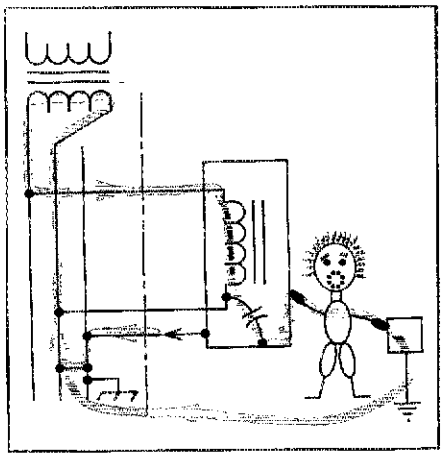


Fig. 3 — Leakage current as a result of distributed *R-C* network and possible wire insulation breakdown.

distributed *R-C* network and possible wire-insulation breakdown. Therefore, the voltage difference between the neutral and ground wires is no longer zero. Since the third wire is connected to your equipment's chassis, you may get the shock of your life if you accidentally come in contact with another ground, as shown in Fig. 4.

Another common culprit is the use of 3-wire "cheaters" to convert 3-wire plugs to the older 2-wire outlets. Without any further inspection, it cannot be determined which of the two connections is the neutral wire. The ground connection is made at the screw holding the outlet cover plate. The hazard associated with the use of cheater plugs is perhaps the most serious of all. This is as bad as using molded 3-wire plugs which have a long ground pin. After many times of plugging and unplugging from the wall socket, the connection to this pin inside the molded plug may break, a fact confirmed by x-rays of a number of plugs in use in many hospitals. If this condition exists, the chassis may be at a higher potential than ground, and if one touches this chassis and ground, a leakage current will flow and may cause serious injury, as indicated in Fig. 5.

Fig. 4 — The voltage difference between neutral and ground is no longer zero!



As stated before, many professional associations have made electrical safety a major concern. The National Fire Protection Association (NFPA) as well as the Association for the Advancement of Medical Instrumentation (AAMI) have set standards for checking the levels of leakage currents in the electrical system,[3,4] and whether the wiring is in accordance with the electric codes.

Table II

Status of Lights for 3-Wire Plug Tester

1) OK	● ● ○
2) Reversed polarity	● ○ ●
3) Open ground	● ○ ○
4) Open neutral	○ ● ○
5) Neutral "hot"	○ ○ ●
6) Open "hot" lead	○ ○ ○
7) "Hot" and ground reversed	○ ● ●

● = On
○ = Off

Neutral ○ ○ Hot
Ground ○

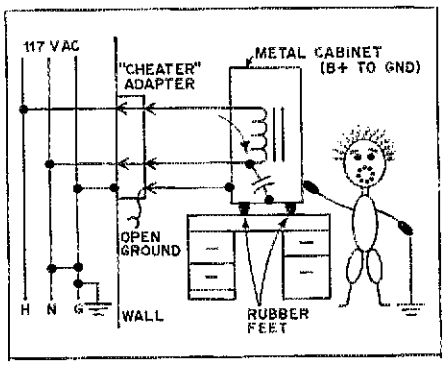


Fig. 5 — The chassis is at voltage difference from earth.

A simple method of determining if your wiring is not faulty is to build a simple tester, shown in Fig. 6, consisting of three NE-2 bulbs with resistors, mounted in a triangular sequence. By noting the status of the neon bulbs, one can assess the wiring of the wall socket (Table II).

Ground Loops

In actuality, contrary to popular belief, there is no such thing as a ground. The ideal ground is a reference of zero potential. A lot of us have commonly used ac outlets at different parts of the room to power all of the equipment located on the operating table. A closer analysis will show that the "ground" pins of the outlets around the room may not be all at the same potential, because of the finite resistance of the power wiring. An example of the possible

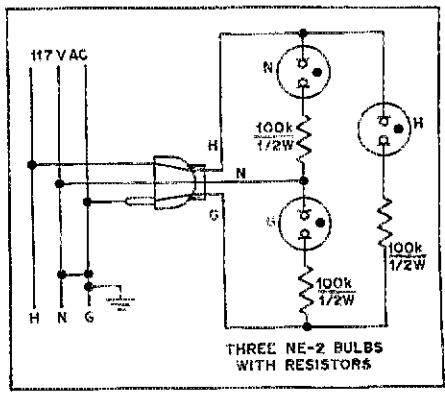


Fig. 6 — Schematic for a simple 3-wire tester.

hazard is shown in Fig. 7. Device No. 1 (i.e. transmitter) is connected to one outlet but has a small leakage current. Device No. 2 (i.e. linear amplifier) has no leakage current, but is connected to another wall outlet. The leakage current will now be present in the ground wire behind the wall thus creating a voltage drop between the grounds (chassis) of both the transmitter and the linear. If the operator simultaneously touches both devices, Zap! This is known as a *ground loop*. AAMI and NFPA have standardized this voltage drop to be no greater than 5 mV. The use of multi-socket outlet strips is a step in the right direction.

Conclusions

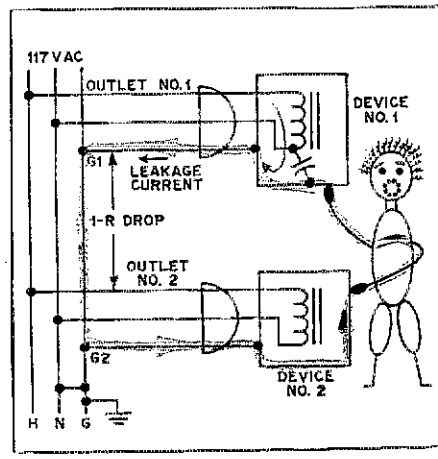
As a result of my experience in physiological research and ham radio, I would like to suggest the following do's and don'ts:

1) Never use "cheater" plugs.

2) Make a survey of your station's power requirements. Make sure the wiring is adequate for all equipment on simultaneously.

3) Eliminate ground loops by the use of multi-outlet strips.

Fig. 7 — Path of leakage current through a ground loop between two outlets of some distance apart, when the operator simultaneously touches both devices.



4) Have facilities for checking the status of outlet sockets.

5) Be cautious of molded 3-wire plugs; if possible, refuse to buy equipment that uses 2-wire plugs.

6) Properly fuse all equipment.

7) Ground the chassis of all equipment together by heavy bus wire and connect all equipment to a good earth ground.

Footnotes

[1] [Editor's Note: It should *not* be concluded from the foregoing that voltage is an unimportant factor in shock-hazard situations. For instance, amateur gear is no more dangerous than other electrical appliances one is apt to find in the home or workshop (such as TV sets or power tools) in regard to the topics discussed in this article. However, accidental contact with the *high-voltage* circuitry found in some amateur equipment has accounted for a number of fatalities over the years. This is because the possibility that lethal currents can occur is much greater as the voltage level is increased.]

[2] L. A. Geddes and L. E. Baker, "Response to Passage of Electric Current Through the Body," *J. Assoc. Advancement Med. Instr.*, 5:13-18, 1971.

[3] *Safe Use of Electricity in Hospitals*, National Fire Protection Association, NFPA No. 76BM, Boston, 1971.

[4] W. D. Jordan, "Standard Methods of Measuring Risk Current," *J. Assoc. Advancement Med. Instrumentation*, 5:357-362, 1971. QST

To the Moon and Back

Nineteen states, 11 countries and 4 continents isn't a bad night's work. But on 432 MHz?

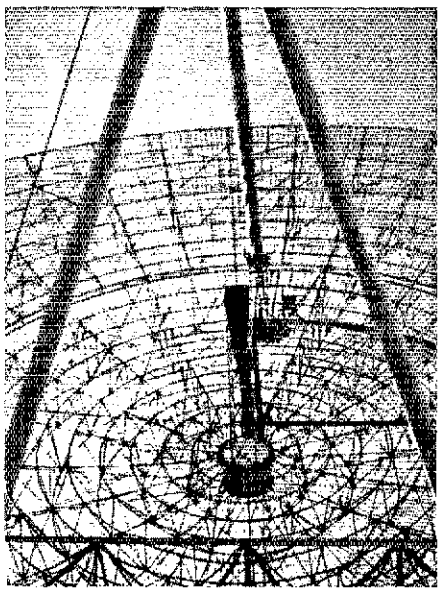
By William A. Tynan,* W3KMV

Earth-moon-earth work takes a big signal. That is, unless you're working WA6LET at the other end. This station's parabolic dish – larger than a 40-meter quad – sure makes up the difference and packs a moonbounce wallop.

Once again, the value of "the big station" in EME work has been demonstrated – this time in tests conducted on 432 MHz by WA6LET using the 150-foot parabolic dish at the Stanford Research Institute near San Francisco. As a measure of the success of the WA6LET experiments, a total of 64 different 70-cm stations was contacted during the two test periods of Oct. 31 and Nov. 23, 1975. Reception of signals from the big dish was accomplished by many additional stations, including reports on the tests conducted at various reduced power levels. Word on this phase of the operation is just beginning to trickle in as this is being written. According to a report from Victor R. Frank, WB6KAP, one of those responsible for the operation, stations with antenna gains as low as 7 dB were able to copy WA6LET via the moon.

*Contributing Editor, *QST*.

What makes WA6LET tick – SRI's 150-ft. dish. *(K1MTJ photo)*



Equipment used consisted of a power amplifier furnished by Stanford Research Institute employing a 7215. As backups and for the power reduction tests, a solid-state exciter built by Bob Sutherland Jr., WA6QCD and an Arcos, K2RIW-type, parallel 4CX250R amplifier were on hand. For receiving, a filter, a low-noise preamplifier, and a converter built by Brian Westfall, K6OJM, were installed at the antenna feed point. Also in place was a similar set up provided by Bruce Clark, K6JYO. The dish was excited so as to provide left hand circularly polarized energy, but many reports indicated that the signals appeared to be linearly polarized.

Keeping the station manned throughout the long night of Nov. 23, took a dedicated crew consisting of Bruce Clark, K6JYO; Victor Frank, WB6KAP; Arne Gjerning, K7CAD; Bob Sutherland, W6PO; Bob Sutherland Jr., WA6QCD; Edward Teyssier, WA6LCZ; Brian Westfall, K6OJM and Douglas Westover, K6TZX. In addition to operating the transmitter, four receivers and two tape recorders were kept going, not to mention a telephone.

During the 11-hour test on Nov. 23, a total of 84 QSOs with 60 different stations was made. Most were on cw, the primary mode used in EME work, but signals were sufficiently good in some cases to permit 15 ssb contacts. Stations in 19 states, 11 countries and all continents, except South America, were worked. The complete list of stations contacted is quite illuminating for it contains, as one would expect, a sampling of "Who's Who" in 70-cm EME, yet it also includes some calls not previously identified with moonbounce on this band. This illustrates the value of EME tests by stations with access to large antenna systems. As WB6KAP points out, many stations, having once worked WA6LET or one of the other big stations that have operated in the past, discover that it doesn't require impossible improvements in their set ups to start hearing and working other lesser equipped stations.

We'll expect to see a significant increase in 70-cm EME activity as a direct result of the work of these fellows. The vhf/uhf fraternity is indebted to them and to Stanford Research Institute for the stimulation and encouragement which the WA6LET tests provided. QST

Learning to Work with Integrated Circuits

Part 2: Threshold . . . logic family . . . BCD. Terms such as these are part of the jargon of the digital IC world. Mysterious terms indeed! Or are they?†

By Jerry Hall, K1PLP and Charles Watts, WA6GVC/1

What's the difference between a digital IC and a linear or analog IC? Are they so different that a digital IC cannot be made to work in analog circuits, and vice versa? And another thing, how come those funny symbols are always used on diagrams with ICs, instead of showing what's really inside? And exactly what is BCD, and why do . . . H-o-o-old it! Wait just a minute! Sure there are zillions of questions to be answered if you are just learning about integrated circuits, but let's ease into them gradually, okay? After all, you wouldn't teach a person how to swim by pushing him into deep water and then letting him figure out what to do, would you? Similarly, let's not jump into something over our heads in the world of ICs.

Reviewing what was stated in Part 1 of this series, a linear IC operates on a continuous electrical signal, whereas a digital IC behaves like a switch to operate at either *saturation* or at *cutoff* (on or off). As a general rule, a digital IC cannot be made to operate in a linear or analog mode. "Why not?" you ask? "Because they're not supposed to," is about the best answer that can be given. Remember, *cutoff* or *saturation!* The internal circuitry of the digital IC is designed so that it may detect whether or not a voltage level at the input is above or below the *threshold* or switching level of the circuit. As a matter of fact, this is the basis for using digital ICs to "make decisions."

Digital IC Families

Of course an IC in itself cannot really decide anything, but it can detect whether an applied input voltage is above or below its threshold level. This level will vary from one *family* of ICs to another, but will be essentially the same for all members of the same *family*. What's a family of ICs? A family is a group of ICs of the same series or type, all members having common characteristics. Each family has its own inherent advantages and disadvantages. Meeting a specific set of needs, each is geared to its own particular market. At present there are eight categories or families of which nearly all monolithic[4] ICs are members.[5]

Direct-coupled transistor logic (DCTL): This is the first logic form that was considered for integrated circuits. DCTL ICs saw relatively limited production.

Resistor-transistor logic (RTL): This family was developed to overcome the problems of variations in the base-emitter voltage of DCTL. In RTL the logic is done by resistors, while the transistors are used to amplify and obtain an inverted output from any positive input.

Diode-transistor logic (DTL): The logic is done by diodes; transistors are used as inverting amplifiers.

High-threshold logic (HTL): HTL devices are designed for immunity to electrical noise in a system. The circuit is the same as DTL except breakdown (Zener) diodes are used at the inputs.

Transistor-transistor logic (TTL or T^2L): To obtain more speed than was possible to obtain with DTL, TTL evolved. The diode cluster of the DTL version was replaced with a multiple-emitter transistor.

Emitter-coupled logic (ECL): This family is the exception to statements made earlier about saturation, because ECL ICs are unsaturated. Logic is performed by emitter-coupled transistors. It was developed to obtain the ultrahigh speeds required by advanced computers. Such speeds are unattainable in saturated logic circuits because of the time required for a transistor to go from cutoff to saturation.

Metal oxide semiconductor (MOS): The active region of an MOS device is a sandwich of metal, oxide and semiconductor material. The oxide acts as the dielectric insulator between the metal and the semiconductor. P-channel or PMOS ICs are used as low-cost large-memory devices with high input impedances.

Complementary MOS (CMOS): With extra diffusions a circuit with both p- and n-channel MOS devices are formed on the same substrate.[6] The devices are paired to work in complementary symmetry; one member of the pair is cut off while the other conducts, and vice versa. The unique feature of this family is its extremely low power dissipation.

Why so many different families? Well, as we have shown, each family evolved as changes in computer technology required higher switching speeds and lower current requirements. Some different IC families, however, still offer advantages over other families. So yet another group (not exactly a family), called

†Part 1 of this series appeared in *QST* for January, 1976.

*Associate Technical Editor, *QST*.
**Technical Assistant, *QST*.

[4]This and all subsequent footnotes appear at the end of this article.

interface ICs, has been developed. These interface ICs allow the designer to use the most effective combination of families in a system design, with the interface devices used to adapt the output data from one family into usable input form for another.

Zero Is a Number

A key word, used often in the above section, is *logic*. Logic is defined as a means of solving problems through symbols that are used to define basic concepts. This may sound like a complicated definition, but it isn't really that bad. Think about the familiar equation, 1 + 1 = 2. This can be considered as an example of logic, for it certainly uses symbols — the plus and equal signs. And it does solve a problem — finding the sum of one and one. Digital logic follows the same basic rules as elementary math, although it does have a few special rules of its own. These rules are merely extensions of the basic rules as applied to practical electronic circuits, and need not concern us for the moment. What does concern us, though, is that digital circuits are limited in what they can do because of their simplicity. We're back to that old adage again, saturation or cutoff. With only two *states* or conditions that a circuit can assume, this means that the circuit can represent only two numbers mathematically. It follows that these numbers are 0 and 1. Zero must be considered as a number, you know, for its value is as significant as any other. To wit, would you rather receive $1 or $100, as a gift?

When a circuit is cut off, that condition can be used to represent the number 0 — no current flowing. And when the circuit is saturated, this would represent the number 1 — the presence of current. "Great," you say, "but what do we do when we want to represent numbers larger than one, like maybe 15?" Well, we could have 15 individual circuits, all of them conducting. If each circuit represented the value of 1 when current was flowing, then all of them together would represent 15. But this would take a very large number of circuits to represent high-value numbers. A simpler way is to use what is known as binary arithmetic, binary meaning to the *base* two. The base is the quantity of numbers used in the system.

The two numbers in the binary system are, as just stated, 0 and 1. In our more familiar decimal system we use the base 10. There are ten numbers in this system, 0 through 9. If we start from 0 and count by ones, we go through the process 0 + 1 = 1; 1 + 1 = 2; 2 + 1 = 3; and so on. But what happens when we come to 9 + 1? We've run out of numbers; there is no single digit in the decimal system to represent the sum of 9 and 1. That's no great problem though. We merely stick a 0 in the right-hand column and carry a 1 to a new column immediately to its left — 10. We're so accustomed to doing this that we don't even have to stop and think about the process. Now what about the binary system? Here again, 0 + 1 = 1; 1 + 1 = . . . oops! We've already run out of numbers, haven't we! There is no single digit in the binary system to represent the sum of 1 and 1. That's no great problem though. We merely stick a 0 in the right-hand column and carry a 1 to a new column immediately to its left — 10. (If these words don't sound familiar, they should. Look back a few lines.) Yep, that's right; 1 + 1 = 10 in binary arithmetic.

Counting further from 10 in binary form, we would have 11, 100, 101, and so forth. (Adding 1 to 11 in binary form is like adding 1 to 99 in decimal form.) The chart below shows the binary equivalents of decimal numbers 0 through 15. Normally we do not write zeros to the left of decimal numbers when the values are greater than one. But it is customary to do so with binary numbers, especially when working with digital ICs. A bit of reflection on the binary numbers above will show why. From these numbers you can see that only four circuits are needed to represent all values through 15, rather than needing 15 individual circuits as suggested earlier. One circuit would be associated with the left-most column of the binary numbers, cut off to represent 0 and conducting to repre-

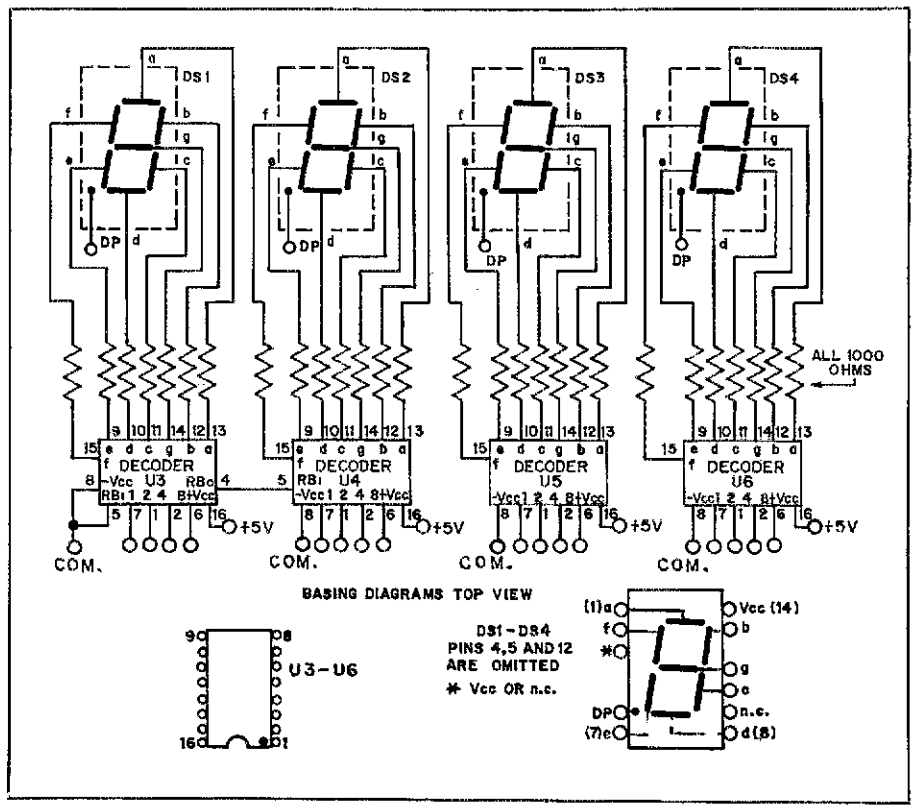


Fig. 3 — Schematic diagram of the readout display circuit. Connections marked common should be tied together but isolated from the chassis. No connections are made to pin numbers not shown on the ICs. Parts required are listed below.

DS1-DS4, incl. — 7-segment LED digital-display readouts, type SLA-1; Archer 276-053, Poly Paks 92CU1658, or equiv.

U3-U6, incl. — TTL 7-segment decoder-driver ICs, type 7447.

Composition resistors, 1000 Ω; 1/4 W preferred, 1/2 W suitable. (28 req'd.)

IC sockets for 14-pin dual in-line IC packages, Cambion 3788-0416 or CA 14S105D, or equiv. (4 req'd. Order 15 and you'll have enough for the entire DVM.)*

IC sockets for 16-pin dual in-line IC packages, Cambion 3789-0416 or CA 16S105D or equiv. (4 req'd. Order 8 and you'll have enough for the entire DVM.)*

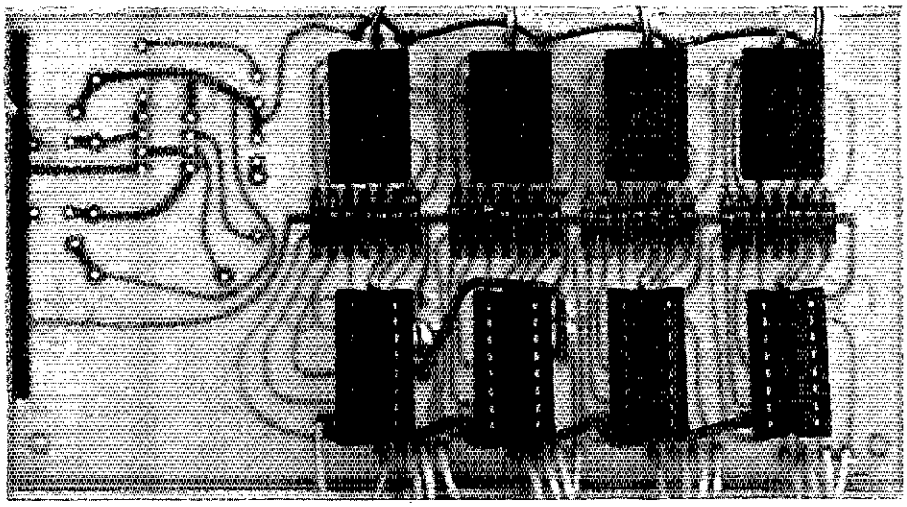
Stranded plastic-covered hookup wire, No. 24 or No. 26, assorted colors.

Circuit board; see separate list of suppliers.

*Note: In addition, three 8-pin dual in-line IC sockets will be required for the project. Molex pins may be substituted for the IC sockets if the builder prefers. These pins are available in a strip and are cut to form 8-, 14- or 16-pin sockets, as necessary. Solder complete strip of 4, 7, or 8 pins in place first, then break off interconnecting metal strip.

Decimal/Binary Equivalents

DECIMAL	BINARY	DECIMAL	BINARY
0	0000	8	1000
1	0001	9	1001
2	0010	10	1010
3	0011	11	1011
4	0100	12	1100
5	0101	13	1101
6	0110	14	1110
7	0111	15	1111



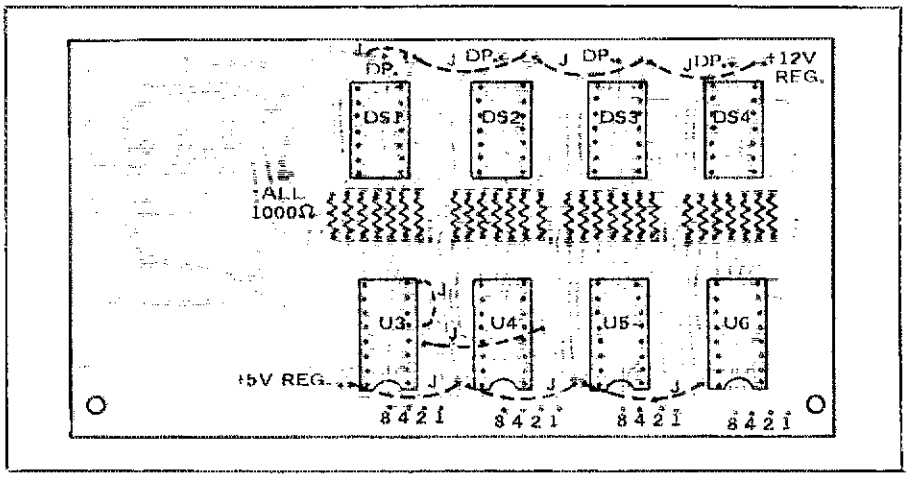


Fig. 4 — Parts placement guide for the display circuit board, not shown at actual size. These views show the component side of the board. Parts on the area of the board at the left will be assembled at a later time.

sent 1. Similarly, another circuit would be associated with the second column of the binary numbers, and so forth, for four circuits. By various combinations of the four circuits being either cutoff or conducting, the various mathematical values from 0 through 15 are represented. The writing of the zeros in the left-hand columns of binary numbers gives a ready indication of whether the associated circuits are conducting or cut off for a particular number. So other than the fact that it uses the base 2, there's really nothing unique about this binary arithmetic after all, is there?

Binary-Coded Decimal Numbers

There are other aspects of our decimal system which are so basic and familiar to us that we tend to forget about them, too. For the moment let's consider the number 7246, a value merely pulled out of the air to illustrate a point. Say that we had this amount of money in dollars. As we examine this number we see, of course, four different digits or numbers — the 7, 2, 4, and 6. But note something important. The position of each of these digits in the number is quite significant. Certainly $7246 is a different amount of money than $2467, yet the digits themselves are unchanged. Only their positions in the writing of the 4-digit number has been changed, but this results in a totally new value. In the original number, $7246, the 6 represents dollars, the 4 represents tens of dollars ($40), the 2 hundreds of dollars ($200), and the 7 thousands of dollars ($7000). The total amount of money represented by these four digits is the sum of the four values just noted — $7000 + $200 + $40 + $6 = $7246. If we stop to think, we realize that the amount represented by a particular digit in a column is ten times as much as the amount represented by that same digit in the next column to the right. This is true because the base of this numbering system is 10.

The exact same idea applies to binary arithmetic; the position of each digit in the number is significant, as is its value. Say that we had $1111 in our pocket, the 1111 being a binary number. (It's okay if you look back at the information presented earlier to see how rich you are. If you do, you'll see that this is the same as $15.) If we stick strictly with binary numbers, the total money represented is $1000 + $100 + $10 + $1, just as when we had $7246 in the earlier example for the decimal system. But there's an interesting and useful correlation between that binary number and our more familiar decimal system. The 1 in the right-hand column of the binary number represents $1 in decimal numbers. The 1 in the second column from the right represents $2 in the decimal system. The 1 in the third column from the right represents $4, and the 1 in the left column $8. You see, the amount represented by a 1 in a particular column here is two times as much as the amount represented by a 1 in the next column to the right. This is true because the base of this numbering system is 2. You can readily see this for yourself if you look at the earlier chart showing binary equivalents for decimal numbers.

Remember before, how we added up the binary numbers to get the total amount of money represented, $1000 + $100 + $10 + $1 = $1111? In the same manner, we may also add up the decimal equivalents of these numbers to get the total amount of money represented in decimal form. Thus, $8 + $4 + $2 + $1 = $15. How about that! We've just come up with an easy way to convert from binary numbers to decimal numbers, right? Okay, how much money would we have if it was written in binary form as $1001? Simple! We'd have $8 + 0 (instead of $4) + 0 (instead of $2) + $1 = $9. Lo and behold, if we look back at the earlier chart, we see that binary 1001 is equivalent to 9.

If we understand this, we can now say that we understand binary-coded decimal or BCD numbers. BCD values are nothing more than information written in this 8-4-2-1 form but using binary notation — 1111 (or combinations of 1s and 0s). Sometimes you may see the order reversed, 1-2-4-8. In this case the 1s in the binary notation are also reversed in their representations. To tell one notation from its reverse, the terms *most significant digit* and *least significant digit* are applied. More frequently the word *bit* is used instead of digit, bit being an abbreviation for binary digit. The terms thus become *most significant bit* and *least significant bit*. You'll also see just their acronyms, MSB and LSB. With four binary digits, the most significant bit is always equivalent to 8, and the least to 1.

Of course binary values can extend to more than four digits by forming additional columns. Decimal equivalent values of 1s in progressive colums will continue in the same fashion — 16, 32, 64, and so on. We'll not be using these larger binary numbers in connection with the digital voltmeter/frequency counter project however. The counter

portion uses BCD values only – decimal values less than 10 but treated in binary form. In the sections which follow, we'll go through construction and testing of the readout display board. When it is completed, we'll be able to see in practical form how all this BCD theory works. But first, let's talk about displays or readouts.

Electronic Digital-Readout Displays

As you can imagine, digital electronic equipment has gone through constant evolution through the years since the discovery of the transistor. The transistor really opened the door for development of solid-state circuitry. Equipment which once took up most of the available space in a 6-foot by 19-inch rack has been replaced by units smaller than most transistorized table-model a-m/fm radios. Not the least significant development in solid-state devices has been the light-emitting diode (LED). With the advent of the LED, other light sources such as the low-voltage pilot lamp and incandescent alphanumeric display are rapidly disappearing from the face (front panel) of modern electronic instruments.

The LED (sometimes called the visible-light-emitting diode or VLED) is a diode that emits light during conduction. A positive voltage (forward bias) is applied to the anode (the arrow portion of the schematic symbol for a diode) of the LED through a series current-limiting resistor. The amount of forward current the LED draws determines the level of emitted light. Each diode emits just a pinpoint of light. Early LED numeric displays used several diodes in a row to form a *segment*, with seven segments arranged in figure-8 fashion. (See DS 1 through DS4 in Figs. 3 and 4.) Seven segments may be used to display any decimal number, as we'll see later. Modern displays use fewer diodes in a row, requiring less current per segment. Behind the row of diodes is a reflective bar which brilliantly illuminates the segment.

The crystal that forms one type of LED is made of a compound of gallium, arsenic, and phosphorous, and the color of its emitted light is in the red range. The concentration of phosphorous in the compound controls the tint of the emitted light. A slightly different compound, containing a trace of nitrogen, emits green light. At present red LEDs are less costly to produce. LEDs operate at potentials above 1.6 volts.

Another type of display device is the liquid crystal. A thin layer (.0005 inch thick) of a chemical substance known as anisylidene-para-aminophenylactate, a semifluid crystalline material, is placed between two pieces of glass. The glass pieces have been treated so that they are electrical conductors. The material changes from clear to milky white when voltage is applied between the two glass plates. This type of display relies on reflected light, rather than emitted light. The clear portion appears black when placed in front of a dark or nonilluminated background. This type of device is gaining popularity due to its low power consumption and compatibility with CMOS integrated circuits. Recently developed liquid-crystal materials will work with potentials between 6 and 15 volts.[7]

Though antiquated for most modern designs, neon displays such as the Burroughs Nixie tube and National Electronics NL-840 indicator still appear in a lot of electronic equipment. These displays are used for more rugged applications such as machine control indicators. The common nomenclature for these devices is gas-filled cold-cathode indicator tube, and they require on the order of 180 volts for operation. To display a number, one of the conductive elements of the tube is a wire bent into the shape of that number. The gas glows around the wire. Ten such elements are included in one tube, each with its own external connection.

A different readout, but similar in some respects, uses seven gas-filled chambers. These chambers are arranged in figure-8 fashion. Application of 180 volts to the elements of appropriate chambers displays the desired information. There are displays other than those we've touched upon briefly here, but these are the most common types.

With most solid-state projects requiring comparatively low voltages to power the electronics (usually 15 volts or less), it hardly seems logical to complicate power supply requirements by using a device that requires a much higher operating voltage. Therefore the LED type of display seemed to be the logical choice for the DVM/frequency counter. LED readouts are readily available from most electronic parts distributors and surplus electronic equipment stores. They are relatively inexpensive, and since we use a 12-volt power supply to power the linear ICs, we can also use it to light the display.

Checking the Power Supply

After you've completed the wiring of the power supply you should check the voltages it delivers. If you don't have a dc voltmeter, try to borrow one from a friend, either an electronic voltmeter or a volt-ohmmeter. Refer to Figs. 1 and 2, Part 1. Because the primary of T1 is not yet completely wired, you will have to make temporary connections. Be sure the ac plug is disconnected from any outlet while you do this! Make the connections secure, not just loosely twisted, and *wrap all exposed metal in the primary circuit* with electrician's vinyl or friction tape! Be sure to fuse the circuit, too. This may prevent burning up something if all is not right. Clip leads may be used for the dc voltages but be sure they don't accidentally short something out.

Now insert the plug into an outlet. First measure the voltage at the junction of diodes CR1 and CR2. With no load on the power supply, it should be in the range from 22 to 24 volts, depending on your line voltage. This voltage will be positive with respect to common. You should also measure the same value at the junction of CR3 and CR4. Now check the regulated output voltages. At pin 3 of U1 you should read 12 volts, and at pin 3 of U2, 5 volts. These voltages should be rather precise, but you'll have to take into account any calibration errors in the meter you're using. If your meter reads within a volt or so of +12 and +5 volts, everything is probably okay. But if you read either nothing or better than 20 volts, something is wrong. If you're certain your wiring is okay, you may have a faulty regulator.

After the power supply checks out okay, you are ready to assemble the display or readout circuit board. Assembly and checkout will be discussed in detail in Part 3 of this series, but the circuit diagram (Fig. 3) and parts placement guide (Fig. 4) are provided here so you can obtain the necessary parts. Part 3 will appear in a subsequent issue of *QST*.

Circuit Board Suppliers

Ready-made circuit boards for the digital voltmeter/frequency counter may be obtained from any of the following suppliers.

MFJ Enterprises, P. O. Box 494, Mississippi State, MS 39762.

PBI Electronic Co., Inc., 1535 McKinley Ave., Box S, Azusa, CA 91702.

Circuit Board Specialists, P. O. Box 969, Pueblo, CO 81002.

Bibliography References

The Fairchild Semiconductor TTL Data Book, Fairchild Semiconductor, 464 Ellis St., Mountain View, CA 94040, 1972.

The TTL Applications Handbook, Fairchild Semiconductor, Mountain View, CA, 1973.

The Optoelectronics Data Book for Design Engineers, Texas Instruments Inc., Dallas, TX 75222, first edition.

The TTL Data Book for Design Engineers, Texas Instruments Inc., Dallas, TX, first edition.

The Radio Amateur's Handbook, ARRL, Newington, CT, 1976 (chapter on semiconductor devices).

Signetics Digital 54/7400 Data Book, Signetics Corporation, 811 East Arques Avenue, Sunnyvale, CA 94086, 1972.

Footnotes

[4] The term monolithic is discussed in Part 1 of this series.

[5] A more comprehensive discussion of IC families has appeared in an earlier issue of *QST*. See Hall, "Digital ICs – A Family Portrait," November, 1971.

[6] The term substrate is discussed in Part 1 of this series.

[7] Blakeslee, "By the Light of a Diode," *QST* May, 1972.

UHF Antenna Ratiometry

Inconsistent results in checking antenna gain? Here is a technique that can restore your faith in measurements and speed up empirical design.

By Richard T. Knadle, Jr.,* K2RIW

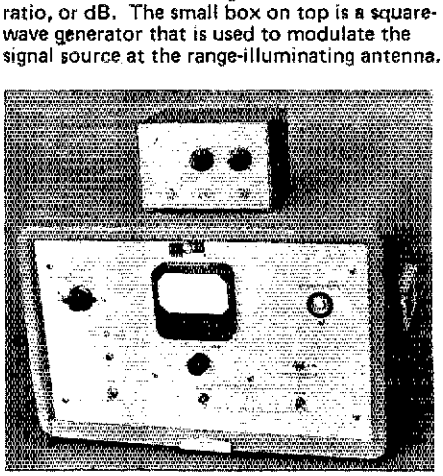
Uhf antenna gain-measuring contests are in vogue across the country. One of the largest detriments to designing competitively is the uncertainty factor in checking whether a change yielded a gain or a loss. It was to be expected that someone who is well-known for uhf antenna design would become chagrined at the nonrepeatability syndrome and find and describe a cure. Here is a condensed version of a paper presented by the author at IEEE Intercon 75, New York City, April, 1975.

Trenton State College has frequently been the location of the antenna-measuring contest held by the East Coast VHF Society for the last six years. During this annual event antenna gain is measured at 432, 1296 and 2304 MHz.

To date there have been 231 antenna entries by contestants from seven states.

*AIL, Commack Rd., Deer Park, NY 11729.

The receiving system for antenna ratiometry is a ratiometer, such as the HP-416A shown here. It is basically a dual amplifier with separate input connections for each. The difference between the two signals is shown as a ratio, or dB. The small box on top is a square-wave generator that is used to modulate the signal source at the range-illuminating antenna.



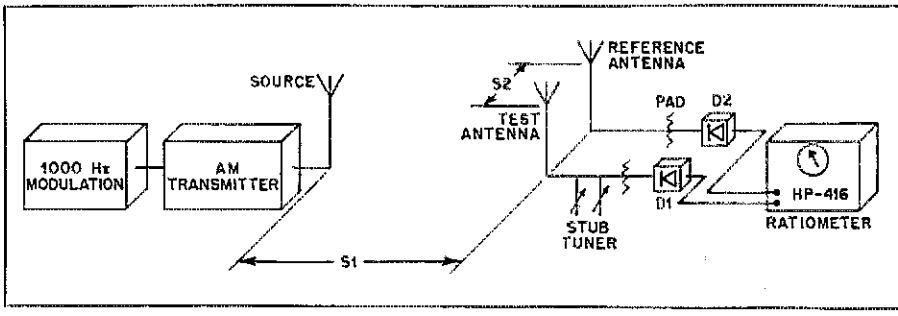


Fig. 1 — Antenna ratiometry set-up, isometric view. D1 and D2 are matched diode-detector assemblies.

It is interesting to note that every winning antenna during the six years has been homemade. This, coupled with the difficulty in confirming the gains claimed for a number of commercially made antennas, has created a credibility gap. As a result there has been a recent upsurge of antenna measurement and gain maximization, which is being done in backyards, open fields, and on towers by a considerable portion of the amateur fraternity.

Antenna-parameter measurement done in an anechoic chamber by an experienced technologist, using modern equipment, yields repeatable results which are traceable to the Bureau of Standards. By comparison, the amateur fraternity traditionally takes pride in its ability to make sufficiently accurate measurements by substituting craftiness and existing equipment for the ideal or expensive laboratory variety. For most "bench" type measurements this has proved adequate. However, high-gain antenna measurements are quite complex, and the control of the equipment and environment has not been as complete; thus, repeatable and absolute antenna gain measurements have not generally been realized.

Frequently the antenna being optimized is a long Yagi-Uda array. The often-used pragmatic approach to maximizing the gain of this antenna consists of making minor adjustments to the parasitic element lengths and positions. The changes to each of the considerable number of variables must be systematically tried and the usually small gain variations must be resolved if overall significant gain improvement is to be accomplished. Adjustment of a parasitic element usually changes the gain a fraction of a dB. Variations in the antenna range and equipment have caused ambiguities as large as two or three dB observed over a half-hour period. As such, determining whether an adjustment yielded an improvement or a detriment has been somewhat hit or miss.

The three major pitfalls to repeatable antenna measurement have been the following:

1) Equipment variations.

2) Changes in the outdoor range characteristics which are beyond the control of the researcher — such as ground-reflection coefficient.

3) Steady-state reflections which cause improper illumination of the antenna under test.

It will be shown that ratiometry, the simultaneous comparison of signal strengths observed with a reference antenna and the antenna under test, will alleviate major pitfalls one and two. Proper technique will reduce pitfall number three. Ratiometry gives continuous gain difference readings in dB with high resolution and decreased ambiguity. It has aided recognition of the small gain changes that occur with parasitic element adjustment of a Yagi-Uda array. As such, repetition of each of the experimental adjustments was not required to resolve improvements over detriments. Thus, antenna gain maximization can be considerably streamlined.

Antenna Ratiometry

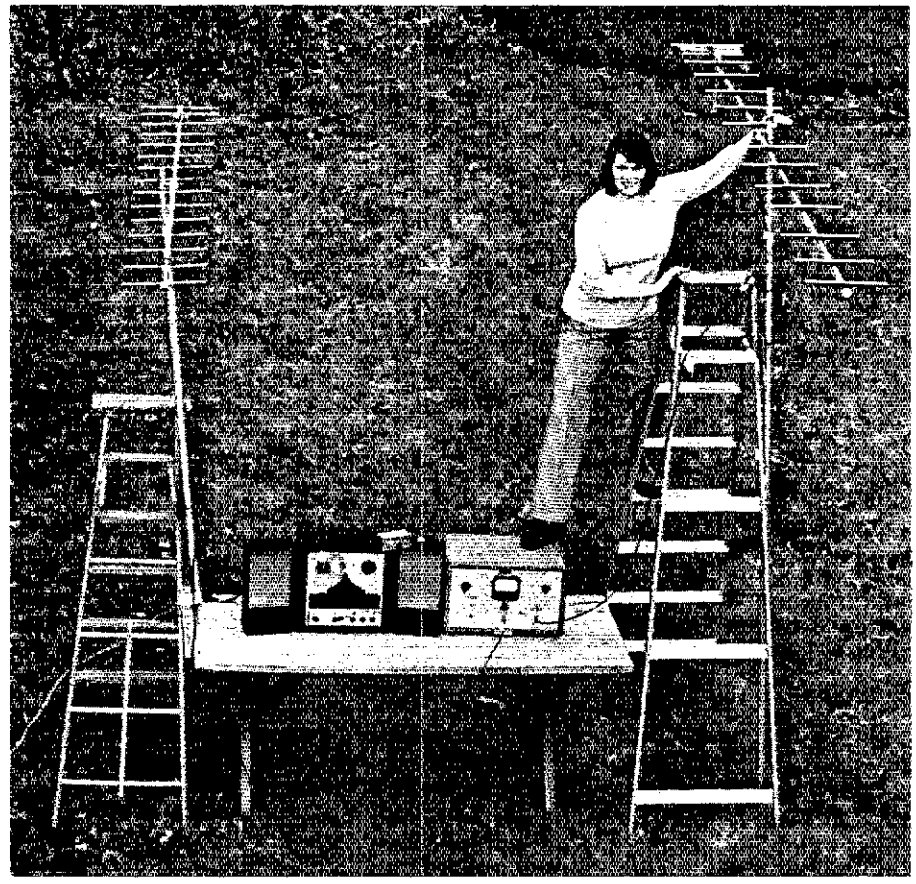
Fig. 1 shows the equipment arrangement used for antenna ratiometry. The reference antenna and antenna under test are horizontally displaced from each other by distance S_2. Each antenna is equidistant from the source by distance S_1. The antenna under test is continuously being compared to a reference antenna in such a way that only the dB difference in signal strength between the two is being displayed on the ratiometer.

Large variations in the source power density or modulation characteristics as observed at the reference antenna are primarily removed from the measurement, since these changes will affect each antenna almost identically. It was observed on the author's Hewlett Packard 416 Ratiometer that a simultaneous 40-dB change into each ratiometer port caused less than 0.2 dB variation on the ratiometer. This implies that a source transmitter power could change by as much as a 10:1 ratio, and less than .05 dB variation would occur on the ratiometer.

Range Setup for Gain Measurements

The outdoor range setup procedure will not be completely described here since this is done in the indicated references. Only those salient features which are required for proper antenna ratiometry operation will be indicated.

For a number of practical reasons, the antenna under test is often used in the receive mode. Antenna ratiometry will require this. If an antenna under test is to display its true gain potential, it must be illuminated across the entire effective aperture of that antenna, with a nearly error-free plane wave. A wave that does not deviate by more than 1 dB in amplitude or 22.5 degrees in phase (1/16 wavelength) is usually sufficient.



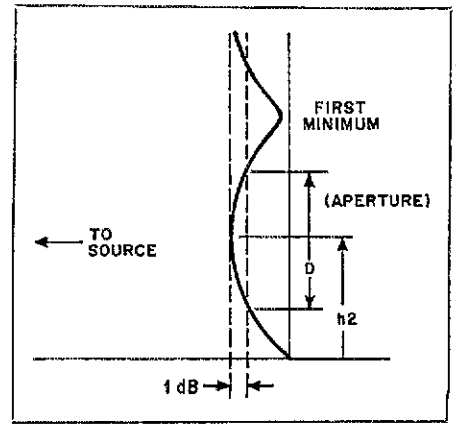
The author's XYL, WB2HJD, is shown here checking the current distribution by listening to an audio tone change when she touches the elements. The tape recorder is used as an audio amplifier, thus eliminating the need to watch a meter as adjustments are made to the antenna.

On an outdoor antenna range, obtaining less than 1 dB of amplitude variation across the aperture of the antenna under test is a more difficult requirement due to ground reflection. Many schemes to achieve this have been devised. One of the more attractive is the low-source technique described by Turrin[1] and Kraus.[2] In this technique the ground reflection is anticipated and the height of the source antenna is adjusted to give the first vertical lobe at least as broad in the vertical plane (at the one dB points) as the anticipated aperture of the antenna to be tested. By selecting proper range geometry, the antenna under test will usually be unable to resolve the source and its image. From the viewpoint of the antenna under test the source will appear as a point source horizontally, and two point sources, displaced less than a resolvable angle, vertically. Although the two sources — the real and the ground reflected image — are unresolved by the antenna under test, they still cause a small pessimistic gain-measurement error.

This error, which could be called reflective range loss, is due to the phase variation in the vertical plane that occurs across the aperture of the antenna under test. The phase variation is due to the angular displacement of the two sources.

Occasionally it has been observed that a properly oriented array of antennas will display increased apparent gain when the individual antennas of the array are moved closer together, even though the effective apertures begin to

Fig. 2 — Field intensity versus h_2 height.



[1] For this and subsequent footnotes see references at the end of this article.

overlap. This is contrary to array theory, and reflective range loss could account for the discrepancy. As the antenna spacings decrease vertically, the vertical pattern increases in beamwidth, the resolution of the two sources decreases, and the reflective range loss decreases more rapidly than the loss of true gain.

Reflective range loss can be calculated by superposition assuming that the waves from the real and the image sources independently impinge on the aperture of the antenna under test. The angular displacement of the two sources is the range angle θ_R.

$$\theta_R = tan^{-1}\left(\frac{h_2 + h_1}{S_1}\right) - tan^{-1}\left(\frac{h_2 - h_1}{S_1}\right) \quad (1)$$

When $S_1 >> h_1$, and $S_1 > 4h_2$ the formula reduces to

$$\theta_R \cong \frac{2h_1}{S_1} \quad (2)$$

Assuming that the antenna under test has relatively high gain and equal horizontal and vertical half-power beamwidths, the antenna beamwidth θ_A (in degrees) can be estimated by

$$\theta_A \cong \frac{180^\circ}{\sqrt{G}} \quad (3)$$

where G = gain over isotropic, and is a real number.

If the true vertical beamwidth of the antenna under test is known, it should be used instead of Eq. No. 3. The vertical beamwidth θ_A of the antenna under test can then be compared to the range angle θ_R. Assuming that the power pattern of the antenna major lobe is approximately proportional to $\cos^2\theta$, the reflective range loss L_R in dB is

$$L_R = \log 10\left\{\cos^2\left(\frac{\sqrt{G}}{4}\left[tan^{-1}\left(\frac{h_2 + h_1}{S_1}\right) - tan^{-1}\left(\frac{h_2 + h_1}{S_1}\right)\right]\right)\right\} \quad (4)$$

If the major lobe power pattern is known to be proportional to $\cos^N\theta$, then the exponent of the cos θ term can be changed to N and the constant 4 can be changed to

$$\text{Constant} = 180\left\{\cos^{-1}\left[(.5)^{\frac{1}{N}}\right]\right\}^{-1} \quad (5)$$

The reflective range loss of Fig. 3 is worse case assuming unity ground reflection. As the ground reflectivity decreases, the reflective range loss also decreases. This is because the boresighting of the antenna under test, when oriented for maximum signal strength, will more closely align with the true source; the image antenna in this case will have less influence. If the estimation of error in gain due to reflective range loss is unacceptable, then usually h_1 will have to be decreased or S_1 increased and L_R recalculated.

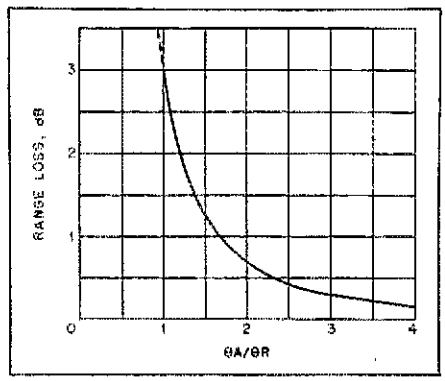


Fig. 3 — Plot of Eq. 4. Reflective range loss versus antenna angle/range angle.

It should be noted that the reflective range loss could also occur simultaneously in the horizontal plane if reflective objects on the side of the range, such as trees and houses, reflect significant energy into the range. This could create image source antennas to the left or right of the true source antenna.

Ratiometry Special Considerations

Once the integrity of the antenna range has been confirmed, ratiometry can be implemented. If a Hewlett Packard Model 416 Ratiometer is used, then the source transmitter will need to be amplitude modulated at a 1-kHz rate. The modulation need not be linear; only the presence of a 1-kHz component is required. Thus, even multiple Class C stages with frequency multipliers can be amplitude modulated in the transmitter early stages if desired. If the source antenna is a simple corner-reflector type and antennas of approximately 10 to 16 dB/d are to be measured, then approximately one watt of source power will be required for a typical range length of 80 feet.

The ratiometry reference antenna need not be a standard gain antenna. It is desirable for the reference antenna to have similar gain to the antenna under test. The reference antenna will then observe approximately the same amplitude of reflections from objects adjacent to the antenna range, and the power to each diode detector will be similar. This will assure more similar diode characteristics and thus greater common-mode rejection of the ratiometer.

The antenna spacing S_2 should be selected to be at least twice the sum of the effective diameter of each antenna. This is to assure that the mutual coupling between the antennas is at least -30dB. Should there be any doubt of the isolation between the antennas, then the insertion loss between them can be confirmed during the set-up procedure by connecting a transmitting source to one and measuring the received power on the other.

Of special interest to ratiometry is a seldom discussed antenna characteristic called scattering area.[3] Each antenna represents a disturbance to the medium, as such a proportion of the energy incident on each antenna is scattered in many directions even if perfect impedance matching is accomplished. In fact, the scattering area of a general antenna is equal to the effective intercept area when ideal conjugate matching exists.[4]

Mutual coupling and scattering are each greatly aided by the usual high front-to-side ratio of most antennas that are likely to be used in the two locations. Should excess scattering between the two be suspected, it can be evaluated by monitoring the received power from the normal source by the antenna under test, while the reference antenna is terminated and translated through a horizontal distance of at least one wavelength. This will rotate the phase angle of the scattered signal through 360. If less than 0.27 dB of peak-to-valley variation occurs, the two antennas can be considered sufficiently isolated for most testing. For complete thoroughness the received power should be observed on the reference antenna while the antenna under test is terminated and translated one wavelength.

For most situations the source antenna should be boresighted on the antenna under test so as to create the most error-free plane wave at this location. It is acceptable for the reference antenna to be located on the sloping side of the source-antenna major lobe, as long as the source antenna is not allowed to rotate in azimuth. This positioning of the reference antenna introduces an additional attenuation to the reference antenna, but this will be compensated for in the calibration procedure.

Calibration consists of placing a standard gain antenna on the range in the position of the antenna under test. The ratiometer is calibrated with the standard gain antenna oriented for maximum signal strength. The standard is removed from the range, and then the antenna under test is substituted and oriented for maximum signal strength. The dB change on the ratiometer is noted and recorded.

Vertical polarization ratiometry measurements could be accomplished with the techniques previously outlined except that Eqs. 1, 2 and 4 will become invalid. Many undesired reflectors such as trees, cars, rain-gutter downspouts and plumbing have greater scattering areas to vertical polarization. Horizontal polarization would seem to have an advantage in the environments where antenna testing frequently takes place

Antenna optimization with ratiometry can be more effective if an audio range voltage-to-frequency converter module is connected to the 0-10 volt output jack on the ratiometer. Many times the process of antenna optimization takes place from the top of a ladder which is eight feet from the meter movement of the ratiometer. By listening to the change in pitch of the audio tone, a judgment of improvement or detriment can immediately be made without seeing the meter movement or removing the eyes from the antenna or ladder. The feedback of information by this method is so rapid that random movements of a hand near a parasitic element can cause a gain change, which was not anticipated, to be sensed.

Ratiometer Alternatives

The Hewlett Packard 416A Ratiometer is less frequently used today for its intended purpose of swept frequency VSWR measurements. It therefore occasionally appears in surplus stores at attractive prices.

For ratiometer measurements up to 1,000 MHz, the H.P. 8405A Vector Voltmeter is an appealing substitute having 80 dB of dynamic range and phase-measuring capability. No 1-kHz source modulation should be used with any of the alternates.

A Dicke-Switched receiver[5,6] may be used to sample the signal strength of the reference and test antennas rapidly and alternately. This could be implemented with an electronic switch between the antennas and an ordinary receiver, plus some not-too-extensive receiver modifications.

An automatic noise figure meter such as the AIL Model 75, or 7300, which alternately samples virtually two receiver channels at a 400-Hz rate, could have an electronic switch added before its input circuits. The two-channel comparison circuitry with attractive common-mode rejection and agc is already built in. The dB scale would need minor recalibration.[7,8]

Ratiometry Advantages

1) Major immunity to source power variations – up to 30 dB.

2) Moderate immunity to source modulation variations in amplitude and waveshape.

3) Major immunity to the often-occurring receiver gain variations.

4) Broadband; swept frequency measurements possible without receiver afc circuits.

5) Gives continuous answers in dB with reference to a standard antenna.

6) Phase measurements require little or no system changes dependent on type of ratiometer used.

7) Gain resolution to a fraction of a dB is possible.

8) Primarily immune to ground-reflection-coefficient changes.

9) Decreases the vulnerability to extraneous signal jamming prevalent with the normal high-sensitivity receiver.

10) Stability such that range calibration usually needs be done only once during a measuring/optimization session.

Ratiometry Disadvantages

1) Requires slightly wider antenna range and may require a wider source antenna pattern.

2) Needs some care to assure that mutual impedance effects and antenna scattering do not contaminate results.

3) Antenna pattern measurements on one half of *E* plane more difficult.

4) Requires matched detector diodes for greatest common-mode rejection – alternative ratiometer needs no diodes.

References

[1] Turrin, "Antenna Performance Measurements," *QST*, November, 1974.
[2] Kraus, *Antennas*, p. 451, McGraw-Hill Book Co., N.Y., 1950.
[3] Collin and Zucker, *Antenna Theory*, Part 1, p. 123, McGraw-Hill Book Co., New York, 1969.
[4] See Reference 2, p. 45.
Kraus, *Radio Astronomy*, p.248, McGraw Hill Book Co., New York, 1966.
[5] Steinberg and Lequeux, *Radio Astronomy*, p. 43, McGraw-Hill Book Co., New York, 1963.
[7] Pastori, "Direct Reading Measurements of Receiver Parameters," *Microwave Journal* April, 1973.
[8] Edden and Pastori, "Digital Monitoring Receiver Performance," *Microwave Journal*, August, 1973.

QST

Strays

□ As part of its continuing work in the field of radio-frequency interference (RFI), the ARRL RFI Task Group recently provided information to assist operators and consumers in resolving RFI problems which are related to electronic home-entertainment products. Released during the RFI Technical Symposium at the ARRL 1975 National Convention (12-14 September 1975), the information serves to indicate who within a given company is responsible for handling RFI complaints, and who might be able to expedite replies to inquiries and to initiate investigations which will help resolve problems.

Assembled with the cooperation of over 40 manufacturers, the type of information available is shown in the following examples:

Baldwin Piano & Organ Company, 1801 Gilbert Avenue, Cincinnati, Ohio 45202. Tel. (513) 621-4300. Mr. Robert C. Scherer, Manager, Organ Technical Service. Electronic Organs: RFI complaints are usually handled by the local Baldwin service technician. Factory personnel are available to assist the technician when needed. Baldwin maintains its own staff of technical representatives who travel in the field and may be called upon to assist the dealer technician with difficult problems, including RFI.

Baldwin provides technicians with a detailed instruction bulletin entitled "Hints on Suppressing RF Interference." RFI complaints should be referred to the local Baldwin dealer.

Harman-Kardon, Inc., subsidiary of Jervis Corp., 55 Ames Court, Plainview, New York 11803. Tel. (516) 681-4000. Mr. Robert Brady, Director of Engineering.

Receivers, amplifiers, turntables, a-m/f-m tuners, preamps, record players, tape recorders – Customers should refer RFI problems to Mr. Len Gaynor, Manager of Customer Service.

Customer RFI problems are handled on an individual basis. If local, the customer is invited to bring the affected set into the plant. Non-local customers are referred to the nearest warranty station. Corrective action is provided at no cost to the customer.

The listing, by the way, was summarized from statements contributed by manufacturers and distributors, and as such, should not be construed as an endorsement by the ARRL of the policies or products of any particular manufacturer.

Because the ARRL list of manufacturers can be an invaluable aid in resolving RFI problems, the League is now including it in its recently revised RFI packet. To obtain your copy of the packet, send a large (9" × 12") self-addressed, manila envelope with sufficient postage for 5 ounces to:

RFI Packet
American Radio Relay League
225 Main Street
Newington, CT 06111

If you already have a copy of the RFI packet and wish to obtain a copy of the list of manufacturers, send a business-sized, self-addressed envelope with postage for one ounce to League Headquarters, requesting this list. – *W4CIZ*

Build a Baby Ultimate

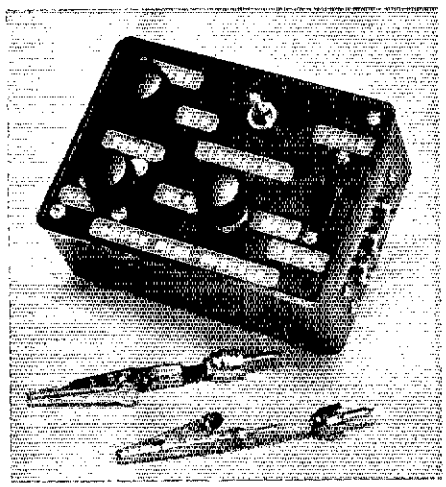
Got a match? Not a classic "match," but one between the antenna and your QRP rig may be what you need. If so, this article is for you.

By Doug DeMaw,* W1CER

Nobody needs or wants a 50-pound Transmatch during a QRP junket to a favorite lake, campsite, or other distant location. The entire point of QRP operation is negated when the low-power station can be held on the palm of one's hand, but the accessory gear needs to be transported by hand truck to the car, airport, or whatever! Operators who prefer to use a random-length wire antenna for field work will require a matching network between the 50-ohm transmitter output and the end of the antenna, whose characteristic impedance can be anything from a few ohms to a couple of thousand. For low-power work (25 watts or less) it doesn't take a big Transmatch to do the job, and some novel ideas can be applied to make the matcher cover 80 through 10 meters without a roller inductor or messy tapped-coil switching arrangement. This article shows some tricks that can be applied to meet that goal.

*Technical Editor, *QST*.

Exterior view of the Baby Ultimate. Dymo tape labels are used to identify the controls.



The heart of the Baby Transmatch is the half-toroid variable inductor. It is the by-product of a few "skull sessions" between Andy Pfieffer, K1KLO, and the writer. Both amateurs are QRP "freaks," and finding the proper mechanical technique for building a miniature panel-operated variable inductor of reasonable inductance range was challenging and productive. The machine-shop skill and imagination of K1KLO can be realized when viewing the accompanying close-up photograph. Early efforts along this line provided a slider type of full-toroid variable inductor (rheostat style), and dismal results were had: the inductor Q was very low, approximately 5, as a result of the shorted-turn syndrome. Finally, a powdered-iron toroid core of Q1 material, 1-inch diameter, with 3/16 by 3/16-inch walls, was sawed in half and cemented to a plastic arm. The arm was glued to the shaft of the control so that it would enable the operator to change the coil inductance by moving the semicircular toroid section in and out of the coil. The coil in this unit was air wound, then cemented to a semicircular piece of plastic which is affixed to a plastic disk of 1-1/2-inch diameter. The overall coil-and-plastic assembly is glued to the 3/8-inch bushing and 1/4-inch diameter control shaft. Although all of the metal work was done from scratch on a lathe, an old volume control or rheostat bushing and shaft can be modified to perform the function required. All that's needed here is some amateur ingenuity! The tuning range of the variable inductor is 3 to 9 μH, and the unloaded Q was measured as 150 at 7.9 MHz. It is reasonable to conclude that the K1KLO "gizmo," as he calls it, could be made to cover a greater inductance range by making the coil bigger in ID and cementing both halves of the toroid core together – one atop the other – to provide greater permeability overall. Ferrite material is unsuitable for this component because of the hardness of ferrite. Without special cutting tools the latter will resist all efforts to saw through it. One half of an Amidon 1-kW balun-kit, powdered-iron toroid should be excellent for larger units of this kind.

Other Circuit Features

As is shown in Fig. 1A, S1 is used to switch an additional variable inductor (L1) in parallel with the K1KLO unit, L2. This provides a lower minimum-inductance amount for operation on 15 and 10 meters.

Fig. 1B illustrates some variations which will extend the Transmatch range down to 80 meters. The model shown photographically was designed for 40 through 10 meters. In the second example, S2 and L3 have been added to increase the total inductance to permit 80-meter matching. Also, C1 has been changed to a two-section 365-pF, bc-style variable, also for the same reason. A dual 365-pF capacitor can be used for the circuit at A, but the tuning rate will be much sharper than with the unit specified.

Three phono jacks are used for external connections. The first photograph shows a pair of clip leads which have been soldered to two phono plugs. These are used for making connections to a single-wire antenna and ground.

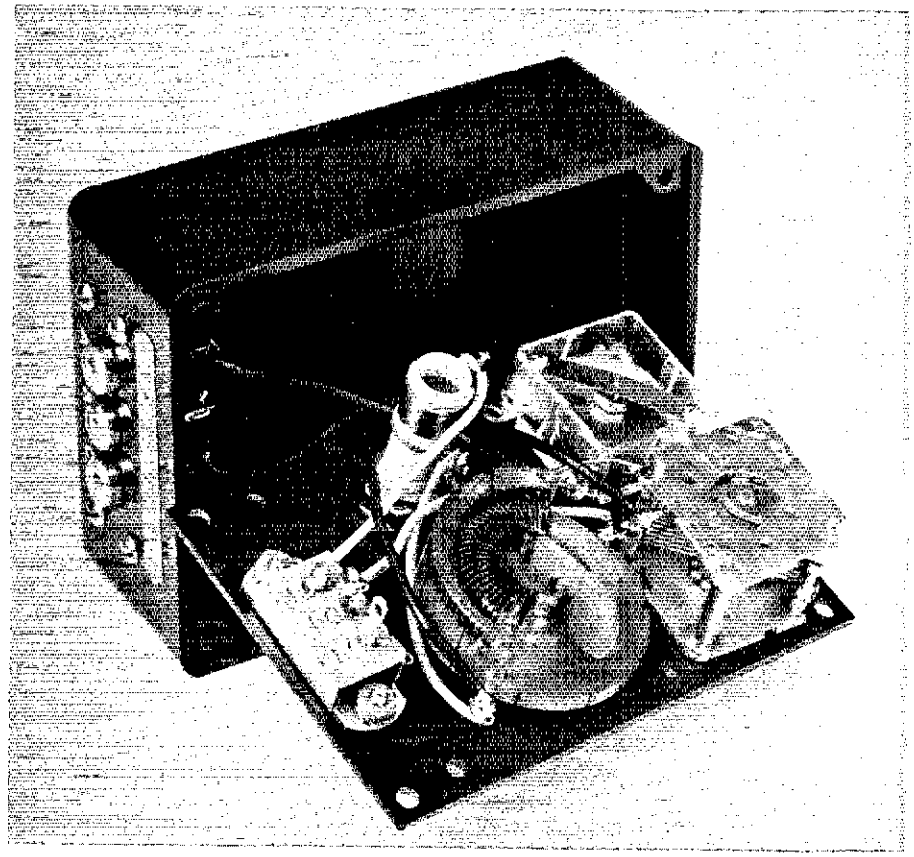
The slug screw of L1 protrudes from the top panel of the small plastic meter case. This feature enables the operator to have additional control of the overall inductance amount during operation on 15 or 10 meters. All internal ground connections are brought to a common point – J3, which has both of its terminals joined.

The "Ultimate" design is based on one which was popularized by W1ICP when he described in *QST* a 1-kW version of the circuit.[1] The network will match a wide range of impedances, but it should be pointed out that this circuit is not capable of providing much (if any) harmonic attenuation. Examination of the circuit will show that the network is basically a high-pass type.

Building the Transmatch

A 1-1/2 × 2-3/4 × 4-inch plastic meter style of case is used to house the Transmatch. The box used by the writer was made by RCA as an enclosure for a 9-volt regulated power-supply kit. Similar boxes are available at Radio Shack and other parts stores, but most have a metal cover. If the latter are used, it will be necessary for the builder to isolate the rotors of C1 and C2 from the metal plate.

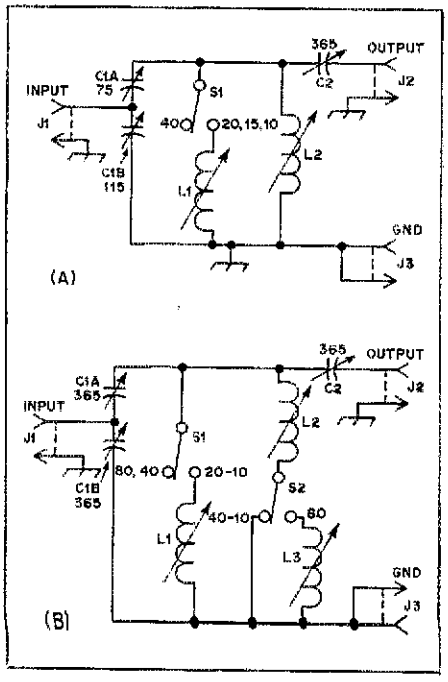
[1] McCoy, "The Ultimate Transmatch," *QST* for July 1970, p. 24.



Interior view of the matcher showing the K1KLO variable inductor (lower center).

Fig. 1 — The diagram at A is for the 40- through 10-meter Transmatch. At B, a suggested circuit for coverage from 80 through 10 meters.

C1 — Dual-section air variable (Miller 2109, J. W. Miller Co., 19070 Reyes Ave., Compton, CA 90224). See Text.
C2 — Calectro or Archer single-section miniature 365-pF variable.
J1-J3, incl. — Phono jack.
L1 — 3.1-to 4.8-μH slug-tuned inductor (Miller 4504 with red core).
L2 — See text. Contains 32 turns of No. 22 enam. wire, air wound, 7/16-inch OD.
L3 — 5.5-to 8.6-μH slug-tuned inductor (Miller 4505 with red core).
S1, S2 — Spdt slide or toggle switch.



unwanted inductances formed by the wires. Adhesive-backed plastic feet are affixed to the bottom of the case to keep it from moving about on the operating table.

Using the Transmatch

When matching the 50-ohm transmitter to a given antenna (fed with coaxial line or single wire in nature), an SWR indicator will be necessary between the transmitter and the Transmatch.[2] C1, C2, and L2 are adjusted one at a time for the lowest reflected-power reading on the meter. There will be interaction between the controls, so it will be necessary to go over them several times to effect an SWR of 1.

Some difficulty may be encountered while working with a voltage-fed (high impedance) wire antenna. The symptom is one of hand capacitance affecting the SWR reading. In such instances the tune-and-try method will be required, moving the hands away from the box after each adjustment. For this reason the builder may wish to house the circuit in a metal box and use insulating shaft couplings on C1, C2, and L2. Of course, this will make the unit somewhat larger.

The writer used this Transmatch for two weeks in October of 1975 while on a QRP sortie to Barbados (8P6EU). Maximum power used was 20-watts output, and minimum power was 2-watts output. The 40, 20, and 15-meter bands were used, and all manner of antennas (end fed and coaxially fed) were employed. In all cases the SWR could be set for a 1:1 condition. Insertion loss through the Transmatch was measured at 14 MHz while delivering 20 watts to a test dummy load. The loss was approximately 0.1 dB at a matched condition. No heating of the components was noted.

One final word is in order. Always use the maximum possible amount of capacitance at C2 when adjusting the Transmatch for an SWR of 1. There can be several settings of C1, C2, and L2 which will provide a match. Best efficiency will always occur with maximum usable C at C2, and this is true of all variations of the Ultimate Transmatch.

If you're a QRP enthusiast, this matcher should be part of your setup when 50-ohm antennas aren't used. It is lightweight, small of size, and can be tucked away in the XYL's handbag when enroute, if need be! QST

[2] DeMaw, "A QRP Man's RF Power Meter," *QST* for June 1973, p.13.

A Multiband Phased Vertical Array

Developing various radiation patterns by switching the phase of currents in vertical arrays is usually a one-band device. Here is an adaptation of the principle to a 5-band system.

By Layne La Baume,* W7HOI

Living in a basement apartment for several years was a tough situation for a former DX and contest operator. The writer dreamed of real estate adequate for trying out antenna ideas, but eventual purchase of a small home on a 75-by-100-foot lot imposed some practical limitations on this ideal. What then became necessary was a relatively unobtrusive antenna system, with reasonable potential for hf DX. We were headed for the low part of the solar cycle, which helped some. Concentration on 20 and 40 meters could be fairly productive for the next few years. If usable performance could be obtained on the other hf bands, so much the better.

Some directivity with a simple array of fixed vertical elements appeared to be a likely solution. The first step in planning a fixed array is to find out where most of your potential contacts lie. Examination of great-circle bearings indicated that over one third of the world's amateur population lay along a line roughly east and west of Salt Lake City. A fixed bidirectional array would be useful in this situation. If it could be made to have selectable broadside, endfire, or cardioid patterns, the directional coverage and rejection of interference from unwanted directions would be advantageous. Since high supporting towers were out of the question, and because radiation from horizontal antennas close to the ground in terms of wavelength is mostly straight up, vertical polarization was indicated.

Test with a Single Radiator

In the fall of 1973 the author installed a single vertical antenna, made from a telescoping steel mast adjusted to 35-foot length. It was fastened to, but insulated from, the side of the house and supported on a large soft-drink bottle, a few inches in the ground. Nylon rope was used for guying at 30 feet. The base of the antenna was fed through a Matchbox, to work into the complex impedances represented by this antenna on several bands. A four-foot rod was driven into the ground near the base, and two wires were run to cold-water pipes at the front and back of the house. More on ground systems later.

The worst-case use of this antenna, on 80 meters, probably entailed considerable loss, especially at low radiation angles, compared to the performance of a similar radiator in the presence of perfectly conducting (but unachievable) ground. Even so, it compared favorably with inverted Vs and other horizontal antennas operated less than a half wavelength above ground. The antenna served well in the 1973-1974 winter DX season on all bands from 15 through 80. All continents except Europe were worked on the latter band. The vertical gave a good account of itself in competitive situations, on paths requiring low radiation angle. A low horizontal radiator might have helped on closer-in stations.

Adding Another Element

An omnidirectional antenna imposes severe interference problems from both signals and noise, especially at frequencies like 7 MHz, so directivity was the next step. Two 32-foot elements were made by taking the telescoping mast apart and adding aluminum tubing to the tops to give the desired length. These were mounted alongside the house, 17 feet apart, with the top 18 feet of each radiator unsupported. Because they were slightly different mechanically, they were resonated separately to 7150 kHz by adjustment of length. This was done one element at a time, with the other removed from the field during the process.

More gain can be obtained with parasitic elements than with a pair of identical driven elements, but adjustment of the former is critical, and adaptation for multiband use is complex. With two identical radiators the phasing of the currents can be adjusted to give omnidirectional, bidirectional (end-fire or broadside) or unidirectional radiation

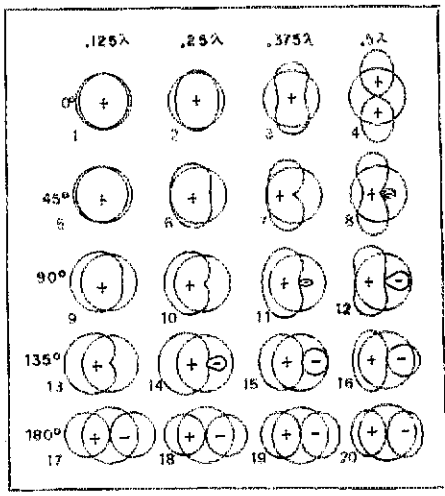


Fig. 1 — Some of the patterns obtainable with two vertical radiators of equal length, fed with equal currents. Pattern shape depends on the phasing of the currents and the spacing of the elements in terms of wavelength. The radiators are along the horizontal axis of the patterns, in each case. More complex patterns, obtainable with wider spacing of the radiators, are not given here. (After G. H. Brown.)

* 4232 S. 3920 West, Salt Lake City, UT 84120.

Table I

Summary of operating conditions obtained with two 32-foot vertical radiators spaced 16 feet apart, using coaxial phasing lines and switching of Fig. 2. The numbers refer to theoretical patterns given in Fig. 1.

Band, Meters	*80*	*40*	*20*	*15*	*10*
Spacing, *d*	.0625	.125	.25	.375	.5
Antennas in Parallel	1	1	2	3	4
Add L1	1	5	10	15	20
Add L2	5	9	18	11	4
Add L3	5	13	10	7	20
Add L4	5	18	2	19	4
Add L5	9	5	10	15	20

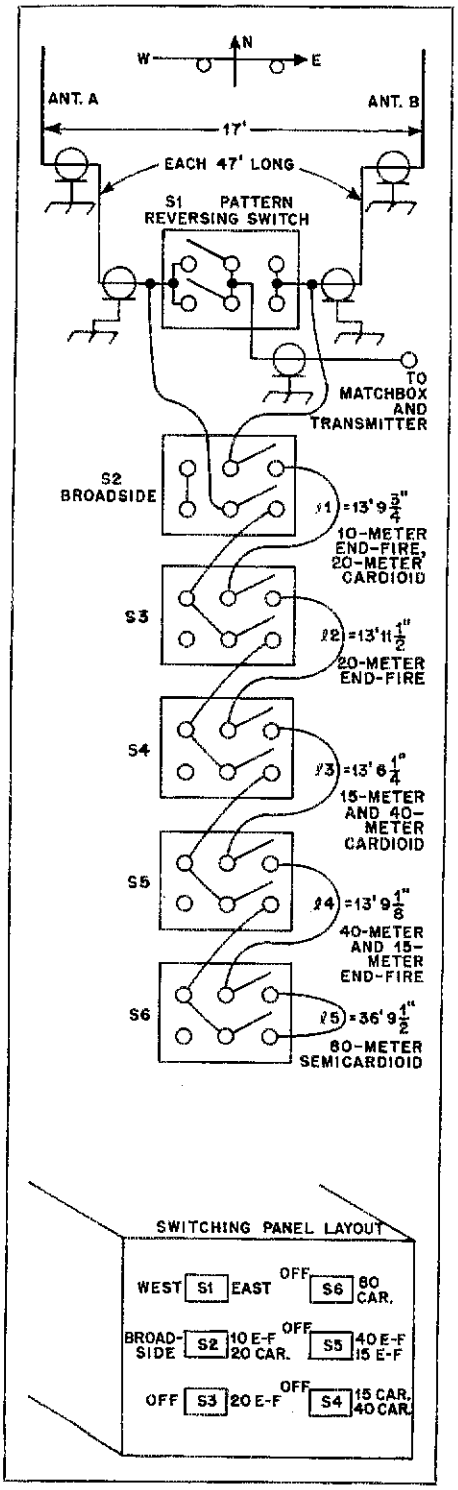
patterns. The degree of success in achieving these various ideals depends on the physical spacing of the elements in terms of wavelength. The basic information derived by G. H. Brown many years ago,[1] and given in part in Fig. 1, has been used in many amateur antenna systems intended for one-band operation.[2] The principal element of novelty in the array at W7HOI is its application to several bands, by means of switching at the operating position. Some critical factors are involved, and there are compromises with the ideal patterns of Fig. 1, but useful performance has been obtained on all bands from 80 through 10 meters.

At the low-frequency end of the hf spectrum, the array tends to act like a widely spaced transmission line. Contacts are made with it on 80 meters, but the performance is not equal to that achieved with the single radiator mentioned earlier. The spacing is 1/8 wavelength at 40 meters, so the ideal cardioid pattern, drawing 13 in Fig. 1, can be obtained with careful adjustment of the phasing. The rather high degree of attenuation in the notch is very useful in this heavily used band. Theoretically it should be possible to eliminate all pickup over a narrow angle at the back, but practical situations include variables that limit attenuation to something on the order of 20 to 25 dB. This is still better than is obtainable with some rotatable beam arrays. Gain and null depths in the bidirectional mode, using 180-degree phasing, are also good on 40 (see pattern 17 in Fig. 1).

Phasing Methods

The various combinations available with the line lengths and switch positions given in Fig. 2 are summarized in Table I. The numbers indicate the theoretical patterns of Fig. 1. Balance is important in developing the 180-degree phasing needed for the figure-8 patterns, 17 through 20. It is possible to use a well-designed Transmatch for this purpose, but optimum adjustment for all frequencies and impedances encountered is difficult. Better multiband operation was obtained through the use of 180-degree phasing lines and the switching arrangement shown schematically in Fig. 2.

Fig. 2 – Switching details and phasing-line lengths for the W7HOI multiband phased-vertical array. All switches are double-pole double-throw toggle types. They should be mounted close together, and connected by leads as short as possible.



To keep the investment in coaxial line to a minimum, the system was worked out to permit some of the lines and switch positions to do double duty. The switch S1 is for pattern reversal, switching the cardioid loops between antennas A and B for the unidirectional patterns 5, 9, 10, 13, and 15. It is left in either position for the other patterns. Broadside operation on all frequencies is obtained with the elements fed in parallel (S2 in the left position). The combinations of phasing lines for the band and pattern desired are selected by means of S3 through S6, as indicated in Fig. 2. Line lengths given are for foam-insulated 50-ohm line with a velocity factor of 0.8.

Installation

It is important that the coaxial lines from the bottom of each radiator to the switching panel be the same length. They are 47 feet long at W7HOI, but they could be made resonant lengths on some bands to simplify matching. Any excess line can be coiled up inside the station. Lines electrically a half wave or multiple thereof in length repeat the antenna feed impedance at the junction. Lines electrically a quarter wavelength or *odd* multiples long can be used as matching devices.

The line from the Matchbox or Transmatch to the center terminal of S1 should be as short and direct as possible. The ideal arrangement is to have the two main lines terminate at S1 at the operating position, immediately adjacent to the matching device. The latter should have provision for connection at two levels of impedance, at least, to simplify matching on the various bands.

A less ambitious project in terms of bands covered can utilize a simple "antenna coupler" of the type that was common when balanced lines were more often used than now. Designs for coaxial cable (unbalanced line) to open-wire (balanced) line coupling, in editions of *The Radio Amateur's Handbook* of 1965 and earlier, are capable of preserving the balance necessary for good rejection in the figure-8 notches, if very high SWR situations can be avoided. Use of the toroidal-balun method for obtaining balanced output, as in some modern Transmatches, is not recommended for this application. It may work on some frequencies, but the precise balance needed for good patterns on all hf bands is unlikely. Using coaxial lines to obtain the 180-degree phasing simplifies the job the Transmatch is called upon to do, in covering five bands. Something like "The Ultimate Transmatch" of recent *Handbooks* will serve well in this role.

Effects of Ground

Information on the performance of vertical antenna systems is usually given

[1] This and all subsequent footnotes will appear at the end of this article.

in terms of that obtainable with a perfectly conducting ground. Practical situations vary greatly from this ideal, so estimates of gain and radiation angle obtainable in amateur installations are not readily made. Ground conductivity is a major factor in any vertical-antenna installation, and if good conductivity is not available in the nature of the land on which the station is situated, a good radial system must be installed if anything like the full potential of vertical antennas for DX work is to be achieved.[3]

W7HOI is located about 15 miles south of the Great Salt Lake, on land that was the floor of ancient Lake Bonneville. Salt content is high, and when the soil is moist the conductivity is quite good. The simple grounding described undoubtedly produces better low-angle radiation than would be obtained in high-and-dry sites. A considerable variation is noted between wet and dry weather in the operation of the antenna described. In most amateur radio locations there is no substitute for an effective radial system for obtaining outstanding results with vertical antennas on paths requiring low radiation angle. It is likely, however, that even simple radial installations will result in performance in DX work better than that obtained with most low horizontal-wire antennas, except at the nearer edges of the skip range.

In any event, consistent results with a simple unobtrusive system like the one described here should make it of interest to DX-minded amateurs who encounter real-estate or zoning problems in trying to erect horizontal arrays high enough to allow them to work well. Zoning restrictions impose a maximum limit of 35 feet for structure height in the writer's neighborhood, and building permits are required. This is not a situation for horizontal radiators, unless one is interested mainly in short-distance communication.

Footnotes

[1] Brown, "Directional Antennas," *Proc. IRE*, January, 1937. Excerpts from this classic paper are found in most antenna textbooks.

[2] Myers and Hall, "Phased Verticals in a 40-meter Beam-Switching Array," *QST*, August, 1972. Extensive bibliography included.

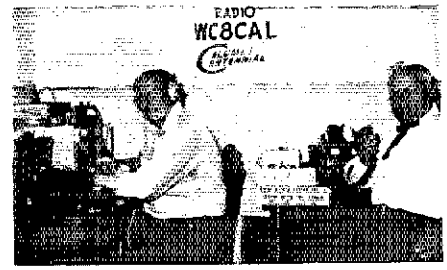
[3] Sevick, "The Ground-Image Vertical Antenna," *QST*, July, 1971. Landskov, "Pattern Factors for Horizontal Antennas Over Real Earth," [Editors Note] *QST*, November, 1975, p. 19.

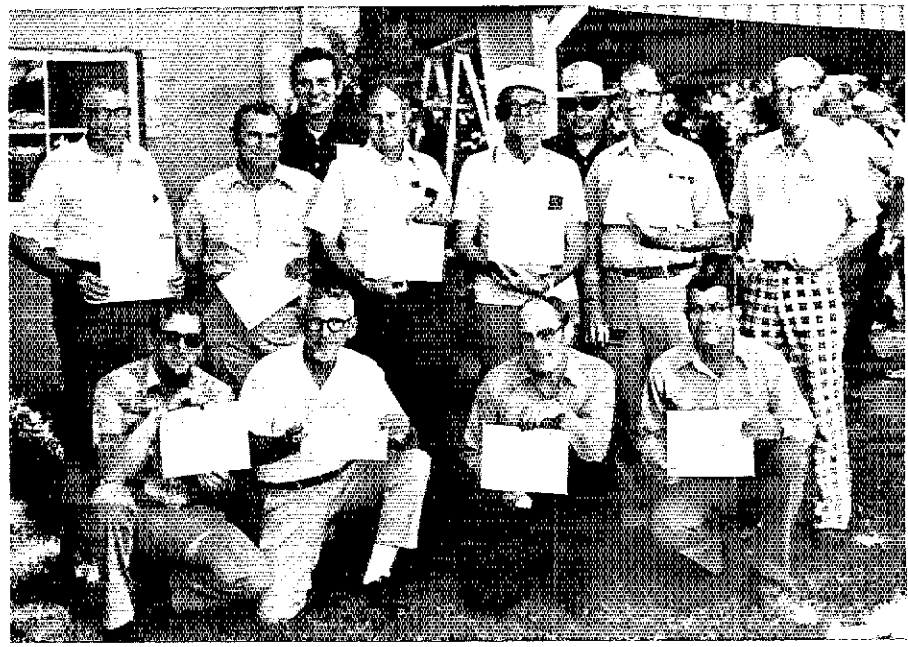
QST

Strays

Dick Van Dyke, left, and his director, Byron Paul, WA6RNG in center, greet Murray Bolen, W6ABR, who came to thank them for saving his life. W6ABR had seen their TV announcements for the National Fire Prevention Association. Recently, his clothes caught fire while starting a barbecue. Although he started to run in panic, he suddenly remembered Dick saying on TV, "Roll, Roll!". He fell to the ground and rolled out the fire. WA6RNG found out about it when he heard W6ABR describing the near-miss on the air. *(Photo by Bernie Ambramson, W6PJX.)*

□ Local press coverage in *The Daily Mining Gazette* spotlighted the operation of special event station WC8CAL during the Calumet Centennial Celebration in Calumet, Michigan. Specially designed QSL cards were mailed to approximately 650 contacts from each of the 50 states and from several dozen foreign countries. Dipoles and a vertical trap antenna topped the Calumet Village Hall which housed the station. Here W3GN and W8DQB are shown at the equipment.





□ The smiling winners of QSO Party Certificates at the Humbolt Tennessee hamfest are: bottom row (l-r) K4TKR, W4OGG, WA4GLS-SCM, WA4FFT, and back row, W4IGW, K4JSF, WB4CQC, WB4VEN, WB4MOZ, W4CYL, WA4GGV.

The Cheapie GP

Keeping an ear on 10 and 15 meters? With the trend of rising solar flux 15 meters "opens" nearly every day — 10 meters occasionally. Don't miss these openings. Build a Cheapie GP!

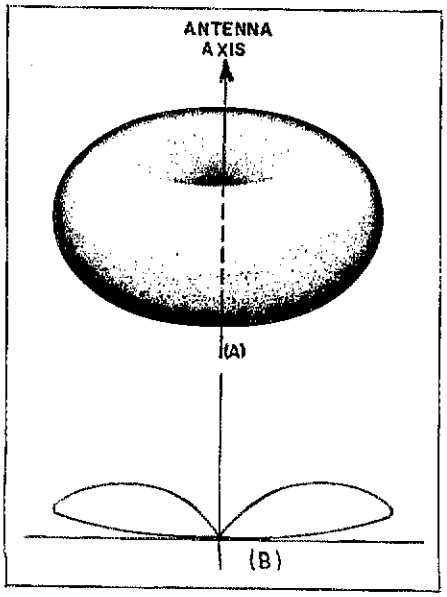
By Jay Rusgrove,* WA1LNQ

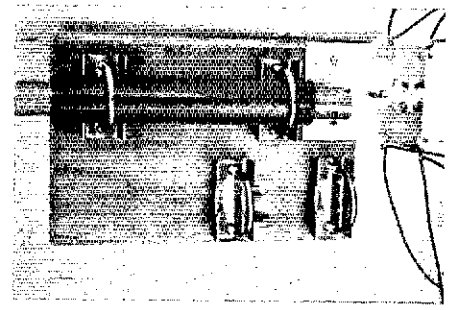
Looking for an antenna that covers the 10- and 15-meter bands that won't pinch your pocketbook? Should it contain easy to obtain items and be relatively simple to construct while using ordinary hand tools? Must it be physically small and not a neighborhood eyesore? If your answer to these questions is "yup," you've turned to the right page! Detailed here is a duo-band, coaxial-cable fed, trap ground-plane antenna system.

A ground-plane antenna consists of a vertical quarter-wavelength radiator and an artificial metallic ground system extending radially from its base. For good results the antenna should be mounted at least one-quarter wavelength above ground. This is approximately 12 feet (3.66 m) on 15 meters. At this height and higher, only four radials for each band are necessary to provide a good ground system. If this antenna was ground mounted, many more radials would be needed to reduce earth losses to an acceptable low level. The antenna has an omnidirectional horizontal or *H*-plane pattern which means radiation from the antenna is essentially the same in all horizontal directions as shown in Fig. 1A. In Fig. 1B the approximate vertical or *E*-plane pattern of the antenna is shown for the antenna mounted one-quarter wavelength above ground. As can be seen, maximum radiation occurs at the low angles above the horizontal plane of the antenna. The antenna has an overhead null so little energy is radiated at high angles. This does not detract from the usefulness of the antenna, since DX signals seldom arrive at high angles on these bands. Instead, maximum radiation is concentrated at the *lower angles* where it will be more effective. Conversely, a horizontal dipole mounted one-quarter-wavelength or less above ground will have maximum radiation straight up or nearly so. Lower angle radiation will not occur unless the dipole is raised to a height of one-half wavelength or more above ground. If it is not possible to mount your horizontal antenna a half wavelength above ground, the vertically-polarized ground plane is perhaps the logical choice over a dipole. As a general rule, the higher the ground plane can be located above power lines, gutters, house wiring and the like, the better it will perform.

*Beginner & Novice Editor, *QST*

Fig. 1 — A) Horizontal or *H*-plane pattern of the ground plane. B) Approximate vertical or *E*-plane pattern of the antenna.





Here is a photograph of the base assembly. The SO-239 coaxial connector and hood can be seen in the center of the aluminum L bracket. The U bolts are TV-type antenna hardware. The plywood should be coated with varnish or similar material.

A Duo-Band System

For the antenna to perform properly on two bands, it must function as a *separate* ground-plane vertical on each band. This requirement is met quite simply in the case of the radials since four radials are used for each band. The 10-meter radials are 8 feet 5 inches (2.56 m) long and the 15-meter radials are 11 feet 7 inches (3.53 m). When the antenna is operated in the 10-meter mode, the 15-meter radials have little effect on the system. Similarly, when the antenna is used on 15 meters, the 10-meter radials do not appreciably alter the operation of the antenna. The effect of the additional radials is to change slightly the feedpoint resistance and the resonant frequencies of the antenna.

The vertical member of the antenna must act as a quarter-wavelength radiator on both 10 and 15 meters. To accomplish this a trap is inserted in the 15-meter vertical section. Its approximate location is a 10-meter quarter wavelength above the base. The trap has a high impedance on 10 meters thereby electrically divorcing the top section of the antenna when it is operated on that band. The length of the 10-meter section (section below the trap) is some-

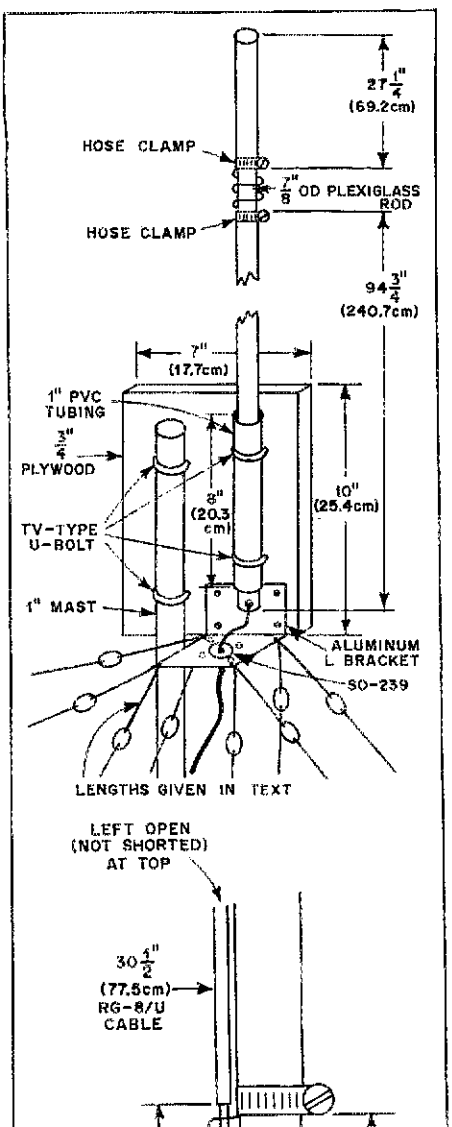
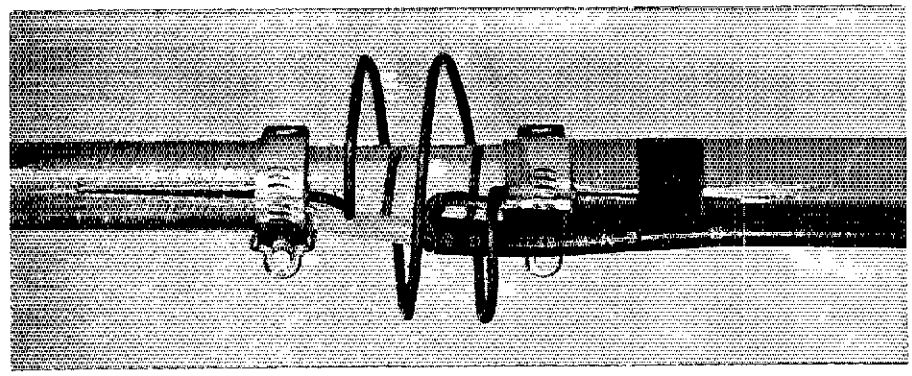


Fig. 2 – Constructional details of the duo-band antenna system.



This is a close-up view of the trap. The leads from the coaxial-cable capacitor should be soldered directly to the pigtails of the coil. These connections should be coated with varnish after they have been secured under the hose clamps.

what shorter than that of a simple 10-meter-only quarter-wavelength vertical. This is because the trap and top section of the duo-band system add top loading to the 10-meter portion of the antenna, reducing the length required for quarter-wavelength resonance. A coaxial-cable capacitor and a coil made from copper tubing form the trap which is resonant at approximately 28.150 MHz. On 15 meters the trap has a low impedance, effectively connecting together those portions of the antenna above and below the trap. The overall length of the 15-meter radiator is a bit shorter than a simple quarter-wavelength radiator would normally be for that band. This is because at 21 MHz the trap introduces inductance into the radiator – similar to the effects of a loading coil.

Construction

The vertical section of the antenna is mounted to a 3/4-inch thick piece of plywood board that measures 7 X 10 inches. Several coats of exterior varnish or similar material will help protect the wood from inclement weather. Both the mast and the radiator are mounted to the piece of wood by means of TV U-bolt hardware. The vertical is electrically isolated from the wood with a piece of 1-inch diameter PVC tubing. A piece approximately 8 inches (20 cm) long is required, and it is of the schedule-80 variety. To prepare the tubing it must be slit along the entire length on one side. A hacksaw will work quite well. The PVC fits rather snugly on the aluminum tubing and will have to be "persuaded" on with the aid of a hammer. The mast is mounted directly to the wood with no insulation. An SO-239 coaxial connector and four solder lugs are mounted to an L-shaped bracket made from a piece of aluminum sheet. A short length of test probe wire, or inner conductor of RG-58 cable, is soldered to the inner terminal of the connector. A UG-106/U connector hood is then slid over the wire and onto the coaxial connector. The hood and connector are bolted to the aluminum bracket. Two wood screws are used to secure the aluminum bracket to the plywood as shown in the drawing and photograph. The free end of the wire coming from the connector is soldered to a lug which is mounted to the bottom of the vertical radiator. Any space between the wire and where it passes through the hood is filled with GE silicone glue and seal or similar material to keep moisture out. The eight radials are soldered to the four lugs on the aluminum bracket. The two sections of the vertical member are separated by a piece of clear acrylic rod. Approximately 8 inches (20 cm) of 7/8-inch (22 mm) OD material is required. The aluminum tubing must be slit lengthwise for several inches so that the acrylic rod may be inserted. The two pieces of aluminum tubing are separated by 2-1/4 inches (57 mm).

The trap capacitor is made from RG-8/U coaxial cable and is 30.5 inches (77.5 cm) long. RG-8/U cable has 29.5 pF of capacitance per foot and RG-58/U has 28.5 pF per foot. RG-8/U cable is recommended over RG-58/U because of its higher breakdown-voltage characteristic. The braid should be pulled back two inches (50 mm) on one end of the cable, and the center conductor soldered to one end of the coil. Solder the braid to the other end of the coil. Compression type hose clamps are placed over the capacitor/coil leads and put in position at the edges of the aluminum tubing. When tightened securely, the clamps serve a two-fold purpose – they keep the trap in contact with the vertical members and prevent the aluminum tubing from slipping off the acrylic rod. The coaxial-cable capacitor runs upward along the top section of the antenna. This is the side of the antenna to which the braid of the capacitor is connected. A cork or plastic cap should be placed in the very top of the antenna to keep moisture out.

Installation and Operation

The antenna may be mounted in position using a TV-type tripod, chimney, wall or vent mount. Alternatively, a telescoping mast or ordinary steel TV masting may be used, in which case the radials may be used as guys for the structure.

Any length of 50-ohm cable may be used to feed the antenna. The SWR at resonance should be on the order of 1.3 to 1.5 to 1 on both bands. The reason the SWR is not 1 is because the feed point resistance is something other than 50 ohms – closer to 35 or 40 ohms

Nearby metallic objects may also have an effect on the impedance of the antenna. The antenna is resonant at approximately 21.150 MHz and 28.150 MHz.

Some amateurs place too much importance on obtaining a "no reflected power" reading on their SWR indicators. Most ham transmitters will load into lines which exhibit an SWR of up to 2 to 1, the exception being some of the new broadband, no-tuning transmitters. To demonstrate how little effect an SWR of 1.5 or 2 to 1 will have on the system, consider the following: if the antenna is fed with 100 feet (30.5 m) of RG-8/U cable and if the antenna is perfectly matched to the line (an SWR of 1), the power loss along the cable will be approximately 0.98 dB on 10 meters. If the SWR on the line is increased to 1.5 to 1, the additional loss on the line due to the higher SWR is less than 0.1 dB. If the SWR is increased to 2 to 1, the additional loss over that of the matched condition will be on the order of 0.2 dB. This amount of loss is insignificant, and for this reason a complicated matching network is not necessary. QST

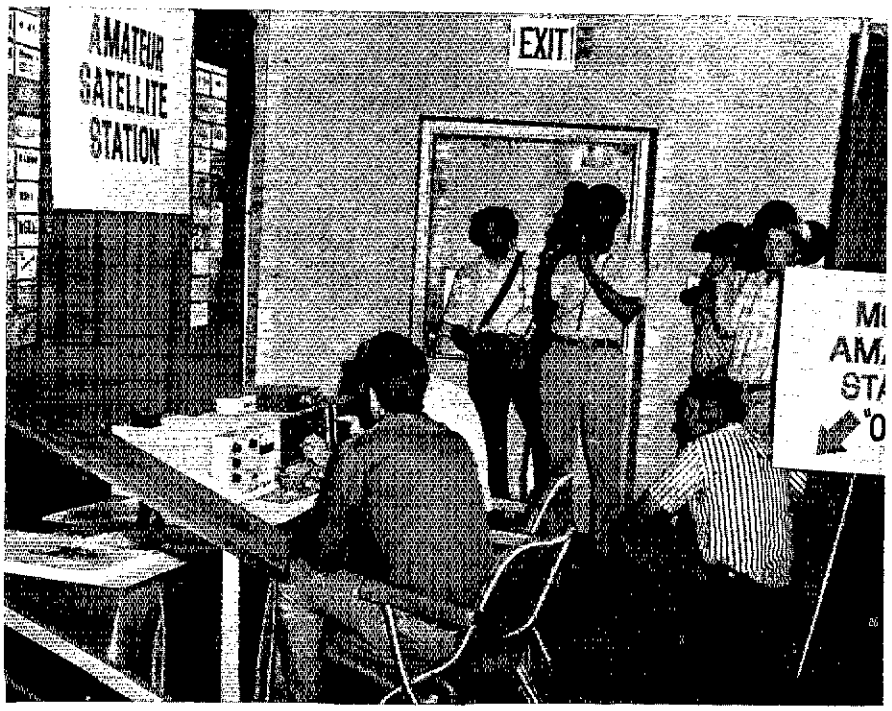
Strays

Teachers and Oscar became acquainted recently at the Goddard Space Flight Center, in Greenbelt, MD. The occasion was a conference on the use of the Oscar satellites as a classroom resource, in conjunction with the Oscar Educational Program, sponsored by NASA and the ARRL (see "Amateur Radio Boosts Education," *QST*, May 1975).

The conference introduced more than three hundred Washington area educators to the details and benefits of this program during the all-day affair. Hosts for the occasion were Elva Bailey and Richard Crone of Goddard's Educational Programs Office. Welcoming the teachers were Dr. John F. Clark, director of the Center, High Turnbull, president of the Goddard Amateur Radio Club, and Harry Dannals, ARRL president.

The program has brought "live" satellite communications into hundreds of classrooms around the country, with the assistance of local amateurs who set up temporary Oscar ground stations in the schools. The League helps arrange these demonstrations, provides on-the-air contacts and supplies teachers with a curriculum supplement, pre-recorded tapes and other materials to assist in planning and conducting classroom sessions in physics, mathematics, electronics and even social studies, as well as space science, using Oscar 6 and 7. Hams are supplied with orbit data, a set of guidelines for classroom demonstrations and other materials to assist them in the project.

Goddard club members demonstrate Oscar station to audience of educators as news media personnel look on. *(NASA photo)*



Educators have learned of the existence of the Oscar Education Program via news stories in educational publications, through NASA's newsletter to teachers and community visits by their Spacemobile team, and through ARRL's own educators' newsletter. The response has been consistently enthusiastic, with teachers seeking to know how they too can use the program. The Goddard briefing was one of the larger efforts to answer that need; more area briefing and teacher workshops are planned around the country.

At Goddard, teachers heard about the mechanics of the program from headquarters personnel, listened to an actual demonstration by the Goddard Club, and heard how the program has actually been used in the classroom from educators themselves who have used it. Among the panelists who described these experiences were Dr. Martin Davidoff of Catonsville (Maryland) Community College and an amateur himself; James Lin of the Nashua, New Hampshire, High School (a non-amateur); Angelos Tsaitsos of the Herkimer, New York, High School and an amateur; Robert C. Reiley, director of the Hall of Science of the City of New York and an amateur; Minot Parker, a spacemobile science education specialist based at Goddard; and Dr. Perry Klein, Amsat president.

There were also demonstrations of a typical amateur station, a beginners' station, a mobile station, amateur radio films, and educational materials available from NASA and ARRL. Also present at the briefing were Dr. Frederick Tuttle, director, and Dr. William Rich, associate director of the Educational Programs Division at NASA headquarters and Dr. James W. Latham, Jr., consultant in science to the Maryland State Department of Education.

As one of the conference attendees commented during a break in the proceedings, "This is a new kind of teaching tool – and it's certainly an exciting one. What's even more important, Oscar is something students can relate to directly."

A 2-Meter Frequency and Sensitivity Calibrator

This no-fuss unit will help you check your receiver for the "blahs."

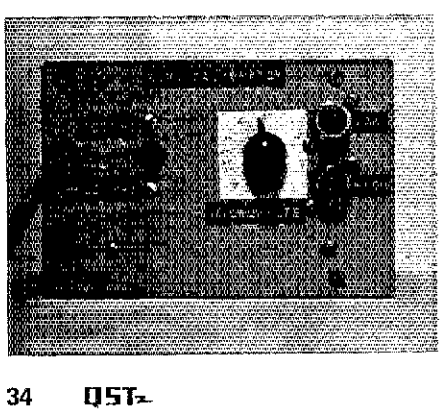
By Herman Lukoff,* W3HTF

An amateur doesn't need a shack full of test gear to keep his station at peak performance. Often, simple methods can be used as "first aid" to revive sensitivity of vhf receivers, especially those in the fm part of the spectrum. Here is an embellishment on an instrument that was described in April, 1972. If nothing else, you'll learn a bit more about those "dB[f] full quieting" numbers you hear bandied about.

How many times have you wished there was a simple way to test the sensitivity of your 2-meter fm receiver? The gain of the modern fm receiver is so great that if the sensitivity dropped by a factor of 2, you would never notice it in local repeater operation. It is only when you get to the fringe of a repeater or operate in the simplex mode that you wonder if the receiver is doing all it is supposed to. Decreased sensitivity of the rf-stage transistor caused by a transient or high rf field is not totally unknown.

*506 Dreshertown Rd., Fort Washington, PA 19034.

Front panel of the 2-meter frequency and sensitivity calibrator, housed in a 6 × 4 × 5-inch metal box. Although two output connectors are shown, only one is used, as explained in the text.



A Solution

Fortunately, there is a simple and low-cost solution. W1KLK provided the basis for it with his channel marker described in April, 1972, *QST* and repeated in the vhf and fm and repeater manuals. The device, starting from a 3-MHz crystal, provides markers every 30 kHz (standard two-meter channel separation) or 300 kHz. The thought occurred that if an appropriate output attenuator could be built, the device could be a useful vehicle for measuring receiver sensitivity. The big question to be answered was whether a simple attenuator could provide the tenths of a microvolt needed at 146 MHz. The signal generators used in service shops require extensive attenuator design and shielding precautions to produce the minute signal levels.

In this case the energy levels from the marker generator are so low at 146 MHz, starting from 30-kHz rectangular waveforms, that the attenuator and shielding required become very feasible. The unit constructed uses a standard SN7400 chip for the oscillator and amplifiers. Use of the higher speed SN74H00 and SN74S00 will generate too much vhf energy and overpower the attenuator.

The additions are shown in Fig. 1 and are detailed as follows:

1. The 100-ohm attenuator and 2700-ohm series resistor must be of composition or carbon type (Allen Bradley type J, for example). Wires leading to the potentiometer must be shielded, and the output connector must be located within an inch of the potentiometer terminals.

2. The output connector and potentiometer should be located physically as far away as possible from the rest of the circuitry. The 2700-ohm resistor must be located at the IC end of the shielded line so that there is no high-level signal near the attenuator.

3. Decouple both 117-V power leads with .01-μF disk-ceramic capacitors where they enter the box.

4. A .05-μF disk-ceramic bypass capacitor was found to be necessary on the +5-V line on the component board.

5. A metallic enclosure is required. All components can be contained within a 6 × 4 × 5-inch box with little trouble. If the metal is painted, be sure to scrape the paint off where the front and back panels contact the box.

Construction

The method of construction used requires no printed-circuit board. All small components – including ICs, resistors, capacitors, and crystal – were mounted and wired on a small piece of perforated board approximately 2-1/2 × 3 inches. A 2 × 2-1/2-inch hole is cut in the aluminum chassis, and the perforated board is mounted in it as shown in Fig. 2. The potentiometer and coax connecter are mounted on the front panel as far away as possible from the perforated board. The photograph shows two connectors, but actually just one is used. Plans to provide a "high" output had to be abandoned because it produced a leakage signal. The transformer and LM309K regulator are mounted on top of the chassis while rectifiers and filter capacitors are be

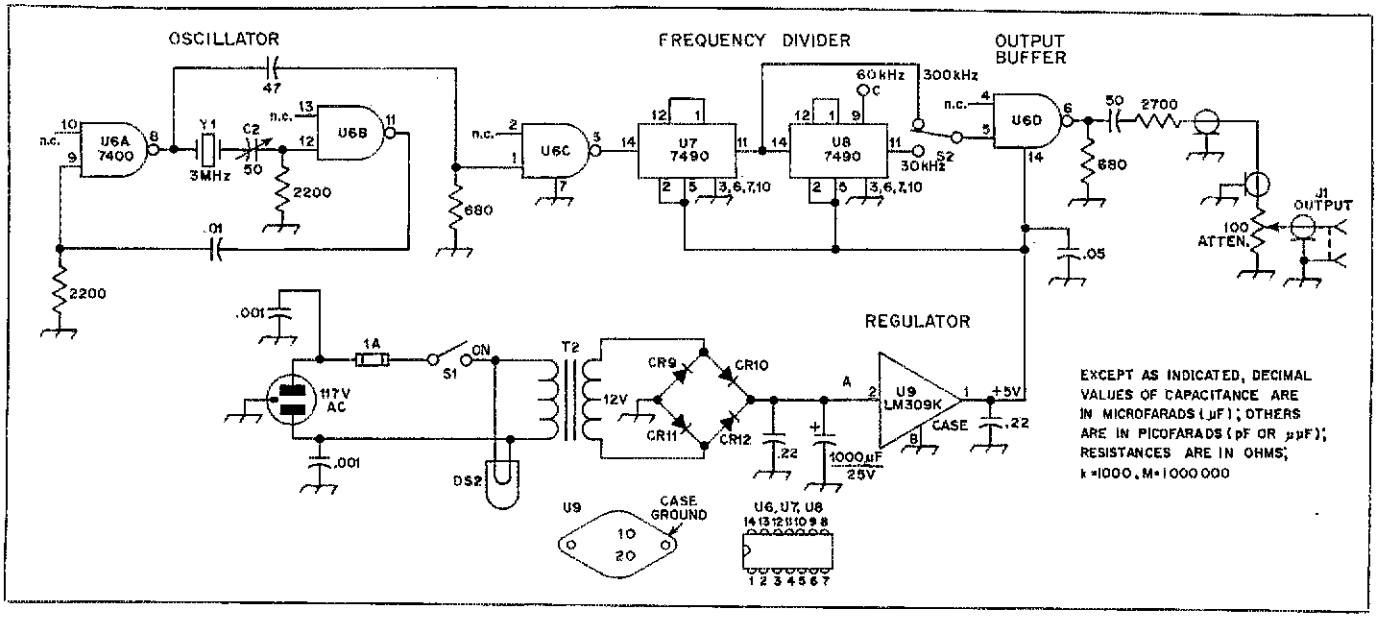


Fig. 1 — Circuit of the 3-MHz standard. Unless otherwise marked, resistors are 1/2-watt composition and capacitors are disk ceramic, except those with polarity marked, which are electrolytic. Components added by the author are enclosed by dashed lines.
C2 — 8- to 50-pF ceramic trimmer (Centralab 822-AN or equiv.).
CR9-CR12 — Silicon diode, 200 PRV or more, 500 mA or more (Motorola HEP156 or equiv.).
DS2 — Neon panel-mount indicator, 117 V. (Allied/Radio Shack 272-1501 or Leecraft 36N2311).
J3 — Panel-mount jack, phono type (Switchcraft 3505F or 3501FR, or equiv.).
S1 — Spst subminiature toggle (Allied/Radio Shack 275-325 or Calectro E2-116).
S2 — Dpdt subminiature toggle (Allied/Radio Shack 275-326 or Calectro E2-118).
T2 — Filament transformer, 12 V, 0.3A, pc mount (Allied/Radio Shack 273-1385).
U6 — Quad TTL NAND gate (Signetics N7400, Fairchild SN7400 or equiv.).
U7, U8 — TTL decade counter (Signetics N7490A, Motorola HEPC3800P, or equiv.).
U9 — On-card regulator, 5 V (National Semiconductor LM300K, Fairchild LM309 or UGH 7805393).
Y1 — International Crystal, type EX.

neath it. Other types of construction (pc board, for example) could be used, but they may present a problem in reducing the leakage signal.

Checking Your Receiver

After the calibrator is completed and checked against WWV, connect it to your receiver antenna terminal via a length of RG-58/U. The length is not critical and can be several feet. With the calibrator in the 30-kHz output position, there should be no detectable signal at the receiver output with the attenuator in the counterclockwise or "zero" position. The receiver squelch must be off (noise on) in order to detect any leakage signal. The leakage signal should be zero, or one or two tenths of a microvolt in the worst case. If it is more than this, additional shielding or grounding is necessary. I found it necessary to connect the perforated board ground wires to the chassis at four points in order to reduce the leakage signal. In any case, you can always get zero output from the calibrator by turning off the ac power. If some leakage is present, it means that your calibrator scale will start from that level rather that at zero microvolts, which is tolerable if the leakage isn't too high.

The method of detecting leakage signal is the same as for measuring sensitivity — by reading the audio noise output voltage. A signal can be detected as a change in audio noise voltage. The meter will give an indication before the operator can hear a change in noise and long before the first-limiter meter indicates a current change. Noise voltage is readily available at the speaker terminals but usually at too low a level for most ac voltmeters. This can be remedied by obtaining an old vacuum-tube output transformer (plate to 3- or 8-ohm voice coil) and connecting the secondary across the speaker terminals. The stepped-up voltage can be read across the transformer primary without having to subject the speaker or ears to a shattering volume.

One standard method of measuring fm receiver sensitivity is to increase the input signal until the noise drops 20 dB, which corresponds to a 10-to-1 drop in audio noise voltage. With the squelch and signal generator off, advance the volume control until the ac meter reads 10 V of noise. You will notice that the meter needle fluctuates, so set it for an average of 10 V. Inject signal until the average noise voltage drops to 1 V. That amount of signal in microvolts that produces the 10-to-1 drop in audio noise voltage is the receiver sensitivity for 20-dB quieting.

Calibration of the unit is a challenge. I was fortunate in being able to borrow an accurately calibrated Singer SG1000 which was used to calibrate my unit. Readers are hereby advised that each unit must be individually calibrated. The amount of signal output for a calibrator of this design is highly dependent on the rise time of the ICs used, and this can vary by a factor of 2 even from a particular semiconductor vendor's production line. Therefore, the calibration chart shown in Table I is given only as a guideline.

All is not lost if you cannot find a signal generator to calibrate your unit. Connect the unit into a receiver that is known to be working properly and adjust the attenuator to produce 20 dB of quieting. Mark the attenuator scale at that point with the manufacturer's sensitivity rating in microvolts. That gives you just one mark, but it is adequate for comparing receivers and can easily disclose that a receiver has lost gain.

Fig. 2 — A drawing of approximate parts location for the marker/sensitivity calibrator. Note that there is only one output connector, whereas the photograph shows two. The additional jack allowed too much leakage of the signal, therefore it was disconnected.

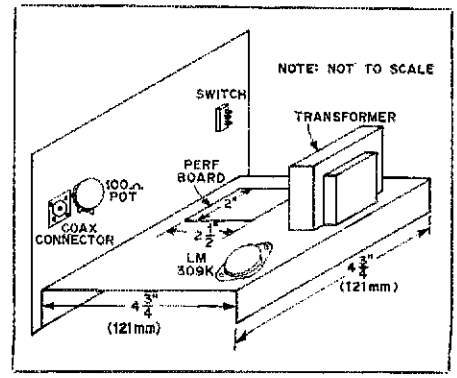


Table I

μV 146.76 MHz	Atten. Res. to Gnd. (ohms)
0.1	16
0.2	19.5
0.3	25.5
0.4	33
0.5	43
0.6	55.5
0.7	84

100-Ω control nominal = 117 Ω actual.
2700Ω nominal = 295 actual.

Even with an accurately calibrated source, there is room for error. All receivers are not 50-ohm input impedance and this will cause inaccuracies in the attenuator calibration. The same piece of coax cable should be used in connecting the unit to any receiver in order to eliminate another variable. Calibrate for one popular channel in your area and use it as the reference to eliminate another source of error.

Results

Within a day of completion of the unit, my sister-in-law, W3AAU, complained that her new two-meter rig just didn't sound right. Sure enough, a quick check of the mobile installation disclosed that signals were good one moment and marginal the next, but it wasn't obvious whether the problem was in the receiver, antenna or repeater. A quick check with the calibrator disclosed that with the attenuator at full output, the reduction in noise was barely perceptible. The receiver clearly had lost sensitivity. In this case we were lucky, the antenna relay contact was open. Within ten minutes the defect was fixed and the equipment was back on the air with solid reception. A check afterwards showed the attenuator had to be opened only 90 degrees to produce "full quieting." This episode occurred before the unit was calibrated in microvolts.

On another occasion several weeks later the XYL's GE "Pacer" intermittently lost sensitivity. The calibrator made an excellent signal source that permitted rapid disclosure of a poor ground. The constant weak signal from the calibrator facilitates finding those elusive intermittents.

Despite any shortcomings that the calibrator may have, I have found it to be a valuable piece of test gear that any two-meter fm-er can hardly afford to be without. It can provide sensitivity measurements comparable to commercial signal generators which cost much more, and best of all you don't have to keep retuning this signal generator to keep it on frequency. QST

Strays

□ Ed Bruns, W3EKT, took top honors recently in the sixth annual World RTTY Championship. This feat is especially significant because it is the first time that the winner was located outside Europe. The award, sponsored by the Italian magazine *CQ Electronica,* is based on the four best scores out of six possible contests taking place during the year.

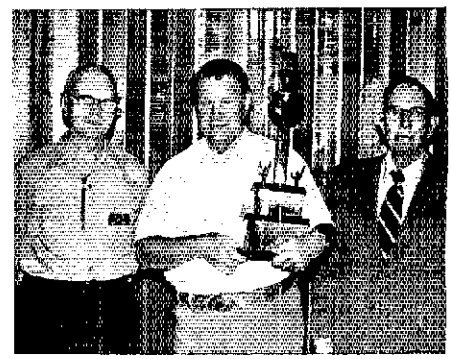
Ed Bruns, W3EKT, displays plaque he received for winning the World RTTY Championship.

Employed in the Communications Sciences Division at the Naval Research Laboratory, Ed is a very active member of the Naval Research Laboratory Amateur Radio Club. In his home station at New Carrollton, MD, Ed uses a Drake T4XC transmitter and an Eldico amplifier with 400-watts output and a Drake R4C receiver. For antennas he uses a dipole for the 80, 40, and 10-meter bands and has separate 4-element Yagis for the 15 and 20 meter bands.

□ Brotherly love, modern-day style, came into action when one of the members of the S.D.A. Radio Amateurs radio bible study group was hospitalized. Many of his friends expressed sympathy, prayers and best wishes over the air as well as with flowers and cards by mail. A daily check on his condition was obtained by a phone call at 5:30 A.M. and this was reported on the Net at 6 A.M.

When his condition improved, a local amateur near the hospital patched him through for personal words of cheer from his many friends up and down the states.

□ At the recent fourth annual Indianapolis hamfest, amateur radio received local TV coverage. Station WLW-I's Eyewitness News was there to shoot film footage of the site and to interview Dr. Don Miller, W9NTP, who outlined his future plans for amateur color TV. At WLW-I TV 13, the engineers responsible for putting the story on the air are: Doug Garlinger, WA9PQX, shader; Keith Spencer, W9LCL, projectionist; John Comstock, K9KFL, audio man; and Jan Frisinger, K9SKR, cameraman.



□ *QST* congratulates WØHS M. August McCollom, blind amateur radio operator, who received the Kansas Amateur of the Year Award at Concordia.

I would like to get in touch with . . .

□ persons interested in membership in Junior Skywatch (JSW) and those wishing to form a skywatch net. Membership open to those 12-18 years of age, UFO Net open to all. For detailed information contact WN9PFZ

□ professional photographers who also enjoy the hobby of amateur radio. WB8RZJ

□ anyone knowing the whereabouts of K1VJC, Arthur (Woody) Stanwood of Peabody, MA. WB2IYQ

□ amateurs who served in the U.S.N. aboard the *USS Wright* (CC-2), communications command ship, from 1964 - 1976. WB2IYQ

A Digital Morse Code Synthesizer

This project contains only 7 digital ICs and can be built in one weekend. Yet, would you believe, it has enough memory capacity to store 2,048 bits of preprogrammed code information.

By Jim Pollock,* WB2DFA

One of the most frustrating things that a cw operator endures is pounding CQ CQ for sometimes hours at a time without a reply, especially during a contest. When a QSO is finally conjured up after the repeated chanting of CQ CQ, ye olde fist is too tired to twitch. While we are not able to control propagation or atmospheric conditions, there is something that can be done to make the chore of tapping out CQ more bearable, even fun!

The answer lies in incorporating some automation in the station. This project was designed to send a variety of cw phrases like CQ, call letters, BT . . . BT, TEST, K . . . K, V . . . V, in any 32-step format desired. It is very versatile and economical, and the circuitry for the project is fairly simple. Also the unit has the capability of sending two programs, one of which can be selected by means of a switch. In my unit, I have one program for calling CQ, and another program for testing purposes.

The heart of this project is the application of two programmable read-only memories (PROMs) in such a manner that a total of 2,048 bits of code information can be obtained by using only 512 bits of memory! A PROM of this type is manufactured by Signetics, type 8223. The 8223 PROM is arranged in a 32 by 8 matrix. That is, each of the 32 available binary words have 8 bits. Each word has an address from 0 to 31, or in binary form, 00000 to 11111. Each of the 32 words can be made accessible at the output by means of 5 binary address inputs. Thus any of the 32 words that were stored into the memory can be selected by merely addressing the PROM with a binary number between 0 and 31.

PROMs in this project are used in conjunction with binary counters and simple data-select logic to digitally synthesize dots, dashes, and correct spacing. All of the components used in the code synthesizer can be obtained from Poly Paks. The cost of the ICs will run you about $21 if some of them aren't already lurking in the dark corners of your junk box. The most expensive are the PROMs ($7.95 each). From other sources such as industrial supply houses, the price jumps to $19.00 (ouch!) in small quantities, so thank goodness for surplus! Not too many people will get ecstatic over the prospect of paying almost $8.00 for just one 14-pin IC, but when you consider its content, it's a real bargain. Imagine, 256 memory cells arranged in a 32 by 8 matrix, complete with all of the necessary address decoding and select logic, all squeezed into a neat 14-pin dual in-line package. PROMs can be used to synthesize sequential logic that could take $100 worth of ICs to make, not to mention the aggravation of trouble-shooting and construction.

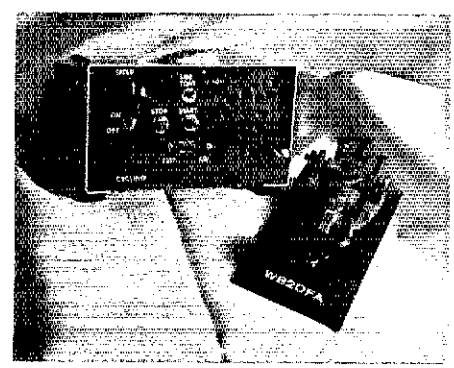
The speed and timing at which the code characters are sent are determined by a unijunction transistor oscillator that is variable from about 4 Hz to 40 Hz. That roughly translates into a range of 5 to 50 wpm.

Designing the Unit

Table I represents the truth table used in my unit. Note that in this particular truth table a binary address input of 01101 (word 13) will result in an 8-bit output of 10101010. An input of 00011 (word 3) will give an output of 111110011. Thus for any binary input from 00000 to 11111, an 8 bit word will appear at the output. So far, this hodgepodge doesn't look like anything that could generate code, but turn your attention to column B0. In column B0, the input address 00000 means that the output from column B0 will be a logic 0. However, when the counter chain advances to an address count of 00001, the output is a 1. In fact, for the address count states of 00001, 00010, and 00011, the output is 1. This is a *dash*. At address 00100, the output is 0. This represents a *space*. When the address counter advances to 00101, the output goes to 1 and then back to 0 at 00110. The 1 at the row address of 00101 (word 5) flanked by a 0 in the 00100 and 00110 rows of column B0 represents a *dot*.

Thus the 1 s make up the timing periods for the dots and dashes, and the 0s make up the timing periods for the spacing between dots, dashes, letters, and words. In this way, addressing the input of a programmed PROM with a 5 stage binary counter can be used to form the letters CQ. Column B0 from the truth table is used as an example. You will notice that the last dash in CQ is extra long. This was done to accentuate the sound and the rhythm of the CQ and make it more "ear catching."

The Morse code synthesizer has but six controls. A straight key (or semi-automatic bug) can be used in conjunction with it for manual keying of the transmitter.



*6 Terrace Ave., New Egypt, NJ 08533.

Fig. 1 — Block diagram showing the fundamentals of circuit operation of the code synthesizer.

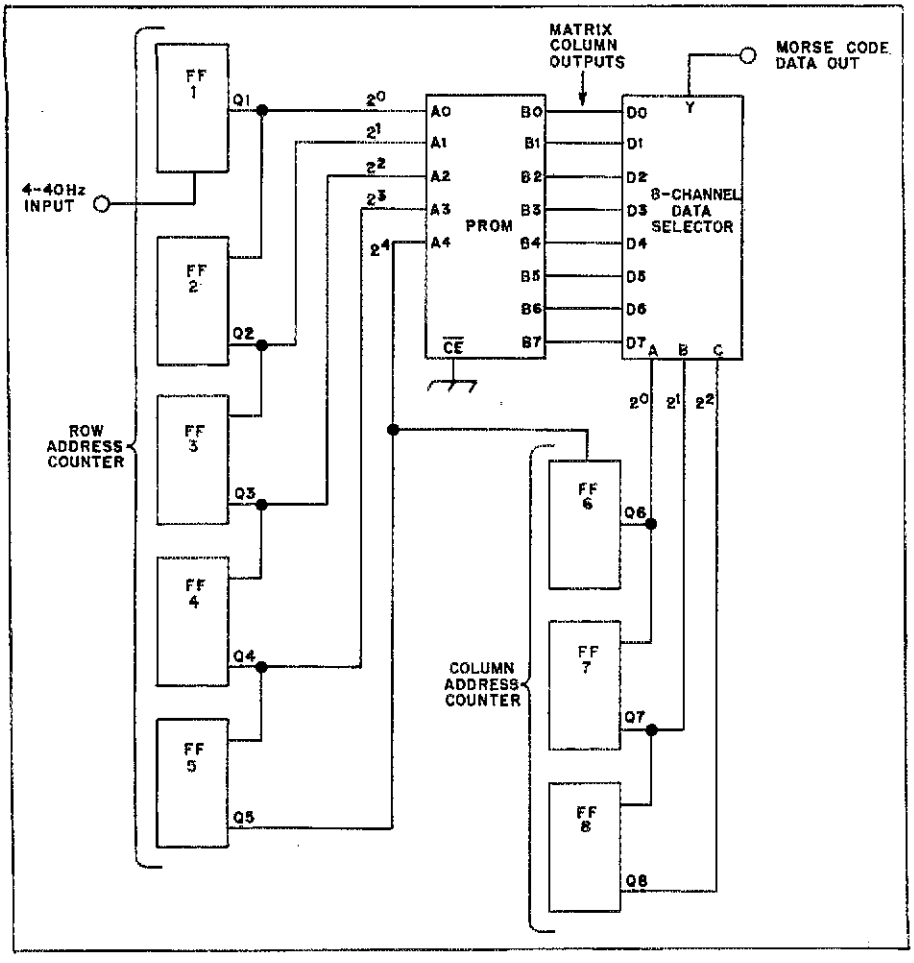


Table 1 — Data PROM Truth Table for Digital Morse Code Synthesis

	5-BIT BINARY ROW ADDRESS INPUTS						*COLUMN ADDRESS*							
WORD	A_4	A_3	A_2	A_1	A_0	*ENABLE*	B_7	B_6	B_5	B_4	B_3	B_2	B_1	B_0
0	0	0	0	0	0	0	0	0	0	0	1	1	0	0
1	0	0	0	0	1	0	1	1	1	1	0	1	0	1
2	0	0	0	1	0	0	1	0	1	1	1	1	0	1
3	0	0	0	1	1	0	1	1	1	1	0	0	1	1
4	0	0	1	0	0	0	0	0	0	0	1	1	1	0
5	0	0	1	0	1	0	1	1	0	1	0	0	1	1
6	0	0	1	1	0	0	0	0	0	0	0	1	0	0
7	0	0	1	1	1	0	1	1	1	1	0	0	1	1
8	0	1	0	0	0	0	0	1	0	1	1	1	0	1
9	0	1	0	0	1	0	1	1	0	1	0	0	1	1
10	0	1	0	1	0	0	0	0	0	0	1	0	0	0
11	0	1	0	1	1	0	1	0	1	0	0	0	0	1
12	0	1	1	0	0	0	1	0	0	0	1	1	0	0
13	0	1	1	0	1	0	1	0	1	0	1	0	1	0
14	0	1	1	1	0	0	0	0	0	0	1	1	0	0
15	0	1	1	1	1	0	0	0	1	0	0	0	0	1
16	1	0	0	0	0	0	0	1	0	1	1	1	0	1
17	1	0	0	0	1	0	1	0	0	1	0	1	0	1
18	1	0	0	1	0	0	1	1	0	1	0	1	0	0
19	1	0	0	1	1	0	1	0	1	0	0	0	0	1
20	1	0	1	0	0	0	0	1	1	1	1	1	1	1
21	1	0	1	0	1	0	1	0	1	0	0	1	0	1
22	1	0	1	1	0	0	0	1	0	1	1	1	1	0
23	1	0	1	1	1	0	1	1	0	1	1	0	1	1
24	1	1	0	0	0	0	0	1	0	1	1	1	1	0
25	1	1	0	0	1	0	0	0	0	1	0	1	0	1
26	1	1	0	1	0	0	0	0	0	1	0	1	1	1
27	1	1	0	1	1	0	1	0	0	1	0	0	1	1
28	1	1	1	0	0	0	1	0	0	0	0	0	1	1
29	1	1	1	0	1	0	1	0	0	0	0	0	0	0
30	1	1	1	1	0	0	0	0	0	0	0	1	0	0
31	1	1	1	1	1	0	0	0	0	0	0	1	0	0
ALL	X	X	X	X	X	1	1	1	1	1	1	1	1	1

In column B6 of the data truth table are the bits that make up V . . . V, which is handy for testing. When this column is scanned by the row address counter, di-di-di-dah . . . di-di-di-dah is synthesized. Therefore, to select words to be sent in code, one of the 8 columns is selected and the row address counter counts from 0 to 31 at a desired rate to form the dots, dashes and spaces that make up that word.

The truth table is filled in by starting with the 00000 row of column B0 and writing in the appropriate logic levels to form dots and dashes in the 32 available slots. It is important to keep in mind that the first bit of any sequence must be 0. If a 1 were placed in the 00000 row of column B0, then the transmitter would be keyed continuously when the row address counters were held in the reset state of 00000. In filling in this particular truth table, I found the following criteria useful in generating proper timing and spacing.

Dot	1 clock period
Dash	3 clock periods
Space	1 clock period
Space between letters	3 clock periods
Space between words	6 clock periods

[Editor's Note: For perfectly proportioned code the generally accepted spacing between words or groups is 7 clock periods. Fewer than this number are often acceptable, and are sometimes desirable to permit a message to fit into the available memory space.] I found that by using these guidelines whenever possible, the code was very rhythmic and consistent.

Inspecting Table 1 once more, you will note that column B4 contains K . . . K or the standard phrase meaning "invitation to transmit." Just like the last dash in the CQ column, the last dash in the second K is extra long. Column B5 contains the word TEST, and columns B1, B2 and B3 contain the phrase, DE WB2DFA. Because my call letters are so long, it took three 32-bit columns or 96 bits of memory to fit them all in. The lucky operators with shorter calls won't require as much memory.

How the Basic Circuit Works

The basic circuit of a cw message sending unit using only one PROM is shown in Fig. 1. Basic units like this one have been used with great success for automatic repeater identification. The flip-flop counter chain (FF1 through FF5) is the row address counter, and its outputs feed the 5 input address lines of the 8223 PROM. The column addressing is done by the last three flip-flops, FF6 through FF8. The outputs of these flip-flops feed a 3-bit binary digit, 000 through 111, to the address lines of the 8-channel data select IC, an SN74151. When the entire flip-flop chain is in the

reset condition (00000 000), the output of the PROM will be the logic value stored in the location where the 00000 row and the 000 column intersect. That address is the first location in the column B0.

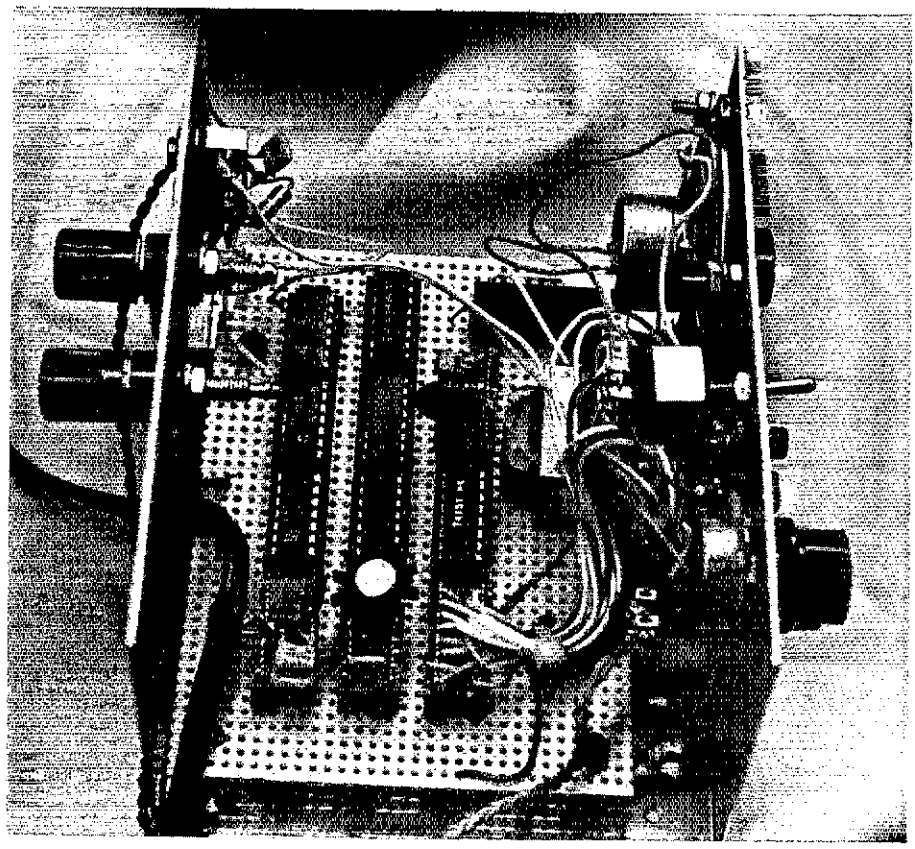
When the count cycle begins, the row address counter starts toggling, and the information in column B0 appears at the output of the PROM in the form of Morse code. When the row address counter has advanced to the count of 11111 (word 31), the output of the PROM will be that of the last bit in column B0. At the next clock pulse, the counter resets to 00000, and the column address counter advances to the count of 001, making the information in column B1 available at the PROM output. The process continues until all of the rows and columns are scanned. The last bit to be sent is the one located in row 31 of column B7. Its address is 11111 111. At the next clock pulse, the entire counter chain resets to 00000 000. The scanning is ready to start all over again, in a process analogous to the vertical and horizontal scanning of a TV screen.

Circuit of the Final Unit

The schematic diagram in Fig. 2 is that of the unit I built. Only seven ICs were needed to make this versatile unit, excluding the power supply regulator. The data for sending CQ, call letters, etc., are stored in U5. This is the data PROM. Morse coded information about such things as your QTH can be stored permanently on the chip. Since we have established a procedure for filling in a truth table for the 8223 PROM, it is just a matter of transferring the truth table to the memory cells of the chip.

Now we become faced with the dilemma of running out of memory space and using up PROMs like they were going out of style to store our code messages. Also another problem arises, that of designing sequencing logic to address the desired columns of the data PROM in any desired manner. That in itself is a formidable problem in logic design. For example, I desired the following sequence: CQ(0) CQ(0) CQ(0) DE WB2DFA(1,2,3) DE WB2DFA(1,2,3) DE WB2DFA(1,2,3) CQ(0) CQ(0) CQ(0) DE WB2DFA(1,2,3) DE WB2DFA(1,2,3) DE WB2DFA(1,2,3) CQ(0) CQ(0) CQ(0) DE WB2DFA(1,2,3) BT BT(7) K K(4).

The numbers in parentheses following each phrase of the message are not part of the Morse code, but serve to illustrate what column was being addressed while the message was being sent. Note that a total of 32 columns was scanned in this format. Why 32? The answer lies in the incorporation of another PROM to replace the complicated sequencing logic to address the data selector, U7.



An inside view of the Morse code synthesizer. As constructed by the author, it does not include a self-contained power supply but may operate from an external ac supply or 12-V dc source. Vectorbord, IC sockets, and point-to-point wiring were used. Note that discrete components and some interwiring conductors are plugged into the sockets.

Since 8223 PROMs are arrayed in a 32 by 8 matrix, and since the data selector needs 3 address lines, the 32 by 8 matrix can be sectioned off into the following matrices: 32 by 3, 32 by 1, 32 by 3, and 32 by 1. The two 32 by 1 matrices were not used, but the two 32 by 3 matrices allow storage of two independent formats or message sequences. Since a PROM is used to do the sequencing logic function, we shall call it the format PROM (U6). The truth table for my format PROM is shown in Table II. You will note that the binary numbers in the "CQ" columns, B2 B1 and B0, are the same as the decimal numbers in parentheses for each phrase of the message given above. Similarly, a test message is sequenced in columns B6, B5, and B4,.

In Fig. 2, UJT Q1 generates the pulses to drive the binary counter chain. Transistor Q2 is an amplifier to assure that pulse amplitude is sufficient to drive counter U2. U2 and U3 are 4-stage binary counters, each containing 4 flip-flops. U4 is a dual *J-K* flip-flop used to complete the 10-bit counter chain. Gate U1 is used as a start and stop latch, LED driver, and output signal gate. When the stop button S1 is depressed, pin 3 of U1 goes high, holding U2 and U3 in reset. Pin 6, however, goes low (0) holding the flip-flops in U4 at reset. When the start button S2 is depressed, the logic levels of the latch reverse, and the counter chain begins to count. S3 selects which message sequence from the format PROM is used to address the 8-channel data selector, U7. When S3 is in the CQ position, the last stage of the counter chain (pin 9 on U4) is coupled to pin 1 of the start-stop latch, U1. When the counter chain has reached the count of 11111 111, capacitor C7 discharges through resistor R5. At the next clock pulse, pin 9 of U4 goes low, and a negative-going pulse appears at pin 1 of U1. This pulse resets the start-stop latch, and the sequence stops. If it is desired to keep recycling the message, C7 can be omitted from the circuit, as it is during my test format.

The sidetone is generated by Q3 and is keyed by the output of U1C via diode CR3. C2, C3, C4 and C5 are rf bypass capacitors to make the counter chain immune to false triggering from strong rf fields. Q4 is a high-voltage transistor, and it is used to key the cathode of the transmitter. It gets its drive from U1C. The output of the data-select IC, U7, is NAND gated with the input for a key so that no switching from the message

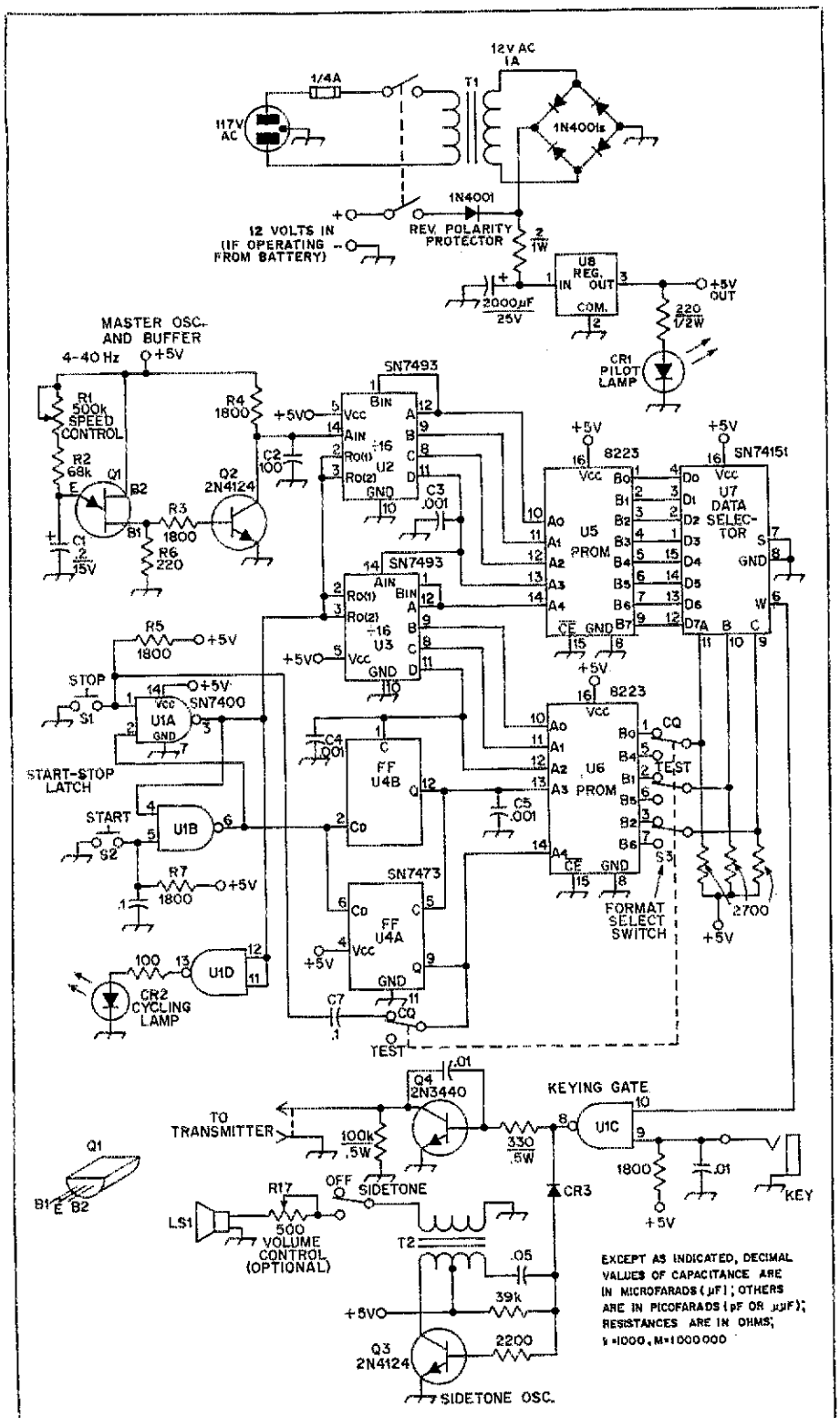


Fig. 2 — Circuit diagram of the code synthesizer. Unused pins of ICs are not shown. All resistors are ¼ watt unless otherwise noted. Parts not listed below are identified for text reference.

CR1,CR2 — LED, Archer (Radio Shack) 276-042 or equiv.
CR3 — Germanium diode, 1N34A or 1N270 or equiv.
LS1 — 8-Ω 2-inch speaker.
Q1 — Unijunction transistor, Motorola MU4891 or equiv.
Q2,Q3 — 2N4124 or Archer 276-608.
R1 — Linear taper.
R17 — Audio taper.
S1, S2 — Momentary push, normally open; Archer 275-1547 or equiv.
S3 — 4pdt slide, Archer 275-405 or equiv.
T1 — 12.6-V 1-A filament transformer, Archer 273-1505 or equiv.
T2 — Audio, line to voice coil, 500-Ω ct primary, 8-Ω secondary; Archer 273-1381 or equiv.
U1-U4, incl., U7 — TTL ICs, 7400 series.
U5,U6 — Programmable read-only memory, Signetics 8223 or equiv.
U8 — 5-V regulator IC; National LM309K, Archer 276-1770, or equiv.

sender to a key or keyer is necessary. In this way the sidetone generator is also keyed by the external key.

Program Flexibility

By using one PROM to control another PROM, the effective memory is greatly increased in much the same manner that cascading two amplifier stages greatly increases the gain. In a 32-step format, 32 rows of the data truth table are scanned for each of the 32 columns. Thus 32 × 32 or 1024 bits are scanned in each format.

In my CQ format, I used 6 column addresses (6 × 32 = 192 bits) from the data PROM, and 3 columns (3 × 32 = 96 bits) from the format PROM. That means only a total of 192 + 96 = 288 bits of memory is required to address a 1024 bit format. To accomplish this by using other methods, 4 PROMs would be required for just doing the CQ format alone!

Once you have made up your mind on what your 32-step format will be, you will still have another routine to select from the format PROM. If one format will meet your needs now, fine! The unused memory cells can always be programmed at a later time. As a suggestion, you could devise two CQ formats, one for general CQ, and another for calling CQ DX. If at any time you desire to have the synthesizer do other formats, you could start a library of data and format PROMs to cover all of your needs.

The synthesizer, as I have programmed it, sends CQ three times before sending the call letters three times. If you wish to send CQ nine times at the beginning of the program, push the STOP button after the third CQ. This will reset the address counters to zero. Pushing the START button will initiate scanning by the address counters, and CQ will be sent three more times. If the scanning is allowed to continue, the address counters will step through all of the address locations in the program. That is, the remaining portion of the program will be sent until the counters receive the instruction to stop, whether it be manual or automatic. Thus, all we need to do to have the unit send CQ nine times in the beginning of the program is to send the first set of CQs three (3) times. By applying this start-stop procedure in a systematic manner, we can lengthen and modify the existing program format in many ways.

Programming the PROMs

The 8223 may be obtained custom programmed from the manufacturer, or commercially available programming devices may be used to program the memory in the field. Such programmers are Curtis Electro Devices PR23 series and Spectrum Dynamics 300 and 400

Table 2 — Format PROM Truth Table (U6)

	BINARY ROW ADDRESS					TEST	CQ							
WORD	A_4	A_3	A_2	A_1	A_0	ENABLE	B_7	B_6	B_5	B_4	B_3	B_2	B_1	B_0
0	0	0	0	0	0	0	—	1	0	1	—	0	0	0
1	0	0	0	0	1	0	—	1	0	1	—	0	0	0
2	0	0	0	1	0	0	—	1	0	1	—	0	0	0
3	0	0	0	1	1	0	—	0	0	1	—	0	0	1
4	0	0	1	0	0	0	—	0	1	0	—	0	1	0
5	0	0	1	0	1	0	—	0	1	1	—	0	1	1
6	0	0	1	1	0	0	—	0	0	1	—	0	0	1
7	0	0	1	1	1	0	—	0	1	0	—	0	1	0
8	0	1	0	0	0	0	—	0	1	1	—	0	1	1
9	0	1	0	0	1	0	—	0	0	1	—	0	0	1
10	0	1	0	1	0	0	—	0	1	0	—	0	1	0
11	0	1	0	1	1	0	—	0	1	1	—	0	1	1
12	0	1	1	0	0	0	—	1	1	0	—	0	0	0
13	0	1	1	0	1	0	—	1	1	0	—	0	0	0
14	0	1	1	1	0	0	—	1	1	0	—	0	0	0
15	0	1	1	1	1	0	—	1	1	0	—	0	0	1
16	1	0	0	0	0	0	—	1	1	0	—	0	1	0
17	1	0	0	0	1	0	—	1	1	0	—	0	1	1
18	1	0	0	1	0	0	—	1	1	0	—	0	0	1
19	1	0	0	1	1	0	—	1	1	0	—	0	1	0
20	1	0	1	0	0	0	—	0	0	1	—	0	1	1
21	1	0	1	0	1	0	—	0	1	0	—	0	0	1
22	1	0	1	1	0	0	—	0	1	1	—	0	1	0
23	1	0	1	1	1	0	—	0	0	1	—	0	1	1
24	1	1	0	0	0	0	—	0	1	0	—	0	0	0
25	1	1	0	0	1	0	—	0	1	1	—	0	0	0
26	1	1	0	1	0	0	—	0	0	1	—	0	0	0
27	1	1	0	1	1	0	—	0	1	0	—	0	0	1
28	1	1	1	0	0	0	—	0	1	1	—	0	1	0
29	1	1	1	0	1	0	—	0	0	1	—	0	1	1
30	1	1	1	1	0	0	—	0	1	0	—	1	1	1
31	1	1	1	1	1	0	—	0	1	1	—	1	0	0
ALL	X	X	X	X	X	1	1	1	1	1	1	1	1	1

Outputs of this PROM are used to address the Data-Select chip, U7, which in turn selects the column from U5 to be sent.

series. The 8223 may also be successfully programmed in the field with a battery or dc supply and a switch, if care is used in the process. The manufacturer's instructions for such programming are given below.

The standard 8223 is shipped with all outputs at logical "0." To write a logical "1" proceed as follows:

1) Remove Vcc.
2) Remove any load from the outputs.
3) Ground the *Chip Enable* (pin 15).
4) Address the desired location by applying ground for a "0" and 5.0 ± 0.25 V for a "1" at the address input lines.
5) Apply +12.5 V to the output to be programmed through a 390-ohm 10-percent-tolerance resistor. Program one output at a time.
6) Apply +12.5 V to Vcc (pin 16) for 50 ms (1.0 sec. max.). Do not exceed a 25-percent duty cycle. Limit the Vcc overshoot to 1.0 volt max. with a "clamping" or "crowbar" circuit. Vcc current requirement is 400 mA max. at 12.5 volts.
7) Remove Vcc.
8) Open the output.
9) Proceed to the next output and repeat, or change address and repeat procedure.
10) Continue until the entire bit pattern is programmed.

I wish to acknowledge the invaluable assistance offered by Roger Amidon, K2SMN, Skillman, NJ, whose help made the project a success. Many thanks to George Graham, Hamilton Twp., NJ for his photography skills. QST

Strays

□ Bob Zimmerman, WA9ZSF, has developed a Morse code translator program as an engineering project at Southern Illinois University, Edwardsville Campus. The translator program is for Honeywell H-21 and H-22 minicomputers, commercial surplus computers originally designed for industrial control applications. Dot and dash differentiation is accomplished with a series of ratio tests. The program continually averages incoming dot and dash marks and character and word spaces to produce reference time periods; in this way the computer "learns" from the incoming code. Lag time is sufficiently short that changes in code speed seldom result in errors in translation. Typewritten text is produced for hand-sent code between 2 and 25 wpm. Additional information and punched tapes may be obtained from WA9ZSF, RR 1, Box 132, Dupo, IL 62239.

□ When Wallaceburg, Ontario, Canada, celebrated its 100th birthday with a parade, area hams set up base station CJ3DTR in the town police station along with 7 mobiles along the parade route. The mobiles were used by St. John's ambulance attendants as their base of operations. Favorable comments were made on the operations by Police Chief Ross Cushman. Standing (l-r) VE3BWT, CJ3BSM, W8SOE, W8OHS, VE3FVT, VE3HAY. Kneeling are:

CJ3EQY, VE3BIG, VE3FAM, and mobile in car, VE3CMC.

Product Review

The Heath SB-230 Kilowatt Amplifier

A new generation of hf-band kilowatt amplifiers is emerging. They are inspired in part by a new series of triodes from Eimac. Among these tubes is a conduction-cooled version which is designated 8873. The mechanical and electrical design offers features heretofore not available to amateur radio equipment manufacturers. First, conduction cooling eliminates the need for a blower or fan to cool the anode; only a heat sink is necessary. Second, the rather low plate-voltage requirement of 2200 allows the use of relatively inexpensive plate circuit and power supply components. Finally, the drive energy power needed for full power is low, thereby permitting the use of a 50-ohm resistive input circuit that simplifies the mechanics of band switching.

Heath has taken advantage of these tube features. The SB-230 is capable of one-kW input for cw service, and 1200-watts input for ssb operation. All of the components including the power supply are packaged in a receiver-size cabinet. The assembly weighs less than 34 pounds. Totally quiet operation has obvious advantages.

Circuit Description

A single 8873 tube is employed in a grounded-grid circuit. To develop the plate voltage, Heath uses a full-wave doubler system. Voltage regulation is good. The dual-primary power transformer may be connected for 117- or 234-volt operation. However, the latter is definitely recommended. During the initial ARRL testing of the SB-230, it was discovered that unless a "stiff" 117-volt circuit is available, the SB-230 breakers trip when the main power switch is turned on.

Five protective circuits are employed to assure proper operation and protection for the 8873 tube. One of these is a warm-up delay relay which prevents the amplifier from being driven for one minute after ac power is applied. During this period, however, the exciter is connected directly to the antenna. The one-minute warm-up period *is* required when using tubes with indirectly heated cathodes. Another protective feature of the SB-230 is an over-temperature thermostatically controlled switch. This device is connected to the heat sink and will disable the amplifier antenna relay should the maximum allowable anode temperature be reached. The test model was used by this writer during several contest activities for extended periods of time. At no time did the thermostat activate, which indicates the dissipation capability of the heat sink. It should be pointed out that the heat sink is exposed at the rear of the cabinet and presents a *minor* hazard should one touch it after a long period of operation. It gets quite warm. A circuit breaker shuts off all power in the event of a component failure which overloads the power supply. There are two cabinet interlock switches which interrupt the primary power should the top or bottom covers be removed without first pulling out the ac line cord. Finally, a protective fuse is located in the 8873 cathode lead. This protects the tube from being driven much beyond the rated plate current. It appears to be impossible for an inexperienced operator to damage this amplifier (unless he defeats the protective circuits!).

The input circuit departs from the ordinary by using a series of resistors from the input connection of the 8873 to ground. This network dissipates half of the exciter drive power and maintains a resistive load for it. Even though the resistor dissipates a considerable amount of power, exciters in the 100-watt output class provide plenty of drive to the SB-230.

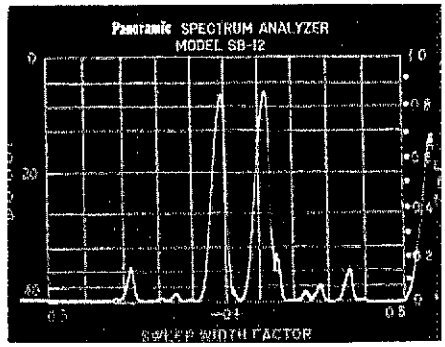


Fig. 1 — Spectrum-analyzer display of the output of the Heath SB-230 amplifier with a two-tone 1200-W PEP input. The horizontal axis of the display represents frequency, and the vertical axis amplitude. Each "pip" represents a single-frequency component of the rf output. The display is adjusted so the amplitude of each component may be read from the scale at the left, directly in decibels below the peak-envelope power (PEP) output, as rated by the manufacturer. Each reticle division represents 5 dB. Responses other than the two individual tones near the center are distortion products; fifth-order products 32 dB down may be seen here. Individual tones of the two-tone signal are down by 6 dB from the PEP output. This is because the tones are displayed as two discrete frequencies. At the instant when voltages of the individual tones are in phase, they add to produce a peak in the envelope wave-form pattern which is twice the voltage amplitude of a single tone alone. The power at the peaks of the envelope (PEP) is therefore four times that of a single tone, a 4:1 power ratio being equivalent to 6 dB.

Table 1

Band	Power output (watts)	Input drive (watts)	Input SWR	Efficiency
80	620	64	1.1	62%
40	665	72	1.2	66%
20	625	85	1.1	62%
15	590	90	1.3	59%
10	640	105	1.6	64%

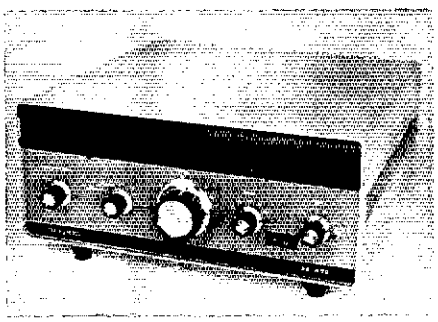
Power measurements made with the SB-230. Single-tone one-kilowatt input conditions are shown.

Operation

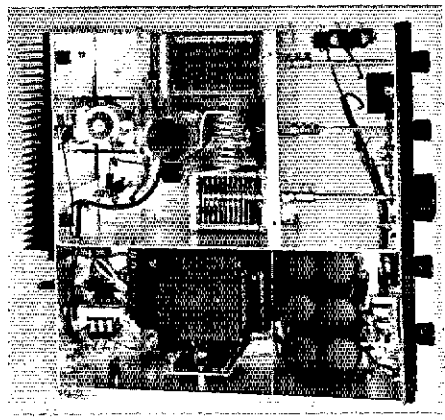
Without question, this amplifier is the quietest, simplest, and smoothest operating unit ever encountered by this writer. The kit was assembled in 18 hours and operated correctly the first time power was applied. While conducting initial tests, it was noticed that the power output dropped a bit during 10-meter operation, but the cause was quickly remedied by Heath. A service bulletin was issued advising the need to reposition the ferrite bead in the plate circuit. The correction took 30 seconds. Power characteristics of the SB-230 are given in Table I. – *WIFBY*

The Heath SB-230 Kilowatt Amplifier

Power input: 1000 watts for cw; 1200 watts for ssb.*
Power output: See Table I.*
Output tank-circuit: Pi network.
Input circuit: Untuned (resistor network).
Amplifier tube: 8873.
Plate dissipation: Approximately 400 watts when connected to the proper heat sink.
Cooling: Conduction.
Drive requirements: See Table I.*
Frequency range: 3.5 to 29.7 MHz.



Inside top view of the SB-230 with the amplifier compartment shield removed.



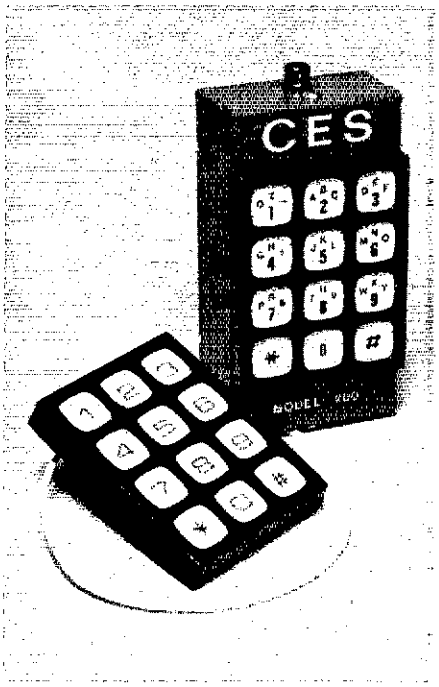
Metering: Plate current, grid current, relative output power and plate voltage.
Power requirements: 117/234 volts, 14/7 amperes.
Color: Green.
Dimensions (HWD) and Weight: 7 X 14-3/4 X 16 inches, 33.5 pounds.*
Price class: $340.
Manufacturer: Heath Company, Benton Harbor, Michigan 49022.

* Measurements made in the ARRL lab.

COMMUNICATIONS ELECTRONICS SPECIALITIES MODEL CES 200 AND CES 210 TOUCH-TONE PADS

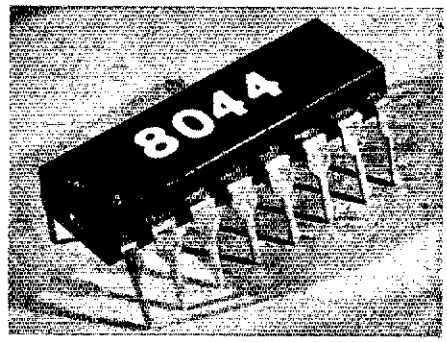
These two Touch-Tone pads from Communications Electronics Specialities, Inc. utilize the Motorola MC14410, MOS integrated circuit, for tone generation. The MC14410 is crystal controlled, providing accuracy and stability to within ±0.2% of the desired tone frequency. The pad functions like the standard telephone (Western Electric) Touch-Tone pads. Pushing two buttons not in the same row or column results in no tone generation. Pushing two buttons in the same row or column will produce the single tone for the selected row or column. The model 200 and 210 both did not seem to be affected by close proximity to rf fields. The keyboard used on both models is designed so that power is applied to the circuit of the pad assembly only when the buttons are pressed. The model 200 is powered by a 9-volt battery, and the model 210 will operate on any voltage from 7 to 35 volts.

Both the model 200 and model 210 are available from Communications Electronics Specialities, Inc., 814 Orwell Avenue, Orlando, Florida 32809 and both are priced at $49.95 each. – *WA6GVC*



CURTIS EK-430 KEYER AND 8044-2 KEYER KIT

When Jack Curtis designed his 8044 IC-keyer subsystem chip for the EK-430 CMOS keyer



– a factory-assembled unit – he must have realized the potential for a factory-wired and kit type of keyer in which the 8044 could be used. As a matter of fact, the two products appeared on the market at almost the same time. The EK-430 is called the deluxe keyer, and features low-drain operation by virtue of the CMOS LSI 16-pin dual-in-line IC which will provide hours of operation from a 9-volt transistor-radio battery. It can be operated also from the internal ac power supply. These features make the keyer a "natural" for home or field use. The QRP man or the power monger should find the EK-430 and 8044-2 products appealing as station accessories.

Both circuits are being treated in one review because of their close similarity. The principal difference is that the EK-430 has a built-in ac power supply – a feature not included with the kit model. Each format has an advantage. The factory-wired version takes zero hours to build, and comes in an attractive, rugged blue cabinet with white labels. Those building the kit version can implant the module in an existing piece of gear for the sake of compactness and utility, as this reviewer did when preparing a QRP transceiver for a recent West Indies expedition. Alternatively, the kit unit can be housed in a smaller cabinet than that of the EK-430 because there is no ac power supply. Of course, the do-it-yourself artist will save quite a few bucks by taking the kit approach, and nowadays that's not a small consideration!

The principal features of both models are: extremely low power consumption; self-completing (jam-proof) dots, dashes, and spaces; instant-starting clock; iambic squeeze keying; key-debounce circuit; weight control (adjustable from panel); internal side tone; diode-protected inputs; operates from any dc voltage from 3 to 15.

Key-down dc current is 30 mA with the side-tone circuit activated. Approximately 29 mA are taken by the monitor, so if it is turned off, the keyer will draw only 1 mA. Idling current for the chip is 50 μA when a 5-volt supply is used. Both keyers feature dot and dash memory, which prevents the operator from losing dots or dashes when "leading" the key.

The keyers are designed for grid-block and cathode keying. In either mode the maximum limits are 300 dc volts at 200 mA, minus voltage for grid-block keying and positive voltage for cathode keying. A nominal speed range of 8 to 50 wpm is provided, but by selecting the appropriate timing components the operator can obtain any speed range desired.

The EK-430 has a self-test button on the front panel. It permits speed adjustments without activation of the transmitter. There is also a pushbutton for transmitter tuning. It permits turning the transmitter on without using the paddle. An input jack is included for plugging in a straight key, just in case ARRL Straight-Key Night is your "thing." Or, if you're a bug enthusiast, you can connect the dash contact of your paddle to the straight-key input. There's no assurance, however, that your cw will come out with a "banana-boat" swing, and maybe it's better *without* that characteristic! The 8044-2 kit has terminals for providing the foregoing features, so all that's needed is additional jack and switch hardware.

Several months of testing with the EK-430 indicated smooth, trouble-free operation at the home station. No evidence of rf "glitching" was found while using the keyer with assorted rigs from 5 watts to 200 watts, 160 through 10 meters. Similar results were had with the kit keyer, even though it was subjected to intense tropical heat and humidity for two weeks at 8P6EU. With direct sunlight beating down on the keyer module, no change in speed or weighting could be discerned.

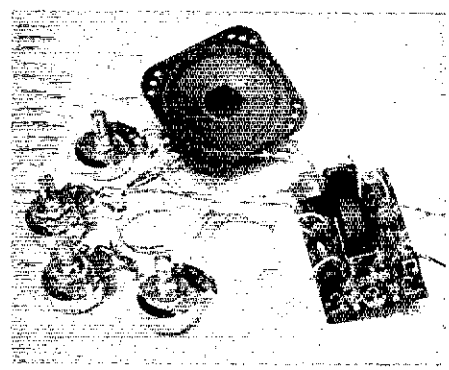
Assembly time for the 8044-2 kit was three hours. An additional two hours were required for mounting the pc module and controls in a small cabinet. Those with fat fingers and tired eyes may have difficulty wiring the kit, as the pc board is mighty small. A fine-tip pencil iron is required to prevent solder flows from one pc element to another, and to prevent damage from heat.

Paddles are not included with the keyers. It is nice to be able to select one's own precision paddle to use with the keyers. No need to make do with a cumbersome built-in paddle which might not be to the operator's liking. The price of the products is lower than it would be if a paddle was included, and that's worth some meditation also! – *W1CER*

Curtis EK-430 Keyer and 8044-2 Kit

Dimensions (HWD) and Weight: EK-430 – 2-1/2 X 7 X 4-1/2 inches, 1 pound, 10 ounces.
Power requirements: 75 to 135 V ac, 50-60 Hz, 1 W. Or 9 V dc, 100 mA maximum, 10 mA nominal. Ac not applicable to 8044-2 kit.
Price class: EK-430, $125. 8044-2 kit, $58.
Manufacturer: Curtis Electro Devices, Inc., Box 4090, Mountain View, CA 94040.

View of the assembled 8044-2 kit keyer shown with earlier 8043 IC installed. Speaker not a part of the kit, but all other components are.



Hints and Kinks

SIDETONE FOR THE ACCU-KEYER PC-BOARD STYLE

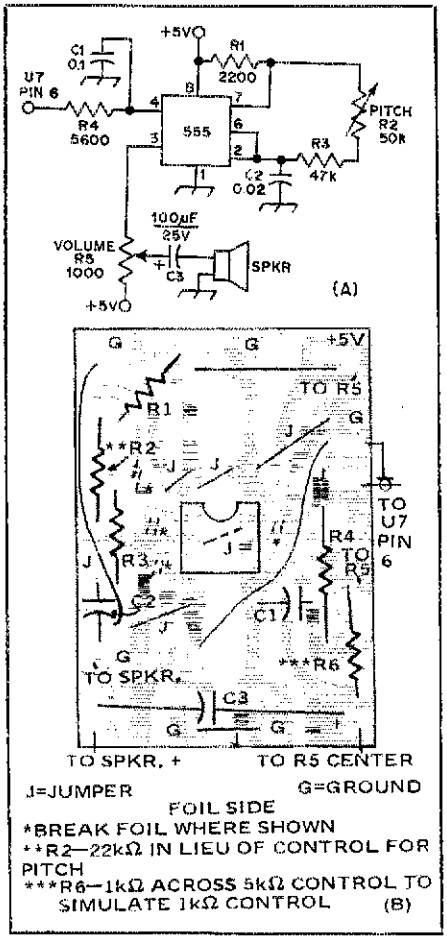


Fig. 1 — At A is shown the schematic diagram of the NE555 sidetone oscillator. At B is shown the modified Radio Shack printed circuit board used to mount the NE555 IC and its associated parts. The user of this hint should have the parts on hand and drill the mounting holes for the placement of those particular parts.

When building the sidetone oscillator for my keyer, the ubiquitous Accu-Keyer, I used a construction method which may be of interest to builders of most any keyer which requires a sidetone. Radio Shack offers a small (1-1/2 X 2-inch) experimenter's printed circuit board with pads for a 16-pin in-line IC package. The IC pads are drilled and have feeders to 16 larger pads at the edges of the board. I found that all of the sidetone components fit easily on the circuit board and, since the circuit uses an 8-pin NE555 timer IC (see recent editions of the *Handbook*), that the sidetone circuit could be reproduced by cutting the foil at 4 places and using the eight left-over pads as connection and mounting points. The result is a professional-looking board with no etching required. The schematic diagram and modified Radio Shack circuit board are shown in Fig. 1. I strongly recommend that those using this idea have the parts on hand and drill the board to suit those parts. – *Ron Mays, WA3WAE*

TESTING "DYE-ODES"

Power diodes are not always what they appear to be – that is, although failure is seldom due to excessive current, not all "new" diodes will "hold-off" their rated reverse voltage when placed in the circuit.

This startling fact was revealed after my linear amplifier final high-voltage diode-rectifier stack partially blew itself several times in an erratic fashion. Indication was that there should be some dynamic method (other than the usual cold resistance check on a VOM) of evaluating these components before they give up the ghost during a QSO.

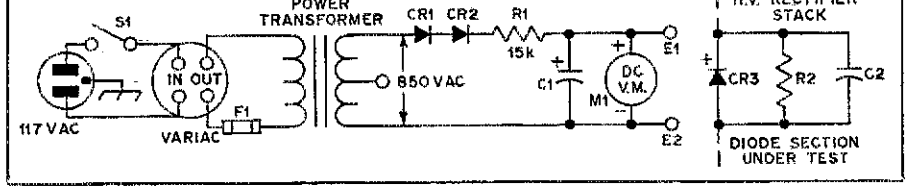
Most diodes used in amateur and commercial power circuits are rated in several amperes forward current with a reverse voltage rating of 1,000 volts. With this statement in mind, I decided to design a circuit which would permit each diode section to be tested to the full voltage. The circuit is shown below.

With S1 in the on position and test leads E1 and E2 clipped across the diode section under test, the Variac setting is increased from zero until C1 is charged to exactly 1,000 volts through R1 as indicated by the dc voltmeter.

Assuming CR3 and C2 are good components, the discharge path of C1 is only through the meter and R2. If any additional resistance appears in parallel with these resistances (such as a defective diode or capacitor in the section under test), the voltage indication on the meter will read lower because of the extra voltage loss across R1.

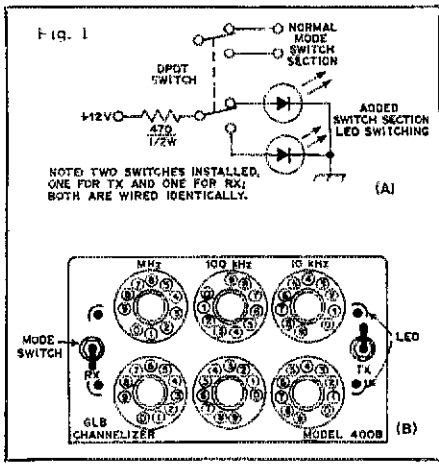
After the initial set up has been made on a "good" section, just flip S1 to the off position. Watch the meter reading decrease from 1,000 volts to zero (as C1 discharges thru the meter and R2), move E1 and E2 to the next diode section, turn S1 on, and watch for the meter to return to the "good" reading of exactly 1,000 volts. If the meter reads anything except 1,000 volts, you have a bad component (usually a diode) in that section.

When using this procedure, please remember that you are working with *lethal* voltages. Be certain the transmitter power supply is disconnected from the mains and the rectifier stack is lifted from the load; also, be certain the dc voltmeter falls to zero before moving the test clips to another diode section. With a little practice, you will find that this system works extremely well in locating those strange electronic devices known as "DYE-ODES" – *R. K. Dye, W8YLN*



LED INDICATORS FOR THE GLB TRANSMIT/RECEIVE SWITCHES

The GLB model 400B Channelizer has two front-panel switches for shifting each row of frequency selectors to either the receive or transmit mode. The operator must observe the position of the switches to determine which mode position they are in. This can be confusing and can result in operations on the wrong frequency, resulting in unintentional interference.



A simple and effective modification to provide a positive indication of switch position can be accomplished by the installation of LED (light-emitting diode) pilot lamps adjacent to each switch, corresponding to the switch position. This entails the careful drilling of four holes in the front panel of the GLB, the insertion of four LEDs, and the replacement of the original spdt switches with two miniature dpdt switches to handle the LED switching. LEDs of different color can be used if desired, making the indication of mode selection easily determined. The modified switch circuitry is shown in Fig. 1A. Both replacement circuits are wired identically; however, only one example is shown. The 470-ohm resistor is in series with the GLB 12-volt source, in the common leg of the

switch. Position of the LEDs on the front panel is a matter of choice, but they fit nicely within the quarter-circle panel markings are shown in Fig. 1B. In addition to the mode-indication value of this system, the LEDs also provide a visible indication that the unit has power applied. – *Bill Vandermay, W7ZZ*

HAM-M ROTATOR BRAKE MODIFICATION

Last fall I installed a Heights 72-foot free-standing aluminum tower with a TH6DXX Hy-Gain beam antenna. To swing this beam, I had a CDR rotator series No. 1 that had never been removed from the original carton. The immediate problem was the instant stop feature of the CDR with no way to install torsion bars (no guys), as recommended by Cornell-Dubilier, on the tower. I read with interest in May, 1974, *QST* the article by K8CM as well as the conversion data by CDR to update the Series No. 1 to Series No. 3. My ultimate goal was to turn the beam and to be able to stop it without the sudden stop. I didn't fancy operating a separate switch on the control box to de-energize the brake. The CDR control box has a switch that, when turned right or left to the first position, turns on the panel light and energizes the meter circuit to give beam position indication. When pushed to the extreme right or left the brake releases, the beam turns and, immediately upon releasing the switch, the brake is applied while the beam is still turning.

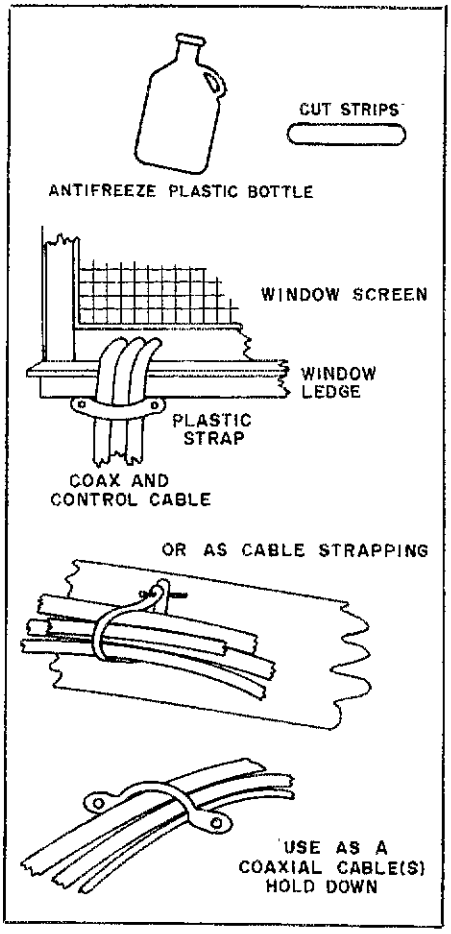
The enclosed diagram shows the conversion wiring from Series No. 1 to Series No. 3, and also the rewiring of the direction control switch. The switch, when placed in the first position to the right or left, turns on the panel light, energizes the meter circuit and releases the brake. If the lever is pushed to the extreme right or left, the rotator will turn to the desired position. When the lever is returned to the first position, the light and meter circuit is still on and the brake is off. The beam comes to a gentle stop. After a short delay, the lever may be returned to the center position, the brake-hold coil is then de-energized and the brake is applied.

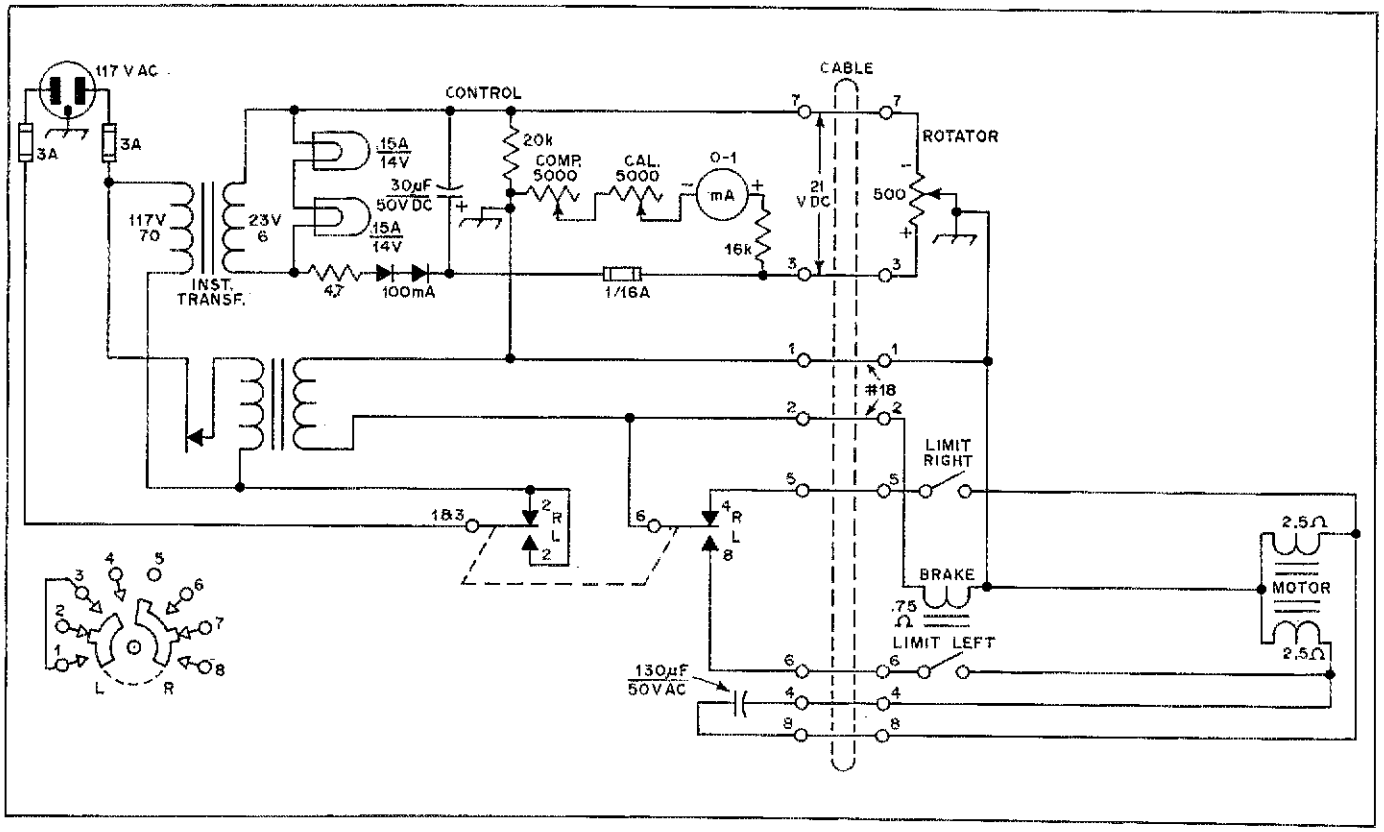
I used this system last winter, even through some severe wind, and found it to be completely satisfactory. The wiring is simple and the results are great! A simple rewiring job gives complete control of rotation with the original switch arrangement, with no drilling or altering of the control box case and no need for torsion bars! – *George A. Onsum, W7IC/K7IC*

COAXIAL CABLE STRAPS

Strips cut from plastic bottles make excellent coaxial cable and control cable strapping. Use either aluminum tacks or brass screws to resist rusting.

Plastic bottles come in various thicknesses and colors and usually are not of uniform thickness so select the portion of the bottle best suited for your needs. Anti-freeze bottles work very well. Wording on the bottle will not be seen since it does not show on the reverse side of the bottle. Paper cutters will do a better job than scissors or snips. – *Katashi Nose, KH6IJ* QST





Schematic diagram of the CDR control circuit with the W7IC/K7IC modification.

Telecom '75

Influential officials were in the audience when this paper on the Amateur Radio Service was presented at the World Telecommunication Forum in Geneva last October.

By George Jacobs,* W3ASK and Richard L. Baldwin,** W1RU

In this paper the authors present a brief history of the amateur radio service, its contributions to society, and its use of technological advances which have permitted continued growth within fixed frequency allocations. A key element of the amateur radio service is the enthusiasm with which its adherents participate in their various activities.

Broadly defined, telecommunications is big business. Industry and commerce depend upon it. Transportation would be utterly lost without it, and the world's masses are entertained by it. Profits are measured in big numbers and success in terms of increased volume of traffic for greater numbers of listeners.

But to the half million radio amateurs scattered around the globe, radio is something different. It is an exciting technique to be used to communicate with one's fellow man, to overcome the barriers of distance and boundary, and to achieve lasting friendships with other enthusiasts around the world, without any pecuniary interest involved. Perhaps only those who have had the experience can truly understand the thrill of assembling a small radio station and then using that equipment to talk with another radio amateur who may be in the next town, or the next continent. It is a form of self-expression and of world friendship that is without equal.

What better way is there to learn about radio communications than by participating in it?

Indeed, many of today's leading telecommunication officials and engineers can trace their first interest in their profession to participation in amateur radio, and they credit amateur radio to getting them started on their lifelong careers. If the experience of some countries is any criterion, the enthusiasm of amateur radio operators which leads them to professions in the radio communications or radio engineering fields is invaluable. What better way is there to learn about radio communications than by participating in it? Many of the young radio amateurs of today are certain to be the professional engineers and scientists of tomorrow.

The Beginning of Amateur Radio

How did amateur radio begin? In the latter years of the 19th century there already existed a keen interest in a new marvel — electricity. Amateur experimenters, mainly in Europe and North America, were making small electromagnets, motors, dry cells, static machines, erecting neighborhood telegraph lines and building numerous other experimental electrical devices.

"Wireless" was on everyone's tongue.

It was not until the very end of 1901, however, that an event took place that fired the imagination of these experimenters still further — Marconi's bridging of the Atlantic with radio signals. The press of the world was filled with jubilation, disbelief and triumph at this accomplishment. "Wireless" was on everyone's tongue. Large numbers of amateur electrical experimenters turned away from their electromagnets, motors and dry cells and began to explore the realm of radio communications. Amateur radio was born!

During the first decade of this century, amateur experimentation with radio was a difficult task, since technical and constructional material was scarce. A typical amateur station of those days consisted of an induction coil, a condenser and a spark gap for transmitting and a simple coherer-decoherer or galena crystal, and a single head telephone for receiving. It was not unusual for early radio amateurs to communicate with each other using such equipment, over distances of 80 to 160 kilometers.

International regulations were non-existent at the time, since there was no radio law. Everyone had an equal right to the air, and during the first decade of this century the number of amateur radio stations on the air greatly exceeded the number of coastal and ship stations — a fact that should qualify amateur radio as the "dean" of the radio services.

Radio Amateurs Have Been Pioneers

From the very beginning, the radio amateur has been a pioneer. He tinkers and experiments, he "tries this" and then "tries that," always with the purpose of extending the range of communication or increasing operator efficiency.

Radio amateurs were the first to demonstrate the enormous usefulness of shortwaves.

Space limitations will not permit a detailed review of all the contributions made by the amateur radio service to the field of radio communications

*U.S. Information Agency.
**General Manager, ARRL.

Radio amateurs were, however, the first to demonstrate the enormous usefulness of short waves, and they also pioneered the use of the vhf and uhf regions of the radio-spectrum. They were among the

Amateurs have led the field in devising techniques to reduce interference.

first to devise practical transmitting and receiving equipment using vacuum tubes, and they have contributed much to radio propagation research, as, for example, trans-equatorial scatter. Amateur radio was the first service to completely outlaw spark transmissions and among the first to utilize cw. Amateurs have also led the field in devising techniques to reduce interference so that greater use can be made of the radio spectrum. Likewise, the use of parametric amplifiers was pioneered in the amateur bands. Suffice to say that since its birth, amateur radio has been a clearinghouse for ideas, and a proving ground for almost every major technical and operational development in the field of radio communication.

From the early days, amateur radio has earned an outstanding reputation for providing communications during emergencies, when other means of communication fail or are overloaded. The annals of radio contain an impressive record of countless emergencies, natural catastrophes, epidemics etc., in which radio amateurs, with skill and devotion, and frequently at personal sacrifice, have served their communities and brought speedy relief to victims of suffering and need. Many thousands of lives, an untold amount of human misery and millions of dollars in property have been saved by their efforts. Radio amateurs consider such assistance not a duty, but an opportunity to serve humanity.

The Exploration of Space

Space exploration opened a new era for amateur radio, as indeed it did for all communication services. Amateur radio entered the space age on December 12, 1961, with the successful launching of

Amateur radio entered the space age on December 12, 1961.

the Oscar 1 satellite (Orbiting Satellite Carrying Amateur Radio). Built entirely by radio amateurs, and containing a beacon transmitter operating in the amateur 144-MHz band, the satellite was tracked by observers in thirty countries as it orbited for a three-week period. Since that time there have been a number of other successful amateur satellites, and at the present time two Oscars are in space and operating, providing reliable intercontinental communications for hundreds of amateurs utilizing frequencies in the amateur allocations at 28 and 144 MHz.

In passing, it is appropriate to note that in many countries, the first two-way space communication was made by amateur satellite, rather than via those satellites that have been established commercially – sometimes, several years before the commercial satellites were available.

A recent study of the growth of the amateur service throughout the world indicates that the present population of amateurs will grow to one million by 1982, and to about two million by the year 2000. This growth alone will increase the already severe crowding that

The present population of amateurs will grow to one million by 1982.

exists in the amateur frequency bands. No matter how we estimate how many amateurs use what frequencies during what hours to communicate with what areas of the world, the fact remains that amateur radio has outgrown much of the hf spectrum first allocated to it in 1927.

Radio Amateurs Have Been Progressive

How have radio amateurs been able to survive such an increase in their numbers without this growth being self-destructive? Only by the progressive adoption of the most modern technical and operating advances. Spark was the earliest form of radio transmission, but when continuous wave radiotelegraphy was developed, radio amateurs seized upon it immediately as a way not only of obtaining greater distances, but also of reducing interference. In the same way, radio amateurs adopted single sideband reduced carrier radiotelephony as a replacement for double sideband radiotelephony, because the signal was more efficient in spanning great distances and because it permitted more stations to work within the limited frequency allocations. Amateurs did this voluntarily, without the advice of an international panel of experts and without prodding from regulatory bodies (as was necessary in other services) because they recognized the spectrum-saving potential of these new modes as a means of survival. Similarly, amateurs early adopted many other techniques which enabled them to absorb the ever-increasing number of amateurs.

In an attempt to maximize the use of the amateur allocations, receivers were radically improved by means of quartz and mechanical filters, which reduced the bandwidth, improved the signal-to-noise ratios and thus made more effective use of the amateur frequency bands by reducing interference. It is worthy of

Amateurs adopted many techniques which enabled them to absorb the ever-increasing number of amateurs.

note that the first so-called "single-signal" receiver was developed by a radio amateur, and was immediately accepted as the standard in the field of communications.

Improved reception and more efficient transmission are frequently attained by the use of highly directive antennas at one or both ends of the circuit, eliminating interference to and from undesired points of the compass, and enabling more reliable communications.

Since amateurs work with the bands of frequencies allocated by international treaty, the use of stable but variable frequency oscillators permitted the users of a given amateur band to conveniently adjust their transmitting frequencies in order to avoid interference being caused by or to another amateur station.

It was thus that the technical inquisitiveness of radio amateurs, and their ready adoption of new techniques, relieved much of the pressure that came from an ever-growing population of radio amateurs.

Problems Facing Radio Amateurs

Nevertheless, the amateur population is growing. The allocated spectrum space has remained substantially unchanged since 1927. Under these conditions the amateur service faces ever-increasing limitations resulting from three principal problems:

a) increasing congestion due to the growing amateur population

b) impractical sharing arrangements with other services in some of the bands

c) the lack of suitable orders of frequency bands to support communica-

The amateur service faces ever-increasing limitations.

tions over the most heavily used paths during the normal daily and yearly variations in ionospheric propagation.

In many countries of the world there are sizeable populations of amateur radio operators, and without exception these individuals are banded together in amateur radio associations. A central staff of each such organization serves the functions of providing monthly bul-

letins for the members, coordinating operating activities, providing education and guidance for the members, and exercising liaison with other amateur societies.

The International Amateur Radio Union

Just as it is essential that there be an International Telecommunication Union to coordinate the activities of telecommunications on a world scale, so must there be an amateur radio organization to represent the interests of the amateur radio service internationally. That amateur radio organization is the International Amateur Radio Union, founded

. . . there be an amateur radio organization to represent the interests of the amateur radio service internationally.

fifty years ago in Paris and now representing eighty-eight healthy, progressive amateur radio societies around the globe. At the 50th anniversary celebration of the International Amateur Radio Union, held this spring in Warsaw, the delegates were honored to be addressed by Mr. Mili, Secretary General of the ITU. Later, in an editorial published in the *Telecommunication Journal*, Mr. Mili made the following statement, which is appropriate to quote at this time:

"The International Amateur Radio Union of Region I has just celebrated in brilliant fashion in Warsaw the first fifty years of its existence. This anniversary marks a decisive stage in the youthful, dynamic life of the IARU and is an appropriate moment to reflect on its future activities. So far as the past is concerned, the record is impressive considering the means at its disposal.

"The IARU now looks back on a half a century of intense activity which, thanks to disinterested research and sound scientific studies embracing the entire radio frequency spectrum, has made an appreciable contribution to the progress of radio-communication.

"They have also been fifty years of international co-operation which has forged a chain of human brotherhood between all those who, by taste or through dedication, have devoted or are devoting the greater part of their leisure time to seeking human contact over continents and seas, beyond differences of language, nationality, religion and political systems.

"Finally, they have been fifty years of chance contacts which have been instrumental in saving many lives, making the International Amateur Radio Union one of the most useful and dynamic organizations when it comes to helping save individual lives or the lives of many in natural disasters and catastrophes.

"I am glad to seize this opportunity of paying tribute and offering my best wishes to the International Amateur Radio Union . . ."

As we have endeavored to point out in this paper, the amateur radio service is a vigorous, vibrant radio service whose practitioners are perhaps the most

Radio amateurs have been responsible for much of the technical pioneering of the radio spectrum.

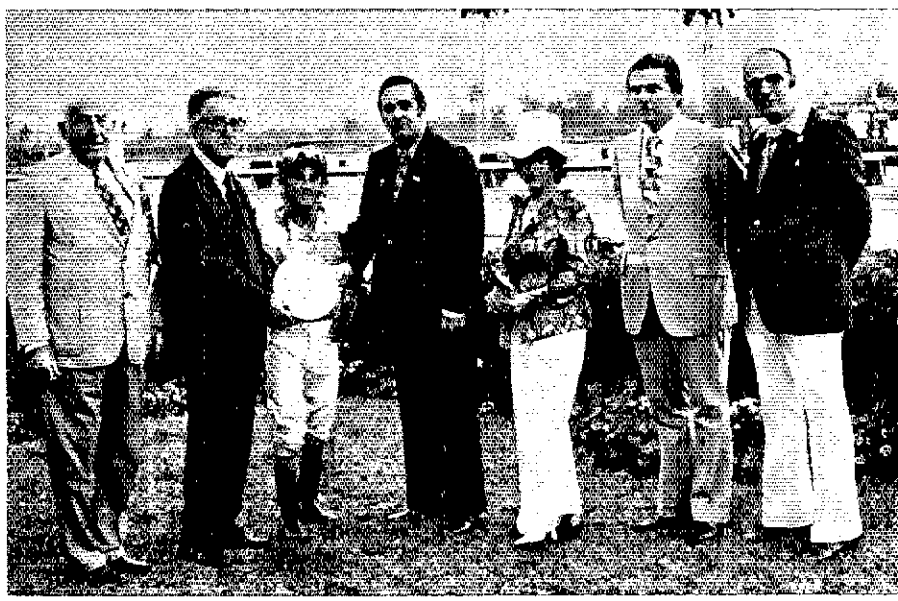
enthusiastic of all of the users of the radio-frequency spectrum. Radio amateurs have been responsible for much of the technical pioneering of the radio spectrum, they have provided vital service to their fellow men in many instances of natural disaster, they establish a person-to-person relationship of international character that is perhaps unmatched by any other activity, and they provide a reservoir of trained operators and technicians that has proven invaluable to many members of the ITU.

As Mr. Mili has said, " . . . the half-century that has gone by has amply demonstrated the importance of the part played by radio amateurs . . ."

On behalf of radio amateurs everywhere, we thank Mr. Mili for this statement, and we hasten to add that amateur radio *is* dynamic and the future looks even more exciting than the past. Unlike other radio services, the amateur service doesn't measure its success by volume of traffic, gross revenue, size of listening audience or profits in dollars and cents – simply by how well it has served humanity. QST

Strays

□ This group of Spanish-speaking radio amateur operators were among those honored on the Pan American Day Program at Gulfstream, FL for the large part they played in aiding hurricane victims of Fifi in 1974. Rafael Estevez, president of the Sociedad International de Radio Aficianados, received broadcast details from Rafael Tavares, an amateur operator in stricken Honduras, and his organization aided both in making known the magnitude of the disaster to the rest of the world and in bringing needed relief. The tenth race honored the organization. Standing (l-r) are: John Smith; R.D. Bokum II, owner of the winning horse; Mike Micelli, jockey; Rafael Estevez, WA4ZZG; Rossy de Merle, HK3DCQ/W4; Hon. Consul of Costa Rica, TI2DLM/W4; Diego Lopez, and Jacobo Delvalle, HK1CWN/W4 *(Photo by Jim Raftery)*



Changing and Chasing

Alphabet: a collection of the signs for the sounds of a language. This too is ham radio (or is it?).

By Ed Mehnert,* W3JZJ

"AC1ICP, this is IV3FIN. That's the list, Lew, and I'll drop the written logs in the mail today. You should have them by next week. How's your prefix-hunting coming along? Over."

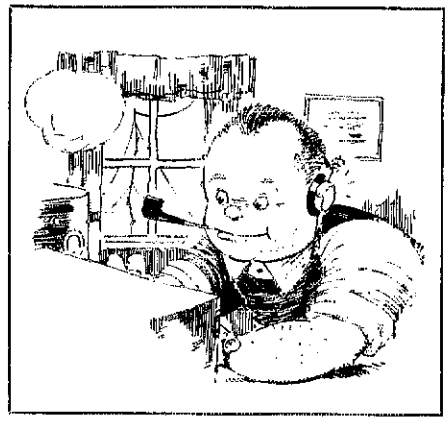
"IV3FIN from AC1ICP. Not too bad, Ed. Just reached 1,500 confirmed total. Just before you came on for our sked, I worked OK31XXZ. That's that special call for the 31st anniversary of the chocolate industry in Bratislava. QSL via UA5ØSSR."

"Missed his QSL manager, Lew. An XX6 came on top of you and called CQ PFX. Gimme a repeat. AC1ICP, this is IV3FIN."

"IV3FIN from AC1ICP. That's UA5ØSSR, Ed. And by the way I'd like to get that XX6. Angola, right? Got XX1, XX2, and an XX19, but no sixes. Oh, and didja hear AA76AA? He's just down the band. That's a special station in Philadelphia for the week of Thanksgiving only. Heard him working a 5L and an 8SM, so the band might be open for you, too. IV3FIN, this is AC1ICP."

"Roger, Lew, and thanks. I'll try to get him, if I can find him. Ten meters was open a while yesterday, and we got some new prefixes up there. Picked up some XLs and a CG3, all in Canada. And be doggoned if I didn't hear what sounded like an XG5-hundred. Can that be right?"

*Det. 9, 1141 USAF SA Sq. APO New York 09221



"Uh, let me see, Ed. Just got this week's edition of the *Prefix Chaser's Guide* this morning. Might be somethin in there, so I'll check. Oof! It's going to take a minute, cuz everyweek's Guide gets thicker and thicker. Here's C31, ET3, KL75 – that's the special one for the Fairbanks Surfriders' Championship next month. And Mexico will use XF until Friday morning, then XG1 till Sunday evening . . . Ah, here it is. XG5ØØ is for today only, for the 650th anniversary of Chapultepec's wedding. Where did you hear *that* one?"

"Break, break."

"Go ahead breaker."

"Hi, Lew. AC1ICP and IV3FIN, this is AC1ECH. Thought you might want to know that XG5ØØ was just down about 14225, chatting with a UR3Ø and an OK5Ø. This is the frequency for the Prefix-Chasers' Net?"

"Yup. The net starts in about half an hour. Thanks for the info, Gary. Ed, didja get that about the XG5ØØ? IV3FIN and AC1ECH from AC1ICP."

"AC1ICP and AC1ECH from IV3FIN. Yes, Lew, got it. And I heard a weird one yesterday you may be able to help me with. He was way below the ten-meter band so I couldn't call him, but sounded like he signed '31KX1044' or something like that. Know anything? Over."

"Aw, you jerk. That's the Citizens' Band! On no, wait a minute. Wonder if that's the new prefix for Nauru . . . I'll see if it's in the *Guide*, here."

"Break, please."

"Go ahead, breaker. This is IV3FIN with AC1ICP."

"Thanks. AC1ICP and AC1ECH, with IV3FIN, this is W4ZM. You all have fine signals here. Just wanted to say hello."

"Oh, wow! Lew, did you hear that? AC1ICP and the group from IV3FIN. Lew, you copy okay? That was a 'Double-you-four' breaking! That's a brand new prefix here, by golly. W4ZM, your report is 5 by 9 and the name is Ed. Where're you located? Have you got a QSL manager? — Sure would like to get your card for my prefix collection! Over to you."

And out. QST

Strays

□ The Totah Amateur Radio Club is offering a certificate called the 507 award to any amateur furnishing proof of contact with K5WXI or any other mobile station that operated from the four corners monument during the weekend of Oct. 11-12. Totzh is Navajo for where the two rivers meet. Submit $1 for handling to Totah Amateur Radio Club, Box 24, Farmington, NM 87401.

□ Seated behind the wheel of his 1910 Reo, VE4IX is set for a Sunday afternoon outing with VE4HA holding the mic and VE5LIK ready to lend technical advice.

Overnight Sensation: Eloise

One thing is evident. Amateurs responded to the communications need in the best tradition of the service.

By Robert J. Halprin* WB2NOM

With these words, Northern Florida Section Emergency Coordinator WA4WBM summarized the effects of the disaster on his state: "Radio amateurs, in Florida and neighboring states again came to the fore to furnish emergency communications when Hurricane Eloise delivered a mighty punch at the Florida Panhandle on September 23rd. Predicted to come ashore west of Pensacola, Eloise made a sudden easterly shift at about 11 P.M. Monday and made a landfall between Fort Walton Beach and Panama City with winds estimated as high as 130 mph. Damage to property was high, especially in the beach areas, but miraculously there was no loss of life directly attributable to the storm." By employing his extensive report, along with several others, we can outline the developments in this emergency.

Many Florida emergency networks were on standby alert as of Monday morning. In Okaloosa Co., FL, the c.d. Emergency Operations Center (WB4VJP) was manned continuously for 48 hours, starting Monday, and about 12 hours a day for the next four days. The EOC used two-meter simplex and the Fort Walton Beach repeater, WR4ABZ, to maintain contact with (a) mobiles on road patrol, (b) the West FL c.d. headquarters, and (c) other fixed stations for message delivery.

The primary low-band frequency used was 3950 kHz, where the Northern Florida Emergency Phone Net handled emergency and priority traffic. The Gulf Coast Hurricane Net, the State RACES frequency (3990.5 kHz) as well as the 40-meter NFPN alternate frequency were also used in the emergency communications effort. The Florida Amateur Sideband Emergency Net was in session for eight hours on Tuesday, under the direction of W4WYR and WA4NBE. Health and welfare traffic was relayed within the disaster area along with weather warnings and updates for Florida and adjacent states.

The city of Fort Walton Beach operated a c.d. center at its fire department; W4MMW and WB4SFU set up a two-meter link there and operated through the peak of the storm. Two-meter stations were operated at evacuation centers in local schools by WB4s GMH SBI and UHW. WA4PUC/4 handled "e/t" traffic on 20 meters.

Northern Florida SCM W4RKH (whose home station in Fort Walton Beach comes complete with emergency power) had antennas which survived the winds, despite the fact that the eye of the storm passed about 15 miles southeast of his QTH. He operated as NCS on the local two-meter net and handled incoming and outgoing traffic on NFPN.

The Florida cw net, QFN, net controlled by WA4HDH, was in emergency session with K4SCL, WA4FBI, WB4s GHU and HKP acting as liaisons on the Fourth Region Net and the Eastern Area Net. W4JL and WA4IJH took care of business on the Fifth Region Net. This net had been alerted the night before, thanks to WB4s DXN SKI, WA5s IQU QOE and W5QU. Northern Florida Route Manager WA4FBI requested that a hotline be setup between Florida and the National Traffic System's elite "Transcontinental Corps." TCC Eastern Director W2FR mobilized his troops and a special sked was held to funnel priority traffic out of Florida. This was carried out by TCC station VE3GOL and WA4FBI.

WA4LBM and WB4JHQ drove from Pensacola to Fort Walton Beach Tuesday evening, bringing a complete station and generator. They fired up at W4MTD's home and handled traffic on QFN and NFPN for about six hours. Amateurs continued the emergency effort for the rest of the week. Approximately 50 Fort Walton area hams participated, along with countless others in surrounding counties.

When Eloise continued to move inland, Alabama Emergency Nets *M* and *X* as well as the Georgia Net joined in the effort. Many reports were directed to W4CUE, Red Cross Hq. in Birmingham, AL. They, in turn, dispatched storm information to authorities, United Press International and local media. WR4ADL and WR4AGA were used to relay up-to-the-minute weather information. Many Alabama amateurs put in over 36 hours of continuous emergency operation.

Mississippi Section Emergency Coordinator WB5FXA, assisted by W5UCY, WA5IDF and WB5FXI, started a communications link at the Pascagoula, MS, Emergency Operations Center. Two, six and eighty meters were utilized, with stations monitoring who were *go* on 40 or 20.

By the time Eloise passed east of Birmingham, she was reduced to a tropical storm. As she moved north, her strength continued to wane, but she was powerful enough to cause monsoon-like rains and flooding in many states. From here we'll sketch flood-related activities of the amateurs in some of the affected areas.

* Communications Assistant, ARRL.

In Alexandria, VA, AREC/RACES operators provided the city with emergency communications. K4BAV manned the "rumor control center" at city hall. Local radio stations were furnished flood information by the center, which was in constant contact with the amateurs on an assigned c.d. frequency on two meters.

On Friday, September 26, the Prince Georges Wireless Association (MD) station K3CEZ was activated to assist the Red Cross Disaster Action Team. Operators were located at local elementary schools and with a roving Red Cross unit checking flooded areas. The Green Mountain Repeater Association's machine, WR3ABB, was used.

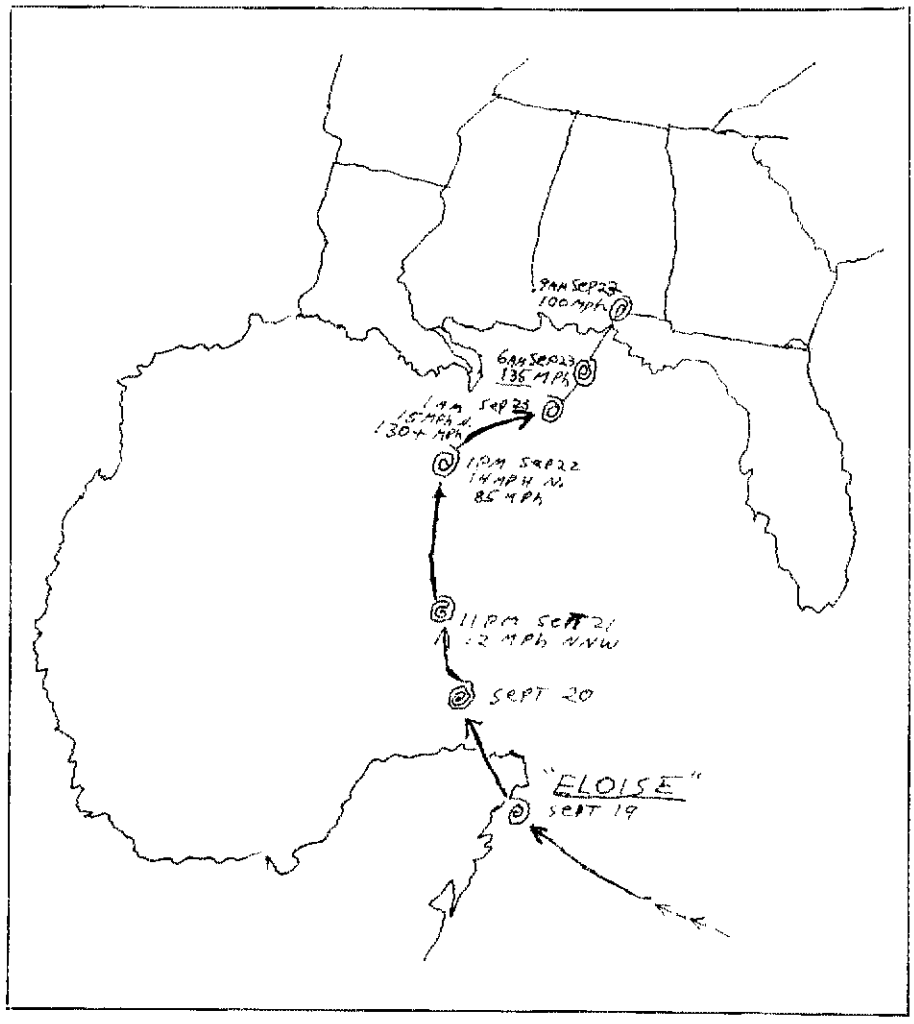
On September 25, WA3UVM, RACES Operations Officer, activated RACES station WA3YOO, after the Montgomery Co., MD, c.d. office requested communications assistance because of the severe flooding. W3VG, WA3s HEM and ZNW were deployed to monitor water levels and road conditions, then to radio reports back to WA3YOO. WA3UVM and WA3PAD shared net control duties as well as maintaining constant contact with the police and fire/rescue communications center. When WR3ABM broke down in the middle of the RACES operation, WA3PAE made a trip out to the repeater, despite the harsh weather conditions, and made the necessary circuit repairs.

On Friday, heavy rain resumed and caused the flooding to worsen rapidly. Parts of Montgomery Co. were cut off by flooded roadways so the RACES network was reactivated by WA3UVM and WA3ZLB. When it appeared that a nursing home was going to be evacuated, WA3HEM drove to the home to provide assistance and communications. WA3TNQ maintained a communications link at the evacuation shelter. At 1045 UTC, the rains finally ended, at least in Montgomery County.

In Lebanon Co., PA, that same day, Emergency Coordinator WA3REY established a 75-meter liaison at the Lebanon c.d. to the state RACES headquarters. WA3s MKU THB and WXP were the operators. Using WR3ACI, WA3REY relayed first-hand reports from the afflicted area to the c.d. station.

Elsewhere in PA, when the North Annville Township c.d. director requested evacuation of the area, K3SLG and W3DGX (who were touring the flooded area with the director) coordinated communications for the effort. K3BHU served as liaison to the Pennsylvania 'Fone Net.

The effects of the storm were also felt in the Philadelphia area. The Eastern PA Emergency Phone and Traffic Net held 14 emergency sessions to handle health and welfare traffic over the weekend. Phone Activities Manager WA3PZO and others maintained a communications link between 75 and two meters on behalf of the Philadelphia Red Cross. Messages were passed which detailed river levels, number of people at shelters and supplies that were needed.



This map courtesy of W9BRD, illustrates the path of Hurricane Eloise, on her way to a deadly rendezvous with the state of Florida.

At the same time, members of the Tamaqua, PA, Area Sideband Amateur Radio Organization (TASBAR) under the guidance of W3ZRQ, and c.d. director W3CMA, manned the emergency communications system in the town's municipal building. Eighty, 75 and two meters were used to relay emergency traffic. River levels were checked every hour via two-meter mobiles.

EC/RO K2DNN (Chemung Co., NY) transmitted Red Cross and c.d. bulletins during flash flooding in the area. Six meters was used as well as the following repeaters: WR2ABD, WR2ABL and WR3AEC. Local amateurs responded to the call for action and provided the c.d. office with information on water conditions from many locations in the area. Flash flooding was also a problem in Connecticut, as many repeaters, such as WR1ADM, were on emergency alert.

Though Mobile, AL, was spared the brunt of the storm, the Mobile Civil Defense Office was very appreciative of the aid amateurs rendered. This is what they said in an open letter:

"The threat of Eloise is gone, and we feel very fortunate that this area was spared the damages which occurred along the Florida coast and in our eastern Alabama counties. However, we can't put this experience behind us without first expressing our appreciation to those of you who helped in coordinating and relaying messages during our emergency operations at the EOC. If we ever do sustain an actual hit from a hurricane, it will be the efforts of volunteers such as you that will enable us to combat and recover from the disastrous effects."

Yes, Eloise is gone but there will be other attempts to take the country "by storm." No doubt amateurs will again rise to the occasion. QST

The First Steps In Ham P.R.

Pratical tips help anyone make effective use of the media in putting the drama of ham radio before the public.

By Stephen K. Thompson,* K4WVT

As a reporter and a ham, I've always been amazed at how little attention ham radio receives from the newspapers and radio and television stations.

It seems like a "natural," especially for feature writers.

What other hobby has its own earth satellites? What other hobby has saved as many lives . . . or assisted so many disaster-struck communities? How many other hobbies provide their practitioners with a chance to make friends on the other side of the world?

Yet the public knows little about ham radio.

My colleagues in the press don't know much about it, either. And hams aren't doing much to teach them.

Hams generally leave public relations — which is really press relations — to some club's committee, generally composed of hams with no special knowledge of how to get something into the newspaper or on television.

Good press relations doesn't take a committee. Any ham can do it, with a little knowledge of how the press operates.

Know Who To Talk To

Start with a list of your community's newspapers. Put the weekly papers at the top. You're much more likely to interest them in doing a feature on ham radio than the big metropolitan dailies. Weekly papers thrive on feature articles, because they can't hope to compete with the dailies on day-to-day developments in the news.

WA3PBC - ground plane

Rolan Clark, WA3PBC, adjusting his ground plane antenna.

Buy a copy of each paper, and analyze it carefully.

Does the paper print a listing of weekly club meetings and activities? That's where your meeting notices should go. If the paper doesn't tell you how to insert a listing, call them on the telephone. Find out who compiles the list, when the deadlines are, and any special format they prefer.

Generally, only written notices are accepted. Your best bet is to follow closely the format of the notices you see in the paper. Type the announcement, double-spaced, and mail it a few days before deadline to the proper person. Make sure to include your name and telephone number in case they have any questions.

Next, read through the paper to find out who your contacts for feature articles should be. You're not looking for the editors. In each day's mail, they're bombarded with a stack of press releases — hundreds of them at big papers. Ninety percent of them wind up in the circular file, and releases from clubs are usually among the first to go.

You're much more likely to get something in the paper by dealing with the reporters. If you interest them in the story, they'll take care of selling it to the editors. They do it every day.

Find out who writes about what. If there's a reporter who, week after week, seems to write features on interesting people, that's the one to start with. Call the reporter on the phone, and convince him (or her) that a particular ham is up to something interesting that would make a tremendous article.

Don't try to sell ham radio in general, as a hobby. People, not hobbies, make the most interesting stories. So tell the reporter about the people involved in the facet of ham radio you're trying to promote. Has a particular ham built a satellite ground station at his home? Few people have, so it's a great story! Is a local ham running dozens of phone patches to help missionaries in South America keep in touch with their families back home? Good story!

But if they don't go for it? Don't argue or complain. There are other reporters at the same paper, and there are probably other papers, too. Good

* 108 West Howell Avenue, Alexandria, VA 22301.

story ideas – especially about people – are a scarce commodity in any newsroom, so your chances of success are good. And ham radio is full of fascinating stories. (Some suggestions are listed at the end of this article.)

If your efforts to get a story in the paper fail, move on to other papers and other reporters on your list. And then go to work on the dailies, with the same approach.


The Centralia Fireside Guard November 14, 1975 – 6

Ham radio – airways to the world

by Jane Flink

Classes require learning to send and receive Morse code at five words per minute, and preparation for a written examination in radio theory and FCC regulations.

Hams are known to be good technicians, and experimental by nature. Over the years they developed high frequencies, often by trial and error, which made communications possible over longer distances.

Conrad Stietenroth sends and receives from his "radio shack," the den of his home, Route 4, Centralia. He teaches ham radio classes Sundays at 6:30 p.m. at the City Hall. The course will last 10 weeks.

Some people involve themselves in ham radio operation in order to be of public service. In emergency situations, ham radios are usually able to operate when every other form of communication has been knocked out.

Ham radio operation offers an opportunity for a large number of shut-ins, handicapped people, the blind and the deaf to "Get out of the house" without having to go out.

Ham operators are some of a country's best representatives in international relations. It's a great method of learning about other people, and telling them about yourself. Hams promote good will.

Radio and Television

The same principles apply to dealing with the electronic media.

Try to interest a reporter in your story, and let him sell it to the producers, editors and news director.

Stress the *sound* of your story when you're dealing with a radio reporter. If hams are providing the only communication with a snowbound community, offer the reporter a phone patch to the town's mayor. The station will be able to tape record the patch, edit it, and use it as an "actuality" on its newscasts. For radio, the *sound* of an Oscar QSO would be vital to any story on local satellite users.

Television reporters want stories that come with good pictures. Offer a reporter and his film crew a ride in someone's mobile on Halloween, for a story on your club's "Spook Patrol." Arrange a story on the new repeater on the day someone is climbing the tower to adjust the antenna.

With radio and television stations, you stand your best chances of success on weekends. Most stations are committed to a fixed number of newscasts or a half-hour TV news program on weekends – and sometimes good weekend stories are very scarce. Find out which reporters work on the weekend, and give them a call on Friday.

Most stations have some sort of "talk" show probably during the daytime hours. Find out the name of the producer or reporter involved, and sell them a local ham as an interesting guest.

It's News, Not Publicity

Newspapers and radio and television stations aren't in business to give you "publicity" – good or bad. They're in print and on the air to report news and inform their readers, listeners and viewers. So don't ask for favors. Tell them you have a good story *for them.*

Act quickly when hams get involved in emergency communications. Hams in hundreds of communities missed a good chance for favorable exposure during the earthquake in Managua, Nicaragua. No one bothered to alert the local press that a ham in town had suddenly become a vital link with the disaster area.

When emergency communications are underway, get on the phone quickly with your contacts. Invite the reporters into the station to get a hometown angle on a major news story thousands of miles away.

When a jetliner crashed on a mountaintop west of Washington, one television station sent a reporter and film crew to the local Civil Defense headquarters, filming hams in contact with the isolated crash scene.

On those occasions when the interests of hams are in jeopardy, don't hide from the press. A weekly newspaper reporter, trying to do a story on a pending tower ordinance, once complained to me that none of the hams with tall towers would talk to him. I gave him the name of one who *would* talk. Otherwise, the hams' side of the story might not have been told.

One final tip.

Don't impose on a reporter or editor who happens to be a ham. You'd be putting him in a professional conflict if the story is a controversial one. If it's not, he still may prefer to avoid doing stories on his own hobby. Or he may prefer to help quietly. But let him set the rules.

Some Ideas To Get You Started

Try to interest reporters in stories on:

A retired ham who keeps in contact with his friends by radio.

A prominent YL or XYL, for the women's page.

A teenage ham, for the paper's youth section.

How the local repeater is used to bring help to stranded motorists.

The students who built a radio station at the local high school.

Field Day and the hams who are ready in case of emergency. (One Washington area club sets up for Field Day right at the studio/transmitter site of a major radio station – and the announcers talk about it all weekend.)

The hometown ham who bounces signals off the moon, or has his own link to a communications satellite.

The ham who is making arrangements to have a medical device flown into a jungle hospital. (Have the reporter come to the shack quickly, while the contacts are in progress.)

The Old Timer who remembers when your town first went "on the air." (Chances are that hams did it, before the commercial stations were established.)

The missionary from your community who is working in some distant country – who keeps in touch with his family by ham radio.

Hams who provide communications for the boat races. (Send a mobile to the interested radio stations, to get them the results fast.)

A local civic leader, public official, TV personality or whatever – who happens to be an active ham. QST

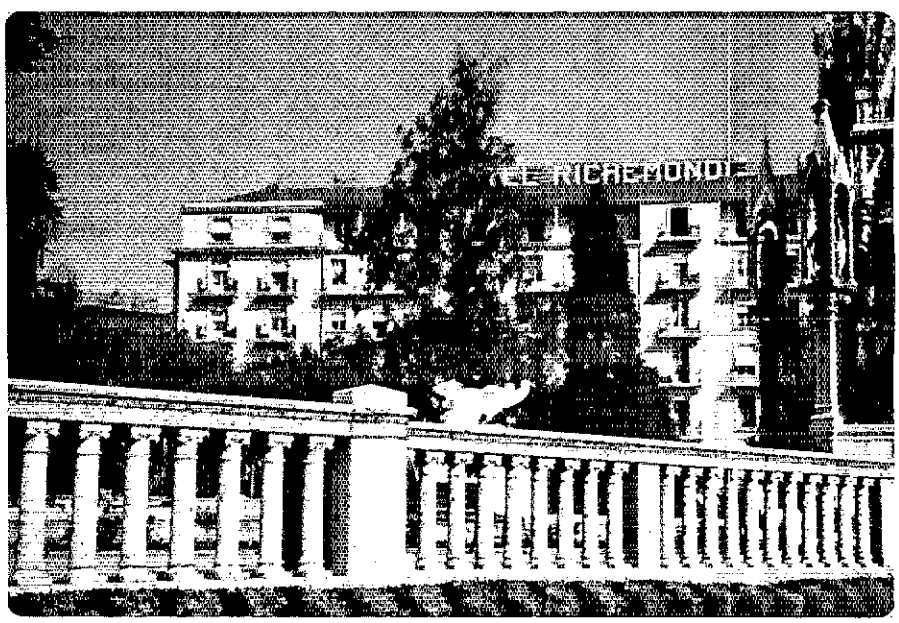
Be Your Own DXpedition

One way to add enjoyment to international travel that your travel agent can't arrange.

By Archibald C. Doty, Jr.,* K8CFU

Thanks to a combination of reciprocal operating agreements between countries and the willingness of other countries to grant licenses to visiting amateurs on a courtesy basis, it often is possible for an amateur to obtain permission to operate in another country.

If you are planning a trip out of your country, have an understanding wife, and rank a ham transceiver above clean socks as far as baggage weight is concerned, you're a natural prospect for a reciprocal license. Don't just call DX, be DX.



The HB9XVA antenna was strung between the flagpoles on the hotel roof.

When the Second World War ended in the summer of 1945, a large number of GIs found themselves temporarily stranded in far parts of the globe with little to do, except for things that they shouldn't. Those who were hams found that the military BC610s and numerous other transmitters and their antenna systems easily tuned up on 20 meters — and propagation conditions were good. In China both the Nationalists and Communists were worrying about jurisdiction over the country, and no one was worrying about jurisdiction over amateur radio operations. Thus, XU2LU, "the voice of the Yanks on the banks of the Yangtze," enjoyed a brief existence at Luscien, China, and gave the writer his first experience in DX operations (no QSLs available, but the station log is still in existence).

Since 1945, circumstances have resulted in providing me with a number of opportunities for additional operations, and experience has been a good teacher. Here are a few tips, based on what I've learned, that may be useful in case you get the opportunity to operate outside of your home country.

* 8360 Rushton Road, South Lyon, MI 48178.

Operating Privileges

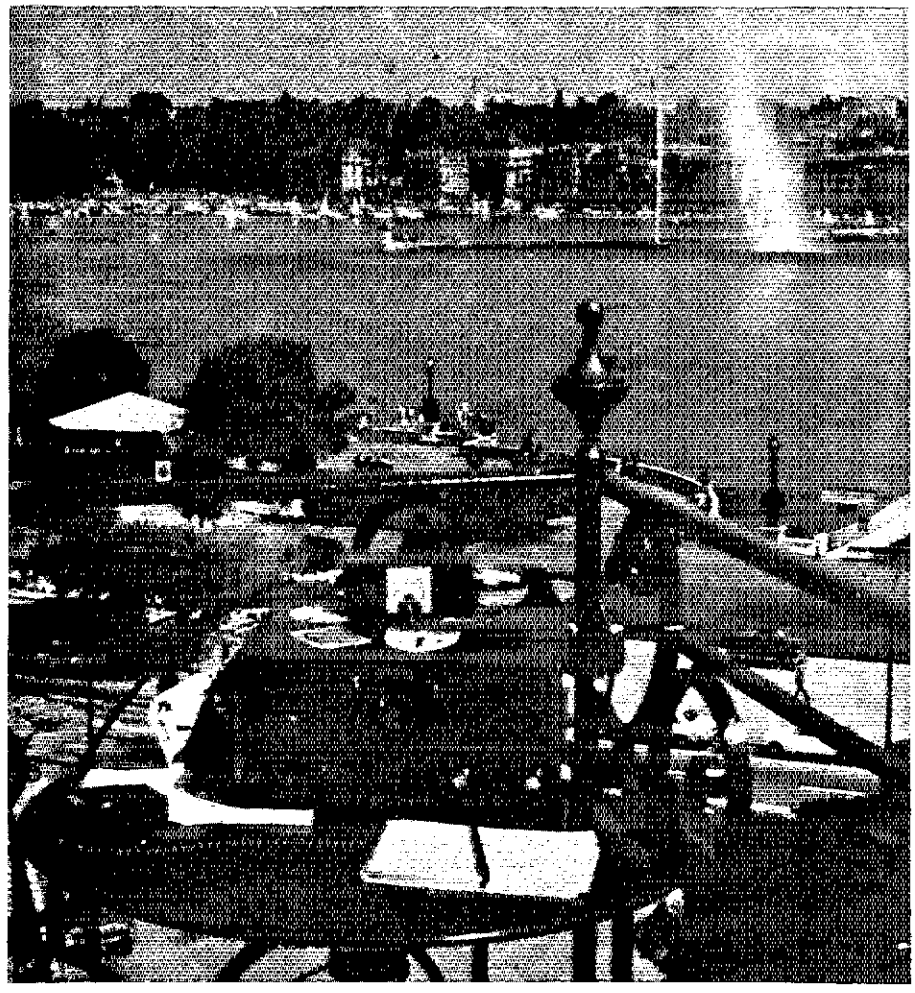
If you intend to operate an amateur station in another country, the first thing you must come to terms with is the fact that, when you are in another country, you are the guest of that country, its people and its authorities. About ten years ago, after a great deal of effort was expended by the ARRL, Senator Barry Goldwater (K7UGA) and many others, the Communications Act was amended to permit the U.S. Department of State to negotiate diplomatic agreements whereby amateurs from one country are permitted the *privilege* of obtaining operating permission while visiting the other. Canada enters into similar agreements, but on a somewhat different basis: theirs are concluded by the telecommunications administrations of the respective countries rather than by the ministries of foreign affairs. Table I is a current list of those countries with which the U.S. and Canada have concluded such agreements.

Even where there is no reciprocal agreement, some countries license visiting amateurs as a courtesy. Many of these countries are listed in the "IARU News" section of *QST* for November, 1974, page 92. In addition, it is sometimes possible for an amateur visiting Geneva to operate 4U1ITU if he is

properly licensed in his home country. If you're planning to be in Geneva, first drop a note to the International Amateur Radio Club, Box 6, 1211 Geneva 20, Switzerland, and tell them when you expect to be there.

To obtain a license in another country, you will first have to write to the licensing authorities and ask for a license application and instructions. The list on page 92 of *QST* for November, 1974, gives the addresses for most countries; ARRL headquarters often can supply others. If all else fails, drop a note to an active amateur in the country concerned or simply address the Department of Telecommunications in the capital city.

If possible, start work on your reciprocal license six months before you are scheduled to leave home, and *always* use air mail. When you receive your application form, it will undoubtedly ask for a copy of your home license and payment of a fee. Photocopies of licenses seem to be universally accepted, and fees should be paid in International Money Orders, available from your post office. By the way, you can probably "get by" with using English in communications with licensing authorities, but it is advisable – even though it may not actually be required – to use the native language of the country involved in completing your license application, especially in French and Spanish-speaking countries.



HB9XVA "operating position" on a hotel balcony overlooking Geneva.

While you're waiting for your license to arrive (and this can take several months), it is a good idea to advise the hotel or other facility where you are intending to set up your station as to what your plans are. Be sure to tell them that you will have the proper license from their country's authorities. I've also found that hotels and others providing you with accommodations (and this includes my Scottish relatives) have been very relieved upon being told that my transmitter uses no more electricity than a lightbulb.

You will also find, almost without exception, that you'll get fine cooperation if you make matters clear before you arrive. For example, the Intercontinental Hotel in Vienna had no objection to a 20-meter dipole strung between the windows of two 10th-floor rooms, and the concierge of the Hotel Richemond in Geneva will not even bat an eye if you ask for a top floor room, and permission to put an antenna between the two flag poles on the roof.

Table 1

The United States has concluded reciprocal operating agreements for amateur radio operators with:

Argentina	India
Australia	Indonesia
Austria	Ireland
Barbados	Israel
Belgium	Jamaica
Bolivia	Kuwait
Brazil	Luxembourg
Canada	Monaco
Chile	Netherlands*
Colombia	New Zealand
Costa Rica	Nicaragua
Denmark	Norway
Dominican Republic	Panama
Ecuador	Paraguay
El Salvador	Peru
Fiji	Portugal
Finland	Sierra Leone
France*	Sweden
Germany	Switzerland
(Federal Republic)	Trinidad and Tobago
Guatemala	United Kingdom*
Guyana	Uruguay
Honduras	Venezuela

*Agreement includes overseas entities.

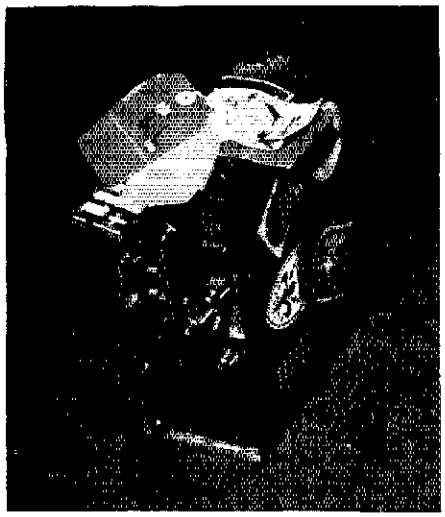
Canada has reciprocity with:

Austria	Luxembourg
Belgium	Netherlands
Brazil	Nicaragua
Costa Rica	Norway
Denmark	Panama
Dominica	Peru
Dominican Republic	Poland
Ecuador	Portugal
Finland	Senegal
France	Sweden
Germany	Switzerland
(Federal Republic)	United States
Guatemala	Uruguay
Honduras	Venezuela
Iceland	Commonwealth
Israel	Countries

Equipment

Transmitter: In selecting equipment for operation while traveling, remember that you are restricted to 44 pounds (20 kg.) of baggage (66 pounds, or 30 kg., if you travel first class) on overseas airline flights. From a weight and bulk standpoint, a transceiver is by far the most convenient piece of equipment to take with you. It is highly advisable to carry your radio equipment as hand luggage. If you check it with your other bags, there is always the definite possibility of damage – and so far I've gotten a hand-held transceiver on dozens of flights without its weight being charged against my overall allowance.

There are a number of very fine transceivers on the market at the present time that are completely self-contained, relatively lightweight and small enough to fit under a plane seat, as they must if you carry them aboard. The photograph shows the 18 lb. (7.2 kg.) Linear Systems SB-34 that I have used for many years. So far this transceiver has logged more than 100,000 miles throughout the United States, Canada, the Carib-



100,000 miles since 1967, and still traveling.

bean and Europe, and it's ready for the next trip.

Voltage: Very few countries outside of North America use 120 volts. Table II shows voltages and line frequencies in a number of the countries most popular with tourists.

For countries having 220/240 volts, you'll need a transformer unless your transceiver has provisions for this voltage (most of those in current production do). For the SB-34 I use a Stancor P8631 which weighs about 3 lbs. and costs about $10. In addition to the transformer, you will need a power line plug that will convert from the U.S.-style plug to the various styles used in other countries. An assortment of these plugs can be obtained in electrical or other specialty shops, particularly those selling electric razors.

Earphones: Take along a lightweight set of earphones. You'll need them if you operate from a hotel room, where you will not want to keep other guests awake while you work DX in the middle of the night.

Antenna: You don't need a complex, high-gain antenna for successful portable operations. I've consistently worked all continents (with 65-watts dc input) from many locations – using a 20-meter wire dipole only 20 or 30 feet off the ground. You will find that the number of contacts you make from outside the United States (and the signal reports that you receive) will vary as the square of the rarity of the call sign you are using!

There are two practical types of antennas for portable operations – a 1/4-wave vertical specifically designed for temporary window sill mounting, or a 1/2-wave dipole. I use a half-wave dipole made of woven phosphor bronze dial cable. This wire is very strong and, of even more importance, very hard to see. In making an antenna of this type, first cut it 6 inches longer than you would expect from the formula:

$$L = \frac{468}{F}$$

L = length in feet.
F = frequency in Megahertz.

Attach the coax and nylon ropes and support the antenna about 20 to 25 feet above the ground (or the exact height you expect it to be in your DX location). Check the SWR, and if it is above 1.5:1, cut 2 inches from each end and check the SWR again. Continue until the SWR is close to 1:1. This antenna, with 50 feet of 3/16-inch nylon rope at each end, and 75 feet of RG58 coax, weighs about 3 lbs. (1.4 kg.), and can be tucked into the corner of a suitcase.

Other equipment: While your suitcase is still open, you should fill odd corners with a few things that you may need, such as:

Spare fuses – just in case.

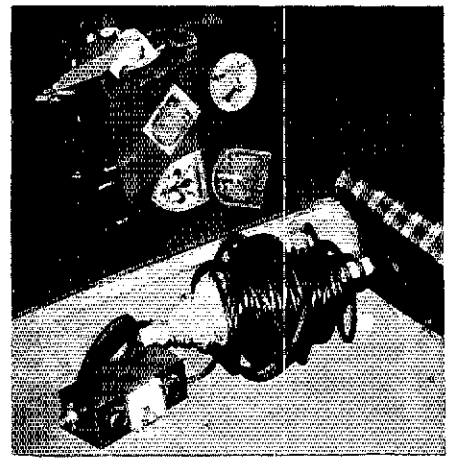
Small screwdriver – dial knobs *do* come loose at most inopportune times.

A knife – equally good for repairing coax, slicing Swiss cheese, aligning rf trimmers, or opening a bottle of wine.

Special items – some countries require that you have certain items of equipment before they will issue a license. For example, Great Britain requests assurance, on their license application, that you will have with you an absorption-type wavemeter which has frequency coverage including the 2nd and 3rd harmonics of your transmitting frequency.

Operations

The major operational problem outside the U.S. is remembering your reciprocal call. You won't have this problem if you think to tape your new call letters on the front or top of your transceiver before leaving home. And remember



Antenna, lead-in, guy ropes, and SWR bridge fit into a corner of the suitcase.

that a carefully kept log – in UTC – is, of course, a "must." The 4 X 6-inch "Minilog" ($.50, postpaid, from headquarters) is the most convenient.

Back Home Again

You might as well plan on getting QSL cards printed with your reciprocal call, because you are certain to be asked for them. Be sure that they contain your exact operating location and other information pertinent to DX operators, such as Zone, Oblast, Shire, Province, etc., as appropriate. I also include a note of thanks to the licensing authority on my cards, and make sure to send one to them as a final gesture of courtesy.

Some of the above may sound overly-complicated, but it isn't, really. One thing I can absolutely guarantee: the thrill of operating overseas will repay a hundred times any small amount of work or inconvenience it may cause you! QST

OE1ZQA

Reciprocal License
Thanks to the
Courtesy of the Austrian
Post & Telegraph Dept.

EI2VDZ

DUBLIN, IRELAND

Reciprocal License
Thanks to the
Courtesy of the Irish
Dept. of Posts & Telegraphs

QSL Via:
Arch Doty, K8CFU
8360 Rushton Road
South Lyon, Mich. 48178

QSL card courtesy is appreciated.

Correspondence

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

RFI BILL

□ I have followed your advice and written Torbert H. Macdonald as well as my Congressman. I think the ARRL Task Group on RFI is one of the most important activities of the ARRL. There are many thousands of irate neighbors of radio amateurs who would dearly love to see us put off the air. They are certainly not concerned about a hearing on HR-7052. The FCC's handling of the CB situation is also alarming. By that token, murder in the U.S. could become legal as the police are overwhelmed.

I believe we are losing more and more of our amateur fraternity due to problems as it is easier to capitulate than fight with neighbors. The question is: Will the FCC be able to effectively control the industry even with a law, considering its performance with CBers? – *J. A. Brown, WA6OUF, Saratoga, CA*

TERTIUM QUID

□ I would like to see more technical articles and less contest material in *QST*. With each issue of *QST* that arrives it seems that one third to one half of the magazine is devoted to contests. This is a disappointment. It reminds me of the class of Citizen Band appliance operators and their interest in the air ways. Amateur radio has gained its respect through the knowledge of electronics, not through the knowledge of how to win a contest. Why not devote one or two pages to contests?

Being a new Novice, I have a great deal to learn and really doubt that I could learn that much from contests. Why not take a look at *Ham Radio* magazine. The information packed in that little magazine could certainly better represent the quest of the amateur radio operator.

Thank you very much for your time and consideration. The technical articles that you do have are excellent, but let's see more of this excellent work! – *Terry D. Wright, WN8UPO, Piqua, OH*

□ Some letters in November *QST* ("Bricks and Bats" p. 73) implied that contests and contest reporting are wasted time. I usually prefer good rag-chews over two-second contacts, but to me contests are also great fun and tremendously valuable:

1) A contest is a great way to test antennas and rigs. How else can you get so many reports in a short time?

2) A contest is a great way to study propagation. Many stations often in many parts of the world are active simultaneously and continuously.

3) Contests teach fast and efficient operating under difficult conditions. Such skills are needed in emergencies. Field Day is especially good experience in emergency operating.

4) Contests make available rare countries, states, and counties. A ham with a modest station can work much rare stuff, especially near the end of a contest when stronger stations are "worked out."

Most important, contests are fun. My operating time is limited and I can make contacts with many places in a short time during contests. The fact that many hams (like me) report unimpressive entries shows that a lot of us do like contests and don't worry too much about low scores.

I guess you can't please everyone, but please continue to keep us informed on contests. – *Ray Good, WB9DVQ, Oak Park, IL*

□ After reading the November "Correspondence from Members," I was shocked to find that Don Allison, WB4ZIU, took the words out of my mouth. I do agree that much space is wasted on contest results. But *QST*, I feel, is as worthwhile a magazine to the ham as a transmitter is to a receiver.

One more thing regarding your magazine; the "Beginner and Novice" section should be expanded, for two reasons. (1) The Novice could get more knowledge through the use of simpler articles, and (2) the prospective Novice could be attracted in a more subtle way by this format. – *Brian C. Leeman, WN1WFT, Bucksport, ME*

□ One of the most attractive attributes of amateur radio is the variety of interest which it comprises. I can't say that now I'm interested in every article in *QST* (or that I comprehend most of them), but if there is something each month that is consistent with the aspect of amateur radio that I'm interested in now, that will satisfy me. My interests will change and I'll have a library of information in my *QSTs* available when I'm ready for it. So try to keep it varied and don't fret over pleasing *everyone all* of the time. – *Mike Drooker, WA1PZQ, Nottingham, NH*

□ I would like to suggest that *QST* include a page each month on basic radio theory for Novices, like myself. I have my license, but that requires very little knowledge of radio theory. I think you could do a good job. – *Greg Schottland, WN2BAZ, Teaneck, NJ*

[Editor's Note: Did you check out the new "Basic Radio" column which started last month? It will be a regular feature from now on!]

PRINCIPLE OR PRIVILEGE?

□ I am replying to Mr. Batt's suggestion of lowering membership dues for retired persons (p. 74, November, *QST*).

We all are living on a fixed income; you on your pension and myself on what my employer will pay me. Both of us can change the amount by getting another job or demanding an increase from our present source of funds. In these days of recession my employer and your source of funds have very little to give. It seems there is little difference between your financial situation and mine.

Is it a principle or special privilege for a group to get lower fees? Can we afford to give any group a reduction in membership dues? Would the added members' dues (assuming there would be more members) pay for the services they would receive? Since the ARRL is not showing a profit, or at least a significant one, perhaps Mr. Batt is proposing that the other members subsidize his group. If a subsidy is to be given, we must know what definite advantages this will give the membership as a whole. I would be pleased to hear from Mr. Batt of any ideas he might have. – *Charles F. Clark, WA9QQO, Marengo, IL*

□ After reading the comments of VE7BNZ in the November *QST* about lowering the fees for membership for those on fixed income, an interesting thought occurred to me. Being only 12, I too am on a so called "fixed income," so how about lowering the fees for youngsters like me and for those older than me on a fixed income? – *Marty Waxman, WA2TUV, New York, NY*

EMP EFFECTS

□ My congratulations to Fisher, Nelson and Barnes for a very good practical treatment of EMP protection techniques for amateurs, *QST*, September, 1975. As an Extra Class license holder, who has given some thought to the phenomenon, I appreciate an article of this quality.

However, as an electric utility engineer, I would like to point out an item that was not adequately covered. Although it is certainly important to provide protection to radio equipment from energy entering along the 120-V ac power line, it must be stressed that these measures will only prevent the equipment from being damaged – not keep it operating! Many power companies are aware of EMP effects and hope to be able to continue supplying power in the event of EMP attack, but it is unlikely that a typical home would remain capable of distributing the power. The voltages generated by such an occurrence are more than enough to arc over switches and burn out fuses and insulation! For an amateur radio station to continue to provide public service in the event of such a disaster, it is imperative – as it is in any disaster – to have a quickly accessible and reliable *source of emergency power.* – *Bruce Whitney, WA8EEQ, Birmingham, MI*

□ VE1APH (Nov. '75 "Correspondence") has *his* priorities misplaced. The integrity of communications just outside the blast area (of a nuclear weapon) *is* of utmost importance – in order to coordinate the resolving of "more fundamental issues." As we say down at the fire house: If you don't protect your pumper (and yourself), you probably can't fight the fire! – *William R. Shoots, K5BY, Seabrook, TX*

NOT A MUSEUM PIECE

□ I'd like to add my voice to that of "Correspondence" contributors in support of "AM Phone Night."

The lowered level of use of a-m in vhf communication is a real loss to "The World Above 50 Megacycles." Perhaps an a-m night now and then, encouraging vhf participation, would be a productive idea. There are thousands of a-m rigs on shelves, stowed away in garages or attics, or just sitting on operating positions taking up space that could enliven the vhf bands if an incentive for their use was properly presented.

And there's nothing wrong with a-m on bands like 10 meters, where activity levels tend to suffer when DX is not a daily fare. There is still considerable use of a-m in the 10-meter band, on frequencies above about 28.7. It should be encouraged as a legitimate use, not just as a museum piece. – *Edward P. Tilton, W1HDQ, Canton, CT* QST

Happenings

Conducted By Perry F. Williams,* W1UED

Deregulation Accelerates!

For the past several months it has been our happy lot to bring you news of deregulation – that is, of changes in the amateur rules which cut down the amount of paperwork we file with FCC.

Now it seems clear that this is a conscious, coordinated, continuing effort which may be with us for some time to come. This month, there are several small steps toward deregulation, and just one a wee bit in the opposite direction. More changes will be announced soon; keep an ear open for W1AW bulletins.

Operating Time for Renewal

The Federal Communications Commission has dropped the operating time and code speed requirements for renewal of an Amateur Radio Service license. Up to December 24, an applicant had to state that he had operated two hours in the last three months or five hours in the last year of the license term, and that he could still copy code at 5, 13 or 20 wpm depending on his class of license. "No one has ever demonstrated that any identifiable relationship exists between the requirements of Section 97.13(a) and an individual's competence as a radio amateur," the Commission declared.

Canadian Visitors

Canadian amateurs visiting the United States and applying for permission to operate here no longer have to furnish a stateside address. The words "Except for applications submitted by Canadian citizens pursuant to agreement between the United States and Canada . . ." have been placed at the beginning of Section 97.42, the rule requiring each applicant to furnish FCC with an address in the U.S. for correspondence purposes.

Remote Control

Last month we reported briefly on deregulation of remote control. Some requirements for information to be filed with FCC in respect to remote control of an amateur station have now become logging requirements instead. This means that licensees and trustees can make technical changes in remote-control operations without having first to notify the Commission. The new rules appear later in this column. It's important to note that licensees and trustees of stations already licensed for remote control (or associated with these stations in control-station or auxiliary-link roles) should add the pertinent information of new Section 97.103(c), (d), (e) and (f) to their logs.

Original License Proposal

The one recent step counter to the current trend is that FCC now proposes (Docket 20672) to require the filing of the original primary station license with applications for renewal or modification. Present practice allows a photocopy to be filed instead, but there have been abuses, wherein applicants have sent in copies altered from the original. The deadline for comments is January 22, with reply comments due February 2; an original and 11 copies of one's remarks should be sent if possible, but the Commission will consider even a single copy of pertinent commentary. Members wishing a copy of the complete proposal may send a self-addressed stamped envelope marked Docket 20672 to ARRL Hq.

BEHIND THE DIAMOND

One of the most popular operating awards of all time is DXCC, with over 1,000 new applicants in 1975 alone. But more important than its popularity is the fact that through the years a great deal of distinction has become attached to DXCC, and no small part of this growth in prestige can be credited to the man behind the award, Robert L. White, W1CW. Bob – sometimes called "Mr. DXCC" – personally examines some 250,000 QSL cards per year, is perhaps the world's foremost authority on DX matters, is widely quoted in DX journals, and is often sought as a speaker at conventions and club meetings. Known for his fairness and honesty, he has helped to make DXCC the prime award in the DX field.

*Assistant Secretary, ARRL.

Bob was introduced to ham radio by his father, W6APG, and received his first license in San Diego in 1938. His radio experience served him well in the Navy for the duration of World War II. Among his post-war occupations was a stint as station engineer for KPOA in Honolulu. Moving east to the vagaries of New England weather, he came to the League in 1952 as an Assistant Communications Manager and has been in charge of the DX Century Club since then.

Bob is joined in his hobby by his wife Ellen, W1YL, who also is a member of the Hq. staff (we'll tell you about her in a future column!) and son Jim, WA1NNC, a sophomore at Boston University. They live in Burlington, Connecticut atop "Nosebleed Hill," 1000 feet above sea level. As if that weren't enough, their antenna farm features a 4-element 20-meter beam on top of an 80-foot tower.

Bob, although he's too modest to tell you himself, is a fine carpenter, and he and his family did much of the original building of their house. A moderate addition – two stories high, cathedral ceiling, balcony with pool table and indoor arbor with canopy! – was completed entirely by them. A few years ago Bob was bitten by the photography bug, and his carpentry talents saw light in the family darkroom, which Bob designed and built.

In addition to his Amateur Extra ticket, Bob holds First Class Radiotelephone and Second Class Radiotelegraph licenses. His past calls are W6QEZ, W2QPZ, W6YYN, KH6QJ and W1WPO. Although he has worked over 300 countries, Bob has never claimed credit for more than the minimum 100 for DXCC; a perfect example of his belief in the way that DXCC should be administered. – *K1FHN*

CHULA VISTA NIXES ANTENNA RESTRICTIONS

A neighbor-to-neighbor dispute in Chula Vista, California, more than a year ago threatened to curb the rights of all amateurs and CBers in the community to put up antennas of their choice. A particularly ornate array put up by one amateur resulted in a petition of his neighbors for a new ordinance severely limiting antenna supports. The radiomen got together, however, and in a campaign coordinated by attorney Howard Shepherd, K6UF, past Director of the ARRL Southwestern Division, were able to defeat the restrictive ordinance on a 3-2 vote of the Chula Vista City Council. Along the way, there were hearings before the Advisory Committee and the Planning Commission to be attended, and four separate drafts of the ordinance to be overcome. Amateurs taking an active part in the struggle were K6AM, W6BIG, WA6CQF, K6IZJ, WB6EHN and W6GBF, ARRL San

Ted Hunter, W@NTI, (right) was presented with the Leonard Heiss Award of the Eye Bank Association of America for his contributions to the association itself and for helping found the Eye Emergency Net, by which amateurs aid in matching corneas donated patients needing them. The Iowa City, Iowa presentation was by Dr. Alson E. Braley, W@GET, another tireless association worker and co-founder of the Net. *(Photo via W6PZU)*

Diego SCM who submitted this report. FB, OMs!

FEDERAL FEEDBACK ON *QST* STORY

Mr. Herman Garlan, Chief, RF Devices and Experimental Branch of the FCC, notified ARRL Hq. that the *QST* article by Riley, "A Morse Code Alphanumeric Converter and Display," Part III, for December, 1975, is in violation of the rules and regulations set forth in Section 15.4(m). Apparently, the equipment, as described, is what the government terms a Class I TV device, which requires FCC type approval before it can be attached to a TV set by inductive coupling, space radiation, or directly, when the TV antenna is attached to the set.

Type-approval procedures are described in Subpart J of Part 2 of the FCC rules. Technical specifications for a Class I TV device are given in Sections 15.401 to 15.423 of the rules. We have been asked by the FCC to inform our authors of the desirability of listing the FCC regulations attendant to devices of this kind, thereby avoiding possible violations of the rules by those who duplicate and operate the circuits. – *W1CER*

Warren Andrews, W1MCX, here is sworn in as deputy pilot commissioner for Marine District 2, North Shore, by the Honorable Michael Dukakis, governor of Massachusetts – the first non-sighted person in the history of the Commonwealth to be so designated. Warren, though, has earned the honor the hard way, through a dozen years running a communications center for the North East Surf Patrol, 50 skilled volunteers who help the Coast Guard with search and rescue. Under his jurisdiction will be port pilots serving Gloucester and Salem.

NEW REMOTE RULES

The amateur regulations were amended, effective December 15, as follows:

1. In 97.41, paragraphs (c) and (e) are deleted, paragraph (d) is revised and redesignated (c), and paragraphs (f), (g), (h) and (i) are redesignated (d), (e), (f) and (g), respectively, as follows:

(c) Each application to license a remotely controlled amateur radio station shall be accompanied by a statement so indicating.

2. In 97.47, paragraphs (d) and (e) are deleted.

3. In 97.88, paragraph (e) is deleted, paragraph (f) is redesignated (e), and paragraph (a) is revised to read as follows:

(a) A photocopy of the remotely controlled station license must be posted in a conspicuous place at the authorized control point(s), and at the remotely controlled transmitter location. A copy of the system network diagram must be retained at each control point. The transmitting antenna, transmission line, or mast, as appropriate, associated with the remotely controlled transmitter must bear a durable tag marked with the station call sign, the name of the station licensee and other information so that the control operator can readily be contacted by Commission personnel.

4. In 97.103, new paragraphs (c), (d), (e) and (f) are added to read as follows:

(c) The log of a remotely controlled station shall have entered the address for each control point and a functional block diagram and a technical explanation sufficient to describe the operation of the control link. Additionally, the following shall be entered:

(1) Description of the measures taken for protection against access to the remote station by unauthorized persons.

(2) Description of the measures taken for protection against unauthorized station operation, either through activation of the control link or otherwise.

(3) Description of the provisions for shutting down the station in case of control link malfunction.

(4) Description of the means provided for monitoring the transmitting frequencies.

(5) Photocopies of all control station licenses and all auxiliary-link station licenses.

(d) When a station has one or more associated stations, i.e., control station and/or auxiliary-link station, a system network diagram shall be entered.

(e) The log of a control station or an auxiliary-link station shall have the following information entered:

(1) A system network diagram for each system with which the station is associated.

(2) The station transmitting band(s).

(3) Description of the means provided for monitoring the transmitting frequencies.

(4) The transmitter power input and justification that such power is in compliance with 97.67(b).

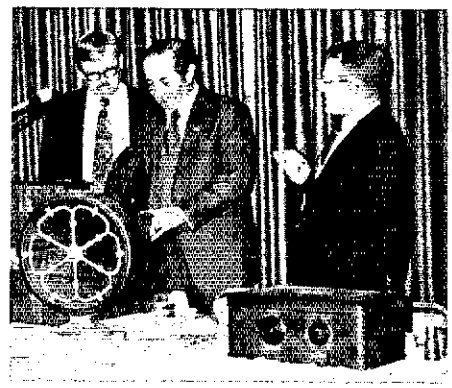
(5) If an auxiliary link station is being operated by remote control, all of the information required by paragraph (b) of this section shall also be entered.

(f) Notwithstanding the provisions of 97.105, the log entries required by paragraphs (c), (d) and (e) of this section shall be retained in the station log until such time as they are amended.

5. In 97.110, paragraphs (b) and (c) are amended to read as follows:

(b) An auxiliary-link station may only be used for fixed operation from the location specified on the station license.

(c) An auxiliary-link station licensed either for operation by local control or remote control may also be operated by automatic control when it is operated as a part of a repeater station system which is being operated under automatic control. Both the auxiliary-link station and the repeater station must appear on the system network diagram. QST



FCC Commissioner Robert E. Lee, center, looks over antique radio gear with Garry D. Cartwright, WA@HNW, left, and Richard L. Baldwin, W1RU, general manager of ARRL, at the Midwest Division Convention in Lincoln, Nebraska.

Fifty years a League member, Ralph B. Ladd, W3KA, here receives his plaque from ARRL President Harry J. Dannals, W2TUK, during the national convention. *(Pix thanks to W3KVS)*

YL News and Views

Conducted By Louise Moreau,* W3WRE

The YL Story - Oceania

Oceania's YL story began in 1922 when Australia's Mrs. F. V. McKenzie received the call VK2FV. Of the 38 islands and continents that make up Oceania, 15 have women amateur radio operators listed in *Call Book* magazine.

Australia and New Zealand lead in YL population with almost 90 licensed women operators, and the number is increasing each year. Tonga has been on the map for some time, and in 1975 Timor's first YL added CR8AL to its list of amateur radio operators. There are 14 women operators in the Philippines, and one, VR4DI, Judith Wathne, in the Solomon Islands. Because of the difficulty in recognizing feminine names in some countries, only 5 YLs – YD1PA, YD1PIC, YD1YL, YDØHV, and YDØHY – can be counted in Indonesia as a certainty.

Among the "K" prefixes issued by the United States in Oceania there are, at present, some 82 YLs. 66 hold the KH6 of Hawaii; there are five with KS6 in Samoa, and two in Wake Island. There is one YL, KG6RX, in Rota; two Novices on Midway, WM6EE, and WM6EC; and five YLs in Guam, KH6ASU, KG6JEZ, KH6JBB, KH6JEX, and WG6JFM. Other than Hawaii, these calls are, in most cases, temporary during the period that these women are operating from that country.

The expansion of YL interest in amateur radio is particularly noticeable in the New Zealand YL club, WARO. This organization is most actively assisting in the mushrooming numbers of women amateur radio operators in that country.

It is possible that there are more than the 191 YLs that have been listed. Many countries list only initials for the first name, and there is, of course, the language barrier. YL News and Views welcomes any additions to give an accurate picture.

Annie Smith, K5JKV and Francis Smith, WA5MPM, Co-chairmen of YLRL 1976 Convention.

WA2NFY – CECILIA ZWACK

A member of ARRL, YLRL, YLISSB, Lia is a very active member of YL Open House and Tangle nets. She enjoys cw on both 20 and 40 meters and particularly likes to work DX YLs in Europe. Born in Switzerland, she likes to ragchew in German, French, and Italian. When not busy hunting more contacts for DX-YLCC, she works traffic nets, particularly the Home County Traffic net.

1976 CLARA OFFICERS

CLARA announces the following YLs to guide the club in the year 1975-76. President, Donez Booth, VE3DWF; vice president, Marjorie Karl, VE6LC; secretary, Ann Nutter, VE3HAI; treasurer, Mae Beaton, VE5OH. Area representatives are VO/VE1, VE1AMB; VE2, VE2JZ; VE3, VE3ARG; VE4, VE4ST; VE5, VE5YV; VE6, VE6CDR; VE7, VE7JB. CLARA certificate custodian is VE3GJH.

YL ADOPTEE PROGRAMS

The YLRL "Adoptee" program now includes 77 women representing 39 countries on all continents. Members hail from Africa: Angola, Seychelles, Ascension Islands, Southern Rhodesia, South Africa, Asia, Japan, Jordan, Lebanon, India, Israel. Europe: Germany, France, England, Scotland, Switzerland, Italy, Norway, Luxembourg, Finland, Czechoslovakia, Netherlands, Sweden, Poland, U.S.S.R., Romania, Yugoslovia. Oceania: Australia, New Zealand. North America: Guadeloupe, Mexico, Costa Rica. South America: Ecuador, Columbia, Falkland Islands, Venezuela.

CLARA also has a permanent club activity of sponsoring DX YLs for membership.

MINOW Net members at Walla Walla hamfest. Front row, l-r: WA7FRM, WA7BDD, WA7TLL, WA7SPA, K7MFS. Back row, l-r: WA7UFS, W7FDE, WA7RBR, WA7RVA, W7JRB, W7QGP, W7WLX, K7UBC, WA7UJI, K7RAM, K7PVG. *(Photo courtesy WA7RBR.)*

VE3GJH HONORED BY CLARA

Cathy Hrischenko, VE3GJH, was honored by the Canadian Ladies' Amateur Radio Association with the club's Dedicated Member Award in appreciation of her work as both a member and as past president of Canada's national YL club. Her work in organizing and assisting the club as well as her originating the Canadian YL Directory and DX-YLCC Award were cited. YL News and Views adds its congratulations.

1976 YLRL Offices Filled

Myrtle Cunningham, WA6ISY, 1976 YLRL president, announced the following women to fill the vacant offices for 1976. Secretary, W6YKU, Jackie van de Kamp; third district chairman, WA3HEN, Doris Dennstadt; VE district chairman, VE5DZ, Ebba Kristjansson. The office of seventh district chairman remains unfilled. QST

*YL Editor, *QST*. Please send all news notes to W3WRE's home address: 305 N. Llanwellyn Ave., Glenolden, PA 19036.

FM Repeater News

Conducted By Lew McCoy,* W1ICP/WR1ABH

1975 - Rip-Off Year for Mobile Rigs!

The facts are hard and cold . . . amateur and CB mobile transceivers were ripped off in fantastic numbers in 1975, and there's no promise of a decrease in the trend in 1976. All one need do is check the stolen gear columns in the various amateur publications; then mentally add in the number of unreported thefts: the figure is startling!

Maybe it's time we amateurs pushed for better protective measures from the manufacturers of fm and hf-band mobile equipment. A good starting point would be the inclusion of engraved serial numbers on the case, chassis, and all subassemblies. Adhesive-backed serial plates are of no value whatsoever, and some kit rigs provide such a sticker. Rip-off alley might become narrower and shorter if better deterrents were offered against easy resale of purloined transceivers, and better methods of serialization could help. At least it would be obvious to the naive would-be customer of the plunderer that something had been altered, as evidenced by ground off numbering.

Then there's the matter of better mounting gimbals than are offered presently. Why not a special mounting bracket (even at some optional extra cost) which could be bolted to the dashboard by means of unslotted screws, and nuts – the screw head being the exposed part of the hardware? The equipment would be *locked* into the gimbal and would obscure the mounting nuts.

As a manufacturer I would seriously consider doing away with wired-in microphones. The few pennies saved by not having a plug-and-jack arrangement are scarcely worth the temptation offered to criminals who delight in severing mic cords and scooting merrily away with the loot. An operator can unplug a conventional mic and cord and stow the setup in a locked glove compartment.

Still another safeguard that should be considered is an optional alarm system for his products, and one that's relatively tamper-proof. If safeguards could be offered, chances are that many more amateurs would invest in rigs for mobile use.

Perhaps the most obvious approach of all has been sorely overlooked. Why hasn't some manufacturer had the marketing foresight to offer a trunk-mounted mobile rig? The control head would contain the essentials needed for channel changing, audio gain, squelch, mic input, and speaker output. After all, the commercial boys have been doing that for years! It hardly seems necessary that everything look pretty and be installed in its entirety under the dashboard: Who knows, the XYL might even be happier with minimum gear exposure in the driver's compartment of that new XKE.

The writer is willing to bet that the first manufacturer to offer a ham-priced trunk-installed rig will scoop up a lot of waiting dollars for fm and hf-band equipment. The writer will be among the first to lay out some "greenies" for gear of that kind.

Maybe some letters from you readers will help shake up the industry enough to help get things moving in a more positive direction. Why not write to your favorite equipment supplier this week? It could benefit all of us who fear the skulking rip-off artist who lurks in the shadows and waits to assault our unattended vehicles.

Doug, W1CER, had written the preceding for possible use as a short article in *QST*, but we talked him out of it for use in this column. There are a few precautions you can take to prevent a rip-off. We note that hams have a tendency to announce to all and sundry on the repeater all the details of their plans. For example, it isn't unusual to tell everyone he is taking his wife out to dinner, announcing what restaurant when he arrives, and so forth. Joe the Rip-Off Artist is listening and has the perfect opportunity to get another rig. And let's not be so naive to think that it isn't hams who are stealing from hams! Unfortunately, we have a lot of rotten apples in our barrel. Make it a habit *not* to announce where and when you are going somewhere – there is no sense in advertising an opportunity for you to become a rip-off victim. Also, check your insurance policy!

220-MHz REPEATER INTERFERENCE

As more and more 220-MHz repeaters come on the air, a new type of interference is coming to light – interference caused by fm broadcast. Recently, a ham in Chicago noticed that a full-quieting signal, no modulation, would come on and trigger his repeater for a short time, and then go away. This interference, while it had a pattern, didn't have a pattern! The signal was tracked down to an fm broadcast receiver installed in the elevator in the same skyscraper as the repeater. As the elevator approached the top floor, the signal from the fm bc set would knock out the repeater. It was determined that the fm broadcast receiver, tuned to 100.5 MHz, for example, plus the frequency of the receiver i-f at 10.7 MHz (111.2 MHz) times 2, equalled 222.4 MHz, the input frequency of the repeater! Some mobile operators on 220 have experienced interfering signals from passing motorists, listening to the fm broadcast band.

It should be pointed out that the frequencies or tuning of the fm bc set (and its i-f) is broad enough and unselective enough so that in any given area of the country, it is possible to have a signal combination that can cause interference to any input or output 220-MHz repeater frequency!

CHICAGO 911 SYSTEM

Six of the major repeater organizations in Chicago now have autopatch activated 911 systems to access the Cook County Sheriff's Police Communications Center. Punching up 911 on a Touch-Tone pad on any of the participating repeaters provides instant emergency communications to the police system. Similar systems have been in operation in Dallas and in the Hartford area in Connecticut. This brings up a point about repeater registration for the next edition of the ARRL Repeater Directory.

REGISTRATION INFORMATION REQUESTED

It is that time of year to start thinking about updating your repeater listing in the ARRL Repeater Directory. The deadline for listing is April 1st so now is not too soon. Please write ARRL for a registration card and enclose an s.a.s.e.

Also, let us know your feelings on listing of autopatch access for emergencies, a la the 911 system. We feel that this is one of the greatest tools ham radio has been given and should be utilized to the fullest extent. Possibly the directory listing should contain this information. Do you agree? QST

*VRAC Liaison, ARRL Hq.

The World Above 50 MHz

Conducted By
William A. Tynan,* W3KMV

VHF Beacons

How much vhf/uhf DX do we miss because there are no signals on the air? Probably more openings go unnoticed than are caught. If we only had signal sources which could always be counted on, we could easily spot good band conditions as well as have a means of assessing the performance of new converters and antennas. Sure, we can monitor TV channels or ATIS stations operating at various airports across the country, but wouldn't it be much better to have signals available right on the various vhf/uhf bands and in parts of them where our equipment is peaked up to optimum performance? Various approaches to FCC, in the past, to authorize unattended beacons have met with less than enthusiastic responses, but recently the Commission's change of heart with respect to unattended repeaters would seem to signal that a similar attitude might prevail in the case of beacons. Indeed, I have it on good authority that a properly drawn-up application for Special Temporary Authority to operate such a beacon will be favorably received. Once one beacon is operating under an STA, its performance and usefulness can be evaluated, possibly clearing the way for regular licensing of more.

There are those, and I must admit to being one, who look with some apprehension at the specter of our bands being a mass of QRM from dozens of beacons every time that an opening occurs. If this were to be the case, beacons would do more harm than good and their main purpose would be neutralized. Thus it would appear that, if beacons were to become prevalent in this country, as they have in many other parts of the world, a unified plan encompassing their power, geographical location and frequency would be mandatory. Such a plan could operate, on a national basis, in much the same way as is now done, on regional basis, for fm repeaters.

What are your views? Would vhf/uhf beacons be desirable at all? If so, how many should there be on each band? What frequencies should they use and how much power should they run? Let me hear your thoughts on the matter. I'll summarize them in a future column. If the responses indicate that the concept of propagation beacons is generally well received, I'll make a stab at proposing a national plan and publish it for the consideration of the vhf/uhf community.

ON THE BANDS

6 Meters. Many, including WA1OLK, WAØTRO, and K7ICW bemoan the letdown in 6-meter activity following the fine Es season of the summer of 1975. The winter peak and the January Vhf SS Contest have alleviated this situation to some extent, but let's keep the activity going now that these are past. If we all try to get on at a regular time as many nights per week as possible, set up skeds and keep them, we can increase activity markedly. One theme which runs through most of the mail I receive is that "activity breeds more activity." One 6-meter activity breeder is SMIRK and the regional nets which it fosters. Ray, K5ZMS, says in his OVS report that the organization's membership now numbers 1113. Speaking of activity, K7ZCB reports that there are now 3 stations on 6 meters in Hawaii, KH6GRU, KH6IJ and KH6BZF.

I have received some complaints, as well as a few compliments, since assuming the stewardship of The World Above 50 MHz but now an accusation of chauvinism has been lodged. Joyseann Evans, WA6BOE, wants me and the rest of the World Above 50 MHz to know that she, despite what the November column might have said, pulled off a 50-MHz WAS before her OM Bud, WB6UWY. Her certificate was Number 127 while Bud lagged with Number 128. Our apologies and congratulations Joyseann!

The winter Es season produced some good openings including a few pleasant surprises. Calls on the telephone recorder from WB5CHW and WA5IKU, both of the Dallas area, reported that TG9MP and TG9NT were worked from "Big D" on the night of Dec. 6 about 2000 local time. WA5IYX in his monthly report lists the 23rd as the best day in November, with 6 meters open at his San Antonio QTH for over 3½ hours. Pat's muf summary lists propagation over 35 MHz for 13 days in November and over 40 MHz during 3 days. This compares with 22 days and 2 days respectively during the same month last year.

2 Meters. One of the mainstays of the 2-meter state hunters is meteor scatter, or m.s. Unfortunately, many of the newer converts to vhf may not fully appreciate this mode for what it can do for their positions in the standing box or they may be scared off by what they consider to be a complicated operating procedure and reporting system. W4ISS and WA4CQG have suggested that we review for these fellows how m.s. schedules are run and signal reports exchanged. First, most m.s. operation is done on a schedule basis. Distances involved are usually in the range of 600 to 1400 miles with 1000 to 1200 being optimum. High power and a huge antenna are not necessary. Fifty to one hundred watts will do the trick. Operation has historically been with quite high speed cw but in recent years ssb has been used fairly extensively also. Operation is carefully timed, usually with 15-second transmissions. Custom calls for the westernmost station to transmit in the first time slot. A schedule may last for 30 minutes to an hour at a time and continue for several days to a week or more until contact is established. The best time to run skeds, especially for beginners, is during meteor showers which are listed in the ARRL Vhf Manual. To initiate the contact, nothing but calls are sent. If one station hears the other, he sends calls plus a report based on the length of the meteor burst. If the other station hears the report, he sends a report plus "roger." Upon hearing the report and the roger, the first station sends, during his transmission time, a string of rogers, thus completing the contact. The reporting system used is as follows: S-1 very short bursts or pings, no complete calls (not used – continue sending only calls); S-2 complete calls received, bursts of about 5 seconds; S-3 longer bursts, about 8 seconds; S-4 rarely used, longer bursts, up to about 12 seconds; S-5 long burst, 15 seconds or more. If this occurs, usually a "BK" is sent and the time sequence is abandoned for normal break-in operation. In order to avoid confusion, once a report is sent, it isn't changed later in the schedule. The next major meteor shower is the Lyrids in mid to late April. It provides a good opportunity for would be "ping jockies" to get their feet wet.

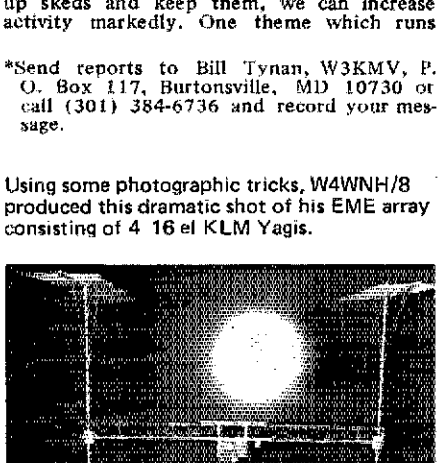
In the other major state total builder, EME, K8IIL suggests holding a "moonbounce activity night" similar to those which take place when big stations, like WA6LET, conduct tests but utilizing the larger home stations as the nucleus of the operation. A few home EME stations on 2 meters now have set ups which rival the stations with the big commercial dishes in terms of the signals they put out. We'll have more word on this as soon as Paul and others firm up plans.

K8TQK passes along word that the Midwest 2 meter ssb net meets Sundays, Tuesdays and Thursdays at 2100 EST on 145.025 MHz. On the a-m side, W1WEE's OVS report mentions the Meriden, CT, ARC Net, also at 2100 EST, on 145.35.

Most reports cite pretty slim pickings on 2 meters during November. No exception is a note from WA4GPM of Norfolk, VA. Buzz tells of an aurora opening to VE3DSS Toronto on the 2nd that was about it, except for a weak tropo opening on the 9th.

1¼ Meters. Yes Virginia, and all you other states for that matter, there is an amateur band at 220 MHz and there are people on it. Fm activity both simplex and through the new repeaters which are popping up each

Using some photographic tricks, W4WNH/8 produced this dramatic shot of his EME array consisting of 4 16 el KLM Yagis.



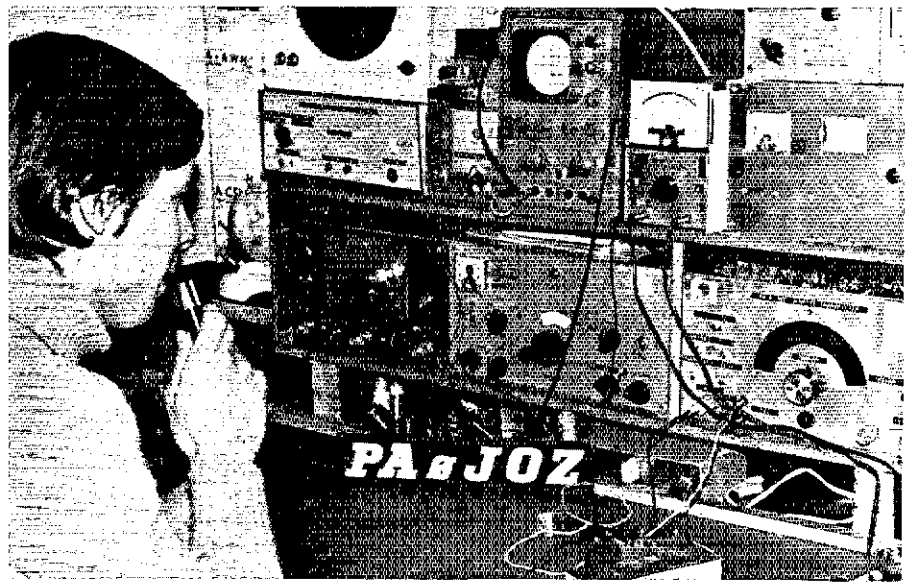
*Send reports to Bill Tynan, W3KMV, P. O. Box 117, Burtonsville, MD 10730 or call (301) 384-6736 and record your message.

Two Meter Standing

Figures are states, call areas and best DX in miles.

WA1FFO	39	10	2624	W5SXD	25	6	1265
K1HTV	37	9	2616	W6PO	32	10	8000
K1ABR	35	8	1478	K6QEH	18	7	5500
W1AZK	34	8	1412	W6GDO	18	5	1326
K1WHS	33	10	10749	W6WSQ	16	4	1390
K1UGQ	30	8	1370	K6HRA	13	4	2580
K1PXE	30	8	1207	K6JYO	13	4	1240
W1VTU	29	8	1296	K6HMS	11	4	1258
K1BKK	29	8	1275	WB6NMT	9	4	1250
W1JSM	29	8	1100	WA6JRA	6	3	2591
W1FZA	29	10	2750	K6GAO	5	4	1276
W1AAI	28	7		K7NII	30	8	2289
K1MTJ	26	7	1250	W7JRG	28	6	1320
WA1OUB	25	8	1525	WA7BBM	21	7	2175
W1HDQ	24	7	1040	WA7KYZ	18	10	6000
K1RJH	22	7	1450	K7ICW	18	4	1278
K2RTH	41	10	11000	WA7BJU	17	10	2600
W2AZL	38	9	2500	W8KPY	42	10	2050
W2CUX	38	8	1334	K8AXU	38	8	1275
W2NLY	37	8	1300	K8HWW 1	36	8	1100
W2CXY	37	8	1360	W8IDU	36	8	1150
W2ORI	37	8	1320	W8VIQ	36	8	1100
W2BLV	36	8	1150	W8IDT	36	8	1150
WA2FGK	33	8	1340	K8DEO	35	8	1200
WB2WIK	32	8	1080	WA8PIE	34	8	1100
WA2BIT	31	10	10000	W8NOH	31	8	1165
WA2CJK	31	8	1160	WA8LLY	28	8	820
W2CRS	30	8	1230	W8TIU	24	8	1000
K2EVW	29	8	1232	W8KBC	24	7	900
K2CEH	29	8	1200	K8ZES	22	8	675
W2CNS	27	8	1150	K9UIF	45	10	1874
K2DNR	27	7	1200	K9HMB	43	10	1827
WA2PMW	25	7	1245	W9YYF	43	10	4500
WB2SIH	25	6	1000	K9UGD	42	9	1300
WA2UDT	24	7	1020	WA9DOT	41	9	1303
WA2EMB	23	6	1335	W9AAG	41	9	1200
K2BWR	23	7	1350	K9AAJ	41	9	1200
W2DWJ	23	6	860	W9OII	37	8	1075
W3BHG	39	10	2488	W9BRN	36	9	1260
K3CFY	37	8	1250	K9UNM	36	8	930
W3RUE	36	8	1250	WA9EUA	35	8	881
K3QCQ	36	8	1000	W9PBP	34	8	820
WA3QVN	33	10	2500	K9KQR	31	8	1105
W3BDP	32	8	1275	W9VWY	30	8	1052
W3TMZ	30	9	2410	K9UYK	29	9	1600
W3LNA	27	8	970	W9JDJ	29	8	1000
W3OMY	26	8	800	K9OXY	24	8	1082
K3CFA	25	8	1200	K0MQS	48	10	10605
W3ZD	22	8	950	WA0CHK	45	10	1650
W3KMV	22	7	1000	W0LER	44	9	1440
W3IFA	21	8	1342	W0DGY	41	9	1300
K3OBU	21	7	930	W0LFE	40	9	1100
K4GL	42	10	2340	W0RLI	39	9	1293
K4IXC	40	10	4850	W0EMS	35	10	1320
W4HJQ	39	9	1150	W0PW	35	9	1380
WA4CQG	39	8	1350	W0ENC	35	9	1360
WA4WNH	38	9	1350	W0LCN	35	9	1100
W4HHK	38	9	1280	W0PMN	32	9	1285
K4EJQ	37	8	1125	W0DRL	27	9	1295
K4QIF	36	8	1225	W0MJS	26	8	1118
W4VHH	36	8	1125	KH6NS	3	2	6000
K4VW	35	8	1440	VE1ZN	7	2	500
W4DFK	35	10	12000	VE2DFO	41	10	10600
W4FJ	34	8	1150	VE2YU	32	8	1200
W4ISS	31	8	1000	VE2BZD	23	7	1309
W4AWS	29	8	1350	VE2HW	18	6	800
W5ORH	45	10	1715	VE3ASO	38	9	2140
K5BXG	44	10	4500	VE3BQN	37	8	1250
W5UGO	43	10	1398	VE3EZC	33	8	1283
WA5UNL	42	10	1725	VE3AIB	29	8	1340
W5RCI	42	9	1289	VE3EVW	29	8	1100
W5WAX	39	10	1370	VE3DSS	28	8	1200
WB5LUA	39	10	1570	VE3EMS	27	10	1100
K5WXZ	38	10	1450	VE3CWT	27	7	1072
K5HFV	38	10	1285	VE7BQH	12	3	7920
K5VWW	33	10	5200	5M7BAE	12	7	11055
W5AJG	33	9	1360	VK3ATN	4	4	10417
W5UKQ	33	9	1290	VK5MC	3	3	10000
W5LO	32	7	1325	ZL1AZR	2	2	11055
K5PTK	29	9	1350	SM6CKU	2	2	4200
WB5BKY	29	9	1407				

month is increasing steadily. Many are finding that the coverage is almost identical to that obtained on 2 meters. In addition to fm there is a stalwart group of a-m, cw and ssb operators on the band. One of these is Joe, W2EIF, in southern New Jersey. He tells me that the gang gets on each Tuesday at 2030 EST. Regulars in this operating activity include K1PXE, W2WOF, WA1NGR and WA1SFC as well as himself. K9HMB writes that he is looking especially for Tennessee, Missouri, Minnesota, Virginia, Delaware, New Hampshire, Vermont, Rhode Island and Georgia. Frank already has 23 states on 1¼ including such goodies as California, Maine, Florida and Montana. New Mexico doesn't seem to be the most likely place to find 1¼-meter activity, but WA5MFZ of Edgewood already has 4 states and 4 call areas. Lee's latest was K7NII, Arizona, which was worked via aircraft reflection on Nov. 30. This was accomplished despite the fact that K7NII was running only 25 watts.



The homebrew layout of Netherlands Oscar operator PAØJOZ.

70 CM. The big news for 432 MHz is the very successful EME tests conducted Oct. 31 and Nov. 23 from the 150-ft. dish at Stanford by WA6LET. From the other end of the line, we have many reports citing the first EME contact for the particular station. An example is WA6EXV of Ridgecrest, in the California desert. Chuck completed a 20-ft. dish and feed system just in time for the tests and was rewarded with a QSO. K1PXE Milford, CT, was another successful participant. Pete did the job with only 200 watts and 4, K2RIW Yagis aimed by hand. W3TMZ, Mt. Airy, MD, also made the grade using an Arcos version of the K2RIW parallel kW and 4, KLM 16-element beams.

A big 70-cm signal out of Connecticut these days is WA1FFO. Steve is now sporting an 8877 amplifier and 4, 13-element K2RIW Yagis. State total is now up to 13.

23 CM and Down. Microwave reports are on the increase of late and that's good news indeed. For, if there is one part of our spectrum which will be under attack at the next World Administrative Radio Conference (WARC) scheduled for 1979, it will be these bands. One proposal has already been made to reallocate our 5650 to 5825-MHz band to another service. We are in particular need of activity reports for this band to help defend the amateur slice of this important portion of the microwave spectrum.

The 9-cm (3300-MHz) band has been getting some play in California according to a report from WA6EXV. Chuck says that in mid November he and K6MBL worked from Blue Ridge, near Wrightwood, CA, to Birdsprings Summit not far from the US Navy's China Lake facility. Both stations used San Bernardino Microwave Society "ROCLOC" rigs, each producing about 100 mW output. Chuck says that a 4-ft. dish at one end and a 6 footer at the other produced very strong signals over the 100-mile path.

The 13-cm (2300-MHz) band is receiving some activity on Long Island. WA2EUS writes that WB2FPE, W2OTA, K2RIW and W2UWC participate in a Wednesday 2100 EST 2304-MHz roundtable often joined by K2JNG, Union City, NJ. Also along the East Coast, W2EIF reports regular 23-cm activity at 2030 EST on Thursdays. He and K1PXE work regularly on 1296 MHz over a 140-mile path from southern New Jersey to Connecticut. Meantime, on the West Coast, California seems to be becoming a hotbed of 23-cm activity. WA6UAM reports via the telephone answering machine that he and K6ZMW, Fresno, can work over a 124-mile path. Paul is running 10 watts from a TWT while K6ZMW has about 20 watts of ssb from a 2C39 stripline amplifier. A note from K6ZMW fills us in on his station including the antenna which is a quad helix with right-hand circular polarization at 85 feet. Other stations active on 1296 MHz in the area are K6UQH and WA6NRV. QST

Strays

□ W7YM sends along a QSL card he just got from W7HOL saying, "Better late than never is my QSL policy." He wasn't kidding! The card confirmed a QSO on Nov. 13, 1940 – 35 years ago!

□ To honor the 1976 Summer Olympics, a certificate will be awarded to licensed amateurs who comply with the following requirements:

1. Canadian amateurs must work 10 Montreal *Island* stations. (Montreal *Island* amateurs must work 20 Montreal *Island* stations - vhf/uhf repeater contacts disallowed).

2. Foreign amateurs must work 5 Montreal *Island* stations.

3. Contacts must be made between August 1, 1975, and July 31, 1976. Any Mode.

4. Send $1.00 or 5 IRCs and a copy of your log containing: date, time, station worked and operator, mode, frequency, received signal report, sent signal report. No QSLs required.

5. Send applications to: Secretary, Westminster Amateur Radio School, Box 323, Montreal Int'l Airport A.M.F., P.Q. Canada.

Hamfest Calendar

Florida: The Stuart Fifty Cent Hamfest is Saturday, February 28 with a $.50 admission at the Tri-County Rehabilitation Center, 4461 Federal Highway (US 1), Stuart.

Illinois: The Sterling Rock Falls Amateur Radio Society hamfest is March 7 at a new location, the Sterling High School Field House, 1608 4th Ave., Sterling. Tickets $1.50 advance, $2 at door. For info write: Don VanSant, WA9PBS, 1104 5th Ave., Rock Falls, IL 61071.

Illinois: The Wheaton Community Radio Amateurs annual mid-winter hamfest is Sunday, February 8 at the Dupage County Fairgrounds, Wheaton (Manchester Rd. near County Farm Rd.) from 8 A.M. to 5 P.M. Tickets $1.50 advance, $2 at the door. For advance tickets send S.A.S.E. to L.O. Shaw, W9OKI, 433 S. Villa Ave., Villa Park, IL 60181 by February 1.

Indiana: The Lake County Amateur Radio Club's 23rd annual banquet is Saturday February 21 at 6:30 P.M., at the Griffith Knights of Columbus Hall, 1400 South Broad St., Griffith. All the delicious home cooked food you can eat, entertainment, speeches, and special awards. Tickets are $7.50 each; no door purchase. Write: Herbert S. Brier, W9EGQ, 409 S. 14th St., Chesterton, IN 46304.

Iowa: The annual Davenport Radio Amateur Club hamfest is on Sunday February 22 at the Masonic Temple in Davenport. Admission is $1.50 in advance, $2 at door. Talk-in on 28/88 and 146.52. Refreshments are available; tables at a small fee. For info and tickets S.A.S.E. to WA0GXC, Dick Lane, 116 Park Ave., Eldridge, IA 52748.

Michigan: The Cherryland Amateur Radio Club's third annual Swap 'n Shop is Saturday February 14 from 9 A.M. to 4 P.M. at the Northwestern Michigan College campus in Traverse City. Talk-in on 146.52 and 3935. For more info contact: Bill, WA8WWM, Box 2, Empire A.F.S., MI 49630.

Pennsylvania: The Public Service Communications Asso's fourth annual hamfest is February 29, 9 A.M. to 3 P.M. at the Lancaster Farm and Home Center.

Coming Conventions

February 13-15
Florida State, Orlando, Florida

March 20
Michigan State. Muskegon, Michigan

April 9-11
Southwestern Division, Tucson, Arizona

April 10-11
North Florida Section, Jacksonville, Florida

April 25
Delta Division, Jackson, Mississippi

May 21-23
New York State, Rochester, New York

June 5-6
ARRL Hamfest, Salina, Kansas

June 11-13
Southeastern Division, Atlanta, Georgia

July 2-4
West Virginia State, Jackson's Mill, West Virginia

July 9-10
Central Division, Milwaukee, Wisconsin

July 16-18
ARRL National, Denver, Colorado

July 24-25
Atlantic Division, Philadelphia, Pennsylvania

July 31-August 1
Roanoke Division, Norfolk, Virginia

August 7-8
ARRL Hamfest, Concordia, Kansas

*August 20-22
Maritime Section, Halifax, Nova Scotia

September 3-5
Pacific Division, San Jose, California

September 10-12
New England Division, Boston, Massachusetts

October 8-10
Midwest Division, Omaha, Nebraska

November 6-7
South Florida Section, Clearwater, Florida

November 13-14
Hudson Division, McAfee, New Jersey

*Indicates change in Halifax convention.

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.

FLORIDA STATE CONVENTION

February 14-15, 1976, Orlando, Florida

The Orlando Amateur Radio Club, W4PLB, will host the 1976 ARRL Florida State Convention and our own "Hamcation" is Orlando, Florida at the beautiful Sheraton Twin Towers Convention Center on February 14 and 15, 1976. The convention center is centrally located at the junction of Interstate 4 and the Florida Turnpike in Major Center with easy access to McCoy Jetport. Transportation is available from the hotel to all local attractions including Walt Disney World, Sea World, and Cape Kennedy.

There will be a large exhibit and display area of commercially manufactured ham gear and an indoor swapfest in the Convention Center. In addition, a gigantic outside swapfest will be in operation both Saturday and Sunday. All activities will be held on the premises, including forums and meetings. Included in the many forums will be an ARRL meeting and discussion hosted by Larry Price, W4DQD, Southeastern Division director, and a technical forum hosted by Doug DeMaw, W1CER, technical editor, *QST*. There will be meetings on slow scan, DX, and other topics plus many exhibits of interest to amateurs. Activities have been planned for the ladies who attend. Two-meter talk-in will be on 16-76 and 22-82.

Hotel reservations may be obtained by calling the Sheraton reservations service at 1-800-325-3535, no charge. Be sure to specify "Orlando Hamcation" for convention rates of $22 single and $28 double. The local Sheraton number is 1-305-351-2811.

Advance registration is $2.50 per person, $3 at the door. Indoor tables are $5, both days and $3 Saturday only. Outdoor space is $1 per car space per day. For registration and table space *only* write Herb Roland, W4LSR, 7556 Charlin Parkway, Orlando, Florida 32807.

Strays

□ The League Headquarters building is open to visitors Monday through Friday, 7:30 A.M. – 5 P.M. on a "drop-in" basis, (except April 12, May 27, July 4, Sept. 2, Nov. 28 and Dec. 25) and at other times by appointment. The headquarters is on Main Street (Conn. Route 176 and 176-A) about a mile north of the center of town, and about 3 miles west of Conn. 15-U.S. 5, the Wilbur Cross Highway.

I would like to get in touch with . . .

□ The objective of this group of young people (ages 12-18) is to observe, report, and study aerial phenomena, astronomy, meteorology, particularly the unknown flying objects of various types, and the study of weather variations reflected in cloud patterns and in atmospheric distrubances. Members become an inherent part of the GSW to plot, record, and identify all observed Unidentified Flying Objects (UFO) sightings.

I, WN9PFZ, am interested in forming a net for all interested persons. Membership in JSW open to those 12 to 18; UFO Net open to all. GSW senior program open to those over 19.

For detailed info, contact WN9PFZ, Jeff Howell, PR 6 Box 239 Bedford IN 47421; or GSW/JSW, 13238 North Seventh Drive, Phoenix, AZ 85029.

Murphy Strikes Again!

□ Did you hear about the fellow who was working on his roof-top antenna? He decided to play safe and rigged up a safety rope around himself, should he slip down the peaked roof. He looped it over the peak to the other side, down into his driveway. There wasn't anywhere to secure it, so he tied it to the bumper of his car. You guessed it, his wife decided to go shopping, didn't see the line and wham-o! Over the roof-top he flew slammed to the driveway and dragged down the block. He's wrapped up like a mummy now, in the hospital. *As told to W2JZQ by W2HAJ*

QST congratulates . . .

□ Tom Bradley, K4GXD, who has been named 1975 Metropolitan Atlanta "Engineer of the Year." He has also been selected as one of 10 persons in the nation for membership in the American Gas Association's Hall of Fame, an honorary society.

□ Clarence Henry "Hank" Ostby, WB6CCJ, recipient of a special award of commendation for his suggestion that the California State Health and Welfare Agency and the State Department of Health plan and implement an emergency amateur radio communication network.

International News

Conducted By David Sumner,* K1ZND

Netherlands Adopts New Entry-Level Amateur License

In an effort to encourage more people, especially illegal users of the 27-MHz band, into amateur radio, the Netherlands Postal and Telecommunications Services has introduced a new class of amateur license with limited operating privileges on 144 MHz. The new license, known as the D-license, can be obtained by persons at least 18 years old who have passed a simplified examination in radio technique and regulations. The holder of a D-license may operate on six specified crystal-controlled frequencies using fm at a maximum input power of 20 watts. The six frequencies are to be allotted in accordance with the IARU Region 1 band plan. Repeater operation will not be permitted.

The D-license holder will be assigned a distinctive call sign, probably with the prefix PD. The license will be valid for a maximum of two years and may not be renewed. Within the two-year period the holder must obtain one of the following licenses to remain on the air:

A – all amateur bands, 150-watts transmitter input power

B – all amateur bands, 50-watts input

C – all amateur bands above 144 MHz, 50-watts input.

The written examination for these licenses is similar to the FCC General Class exam. For the A and B licenses there is an additional test in Morse code at 12 words per minute.

The D-license was the result of consultations between the PTT and the VERON, the IARU member-society in the Netherlands. The VERON has commented on these consultations as follows:

"The decision to introduce a D-license was instigated by a political promise, given by Dr. Van Hulten, State Secretary of the Ministry of Transport and Public Works, in the Dutch Parliament, when he announced severe repressive measures against illegal use of the 27-MHz band. His original idea seemed to be the establishment of a permanent and separate class of "communication amateur" in the two-meter band. From the beginning VERON has taken a strong stand against this ill-considered plan. VERON only wanted to consider extensions of the licensing system insofar as they fitted in the existing (satisfactory) structure, and would not conflict with the aims (and definition) of the Amateur Service.

"The D-license, as it emerged from the meetings and discussions between VERON, VRZA [another amateur group in the Netherlands], PTT, and the State Secretary, shows that the interests of the Amateur Service have prevailed. The newly established license is meant as an entry to amateur radio. People who have to spend an appreciable amount of time on the preparation for the normal examination will undoubtedly be encouraged and stimulated considerably when they can already during their study participate in amateur radio communications – albeit temporarily and with limited possibilities." – Ir. C. van Dijk, PAØQC, VERON representative to PTT.

JA7AO WINS FIRST SIX-BAND WORKED ALL CONTINENTS AWARD

As mentioned briefly in "League Lines" (*QST*, November, 1975), Tokuro Matsumoto, JA7AO, was the first successful applicant for the Six-Band Worked All Continents (6BWAC) award. The magnitude of this accomplishment is perhaps best measured by the fact that, although some 35 five-band versions of the award have been issued and hundreds of amateurs are hard at work on the requirements for the 6BWAC, no one has stepped forward to claim the second award in the three months since the issuance of the first. As input to the continuing controversy as to whether it is the station or the operator which lends the most to an amateur's success, it is worth noting that JA7AO, while well-equipped, is by no means a super-station. OM Matsumoto runs 800-watts input to a dipole at 50 feet for 160 meters, inverted Vs at 50 feet for 80 and 40 meters, and a three-element triband Yagi at 60 feet for 20, 15 and 10 meters.

Through the courtesy of the Japan Amateur Radio League we are able to pass along these comments from JA7AO himself:

"I thought that a number of stations would have already applied for 6BWAC, and I was very glad to be informed by JARL that I am the first winner of the award. I started to work on the new award when it started [January 1, 1974], and it took me a year and nine months to qualify. I had the most difficulty in contacting Africa on 160 meters and obtaining a QSL card from South America on 80 meters. To make many contacts in short periods of time I operated in several international contests, but it was more difficult to confirm contest contacts.

"I am very much obliged to those who kindly gave me the chance to contact them for 6BWAC."

ITALIANS FORM RADIO TELEPRINTER GROUP

The Associazione Radiotecnica Italiana (ARI), IARU member-society for Italy, has formed the Italian Amateur Radio Teleprinter Group to represent the interests of RTTY-oriented amateurs. The group will promote annual meetings and conventions, assist newcomers and others with technical problems, publish RTTY articles and news in the ARI's official magazine, and promote amateur RTTY activity. Further information may be obtained from Lamberto Rossi, I5ROL, P. O. Box 50, 56021 Cascina, Italy. QST

* Assistant Secretary, ARRL.

First 6BWAC winner JA7AO. *(Photo courtesy JARL and the Japanese magazine,* CQ Ham Radio*)*

How's DX?

Conducted By Rod Newkirk,* W9BRD

Jeeves Rolls a DX Gutter Ball

He showed up with his battered bowling bag and it wasn't even our night for the lanes. "You're two days early, Jeeves. Put that heavy thing down and let's check 40 for Africans." Eyes twinkling, Jeeves doffed his bowler, set his baggage on the kitchen table, unzipped it and withdrew the craziest bowling ball you ever saw. Pure crystal! Our old buddy also handed us a tattered *QST* for July, 1952. There in hallowed pages we found the reason for this offbeat visit. Updating calls for relevance, the ancient "How's" went thus:

". . . Jeeves thought it proper this month to wrap on his turban, haul out his xtal ball and give us a peep at a page of "How's DX?" circa 1975. We don't know who's conducting it, but a few paragraphs look interesting. . . ."

. . . W4BPD and W6KG are off to Neptune with radio gear. . . . QSLs are rumored coming through from UJ8AC and FR7AM. . . . W9BRD has almost licked his TVI. . . . KV4AA converted his W/VE QSL file to microfilm after his shack floor buckled. . . . W6AM needs Jupiter for ssb WAP. . . . u#0 is the new prefix for Arcturus. . . .

"Then the darned thing QSBd. Jeeves wiggled the knobs frantically and DX column paragraphs for a 2002 *QST* momentarily came into view:"

. . . W4BPD and W6KG came back for another 807. . . . QSLs are rumored coming through from UJ8AC and FR7AM. . . . W9BRD has almost licked his TVI. . . . KV4AA bought more land for his microfilm QSL file. . . . W6AM's Jupiter QSL was bounced by W1CW; Jupiterian ink disappears in our atmosphere. . . . OH2BH is now u#0BH. . . .

The years have flown and, sure enough, time had come for another Jeevesian probe of the wireless future. Again he donned that dusty old turban, gestured magically and peered into the foggy xtal. By gollies, before our very eyes appeared *QST* pages for the year 2027:

. . . Sliders infest a-m broadcast band, clobber WLW, WCBS and KNX. . . . Breakfast cereals include free all-band ten-kW microlinears. . . . FCC gives up efforts to clear marine emergency channels of slider QRM. . . . Airlines foil sliders, resort to wigwag and carrier pigeons. . . .

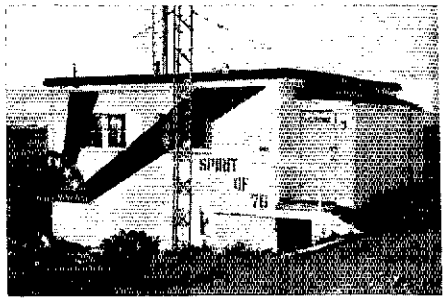
We beat that rock to death with a hammer, but not before another future item caught our eye: "Slider mobs march on Washington, protest mounting QRM and demand relief from radio lawlessness through properly enforced regulations." Another coming Communications Act of '27, perhaps. Full circle?

WHERE

EUROPE: The French '75 Contest, an annual REF affair, saw our side scoring in this radiotelegraphic order: W8KPL, K1OME, Ws 3ARK 8VSK 9OHH, K5ETA, Ws 1VH 8DSO 3QA 4JUK, WB2NDR, W4WSF, WA2SRH, W1OPJ, Ks 7AL 3NTD, W9RJM and WB9NME. Up north it went VO1AW, VE3s BBH EJK and BR. On the phone front W1BIV, F2YS/W2 and W4WSF finished 1-2-3 with VE3s BS BBH EUP and GCO the Canadian sequence. Cw worldwide highs were posted by LZ1GX, OD5LX, W8KPL and PY7ALC per continent, top voice tallies by 13MAU, OD5BA, VE3BS and PY1EMM. Fs 3CY and 8OP led the home front on code and phone respectively. (REF) . . . I hope to put HVs 1CN and 3SJ on 10 meters when I revisit Rome late next month. (K2YFE) . . . My friend JA1OGX, on business in Rotterdam, works much DX on 20 as PA9AAN. (JA1RUJ) . . . Twenty seems to be in much better shape in Wiesbaden since I raised my quad to the 110-foot level. Also working quite a few Novices on 15 with my C-line.

*c/o ARRL, 225 Main St., Newington, CT 06111.

KL7FBI's gang spruced up their Shemya hamshack with Bicentennial enthusiasm. To appreciate the vast improvement, check the "before" picture in March '75 *QST*. KL7FBI operated mostly by military personnel on Aleutians assignment is thoroughly worked on 3.5 through 28 MHz *(Photo via KL7ICL)*



OCEANIA: In three short days of 160-meter fun I had two dozen contacts with five countries on three continents using an FT101B and low bent dipole. It's an interesting change from higher frequencies. (VR1AA courtesy W6BLZ) . . . VK4AK visited my (DA1DS) . . . No one can say I'm crowding the onrushing forefront of communications technology. After 25 years in ham radio I'm still doing fine without transistors, microphones, beams and loudspeakers. (G3IDG) . . . Lightning storms, local broadcasting QRM and other difficulties beset our September efforts to give the 40- and 80-meter gang a good shot at 4U1ITU. (DL7RT & Co.) . . . Much fun scoring 1381 QSOs with 33 countries on 20 cw as F@BPR with my homebrew 15-watt battery-powered transceiver. (W6FKF) . . . EX-DA1s CC CL and W3JZJ are heard from club station I3DFQ. Amateur radio courses are in progress there. (WA4ZSB) . . . That Radio Moscow ham radio program is well heard here each Thursday at 0000-0015 UTC near 9.7 MHz. (K2JFJ) . . . Enjoyed visiting the G3WYX Exeter Contest Group in Devon, particularly G3s HTA RUV RUX and TJW. Three of the four hold 5BDXCC. (WB6PDV) . . . DM2AYK and I, members of the Ilmenau DX Group, worked some 1500 W/Ks in ssb contest activity last October with a kW, quad and dipoles. (DM2DUK) . . . Continental comment in club periodicals: Nebraska, Wyoming and North Dakota will wrap up WAS for M1C. Tony hunts 'em on 14,010-14,025 kHz around 1700 UTC. . . . SV@WZ keeps Rhodes comin' near 14,305 kHz but SV@WKK swaps Crete for West Virginia. . . . UK1PAA takes up in Franz Josef Land where old UA1KED left off, and UK1PAB likes 20 cw from Nova Zemlya. . . . A polar expedition activated U@s CR and RV from Sverdrup and Severnaya Zemlya with the accent on 40 cw and 20 phone. UA1ZZZ, 20 cw, also is reported on arctic assignment. . . . G8TK designates 3540, 7030, 14,065, 21,040 and 28,040 as international QRP frequencies, the 20-meter spot most active around 1100 UTC. PA@EE is European representative for QRP ARC. . . . GD3IAD, a briefie by G3IAD, gave a new country to 320 SSTV buffs in 52 countries on all continents. He was No. 102 for W4MS, No. 42 for PY7APS. . . . Boy Scouts from nineteen nations took turns operating LC1J. Forty-three of their 2362 QSOs with 105 countries went via Oscar.

shack in mid-August for a real gabfest. Gil looks forward to more rare-island hopping in the not too distant future. (W7OK) . . . KG6JFY, formerly K1MTJ/KG6, likes 7-MHz cw at 1000-1500 UTC. Joe guns for the U.S. east coast on Thursdays and Fridays. He also tries 21-MHz voice or code when that band shows promise. (K1RQE) . . . After a session as VR1Z we signed VR8B on Tuvalu around the first of the year. We've used about fifty DXpeditionary call signs in the past and, under Yasme Foundation auspices, we're now on our way toward 100. Watch (cw) 3505, 7005, 14,050, 21,050, 28,050; (phone) 3795, 7095, 14,195, 21,255 and 28,550 kHz. We'll be tuning mostly five kHz up or just inside General subbands. (W6s KG DOD) . . . YB9ABX, the first SM reciprocally active in Indonesia, chases DX certifications by mic and key. Hal's XYL and daughters are with him and all will tour the States en route home to Europe. (K3RDT) . . . K4KEW has applied for a KJ6 call. Marv starts a one-year stint on Johnston next month. (WB5HVY) . . . My hair and teeth may grow sparse but I still look forward to such DXpeditionary efforts as ZK2AP after five previous trips to Lord Howe Island and Norfolk. (VK5XK) . . . Hated to cut short my budding Canton DX career in mid-November. (WA6LRG/KB6) . . . DJ@FX and DL9PT expect to arrive in Hawaii in April with KH6 operating privileges. (KH6IAC) . . . Pacific patter via club newshawks: FK8s AT BR BY CD and other New Caledonians bat the local breeze near 14,110 kHz at 0800 UTC. . . . WB4KSE may be banging away in the annual ARRL DX Test this month as WB4KSE/KX6 and/or VR3AH. Are *you* all set for the fray? . . . VS5MG (GI3WME) anticipates a two-year Brunei tour. Ex-VS5MC, now G3NWQ, reports a local sultan there developing a keen interest in ham radio. A TH6 already adorns his palace roof. . . . Code give you trouble? KH6BTH, blind and deaf, reads 25 or 30 wpm by fingertipping a loudspeaker cone. . . . VKs 3JW 4ABA 4OR and 4WS rescheduled their Coral Sea thing for early spring. . . . Old VR1AT becomes VR8A of Tuvalu at the same location. VR1PE of British Phoenix still likes 14,204 kHz from 0630 UTC. . . . ZL2BKL and other New Zealand YLs have the necessary Kermadecs credentials but DXpeditionary transport poses problems.

AFRICA: Wish I had more time to spend with the W/K/VE gang from Diego Garcia and

Cocos-Keeling around 14,212 kHz. My 400 watts and long-wire normally do okay on the polar route, usually at 1800-2000 UTC. (W6OAL/VK9/VQ9-KX6KV-KH6HQX) . . . I understand that exorbitant license fees are one factor causing a scarcity of Zaire amateurs. 9Q5SW still generates huge audiences on 20 sideband with 200 watts and a groundplane. (WB4FDT) . . . EL2s CI and DK are Stateside while EL2NAP, I believe, QSYd to the Ethiopia vicinity. (K8LUH) . . . Despite Old Sol's inactivity 5L2FM sneaks through steadily near 28,600 kHz around 1700 UTC. (K1RQE) . . . FB8YC of Terre Adelie presents Antarctica to cw hounds around 1300 UTC near 7020 kHz. (W7YF) . . . Additional Africana from the DX grapevine: 3V8CA offers Tunisia on 14,345 kHz, usually Sundays at 0800-0900 UTC, with 300 watts and a vertical. . . . FL8OM/a radiated Jabal at Tair on 20 ssb in October, European QSOs predominating. . . . Various FB8s populate an Australasian group gabbing on 14,105 kHz almost daily around 0630 UTC. . . . FR7BE could give St. Brandon, then Glorioso, a whirl at any time. . . . 5N2s AAE AAJ ESH and NAS still contribute Nigerian rf. . . . Cape Verde amateurs adopt the D4C prefix, old CR4BS becoming D4CBS. Angolans are D2As in the new scheme of things, former CR6LD now signing D2ALD. . . . Libya and Somalia now top the most-wanted lists of our younger DX-hungry generation according to poll data analyzed by W1AM and associates.

NORTH AMERICA: Ten meters really came alive for fall contest action. In addition to the usual north-south stuff I found CR6FW, CT3BD, EA7TL, KH6IJ, KS6FF, YJ8AN, ZD8AA, ZK1DX and 6W8FP. Our Central Florida DX Association, responsible for recent ZF1AU and PJ8YFQ doings, plans an April DXcursion to a place widely yearned for. (WA4BTC) . . . I can add such recent 10-meter sideband items as C9MGK, CRs 4BS 6FW, DL1VX, EAs 3XD 7ZN, F6BAQ, I2FAE, LX1PD, ZD7SD, ZE1JJ, ZSs 1XG 6AO, 5L2A and 5Z4PP. On cw there were DK5VB, EAs 1AB 4OA 7RA, F8VJ, ZD8TM, ZE1AN and 9G1LZ. I frequently hear the DLØIGI and 3B8MS beacons rolling through with no other DX activity apparent. (K2YFE) . . . There ought to be a law requiring DXpeditions to use nothing but split frequency operation. On-frequency pileups become nightmares. (W2IYX) . . . Fifteen's been good enough here to provide occasional stuff not heard on 20. (WA4HHG) . . . I'm now the proud possessor of all four ARRL DX plaques. Maybe I'll tape 'em for SSTV. (W5UR) . . . My first month as a Novice produced twenty countries and 39 states with a low 21-MHz dipole. OA4AOB and XE1TI like working WNs between 21,120 and 21,150 kHz. (WNØQNX) . . . Radio Club Dominicano's HI5ØRCD, a station commemorating the organization's fiftieth anniversary, will be active throughout the year. (RCD) . . . Plenty of DX answered my ZF1JH two-watter in late '75. (WA6VNR) . . . Narrowly missed DXCC as a Novice. I'd like to see an annual summation of all "How's" QTH info plus more 10-meter coverage. (WØDYK) . . . I'm off to Palmer station for a year at KC4AAC. Besides multiband contest work I'll be giving Oscar a try for those who still need Antarctica by satellite. My anchor spots are 7296 kHz at 0900 UTC, 14,325 at about 0130. (WB6KIL) . . . Ten-meter contest pileups were wild at WB4SJG/6Y5 on Montego Bay. My best hour was jammed with 306 sideband contacts. (WB4SJG) . . . After two active years our University of Missouri (Rolla) club station, with 169 countries logged, still needs seventeen QSLs for DXCC. (WBØGQP) . . . November 18th was a hot night on 40 cw, three new ones for me in JA8IEV/JD1, ZK2AP and 3B8DQ. KZ5DE and I speculate on possible beneficial DX effects of a full moon. (K4DAS) . . . VP2DM hopes to be active from VP2KC again this year with increased power and a better skyhook. (W1WQC) . . . Glad to get my Extra and a better crack at all the cw goodies on 40's low end. So far it's 67/40 worked/confirmed countries here. (WB9NME) . . . Eighty cw got off to a fine start this season, early QSOs with C5AJ, DJ3KR/OA4, FP8AA, ISØAEW, JAs 1EEO 1BYL 8DXB, KL7PI, UA9s OAQ ODY, UK9AAN, ZS2HI, 3V8DQ, 4L3MK, 4X4NJ and many VK/ZLs. (W1SWX) . . . An autumn week on Sint Maarten produced nearly 1500 contacts as PJ8CM, fifteen QSOs on 160. (K5CM) . . . After too many lean months DX finally picked up on most bands by December. (W7HPI, K4KCK) . . . The F08 gang on Tahiti, who should know, hold no hope for Clipperton activity in the near future. (K6ILM–FOØILM) . . . I expect to be signing PJØUSA on St. Eustatius and VP2VAN in the British Virgins again this month and next on 10 through 160 meters. (K2FJ) . . . My next DXpeditionary possibilities include Iraq, Malpelo, Bajo Nuevo, Serrana Bank and a CEØZ-land encore. (K5QHS) . . . New Colorado QTH proved great for 10 meters beginning in October. (WBØQOT, ex-WA1QME) . . . Working DL2QB, G4DZU, KH6IJS and OK1MIN on 15 sure shook up my usual rag-chewing routine. Say, where do Novices come by all those fancy Yaesu, Kenwood, etc., outfits? (WN1VKN) . . . Still hear more DX than I can work, especially on 7 MHz. Europe and Africa are big challenges for my cw 75-watter and inverted-V. (WA6ARP) . . . DX ops hunting WAS should have little trouble finding Montana. DXers W7s GKF and YB work both cw and phone, W7LR and K7ABV are readily available on cw, and K7LTV concentrates on voice. (W7LR) . . . "How's" has finally gotten to me. After my tour as KZ5WA I'm out for a Michigan DXCC. (WA8WWM) . . . Yes, Virginia, there *is* a 10-meter Novice band. Nice recent chat with WB5KIA on 28,190 kHz and I'm watching for Stateside WNs. On 21 MHz I've collected sixteen countries and 31 states with 75 watts and a TH3 jr. Forty and eighty are clogged with SWBC and RTTY hash out here. (WH6IOZ) . . . October was my best month on 20 and 40 cw in quite a while, also some luck on 15 and 75 ssb. (WA2JZX) . . . I'd like to see all rare DX stations adopt a policy of first answering low-power stations, especially WAØs using vertical antennas. (WAØEWU) . . . Finally sewed up 5BWAS but I can see that 5BDXCC will take a little longer, even with a new Advanced ticket and SB220. Man, Murphy really murdered my shack last year. (WB5HVY) . . . TI2BCA's two-watter is very big around 14,075 kHz. (W8ZCQ, CARA) . . . K5FVA calculates Delta DX Club's 23 members at a 190-country average, high man 315. (WCDXB) . . . VE3s GMT IAA MJ and MR managed about fifteen kiloQSOs from the Canadian isles of Sable and St. Paul in November as VX9A and VYØA. Thus properly inspired, W4BPD may kick off another gala Guspedition next month or next. . . . Credit for some preceding items and data in last month's QTH/QSL rundown must go to Canadian DX Association *Long Skip* (VE1AL/3), Columbus Amateur Radio Association *CARAscope* (W8ZCQ), *DX Newssheet* (G. Watts, 62 Belmore Rd., Norwich, NR7 OPU, England), International Short Wave League *Monitor* (E. Chilvers, 1 Grove Rd., Lydney, Glos., GL15 5JE, England), Japan DX Radio Club *Bulletin* (JA3KWJ), Long Island DX Association *DX Bulletin* (WA2RJZ), Newark News Radio Club *Bulletin* (M. Witkowski, Rt. 6, Box 255, Stevens Point, Wisconsin, 54481), Northern California DX Club *DXer* (VE3DXV/W6), North Florida DX Association *News* (WA4UFW), Southern California DX Club *Bulletin* (WA6KZI), VERON's *DXpress* (PAØTO), West Coast *DX Bulletin* (WA6AUD) and Western Washington DX Club *Totem Tabloid* (WA7JCB).

SV1IG, is well heard from Athens, usually near 14,225 kHz at 1900-2200 UTC or 21,275 at 1300-1500. Panos also keeps busy in organizational work and frequently operates club station SV1SV.

BV2B, by being the only active DXer in his Taiwan homeland, is always assured a warm ham welcome wherever he wanders. Here Tim, at left, is surrounded by Long Island DX Association hospitality during his recent visit to our east coast. *(Photo via W2s DIE, IYX, LIDXA.)*

DX Century Club Awards

Conducted By Bob White, W1CW

New Members

The following listings show DXCC Awards issued by Headquarters during the period from November 1 through November 30, 1975.

253	152	131	116	111	YU3TJA	104	100
I3LLD	JA2OJ	JA3UDR	K1QFD	G5BGM	106	JA4BCW	LZ1QR
166	140	126	WA7EQL	110	W6JOT	103	W7IQF
YU3EZ	YU2RFK	F6COU	115	WB9KZS	WA7CNP	K4TMR	WA4KFF
154	133	119	YU3BL	109	WA8TCZ	YU1AJF	WA8FRO
W3OJS	WB5MXS	W7RUK	113	K4FIC	105	101	WA9DYV
			YU3CYZ	K4HLJ	K2JFJ	W2MEI	
				WA7YRP			

Radiotelephone

169	120	114	111	106	102	WA9AKT	W6WRA/4
I4BNR	CN8BF	K4APL/6	IC8EGO	I6MRD	K4IMK	101	100
131	119	112	W1CRL	103	K8MPV	W2FGT	W4JUX
JA3UDR	WA1JKJ	I3BUG		JA2OJ			

CW

104		103		101		W8RSW	
JA1EMK		JA1IBX		K2SHZ			

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.

335	300	WAØTLT	WB5DDI	W2FPG	WA1JKJ	140	K4HHD
K6KII	K4RZK	270	W7JUO	WA3AFQ	W4IMB	HB9AIB	W1ERW
315	K6PZ	HB9AIJ	200	WA4LPX	WA4EPF	K2IJ	W1GME
I1RB	W7BGH	WA4NRE	DL9EM	WØFHE	W6GBY	WA2WLM	WB2LDF
JA1GC	290	250	PY1BDU	160	W7BGG	W6CQ	WB6PZW
K1GAX	JA2KLT	W5SZV	WA1IJC	DL7RT	W7FCD	120	WA7IHW
LA1K	K6UJS	220	W7FR	JA8BFI	W7MCU	F6AZT	
305	280	F5TI	180	K4JPD	W8KI		
W9ABA	SM3RL	JA8JN	K4HQI	K9DDA	ZL1IB		

Radiotelephone

315	JA1OCA	WA6FPB	250	200	160	140	120
I1RB	270	260	DJ6VM	EA3UU	WA1EUO	K4JPD	HC2VL
W2PTM	JA1GC	PY4AKL	220	JA8JN	WA3AFQ	WA3VQP	WB2SZH
305	K6PZ	W1RO	DL2CQ	180	W8KI	W7FCD	W7FR
F5II	WA4NRE.		W1KSN	PY1BDU	W9ABA	WA7UVO	WAØTAM
				5U7BA	WØFHE		WAØVAQ

CW

160
W1DAL

DXCC NOTES

Effective February 1, 1976, DXCC Rule 5 (concerned with the number of confirmations that must be submitted for an endorsement application) will have the following addition: "Once per year, any DXCC participant having an accredited DXCC total of 250 (or more) may make a submission without regard to the number of cards submitted." QST

Strays

WAMRAC extends a welcome to anyone interested in joining this world association for encouraging and establishing Christian friendship through amateur radio. Nets are organized on the lf and hf bands and a regular newsletter is issued free to all members. Bill Ehlers, K3SFT, U.S. representative, has further details for those interested in joining.

Here's a memorabilia item to add to your collectibles. Klipsch and Assoc., Inc., P.O. Box 688, Hope, AR 71801, have reprinted by permission the "1922 Radio, Wireless Telephone, Wireless Telegraph, Equipment Catalog of Montgomery Ward and Co., Chicago". Thirty-four pages in length, the catalog features complete sets, many parts, including spark and vacuum tubes and so on. The price is seventy cents postpaid.

To commemorate this Bicentennial Year, the Virginia Independence Bicentennial Commission and The Richmond Amateur Radio Club are offering a new certificate award, the Virginia Independence Bicentennial Award (VA-VIBA). This award is available to all licensed amateurs. Details on requirements may be obtained from the Richmond Amateur Radio Club, P.O. Box 73, Richmond, VA 23201.

Every ham has to have a "second" hobby (actually first hobby – ham radio is more of a preoccupation) for those times when the band folds up, rig blows up on a holiday, or XYL sticks nails in your coax. Mine is reading the dictionary.

Sounds about as thrilling as working consecutive W4's? Etymology can be fascinating. No, not bugs or Ethiopia, but the study of the origins of words. *Word* for example, comes from a Greek word meaning "to speak." A couple of hours with an unabridged dictionary indicates that the ancients had ham radio in mind when they coined much of our amateur vocabulary.

Some tens of thousands of years ago, for example, some Roman had present-day twenty meters in mind when he made up *frequens, frequentis,* the predecessor to our *frequency.* Back then it meant "crowded, in a crowd." A few hundred years later a pre-wireless G showed precognition of all-too-many amateur signals, with the Anglo-Saxon roots for *wavelength.* Loosely translated the Anglo-Saxon means "flutter-long." Or perhaps he was thinking of aurora.

Some words are much more obvious. *Transmitter* derives from the Latin words for "send across," obviously referring to transatlantic communication a couple of thousand years before the event. *Receiver* comes from "seize again," what those big stations do to my DX. Another Latin wag envisioned the monster beams popular at the bottom of the sunspot cycle, and the effect of the first good wind. *Antenna* means "sail yard" which is what happens to my skyhook: it sails into my neighbors yard!

More details about antennas are available. *Beam* was originally part of a plow, and that 6-el Yagi certainly plows through the QRM on 20. *Yagi,* by the way, comes from the Japanese inventor, H. Yagi, born in 1886, who contributed greatly to the current superabundance of JAs. No, the quad was *not* invented by Dr. Quad, but derives from the Latin for four, because a four-element quad is so good.

Other parts of the shack further reflect this great perception of amateur bands in the 1970s. *Microphone* comes from the Greek, meaning "small sound", which is exactly what kind of signal I have on 20. I need an amplifier, from the Latin "that which makes larger." Or maybe a key. In Anglo-Saxon it was something you used to gain entrance (to DXCC?).

A few connections are more difficult to understand. Perhaps words like *switch* (from "end of cow's tail") and *coax* (wheels together) will make more sense after restructuring. Meanwhile, I hear a weak beacon on 10, so it's time to go back to amateur (from the Latin "I love") radio.

Members of the "Coffee Pot Net" invite stoppers-in to stay awhile or just say "hi." The net meets daily at 2300 UTC at 14,300 or thereabouts. Active members who opt to pay a small dues fee receive a monthly newsletter. For further information contact President Andy Silverman, 444 Hidden River Road, Narberth, PA 19072.

Logs for WL1CEN (Apr. 19-21, 1975) and WC1MAR (Jan. 13-18, 1973) with plenty of QSL cards are at W1HUM. A s.a.s.e. will bring them your way.

The University of Pennsylvania Amateur Radio Club, W3ABT, is offering a new nonprofit service for the ham interested in SSTV. A list of cataloged pre-recorded SSTV pictures may be obtained by sending a s.a.s.e. to W3ABT. They would like to solicit from operators pre-recorded tapes (7-1/2 IPS or cassette) with SSTV pictures. For details on how to obtain pictures from their library, write W3ABT, Attn: Tape, University of Pennsylvania Amateur Radio Club, 200 South 33rd Street, Philadelphia, PA 19174.

I would like to get in touch with . . .

anyone interested in 6-meter or 2-meter cw activity in the PA, OH, W. VA area. WA3TGR

anyone whose last name matches their occupation. WA6HCH (Larry Plummer – Plumber)

amateurs using fm on ten meters. WA7CSK

anyone interested in fast-scan ATV, 439.25 MHz, in southeastern Florida. WA2PRG/4

teen-age hams who are interested in astronomy to start an informal ssb net. WA2YYW

telephilatelists. VU7GV (Sula, ISPW, Port Blair-744 101, India)

University of Missouri graduates interested in forming an MU net. WØZXX

QST congratulates . . .

Sister Michel Pantenburg, WAØPST/7, upon her admittance to the American College of Hospital Administrators.

Stewart Perry, recipient of the International W1BB Award.

Dr. Larry Burch, WB4JXK, newly elected president of the Broward County Chiropractic Society for 1975-1976. He received his gavel from outgoing President M. I. Garfinkel, K4FHF.

Robert L. Pierce, WBØCGJ, who was awarded the China War Memorial Medal by His Excellency James C. H. Shen, Ambassador from the Republic of China.

Public Service

Conducted By George Hart,* W1NJM

NTS Staff Meetings

We have two NTS Area Staff meetings to report on this month, held within a week of each other in October. No official minutes have been received at headquarters, so what follows is from the notes taken by W1NJM, who attended both meetings.

The first meeting was of the Central Area Staff on Oct. 17-18 at Lincoln, NE, at the same time as but not as part of the Midwest Division Convention. All staff members were in attendance except the TEN manager, a total of 11 people, as follows: WØINH (chairman and member-at-large), WA5IQU (RN5), W5KLV (DRN5), WB9KPX (9RN), WB9NVN (D9RN), WBØHOX (DTRN), WØHI (CAN), WA5ZZA (CTN), KØAEM (TCC), W9QLW and W5MI (members-at-large). The group convened Friday evening (17th) to formulate an agenda and was in session all day Saturday (18th) with a break at 5 P.M. to attend the NTS forum of the convention. Subsequent session Saturday evening was informal. Here is a brief chronology of the formal meeting:

1) A proposal by WA5ZZA for daytime area net sessions was discussed and scheduled for implementation on a trial basis.

2) More publicity needed for NTS among directors, SCMs and non-traffic fraternity. Staff members should do more traveling to spread the word.

3) KØAEM's resignation as TCC director. Staff recommends appointment of W5GHP.

4) More candidates needed to perform TCC functions; discussion led by KØAEM.

5) Criteria for staff meeting attendees. Communications manager limits reimbursed attendance to 8 for future meetings.

6) Discussion on section representation in daytime region nets.

7) Lack of interest in net control and liaison functions and what to do about it.

8) Use of alternate channels.

9) Status of quarterly reports to staff chairman for use in formulating meeting agenda items.

10) W5GHP plan for "offshore" emergencies and traffic to and from.

The Eastern Area Staff met in Toronto, ON, on Oct. 25-26, with 100% of the staff in attendance, plus D2RN Manager WB2EMU. Voting members: W2FR (TCC director and chairman), W1QYY (1RN), W2MTA (2RN), W3NEM (3RN), W4SHJ (4RN), W8PMJ (8RN), VE3AWE (ECN and host), K2KIR (EAN), WA1FCM, W4UQ, WA8MCR (members-at-large). Following is a brief chronological account:

1) Each net manager and the TCC director gave a brief status report of his operation.

2) Discussion on a motion to make daytime managers an official part of the staff continued through lunch (Oct. 25) and into the afternoon, and was eventually defeated.

3) A motion to formalize acceptance of DNTS as a permanent part of NTS was carried.

4) A motion to recommend appointment of WA8MCR as Daytime Eastern Area Net manager (in addition to his several other functions) was carried.

5) A motion to create a committee to study streamlining NTS to integrate daytime and evening NTS was carried.

6) A motion to recommend daytime region to evening region as preferred liaison in preference to present liaison through section was carried.

7) Extensive discussion on emergency procedures, "hot lines," "gateways," linked repeaters, resulted in no specific action or recommendation.

8) A motion to specify "rate" as equaling number of messages directed and passed divided by total time in session (R = Tfc/Time) was carried.

9) Discussion of representation statistic and how it can be made more meaningful.

10) Discussion of funds and fund limitations.

11) A motion to enlarge EAS by adding two more members-at-large was defeated, after considerable discussion.

12) Discussion on codification of NTS policy by putting out a separate publication covering minutiae of operation; no formal action taken. – *W1NJM*

Recently, WB4FDT presented outgoing SCM K4GR with a plaque containing an actual 1916 ARRL Radiogram in appreciation for his work as SCM between 1969-1975. WA9NEW and WB4PMG look on.

PUBLIC SERVICE DIARY

□ Oroville, CA – September 9. W6GEC reported a highway accident on WesCARS, 7255 kHz. Four amateurs responded and the highway patrol was notified. – (WB6IZF)

□ Columbus, OH – October 6. The Central Ohio AREC Net handled communications for the Red Cross during the evacuation of fire-damaged building. Sixteen amateurs took part. – (WB8IBZ)

□ North Abington, MA – October 6. W1DMS handled medical traffic with HK1PQ when a girl was rushed from Bogota, Columbia, to a Boston hospital for an emergency operation. – (W1DMS)

□ Kern Co., CA – October 13. WA6JDN, WB6OAO and WA6PYN assisted the sheriff's rescue squad in the search and rescue of a lost hunter in the Sierra Nevada Mountains. – (WB6IZF)

□ Indian Orchard, MA – October 18. W1MTV, WA1OTC and WA1PLS provided communications on behalf of the Red Cross during a fire in an apartment block. – (WA1PLS, PAM WMass)

□ New York City – November 1. WAØTCO/mm2 put out a distress call on 20 meters. The ship was in the North Atlantic with a seriously injured crew member. WB2LMA notified the Coast Guard. – (WB2LMA)

□ Owensboro, KY – November 10. WB4ANL and WB4PVC assisted local police and c.d. authorities in their search for two missing hunters. They were found unharmed. – (WB9LHO/4)

□ Bayonne, NJ – November 13. WA2FUI/mobile 2 reported several disabled vehicles during a rainstorm on the Bayonne AREC/RACES Net. WB2KGV notified police. – (WA2FUI, EC Bayonne)

□ Altoona, PA – November 29. W3BTX and W3TEF reported a burning building in a wooded area on Wopsonock Mountain. WA3CJF responded on two-meter fm and called the fire department. – (WA3VUP, EC Blair Co.)

□ Columbia, SC – October. WA4EAU held three robbers at bay with a shotgun while he called for help on WR4ACD. Thousands of dollars worth of electronic equipment was also recovered. – (K4FRX)

□ *Repeater Log.* According to reports received repeaters were used to report nine traffic accidents and related occurrences, two power outages, one flood, one search for a missing-person and twice provided individuals with emergency medical aid. The following repeaters were involved: WR1s AAC ACP ACR ADS, WR2s ACC AGH, WR7AFN, WR8AHM,, WRØADU.

□ *Great Pumpkin Dept.* The following repeaters were used to assist police in handling communications for Halloween "goblin" patrols: WR2s ABA ADL AGH, WR3ADF, WR4s ADJ ADO. Thanks to the repeater groups involved, vandalism and other crimes were drastically reduced.

For November, 36 SEC reports were turned in, with the number of AREC members totaled up as 13,635. Last year at this time, 44 SEC reports were submitted, with membership totaling 14,564. Sections reporting: Alaska, Alta, Ariz, Colo, Conn, Del, EBay, EMass, EPa, Ill, Ind, Kans, Ky, Maine, Mich, NLI, NC, Fla, NNJ, NTex, Ohio, Okla, Org, Oreg, SV, SDgo, SJV, SBar, SCV, SFla, SNJ, STex, Utah, Wash, WMass, WPa.

NATIONAL TRAFFIC SYSTEM

"This has to be the worst month I have ever seen in 18 years in NTS, with respect to band condx. on 80 meters," writes W2MTA. Long skip is making for very lean times on the nets; representation and traffic are way down. Bill, among others, advocates the utilization of 160 meters. K2BHL received a certificate of merit for his extra efforts on D2RN. College club stations VE2UN and VE3UOT generated traffic on DEAN and W5YJ did the same on DRN5. D1RN is also holding an 1800 UTC early session. WB2RUZ, WA2SYR and WA2UYK qualified for D2RN certificates.

*Communications Manager, ARRL.

November Reports

1	2	3	4	5	6
EAN	30	1420	47.3	.939	96.1
CAN	30	1047	34.9	.891	99.4
PAN	30	1138	37.9	.798	97.7
DEAN	60	900	15.0	.522	96.9
1RN	58	444	7.7	.313	90.2
D1RN	30	206	6.8	.401	81.4
2RN	59	376	6.3	.430	96.6
D2RN	60	343	5.7	.400	96.3
3RN	58	281	4.8	.270	80.8
D3RN	30	270	9.0	.478	96.7
4RN	56	574	10.2	.419	91.9
5RN	60	748	12.4	.414	90.7
DRN5	30	145	4.8	.264	65.2
RN6	57	608	10.6	.398	98.3
DRN6	30	283	9.4	.229	84.2
RN7	59	416	7.0	.426	85.9
DRN7	45	69	1.5	.170	38.2
8RN	50	288	5.7	.299	75.0
DRN8	30	121	4.0	.431	95.6
9RN	55	415	7.5	.312	82.0
D9RN	30	152	5.0	.277	87.5
ECN	60	444	7.4	.390	94.0
TWN	60	531	8.8	.297	96.6
DTWN	19	88	4.6	.161	55.3
CTN	30	605	20.1	.417	92.8
TCC Eastern	110[1]	709			
TCC Central	78[1]	588			
TCC Pacific	109[1]	846			
Sections[2]	3736	15113	4.0		
Summary	4852	29168	6.0		
Record	5052	30541	18.4		

[1] TCC functions not counted as net sessions.
[2] Section and local nets reporting (100): AENB AEND AENJ AENM AENW (AL), ASN (AK), ATEN HARC (AZ), NCN NEN SCN (CA), CCN (CO), CN (CT), DEPN DTN (DE), FAST FMTN FPTN GN NFPN QFN QFTN TPTN VEN (FL), GSBN GSN (GA), IMN (ID, MT), ILN (IL), 175MN TLCN (IA), KTN KYN (KY), LAN LRN LSN LTN (LA), 5GN (ME), MDCTN MDD (MDD), WMN WMPN (MA), MACS M16M MNN QMN WSBN (MI), PAW (MN), MTN (MS), MSN (MO), NAN (NE), NHTN NHVTN (NH), BARTEN NJN NJPN NJSN (NJ), SWN (NM, AZ), NLI NLS NYS (NY), NCSSBN THEN (NC), BN BNR OSSBN OSN (OH), OAN OLZ OPEN OTWN STN (OK), NSN (OR), PFN PTTN WPA (PA), CN PX SCNN (SC), SDEN (SD), TN TNN TPN (TN), TEX TEXSS TTN (TX), BUN UCN (UT), VSN (VA), WVN WVMN WVPN (WN), BWN WIN WNN WSBN WSSN (WI), MTN (MB), GBN ODN OPN OQN (ON), WQV/UHF (PQ).

1 — NET
2 — SESSIONS
3 — TRAFFIC
4 — AVG.
5 — RATE
6 — % REP.

Transcontinental Corps

80 meters isn't the only band that's ailing. W2FR reports several Bravo failures because of the "now you see it — now you don't" 40-meter propagation. K5MAT votes for holding some TCC skeds on 160. An annual TCC-E certificate went to WA2UWA. First-timers to K1EIR, K1GMW, VE3SB. VE7ZK received a TCC-P certificate.

1	2	3	4	5
Eastern	121	90.9	1824	709
Central	90	86.6	1106	588
Pacific	120	90.8	1697	846
Summary	331	89.4	4627	2143

1 — AREA
2 — FUNCTIONS
3 — %SUCCESSFUL
4 — TRAFFIC
5 — OUT-OF-NET TRAFFIC

TCC ROSTER

The TCC roster (November): Eastern Area (W2FR, Dir.) — W1s NJM QYY, K1s EIR GMW, WA1s MSK STN WEM, W2s FR GKZ KAT/3 WA2s DSA ICB PJL UWA, WB2s PYM RKK, W3EML, K3MVO, WA3OGM, W4UQ, K4KNP, WA4VFW, W8PMJ, K8KMQ, WA8HGH, WB8ITT, VE3s GOL SB. Central Area (W5GHP, Dir.) — W4OGG, WB4DXN, W5s MI QU UGE UJJ, WA5IQU, W9s CXY DND NXG, WA9EED, WB9NOZ, W0s HI INH LCX QMY ZHN, K0s AEM CVD, WA0TMN. Pacific Area (K5MAT, Dir.) — W5RE, K5MAT, WB5KSS, W6s BGF BVB EOT MLF TYM VZT YBV, K6HW, WA6DEI WB6DJP, W7s BQ DZX GHT KZ, K7s IWD NHL NHV QFG, W0s ETT LQ LRN, K0DRL, WA0KKR/7, WB0s HCK QOT, VE7ZK.

Independent Nets (November)

1	2	3	4
Clearing House	25	293	561
Hit & Bounce	30	1134	432
Hit & Bounce Slow	18	106	222
IMRA	25	429	1085
North American SSB	25	364	504
Washington Region PON	13	12	230
20 Meter ISSB	19	914	211
75 Meter ISSB	—	475	1366
7290 Traffic	38	496	1830

1 — NET
2 — SESSIONS
3 — TRAFFIC
4 — CHECK-INS

Public Service Honor Roll November 1975

This listing is available to amateurs whose public service performance during the month indicated qualifies for 40 or more total points in the following nine categories (as reported to their SCM). Please note maximum points for each category: (1) Checking into cw nets, 1 point each, max. 10; (2) Checking into phone/RTTY nets, 1 point each, max. 10; (3) NCS cw nets, 3 points each, max. 12; (4) NCS phone/RTTY nets, 3 points each, max. 12; (5) Performing assigned liaison, 3 points each, max. 12; (6) Phone patches, 1 point each, max. 20; (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.

78
WB5AMN

66
WB6BDL
WB2VTT

65
WB0HOX
W0QMY

64
WB2SHL

61
WA1MSK
WA2DSA
WB2EDW
W2MTA
WA3PHQ

WA4FBI
WB2PYM
WB5EKU
W5GHP
WA5IQU
K5TTC
W7OCX
W8IBX

WB0CZR
WB0HBM

59
W4OGG
WA5RKU

58
K1PAD
W5KLV

56
WA1FCM
WA2PCF
WB2RKF
K4VHC
W4WNY
WA5YEA
WA5ZZA
WA8HGH
K8LGA
K0ZXE

55
WB8JGW

54
WA4EPJ
WB6PVH

53
W2MLC
WA0GLI

52
WA0FMD

51
WB4OXT

50
WA1QKD
WA2PJL

WB2RKK
WA2UYK
WB0KTH
VE3GJG

49
W2FR
WB2LZN
WB2RMK
WB2UBW
WB4DXN

WB4EKJ
K5MAT
W5MYZ
W7GHT
WA7MEL
K9LGU
K9ZTV
K0CVD
K0MRI
W0OTF
VE3FRG
VE3GFN

48
WB0LOR
KL7JDO

47
WB2THS

WA3DUM
W4WXZ
W6RFF
WA9QVT
VE3GOL

46
W5UGE
WB6MXM
WA6TVA
WB0QOT

45
WB2RUZ
K3YHR
W0OYH
VE3GT

44
W1BVR
W1EIH
WB2TDZ
K2TTG
WB2WRT
WA3VBM
WA3WPY
WB4DJU
WB4SKI
WB5FMA

WB8WKQ
WB9KPX
WB9KTR
VE3FQZ
VE3SB

43
WA4BAZ
W9MMP/
WB0JYT

42
WA1MJE
WA1SQB
WA6DEI

41
WA1IOG
WA1SXU
WB2EMU
WB5MFQ
WB9NME
K0JTW

40
WB5NUM
W5VZO/
W7LG
WB8NCD
WB9ICH

Brass Pounders League November 1975

BPL Medallions (see December 1973 *QST*, p. 59) have been awarded to the following amateurs since last month's listings: WA3WRN, WB5MFQ, WA9VGW.

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.

Winners of BPL Certificates for Nov. Traffic

1	2	3	4	5	6
W3CUL	449	1320	1602	39	3410
K3NCN	12	705	700	5	1422
W0WYX	36	677	225	452	1390
W3VR	301	270	524	12	1107
K9CPM	2	150	451	190	793
W6RSY	5	358	356	19	738
WA0RWM	0	343	1091	343	717
WB6EIG	7	317	315	0	639
WB0HOX	31	288	277	20	616
WA3AIQ	164	129	282	2	577
WB0QOT	25	225	290	27	567
KH6IQU	67	213	183	76	539
WB9NVN	4	240	276	3	523
VE3GOL	58	217	226	30	521
K5HZR	1	246	257	2	506

BPL for 100 or more originations-plus deliveries

W5TI	198	W7TZK	113
WB2SHL	154	WB2VTT	103
WA7JRC	132	WA0VRE	100
K8DYI	119	K1BCS (Sept.)	104
W9NJP	117		

More-Than-One-Operator Station

K3IQG	130

1 — CALL
2 — ORIG.
3 — RECD.
4 — SENT
5 — DEL.
6 — TOTAL

Feedback

□ In the article "A General Technique for Satellite Tracking", November, 1975, *QST*, one of the formulas is incorrect. The author, and some of our astute readers, inform us that the correct formula (14 on page 31) is:

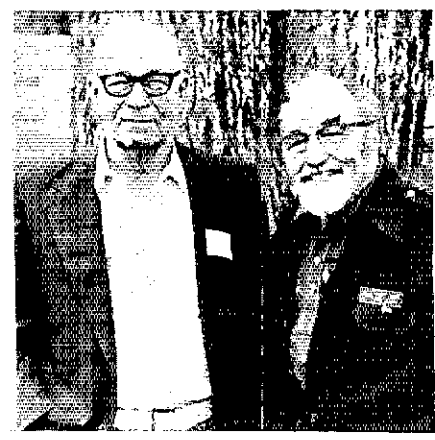
$$\theta_C = \sin^{-1} [\cos\theta \sin\phi_T + \sin\theta \cos\phi_T \cos A_Z]$$

Because of page space considerations, one table was not included in the published article. Those who wish to check their calculations on an Oscar 6 ground track can obtain the missing table by sending an s.a.s.e. to Mr. Thompson.

□ The name of Wendell D. McNeal, WN4LUH erroneously appeared in the Silent Keys column of September, 1975 *QST*.

Strays

□ Ninety-seven years of ham radio were represented by 'Dell' Burner, W0OEL, and 'Prof' Sheets, W0DM, at the revived Red River Valley ham picnic held in Mayville, ND.



Operating News

Conducted By George Hart,* W1NJM

"Countries" Criteria and How Applied

Recently, some of the feathers of the DXing fraternity and other amateurs were ruffled by a decision to declare a couple of Canadian islands off Nova Scotia eligible for listing as a separate "country" in the DXCC list. The remarks made and allegations leveled brought to focus the need for some discussion of the procedures and problems involved in deciding what constitutes a "country" on the list.

To begin with, you will note that we put the word *country* in quotes. Some DXCC traditionalists dislike the quotes, because through the decades that DX has so preoccupied much of the amateur fraternity it has become such a common term as to have a specialized definition of its own as applied to amateur radio, like cw. A country is an addition to the ARRL countries list, a confirmed contact with which will give you one more point toward the coveted DX award, whichever one you are shooting for. Never mind the dictionary definition. If we adhere to the latter, the word "entities" would probably be closer to what we mean. But let's not get bogged down in semantics. We'll call them countries, without the quotes.

There are four criteria for consideration in determining a new DXCC country. These were described in detail in this column in 1972 (Oct. issue, p. 131). Briefly, they have to do with government or administration, separation by water and separation by *foreign* land. If a new area under consideration meets *any one* of the principal three requirements of these criteria, it is eligible for DXCC country status.

So far, it sounds pretty simple and straightforward, right? The criteria have been reviewed by the DX Advisory Committee and no changes were recommended. Once the criteria are set, interpretation is the function of the headquarters, centralized in the person of the communications manager, to whom the DXAC is in part advisory.

Of course DXCC functions are largely delegated to a staff member who is expert on the subject – in this case, one who heads up a Communications Department branch whose function is exclusively the administration of DXCC. Probably no one, and we mean NO ONE, has had more background and experience in administration of this one award area than the individual now heading it up – Bob White, W1CW.

But Bob is only one member of a headquarters advisory committee (sometimes referred to as the HAC) which has the function of advising the communications manager on contest and awards decisions not specifically covered by existing directives, most of which are broad in scope, as they should be. So the HAC is really the HCAC (Headquarters Contest and Awards Committee) and it consists of six voting members, three from the communications department and three from other departments. All members are chosen by the communications manager and all are highly knowledgeable amateurs in the contest and awards field. The CM is chairman and votes only to break a tie. The general manager is not a voting member but is kept advised of all committee deliberations and has power of command – that is, he can overrule both the committee and the communications manager if he feels that it is necessary.

So that's the interpretive structure. When some DX enthusiast finds a rare spot which he feels might meet one of the criteria and contemplates a DXpedition thereto, his first objective is usually to seek DXCC country status for it; so he writes to headquarters to present his case. The DXCC administrator prepares a brief, a voting sheet, attaches all pertinent documents and correspondence, and this is passed around by hand among the members, each of whom reads the brief, reviews the material and records his vote and/or comments on the voting sheet or by special memo. The committee consists of W1YL, WA1STN, K1ZND, W1FBY, W1ICP and W1CW.

Is the majority vote of the committee always accepted? Just about. Departures are rare, almost unprecedented, but in the 30 years or so that the committee has operated it has happened. No use having an advisory committee if you aren't going to accept its advice. Is the committee usually in agreement? Yes, usually, but this means only a majority of times. There are many "hassles," and sometimes an in-person meeting has to be called to argue the matter out. Sometimes emotions flare. Usually, questions are resolved by inter-office memo (prevents breaking into individuals' concentration), but when an issue is particularly sticky or there seems to be misunderstanding this isn't always the best way to resolve it, and so we argue it out face to face in the conference room. If a tie vote occurs, the CM usually makes the decision on the basis of status quo; that is, no action.

5-BAND AWARDS

Updating the January 1976 listing. 5BDXCC: (Starting with number 465), DL3VX K2QIL OZ7IZ W4BAA. WB5WAS: (Starting with number 233), K3EH.

NEW A-1 OPERATORS

WA2DHF WA2WLM W3ZUH W4BTZ K8RYA W9BCL WØIPU

W1AW OPERATING SCHEDULE

Operating-visiting hours are Monday through Friday 1 P.M. to 1 A.M., Saturday 7 P.M. to 1 A.M. and Sunday 3 P.M. to 11 P.M. (all local Eastern time). The station address is 225 Main St., Newington, CT 06111 (about 7 miles south of Hartford). Maps with local street details and the general contact schedule are available upon request. All frequencies shown are approximate. If you wish to operate, you must have your original operator's license with you. The station will be closed Feb. 16 and Apr. 16. *Staff:* Chief Operator/ARRL Asst. Communications Mgr. C. R. Bender, W1WPR; Alan Bloom, WA3JSU; Chris Schenck, WB2SEZ.

Code Practice

Approximate frequencies: 1.805 3.58 7.08 14.08 21.08 28.08 50.08 and 145.588 MHz.

*Communications Manager, ARRL.

For practice purposes the order of words in each line may be reversed during the 5-13 wpm transmissions. Each tape carries checking references. Details on Qualifying Runs appear monthly in *QST* Operating Events. The 0230Z practice is omitted four times a year on designated nights when Frequency Measuring Tests are sent in this period.

Speeds	*EST*	*UTC*
5-7½-10-13-9	A.M. MWF	1400Z MWF
20-25	9:30 P.M. TThSSu	0230Z MWFS
10-13-15	4 P.M. M-F	2100Z M-F
	7:30 P.M. Dy	0030Z Dy
35-30-25-20-15	9:30 P.M. MWF	0230Z TThS
	9 A.M. TTh	1400Z TTh

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 UTC dates and *QST* text to be sent in the 0230Z practice from the December issue of *QST*.

2/4	It Seems to Us	2/26	Pub. Sv.
2/10	Correspondence	3/1	World Above
2/19	League Lines	3/5	YL News

Bulletins

(Columns indicate times in EST-PST-UTC.)

Phone Bulletins (1.82 3.99 7.29 14.29 21.39 28.59 50.19 145.588 MHz):

2100 Dy	1800 Dy	0200Z Dy
2330 M-S	2030 M-S	0430Z T-Su

CW Bulletins at 18 wpm (1.805 3.58 7.08 14.08 21.08 28.08 50.08 145.588 MHz):

1630 M-F	1330 M-F	2130Z M-F
2000 Dy	1700 Dy	0100Z Dy

CW Bulletins at 10 wpm (same frequencies as above):

0000 M-S	2100 M-S	0500Z T-Su

RTTY Bulletins at 170 Hz shift are repeated at 850 Hz shift when time permits (3.625 7.095 14.095 21.095 28.095 MHz):

1730 M-F	1430 M-F	2230Z M-F
2300 M-S	2000 M-S	0400Z T-Su

Oscar Bulletins (18 wpm on cw frequencies):

0840 M-F	0540 M-F	1340Z M-F
1400 M-F	1100 M-F	1900Z M-F
1600 Su	1300 Su	2100Z Su

Oscar RTTY:

1700 Su	1400 Su	2200Z Su

In a communications emergency monitor W1AW for special bulletins as follows (times in UTC):

Phone: On the hour.
RTTY: At 15 minutes past the hour.
CW: On the half hour.

SCM ELECTION NOTICE

To all ARRL members in the Sections listed below.

You are hereby notified that an election for Section Communications Manager is about to be held in your respective sections. This notice supersedes previous notices.

Nominating petitions are solicited. The signatures of five or more ARRL full members of the Section concerned are required on each petition. No member shall sign more than one petition.

Each candidate for Section Communications Manager must have been both the holder of amateur Conditional Class license or higher (Canadian Advanced Amateur Certificate) and an ARRL full member for at least two years immediately prior to receipt of petition at headquarters. Petitions must be received on or before 4:30 P.M. Eastern local time on the closing dates specified. In cases where no valid nominating petitions were received in response to previous notices, the closing dates are set ahead to the dates given herewith. The complete name, address, zip code of the candidate and signers should be included with the petition. It is advisable that a few extra full-member signatures be obtained, to insure that it will be valid.

Elections will take place as soon after the closing dates specified as full information on the candidates can be obtained. Candidates' names will be listed on the ballot in alphabetical order. The following nominating form is suggested. (Signers should be sure to give city, street address and zip code.)

Communications Manager, ARRL
(Place and date)
225 Main Street, Newington, CT 06111

We, the undersigned full members of the . . . ARRL Section of the . . . Division, hereby nominate . . . as candidate for Section Communications Manager for this Section for the next two-year term of office.

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

George Hart, W1NJM,
Communications Manager

SECTION	CLOSING DATE / CURRENT SCM	PRESENT TERM ENDS
SK*	2/20/76	
	P. A. Crosthwaite, VE5RP	4/10/75
S.NJ*	2/20/76	
	C. E. Travers, W2YPZ	3/4/76
PQ*	2/20/76	
	L. P. Dobby, VE2YU	6/1/76
WY*	2/20/76	
	J. P. Ernst, W7VB	6/26/76
NE*	2/20/76	
	C. R. Dyas, WØJCP	7/1/76
NYC-LI*	2/20/76	
	J. H. Smale, WB2CHY	7/5/76
West Indies*	2/20/76	
	J. S. Sepulveda, KP4QM[1]	7/12/76
SJV*	2/20/76	
	R. Saroyan, W6JPU	8/20/76
MT	4/20/76	
	H. A. Roylance, W7RZY	9/9/76
IA	4/20/76	
	M. Otto, WØLFF	9/11/76
MS	4/20/76	
	W. L. Appleby, WB5DCY	9/11/76
ON	4/20/76	
	H. H. Shepherd, VE3DV	9/11/76
Orange	4/20/76	
	W. L. Weise, W6CPB	9/11/76
AZ	4/20/76	
	M. Lincoln, W7DQS	9/12/76
N.TX	4/20/76	
	L. E. Harrison, W5LR	9/15/76
AR	4/20/76	
	S. Pokorny, W5UAU	10/12/76
KY	4/20/76	
	T. H. Huddle, W4CID	10/30/76

*Repeat Solicitations
[1] Resigned 9/5/75

SCM ELECTION RESULTS

Valid petitions nominating a single candidate were filed by members in the following sections completing their elections in accordance with applicable rules, each term of office starting on the date given.

Balloting results: In the *Oregon* Section, Mr. Dwight J. Albright, W7HLF, Mr. William Oliver, W7GUH and Mr. Earl E. Hemenway, K7KVV were nominated. Mr. Albright received 244 votes, Mr. Oliver received 239 votes and Mr. Hemenway received 117 votes. Mr. Albright's term of office will begin February 1, 1976.

In the *Connecticut* Section, Mr. Roland J. Goulet, WA1OPB, and Mr. John J. McNassor, W1GVT, were nominated. Mr. McNassor received 476 votes, and Mr. Goulet received 263 votes. Mr. McNassor's new term of office begins April 13.

In the *Oklahoma* Section, Mr. Cecil C. Cash, W5PML and Mr. Leonard R. Hollar, WA5FSN were nominated. Mr. Hollar received 370 votes and Mr. Cash received 183 votes. Mr. Hollar's term of office begins March 20, 1976.

VT	J. Breakstone, WA1PSK	1/22/76
MO	L. G. Wilson, KØRWL	5/12/76
N.NJ	W. S. Keller, III, WB2RKK	5/12/76
W.PA	D. J. Myslewski, K3CHD	6/13/76
E.MA	F. L. Baker, W1ALP	6/16/76

Operating Events

FEBRUARY

5: **West Coast Qualifying Run,** (W6OWP, prime, W6ZRJ, alternate), 10-35 wpm at 0500Z on 3590/7090 kHz. This is 2100 PST the night of February 4. Please note that dates are always shown at least 2 months in advance and times are always the same local "clock time," e.g. 9 P.M. local Pacific time. Underline one minute of the highest speed copied, certify copy made without aid and send to ARRL for grading. Please include your full name, call (if any) and complete mailing address. A legal size addressed stamped envelope would be a helpful enclosure to expedite your award.

7-8: **DX Competition phone,** p. 61 Dec.

7-15: **Novice Roundup,** p. 70 Jan.

11: **W1AW Qualifying Run,** 10-35 wpm at 0230 UTC transmitted simultaneously on 1.805 3.58 7.08 14.08 21.08 28.08 50.08 and 145.588 MHz. This is 2130 EST (9:30 P.M. local Eastern time) the night of February 10. Underline one minute of top speed copied, certify copy made without aid, and send to ARRL for grading. Please include your full name, call (if any), complete mailing address and a return stamped, addressed, legal size envelope.

13-15: **QCWA QSO Party,** sponsored by the Gator (FL) Chapter, from 2300Z Feb. 13 through 2300Z Feb. 15. A contact with a member living in the same or adjacent country counts as 1 point. (For U.S., KL7 and KH6, read on.) Contact with a member living in a nearby country or state that is separated from your own by at least 1 intervening country or an ocean counts for 2 points. A contact with a member on a different continent counts 5 points. Contact with the QCWA Memorial Station W2MM/4 counts 2 points. Contact with any "Distinguished Member" holding a 50-year or 60-year anniversary award (signified by the letter "D" after the QSO no.) adds 1 point for each contact. You may count a cw contact and a phone contact with the same station as separate contacts; otherwise, duplicate contacts on different bands do not count. Each different chapter represented in your contacts counts as a multiplier. Scoring: no. of QSO contact points, plus number of "Distinguished Members" worked equals total contact points; this figure multiplied by the no. of different chapters worked equals your total score. Suggested frequencies, all 20 kHz up from: phone, 1805 3940 7240 14240 14280 21340 28640; cw, 1805 3540 7040 14040 21040 28040. For calling CQ, call on the frequency ending in the same digit as your call letter district, e.g., W7 on 14247 or 14257, etc. Usual entry format. Send to: Lew Sieck, K4NE, 12270 Fourth St. East, Treasure Isle, Florida 33706. Submit your entry within a month.

14-15: **Ten-Ten Net Winter QSO Party,** p. 72 Jan.

15: **Frequency Measuring Test,** p. 72 Jan.

21-22: **DX Competition** cw, p. 61 Dec. **YL/OM Contest** phone, p. 72 Jan.

28-29: **French Contest phone,** p. 99 Dec.

MARCH

3: **West Coast Qualifying Run.**

6-7: **DX Competition phone, YL/OM Contest** cw.

11: **W1AW Qualifying Run.**

13-14: **The Commonwealth Contest** (formerly BERU), open to members of the RSGB resident in the UK and radio amateurs licensed to operate within the British Commonwealth or British Mandated Territories, from 1200Z March 13 to 1200Z March 14, cw only, 80-40-20-15-10 meters. Contacts may be made with any station using a British Commonwealth call sign, except those within the entrant's own call area. UK stations may not work each other for points. Contestants are requested to confine their operations to within the lower 30 kHz of each band. Each completed QSO will score 5 points. In addition, a bonus of 20 points may be claimed for the first, second and third contacts with each Commonwealth call area. All British Isles stations (G GB GC GD GI GM GW) count as one call area. Separate logs for each band. Each band log should be separately totaled and should include at the end a check list of call areas worked on the band. Separate band totals should be added together and the total claimed score entered on the cover sheet. Single band or multiband. Single-band entries should show contacts on only one band; details of contacts made on other bands should be enclosed separately for checking purposes. Multiband entries are not eligible for single-band awards. Usual declaration. Address entries to D. J. Andrews, G3MXJ, 18 Downview Crescent, Uckfield, Sussex, England. Entries received after May 17 may be excluded from the contest. Awards.

13-15: **Virginia State QSO Party,** sponsored by the Sterling Park ARC, from 1800Z March 13 through 0200Z March 15. The same station may be worked on each band and mode, VA stations may work other in-state stations. Exchange report and QTH (county for VA stations, state/province or country for others). Score 1 point per QSO, VA stations multiply QSO points by sum of states, provinces, countries and VA counties worked. Non-VA stations use VA counties for the multiplier (max. of 98). Suggested freqs.: cw, 60 kHz from the low end of each band and Novice band; phone, 3930, 7230, 14285, 21375, 28575 (check phone bands on even hours). Awards. With your results, indicate each new multiplier worked, enclose a summary sheet and check sheet. Only QSOs 160

through 10 meters may be counted. Logs must be received by April 15 and go to: Gary D. Poorman, W4UPJ, 1114 S. Dickenson Ave., Sterling Park, VA 22170.

14-15: South Dakota QSO Party, p. 72 Jan.

20-21: DX Competition, cw.

22: W1AW Morning Qualifying Run.

27-28: BARTG Spring RTTY Contest, 0200Z March 27 until 0200Z March 29. The total contest period is 48 hours but not more than 30 hours of operation is permitted. Times spent in listening count as operating time. The 18-hour non-operating period can be taken at any time during the contest but off periods may not be less than 3 hours at a time. Off/on times must be summarized on the log/score sheets. Additional categories for multiop. and SWLs. Operation on 80, 40, 20, 15, 10 meters. Stations may not be contacted more than once on any band, but additional contacts may be made with the same station on a different band. ARRL Countries List (and, in addition, each W/K and VE/VO call area) will be counted as a separate country. Messages consist of: time in UTC (this must be a full 4-figure group). The use of expressions same or same as yours will not be permitted. RST and message no. The message no. must consist of a 3-figure group starting with 001 for the first contact made. All two-way RTTY contacts with stations within one's own country will earn 2 points. All two-way RTTY contacts with stations outside one's own country will earn ten points. All stations will receive a bonus of 200 points per country worked including their own. Note: any one country may be counted again if worked on another band but continents are counted once only. Scoring: two way exchange points times total countries worked, add to this your total country points times bonus points times number of continents worked. One log per band, indicate rest periods. Logs must contain all info., and must be received by May 31 to qualify. Send to: Ted Double, G8CDW, 89 Linden Gardens, Enfield, Middlesex, England EN1 4DX. Judges' decision final, no correspondence can be entered into in respect to incorrect or late entries. **Tennessee QSO Party,** 2100Z March 27 to 0500Z March 28 and 1400Z-2200Z March 28. Tenn. stations send signal report and county. Others send report and state, province or country. Each station may be worked twice on each band (cw and phone) except mobiles and portables may be worked each time in a different county. Score 1 point per QSO for phone contacts, 1.5 points per cw. TN stations: QSO points times the sum of different states (incl. TN), plus different provinces, plus different TN counties plus bonus points if portable or mobile. TN mobiles receive 200 extra points each county outside home county, same for portables. Out of state stations: QSO points times the no. of different TN counties. Suggested freqs.: cw; 3550 7050 14050 21050 28050 3725 7125 21125 28125; phone, 3980 2780 14280 21380 28580. Log date/time(Z), stations, bands, modes, exchanges, score. Separate log sheet for each band with over 25 contacts. Contestants with 100 or more contacts must submit a dupe sheet (similar to ARRL Operating Aid 6). Legible logs mandatory in order to avoid disqualification. Awards. Repeater contacts not allowed. Mobiles compete against mobiles, portables against portables. Minimum of 5 contacts each county for mobiles and portables to earn bonus points. Variations on the usual CQ TN QSO Party or CQ TN to encourage contacts from non-contests may result in disqualification. Mailing deadline April 25. Send s.a.s.e. (if eligible for awards – for 10 or more TN QSOs) to: Dave Goggio, W4OGG, 1419 Favell Dr., Memphis, TN 38116.

April 3-4: "Open" CD Party phone, SP DX Contest.

April 10-11: "Open" CD Party, cw.

May 8: FMT.

June 12-13: VHF QSO Party.

June 26-27: Field Day.

July 4: Straight Key Night.

July 24-25: ARRL Bicentennial Celebration.

Sep. 4-5: VHF QSO Party.

Nov. 6-8: Sweepstakes, cw.

Nov. 20-22: Sweepstakes, phone. QST

Silent Keys

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

W1CLH, Edward C. O'Neill, Trumbull, CT
W1CTX, Maxwell Cohen, Quaker Hill, CT
W1DI, Lemuel Temple, West Wardsboro, VT
WA1GRI, Joseph T. Donovan, Arlington, MA
Ex-W1HYP, Paul E. Nosieux, No. Grosvenordale, CT
W1SE, Earle G. Holbrook, Attleboro, MA
W1WTY, Gardner B. Pratt, Hyannis, MA
WB2CFI, Raymond J. Pogulki, Totowa Boro, NJ
K2CSU, James E. Runyon, Somerville, NJ
W2DKK, Harry Geduld, Lindenhurst, NY
W2HZ, Morris Lieberman, East Meadow, NY
W2IQ, Vincent S. Barker, Sag Harbor, NY
W2NHH, John E. Barre, New York City, NY
W2OKQ, James L. Clark, Beechhurst, NY
W2PHD, Charles P. Parks, Union, NJ
K2UPA, Jason D. Croissant, Merrick, NY
W2UWA, Charles E. Buelow, Jr., Tuckerton, NJ
K3CJR, Oliver W. Smith, Cumberland, MD
W3EKU, Thomas E. Tronsue, Nanticoke, PA
W3GHA, Harry R. McBrien, Bristol, PA
WA3GNZ, Allyn R. Watson, McKeesport, PA
W3KKX, Theodore W. Schreiber, Columbia, PA
W3LUH, Jesse W. Smith, Butler, PA
K3OOQ, H. H. Jodon, Bellefonte, PA
W3PM, Charles S. Horn, Jr., Rehoboth Beach, DE
WA4AXD, Ray J. Jicka, Tampa, FL
W4BBG, Felix B. Ramey, Harlan, KY
K4NTB, Kenneth M. Denman, Orlando, FL
W4SJD, Joseph D. Lawson, Roanoke Rapids, NC
W4WZI, Joseph L. Jenkins, Louisville, KY
W5AKI, Melvin T. Norman, Oil City, LA
W5AZN, Eugene J. Bauer, Dallas, TX
W5DG, Russell E. Curry, Bethany, OK
W5HQE, Frederick J. Morgan, New Orleans, LA
W5LRJ, James B. Terhune, West Fork, AR
WA5NRJ, Russell K. Bobbitt, Oklahoma City, OK
WN5OWR, Gerald F. Dethrow, Shawnee, OK
W6ARN, Gerald E. Goss, Oceanside, CA
WA6CEE, Charles T. Richardson, Los Angeles, CA
W6KHB, Edward L. Knotts, Los Angeles, CA
WB6MPC, Milton C. Nelson, Los Angeles, CA
W6PUG, John H. Williams, Altadena, CA
W6SXG, Ruth E. Bartlett, Moss Beach, CA
Ex-W7EBQ, Heino T. Rüppa, Astoria, OR
W7GJB, Clarence J. McCredie, Milwaukie, OR
K7KWV, Clyde E. Dawson, Martinsdale, MT
K8DTA, Carl P. Henry, Niles, OH
W8NBF, Joseph J. Nameth, Detroit, MI
W8PNF, William E. Johnson, Kalamazoo, MI
WA8QAR, Raymond V. Knaebel, Barberton, OH
W8QFJ, Edward Kostir, Cleveland, OH
W8RFW, Victor E. Pennington, Grand Rapids, MI
W8WGU, Steven Schmalzel, Lincoln Park, MI
WA9CTC, Ivol Thostesen, LaGrange Park, IL
K9DDQ, Elmer W. Franke, Batchtown, IL
W9EDY, Norman P. Fornoff, Pekin, IL
K9IAH, William R. Tyrrell, Chicago, IL
WA9OFF, Leroy M. Friestad, Delavan, WI
W9PPA, Chris L. Anderson, Crystal Lake, IL
Ex-W9ZAK, Fred Warrick, Quincy, IL
KØCBK, Robert Andrews, Jr., Melbourne, IA
WØCUN, Jay V. Wilcox, Kansas City, MO
G6GA, H. R. Gautby, Alsager, England
DC9JQ, Gerhard Heydemann, Allensteiner, Germany

STOLEN EQUIPMENT

□ Clegg FM-21, Serial No. 825 and antenna part of Antenna Specialist 220 MC. James W. Wheeler, WA6YFV, 4434 Heppner Lane, San Jose, CA 95123.

□ Drake TR-4, Serial No 16457-A; Drake Pwr. Sply. AC-4, Serial No. 30557; Swan SSB 250-C, Serial No. E189109; Swan Pwr. Sply. 117XC, Serial No. 015095; Astastic D-104 Microphone with UGB stand; Swan FM-2X, Serial No. 111454, with microphone M-1002; Swan Pwr. Sply. FM-2X, Serial No. 11454; Swan 6M-2M TV-2. This equipment was stolen the Findlay Radio Club Inc., P.O. Box 587, Findlay, OH 45840.

□ Drake AC4 & MS4, Serial No. 20781; L4B & Pwr Sply., Serial No. 750; R4C, Serial No. 16889; T4XC, Serial No. 20299; Converter Console 1 (CC1), Serial No SC2/241; NEMS/CLARKE, Model 1670F, Serial No. 320. Greg Burton, KITZD.

□ Regency HR 23, Serial No. 49-01928 was stolen from auto on Oct. 28. John B. Fell W7IKE, 2516 Olson Drive, Billings MT.

□ KDK 144-10SX, Serial No. 5446. Nick Kalafice, WØOZZ, 117 West Glencrest Drive, Mankato, MN 56001.

□ IC-230, Serial No. 240-1926; Heathkit HWA-202-6 Colinear and Data Tone 2 touch tone decoder stolen from car in Tampa, FL. Bud Holman, WA4ASJ, P.O. Box 698, Vero Beach, FL 32960.

□ Heath HW-29, 6-meter transceiver, taken from car on Sept. 17. Frank L. Wayland Sr., 374 Hibbs Ave., Glenolden, PA 19036.

□ FM 27-B, Serial No. 27084-4771, taken with car. Contact Birmingham Police, Birmingham, AL.

□ Drake TR-22C, Serial No. 850632, with Sure 414A Microphone. Was taken Oct. 27 from truck. P.O. Box 1603, Springfield, IL.

□ Regency HR-212, Serial No. 24-00521 with microphone and mobile mounting bracket; Vanguard Labs Model 201 pre-amp attached to back of the HR-212, and Collins radio logbook. Randy Thompson, WA9YII, 842 Shagbark Lane, Apt. 302, No. Aurora, IL 60542.

Frequency Measuring Test

By Ellen White, W1YL

Four times a year you get a scheduled opportunity to compare your own frequency measuring results against those of a professional lab. November 8 was one of those scheduled periods. But, all was not peaches and cream (and S-9 signals!). The propagation curtain lowered and W1AW was a "no show" on twenty meters (both runs) for almost all of the reporting participants. However, in spite of generally poor conditions 140 fans reported a total of 2415 measurements in this now popular quarterly affair. Here are the official measurements used in calculating the averages: early run, 7100.751 and 3526.283 kHz; late run, 7084.715 and 3554.245 kHz.

Upcoming FMT is February 15 (rules appeared in January "Operating Events").

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 better) accuracy. Please note that a participant must submit a minimum of 2 measurements to qualify for this listing. Again, the following are of equal merit, and are most conveniently shown in an alphabetical listing by call area.

W1BGW W1PLJ K1VHO K2HT W2JDC W2LYH WA2VPA K3WIK W4HU W4NTO W4VWS K5DEG K5EVK W5FMO W5IJW W5KK K5LAZ WA5NYY K5WVX WB6AAL WA6CKD W6CLM K6KA K6MZN WB6MZP W6OQI W6RQ W7DY ex-7HM W8CUJ W8OK WA9AAT K9KEP W9MNY W9VOX W9ZTK WØBKV WBØDRV WØIHI WØMDL KØRPH KØTIV.

Better Than 35 Parts Per Million

(.6) W1JH W1JOT K3HJI WA9CXN, (.7) WA5QMI W9KO, (.9) W2FVI W9ABI, (1.0) W1FCC/3 WØIBZ Ireland, (1.3) WB8PGK W1AYG, (1.4) WA8ULG, (1.6) W9HPG, (2.4) WA8URE, (3.3) K4MZK, (3.9) W4JWG, (4.1) W9MZE, (4.5) WA5WUJ, (4.6) W4RHZ, (4.7) K4JK, (4.8) W6CBX, (5.0) W9REC, (5.7) W1DDO, (6.4) K3YHR, (6.9) WB4MWC, (7.4) WA7HGB, (7.7) W9AG, (8.3) WA6INF/7, (8.6) W7FIS, (8.7) WØGW, (10.0) WB4SXX W7DQS VE6MJ, (10.5) W9MKL, (10.9) K9CCX, (11.1) WØOZX, (11.8) W4UCL, (12.9) K6EC, (13.1) WBØCTR, (14.9) WØKL, (15.2) K4CVF W6PZU, (15.4) W1VH, (16.1) KØETA, (17.2) WA6WXH, (18.3) W9JAY, (18.4) W2MVS, (18.8) WA9ITB, (19.4) W3ADE W3PLI, (19.9) W1QV, (22.9) W2TE, (23.7) K6UK, (25.8) W3BEF, (27.2) W8OW, (28.3) WA1SQB, (29.4) W3EBK, (29.5) WB5FMA WN4UXU, (30.4) WB8ESK, (33.2) W4YOK, (34.2) WB2MDR.

Better Than 179 Parts Per Million

(37.7) W2WSS, (39.1) W7HVB, (40.3) W6KT, (42.8) K6EPX, (45.6) WA2LLP, (46.7) WAØYED, (48.4) K1EPL, (48.8) VE6XO, (51.0) WB6UAX, (51.2) WA3GYT, (51.6) WB5EXI, (55.7) W5PW, (58.0) WB2TFH, (58.2) WB5IMT, (58.8) WB2FPG, (60.0) K4FBG, (65.1) K9WMP, (70.7) W8DOP, (75.0) Dick Bingham, (78.5) WØSIN, (84.3) K2GMF, (86.3) WB2CHO, (95.3) K6GG, (100.2) WB5AWN, (108.7) WA9YOL, (112.3) WA3UHJ, (133.1) WB8JKH, (143.8) K9UML, (158.4) W5YTN.

Frequency Drift

WWV reception was poor, so I used Loran-C on 100 kHz to check my counter time base. – K1VHO. The only noise-free signal was on the late 40 run. – K5EVK. Fun and a challenge. I'll be back next time. – W5KK. Normally I use a circle on the scope in measuring the audio beat between my secondary standard and the unknown. The November signals were so far down in the noise, I had to put my receiver output and the audio oscillator output both into the phones and zero beat the two in my head! – W6RQ. Only a faint signal from WWVH was available for calibration during all runs. – W7DY. This was my first FMT. I zero beat the spot signal of the SB-401 with W1AW and read the frequency on a homemade counter. – WA9AAT. [Bill achieved HR standing. – ED]. Frequency standard is home built with a 1-MHz crystal oscillator inside a proportional control oven. The audio generator and counter are also home built. The counter is out of surplus decade divider boards picked up at a hamfest. The counter is only good up to about 50 kHz, but serves quite well for this sort of application. Also home built is the 60-kHz WWVB receiver used to calibrate the secondary standard. Who says we don't build equipment any more? – W9ZTK. This test was a good one. I was impressed by the lack of QRM from the particular type of who must radiate to measure. – WØBKV. Thank you for this splendid activity. – KØTIV. Early run – ugh! Late run, just a little bit better. As if conditions were not bad enough, had a bad case of cross mod. products from four nearby 50-kW broadcast stations. Later found a corroded connection in one of the antennae which created a non-linear rectifier element and consequent re-radiation. – W9KO. My first try and thanks to WA8ULG for advice and loan of a BC-221 and rf attenuator. – WB8PGK. Please please please don't use your transceiver as a VFO with your antenna connected so as to QRM W1AW! – W4RHZ. Worst band conditions I've heard this year. – WA6INF/7. Used an old BC-221 and an SB-102. It is amazing that a 30-year old piece of equipment can still measure to a few parts per million (although the readout is not nice nixies!). – WØOZX. Many thanks to the League for continuing to sponsor this interesting technical competition. – WA6WXH. Conditions on 20 (early run) were very erratic causing W1AW to pop in and out like a switch being thrown. – W3PLI. [Twenty was not used in calculating the averages – ED]. Conditions were the worst of any FMT for the past 15 years. – W3BFF. The technique used was to calibrate the receiver BFO and set the main dial to the nearest 1-kHz point below the received frequency. A correction factor based upon the linearity characteristics of the PTO is then applied which turned out to be a $\cos^2$ function when calibrated at a 100 division point (center of the PTO range). – W7HVB.

Feedback

Re the September FMT (reported on p. 89 of the November issue): That 4.1 ppm of K2KTK should have read 1.4 ppm, WA1SSH should show at 7.7 ppm (instead of 25.2 ppm). That 7.4 ppm score belongs to WB4KCL (not WB4RCL). K6MLN did indeed make the Honor Roll but inadvertently appeared as 1.3 ppm. WØBKV also achieved HR Standing as did WBØDRV. WA2LLP should have been shown with 25.4 ppm.

*Deputy Communications Manager, ARRL.

Station Activities

SCM ≠ AREC ≠ ORS ≠ OVS ≠ SEC ≠ OBS ≠ TCC ≠ OO ≠ NTS ≠ WAC ≠ CP ≠ A-1 OPR ≠ EC ≠ DXCC ≠ CLUBS ≠ RM ≠ OPS ≠ RCC ≠ PAM ≠ WAS

ATLANTIC DIVISION

DELAWARE: SCM, Roger E. Cole, W3DKX — SEC: K3KAJ. RM: W3EEB. PAM: WA3DUM. PSHR WA3DUM 47, K3YHR 45, WA3WPY 44. 1976 Club officers, Delware ARC: K3YHR, pres.; K3HBP, vice-pres.; WA3WPY secy-treas. DE Repeater Assn. WA3QPX, pres.; WA3QLS, vice-pres.; W3EKO, treas.; WA3WUR rec. secy.; WA3RUF secy.; K3GUW, DE dir.; WB2FJE, NJ dir. First State ARC WA3THL, pres.; WA3WCE, secy.; K3YBW, treas.; W3URR, act. dir. K3YHR has been appointed EC for New Castle Co. The DE 2-Meter Net now operating Mon. 7:30 local on 13-73. W3BHG worked WA7KYZ for his 39th State and 10th call area on Moonbounce 2 meters. Bill also made a 432-144 MHz Oscar 7 contact on Dec. 7th. WA3JKY invites use of his UHF repeater, WR3AFK 448.0 MHz input, 443.0 MHz out. DTN QNI 311, QTC 60, DEPN QNI 75, QTC 3. Traffic: WA3WPY 152, W3EEB 63, K3KAJ 49, WA3DUM 39, W3DKX 32, K3YHR 24, WA3GAY 17, WA3UUN 9, W3YAH 7, W3WD 3.

EASTERN PENNSYLVANIA: SCM, George S. Van Dyke, Jr., W3HK — SEC: W3FBF. PAMs: WA3PZO W3AVJ. RMs: W3EML K3MVO WA3PHQ K3DZB WA3WOE WB2FWW/3. Net reports: PFN, QNI 476, QTC 441; PTTN, QNI 155, QTC 60. PSHR: WA3PHQ WA3NDQ. BPL: W3CUL W3VR K3NSN WA3ATQ. OOs: K3RDT W3NNC W3KCM W3BFF K3NSN. OBSs: K3BHU W3VA WA3PHQ W3AVJ W3ID W3ZRQ. OVSs: WA3KFT W3CL WA3NDQ W3KEK WA3BSV. W3VR is on 220 MHz? W3EML says traffic picking up a wee bit. WB2RBA looking for odd jobs to fill in his spare time. W3WRE added five new keys to her collection. W3VA on the mend after surgery. W3ADE our Harrisburg outlet like the Marines Always ready! W3ID says he copies the jammers better than local net stations. Conditions on 80 meters around net time are poor right now but hang in there! WA3VDQ nearly welded his key on CW SS! Welcome to WA3YMV a new traffic handler. W3BNR hope he can operate from home during Christmas! W3GMK shifting from RTTY to CW. Murphy at work at W3EU's. W3LC off due to house reconstruction — poor planning not to have a ham shack before the job started! WA3BSV reported an accident via 2M repeater then used same repeater to inform family of those involved! W3BHF often says "In the wilds of Bradford County"; well he sent pictures to prove it, a brown bear running through town! Welcome to WN3ZPA who made his first traffic report! Congrats to W3NNC for making top ten on the OO list. WA3NQN & W3NCX hoarse after LVRC auction. WA3MNT operated LVRC station W3OI in SS. Lancaster County ARC have been very busy, latest is a First Aid Course for Hams given by guess who MD Hams! Let's hope all the plans for the SET were successful and we learned something. Don't forget the liaison stations from net to net, don't hold up traffic waiting for an outlet on your net when it could be moved elsewhere. Hope you all had a Merry Christmas and Happy New Year! Remember the deadline for reports and get them in on time. RMs and PAMs please note! Unreported traffic and activity doesn't help EPA records. Hope the VHFers have recovered from their Jan. contest. Traffic: (Nov.) W3CUL 3410, K3NSN 1422, W3VR 1107, WA3ATQ 577, WA3THT 351, W3EML 144, W3IPX 106, WA3PHQ 98, WB2RBA/3 63, W3WRE 58, K3MVO 53, WA3QLG 39, K3BHU 38, W3AVJ 33, W3ATJ 25, W3VA 17, WA3TMP 15, W3ADE 14, W3ID 14, W3CL 12, K3GJL 12, WA3NDQ 12, WA3VDQ 12, WA3YMV 9, W3BNR 8, W3HK 8, K3HXS 6, W3ZRQ 2, WA3BJQ 1, WA3BSV 1, W3EU 1, W3GMK 1, W3KEK 1, W3LC 1. (Oct.) WA3QYY 148, WA3OGM 86.

MARYLAND-DISTRICT OF COLUMBIA: SCM, Karl R. Medrow, W3FA — K3IOG at Loyola makes BPL for Nov. W3ZSR and W3BWZ are new AI Ops. Congrats. Oct. Top Brass for MDD were K3KAJ W3EEB WA3WPY and W3FA. Nov. Top Honor Rollers for the MDCTN were WA3WRN W3LDD and WA3PRW with perfect attendance as well. WA3LPL had to give up the NCM job for the MEPN. W3LDD takes over. K3LFD resigned as SEC due to the press of work. Send reports to W3FA. WA3EOP and W3FZV hold the reigns on MDCTN and MDD respectively with W3DFW guiding the WR PON. WA3UYF to his dismay finds Hi-Fi interference in his new QTH on Campus. He is maintaining his skeds as he irons out the difficulties. W3MWD is doing okay lousy conditions notwithstanding. W3EOV is set for the winter months with a new 40-meter dipole and added legs for 20 meters. W3CDQ hosted W0QXA and W0QRF last month and had a go at the YLRL-YLAP and the SS. WA3SJY does most all of his traffic work via phone patch. WA3JSZ and W3EBK continue to monitor the bands as OO. W3ENL reports the Chesapeake Bay Repeater Assn. WR3ADH/WA3SJF demonstrated ham radio at the Hartford Mall in Havre de Grace. Participants included WA3IGC WA3UMC W3ENL K3UAV WA3TFI WA3MMX WA3MMW K3GUX W3JDG K3GMV WA3HHR W3LDD and K3SSX. Welcome to a new Novice in Camp Springs, WN3AOQ. W3ABC and the FAR are pleased with the hamfest results, and are planning the next one with improvements. WA3UPH manages to keep a hand in despite a busy school sked. W3FZV by coincidence found 9 JA hams at the top of an old lighthouse during his Japan trip to visit WA3PRF there. W8BZY/3 has been filling in for some of the no shows. W3BHE is having a ball with SB300 and 400s. W3FCS was closest to PSHR this month with 30. WA3ZAS made a creditable showing from W3FA in the SS despite school and work. He and W3LDD are new ECs in Montgomery and Hartford counties respectively. K3ORW had his AREC gang all lined up for the SET. WA3WRN is another busy guy with school and work. WA3GXN/3 W3FNN and K3RUQ team up to help a prospective Novice on the Eastern shore. W3DFW maintains regular contact with WA3IIV/4 in FL. With the nets: Sessions/Tfc/QNI Avg. MDD (Oct.) 60/64/5.7, MDCTN (Nov.) 18/79/14.3 and the WR PON 13/32/17.7. Traffic: (Nov.) K3IQG 156, WA3SJY 127, W3FA 122, WA3WRN 100, WA3EOP 62, W3MWD 57, W3FZV 47, WA3PRW 47, W3FCS 43, WA3ZAS 42, W8BZY/3 34, W3EOV 31, W3LDD 31, WA3UYF 18, W3BHE 8. (Oct.) WA3UPH 11.

SOUTHERN NEW JERSEY: SCM, Charles E. Travers, W2YPZ — SEC: W2JI. RM: WB2LCV. Affiliation of the Stone Harbor ARK announced by ARRL. SHARK is in the process of building a repeater which should be ready by mid Jan. WB2RMK reports 31 sessions for NJSN with 170 QNI, 43 QSP. WN2AZU working hard for a net certificate. K2QIJ reports a new 68-ft. tower to improve sigs for the AREC program. WB2ANJ and WB2LBT have new towers. The GC ARC is making printed circuit boards available for a 6-meter receiver as a club construction project. WA2SEA, who has done an FB job as Gloucester Co EC has received ARRL endorsement renewal. New OPS and OBS is WA2AML and also is doing FB work as Atlantic Co EC. Burlington Co RC reports WA2NEQ has upgraded to Advance Class, congrats. New members in the club are W2IL and W3DVC/2. WB2JCE is recent OPS, OBS appointee. WA2AML and W2JI are working hard for their PSHR. Traffic: (Nov.) WB2LCV 213, WA2AML 113, WB2LCC 42, W2JI 23, WB2JCC 21, W2SPY 10, WA2TRK 7, WB2OSQ 5, W2IU 2, K2QIJ 1. (Oct.) WB2LCC 18, K2BG 8.

WESTERN NEW YORK: SCM, Richard M. Pitzeruse, K2KTK — SEC: W2CFP. A new Novice in Lackawanna is WN2CCD who wishes to thnk W2AOO for giving him his test and WA2TLM for his first QSO. K2DNN out of the hospital and after surgery, resigns after 17 years EC for Chemung County, a job well done Met. RAGS reports 689 in attendance of their Oct. Hamfest. K2KWK actively transmitting bulletins on various Rochester area repeaters. W2RQF adding a keyboard to his SSTV set up. Heard in the ARRL 160-Meter test K2KIR K2KTK W2MTA W2FHU K2FC/2 W2SSC WA2QXA W2YIK WB2URU W2RQF. Ex-WA4SDT, WB2ECR is now WN2CFN going strong with dipoles, verticals, HT-32, and NC-300. New ham WN2CCD also one of those stargazing folk. The Chemung County AREC elected WA2SMM, pres.; W2HQY, veep.; WN2VHN, secy.-treas.; K2PIT, EC/trustee. Traffic: (Nov.) W2FR 301, WA2UYK 242, W2MTA 204, WB2UBW 164, W2OE 160, W2RUF 115, WA2ICB 84, W2PZL 76, WA2HSB 70, WB2VND 68, WB2THS 61, W2EZK 52, WA2TPC 33, W2EAF 24, W2RUT 23, K2KTK 22, WA2PUU 21, WA2DRC 20, K2KIR 20, W2RQF 20, WA2AIV 19, WB2QIX 17, W2UVE 17, K2IMI 3, WA2EAJ 2. (Oct.) WA2DRC 11, WA2AIV 7. (Sept.) WA2DRC 13, W2CFP 2.

WESTERN PENNSYLVANIA: SCM, Donald J. Myslewski, K3CHD — SEC: W3ZUH. Asst. SEC: K3SMB. PAM: K3ZNP. RMs: W2KAT/3 W3NEM W3LOS W3KUN. WPA CW Traffic Net meets daily on 3585 kHz at 7:00 PM local time. PA Traffic Training Net meets daily on 3610 kHz at 6:30 PM local time. PA Phone Net meets Mon. thru Fri. on 3960 kHz at 5:30 PM local time. Central and Western PA RACES Net meets every Sun. at 8:00 AM & 9:00 AM respectively. New appointments: K3HJI and W1FCC/3 as Class I & II OO. W3LEZ and W3ENA building two meter beams while W3ESV and W3RIH are back on the air. K3FFJ has discovered antique radios. Allegheny Co. AREC has reorganized and is now known as AL.AREC on 147.69/.09. Over 150 stations in the Tri-State area participated in the Breeze Shooters Groundwave contest on 10 meters. WA3WIM was top scorer in the PA QSO Party. WA3DET WA3WKV WA3TCO and K3YAK are conducting code and theory classes for the Crawford ARS. W3NGI and staff also conducting amateur radio classes in the Erie area. Carnegie Tech RC officers for 1976: WA3HFJ, pres.; WA2UDS/3, vice-pres.; WB9HSS, treas.; WA2ZUL, secy.; WB9IHC, station mgr. Etna RC officers for 1976: W3OJM, pres.; K3HZL, vice-pres.; W3TZW, secy.; WA3CHC, treas.; WA3AHP, act. mgr.; K3AMI, dir. It is with deep regret to note the Silent Key of WA3GNZ. Good luck to W3CAZ, new EC for Clinton Co. WN3YFJ and WN3YFN are eagerly awaiting their General Class tickets. Thanks to WA3WPR and K3QEQ for assisting WN3AFS with the Novice test. WA3YKN upgraded from Novice to Advanced and WA3ZBX from Novice to Technician. Washington Co. (WACOM) officers for 1976: WA3BKD, dir.; WA3LDM, 1st dir.; WA3OKK, 2nd dir.; WA3ZEP, secy.; WN3ADQ, treas. Thanks to WB3AGB for the fine PR given to Amateur radio thru PARIS (Pittsburgh Amateur Radio Information Service). The WPA CW Traffic Net had 30 sessions in Nov., 363 stations check in and handled 176 messages. PSHR credits WA3VBM 44. Traffic: W2KAT/3 278, K3CR 166, WA3VBM 159, W3EGJ 52, K3MIY 45, K3SMB 41, K3HCT 36, WA3SWF 32, W3RUL 30, K3CHD 25, W3SN 22, WA3JBQ 18, W3KUN 17, WA3OKK 17, W3IDO 10, K3SJN 6, W3TTN 6, W3YD 6, W1FCC/3 2, WA3PMT 2.

CENTRAL DIVISION

ILLINOIS: SCM, Edmond A. Metzger, W9PRN — Asst. SCM: Harry Studer, W9RYU. SEC: W9AES. PAM: WA9KFK. RM: K9ZTV. Cook County EC: W9HPG.

Net	Freq.	GMT	Dys.	Tfc.
ILN	3690	0300	2330 Dy	267
Ill Phone	3915	2245	2245 Dy	332
NCPN	3915	—	1200 MS	112
NCPN	3915	—	1700 MS	115
IEN	3940		1400 Su	no rpt.

Plan now to attend the ARRL Central Division Convention which will be held on July 9 and 10 in Milwaukee at the Red Carpet Inn and Exposition Center. WB9SKJ has received his Technician ticket. W9NJP's new QTH is Wheaton. The York Radio Club's Annual Heath nite was well attended and the new Heath Products, HW 2026 and HW 2021 were unveiled. With the rash of mobile equipment being stolen, it is advisable to refrain from giving your whereabouts on the air. With the new scanning equipment available, it is an easy way to monitor several bands and check where mobiles are parked. New Novice in Southern IL is WN9SKB. W9KO is one of the top ten OOs and was recently honored by the League. K9GHR and WA9NEJ were appointed Public Relations assistants by Dir. Phil Haller. The Egyptian Radio Club has installed new antennas for their club stations WR9ACA and WR9ACB. WR9AEV (Kankakee) is putting their antenna up another 250 feet higher, making it the highest structure in the County. WN9SIU and WN9RDI are starting a Novice Net on 28.125 MHz every Thur. and Sun. at 2100 local time and will be known as the KARS Novice Net. WB9NIO now an Advanced Class licensee. W9NXG has a new FPM-300 and is doing FB on the nets. K9KZN and the Sangamon Valley Radio Club are sponsoring code practice sessions on the air on Tue. Thur. and Fri. evenings on 21.1 MHz at 7:30 PM. With this column I am completing my 18th year as your SCM. I would like to thank all of the gang who have faithfully contributed to this column and helped make my job a lot easier. And many thanks to all who voted and elected me to serve another two years. Again my thanks to a grand gang the IL Section. WB9NVN and W9NJP are BPL recipients for the month. Traffic: (Nov.) WB9NVN 523, WA9VGW 431, W9NJP 260, WB9NOZ 222, W9NXG 217, K9ZTV 130, WA9KFK 96, W9JXV 91, K9KHI 79, W9HOT 66, W9LNQ 62, WB9DED 51, W9DYL 46, WB9PHM 39, W9HPG 38, WA9JJE 19, W9KR 18, W9PRN 18, W9RYU 10, W9ACU 6, WB9GIU 4, K9DDA 2. (Oct.) W9HPG 31.

INDIANA: SCM, M. P. Hunter, WA9EED — SEC: W9UMH. W9EI is traveling to Indonesia for a few months and hopes to acquire a YB license. Huntington College offering a credit course in ham radio which began in Jan. The Indy Police Dept. has begun a crackdown on illegal CB radio traffic. W9EGQ was recently surprised with a new tower, compliments of some very grateful fellow hams. Congrats to the new officers of the Ft. Wayne RC: WB9JDM WN9RZS & K9TUS. There are numerous contests coming in the next few months; good chance for some fun. K9EAT is a new member of the Old Timers Club. WB9IHH is presently active from K4WAR, also WB9NJA. Lake Co. ARC will be holding it's annual banquet on Feb. 23, details from W9EGQ. K9OTB now holding down QSL chores for FP8DX as well as FP8DH. WA9EED handles QSLs for VP2DM. IN has again achieved 100% representation on D9RN. Another reminder that any group interested in having a meeting at the Central Division Convention should contact me as soon as possible so the information can be forwarded to the sponsors. Nets: QIN 207, ITN 533, IPON 7. Traffic: WB9PIR 207, K9FZX 174, WB9OMX 138, K9DCX 99, W9HUF 87, W9QLW 83, WB9FOT 77, W9EI 70, WA9OAD 61, WB9MDS 58, K9VKE 54, WA9OLM 53, K9YBM 51, WB9IHR 50, WB9PFZ 50, W9DKP 33, WB9HCH 32, K9EQT 31, W9ENT 29, WB9NAQ 29, K9RWQ 29, W9KVB 28 W9ICH 27, K9CBY 26, K9RPZ 20, WB9DIX 18, WA9OKK 17, W9DZC 16, WA9OHX 16, W9LTU 15, W9EBUQ 14, K9JQY 14, W9PMT 14, K9LZN 12, W9CMT 11, WB9HCH 7, K9RGF 7, W9JGE 5, W9BDP 1, K9HMC 1.

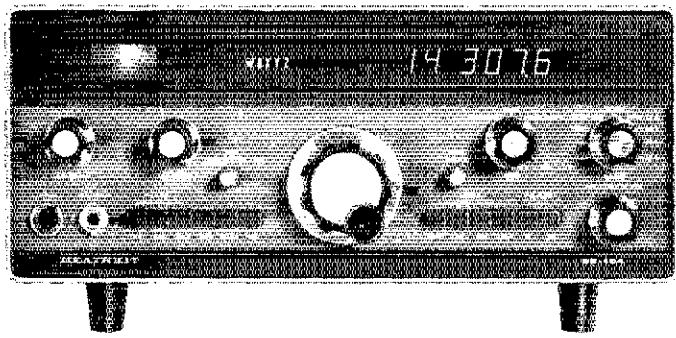
WISCONSIN: SCM, Roy A. Pedersen, K9FHI — SEC: K9PKQ. PAMs: W9AYK WA9LRW K9UTQ. RMs: K9KSA WB9ICH W9MFG K9LGU. Nets, Freq., Time(Z)Days, QNI, QTC, Mgr.: BWN 3985, 1245 M-S, 468, 338, W9AYK; BEN, 3985, 1800 Dy, 820, 173, WA9LRW; WNN, 3725, 2315 Dy, 100, 23, WB9ICH; WSBN, 3985, 2330 Dy, 1182, 168, K9UTQ; WSSN, 3662, 0030 M-W-F, 107, 3, K9KSA; WIN-E, 3662, 0100 Dy, 314, 205, W9MFG; WIN-L, 3662, 0400 Dy, 141, 84, K9LGU; Expo Net, 3925, 1801 M-F, 537, 51, WA9NIX. YTARC family banquet a success with 64 attending. WB9SBN member of Amateur Radio Telegraph Society. K9FHI attended club meeting of KMARA in Waukesha Nov. 14. WIN-E certificate to K9MZO. Sorry to report WA9OFF a Silent Key. BEN cert. to WB9NYG/9. OVS cert. renewed W9EWC, he also is on 144, 11 SSB. KH6IAC will be going to the East Coast after a vacation with his parents in St. Croix Falls, WI. WB9GGC 76 years old operates 40-meter phone. K9CPM made BPL. WIN-E cert. to WB9LKC. Waukesha County Emergency Net will be on 174.06 MHz. WB9NRK WN9QCC passed Tech. Class exam; WN9ROK the Advanced; WB9NLS the Extra. Don't forget Central Division Convention in Milwaukee, Red Carpet Inn July 9-10, 1976. K9PKQ assisted in relaying traffic on a KY Net. Traffic: (Nov.) K9CPM 793, W9DND 286, WB9KPX 229, WB9NME 135, WN9IOU 120, K9FHI 109, WB9ICH 107, W9PVH 93, W9MMP/0 66, WA9QVT 65, K9LGU 61, W9AYK 54, W9MFG 51, W9IHW 50, WA9LRW 44, WN9PTX 37, WB9NHT/9 36, WB9JSW 33, K9JPS 31, K9UTQ 31, WB9LKC 30, K9MZO 29, WB9NRK 27, WB9HLS 26, K9KSA 20, W9ZED 19, K9ASC 18, WB9PYG 18, WB9LIW 16, W9IEM 13, W9SFL 13, WA9PKM 11, W9YFW 9, W9KHH 7, W9CFS 6, W9RTP 5, K9ANV 3. (Oct.) K9ANV 15.

DAKOTA DIVISION

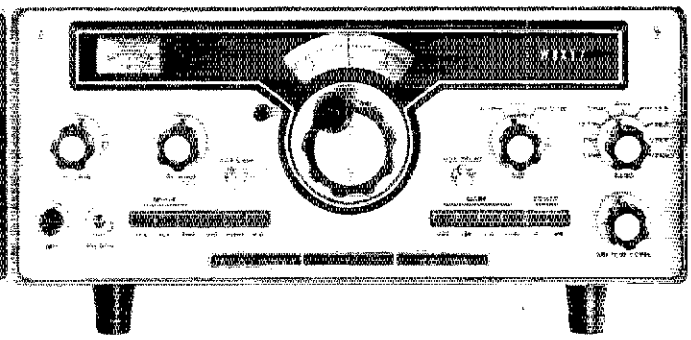
MINNESOTA: SCM, Frank Leppa, KØZXE — SEC: WAØOFZ. PAMs: KØFLT WØØHOX WAØYVT WAØGLI. RMs: KØCVD WAØYAH KØRYU. Chief OO: WAØPRS, Chief OBS: WØØLOR. The ASK repeater group has WRØAFK operating on 223.34/223.94 in the Twin Cities. The Winona Radio Club now publishing the HAMGRAM. This is available from Box 442 Winona 55987. WNØPDI passed the Tech. Class exam and wants to form a cw practice group on 6 meters. Congratulations: WØKE, new Dakota Dir. WØIYP; Vice-Dir. KØZFG WØLN WBØNIU; new officers of the Winona RC WBØHOX; new MSPN evening PAM who is also a member of NTS Central Area Staff WBØMAO and WBØOAG both have worked all states and new club of Winona Senior High WBØNJV, pres.; WNØPTB, secy.; WAØVHO, advisor. The Twin Ports FM Club foxhunt was a thriller with much gas burned and many receivers overloaded. TPFM will sponsor a statewide swapfest Sat. Apr. 24, more later. WØQIG visited brother WØSTV in CA. KØHLT FMed his way to Phoenix on vacation. The KØIJL/KØIJP contest combine is back on the air after much wind damage last spring. The Minneapolis Radio

State of the Art...

Heathkit SB-104



Heathkit HW-104



Whether you choose the SB-104, or the HW-104, you're getting one of the finest Amateur transceivers you can buy at any price. And because you build them yourself, you get a feel for the equipment you simply can't duplicate with ready-made units.

100% solid-state construction including finals ...totally broadbanded circuitry for instant QSY without pre-selector, load or tune controls... switchable 100 watts/1 watt out... 0.6 μV typical sensitivity... super-clean operation thanks to reduced cross-mod and IM distortion... specs that show what state-of-the-art is all about... and styling second to none!

The SB-104 offers true digital frequency readout with resolution to 100 Hz on all bands, and complete frequency coverage from 3.5 MHz through 29.7 MHz without accessories.

Kit SB-104, Shpg. wt. 31 lbs. **669.95**

The HW-104, for $130 less, brings you the same broadbanded circuitry as the SB-104, but it has an easy-to-read circular tuning dial, and 3.5 to 29.0 MHz coverage (to 29.7 MHz available with HWA-104-1 accessory). It's one of the best price/performance combinations available in Amateur Radio today.

Kit HW-104, Shpg. wt. 31 lbs. **539.95**

Reviews and articles in the major Amateur magazines have consistently praised the 104's because of their advanced circuitry, reliability and sheer operating pleasure! If you're serious about Amateur radio, you owe it to yourself to find out more about the 104's. For complete descriptions and specifications, order the new FREE Heathkit catalog. Send coupon today!

Station of the Art...

The SB-104 with sophisticated station accessories. Unquestionably, some of the finest Amateur gear you can own.

Clockwise from top:

SB-104 Transceiver:

SB-230 Conduction-Cooled Linear: 1200 PEP SSB; 1000 watts CW from less than 100 watts drive. Also 400 watts for SSTV and RTTY.
Kit SB-230, Shpg. wt. 40 lbs. **339.95**

SB-614 Station Monitor: CRT indicates signal quality. Also RF envelope and Trapezoid displays. For SSB, CW and AM to 1 kW; 80-6 meters.
Kit SB-614, Shpg. wt. 17 lbs. **139.95**

SB-634 Station Console: 24-hour clock, 10-minute ID timer, RF wattmeter, SWR bridge, phone patch.
Kit SB-634, Shpg. wt. 14 lbs. **179.95**

SB-644 Remote VFO: For split transmit/receive on SB-104. Not for HW-104.
Kit SB-644, Shpg. wt. 10 lbs. **119.95**

Fixed Station Power Supply. Fits inside accessory speakers of SB-104 and HW-104. 120/240 VAC, 60/50 Hz.
Kit HP-1144, Shpg. wt. 28 lbs. **89.95**

Station Speakers: 5x7″, 3.2 ohm speakers response-tailored to SSB. With cable, connectors and cabinet.
Kit SB-604, For SB-104 Shpg. wt. 8 lbs. **29.95**
Kit HS-1661, For HW-104 Shpg. wt. 5 lbs. **19.95**
Useful options for both the SB-104 and HW-104.
SBA-104-1, Noise Blanker, Shpg. wt. 1 lb. **26.95**
SBA-104-2, Mobile Mount. Shpg. wt. 6 lbs. **36.95**
SBA-104-3, 400 Hz CW Crystal Filter, Shpg. wt. 1 lb. **39.95**

FREE!

New Heathkit Catalog

Over 400 Easy-to-Build kits including Amateur and SWL gear, test instruments, automotive and marine electronics, digital clock and weather monitors, stereo hi-fi, color TV. Send for yours today!

HEATH
Schlumberger

Benton Harbor, Michigan 49022
Dept. 9-14

Please send me my FREE Heathkit Catalog.

Name _____

Address _____

City _____ State _____

AM-327 Zip

Club is reactivating. The Handi-Ham/Piconet Hamfest was a tremendous affair in Faribault. Nov. '75 meteor conditions were very poor, but MN operators showed their stuff. Duluth 22/82 link on 420 was destroyed in a mobile home fire, both a total loss. WB@EAL, owner, sez he will sell such without a hitch; no injuries. Get ready for ARRL DX Test in Feb. and Mar. Predicted solar index about 14, so should be a challenge. Nov. BPL: WB@HOX. Traffic: WB@HOX 616, W@QMY 275, K@CVD 191, WA@YVT 156, WB@OCT 147, WA@GLI 136, WB@JYT 136, K@CSE 131, K@ZXE 120, WB@EKC 117, WA@YWA 105, WB@OAG 101, K@FLT 51, WB@NGX 47, WB@HNS 45, WA@URW 44, WA@TFC 43, K@ZRD 37, K@ZBI 34,WB@LDW 33, WB@LOR 33, K@JTW 26, WB@NZX 24, K@RMX 22, WA@CCA 21, W@HNU 21, WA@YAH 19, WB@JJA 8, WA@JPR 7, W@UMX 6, WB@NIU 1.

NORTH DAKOTA: SCM, Harold L. Sheets, W@DM — Our sympathies to the families of W@NMV and W@EF who joined the ranks of Silent Keys. These OT's will be greatly missed. W@RTY is again on the air, WA@YFF has his 40-ft. tower up for the TA33 and the 2m beam, puts in a real good sig from the Petersberg repeater. W@DM was interviewed on TV in regard to the weather net and amateur activity over Ch. 8 with good coverage. K@PYZ in Chicago for the winter, can be heard on 7298 8 AM week days and 9 AM week ends. WA@CSL/@ drives a school bus in addition to her 2m activities. The FORX ARC elected WA@LPV, pres.; WA@CSL/@, vice-pres.; K@OSL, secy-treas.; W@IUJ, act. mgr. WA@UNA WA@WBIJ and K@FRP from the Gratton Club attended the last meeting while WB@LRK and XYL braved the elements to be there. A Christmas party planned for the Dec. meeting.

Nets-kHz Manager	CST/Days	Sess.	QNI	QT
Goose River — 1990.0 Su. W@CDO	0900	5	66	
RACES — 3996.5 S-S WB@ATJ-WA@SUF	1730 1830	50	664	25
YL WX Net — 3996.5 S-S WA@RWM-WA@GRX	0730	30	405	38

Traffic: WA@RWM 717, WA@SUF 132, W@CDO 93, K@ATK 68, WB@RHT 63, W@DM 55, WB@BMG 54, W@WWL 46, WA@REW 45, W@MXF 11, WA@JPT 7, W@DXC 3.

SOUTH DAKOTA: SCM, Edward C. Gray, WA@CPX — K@HUD has a 90 foot telescoping mast for hi antennas. Rapid City reports that WA1RJC ha returned and is working for Westcom. K@OTZ has a viking thunderbolt, and WA@GLP has a new quad to 20-15-10. The Pennington County AREC net meet every Sun. morning at 1400Z. K@MZN does code practice after the net. WN@RMD is a new Novice in Sioux Falls. The Mitchell ARC has a code and theory class; as well as the Prairie Dog Club of Yankton Vermillion. Don't forget the PDARC QSO party Mar 14-15. Details were in last month's section. WA@VRE made BPL this month with 100 originations. Ne Reports: NJQ-847 QNI and 53 QTC; Evening Net-1508 QNI and 51 QTC. Traffic: WA@VRE 185 W@HOJ 133, W@DVB 24, WB@EVQ 10.

DELTA DIVISION

ARKANSAS: SCM, S. M. Pokorny, W5UAU — SEC W5RXU. PAM: W5POH. RM: W5MYZ. Net, kHz Time/Day, QNI, QTC, Mgr.: ARN, 3995, 0030/Dy 505, 51, W5UAU; OZK, 3765, 0700/Dy, 176, 46 W5MYZ; APN, 3937, 1200/M-S, 782, 30, W5POH M-Bird, 3925, 2230/M-F, 569, 9, WA5ZWZ. Welcome to Hams' Wide Wide World WN5s QBG, QBU, QCW QDK, QDU; WB5QBC. To all AR stations; have had several people suggest that all AR Phone Nets use one frequency for the nets, it would be more convenient in case of an emergency. Your comments would be appreciated with suggested frequency. Would like al secy's of radio clubs to advise the SCM of radio club officers for this year. Also the dates of all Hamfests The Razorback Chapter QCWA, held its first meetin Nov. 15, 1975 at Harrison, AR with 17 members and 13 YFs present. The Charter was presented and proposed Constitution and By-Laws adopted. A member Board of Dir. was elected and officers selected for 1976. Members of the Board are W5CFQ W5POH, W5MYZ, W5ENH, W5KL, W5UAU, W@OFC. Officers are W5UAU, chmn.; W5ENH, vice-chmn. W5CFQ, secy.-treas. Next meeting will be on May 2 a Agri-Park, Fayetteville. On-the-air meetings will be held on Sun. on/or about 3.900 kHz at 1900 GMT until further notice. All operators with 25 or more years as a ham are welcome to join, write SEC W5CFQ for info. PSHR: W5MYZ 49, W5POH 39, W5BED 34 WB5OHD 22, W5UAU 19, Traffic: W5BED 59 WB5OHD 51, W5MYZ 41, W5UAU 38, W5TXA 27 W5POH 20, WB5GWU 12.

LOUISIANA: SCM, Robert P. Schmidt, W5GHP — Asst. SCM: John Souvestre, WA5NYY. SEC: W5TR RM: WA5PRI. PAM: WB5EKU. VHF PAM WA5KND. Congrats to the Twin Cities Club o Monroe on their excellent Hamfest in Nov. W5DDL/5 Lafayette Club station was number one in the fift call area 1975 FD. LARC Novice class reports members passed their code test. W5RKR now net mgr of the NO VHF Club Mon. night net. Congrats t WA5RRN on excellent job of rebuilding the 16/7 repeater for the NO VHF Club. New officers o Northwest RAA of Natchitoches are G. Pratt, pres. Rick Bergeron, vice-pres.; R. Laborde, secy. Officer of Baton Rouge Club are WA5LMH, pres.; WB5IIU vice-pres.; WA5NVB, secy.; WA5ZAB, treas. K5FVA now chmn of the ARRL DX Committee. New Monro repeater 37/97 now operational. WB5FHU very activ on LRN the RTTY net. Remember QSL card promoting the 1979 ARRL National Convention i Baton Rouge can be obtained by writing P.O. Box 891, Baton Rouge, 70821. WB5NWO has complete new shack in the back yard.

Net Manager	kHz	Time	QTC	QN
LAN	3615	7:00 PM DY 10:00 PM Dy	264	35
WA5PRI LTN WB5EKU	3910	6:45 PM Dy	86	26
LSN K5TTC	3703	8:30 PM M-F	106	16
LRN W5GHP	3587.5	7:00 PM Su	6	1

Traffic: WA5IQU 307, W5GHP 305, WA5ZZA 283 K5TTC 254, WB5KQJ 142, WN5QCJ 98, WA5ANV 78, WB5EKU 68, WA5PRI 43, WA5QVN 31, WB5IKT 28, WB5ASD 24, W5YN 17, WB5JZQ 6, WB5NSR 5 WB5DVS 4, WB5NWO 4.

TS-520 Specifications

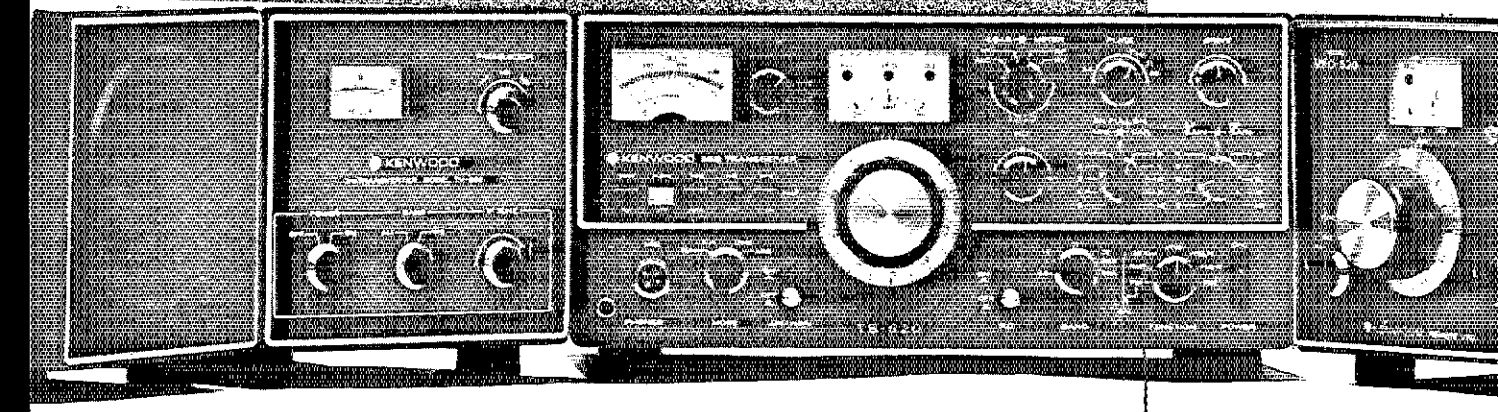
MODES: USB, LSB, CW
POWER: 250 watts PEP input on SSB, 160 w
DC input on CW
ANTENNA IMPEDANCE: 50-75 Ohms,
unbalanced
CARRIER SUPPRESSION: Better than -45 d
UNWANTED SIDEBAND SUPPRESSION: Bett
than -40 dB
HARMONIC RADIATION: Better than -40 dB
AF RESPONSE: 400 to 2600 Hz (-6 dB)
AUDIO INPUT SENSITIVITY: 0.25μV for 10 d
(S+N)/N
SELECTIVITY: SSB 2.4 kHz (-6 dB), 4.4 kH
(-60 dB), CW 0.5 kHz (-6 dB), 1.5 kH
(-60 dB) (with accessory filter)
FREQUENCY STABILITY: 100 Hz per 30
minutes after warmup
IMAGE RATIO: Better than 50 dB
IF REJECTION: Better than 50 dB
TUBE & SEMICONDUCTOR COMPLEMENT:
9 tubes (2 x 6146B, 12BY7A), 1 IC, 18
FET, 44 transistors, 84 diodes
DIMENSIONS: 13 1" W x 5 9" H x 13.2" D
WEIGHT: 35.2 lbs.
SUGGESTED PRICE: $629.00

VFO-520

Provides high stability with precision gearing
Function switch provides any combination wi
the TS-520. Both are equipped with VFO indi
cators showing at a glance which VFO is bein
used. Connects with a single cable and obtain
its power from the TS-520. Suggested price:
$115.00.

SP-520

Although the TS-520 has a built-in speaker, t
addition of the SP-520 provides improved tor
quality. A perfect match in both design and
performance. Suggested price: $22.95.



So much for only $629!

Kenwood's TS-520 is a solidly built, superbly designed SSB transceiver that has literally taken the amateur world by storm. The value of its features and specifications are obvious. Less obvious, but just as important, is the kind of quality that Kenwood builds in. Hundreds of testimonials, in writing and on the air, attest to its performance and dependability. You probably have heard some of the same glowing praise.

The TS-520 operates SSB and CW on 80 through 10 meters and features built-in AC and 12VDC power supply. VOX, RIT, noise blanker, 2-position ALC, and double split frequency controlled operation are only some of its fine features.

Kenwood offers accessories guaranteed to add to the pleasure of owning the TS-520. The TV-502 transverter puts you on 2-meters the easy way. (It's completely compatible with the TS-520.) Simply plug it in and you're on the air. Two more units designed to match the TS-520 are the VFO-520 external VFO and the model SP-520 external speaker. All with Kenwood quality built in.

Available at select Kenwood dealers throughout the U.S.

Kenwood... pacesetter in amateur radio

TRIO-KENWOOD COMMUNICATIONS INC.

116 East Alondra / Gardena, California 90248

TV-502

TRANSMITTING/RECEIVING FREQUENCY:
144-145.7 MHz, 145.0-146.0 MHz (optior
INPUT/OUTPUT IF FREQUENCY: 28.0-29.7
MHz
TYPE OF EMISSION: SSB (A3J), CW (A1)
RATED OUTPUT: 8W (AC operation)
ANTENNA INPUT/OUTPUT IMPEDANCE: 50Ω
UNWANTED RADIATION: Less than -60 dB
RECEIVING SENSITIVITY: More than 1μV at
S/N 10 dB
IMAGE RATIO: More than 60 dB
IF REJECTION: More than 60 dB
FREQUENCY STABILITY: Less than ±2.5 kHz
during 1-60 min after power switch is ON
and within 150 Hz (per 30 min) thereafte
POWER CONSUMPTION: AC 220/120V, Trans
mission 50W max., Reception 12W max.
DC 13.8V, Trans-
mission 2A max., Reception 0.4A max.
POWER REQUIREMENT: AC 220/120V, DC 12
16V (standard voltage 13.8V)
SEMICONDUCTOR: FET 5, Transistor 15,
Diode 10.
DIMENSIONS: 6⅝" W x 6" H x 13¼" D
WEIGHT: 11.5 lbs.
SUGGESTED PRICE: $249.00

CW-520
500 Hz CW Crystal Filter: $45.00

Prices subject to change without notice

Looking for spare time income? Your own business? A new career?

Learn TV/Audio Servicing at home, the NRI way!

If the money pinch has you looking for some extra bucks, NRI training may be just what you're looking for. You can learn to service television sets and quadraphonic stereo equipment at home, in your spare time, and turn your skills into part time income or a whole new career.

NRI training includes step-by-step instruction starting with the basics, giving you both theory and practical "hands-on" experience with electronic circuitry. The texts are bite-size for ease of learning, and you get outstanding equipment engineered specifically for training.

Build color TV, Quadraphonic Stereo

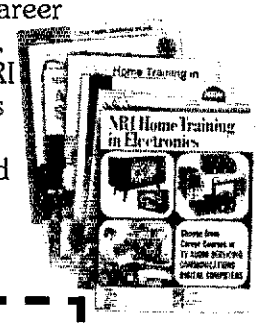
No one else gives you so much. You learn by doing with NRI's exclusive "Power-On" training. In our Master TV/Audio Course, you actually build a 25" (diagonal) solid state TV, a solid state quadraphonic audio center complete with four speakers, and useful test instruments like a digital/color TV pattern generator, 5" triggered sweep oscilloscope, CMOS digital frequency counter, and transistorized volt ohmmeter. All this, plus our unique Discovery Lab and seven other electronics kits shows why NRI gives you the most in practical bench training.

The Pro's choice for 62 years

NRI is the oldest and most successful school of its kind. A documented national research study shows that over half of the professional TV/Audio technicians have home training, and among them, it's NRI 2 to 1 (survey summary on request). And, it's economical. For what you'd pay for either course from the next leading school, NRI gives you both TV and quad audio training . . . training on equipment designed to teach!

Send for Free catalog

Our big new catalog tells all about the many NRI courses in TV, Audio electronics, CB radio, computer technology, and more. It shows you lesson plans, equipment, career opportunities, the whole NRI story. There's absolutely no obligation and no salesman will ever call.



Rush the free catalog of my choice (select only one, please). No salesman will call.

- ☐ TV/Audio Servicing Choose from 5 courses
- ☐ Communications with CB Complete Communications Electronics • FCC Licenses • Aircraft Electronics • Mobile Communications • Marine Electronics
- ☐ Amateur Radio Basic and Advanced Courses
- ☐ Industrial & Business Electronics Digital Computer Electronics • Electronic Technology • Basic Electronics • Math for Electronics
- ☐ Appliance Servicing Homeowner & Professional Repairs
- ☐ Automotive Mechanics Master Automotive Technician • Tune-Up and Basic Repairs
- ☐ Auto Air Conditioning
- ☐ Air Conditioning & Refrigeration Basic Air Conditioning Servicing • Master Course in Air Conditioning, Refrigeration & Heating

NRI McGraw-Hill

19-026

NRI SCHOOLS
McGraw-Hill Continuing Education Center
3939 Wisconsin Avenue,
Washington, D.C. 20016

☐ APPROVED FOR CAREER STUDY UNDER GI BILL. Check for details.

Name _____ Age _____
(PLEASE PRINT)

Street _____

City/State/Zip _____

Accredited Member National Home Study Council

TENNESSEE: SCM, O. D. Keaton, WA4GLS — SEC: WB4DYJ. PAMs: WB4PRF K4LSP. RM: WB4DJU.

Net — Freq. Manager	Time(Z)/Days	Sess.	QNI	QTC
TPN — 3980 WA4EWW	1040 M-F	81	3757	191
W4PFP	1145 M-F			
WB4YPO	2330 M-S 1300 SSuH			
TCN — 3980 WB4MPJ	0030 M	4	90	2
TN — 3635 K4YFC	0000 Dy	28	164	104
TNN — 3707.5 WA4HLV	2300 Dy	6	9	0
ETVHFN — 50.4 WA4YKN	0000 TThS	14	93	0
ETVHFN — 145.2 WB4DZG	0000 WF	9	40	1
ETTMN — 28.7 WB4NFI	0100 WF	9	105	4
MTTMN — 28.8 W4EAY	0100 TF	9	59	0
KCARECN — 146.522130 F WA4IPT		5	141	3
WTVHFN — 146.372000 S WA4VYX		9	148	3
146.97	0130 F			

WA4DPF had 162 phone patches for Nov. Congratulations to K4MZE on passing the Amateur Extra Class. The FACT club of Lebanon doing well, they obtained 8 new members last month. The MTARS of Tullahoma meets every 2nd Thur. at the Rec. Center. Help is needed on the daytime RN5 nets, anyone interested please contact W5KLV. We certainly welcome WA5MMD/4 as NCS on TN. BMRC in Kingsport reports 40 students in their present class, also congrats on their Field Day exercise. Traffic: K4CNY 214, K4KCK 52, WB4DJU 48, W4DGG 48, WB4ZSZ 43, K4JSF 37, WB4ANX 30, WB4YPO 24, W4RUW 22, WB4CQC 20, WA4GLS 18, WA4ZBC 17, WB4PRF 16, W4SGI 12, WA4LJW 11, WA4MIU 10, WB4WHE 8, W4CYL 7, WB4GBI 7, WB4MPJ 7, WB4DDV 6, WB4VXC 6, K4AMC 5, WA4DPF 4, WA4EER 3, WB4GZF 2, WB4TDN 2.

GREAT LAKES DIVISION

KENTUCKY: SCM, Ted H. Huddle, W4CID — SEC: WA4GHQ.

Net	QNI	QTC	Net	QNI	QTC
KRN	312	20	KYN	339	157
MKPN	1112	120	6DAREC	47	5
KTN	1231	205	8DAREC	88	17

Net Mgr. WB4EOR reports that winter long-skip is hampering KTN operations. Many sessions are conducted using out-of-state stations as NCS and relay, many thanks fellows. New Novice in Danville is WN4CAC. Many thanks to WA4AXN for helping mail the license plate forms. Deadline for reports to me for this column is the 7th of each month. Traffic: WB4ZML 121, W4NLM 105, WB4QVS 59, WB4AUN 58, W4BAZ 56, W4CID 56, WB4EXQ 52, WB4EOR 51, WA4RCD 42, WA4GHQ 31, WA4FAF 28, K4KAK 17, K4FUM 15, WB4NOE 14, K4IXJ 14, W4VWQ 13, W4CDA 12, K4HOE 12, WA4AGH 11, K4AVX 8, K4HFD 6.

MICHIGAN: SCM, A. L. Baker, W8TZZ — SEC: W8MPD. RMs: W8JYA W8RTN W8YIQ K8AMU K8KMQ. PAMs: K8LNE W88JIX. VHF PAM: WA8WVV.

Net — Freq. Manager	Time/Dys	QNI	Tfc.	Sess.
QMN — 3663 W8JYA	2300/0300/Dy	1113	277	89
MACS — 3953 K8LNE	1600/Dy	920	323	34
WSBN — 3935 WB8JIX	0001/Dy	766	103	30
MNN — 3720 WB8NCD	2230/Dy	256	83	30
Mi6M — 50.7 WA8VXE	0000/MS	501	35	66
UPEN — 3922 K8VOA	2230/Dy	583	34	33
BR/MEN — 3930 WB8BYB	2130/Dy	754	146	30

W8CVQ reports SW MI 2M net QNI 36 in 4 sessions. 2M Catfish net had QNI 78 in 5 sessions as reported by WA8WVV. Arrow Repeater net had QNI 77, QTC 3 in 4 sessions. New rigs reported by: WB8DKQ a Swan 700CX; WN8WEO a Kenwood TS 520; W8JAU an HW 202; WB8ITT the Drake Twins; W8CRP has forty-four-element beam for 144 MHz. W8RKD joins K8AMU with 100% QNI on QMN. WB8ESK reports purchase of a GE Master II Repeater for 16/76 in G.R. area. Adrian Hamfest prize winners: WA8s RLT, QPN and UBX. WN8VCE awaiting arrival of General Class license. K8PJQ contributes Tri-Band beam to K8BYI club station of SEMARA. W8QWN and WB8BHM teach Novice class in Livingston County. WN8VBC has a WAC pending in only 5 weeks of operating. New officers: Central MI Amateur Repeater Assn. — W8IFA, pres.; WB8LZB, vice-pres.; WB8RCR, secy.; K8VXX, treas. Genessee County Radio Club — WB8UKC, pres.; W8LSW W8WXO WA8JND vice-pres.; K8YZI, secy.; K8KMQ, treas. Arrow Repeater Assn. W8POX, dir.; W8GND, secy.; WB8IBO, treas. Southeastern MI ARA — WB8LZV, pres.; W8KAZ, vice-pres.; WB8PRJ, secy.; W8HID, treas. Livingston AR Klub — W8SWN, pres.; WN8VCE, vice-pres.; WB8NXG, secy.; WN8UBY, treas. W8AQQ new member at DARA. Regretfully I report W8PNF and W8NBF are Silent Keys. Traffic: (Nov.) WB8DKQ 339, WB8ITT 247, K8DYI 237, K8LNE 202, W8MO 128, WB8WKQ 123, WB8POL 118, WA8WZF 112, W8TZZ 70, WB8NCD 64, W8NDH 63, W8UFS 51, WB8JIX 49, K8JED 48, W8YIQ 40, WB8BYB 39, W8RTN 37, K8AMU 36, W8EU 28, WB8EEU 24, WB8NII 22, WB8LWW 17, W7KQU/8 17, W8VIZ 17, WB8FBG 16, WA8MDK 16, WB8PFB 16, WA8RXI 16, W8PBO 14, W8QBE 14, W8SDB 14, WB8DJS 13, WA8FJF 13, W8JUP 13, W8JYA 13, W8FZL 12, W8LDS 11, K8WRJ 11, W8DCN 11, W8DT 11, W8LOU 11, W8UOQ 10, WA8WVV 10, WA8FXR 9, W8IUC 9, W8TBP 9, W8BEZ 8, WA8MTI 8, K8GXV 7, W8GLC 7, W8CUP 6, W8TXM 6, W8HKL 5, W8RNQ 5, W8SCW 4, K8ZJU 4, WB8GKB 3, W8OW 2. (Oct.) W8UOQ 36, WA8TBL 36, W8CSO 13, W8BNF 7, K8MFK 5, W7KQU/8 2.

OHIO: SCM, Hank Greeb, W8CHT —

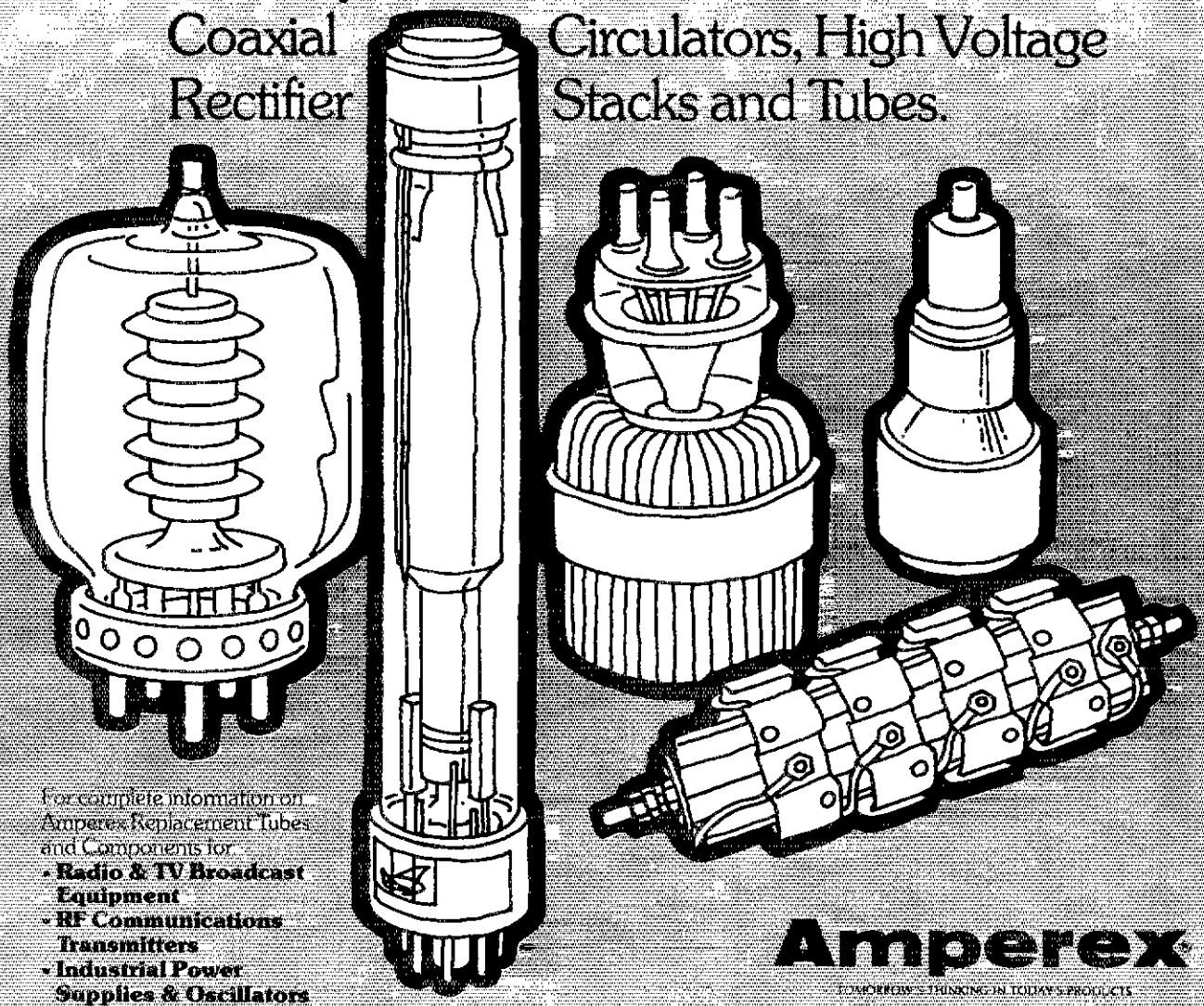
Net — Freq. Manager	Sess.	QNI	QTC	Time(S)
ONN — 3708	10	44	19	2330Z

Mention the name Amperex and what comes to mind?

Plumbicon* TV Camera Tubes, of course.

That's fine, but we'd like to remind you that Amperex is your one stop source for all these broadcast components, too!

RF Power Triodes and Tetrodes for AM and FM Transmitters, VHF Power Tetrodes and Cavities, Vacuum Capacitors, UHF Klystrons, UHF-TV Triodes, Coaxial Circulators, High Voltage Rectifier Stacks and Tubes.



For complete information on Amperex Replacement Tubes and Components for:

- **Radio & TV Broadcast Equipment**
- **RF Communications Transmitters**
- **Industrial Power Supplies & Oscillators**
- **Microwave Ovens & Commercial Radar Equipment**
- **Scientific Instruments...**

contact Bob Norris, Distributor Sales Operation, Amperex Electronic Corporation, Hicksville, New York 11802. Telephone: 516 931-6210

Amperex

TOMORROW'S THINKING IN TODAY'S PRODUCTS

A NORTH AMERICAN PHILIPS COMPANY

*Registered trademark of N. V. Philips of the Netherlands

K8IKD				
OSSBN — 3972.5	79	2214	760	1530/ 2100/ 2345
W8MOK				
OSN — 3577	30	150	46	2310
WB8JGW				
O6mtrN — 50160	30	317	98	0200
WA8SSI				
BN — 3577	60	407	220	2345/ 0300
WA8WAK				
BNR — 3605	30	119	145	2300
K8NCV				

Remember the 25th Annual Dayton Hamvention — Apr. 23 thru 25. W8BU & WB8QYZ are cooperating on code & theory classes at Lorain County Community College, Elyria. Triple States ARC sponsored a turkey-shoot & eyeball QSO in Belmont County. Belmont-Monroe County AREC & Triple States ARC sponsor a very active Novice CW net on 28 MHz with average QNI of over 10. Apricot Net members provided communications for Cleveland Parades on Nov. 11 & 27. W8PMJ received 40-year ARRL membership pin. Greenville AREC is utilizing the new 146.19/79 repeater for their 7:00 PM Mon. evening nets. WB8VVX is a new General, and WA8VYG passed the Advanced Class exam both from the Massillon area. Queen City Emergency Net (Cincinnati) aided MD Assn. in collections on Nov. 2. K8ONA & W8KC presented Ham Radio to Euclid Junior High School students on Nov. 5 & 19. The current SCM election has generated lots of discussions, suggestions, new ideas, and resolution of problems. Regardless of the outcome an election is a very useful vehicle for generating interest in section matters. Thanks to those of you who have supported ARRL activities for the past two years. Please continue your support in the future. Traffic: W8PMJ 423, WA8MCR 397, WB8MZZ 317, WA8HGH 249, WB8KWD 191, W8ENI 174, W8PTT 174, WB8LQU 165, WB8OMQ 158, W8DIL 157, W8IBT 144, WA8SSI 100, W8OE 80, WA8VWH 80, W8JD 72, WB8IGW 71, K8LGA 65, WB8HWE 64, WA8SED 54, W8MOK 51, WA8TKW 50, K8LXA 49, W8QZK 48, WB8MRL 45, K8ONA 42, K8VMI 41, WB8CJU 40, WBALS 36, WB8RKA 36, W8LZE 34, WB8LNF 33, WB8VKS 31, WN8TRK 29, W8CXM 18, K8BYR 23, K8KWO 21, WB8TEM 17, W8BHL 16, WB8PIY 16, WB8JUI 15, WB8GGR 12, WA8MHO 12, WB8ORR 12, WB8QXN 12, WN8VLR 11, WA8GPO 10, WB8NUT 10, WA8VTD 10, W8CHT 9, WB8TGA 9, WA8BOV 8, K8MLO 8, K8CKY 7, W8TH 7, WA8JXM 6, W8OUU 6, W8QXQ 6, WB8HHP 5, WA8DWL 4, WA8RQQ 4, W8UQY 4, W8DYF 3, WA8TSX 3, WA8UET 3, WA3BGE 2, W8WEG 2, W8LAU 1.

HUDSON DIVISION

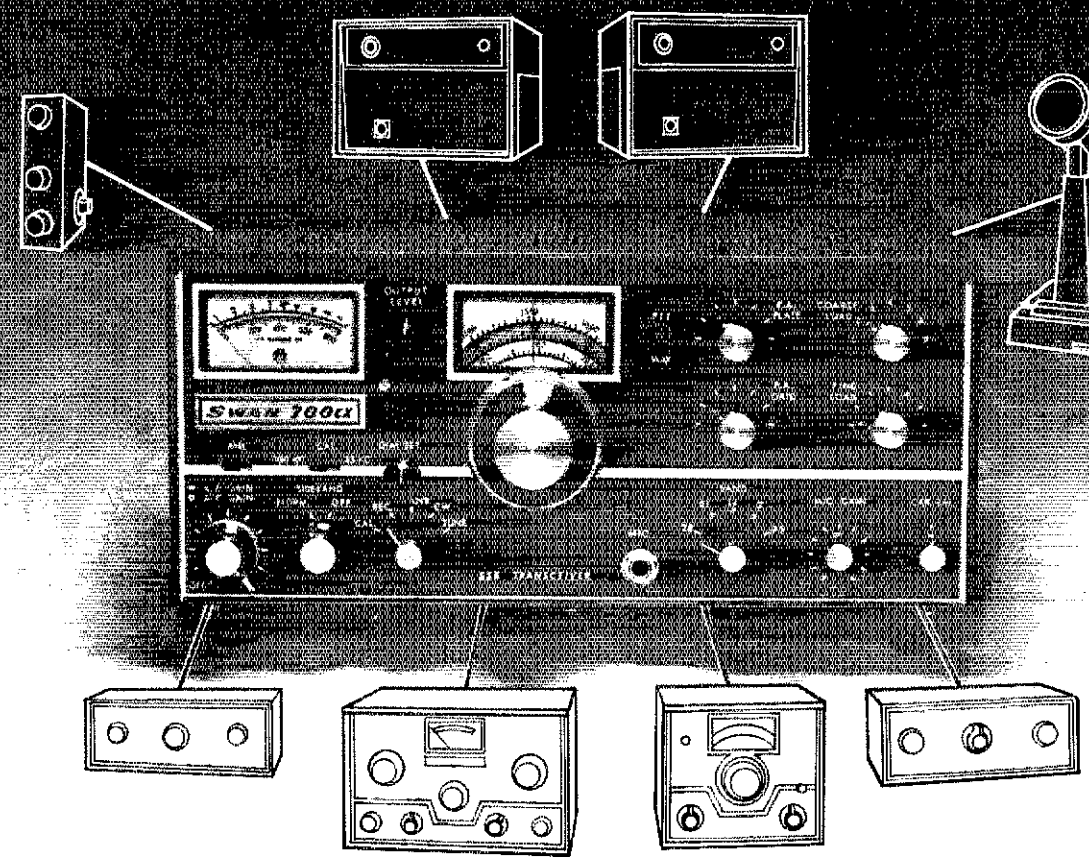
EASTERN NEW YORK: SCM, Gary J. Ferdinand, WA2PJL — Nov. net totals: NYSPT&EN QNI 1009, QTC 141; Clearing House QNI 561, QTC 293. New EC for Rensselaer Co. WB2MKJ, let's all give him our support. Former SCM K2SJN now enjoying the FL sunshine as W4MGO. ORS and OPS appointments to K2TTG. 1976 officers for the NYSPT&EN: WB2RUZ WA2IYB K2TTG WB2FYZ. WB2YQU now on 220 with 40-elements and 50 watts on cw. Skeds anyone? WA2BLM reports activity in Sept. VHF contest and the Itchycoo Park VHF contest. New General in Albany club WA2WJO. WB2IGL had trouble with trees when raising his 80-meter antenna, but says it's more challenging than a tower. WA2RFP and WB2RUZ helped WA2PJL raise a new 50-ft. tower. Westchester ARA had W2EV to entertain at their annual banquet. Overlook Mt. ARC heard WA2DHA on the building of WR2ABB. Schenectady had their Ladies Night dinner in Dec. Saratoga County RACES Assn. heard K2VW. Albany ARA visited by W2GN speaking about Oscar communications. The Albany club is beginning a new Novice class. WB2VVS doing a fine job operating the 7553-B at WB2ELA, the VA hospital in Montrose. Maple Hill High School Club WB2YCR in Castleton has four new amateurs: WN2CPE WN2CPD WN2CQL WN2CQM. The club appeared in a feature article in an Albany area newspaper. Several members of the Mt. Beacon Repeater Club helped the Red Cross provide valuable communications during the evacuation of elderly residents as a result of a fire. PSHR to WB2TDX WB2RUZ WB2EMU WA2PJL. Traffic: WA2PJL 302, WB2EMU 195, WB2RUZ 80, WB2TDX 59, WB2TGL 57, W2BIW 47, WB2WZL 38, WB2VVS 37, K2TTG 35, W2WSS 20, K2OUA 13, K2HNW 7, WA2CJY 4, WB2EKM 4, WB2ELA 4.

NEW YORK CITY-LONG ISLAND: SCM, John H. Smale, WB2CHY — Asst. SCM: Art Malatzky, WB2WFJ. SEC: K2HTX. RM: WB2LZN. The following are Traffic Nets in and around the Section:

NLI*	3630 kHz	1900 Dy 2200 Dy	WB2LZN Mgr.
NLI Phone*	3928 kHz	1730 Dy	WB2PYM Mgr.
NLS*	3730 kHz	1830 Dy	WB2WRT Mgr
Clear House	3925 kHz	1100 Dy	WA2ODD Mgr
All Svc	3925 kHz	1300 Su	W2OE Mgr.
MIC FARAD	3925 kHz	1300 MT W1HF5	W2OE Mgr.
ESS	3590 kHz	1800 Dy	K2UIR Mgr.
NSYTPEN	3925 kHz	1800 Dy	WA2RSP Mgr.

*Denotes Section Net, all times are local. Congratulations to WB2EDW who made the big step and is now working for ARRL in the Communications Dept. NLI's loss is Amateur Radio's gain. Jim will be missed as EC of Manhattan and NLS Mgr., but I'm sure we will all wish him success in his new job. W2PDM has been mobile with an FPM 300, and has given out over 60 counties to approx. 250 county hunters between Apr. 1 and Oct. 31, 1975. K2RIW worked WA6LET via the moon with 4 Yagis. K2OVS now an AMSAT bulletin station on Mon. evening for Oscar 6. W2GFF is nearing WAS on Oscar 6 and 7. WB2FZE now in his new QTH in Miller Place. WA2HOP now /1 in Ft. Devon, MA. The Great South Bay ARC had its first meeting in the Babylon Town Hall with over 40 in attendance. W2PF reports that over 325 attended the 66th annual dinner meeting of the Radio Club of America at the NY Sheraton Hotel. The Africana Net again started on Nov. 1, 21.355 kHz is the freq. at 1230 GMT each day, Sat. and Sun. Sessions will be run by W2PPG. K2SJO has organized a freq. committee of the major repeaters in the area, officers are WA2EXP, pres.; WA2DHA/W1UYK, vice-pres.; WA2DHF, secy.; WA2FXB, treas.; K2QPF, dir. Congratulations to new appointees W2TE OO Class I, WB2CHY Class III. DA1PK reports the G.I. simplex freq. in Wiesbaden is 145.55 MHz and the Frankfurt/Rhein main area is 144.48 MHz. This and the following is for the hams in the APO/FPO NY area: code and theory classes are being conducted on most Mon., Wed. and Fri. nites at 7 P.M. local at the Bitburg

Swan 700CX transceiver.



It's the way to grow.

Everybody wants the ultimate ham station, but the only way most of us are going to get it is to start now and grow into it.

And the best way to start is with our 700CX.

Then you'll have an excellent transceiver with 700 solid watts P.E.P. input of SSB power at the lowest cost per watt—about a buck—of any comparable equipment.

And when you're ready to add capability and features, plug in or hook up Swan accessory equipment for easy expandability.

For instance, just plug in our 510-X crystal oscillator when you want extra frequency coverage. If your kind of traffic calls for separate transmit and receive frequencies, our 508 VFO is made for your station. Want VOX? Plug in the Swan VX-2 and start talking. Or hook up our FP-1 telephone patch in minutes.

And when you're ready for that big jump to all-the-law-allows, our 2000-watt P.E.P. input Mark II linear amp is waiting in the wings.

Add our complete selection of power supplies, microphones and other options and you've got everything you need for a full-house rig in matching specs and matching decor.

So your ham station will look and perform like it belongs together.

With the 700CX you'll probably never be troubled by things like cross modulation and front-end overload because the design is excellent. All bands from 10 to 80 meters with selectable upper or lower sideband, AM or CW with sidetone.

Get started on your dream rig today. See the 700CX at your nearest Swan dealer or order direct from our factory.

700CX Champion Transceiver	**$649.95**
117-XC 110V AC Power Supply *(includes Speaker and Cabinet)*	**$159.95**
117-X 110V AC Power Supply *(less Speaker and Cabinet)*	**$114.95**
510-X Crystal Oscillator	**$ 67.95**
508 External VFO	**$269.95**
VX-2 Plug-In VOX	**$ 44.95**
FP-1 Telephone Patch	**$ 64.95**
Mark II Linear Amplifier *(complete with 110/220 VAC power supply and tubes)*	**$849.95**

Dealers throughout the world
or order direct from

SWAN® ELECTRONICS
A subsidiary of Cubic Corporation

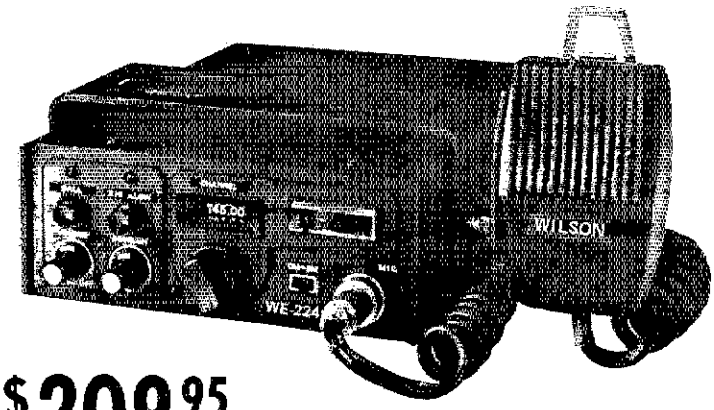
Home Office: 305 Airport Road • Oceanside, CA 92054
Telephone: (714) 757-7525

Wilson Electronics Corp.

"FACTORY DIRECT ONLY"

"WILSON GOES MOBILE"

introducing the new WE-224



$209.95

SPECIAL INCLUDES: WE-224; 52/52, SIMPLEX PLUS TWO TX/RX CRYSTALS, YOUR CHOICE (Common Repeater Frequency Only), MOUNTING BRACKET; MOBILE MIKE

FEATURES

1. 24 Channel Operation
2. One priority Channel
3. Selectable 1 or 10 Watts Out
4. 10.7 Monolithic Filter Installed
5. 455 KHz Ceramic Filter
6. Numerical Read-out on each Channel
7. Built-in Adjustable "Tone- Burst" Generator
8. Front Panel Tone Encoder Control
9. Accepts Wilson 1402 & 1405SM Xtals
10. Individual Trimmer Capacitors for both TX/RX
11. Mosfet Front End
12. Helical Resonator
13. High VSWR Protection Circuit
14. Reverse Polarity Protection Circuit
15. NBFM - 15 KHz Channel Separation
16. External Speaker Jack
17. Built-in Speaker
18. Dynamic Microphone Included
19. Mobile Mounting Bracket Included
20. Frequency Range 144-148
21. 6½"W x 2½"H x 9½"D
22. Weight: 5½ lbs.
23. Power Requirements:
    Source: 13.5 VDC ± 10%
    Receive: .45A
    Transmit: 2.6A (10W), .7A (1W)

WILSON announces the addition of the 220 and the 450

2202 SM

FREQUENCY RANGE 220 - 225 MHz

- 6 Channel Operation
- Individual Trimmers on all TX/RX Crystals
- All Crystals Plug In
- 12 KHz Ceramic Filter
- 10.7 and 455 KC IF
- .3 Microvolt Sensitivity for 20 Db Quieting
- Weight: 1 lb. 14 oz. less Battery
- Battery Indicator
- Size: 8 7/8 x 1 3/4 x 2 7/8
- Switchable 1 & 2.5 Watts Output @ 12 VDC
- Current Drain: RX 14 MA TX 500 MA
- Microswitch Mike Button
- Unbreakable Lexan® Case

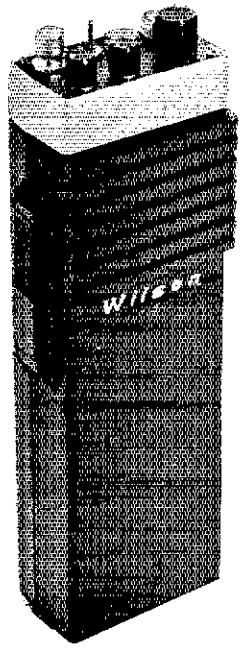
USES SAME ACCESSORIES AS 1405

INTRODUCTION SPECIAL

$279.95

INCLUDES

1. 2202 SM
2. Antenna
3. Ni-Cad Batteries
4. Leather Case
5. 223.50 Simplex Installed



4502 SM

FREQUENCY RANGE 420 - 450 MHz

- 6 Channel Operation
- Individual Trimmers on all TX/RX Crystals
- All Crystals Plug In
- 12 KHz Ceramic Filter
- 10.7 and 455 KC IF
- .3 Microvolt Sensitivity for 20 Db Quieting
- Weight: 1 lb. 14 oz. less Battery
- Battery Indicator
- Size: 8 7/8 x 1 3/4 x 2 7/8
- Switchable 1 & 1.8 Watts Output @ 12 VDC
- Current Drain: RX 14 MA TX 500 MA
- Microswitch Mike Button
- Unbreakable Lexan® Case

USES SAME ACCESSORIES AS 1405

INTRODUCTION SPECIAL

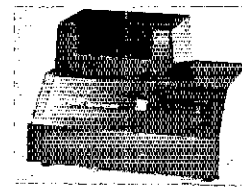
$299.95

INCLUDES

1. 4502 SM
2. Antenna
3. Ni-Cad Batteries
4. Leather Case
5. 446.00 Simplex Installed

HAND HELD ACCESSORY SPECIALS

DESCRIPTION	SPECIAL PRICE
BC1 - BATTERY CHARGER	$36.95
BP - NI-CAD BATTERY PACK	15.00
LC1 - 1402 LEATHER CASE	14.00
LC2 - LEATHER CASE FOR 1405, 2202, 4502	14.00
SM2 - SPEAKER MIKE FOR 1402 AND 1405	29.95
TE1 - SUB-AUDIBLE TONE ENCODER INSTALLED	39.95
TTP - TOUCH TONE PAD INSTALLED	$59.95
XF1 - 10.7 MONOLITHIC IF XTAL FILTER INST.	$10.00
CRYSTALS: 1X OR RX (Common Freq. Only)	4.50



BC-1 NI-CAD BATTERY CHARGER WITH REGULAR AND TRICKLE CHARGE FEATURE

Wilson Electronics Corp.

1402SM HAND HELD 2.5 WATT TRANSCEIVER

144-148 MHz

$199.95

FEATURES

1402 SM

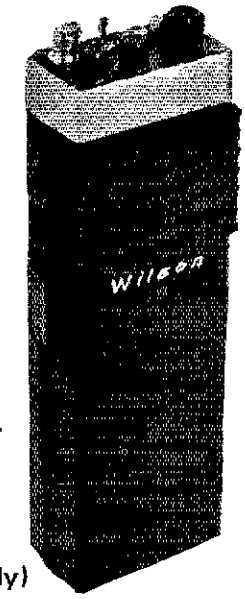
- 6 Channel Operation
- Individual Trimmers on all TX/RX Crystals
- All Crystals Plug In.
- 12 KHz Ceramic Filter
- 10.7 IF and 455 KC IF
- .3 Microvolt
- Sensitivity for 20 dB Quieting
- Weight: 1 lb. 14 oz. less Battery
- S-Meter/Battery Indicator
- Size: 8 7/8 x 1 7/8 x 2 7/8
- 2.5 Watts Minimum Output @ 12 VDC
- Current Drain RX 14 MA TX 500 MA
- Microswitch Mike Button

1405 SM

- 6 Channel Operation
- Individual Trimmers on all TX/RX Crystals
- All Crystals Plug In
- 12 KHz Ceramic Filter
- 10.7 and 455 KC IF
- .3 Microvolt Sensitivity for 20 dB Quieting
- Weight: 1 lb. 14 oz. less Battery
- Battery Indicator
- Size: 8 7/8 x 1 3/4 x 2 7/8
- Switchable 1 & 5 Watts Minimum Output @ 12 VDC
- Current Drain: RX 14 MA TX 400 MA (lw) 900 MA (5W)
- Microswitch Mike Button
- Unbreakable Lexan® Case

1405SM HAND HELD 5 WATT TRANSCEIVER

144-148 MHz



$279.95

SPECIAL ON EACH RADIO INCLUDES:

1. Antenna
2. Case
3. Ni-Cad Batteries
4. 52/52 Xtal
5. Your Choice of 2 TX/RX Crystals (Common Repeater Frequency Only)

OPTIONAL TOUCH-TONE PAD SHOWN

Can be Modified for MARS or CAP

10 Day Money Back Guarantee

90 Day Warranty

TO: WILSON ELECTRONICS CORP., 4288 S. POLARIS AVE., LAS VEGAS, NEVADA 89103
(702) 739-1931

FEBRUARY FACTORY DIRECT SALE ORDER BLANK

_____ 2202 SM @ $279.95. _____ 4502 SM @ $299.95. _____ WE-224 @ $209.95.

_____ 1402 SM @ $199.95. _____ 1405 SM @ $279.95.

_____ BC1 @ $36.95. _____ BP @ $15.00. _____ LC1 @ $14.00. _____ LC2 @ $14.00.

_____ SM2 @ $29.95. _____ TE1 @ $39.95. (SPECIFY FREQUENCY _____)

_____ TTP @ $59.95. _____ XF1 @ $10.00. _____ TX XTALS @ $4.50 ea. _____ RX XTALS @ $4.50 ea.

EQUIP TRANSCEIVER AS FOLLOWS: XTALS A. _____ B. _____

C. _____ D. _____ E. _____ F. _____

ENCLOSED IS _____ ☐ CHECK ☐ MONEY ORDER ☐ MC ☐ BAC

CARD # _____ EXPIRATION DATE _____

NAME _____

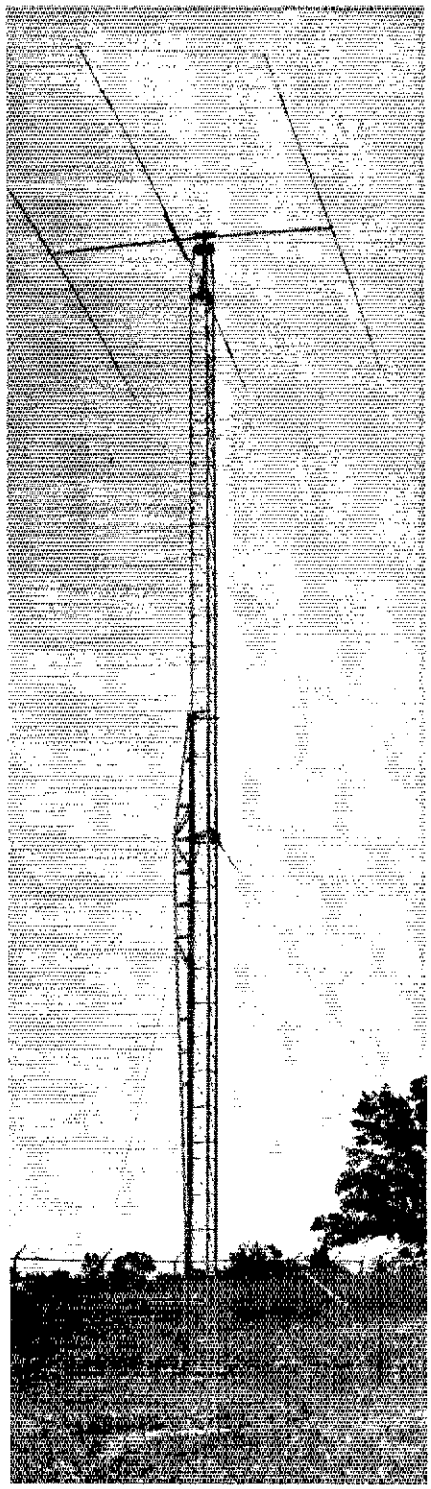
ADDRESS _____

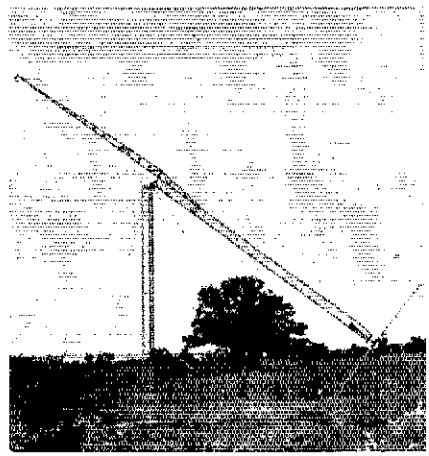
CITY _____ STATE _____ ZIP _____

SIGNATURE _____

Add $5.00 per Radio for Shipping, Handling; and Crystal Netting.

SALE VALID FEBRUARY 1 THRU 29, 1976 QST NEVADA RESIDENTS ADD SALES TAX





Comm. Cont. Room. WB4CUK now DA1BG and active on 2m. Personnel stationed at Keflavik Iceland (MARS KKKRKG) are awaiting news about their host country licenses, for now they are QRT, for further info contact: OIC MARS, FPO NY 09571. Thanks to DA1PK for sending along the info. K2RYE now in Encino, CA. WB2ART has a 220 machine operating for LIMARC, along with K2CFG's 450 machine, also for LIMARC. WB2WFJ has a new IC22A. Traffic: (Nov.) WB2PYM 297, WB2SHL 271, W2EC 184, WB2LZN 147, WB2EDW 125, WA2WKH 113, W2MLC 58, WB2WRT 103, WA2YAY 34, WA2ROK 33, WB2YKG 28, K2JFE 26, WA2PMW 20, WB2SJG 20, WA2UAJ 19, W2HXT 11, WB2WFJ 10, W2PF 5, WN2ZPV 4, WA2YEI 3, WA2JZX 1. (Oct.) WB2SJG 11. (Sept.) WB2SJG 10.

NORTHERN NEW JERSEY: SCM, William S. Keller, III, WB2RKK —

Net — Freq. Manager	Time(pm) Days	Sess.	QNI	QTC
NJN — 3695 WB2LCV	7:00 Dy	30	443	196
NJN — 3695 WB2LCV	10:00 Dy	30	201	89
NJPN — 3950 WB2VTT	6:00 Dy	30	487	244
NJPN — 3950 WB2VTT	9:00 AM Su	5	93	38
NJSN — 3730 WB2RMK	8:15 Dy	30	170	43
PVTEN — 145.71 WA2OPY	8:00 Dy	30	No Report	

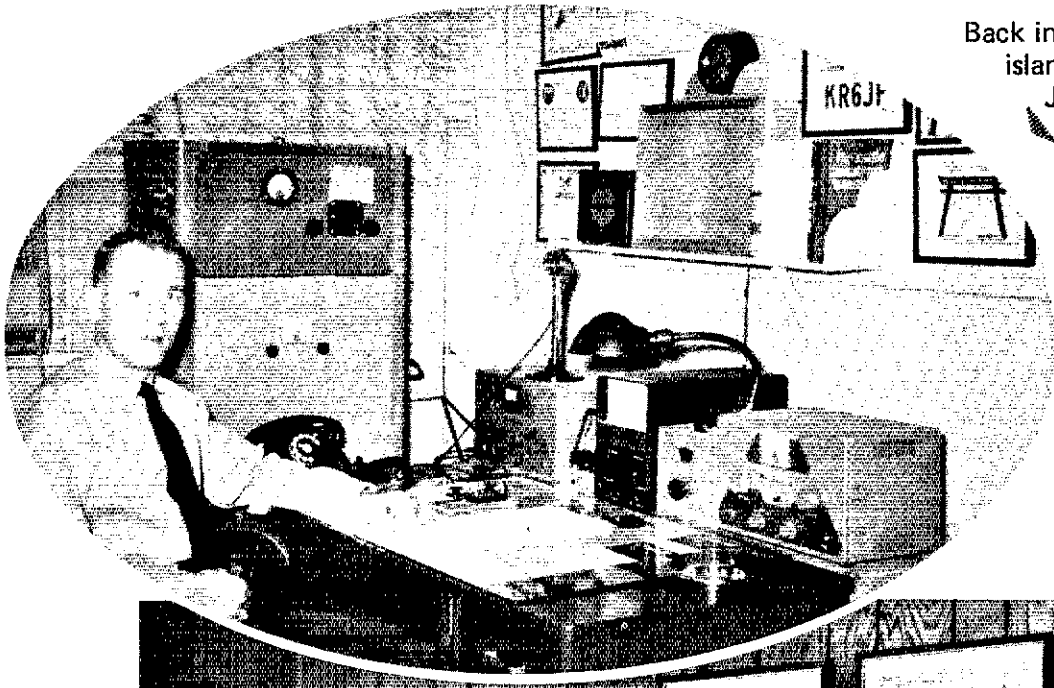
SEC: WB2PBO. PAMs: WA2OPY (VHF), WB2VTT (HF). RMs: WA2DSA, WB2RMK. OO reports received from WB2CST WA2DNY K2EK K2JFJ WB2TFH W2TPJ. The annual NJDXA Christmas dinner, hosted by W2JB and MCd by W2QM again a tremendous success. A presentation on Amateur Radio and the Law recently given at the New Providence ARC by K2SKV. NPARC reports recent auction a huge success. Attention prospective amateurs: The Thomas A. Edison ARA now conducting Novice and General class licensing courses. Anyone interested is invited to attend. The Bayonne CD RC (W2ODV) invites interested amateurs to attend meetings held Sat. evenings at the 16th Street Firehouse, Bayonne. The Wireless Institute of the Northeast reports a successful SS despite puor conditions. They are planning big ARRL DX contest operations and looking for new members. Contact WA2DSA or WB2RKK for info. The Cranford ARS set up its bicentennial station at Williams-Droescher Mill in Cranford, already handling a lot of traffic. NNJ welcomes Novice WN2CHE. We also commend the following NNJ amateurs on their accomplishments: K2JFJ receiving DXCC, WA2GEZ working country No. 161, K2EK attaining .9 ppm accuracy in recent FMT, and WB2CST on his commendation from Hq. for outstanding OO work during the past year. WB2VTT enjoying new TS520, while WA2KFE and WB2HSD work 2 fm with a TR22C and Gladding 25, respectively. WA2FUI has RTTY back in operation. K2QBW reports working EA8 PJ9 OK and DM via Oscar during Nov. NNJ well represented in recent contests. W2YD WB2RKK WA2SRQ W2HZY and WA2UOO ran up a big multi-single score in the CW CQ WW contest. K2OJD put in a big 80-meter score from FP8AA during that contest. K2JFJ visited ARRL. WA2QNT now an announcer at a Baltimore FM broadcast station. Because of recent conditions, NJSN will hold an extra session at 3:30 PM on 3730 Sun. Anyone interested in learning about cw traffic handling invited to check in. Congrats to WB2VTT and XYL on FB job running the NJPN dinner this year. Don't forget the ARRL DX competition this month. See Dec. QST. Traffic: (Nov.) WB2VTT 368, K2BHL 316, WB2RKK 289, WA2DSA 189, WB2RMK 108, W2SWE 85, W2CU 73, WA2NPP 66, WA2RMZ 63, WA2PCF 51, W2BLM 40, WA2DIW 40, WB2HSG 32, W2ZEP 32, W2WHB 29, WA2KFE 27, WA2CCF 22, K2ZFI 21, WA2CAK 20, WB2VFT 15, WB2HSD 10, WB2PBO 8, WA2QJU 5, WA2SRQ 5, WA2KGV 4, WA2UOO 4, W2ODV 3, W2WCJ 3, WA2FUI 2, WA2QHN 2, W2SHM 2. (Oct.) WB2RMK 105, WA2WDT 22, WA2KFE 21.

MIDWEST DIVISION

IOWA: SCM, Max R. Otto, W@LFF — WR@ACF at Ames being rebuilt. K@FLY organized, W@LPQ as NCS the 2M witch-watch impressed the Linn Co. sheriff. Feb. 22 is date of Davenport Hamfest at Masonic Temple. Congrats to WA@LFN for being judged in the top 10 OOs by Hq. W@JAQ Bulletins are heard at 1825Z on 3975 kHz Mon., Wed. and Sat. New Novices in Marshalltown area: WN@QOQ WN@QJG and WN@QIG; Humbolt area: WN@QAT WN@QYY and her Dad became WN@RKO. WN@QWS is now General. New appointments: WB@JYF ORS; W@UPX OPS; WA@DXZ OVS. WB@EKU suffered heart attack, happy to report he is now home. K@HCO WB@MEW WA@KGH WA@IJT and WA@ZJK of the Muscatine ARC provided 2M communications for the American Lung Assn. Walk-A-Thon. The National Guard was so impressed they offered the up and coming repeater on 31/91 a home. WB@KBA has new Advanced ticket and 40-ft. tower to go with it. Congrats to K@RDT who made Advanced with a perfect score. WB@ACU was used two nights to contact Santa from the children's ward. WDGET and yours truly did the HO-HOs. K@OBU moving to Quad City area, K@SVW Duluth. During the Phone SS contest, some doubted my license ck as 32. They thought a boy of my age wouldn't be up at 2 A.M. WN@OKA having good luck with new beam. (Net, Freq., Time(Z)Days, QNI, QTC, Sess., Mgr.) Iowa 75 Meter, 3970, 1830 M-S, 1604, 102, 25, WA@VZH; Iowa 75 Meter, 3970, 2330 M-S, 1124, 31, 25, WA@ACX; Tall Corn, 3560, 0030/0400 Dy., 290, 99, 58, K@AZJ. Traffic: (Nov.) WA@AUX 171, K@AZJ 169, W@YLS 139, W@UPX 104, W@LCX 55, W@MOQ 51, W@NO 50, WA@KHF 13, W@LFF 13, WN@OKA 12, WB@AVW 9, K@MST 5, WA@TAQ 5. (Oct.) W@LCX 57, K@KQJ 6.

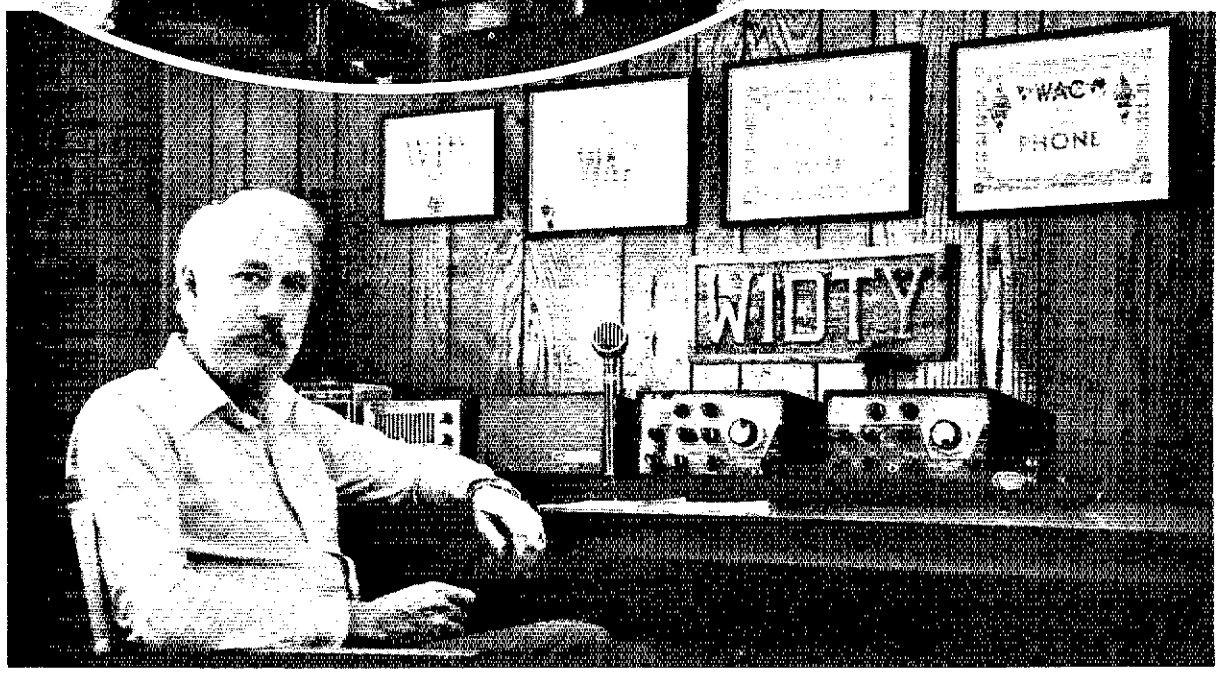
KANSAS: SCM, Robert M. Summers, K@BXF — SEC: K@JMF. RM: K@MRI. PAMs: WA@SEV and WB@BCL. VHF PAM: WA@EDA. Congratulations to W@NYG on becoming the new ARMY MARS Director for KS. Congrats also to WB@KWI on finishing up his DXCC. WB@CZR reports the Topeka gang activated the weather net in that area Nov. 29 and had 20 stations involved in cloud watching. Still a few stations sending in PSHR totals below the 40 count needed for publication, just a little more activity guys and you'll make it. Some of the original PON members have been QNI the Central States Traffic net, WA@OMB, mgr. reporting QNI 865 and QTC 43 for Nov. QKS — 465 QNI and 154 QTC. KWN QNI 739, QTC 189. KPN — 212 QNI, 21 QTC and KSBN 1035 QNI, 100 QTC. Year end report for Mid States Mobile Monitor Service

Many of our customers then are still our customers today...



Back in 1958, on the island of Okinawa, Jim Fisk, KR6JF, was operating his Drake Model 1A Receiver.

Today, Jim Fisk, W1DTY, is operating his Drake C-Line station at home in New Hampshire.



Long term stability means more than just equipment performance.
(*It also refers to people and companies*).

R. L. DRAKE COMPANY

DRAKE®

540 Richard St., Miamisburg, Ohio 45342
Phone: (513) 866-2421 • Telex: 288-017

See us at Dayton Hamvention

next month. K0JMF says we fell short of our 1000 goal of AREC membership this year. 1976, we'll make it. 754 members now and 114 drills and or nets in Nov. I got scolded for running over our space quota by the HQ so this is it. Traffic: (Nov.) W0HI 204, W0INH 152, W0FIR 129, W0CHJ 112, W0MRI 94, W0OYH 69, WB0HBM 63, WB0CZR 60, W0PB 60, WA0LBB 56, WB0LKA 47, WA0MLE 45, WB0KWI 41, WA0KVP 25, W0RBO 24, W0ULI 20, WB0OCK 16, W0MCH 11, K0JMF 9, W0KL 8, W0FCL 2, W0OWH 1. (Oct.) WB0GVR 37.

MISSOURI: SCM, B. H. Moschenross, WA0FMD — Asst. SCM/SEC: Cliff Chamney, K0BIX. K0LVR appointed EC for Linn and Livingston Cos. WB0DBW received MON net certificate and ORS appointment.

Net	QNI	QTC	Net	QNI	QTC
MOSSB	1269	67	MON2	84	34
MEN	491	27	SCEN	72	6
MSN	214	79	ST.LAREC	41	4
MON	170	109			

W0SIV and W0ENW held AREC alerts in connection with bad weather of late Nov. New pres. of W0EEE is WB0GRJ who is busy studying EE but finds time to work DX with new two-element quad. New officers of St. Louis ARC are K0DYM, pres.; W0EWD, vice-pres.; WA0KMF, secy.; W0RUR, treas.; W0UCK, W0KC, W0PVZ, dir. Ozark ARS is a new club in Aurora. WA0RVK is pres.; W0CKK, vice-pres. MO-KS Council of ARCs had their biggest turnout ever at their dinner, over 100 attendees. Congrats to PHD Amateur of The Month WA0UUK, and to WN0MUU on passing General. Thanks to the Western Electric ARC and K0JPR, the Lees Summit Emergency Operations Center is operational. Traffic: K0AEM 190, W0NUB 155, WB0HSP 139, W0OTF 105, WR0MEO 89, WA0FMD 86, W0GV 72, WA0GOA 70, K0ONK 52, WB0LMW 49, W0OUD 28, W0EPI 27, WA0EMX 21, K0BIX 17, WB0FKY 13, W0EEE 8, K0ENH 7, K0RWL 7, WA0MOF 5, WN0PLW 1.

NEBRASKA: SCM, Dick Dyas, W0JCP — SEC: WA0ASM. New appointments: WA0OHO EC Kimball Co; W0TQD EC Jefferson; W0ZUT EC Stanton; K0GND Zone Coord. for SE NE, and W0OXT EC Douglas. Adventist Amateur Radio Net (AARN) formed to assist 7th Day Adventist Church in its disaster operations by providing ready communications. During normal net time formal & informal traffic started on Jan. 4, 1976, Sun. thru Thurs. at 2330Z on or about 3980 Hz. Lincoln ARC held their annual auction. Nets: 160 Meter WX Net, QNI 270, QTC 168; NE Morning Phone, QNI 1172, QTC 99; Sandhills WX, QNI 193, QTC 8; Western NE QNI 471, QTC 5; Afternoon, QNI 432, QTC 18; QCWA, QNI 71; Cornhusker, QNI 1429, QTC 102; AREC Sun. Morning QNI 240, QTC 3; NE Storm 1, QNI 1287, QTC 17; NE Storm II, QNI 478, QTC 12; Eastern NE 2 Meter, QNI 486, QTC 22. W0HQQ moved AZ. W0FQB elected VP of Fire & Police Retirees Assn. W0JCP elected Vice-Director of Midwest Division. Traffic: WA0CBJ 67, W0VEA 54, W0GKK 42, W0JDJ 32, W0HOP 30, W0HTA 26, K0SFA 24, W0JCP 20, W0GEQ 19, W0FQB 16, K0JFN 12, W0MW 12, WB0MNK 9, WB0GAK 7, WA0GHZ 7, WA0HQQ 6, WA0QEX 6, K0MUF 5, WA0PCC 5, WA0JWQ 4, WB0GMQ 3, WA0LOY 3, W0NIK 3, WA0ONX 3, WA0EEI 2, W0IXB 1, W0RJA 1.

NEW ENGLAND DIVISION

CONNECTICUT: SCM, John McNassor, W1GVT — SEC: W1DGL. RM: K1EIR. PAM: K1YGS. VHF PAM: WA1ELA.

Net — Freq.	Time/Days	Sess.	QNI	QTC
CN — 3640	1900 Dy	60	302	260
CPN — 3965	1000 Su	31	468	256
	1800 M-S			
VHF-2 — 28/88	2130 Dy	30	335	114

High QNI: CN — W1CTI and W1EFW. CPN — W1NQO WA1IKN W1LUH and WA1RYL. SEC W1DGL extends thanks to all ECs for great cooperation during Nov. Nature II Exercise — a big success with full cooperation between RACES, AREC and MARS. Reports from WA1NGL WA1JYP WA1RXA WA1LMV WA1OPB and WA1RRZ. Director W1HHR appreciates Net Member assistance with his "Welcome to Amateur Radio" project directed to all new NE Division Amateurs. Unfavorable conditions cause curtailment of Late CN for winter months. CSN is QRT due to lack of QNI. Try NE Novice Net on 3720 at 1830 — also 15-Meter Slo Net on 21.155 at 2145Z. Hamden ARA Christmas Party. Club active in RTTY, EC Message procedure and Radio Class. ICRC 28/88 growing in membership and facilities. Meriden ARC active with Scout Jamboree promoting Amateur Radio. Congratulations to: K1VDF Extra Class; WA1URA General; WN1VTO & WN1VVA Novice; W1EFW High QTC; and ARRL for PR Tapes and Broadcast Band exposure! It should be obvious to all that NOW is the time to make the Public more aware of Amateur Radio — it is also the time to improve our skills to be sure each of us make the contribution by way of amateur radio that is expected of us. Keep that Radio Class going and be sure each Novice becomes General Class! Happy Valentines Day to all — 88! Traffic: W1EFW 347, WA1RZL 159, WA1GFH 147, WA1IKN 143, W1CTI 115, WA1RUR 90, WA1SQB 88, W1AW 73, WA1UNE 65, WA1STN 60, W1DGL 56, WB2NOM/1 55, K1YGS 53, WA1HLP 50, W1GVT 46, WA1RUS 40, WA1RZA 29, WA1OPB 24, WA1URA 23, WA1UAX 20, W1BDI 16, W1BDN 10, W1QV 10, W1EDH 9, W1KV 8, WA1TGE 7, W1CUH 5, K1MUJ 5, WA1RRZ 5, WA1HLP 4.

EASTERN MASSACHUSETTS: SCM, Frank Baker, W1ALP — SEC W1AOG received reports from WA1s RTR SXU KZT; W1BAB, K1s NFW CCW PAD. New ECs: W1PEX Lexington, WA1UWS also RO Dover, WA1AER Reading, WA1RCY Lowell, WA1TFH Dracut. WA1TWD new OVS. W1AYG endorsed as OO. K1IPU a Silent Key. K1UDI in Dover. W1WK spoke on tracking Oscar 7 at the South Shore Club, W1IHA is secy. W1CED WA1JHY retired. W1JLQ now in ME. W1MA W1JNV on 2m repeater. W1EJE now in FL. WN1WFA son of W1DGD. WA1KZT had AREC out for March of Dimes Walkathon from P-town to N. Truro. W1GNM/7 in AZ. W1BRI had his 50th anniversary. The 4 PMers had a luncheon at the Alamo in Abington. The Barnyard Net had a luncheon in Springfield. W1YOT teaching in NH. K1WYF working in PA, and on 40 mobile. W1RMT/WB4MNQ XYL Silent Partner. WA1ADG W1AMV in FL. EMRI had 281 QNI, 225 QTC. T9 Club met at Dan Fullers QTH. Massasoit & Whitman Clubs had annual banquet at Ridder Country Club. WR1ADR on a new all transis-

NEW!
FM144-10SXR-II

All Solid State-PLL digital synthesized — No Crystals to buy! 5KHz steps — 144-148 MHz-LED digital readout.

Introducing the standard of comparison for years to come. No other unit begins to compare with the superb engineering and superior commercial avionics grade quality and construction of the FM144-10SXR-II

INTRODUCTORY PRICE

$419.00

VALUE $599.00

Regulated AC/PS
MODEL FMPS-4R . . . $49.00

- **FREQUENCY RANGE:** Receive: 144.00 to 148.995 MHz, 5KHz steps (1000 channels). Transmit: 146.00 to 147.995 MHz. 5KHz steps (400 channels).
- **FULL DIGITAL READOUT:** Six easy to read LED digits provide direct frequency readout assuring accurate and simple selection of operating frequency.
- **AIRCRAFT TYPE FREQUENCY SELECTOR:** Large and small coaxially mounted knobs select 100KHz and 10KHz steps respectively. Switches click-stopped with a home position facilitate frequency changing without need to view LED'S while driving and provides the sightless amateur with full Braille dial as standard equipment.
- **FULL AUTOMATIC TUNING OF RECEIVER FRONT END:** DC output of PLL fed to varactor diodes in all front end R-F tuned circuits provides full sensitivity and optimum intermodulation rejection over the entire band. **No other amateur unit at any price** has this feature which is found in only the most sophisticated and expensive aircraft and commercial transceivers.
- **TRUE FM:** Not phase modulation — for superb emphasized hi-fi audio quality second to none.
- **FULLY REGULATED INTEGRAL POWER SUPPLIES:** Operating voltage for all circuits, i.e., 12v, 9v and 5v have independently regulated supplies. 12v regulator effective in keeping engine alternator noises out and protects final transistor from overload.
- **MONITOR LAMPS:** 2 LED'S on front panel indicate (1) incoming signal-channel busy, and (2) un-lock condition of phase locked loop.
- **DUPLEX FREQUENCY OFFSET:** 600KHz **plus** or **minus**, 5KHz steps. Plus simplex, any frequency.
- **MODULAR COMMERCIAL GRADE CONSTRUCTION:** 6 unitized modules eliminate stray coupling and facilitate ease of maintenance.
- **ACCESSORY SOCKET:** Fully wired for touch-tone, phone patch, and other accessories.
- **RECEIVE:** .25 uv sensitivity. **9 pole filter** as well as monolithic crystal filter and **automatic tuned** LC circuits provide superior skirt selectivity.
- **AUDIO OUTPUT: 4 WATTS**
- **HIGH/LOW POWER OUTPUT:** 10 watts and 1 watt, switch selected. Low power may be adjusted anywhere between 1 watt and 10 watts.
- **PRIORITY CHANNEL:** Instant selection by front panel switch. Diode matrix may be owner re programmed to any frequency (146.52 provided).
- **DUAL METER:** Provides "S" reading on receive and power out on transmit.
- **OTHER FEATURES:** Dynamic microphone, mobile mount, external speaker jack, and much, much, more. Size $2\frac{1}{8} \times 6\frac{1}{2} \times 7\frac{1}{2}$. All cords, plugs, fuses, mobile mount, microphone hanger, etc., included. Built in speaker.

Manufactured by one of the world's most distinguished Avionics manufacturers, Kyokuto Denshi Kaisha, Ltd.

AMATEUR-WHOLESALE ELECTRONICS

BANKAMERICARD

master charge

8817 S.W. 129th Terrace, Miami, Florida 33176
Telephone (305) 233-3631

for repeater. WA1CRI has all new Drake rigs. W1AEC & WR1ADR holding test drills on Mon. nights at 7 PM. WA1WER new in Dover. WA1UWS has 80m bazooka ant. W1UX says the Clearing House Net needs some Conn. & RI members. NEEPN had 98 QNIs, 28 QTC; Mgr. W1KKD appointed W1PEX as his deputy. EMRIPN had 111 QNIs, 25 QTC. WA7ETN/1 active on this net. K1PAD & WA1SXU started AREC net on 3896 for ECs to check into. W1NF has a sked with WA1LZK/MM. WA1PAZ is NCS on Tue. for EMRIPN at W1MX. WA1PAJ back on 6. W1BUF active on 2-meter fm and our EMRIN on 3660. WA1OAM is at Univ. of Mich. and on W8UM. WA1TMN has his Conditional. EM2MN had 73 QNIs, 26 QTC; on Fri. nites they are on Marlboro repeater 01-61 K1LCQ is NCS. WN1VUB new in Winchester. WA1TAM has HW-100 and a liaison of D1RN. The first and charter meeting of the new Lexington ARC was held; W1HWM, pres.; W1PEX, vice-pres.; WN1VDA, secy.; WA1MOP, treas.; K1NBQ, act. mgr.; assisted by WN1s STJ, TTV, TZO. meetings 2nd Sun. of month. WA1HON new EC for Lincoln, also RO. W1UF has sked with Dad, W2CSZ/WA4SYX in FL, visited YV5ANS PY1YP on a trip. WN1UGJ mgr. of Eastern Area Slow Net on 3710 says they have added a morning session at 1115 UTC. WN1TYX assisting. W1BNS has sked with WB2WRX on 2 on Sun. nites. Honeywell-Waltham Repeater Groups had auction. WA1EMN home from hospital. WA1TNY busy getting tower up at new QTH. Chelmsford ARA held its Christmas banquet. K1OJQ has a column in the Boston Globe on 2nd Sun. of month. WA1OJX presented a program on touch tone pad circuits at a MMRA meeting. W1BDU active on 20. W1HHR our Director spoke at the Quannapowitt RA. K1FMM EC-RO for Burlington has things well under way for any emergency. Traffic: WA1MSK 421, W1PEX 310, WA1QKD 155, W1UX 148, W1EIH 135, K1PAD 132, W1DMS 104, WA1SXU 88, WA1OWQ 58, W1EMG 54, WA1PQY 28, WA1TAM 21, WA1IFE 16, W1DMH 14, W1NF 10, WA1QAJ 7, K1LCQ 6, WA1PAZ 6, W1BUF 4, WA1OAM/8 2, WA1FNM 1.

MAINE: SCM, Ed Bristow, WA1MUX — SEC: WA1FCM. PAM: K1GUP. RM: K1MZB. ECs: K1CLF WA1NMW. Renewed ORS W1GU. Nets: NE Barnyard, QNI 870, QTC 16; ME Seagull, QNI 987, QTC 101. New in ME WA1VIO WA1VSH WA1VTI WN1VNG WN1VOD WN1VOB WN1VOU WN1VOX WN1VLD WN1VSR WN1VTN. Section on-air meeting 2nd Sun. each month 1500 local, 3,940 MHz, all section amateurs invited to participate. Hosstrader's Net back Sun. 1600 local 3,940 MHz, Oct. thru Apr. K1RQG & WA1IVB NCS. Code classes in progress by K1ZIL W1IXC & WA1MUX. WR1ACI WR1ADS & WR1AFC used in public service this month with K1CXW W1LCV WA1VTI W1VF W1LRZ WA1FCM VE1CL K1DTX WA1LZL K1AHD participating. OOTC NE chapt. had 97 at fall meeting in W. Scarboro. K4RO W1MPP K1YJE south for winter. W1MGP & WA1MXO had demonstration between W1YA (UMO) & N. Haven Community School for 40 students & teachers with assist from WA1VGC via WR1ACI to set it up. W1QXR W1VF & W1PWD power most fixed gear by wind power. WR1AGH up on Sugarloaf in spite of 90 mph winds: K1PMR K1DAP WA1GHD & W1VLU in attendance. Traffic: WA1FCM 246, WA1IOG 150, WA1JHT 55, WA1RDX 28, W1RWG 20, W1CTR 17, K1GUP 16, WA1MUX 12.

NEW HAMPSHIRE: SCM, Robert C. Mitchell, W1SWX — SEC: K1RSC. PAM: K1YSD. RM: WA1GCE. Endorsements: K1ACL as ORS, W1EUJ as OVS, K1RSC K1LMS K1RSO W1DUW WN1VKM WA1GBZ WA2DTN & W1SWX attended the NH Nets meeting at the ARRL Convention in Hartford. W6MZW/1 has a loop antenna for 160. The NHVT Net had 180 check-ins & 101 traffic. WB2JLT visited K1BCS. New officers of Derry ARC: WA1GFT, pres.; WA1EFX, treas.; WA1LNH, secy. The GSPN had 460 check-ins, 102 traffic, W1SX spin casting skill in great help for antenna work. WN1UAV passed his General. K1AC had a direct hit by lightning. The disintegrated antenna Ranger AC lines have been replaced. W1EHT reports NHEPN had 40 check-ins, 40 traffic. W1EUJ's new 144/220/432 & 1296 MHz antenna systems almost completed. Tom's original 160 foot towers were lost in last Apr's. storm. The Derry RC started Novice classes in Jan. & Feb. K1LMS home brew tower and four-element quad helped for 2 new countries in the WW DX contest. K1PQV visited W1UBG. Sid also reports the NHVT Net copy is rough. The Port City ARC W1WQM started General Class instructions on Feb. 11. Traffic: (Nov.) K1BCS 122, WA1GCE 72, K1PQV 72, WN1UAV 28, (Sept.) K1BCS 264, K1PQV 53, K1LMS 26, WN1UAV 11.

RHODE ISLAND: SCM, Ron Simonton, K1GMW — SEC: K1YDA. I would like to hear from you if you are interested in participating in Section AREC activities. K1YDA looking for EC candidates. W1GO preparing code practice material for transmission over WR1AFY 147.36 MHz. K5FPW/1 completed an outstanding year as pres. of the NCRC. A major communications support effort planned for the Tall Ships activities in Newport. Check with K5FPW/1 is you wish to help. The northern RI repeaters were moved in Nov. WR1ACE, Lincoln, frequency was changed from 16/76 to 34/94. WR1ADD relocated from the State House to Chopmist Hill, Scituate (elevation 820 feet) and changed frequency from 34/94 to 16/76. W1JFF reports Red Cross communications moving to two meters. The Section was well represented at the ARRL New England Convention in Hartford. K1ABR lectured on Auroral Propagation. WA1POJ K1LPA K1KYI W1JFF W1OAV and K1GMW were there. Fidelity ARC pres. is WA1QKD, many members upgraded during 1975. Appointments and endorsements: WA1POJ, RM; WA1KOO, OPS; K1QFD and WA1UPL, ORSs; WN1ULF, ORS II. Traffic: K1GMW 77, WA1RFT 21, WA1POJ 3.

VERMONT: SCM, J. H. Viele, W1BRG — SEC: W1VSA.

Net — Freq. Manager	Time(Z)	Day	QNI	QTC
VTSB — 3909	2300	M-S	527	80
WA1PSK	1230	Su		
Carrier — 3935	1300	M-S	370	14
W2DSK				
Green Mt. — 3932	2130	M-S	461	51
W1JLZ				
Vt. Phone — 3909	2130	Su	120	6
W1KKM				

Connecticut Valley Repeater Assn. held its first annual Ladies Day and BARC its annual Christmas party. WA1REL proud owner of one of the first HW2026. WR1AEA public service net is back on the air for the winter at 1600Z Sun. Congratulations to WA1PSK on his election as SCM. Next monthly report will be by

2 METER FM AND HF TOO . . .

HEADQUARTERS

ERICKSON

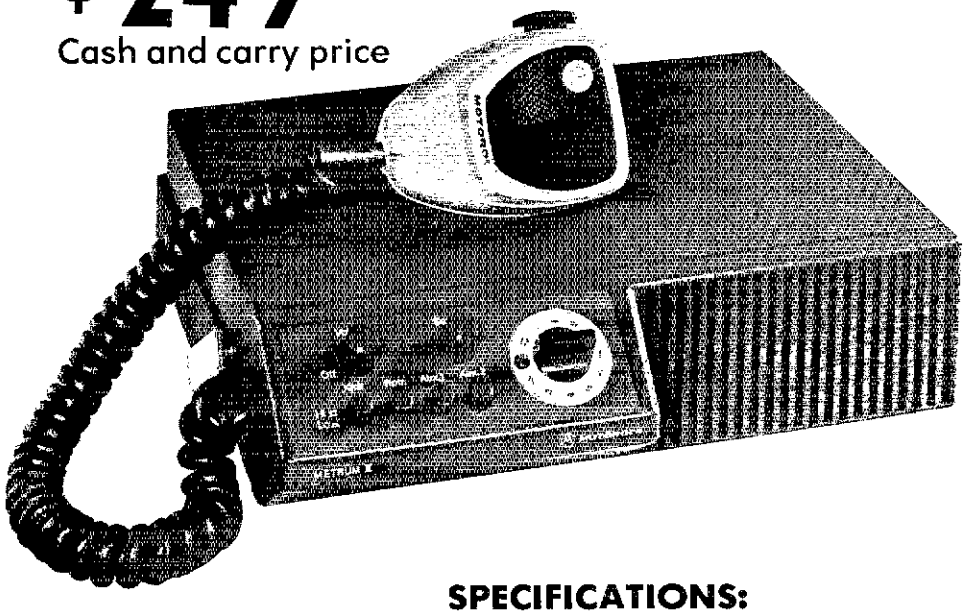
NEW STORE

GRAND OPENING SPECIAL!

MOTOROLA METRUM II

$249.50 (half suggested list!)

Cash and carry price



FEATURES:

- 25 Watts out
- Hot, selective receiver
- 12 channels
- Single crystal R/T
- PL provision built in

SPECIFICATIONS:

Transmitter Power: 1W/25W
Receiver Sensitivity: .2uV
Power Requirement: .3 A receive,
7.5 A transmit (25W)
Size: 2¾x11x9¼ inches

Optional PL, AC power supply and multiple repeater offset kits available

Ask for our very competitive prices on:

ASP
Atlas
CDE Rotors
Collins
Cushcraft
Data Signal
Dentron
Drake
Hy-Gain
Icom
Kenwood
Larsen
Mosley
Newtronics
Regency
Standard
Swan
TPL
Ten-Tec
Yaesu

Mail orders shipped UPS same day on receipt of cashier's check or money order. Mail orders add $10 for handling and shipping.

HOURS: 9:30 - 9 Mon. & Thurs.; 9:30 - 5:30 Tues., Wed. & Fri.; 9 - 3 Sat.

Open more than 50 hours a week to serve you better

ERICKSON COMMUNICATIONS, INC.

5935 North Milwaukee Ave., Chicago, IL 60646
(312) 631-5181

We Service What We Sell

him. My sincere thanks to all for their fine cooperation and support during my term in office. Traffic: WB2RKF/1 321.

WESTERN MASSACHUSETTS: SCM, Percy C. Noble, W1BVR — My address on page 6 all QSTs. Need info by 5th of each month. New OVS WA1HHN. Hampshire College ARC now on air as WA1WDU. The club also has Novice classes. W1YK (Worcester Tech.) now very active on CW & SSB nets (chief op. WA2CXY). W1DVW's Drake 2-meter rig was lifted from his car. Check with your insurance companies to be sure you have coverage! WMPN reports 20 sessions, QNI 246, traffic 51, different stations 51. WMN 30 sessions, QNI 138, traffic 111, different stations 16. WMEN 5 sessions, QNI 124 (including 3/7 from 2m repeaters), traffic 5. West. Mass. AREC group now up to 106, WMAREC (Mt. Lincoln 2m.) 20 sessions, total stations 32, traffic 17. See last month's QST for times of above nets. CMARA says month's speaker K1KQS. Six of Novice class group now ready for Novice exam. HCRA month's speaker W1HDQ. A half-hour question & answer ham broadcast was presented over WBNR. 12 new members during the month. MARC held very successful Chinese Auction and Flea Market. Mt. Tom says new Novice class starting at Easthampton Community Center. NOBARC Mt. Greylock Repeater still doing fine job. Mt. Lincoln repeater SCM congratulates them on their 5-day a week AREC and traffic net. Traffic: WA1MJE 163, WA1RLP 155, W1BVR 147, W1DVW 106, W1TM 75, W1KK 34, K1RGQ 20, W1YK 17, WA1DNB 13, WA1PLS 8, W1DOY 6, WA1TFT 5, WA1OLK 2.

NORTHWESTERN DIVISION

ALASKA: SCM, Roy Davie, KL7CUK — Propagation has really hurt AK this month with several days of no signals or so weak a QSO was impossible. KL7IS has prepared a very comprehensive report on 2-meter history in AK. He and KL7HAQ are carrying on two-way 2 meter QSO nearly every night between Fairbanks and Anchorage without the aid of a repeater. KL7CFX is active on AKN ASN $RDO and AK Pac. KL7GCH making a trip to the East Coast. KL7HMK reports he is smoke testing his H.F. transmitter. KL7HOV reports the ASN had 31 sessions, with a total of 614 check-ins. KL7JDO reports we now have 75 AREC members in AK with the ECs sending in AREC emergency plans from all areas. Good work guys and gals. Tony also very active on Oscar these days. Please listen for the South Eastern Area Emergency NET on 3920 daily at 0200 GMT, the roster is growing every day. Traffic: KL7GCH 19, KL7JDO 10.

IDAHO: SCM, Dale A. Brock, WA7EWV — SEC: W7JNH. PAM: WA7HOS.

Net — Freq.	Time/Dy	Sess.	QNI	QTC
Manager				
FARM — 3.935	0200 Dy	30	1039	26
W7TWZ				
IMN — 3.635	0230 M-F	20	182	61
W7GHT				
RACES — 3.99	1515 M-F	20		
K7UBC				
ID Silver — 3.93	0115 MWF			
W7IY				

W7WVD has become the 139th person to work all U.S. Counties. W7FHQ and WA7JFC will be /6 this winter. Canyon County Civil Defense already had their SET; participating were W7KDB K7MIY W7AHS W7SUV WA7YSO W7RKI K7IRY and W7DSU. K7TQM moving to CA. W7KDB has new IC 22A. Traffic: W7GHT 128, WA9KKR/7 120, K7NHV 35, W7GBO 9, W7KDB 2.

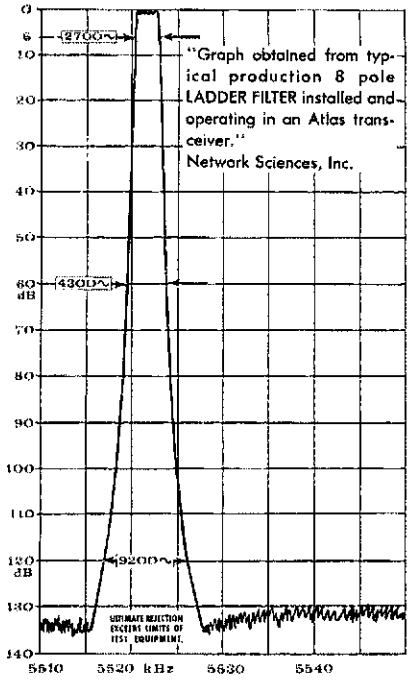
MONTANA: SCM, Harry A. Roylance, W7RZY — Asst. SCM: Bertha A. Roylance, K7CHA. SEC: WA7IZR. PAM: WA7PZO. Had a real good VHF meeting in Helena. W7LR received a Fellow Award from the Radio Club of America. Bob also has 173 countries and was active in the cw SS. Butte Radio Club had made several trips to WR7ABY and reports lots of snow and ice. Yellowstone Radio Club is raffling a TV to raise money for a new machine for WR7ADY. IMN reports 20 sessions, 61 QTC and 182 QNI. Sorry to report the passing of W7KWV. Traffic: W7TGU 53, W7NEG 21, K7BMT 8, WA7OBH 3, WA7PZO 3.

OREGON: SCM, L. R. Perkins, WA7KIU — SEC: W7HLF. RM: K7OUF. PAM: K7RQZ.

Net — Freq.	Time	QNI	QTC	Manager
BSN — 3908	0130Z	437	62	WA7MHP
OSN — 3585	0245Z	179	140	WA7TXV
AREC — 3993	0300Z	—	—	WA7NEQ
NSN — 3702	0300Z	274	110	WA7OCV
NUCLEAR — 50.250	9:30 AM	26	—	W7FFE

As you read this the new SCM is Dwight Albright, W7HLF. Please note address page 6. Dwight has done an outstanding job as SEC and will most certainly do as well as SCM. WA7SDI reports a grand time was had by all when Mid Valley ARC was hosted in Springfield by EARS. The program was provided by Mid Valley ARC. Salem ARC now starting to make plans for the OR State Fair ARS. One old timer tells me he thinks Amateur Radio is going backwards. Speech Processors and Overdriven Amplifiers will soon have SSB signals as BROAD as SPARK. When was the last time you looked at your RF envelope? Handbook shows what you should see. Poor band conditions? Maybe so, but the traffic totals above indicate the boys on cw are still getting through an hour later with no flattopping either, hi. SWAN SONG. Many thanks to all for having made the last two years most enjoyable and memorable for me. Traffic: K7IFG 454, K7QFQ 162, K7IWD 111, W7VSE 98, WA7IXV 96, K7NTS 75, K7OUF 73, WA7UJO 54, W7DAN 37, W7MLM 31, WA7QDC 26, W7LT 18.

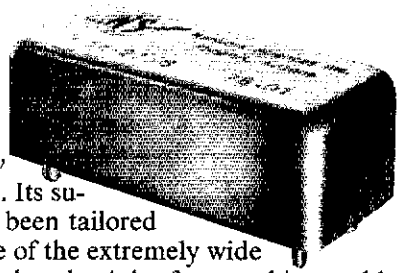
WASHINGTON: SCM, Mary E. Lewis, W7QGP — Asst. SECs: W7PWP, K7VAS. VHF PAM: K7GWE. RM: K7OZA. PAM: K7YRQ. Nets: NTN QNI 1746, QTC 85; WSN QNI 834, QTC 99; NWSSB QNI 582, QTC 53. Totals of traffic count and reports reflect the band conditions for Nov. WN7YXX & WN7BOB upgraded to Generals. Spokane ARC officers are K7EFB, pres.; WN7AVD, vice-pres.; WN7BOB, secy.; WA7OQS, treas.; WA7NUY WA7RVD & K7EAM, trustees. Lower Columbia ARC W7DG, have moved their club meeting place, contact WA7OMX or club members 147,90/30 or 63/03 for new location. W7HAD working traffic with new antenna plus Heath SB104 & SB230 linear. The Evergreen chapter of QCWA at a luncheon meeting Nov. 15, presented golden anniver-



Superior selectivity... maximum operating pleasure... You get both with the Atlas transceiver!

The selectivity curve above looks phenomenal, especially when compared with ordinary filters. What makes it even more phenomenal is that it is a *true* graph of the *overall* selectivity of the Atlas transceiver, not just a graph of a filter operating in a special test fixture under laboratory conditions.

THE SUPER SELECTIVITY of the Atlas transceivers is provided by an *8 pole crystal ladder* filter designed especially for Atlas by Bob Crawford of Network Sciences, Phoenix, Arizona. This filter represents *a major breakthrough in filter design with unprecedented skirt selectivity and ultimate rejection.* Its superior selectivity has been tailored to take full advantage of the extremely wide range of signal levels that the Atlas front end is capable of handling.



THE 6 db BANDWIDTH of 2700 cycles was purposely selected to provide audio response from 300 to 3000 cycles in both *transmit* and *receive* modes (it has been proven that transmission and reception of voice frequencies between 300 and 3000 cycles provides a substantial improvement in readability under noisy or weak signal conditions, as compared to narrower bandwidths). At the same time, the improvement in fidelity of voice communication is readily noticeable, and accounts for the constant reports of "broadcast quality" from Atlas transceivers. Unfortunately, many receivers with narrower bandwidths cannot fully appreciate the audio quality of the Atlas transmitter. It takes *2700 cycles of bandwidth* to get all of the quality, and the Atlas transceivers are among the few that have this ideal bandwidth.

SKIRT SELECTIVITY. The 8 pole ladder filter provides a bandwidth at 60 db down of only 4300 cycles (shape factor of 1.6) and a bandwidth of only 9200 cycles at 120 db down! No other filter that we know can even list their 120 db Bandwidth. Note that the Atlas filter is narrower at these levels than other filters, even though the others provide less bandwidth at 6 db.

ULTIMATE REJECTION is in excess of 130 db, greater than the measuring limits of most test equipment.

IT IS THIS EXTREMELY STEEP SKIRT SELECTIVITY, illustrated in the above graph, which rejects strong adjacent channel signals better than any other known receiver.

Combine this amazing selectivity with all the other features of the Atlas, such as: • Strong immunity to overload and cross modulation • All solid state design • 200 watts P.E.P. input • Total broadbanding with NO TRANSMITTER TUNING • Modular construction • Compact plug-in design (7 lbs, 3½" x 9½" x 9½"), and you quickly see why you get so much more operating pleasure with the Atlas 210x/215x.

210x or 215x	**$649.**
With noise blanker installed	**$689.**
AC Console 110/220V	**$139.**
Portable AC Supply 110/220V	**$ 95.**
Model DD6 Digital Dial	**$199.**
Plug-in Mobile kit	**$ 44.**
10x Osc. less crystals	**$ 55.**
Noise Blanker, for plug-in installation	**$ 48.**

For complete details see your Atlas dealer, or drop us a card and we'll mail you a brochure with dealer list.

ATLAS RADIO INC.

Ask the ham who owns one!

417 Via Del Monte • Oceanside, CA 92054 • Phone (714) 433-1983

sary awards to W7GND & WA7NPT and 60 year awards to W7CJ & K7RVJ. Section 2 presented W7OS with a 60 year award also. Congrats fellows. Do you want to start a chapter of QCWA, or a section meeting contact me. WA7QWG will be radio operator aboard the 71-year old Brigantine Explorer on the first leg of trip from Seattle thru Panama Canal to winter in British Honduras to arrive July 4 in Philadelphia for Bicentennial party. M.S. Brigantine Explorer is designated as WA State's official bicentennial ship. The ship's Captain has requested Amateur Radio station aboard. We Need Operators. Mt. Baker ARC supplied communications for motorcycle club's cross county race and also Pumpkin Patrol working with state patrol. Nov. 29 & 30 a heavy snow fall on top of an early deep snow pack and then Dec. 1, early AM snow turned to rain. W7PWP, EC for Lewis County, K7BCL, W7EBU, K7MGA thru 66/06 repeater maintained contact with Seattle, Olympia and other points. On Tue. Dec. 2 Snohomish, Skagit, Whatcom and parts of King County were also flooded, 28/88 repeater was main communication link as 80M was out. Amateurs who participated are too numerous to list. Many were not AREC members. Traffic: WA7BDD 62, W7APS 57, K7OZA 56, W7QGP 28, W7IEU 19, W7LG 19, W7BUN 14, W7PWP 14, W7KEI 9, W7AIB 6, K7EFB 4, W7AXT 2.

PACIFIC DIVISION

EAST BAY: SCM, Charles R. Breeding, K6UWR – Asst. SCM: Ronald D. Martin, W6ZF. SEC: WB6RPK Asst. SEC: WB6DSI. The newly elected club officers are starting to come in. For the Mt. Diablo ARC W6BSL, pres.; WB6HWT, vice-pres.; WA6BZG, secy. WA6OJT, treas.; W6RVC, EC WA6JUD and WA6JLF board. SARO, K6VY, pres.; W6JFA, vice-pres. W6SFW, secy.; W6CMZ, treas.; W6GIP, comm. mgr. Good luck to all. Four members of the Mt. Diablo ARC, WA6EKS WB6FMA VE2AQV/W6 and WN6AEO spent two hours in a question and answer radio show on Clayton Valley HS FM station KDHS. All did a very fine job of PR and selling of Amateur Radio in the Diablo Valley. WB6WAI has a new HW202 going. He has found repeaters a new world. W6GIP and W6ZF are getting ready for low power, low freq. 180 kHz circuit between each other. WN6LMU has been working on a shunt feed system on his tower for 40 and 80 meters. W6AXE has been in the hospital. We all hope for a speedy recovery. Out of the hospital and back at hamming is K6OKO. K6MIS now active on the Vallejo Net. WB6DHH reports he is now active on 160. K6HVU has passed his Advanced. Traffic: K6HW 431, W6TYM 333, WA6IPI 197, W6JXK 108, WA6CAZ 8, WA6BMV 6.

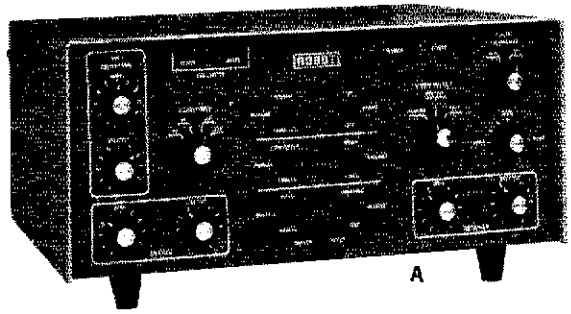
NEVADA: SCM, John D. Weaver, W7AAF — New SNARS officers are WA7ANA, chmn.; WA7KCD, vice-chmn.; WA7MOD, secy.-treas.; W7IEZ and K7INK, dir.; WA7EGT and W7DDK, pub.; WA7KQS, trustee. SNARS Dec. meeting and Christmas party held Dec. 12. Guest speaker WA6ESA. WA7WYF renovating coax and antenna system. WA6INF received his 30 wpm endorsement and is studying for commercial exams. W7ILX getting a new AN/UGC-6 for MARS RTTY nets, then will use his Model 28 for HAM bands. WB7WMZ has new SB104. WA7LBP elected V.P. Net Mgr. for WPSS. WA7DIA has two new MOTRACS, one on two meters and the other on 450. WA7ZZZ has new ZZZ license plates. W7GDY moving to CO. W7PXF has new Genave and a new house. Keep sending in your reports. Traffic: W7ILX 130, K6MQX/7 5.

PACIFIC: SCM, Pat Corrigan, KH6GQW — SEC: KH6GMP. RM: KH6IQU. ORS: KH6JAQ. Don't forget ARRL DX Contest this month and next. Also, the Bicentennial WAS should be of interest to Pac. Section. See details in Jan. QST. Hon. DX club was honored to host WA9UCE at a Dec. meeting. Jim brought the slides, films & tapes of the Kingman Reef DXpedition. A recent article by KH6IJ in Hon. newspaper had a couple of misleading figures: Pac. Division may have 45,000 licensed hams (there is some doubt about that figure) but only 6500 are ARRL members and eligible to vote. Pacific Section (the name changed more than 6 months ago) has 10% of the Div. members not 2% and indeed can affect balloting results. W1ZPB/KH6 (ORS) is now using 120-ft. long wire but still QRP. He nonetheless makes all traffic skeds. KH6JEU got his 20-meter beam up and is much louder on WPTN. KH6ILR now on Section Net. 160m condition good for test. KH6IKB gone to New England. Traffic: KH6IQU 539, KH6GQW 71, W1ZPB/KH6 52, KG6JES 51, KH6IAC 26, KC6DK 25, KH6BZF 2, KH6GMP 2.

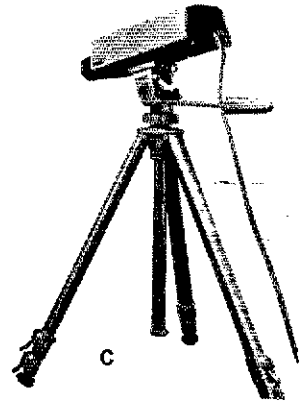
SACRAMENTO VALLEY: SCM, Norman Wilson WA6JVD — SEC: W6SMU. Named by the ARRL pres. to the Repeater Advisory Committee is W6GO. W6NJU continues with the DX Committee. I regret to note the passing of W6HSB. Jack left a 100% ham family to continue the tradition. The North Hills RC was visited by W6OAT, SCM SF, who gave a presentation on the Kingman Reef DXpedition. Welcome to WN6EQR, a new Novice in Chico. W6DEF is now an SV ORS and is busy putting up antennas at his new QTH. K6KWN has again migrated to S. CA for the winter. WA6JVD has a small 450 MHz log periodic beam. K6QIF reports excellent coverage from WR6AEN (146.31-91) located in his back yard and was ready for the SET. WA6HAR conformed to Davis' new antenna regulations and operated the Sweepstakes with dipoles at 35 feet. K6HTM's zeal to work more DX has driven him into getting his Ph.D. in French. Congratulations Dr. Bird. Traffic: W6RSP 15, WA6ORW 13, W6DEF 11, WB6TWQ 2.

SAN FRANCISCO: SCM, Rusty Epps, W6OAT – Congrats to K6TP as new pres. of NPEC; to WB6EKV pres.; WA6RNF, vice-pres.; WA6KWN, secy.-treas. WA6CWL, board of dir. for SCRA; W6FCQ, pres. WA6MGK, vice-pres.; K6PF, secy.; K6JQX, treas. of MARC; W6URA, vice-pres.; WA6DJI, secy. of CCRC WB6GHA, pres.; W6GFK, vice-pres.; W6SOU, treas. W6OZA, secy.; W6UIG & WA6TQW, ex-comm of Geo. Ladd PRC. Also congrats to W6ZRJ on re-election as Pac. Div. Dir. and W6UF/WA7LRU as Vice Dir. K6MUP new EC for Sonoma Co., WB6BWC new EC for SF Co. We still need an SEC and ECs for Marin and Del Norte — volunteers? WB6BDL again made PSHR in Nov. Good luck to WA6BTF on new job in OR and to W6RNF on new medical practice in SCV. With help from HARC, College of the Redwoods (Eureka) will start courses in Feb. aimed at qualifying individuals for ham tickets. MARC's radio classes are drawing 40 prospective WN6s. Nice to see so many SF Section stations in SS. WA6AUD W6BIP WB6BLA K6TP and W6URA were SF luminaries seen at Pac. Divn Director's meeting. W6FFQ & W6FFS are new SFRC


B


A

SSTV IS EASY!


C

Model 300 SSTV Scan Converter (A)
Displays amateur standard 128-line SSTV pictures on any size standard TV monitor. RF or video (CCTV) input. Holds pictures for up to 10 minutes. Frame grabs ("freeze motion") from any standard CCTV camera; converts to SSTV for transmission. Features: video reversal, partial frame, manual or auto frame grab. Includes 256-line (double resolution) SSTV mode (send and receive). All station interconnections: receiver (speaker output), microphone, transmitter (mic input), tape recorder, phone line. Requires TV monitor for display, TV camera for frame grab. All solid state except scan converter tube. $995.

Setchell-Carlson Model 10M915 CCTV Monitor (B)
Ten inch diagonal CCTV monitor with front-panel access to operating controls: brightness, contrast, height, linearity, focus. Regulated supply, 2% linearity, all solid state except CRT. Use this or any other TV monitor with Model 300. $225.

RCA Model TC 1000 CCTV Camera (C)
Compact CCTV camera 2/3" vidicon, with 8000:1 automatic light compensation, 10 grey shades, two tripod mountings, rear-panel adjustment of vidicon carriage for close focus. Includes 16mm f/1.6 C-mount lens. Use this or any other CCTV camera with Model 300. $260.

Model 70D SSTV Monitor
Receives and displays amateur standard 128-line or 256-line SSTV pictures on six-inch (diagonal) P-7 (radar) screen. Also displays Model 80A SSTV Camera's fast-scan video picture for easy set-up and focus (Viewfinder mode), and demodulated SSTV waveform (oscilloscope display) for aid in receiver tuning or SSTV camera adjustment (Video-Graph mode). All station interconnections: receiver (speaker output), microphone, transmitter (mic input), tape recorder, phone line. With tape player and SSTV tape recording, the Model 70D alone provides for complete two-way SSTV station operation. All solid state except CRT. $445.

Model 70C Basic SSTV Monitor
Identical to Model 70D, but without Viewfinder or Video-Graph modes. Add these features at any time with Viewfinder/Video-Graph Kit (below). With tape player and SSTV tape recording, the Model 70C alone provides for complete two-way SSTV station operation. All solid state except CRT. $345.

Model 80A SSTV Camera
Generates amateur standard SSTV pictures and fast scan video for Viewfinder mode. High resolution 1" separate mesh-vidicon. Controls for contrast, brightness, SSTV signal level, black/white video reversal, partial frame operation. Provision for adding automatic light level control (ALC) with ALC Kit (below). All solid state except vidicon. For use with Model 70C or 70D. Requires suitable C-mount lens. $345.

Lenses (C-Mount)

Lens	Focal length mm	Min f stop (all 22 max).	Min focus (inches)	Price
A	12.5	1.9	10	$ 75.
E	25	1.4	6	$ 65.
F	50	1.9	42	$ 85.
H	18–108	2.5	48	$230.

All lenses fit either Model 80A or any CCTV C-Mount Camera.

Other Accessories
Viewing Hood: Two piece detachable hood to block outside light. Fits Model 70C or 70D. $45.
Calibration Tapes: Reel or cassette audio SSTV tape recording aids setting monitors to SSTV standards. $5.

Kits
Viewfinder/Video-Graph Kit: Updates any 70-series monitor to include Viewfinder and Video-Graph modes (see 70D above) Factory installed $145. Kit $99
Monitor 128/256 Kit: Adds 256-line SSTV picture receiving capabilities to any 70-series monitor. Includes vertical sweep manual reset. Factory installed $55. Kit $25.
Camera ALC Kit: Adds automatic light level control (ALC) to any 80-series SSTV camera. Manual mode remains selectable. Factory installed $55. Kit $25.

If you're a licensed amateur radio operator and you know how to work a 35mm camera, you have all the technical training necessary to work slow scan television on amateur radio. The impression that you had to have advanced technical training goes back to the pre-Robot days when you had to build your own equipment. Actually, all you need to get started is our Model 70C basic SSTV Monitor. And it's simplicity itself. With either the Robot 300 Scan Converter or our Model 70C (or D) Monitor and Model 80A Camera, you simply plug the Robot equipment into your station, tune to the SSTV portion of the band, make contact with another SSTV station, and you are in SSTV. Send us a card, and we'll be happy to send you the complete SSTV story.

SSTV IS EVERYWHERE

At last count there were over 3000 SSTV stations in operation in over 100 radio countries, and the list is growing rapidly. Making contact on the SSTV frequencies is easy. Write for a copy of our 1975 "Directory of SSTV Operators," or tune in to 14.230 MHz. SSTV operators are happy to rag chew about this exciting new activity.

SSTV IS INEXPENSIVE

Compare the price of Robot SSTV equipment with the cost of a good linear amp, RTTY, or Transceiver and you'll see it really costs no more to operate SSTV, and you're involved in the newest, most exciting and rewarding development in amateur radio. Choose from our new Model 300 Scan Converter, or our popular Model 70C or D Monitor and 80A Camera.

30 DAY 100% SATISFACTION OR MONEY BACK GUARANTEE

There's absolutely no financial risk with Robot SSTV equipment. If you order our equipment, and find you don't like it, or don't like operating SSTV, just return the equipment to us, and we'll refund the complete purchase price immediately.

Please send me the following:
Complete information on Robot SSTV equipment.

- ☐ **Model 70C Basic SSTV Monitor**
- ☐ **Model 70D SSTV Monitor**
- ☐ **Model 80A Camera**
- ☐ **Model 300 Scan Converter**

ROBOT

ROBOT RESEARCH, INC.
7591 Convoy Court
San Diego, CA 92111
Phone (714) 279-9430

Name_____ Call_____
Address_____
City_____
State_____ Zip_____
Use your BankAmericard or Master Charge.

members. W6EAJ using water power to run his 160 meter rig. K6SRM back on 75 with new ant. Traffic: (Nov.) W6RNL 170, W6IPL 146, K6TP 139, W6NL 78, WB6BDL 40, WB6UPV 28, W6GGR 8, W6OAT 1. (Oct.) K6TP 158.

SAN JOAQUIN VALLEY: SCM, Ralph Sarovan, W6JPU — The Bakersfield RC boasts 72 members and still growing. K6RGZ experimenting with various antennas. WA6FZF on 2 meters fm. W6WZM and XYL recent visitors in Russia. WA6FVI now General class. K6OZI has a triband beam up 65-ft. W6YKM has new QTH. The Stockton VHFers are working on a 220 MHz repeater. WA6EXV made his first EME contact on 432 MHz. K6MBL and WA6EXV worked over 100 miles on 3300 MHz. K6PKO and WA6NRV have Yaesu FT620B 6-meter transceivers. WB6RLX has an ICOM 22A. WB6HQU has a Multi 2000 2-meter transceiver. W6QKP passed his Advanced Class exam and now putting up some beams. WB6QDN and WA6YAK has a TR22. W6ZNX building an amplifier using a 3-1000Z tube. WB6OSH in England operating as G5BOZ, is on 2 meters fm. WA6RXI busy handling traffic. W6YKS was in the SS contest. K6OZL has 100 confirmed on 80 meters. WB6EHH operating on 15 and 20 handling phone patch traffic. W6PXP an Extra Class licensee. K6RAU conducting code practice on 3845 kHz at 6:45 AM. WB6JDG is heard on 2 meters fm. The Fresno ARC will hold their Hamfest on May 1-2, 1976 at the Holiday Inn. Traffic: WA6RXI 52.

SANTA CLARA VALLEY: SCM, Jim Maxwell, K6AQ/W6CUR — SEC: WA6RXB. RMs: W6BVB W6RFF W6QNB. Watch the ARPSC column in QST for further info on the important new post of regional emergency coordinator. SSB activity on 2M has bloomed to the point that the No. CA SSB Net is no longer needed to stir up activity. It has therefore been disbanded, reports WB6JNN. Congrats to W6ZRJ and W6UFW, our Pac. Div. Director and V. Director, respectively, for the next two years. Ex-Vice-Dir. W6VZT is considering some 1296 activity to fill up his new-found spare time. New officers for the San Mateo RC: K6EER, pres.; W6CBN, vice-pres.; WA6FXC, secy.; W6UQ, treas.; W6PCP, act. chmn. WB6YIN has been heard tapping on NCN. W6RSY reports KH6IQU has taken over from KH6tAC as main traffic outlet to and from KH6. Congrats to W6AUC and brothers W6BEU and W6JAO, all of whom will receive a QCWA 50-year certificate in Feb. WA6SDJ now QRV from a new San Mateo QTH on 2M. The Oak Grove High School RC (San Jose) participated in a Bicentennial Festival in Dec., sez WB6ESF, with lots of good public contact. The Lockheed ARC is in the middle of converting 300 surplus paging units to 2M, under the guidance of WB6VPI and WA6GYT. Welcome to new Novices WN6EQS and WN6CPC. 22 showed up for a Santa Cruz breakfast rundown by WA6DVY and WB6PEC on the new Tree and Sea repeater WR6AJB. The Santa Cruz AREC FM Net meets every Mon. on 146.52 at 7:00 PM. The club election season continues with new SCCARA officers W6ZM, pres.; W6JTR, vice-pres.; Bob Hudgens, secy.; K6LHQ, treas. The Santa Cruz club will be under the guidance of W6GML, pres.; K6QJZ, vice-pres.; WB6RWU, secy.; W6EJ, treas. SEC WA6RXB will be the chmn. for the next Pacific Division Convention to be held on Labor Day week end some place in the San Jose area. Any ideas of volunteers will be welcomed. K6CU will be heading up a Novice class for SCCARA this coming spring. Traffic: (Nov.) W6RSY 738, W6YBV 308, W6RFF 145, W6NW 144, W6AUC 73, W6BVB 47, W6OII 16, WA6HAD 7, WN6EQS 1, W6KZJ 1. (Oct.) WA6HAD 6.

ROANOKE DIVISION

NORTH CAROLINA: SCM, Chuck Brydges, W4WXZ — SEC: W4EHF. PAM: W4OFO. VHF PAM: K4GHR. RMs: K4MC WB4ETE. EC of the Month is K4IOF covering the hills of McDowell, Mitchell, Rutherford and Yancey counties so if you reside in this area please contact your EC. W4DW/4, under the Raleigh ARS banner, ran traffic for the citizens of Lizard Lick. New officers for Cape Fear ARS (Fayetteville) are K4KMZ, pres.; WB4JVI, vice-pres.; W4WMZ, secy-treas.; WB4AKC, recorder. CFARS also reports a new repeater and invites callers to WR4ANN on 31/91. WA4KWC working new countries on 15 meters. Shopping mall demonstration stations continue at Raleigh and Fayetteville. WA9NEW/4 informs that 4RN daytime SSB is running on 7240 at 1800Z and 3935 at 2100Z, please check for NC traffic. WB4OXT finished new dipoles for 80/40 cw. Brightleaf ARC will issue a Bi-Centennial award, details will be out shortly. BARC also communicated for a Bike-A-Thon using W4NXY W4OMW WB4PAC WA4EPU WB4DOO and WB4NNJ. New officers for the Carolinas-Virginia Repeater Assn. are WA4PEN, pres.; WA4UQC, vice-pres.; K4ARO, secy.; K4CAW, treas. Grandson of K4CHU (age 14) WB4CCL passed General and Advanced, congrats! Greensboro repeater WR4ANP (147.72-12) now assisting local broadcast station WCOG with reports on unusual weather, severe traffic problems and emergency reports to prove that CB is not the only radio bunch around. During Canadian postal strike the Cary ARC volunteered, through a newspaper article, to send messages via our hobby. Raleigh ARS featured W4WCG in the RARS News and boasted of membership passing the 130 mark. Thanks for the fine traffic reports with 23 stations reporting their labors. Finally, our sympathy to the family and fellow amateurs of W4SJD, Roanoke Rapids, now a Silent Key. Traffic: (Nov.) K4GCN 274, W4OFO 134, WA9NEW/4 128, WB4PZU 83, WA4SNC/4 69, K4EZH 60, K4FTB 49, WB4MXG 47, K4FOY 44, WB4KHZ 44, W4DW/4 43, W4WXZ 40, W4WWR 39, K4MC 35, WB4OXT 31, W4FMN 30, WA4KSO 25, K4VHO 24, W4ACY 8, K4KH 8, K4TTN 4, WB4CES 3, K4DJ 2. (Oct.) K4EZH 43, W4EHF 10.

SOUTH CAROLINA: SCM, R. H. Miller, WA4ECJ — SEC: W4ZMZ. RM: WB4OBZ. The SC Distribution System, a grass-roots extension of NTS, has become a remarkably successful operation, due to enthusiastic support of participating nets and repeater groups. With Palmetto Traffic Exchange (PX) serving as common market-place for reps from other nets, it introduces concept of organized liaison, a basic ARRL principle but hitherto unknown in this Section. Even the staunchly independent SSBN is using it to advantage, for PX has daily contact with both 4RN and 4RN(D), the latter a daytime phone operation. Your group too, can benefit by grabbing a piece of the action. Just send a rep on regular basis to PX on 3900 at 6:40 PM. System also includes SC Novice Net, with liaison to PX and CN furnished by Generals and higher. Your help is really needed here, for laborers are few. Contact WN4UKU, our first Novice ever to become

HAVE I GOT A NUMBER FOR YOU! !

Toll Free

800-325-3636

Call

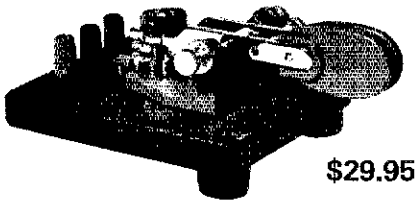
HAM RADIO CENTER ST. LOUIS

FOR NEW & USED
AMATEUR RADIO EQUIPMENT

We Trade on New or Used
Charge it on Master-Charge or BankAmericard

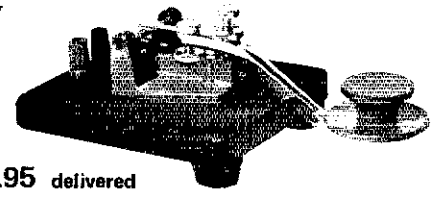
THE HAM-KEY

NOW 4 Models



$29.95 delivered

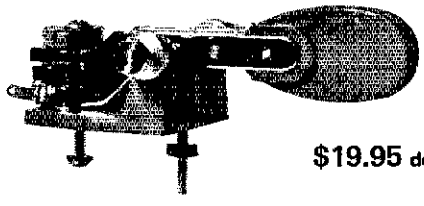
Model HK-1
- Dual lever squeeze paddle
- For use with all electronic keyers
- Heavy base with non-slip rubber feet
- Paddles reversible for wide or close finger spacing



$16.95 delivered

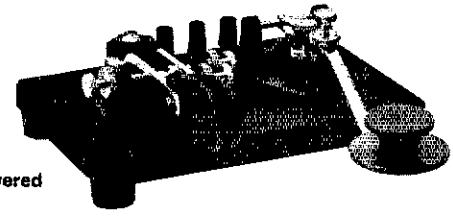
Model HK-3
- DeLuxe straight Key
- Velvet smooth action
- Heavy base with non-slip rubber feet.
- No need to attach to desk

All keys are completely adjustable
All plastic parts Hi-Impact styrene
All have color coded binding posts



$19.95 delivered

Model HK-2
- Same as HK-1, but less base for those who wish to incorporate in their own keyer



$44.95 delivered

Model HK-4
- Combination dual lever paddle and straight key on same base
- Straight key may be used conventionally or as a switch to trigger a memory

HAM RADIO CENTER INC.

8342 Olive Blvd., P. O. Box 28271
St. Louis, MO 63132

mgr. of an Official NTS Section Net. OVS K4GL and WB4NBK working real DX on 2 and 6 meters. K4JLM advises Palmetto Chapter QCWA now has 54 members. Nets: CNE 174, CNL 96, PX 72, SCNN 24, Traffic: WB4OBZ 253, W4NTO 106, WA4DAX 25, K4JLM 11, WA4ECJ 18.

VIRGINIA: SCM, Robert L. Follmar, W4QDY — SEC: WA4YIU. Asst. SEC: WA4PBG. PAM: WB4YKM. RMs: W4SHJ 4RN, K4IAF VN, WB2VYK/4 VSN. Net totals VSN (Nov.) sessions 30, QNI 333, QTC 131, QTR 788. CVN 2 Mtr. net: sessions 30, QTC 79, QNI 464. On Dec. 3 the SCM was guest speaker at the quarterly meeting of the Hampton Roads Repeater Assn. & on Dec. 4 spoke at the Norfolk Technical Vocational Center which hosted a class of 10 Novices who completed 66 hours instruction under the direction of WA4BUE. Ye SCM presented the diplomas & took pictures of the class. On Dec. 6 also visited the VSN Mgr. WB2VYK/4 & OM WA2TPV/4. We discussed the training aspects of the VSN. 1st VP ARRL W4KFC took part in Phone & CW SS also attended New England Div. Convention in Hartford. WA4EPJ really turning to in VSN, VSBN, VN & 4RN. Also got a Model 15 running on RTTY. During Sept. Farmville Fair station KF4FCF was operated by K4IXL WA4NEL K4VWK W4WWO and SEC WA4YIU. It was well accepted by the public and they even picked up a bunch of prospective Novices. HI. K4FEL back on the air with 80-meter dipole and a class of 3 Novices reported by WB4FQT. W4WWD reports newly formed Southside Amateur Radio Assn. officers: W4WWD, pres.; WA4YIU, vice-pres.; K4VWK, secy.-treas. First project Novice class thru Central VA Community College. W4LXB working with house power but using car whip! The Univ. of VA ARC is back at the grind after a nice summer. W4YZC says: plenty to do around new QTH, keeps me busy; NVRC now has several members of disaster assessment team to assist Red Cross, also gave WN4DDK his Novice exam. FB Bud! W5VZO/4 presently negotiating with Fairfax Co. zoning board over antenna locations & heights. WB4FLT passed his Amateur Extra. FB Jim! EC WB4WUX again back on cw. WA4CGX shows participation in 6 nets. He is running a Drake T-4X, R4C SB-200 TH3MK3 Inverted Vee 80 thru 10 & 39/97, 19/79 2 meters, also 120 phone patches! The Daytime session of 4RN (D4RN) now meeting at 4 PM local time on 3947 kHz. We need your cooperation to make this net a success. Make it a point to check into this net with your traffic! WA4KKP passed his Advanced & acquired a new SB-200. WA4HUB rig is broken. W4HU participated in the Nov. 8 FMT, FB. K4DHB reports QSOing the ZF1TW DXpedition. County hunter W4JUJ needs 39 more to complete all counties. He has also completed 37 states. K4GR has rig problems. Traffic: (Nov.) WA4VFW 426, WA4EPJ 327, W4QDY 190, W4UQ 158, W4YZC 125, WB4DZL 112, W5VZO/4 92, WB4KIT 85, K4KNP 74, K4JM 69, WB4FLT 66, WA4YIU 49, WA4AJF 41, WB4WUX 40, WA4PBG 37, WA4JVO 34, W4LGM 34, W4SUS 32, WA4JVO 29, K4IAF 28, W4SHJ 27, K4KA 23, WB2VYK/4 22, K4VWK 21, WA4CGX 18, K3DSQ/4 17, W4TDN 15, WB8MKL/4 14, K4FEL 14, WA4HUB 13, WA4KKP 13, W4WWD 10, W2TPV/4 8, WB4DFT 6, W4KFC 6, WB4YXN 4, W4HU 2, K4DHB 1. (Oct.) WA4JVO 29, K4FEL 14, W4WWD 11, W2TPV/4 9, W4LXB 5. (Sept.) KF4FCF 223, WB4DZL 134, W4LGM 17, W4WWD 16. (Aug.) W4WWD 14.

WEST VIRGINIA: SCM, Kay Anderson, W8DUV — State Amateur Radio Council sponsoring a Bi-centennial QSO Contest beginning Jan. 1. WV stations using new centennial call signs will receive 1 point for each U.S. contact, 2 points if QSL card is received. Contest ends June 30 and award will be made at annual State Convention at Jacksons Mill. MARA invited the SCM to visit club on Nov. 15 and will hold Christmas party on Dec. 6. TARA (Huntington) had successful transmitter hunt on Nov. 28 in spite of cold weather. Mid-day net had 643 check-ins and 118 messages. WV Phone net participation was 985 stations and 114 messages. WVN-cw had 197 check-ins; 69 messages. RM, W8HZA wishes every one had 160-meter rigs! Traffic: (Nov.) WB8DQX 65, W8HZA 62, WB8IIT 55, W8SQO 31, W8CKX 26, WB8QYN 24, W8EUE 23, W8JWX 19, W8FZP 18, K8QEW 8, WB8UCH 8, W8DUV 6, K8ZDY 5, WB8CPU 5, WB8CNN 5, W8DYB 5, WA8POS 5, WA8RUZ 5, K8IXO 4, K8LSN 4, WA8MRK 4, WB8DXF 3, W8ETF 3, WB8NSL 3, W8JM 2, W8QEC 2, WB8SAW 2, WB8OSM 2, K8CFT 2, W8HIC 2, K8NNK 2. (Oct.) W8SQO 47, W8JWX 34.

ROCKY MOUNTAIN DIVISION

COLORADO: SCM, Clyde O. Penney, WA@HLQ — SEC: K@FLQ. RM: WB@HCK. PAMs: K@CNV WA@YGQ. K@SPR continues to serve as asst. NCS for CTN(D). Interest in the CO Chapter of the 10-X Centennial Net continues to grow each week. The net meets four times each week on 28.625 MHz as follows: Tue., Thur., & Sat. at 6:00 PM local time, and Tue. at 8:00 PM local time. All amateurs interested in 10-meter operation are invited to check in as often as possible, to enjoy the fellowship, and to begin earning points toward a 10-X No., Centennial No., Senior Award No., and many more awards, plaques, etc., which are available to members. Congratulations to WB@MRU who recently received his General Class ticket. Newly elected officers for the Denver Radio Club are, K@HRZ, pres.; WB@HWQ, vice-pres.; WB@IWL, secy.; WB@HWP, treas. Columbine QNI 1136, QTC 63, informals 203, time 1418 minutes. Traffic: W@WYX 1390, WB@QOT 567, WA@YNP 218, W@ETT 192, W@HXB 148, K@QIX 82, W@INS 70, WB@NOH 65, WB@BAL 54, W@LAF 49, WB@PVT 39, K@OTU 38, WA@TMA 29, K@SPR 28, K@WZN 26, WA@YNQ 24, W@PGX 23, WB@IZO 18, W@MYB 15, WN@MCL 12, W@PT 12, WB@DUM 10, WB@ELD 6, WA@WWO 6, WA@DFM 5, K@FLQ 5, WB@LFQ 5, WA@YED 5, K@CNV 4, K@STX 4.

NEW MEXICO: SCM, Edward Hart, Jr., W5BE — Asst. SCM: Joe T. Knight, W5PDY. SEC: W5ALR. PAMs: W5PNY W5DMG. RMs: W5UH K5KPS. Southwest Net (SWN) needs more active representation. They operate on 3585 kHz at 1915 daily. All check-in stations will be answered by the net control at the same speed or slower than the station checking in. SWN handle 187 msgs., 195 check-ins. NM Road Runner Net (NMRRN) meets daily on 3940 kHz, traffic total 47, 983 stns checking in. WB5KSS moved to a new location, now back in full operation. W5HRS had fun with 2-meter mobile travelling but now back in Sterling Co. with call WB@PVT. Great interest has been shown by many RCs in WX stations such as installed by the cooperating RCs of Albuquerque (see page 97 Dec. 1975 QST). Two rescues were made

Automatic/Manual 10-band switching 30-76 MHz. AS-1729/VRC Omnidirectional, vertically polarized center-fed mobile antenna.

The AS-1729/VRC is built to MIL-A-55288B (EL) specifications. It is fully compatible with all military radios in a 10-band spectrum from 30 to 76 MHz and with all previously manufactured AS-1729 equipment.

Band switching is automatic when the antenna is connected to a transceiver with automatic band switching. When connected to other receivers or transceivers, bands are switched by operating a manual control on the base matching unit.

The AS-1729 is designed for installation on all mobile military equipment, including jeeps, tanks, APC's and weapons carriers, with a minimum of downtime. The base/matching unit interfaces to the vehicle using only four bolts and an included gasket. It is also well-suited for shipboard use.

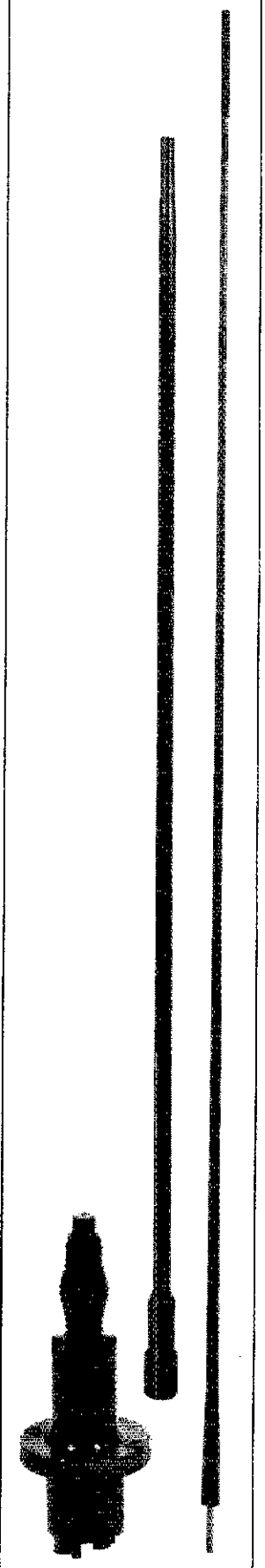
The AS-1729/VRC consists of three interdependent assemblies: MX-6707/VRC Base Matching Unit with spring cable assembly; AS-1730/VRC Lower Antenna Element; and AT-1095/VRC Upper Antenna Element.

SPECIFICATIONS SUMMARY
AS-1729/VRC, Hy-Gain Model V-4231

Frequency range:	30-76MHz
Power input:	70 watts maximum
Input impedance:	50 ohms
VSWR:	3.4:1 maximum
Operating temperature:	−40F to 150F
Antenna type:	Whip, fiberglass
Band switching capabilities:	Automatic or manual, 10 bands 30-33, 33-37, 37-42, 42-47.5, 47.5-53, 53-56, 56-60, 60-65, 65-70.5, 70.5-76 MHz

hy-gain®

Hy-Gain Electronics Corporation; 8601 Northeast Highway Six; Lincoln, NE 68505; 402/464-9151; Telex 48-6424



during the month, one of a hunter lost in a mountain snow storm and the other of a lost plane. Unfortunately all the persons when found were dead. Those participating were W5ALF WB5LRS WB5QDS W5IWX W5MZM W5SWA W5QNR WB5AZP and W5PDY. Traffic: K5KPS 217, W5ENI 176, K5MAT 167, W5PDY 76, WB5KSS 75. W5DMG 37, W5QNR 29, W5RE 26, W5TWZ 24, WB5MSW 21, WA5MIY 3.

UTAH: SCM, Ervin Greene, W7EU — SEC: WA7ZBO. Congrats to WA7JRC and K7HLR on BPL. New officers for 1976: UARC: WA7WKQ, pres.; WB7WEQ, vice-pres.; WA7UUJ, secy.; WB7AYM and WA7WNA, pgm. chmn.; K7HFV, reelected as Microvolt Editor; WA4YQQ/7 asst. editor. Ogden RC: W7KIL, pres.; WA7BJV, vice-pres.; WA7QFR, secy.; W7GRN, dir. W7OCX reports Nov. a busy month for BUN. K7WYT commenting on summer-like winter from Yuma. K7ZVT sporting new Atlas 215X. WA7GWU operating partly from a new apt. and former QTH. John and WA7GTU linking the WR7AGI and WR7AAA repeaters making for full Statewide repeater coverage. Activity growing on RTTY through new UART organization with 24 hour autostart operation on 2 meters. W7BE has a new digital wind system. WA7VNQ participated in the Jamboree of the Air in Oct. Salt Lake area Dime Lime get togethers are gaining in popularity Tue. nights. K7DEQ finding the Hidden Peak repeater the only communications between his valley home and remote mountain cabin. WA7ZBO running phone patches for him when he is there. Congrats to WA7SYV and XYL on 5th harmonic. W7VEO working on a synthesizer for his Metrum II. UT State EOC has new Multi-5000. Trend of 2-meter thefts increases with W7CWK latest victim. Monitoring of 2 meters for 11-meter type of activity is being stepped up. Traffic: (Nov.) WA7JRC 165, K7HLR 137, WA7MEL 79, K7ZVT 74, W7OOX 49, K7CLO 44, W7BE 11, W7DKB 22, WA7VNQ 14, W7EU 13, W7UTM 8, W7HOI 5. (Oct.) K7ZVT 25.

WYOMING: SCM, Joe Ernst, W7VB — An oddball spare tube bank is being compiled by W7VB. A good donation having been received from K7JED. WR7AEQ has 24 hours control with WB7CPC at the TV site. Equipment has been purchased and work is underway to tie the Casper and Boysen repeaters together on 450 MHz. W7SDA on two meters with a 140 watt KLM amplifier. Rawlins has a portable two-meter repeater on 16-76, courtesy the Univ. of WY Radio Club. A two-meter group met near Sheridan early in Dec. for a gabfest and testing of equipment. W7ILL keeps in close touch with the clubs in Rawlins and Rock Springs. K7VWA back from OR coast and busy smoking fish. K7WRS dreaming about springtime and the big ones at Alcova. Traffic: W7TZK 233, W7IOI 8.

SOUTHEASTERN DIVISION

ALABAMA: SCM, Jim Brashear, WB4EKJ — Congrats to WA4FYO on being elected NM, AENM. Many thanks to W4LNN for his guidance as NM, AENM during the past year. Glad to hear WA4RBH has returned to our Section. K4VUW recently gave an interesting talk to the Huntsville ARC on his moon bounce operations. The Mobile ARC planning a Hamfest this year — watch for date to be announced. With only two days notice, K4LXU W4AMD WA7INS WA4VKA WB4JUJ K4QFO WB4CNL WB4RCF and W4ZRQ planned and worked out communications for the Prichard Veterans Day parade. The West AL Emergency Net WAEN, meets Mon. (except 2nd Mon.), 7:30 PM local on WR4AEH .22/.82, 42 QNI in the 3 Oct. sessions. Any and all help appreciated on DRN5, AENB and RN5. Welcome the following to our Section: WN4s BSB BUB BUC BUF BUG BWK BXF BXL BXM BZN CAH CAI CAM CAN CAS CAY CDY CED CEE CEO CEP CKC CLA CNN COV CPE CPX CQU CQV CVS CXS CYF CYQ CYW CZI DCG DCU DDC DDD DDT; WA4s BTJ BTX CCQ CHR CHU CHV CNA DAY; WB4s BTA BTB BUY CCC CCQ CGT CHY CNL CWN CWX DCL DFA DHM and DHN. Traffic: (Nov.) WB4EKJ 157, WN4JDH 98, WB4RCF 40, WA4AJA 35, WN4TMQ 35, K4AOZ 32, K4GUU 24, WB4IYW 22, K4CUU 13, K4LYY 13, W4MVM 9, W4RQS 8, WB4CQA 6, WA4MLK 2. (Oct.) WB4CQA 7.

GEORGIA: SCM, A. H. Stakely, K4WC—

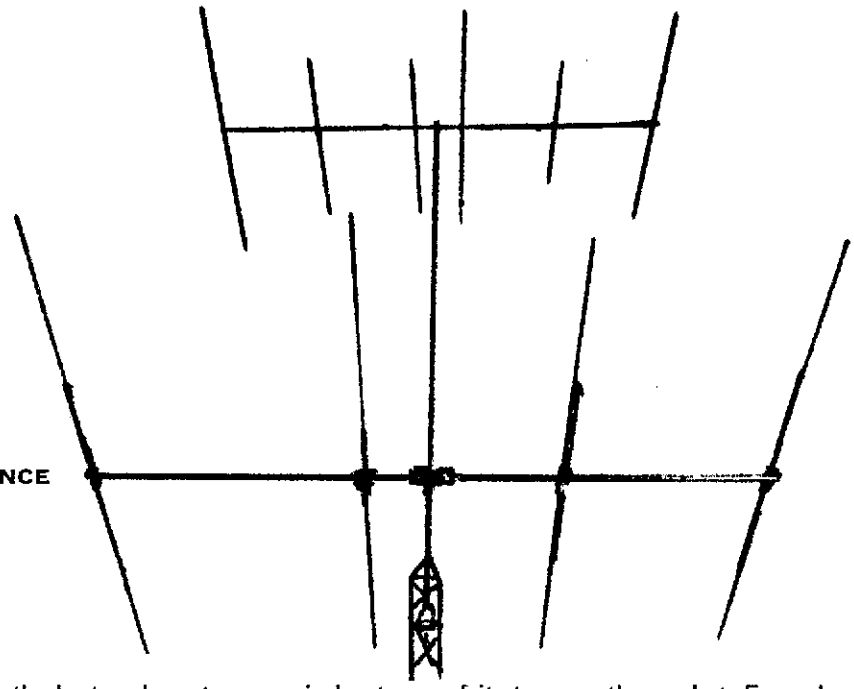
Net — Freq.	TimeZ	Meet	QNI	QTC
CVEN 1 — 3.950	1830	Su	74	11
CVEN 2 — 146.94	0230	Dy	789	43
NEGEN — 3.975	1830	Su	—	—
GSN — 3.695	0000/0300	Dy	339	148
GSBN — 3.975	2330	Dy	1337	118

SEC: K4KZP. PAM: K4JNL. RM: K4VHC. Cerebral Palsy Walkathon in Gwinnett Co. assisted by WA4AJY WA4BXA WA4IGO WB4MHK WA4MYP WB4PHF WA4SCR and K4ZUY. New officers SE DX Club, K4TBN, pres.; W4GKF, vice-pres.; W4KNW, secy.; K4KZP, treas.; K4LRO, act. mgr. Confederate Signal Corps officers for '76, WB4DYQ, pres.; WA4EPK, vice-pres.; K4VCB, secy.; Nathan White, treas.; WB4GFI, act. mgr.; W4REI, Bugle Editor. W4BTZ doing great job as OO. Need more OOs. How about you? Net activity great and getting better. Unlimber your fist and join GSN. K4VHC new RM and makes PSHR for Nov. Traffic: WB4IGX 117, K4JJQ 89, W4AAY 73, K4VHC 61, W4HON 43, K4WC 28, K4BAI 5, W4JM 4.

NORTHERN FLORIDA: SCM, Frank M. Butler, Jr., W4RKH — SEC: WA4WBM. RM: WA4FBI. PAM: WB4VDM/75, W4SDR/40, WB4BSZ/VHF. (D)4RN has resumed operation; QNI at 1800Z & 2100Z on 7240 kHz. WB9HHC/4 now WB4DTS. K4RNS has 1000 YL QSL cards — a record! NOFARS station W4IZ had top FD score in nation in 4A class. WA4EYR made Extra Class; W4EAT moved to Advanced; WA4NID General. New officers of RAMGE are: WA4UFW, pres.; WB4CGD, vice-pres.; WB4GCQ, secy.; K4BED, treas. WB4GRK is new proxy of Santa Fe CC ARS. WA4FAX upgraded to Extra; WA4HHC from Novice to General. W4TKE & WA4DXW put up new towers. W4KFA acting as pres. of GARC; WA4ROX had to resign because of work. WA4BAX has a quad-loop for 80M. WB4LZK works 2M fm from his motorcycle. New officers of PARC are K4JEM, pres.; W4FDJ, vice-pres.; W4RKH, secy.; WB4PGQ, treas.; WA4FMA, act. mgr. The club adopted a new patch to be worn on vests. W9OMH/4 looking for someone to start a 2M RTTY autostart net. Eglin ARS, W4NN active in Fall SS. WA4URF received Extra Class. Gulf Coast Propagation Net now meets on 50.125 MHz at 0230Z. WA4AYO found time to make phone call on 2M while parachuting from 3,000 feet! OO reports received from WB4JHQ and K4MZK.

Wilson Electronics Corp.

WILSON 204 MONOBANDER PLUS DB33



The Wilson 204 is the best and most economical antenna of its type on the market. Four elements on a 26' boom plus a Gamma Match (no balun required) make for high performance on CW & phone across the entire 20 meter band. The 204 Monobander is built rugged at the high stress points. Using taper swaged slotted tubing permits larger diameter tubing where it counts, for maximum strength with minimum wind loading.

The DB33 is the newest addition to the Wilson line of antennas. Designed for the amateur who wants a lightweight, economical antenna package, the DB33 compliments the M204 for an excellent DXers combination.

All Wilson Monoband and Duoband beams have the following common features:

- Taper Swaged Tubing
- Full Compression Clamps
- No Holes Drilled in Elements
- 2" or 3" Aluminum Booms
- Adjustable 52 Ω Gamma Match
- Quality Aluminum
- Handle 4kw
- Heavy Extruded Element to Boom Mounts

WILSON AMATEUR ANTENNA SPECIFICATIONS

	Boom Length (ft)	Number Elements	Longest Element (ft)	Turning Radius (ft)	Surface Area (sq ft)	Wind load at 80 MPH (lbs)	Assembled Weight (lbs)	Shipping Weight (lbs)	Price
M240	30	2	73'0"	39'6"	10.0	250	60	63	$299.00
M520	40	5	36'4"	27'0"	5.0	125	90	96	269.00
M204	26	4	36'4"	22'6"	3.9	100	46	49	139.00
M155	26	5	24'3"	18'0"	3.7	93	41	44	139.00
M154	20	4	24'3"	15'9"	3.0	75	30	32	89.00
M106	31	6	19'0"	16'1"	2.9	73	34	36	99.00
M104	17	4	18'0"	12'9"	2.0	50	20	22	64.95
DB54(20)	40	5	36'4"	27'0"	7.9	198	105	119	299.00
(15)		4	24'3"						
DB43(15)	26	4	24'3"	15'8"	4.3	108	36	38	119.00
(10)		3	18'0"						
DB33(15)	17	3	24'3"	12'2"	3.8	95	31	33	89.00
(10)		3	18'0"						

All Wilson Antennas are FACTORY DIRECT ONLY! The low prices are possible by eliminating the dealer's discount. Most antennas in stock. If you order any antenna, you may purchase a CDR Ham II for $124.95 or a CDR CD44 for $85.95. Send check or money order, or phone in BankAmericard or Master Charge. All 2" Boom antennas shipped UPS, 3" by truck.

Wilson Electronics Corporation

4288 S. Polaris Avenue, Las Vegas, Nevada 89103 **702-739-1931**

K4HYV providing info to Ch. 3 TV for programs on amateur radio. K4LAN had good score in Fall CD Party. The WR4ACZ autopatch has a field-programmable auto-dialer — first for FL? K4BSS QNIs NFPN and QFN. Traffic: WA4FBI 360, WB4HKP 258, WB4GHU 205, WB4SKI 167, W4WNY 114, W4SDR 98, WA4NID 93, K4DDY 81, WB4DXN 70, WB4DTS 68, WB4TPR 68, WA4EYU 58, W4KIX 56, WA4LDV 50, WB4FJY 49, WB4NJI 46, W4RKH 45, WB4VDM 36, WB4GZV 29, WA4MYF 28, WB4JHQ 28, WB4UPJ 27, WA4BAX 23, W4QUJ 23, WA4FJA 20, WB4DAD 14, K4OER 12, K4RZM 9, W4FP 8, K4RNS 8, WB4TVQ 8, WB4VAP 7, WB4VMP 3.

SOUTHERN FLORIDA: SCM, Woodrow Huddleston, K4SCL — SEC: W4IYT. Asst. SEC: W4SMK. RM: K4EBE. PAMs: WA4NBE W4OGX. New appointment: K4TH ORS. OOs reporting: K4DAS K4JPF K4NE K4QG WA4UVG. Our congratulations to K4DAS and WA4UVG on being in top ten most active OOs in our nation for past year. WA4UVG received 30 wpm CP sticker. K4GFG reports Motorola ARC helped Jaycees with Broward County Christmas parade Nov. 29, using 13 operators on 2M WR4AEP. WA4CTM now conducts Oscar Information Net on SPARC repeater WR4ALM 9 P.M. Thur. Discussion includes RTTY, computers, and advanced communication techniques. K4QG reported Gator chapter QCWA newly elected officers are K4OQ, pres.; K4FCW, vice-pres.; W4GQ, secy.; K4QG, treas. K4FCW reported membership in SPARC Repeater Team, operating WR4ALM, now exceeds 100. K4KE and the FL-Power hams have a new repeater in Pinellas County on 147.18/147.78. Three repeater groups are to handle the Toys for Tots telethon with Channel 10 TV in Pinellas County. SPARC, WR4ALM, will handle pickups in lower Pinellas County. TBRA, with WR4AKV, takes middle, West Pasco, WR4AML, takes northern edge of Pinellas as well as Pasco county. TBRA, using WB4HAE, does Hillsborough county. TBRA has their new 223.34/224.94 repeater operational at their Tampa site. They are still waiting for a WR4 call. Traffic net liaisons have improved so we now certify following nets as "Part of NTS": QFN, FAST, Gator, FPTN, TPTN. Our congratulations to net mgrs. WA4FBI W4WYR W4EH and W4SIZ for meeting our new standards of providing liaison to their NTS outlet net on at least 75% of its sessions. W4WYR, mgr. of both FAST and FPTN, is doing an outstanding job of supporting DNTS. Traffic: (Nov.) K4SCL 376, K4SJH 360, W4EH 314, K4TH 279, WA4SCK 250, W4WYR 212, W4DVQ 176, WB4TRI 174, W4GOG 163, WA4NBE 154, K4YSN 143, WA4KKE 122, K4GYF 106, K4SJA 101, K3PIE/4 98, WA4CTM 71, WB4ALH 54, K4GFG 53, WA4QYR 53, W4IYT 51, W4MEE 40, W4ILE 36, K4NE 31, W4GDK 29, K4BLM 27, K4QG 26, W4DQS 25, WB4FLW 25, WB4HJW 25, WA4EIC 19, K4CFV 18, W4NTE 15, W4IRA 14, W4SMK 12, WB4ZSO 11, W4TJM 8, K4DRH 7, K4EBE 4, K4FV 4, WA4UVG 4, W4OGX 2. (Oct.) WA4KKE 78, K4YSN 76.

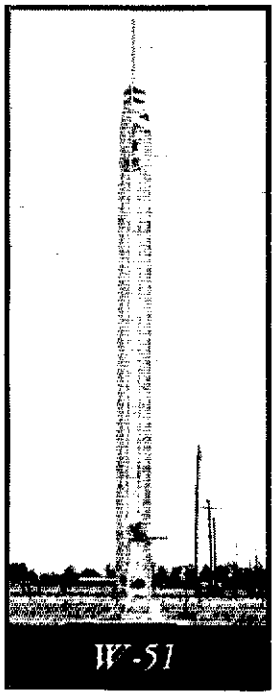
WEST INDIES: SCM, David Novoa, KP4BDL — We are planning to have our first Section Convention on the 3rd week end of Apr. For the latest news check into one of the following local or Section-wide nets: Sun. 1400 GMT 7,250, 1415 GMT 34/94; Thur. 2330 GMT 3897 kHz and 69/09 repeater. Appointment: KP4AOC PAM. Two new repeaters may be on the air by the time you read this: One in Corozal sponsored by KP4s ABN AQX CPK and others, and the other one in Maravilla Mt., Villalba owned by KP4EGF. KP4FS became Silent Key. New on two meters are KP4s EIJ EIU EJA and EJD. Heard about a repeater in the KV4-land. Many DXers are sharing DX info thru the 25/85 machine. KP4BJM active on 20 cw with a new "Big Stick" antenna. KP4EDP worked more than 150 countries in 6 months 20 ssb. KP4EAK heard nightly on 75 working DX. KP4CQB now KG4WW. KP4DBK handles patches to keep KP4s in the W2-land in touch with relatives in the Island.

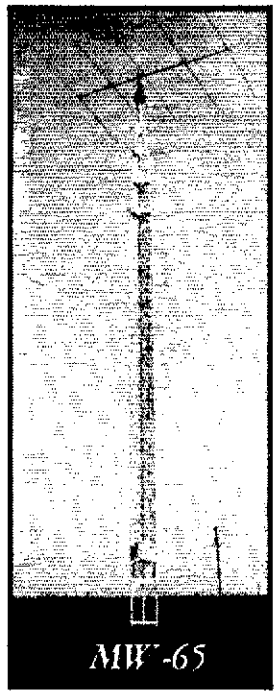
SOUTHWESTERN DIVISION

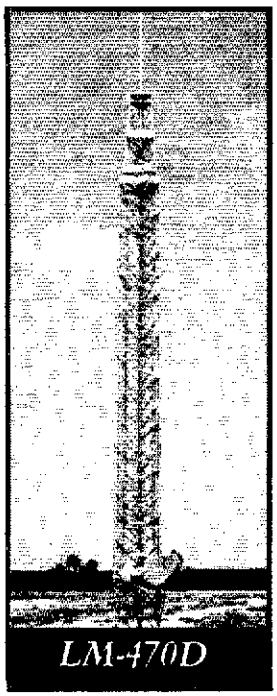
ARIZONA: SCM, Marshall Lincoln, W7DQS — PAMs: WA7KQE & W7UQQ. RM: K7NHL. New officers of the Scottsdale ARC are VE2US/W7, pres.; K7AK, vice-pres.; W7KIH, secy.; WA7TII, treas.; W7FCQ, trustee. New officers of the Phoenix Repeater Club are WA7TGB, pres.; WA7NIY, vice-pres.; K7ESA, secy.; K8NSA, treas.; WA7KRC, property custodian; WA7UJH and K7VOR, dir. Tucson Repeater Assn. members providing communications for the Easter Seal Society "hike-a-thon" were K7PQI WA7DAO WB2WPY/7 W7JIC WA7ZVS WA7HEH K7UDG and K7RKC. W7KAX is new net mgr. for the Hualapai ARC. W7JTT has checked into the Cactus Net (formerly PO Net) every day for five consecutive years. Evening phone nets have been having difficulty with low sunspot propagation conditions, but active members have been doing their best to handle traffic anyway, sometimes with the help of relay stations out of the AZ area. There still is need for more stations which handle traffic to report their monthly totals to the SCM. Every report, no matter how small, helps boost the AZ total in national traffic standings. Very few stations are reporting their PSHR totals either — those who do are reminded the new requirement for listing in QST is 40 points. Nov. Nets: Cactus Net QNI 1182, QTC 330; ATEN QNI 662, QTC 55; SWN QNI 195, QTC 187. ATEN certificates to K7NTG W7RQ WA7VTM K7NMQ WA7JCK W7CAF. Traffic: K7NHL 355, WA7VTM 83, K7NTG 60, K7UXB 30, W7DQS 18, WA7KQE 14, WA7EXL 12, WA7WEB 8, WB2WPY/7 8, W7RQ 6, K7NMQ 5, WA7JCK 2, WA7NHQ 1.

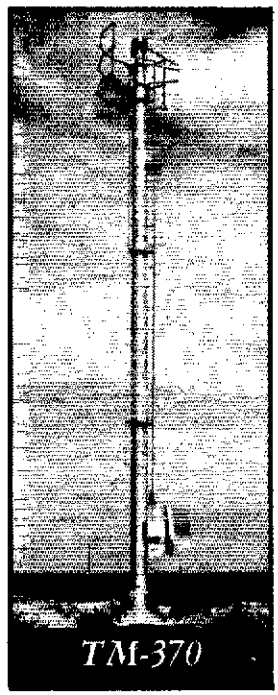
LOS ANGELES: SCM, Eugene H. Violino, W6INH — Asst. SCM: Kevin A. Berasley, WB6OYN. RMs: K6UYK WB6ZVC. EC in charge of AREC W6SPK. The Ramona RC held their yearly Christmas dinner at El Gordo, present were W6CL and XYL, W6MLZ, a nice party with door prize. The United RC of San Pedro already planning for the Tucson Convention. W6SZH and his crew have some good ideas in the works. You ssb fellows don't forget the daytime traffic net meets daily on 7265 kHz at 2100 GMT, it's a good way to help deliver and send your messages off. The Palisades RC net meets at 8 PM every Mon. evening via the WR6ABB Club repeater 146.01/.61, also the club has a Fri. breakfast and a Mon. evening dinner meeting. Those interested should contact K6AEH. The TRW/ARC recaptures first place in class 6A in last June's annual Field Day. The club has been participating in this annual event since 1968. Congrats gang. One of our local section members also a winner, ranked among the top ten best OOs in the nation K6KA. We have a new ORS in the area also. WB6AIT who recently passed his ORS test with flying colors. The TEL CO RC recent party was a huge success.

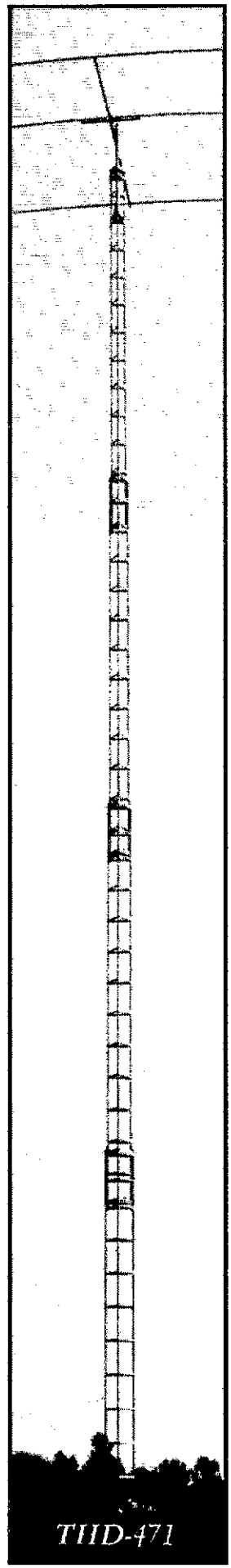
NOW.
Top-of-the-Line
Tri-Ex Towers
for HAM operators at basic prices!


W-51


MW-65


LM-470D


TM-370


THD-471

Now you can afford the best! Free-standing or guyed, Tri-Ex Towers stress quality. All towers are hot dipped galvanized *after* fabrication for longer life. Each series is specifically engineered to HAM operator requirements.

W Series

An aerodynamic tower designed to hold 9 square feet in a 50 mph wind. Six models at different heights.

MW Series

Self-supporting when attached at first section — will hold normal Tri-Band beam. Six models.

LM Series

A 'W' brace motorized tower. Holds large antenna loads up to 70 feet high. Super buy.

TM Series

Features tubular construction for really big antenna loads. Up to 100 feet. Free-standing, with motors to raise and lower.

THD Series

Very popular. Low Cost. Holds Tri-Band antennas. Eight models — all support 7 square feet of antenna at full height in 70 mph winds. Guyed.

Start with Top-of-the-Line Tri-Ex Towers. At basic prices. Write today, for your best buy.

Tri-Ex®
TOWER CORPORATION
7182 Rasmussen Ave.
Visalia, Calif. 93277

many members and their friends attended the steak fry and social event. Since the recent fires in the hills I have been asked what about an SEC appointment, so many suggestions but no takers; you fellows who complain about the SEC spot step right up, we're anxious to help from this end, all you need is the qualifications of a good ham. Now that I have said all that, I have appointed W6SPK EC in charge of AREC in the Los Angeles section, now line up and send him an application and show him that you really need some protection in the section when the rains come. WB6JFD has new 2-meter seven-element Yagi up for his MARS net, also reports having built 2048 bit memory for his Accu-Keyer, reports perfect operation. WB6OYN has new call for his Cal-Tech station WB6EWP, so we now have two calls from there WB6EWP and W6UE. Kevin also reports a new SCN station on from Arcadia, WB6YCU. A new RM appointee is WB6PKA who will later be appointed as Asst. Mgr. to region 6 area net. Steve has been doing a great job on both nets. W6BNO recently on a trip forgot his mike and key, he had a sked coming up so maintained it by keying his cw/tune switch on the Swan 270. Traffic: W6HUJ 225, W6INH 217, WB6PKA 203, W6OEO 136, WB6ETB 67, W6QAE 58, WA6IDN 44, WB6EPS 42, WB6AIT 22, WB6VZI 19, W6BRO 13, WN6BRQ 12, WA6TCH 11, K6EA 10, WA6EWY 10, W6IJSY 10, WB6JFD 8, K6UYK 7, K6CL 6, WA6ZKI 5, W6NKE 4, WB6YID 4.

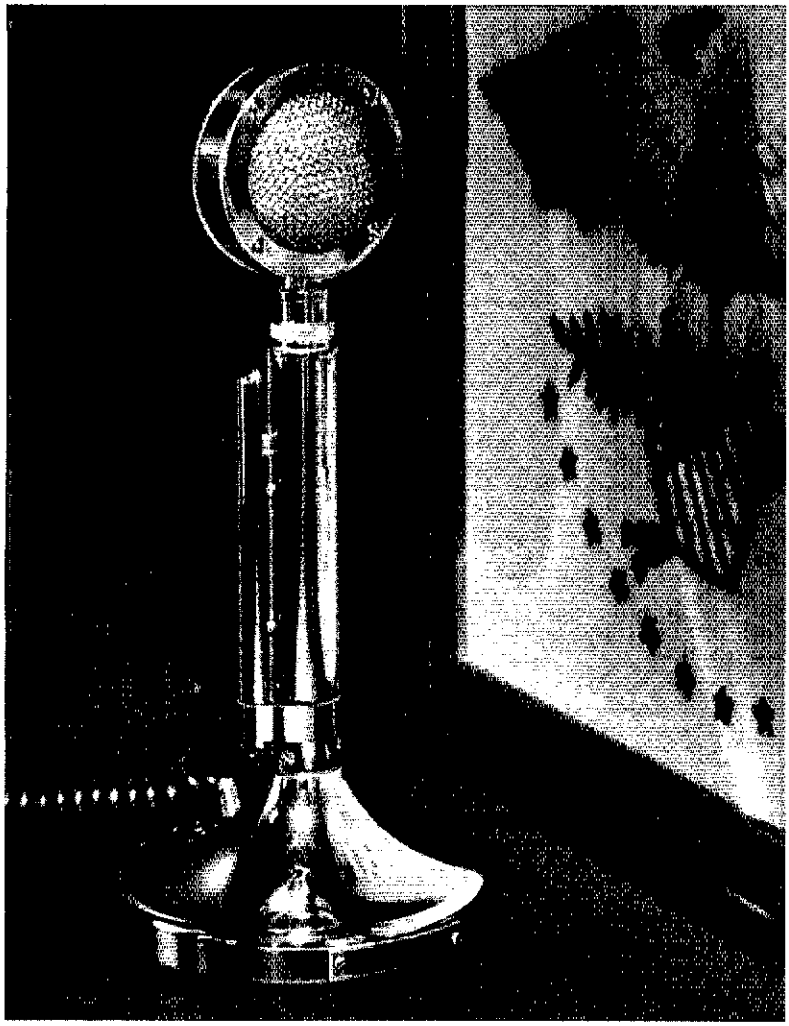
ORANGE: SCM, William L. Weise, W6CPB — Asst. SCM: Dick Birbeck, K6CID. SEC: WA6TVA. RM/PAM: WB6AKR. Congrats to WB6AUK for passing her Advanced test. Desert Rats held an emergency exercise on Nov. 19. K6UZ, Net Control, did an excellent job in coordinating the exercise. Nov. 10-15 the Desert Rats provided an amateur radio booth at the annual Health and Safety Fair in Palm Springs. Thanks to all who participated and especially WB6PHA, the Honcho. WB6AIT and WA6JHV are new members to SCN. Welcome and the best of luck. If you need training to join SCN get on the Fiesta City Net Tue. at 0400Z 21, 150 kHz, WA6MBZ mgr. of the net. To save postage anyone can send in his monthly report through SCN or DRN6 traffic nets. Congrats to WA6JQN on passing his Extra Class exam at the Ventura Convention. K6YNB and WA6LET made their first 432 MHz moonbounce QSO on Nov. 23, both on cw and ssb. W6BUK still keeps his skeds with QCWA and his friends. Look for Graham on the QCWA net. W6LY, the club station at Leisure World in El Toro has excellent facilities, including much test equipment. The station is active on DRN6 and other traffic nets. They are planning many exercises to provide emergency communications in the event of a disaster. W6WRM suffered a severe heart attack Nov. 20. Please send cards with your best wishes for speedy recovery. Also send cards to WB6GXO who is in the hospital at this writing. Our best wishes to both John and Carl for a speedy recovery. Traffic: WB6EIG 639, WB6VTK 115, W6CPB 22, K6GGS 20, K6LJA 15, WA6TVA 10, K6UZ 10, W6WRJ 6, W6QBD 4, W6UZK 4.

SAN DIEGO: SCM, Arthur R. Smith, W6INI — SEC: W6GBF. W6PZU new EC for Northern District of San Diego County. Retiring EC, K6HAV, is commended for his many years of outstanding service. Our loss is Orange Section's gain! Enhance your emergency capability. Acquire portable antennas for HF and VHF. Install fone patch on 2-meter FM gear. Practice written-message handling. New antenna improves coverage of Otay repeater, 146.04/64. Don't forget Palomar RC flea mart in SWAN parking lot, first Sat. each month. Club officers for 1976: No. Shores ARC, W6JIP, pres.; WB6IKW, vice-pres.; WA6HCA, secy.; WA6APN, treas. Palomar RC, WA6SCV, pres.; WA6KZN, vice-pres.; WA6AEZ, secy.; K6SLA, treas. Imperial Valley ARA, WA6FND, pres.; W6JHG, vice-pres.; WB6RMG, secy.; K6AXU, treas. SD County Council of ARCs is sponsoring extensive public relations program. Primary effort will be to contact all inactive hams. FCC has changed WC6WQI's call to WB6WQI. WA6VYD replaces K6PKC as instructor for licensing course at Mira Costa College. WA6GYR in Army Reserve Special Forces. WB6OGP reports 6-meter AREC net activity picking up, Sun. at 0930, 50.25 MHz (AM). Clubs should consider affiliating with ARRL to take advantage of many benefits. Traffic: WB6PVH 355, W6BGF 158, W6DEY 30, WA6IIK 15.

SANTA BARBARA: SCM, D. Paul Gagnon, WA6DEI — WB6MXM busy on traffic nets using new TS-520. WA6WYD handled 96 msgs on MARS RTTY. W6EHK also active on MARS. W6ITW handled 44 Antarctic patches in Oct. W6PNM WA6UEO and WB6TNL installed new antenna for RTTY repeater in LA. WB6DHW and WB6JKM built Altair 8800 Computers. WA6YMU moving to Arnold up north. WB6PGX working DX and writing DX column for Key Klix. K6BPY new SB104 and K7IKG new Kenwood twins. W6KCG moved to Arroyo Grande. The Ventura Co. ARC annual auction held Feb. 20 at the Oxnard Community Center. WB6ITZ presented plaques for FB job to VCARC outgoing pres. and vice-pres. WB6CQQ and K6VMN. W6RIC new SB104 and talked on it at VCARC. WB6EGW starting a club at Santa Paula High School. WB6JKM new editor of Poinsettia ARC "Overmodulation". New officers of the Poinsettia ARC are WA6TMQ, pres.; WB6DHW, vice-pres.; W6KXH, secy.; WB6EGW, treas.; WB6JKM and W6CJS, dir. WA6MBZ W1UUQ K6YX WA6DEI and W6SJK comprised a panel on Net operation at SBARC. New Canejo Valley ARC officers are WB6WGE, pres.; WA6YWU, vice-pres.; W6RML, treas.; WN6EIP and WN6CZV, secy.; K6VNQ, ops.; W6RYK, tech.; WA6DSA, social; W6EEG, pub. Code classes are being held in Santa Marie, Camarillo and Santa Barbara. New Novices in SB are WN6s CWE DMU CWD DKQ DZQ. New Techs: WA6HOZ and WA6BBV. The Ventura Co. AREC mobilized to provide Red Cross communications during the Nov. fires in the county. WB6LND WA6HCD WA6DEI W6PNM K6GYL WB6RWY and WA6IBV used WR6AGH to assist. Have you written your congressmen to support TVI bill HR7052? PSHR: WB6MXM 46, WA6DEI 44, WA6VBS 34, W6ITW 24, WA6OQZ 22. Traffic: (Nov.) WA6VBS 255, WA6DEI 146, WA6MBZ 76, WB6MXM 41, WA6OQZ 8, W6EHK 2. (Oct.) WB6VGC 4.

WEST GULF DIVISION

NORTHERN TEXAS: SCM, L. E. Harrison, W5LR — Asst. SCM: Frank E. Sewell, W5IZU. RM: W5QU. PAM: W5GSN. W5GSN reports Abilene repeater set at 500 ft. elevation south of town. Brownwood on 34/94 machine wkg FB. W5KLV RN5 Mgr. San Antonio sent

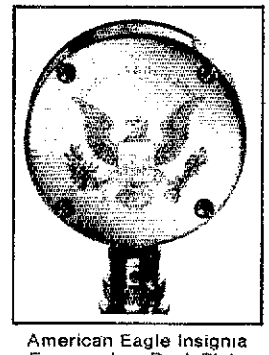


Presenting THE GOLDEN EAGLE

A special gold-plated microphone commemorating our nation's bicentennial. Limited production Model T-UG9-D104

The Astatic Corporation, a pioneer in microphone manufacturing, is proud to introduce this very special product. A close companion of hams since 1933, Astatic's famous D104 microphone is now combined with a transistorized 6 wire grip-to-talk stand to provide a universal base station microphone. The complete assembly is 20K gold plated and includes a removable plate which can be returned to Astatic for engraving call letters.

PERFORMANCE FEATURES · Amplified for transistorized CB and ham transceivers. · Controlled frequency response for maximum intelligibility. · Screwdriver adjustable volume control, prevents accidental change. · 6 wires (5 conductors, 1 shielded) for universal application with almost all known CB transceivers. · Includes 9 volt battery.



American Eagle Insignia Engraved on Back Plate

THE ASTATIC CORPORATION

CONNEAUT, OHIO 44030

SCM plus PAM, report covering National Mtg TCC directors, Comm. Mgr. & associated personnel regarding existing problems. Pres. WB5IUC reports Panhandle ARC meets 1st Wed. monthly Red Cross Bldg, 1800 Harrison St. '76 FD set for June 26/27. 21 applicants for Novice class. Amarillo repeater on 16/76. Everyone note SCM's new QTH Arlington. How many received copies AR Public Svc. Corps Bulletin? Anyone ever fill out an ARRL rpt. form. If so please send along your ideas for improvements of such forms. Remember Advisory Committee's (Emgcy, Rptr's ec Contests/DX), share your thoughts with K5SVD & W9INH. PSHR reports to HQ monthly if totals exceed 40 or more. Deadline this office 7th each month. Errors which infrequently creep into QST (we hope) are often result of poor legibility in rpt rcvd. Please make clear. Page 15/16 PSC authorizes Section Net certs, where endorsements req. SEC application from W5DWL. Arlington ARC Nov. meeting held Bill Wades home. Spook patrol OK. Operation NoPole held Dec. 13th. Houston host National QCWA meeting '76. Irving ARC held monthly 3rd Thur. Central Fire Station, 2nd & Jefferson per WA5PCF. W5KLV Dir. RN5 further reports daily meetings on 7290 kHz 3:30 PM, 2130Z. Liaison stations from this area are Sun. WB5FMA, Mon. W5SHN, Tue. WB5LBR, Wed. WA5ZZA, Thur. WB5LBR, Fri. WA5ZZA & Sat. WB5KQJ. For more info contact W5KLV or WA5ZZA. Chuck Horton has requested assignment as OO for the N.TX area. W5YK interested in League appointments other than EC. W5SHN N. TX SEC spoke before the Kilocycle Club of Fort Worth on Nov. 20th. WB5MTN and WA5UIH were in attendance. Tnx to K5AH pres. and John Roden Tarrant Co. for the invitation. The Frequency Sheet reports 14 new licensees for club members during the last month. W5WIQ made Texoma & interested in EC appt. possibly Ochiltree County possibly Hemphill & Lipscomb. K5ZCO EC cancelled. Traffic: W5TI 429, WB5MFQ 116, W5GY 51, W5GSN 20, W5SHN 18, W5YK 8, W5LR 7.

OKLAHOMA: SCM, Cecil C. Cash, W5PML — It's not only in the Spring that we must be on the lookout for and prepare for tornados here in tornado alley of OK. A mini tornado hit Oklahoma City in mid-Nov.; a bad one in Tulsa and east of Tulsa the 1st of Dec. The emergency net and warning systems were put into effect, property damage was heavy. I am very proud of our amateur nets and cooperation of the TV and Radio stations. I believe that the two meter alert systems have in the past and will continue to save many, many lives. WB5HLR has his antennas back up, we will be looking for Doug on the HF nets. W5TKE made a flying trip home for a short visit from the East Coast, he has just returned from Germany. Welcome back to the fold WB5NXO a retread of the 1920s. Congrats to WN5NIY on his upgrading to Advanced, also new General WB5NQT. W5TJL has a new Granddaughter. Congrats on new net mgr. of OAK RM WB5NKD. Traffic: W5RB 227, WB5NKD 135, WB5OYU 67, K5TEY 52, WB5ELG 48, WB5AZS 35, W5FKL 26, W5PML 21, W5FW 16, W5SUG 14, W5REC 10, WA5QQP 9, W5JJ 7, WB5NKC 7, WA5OUV 7, WB5NMZ 4, WB5KGP 3.

SOUTHERN TEXAS: SCM, Arthur Ross, W5KR — SEC: WB5CUR. RM: W5UGE. PAM: WB5AMN. OOs reporting this month: W5NGW WA5LTQ WA5KLX K5HGB WB5CIT K5BSZ WA5LES. OVSs reporting: WB5CIT K5LZJ WB5HRI. OO K5BSZ sent in summary of 1975 activities; too long for one issue but he has been busy, especially in CD parties. WA5EIU moving to KL7-land where he will have 40 acres of antenna farm! W5MIF working mobile from his Winnebago. OPS (former SCM) K5HZR again made BPL. WN5QDX brother of WB5QDW (ex-WA3VWJ). OPS WB5NUM says new 2-meter net began in Oct.; meets at 2100 LCL time (frequency?). OPS WB5LTW says WB5BMZ has new 75-meter antenna with excellent reports. EC W5TFW says 1975 GOOD TURN operation went quite well. OBS (former SCM) W5AIR reported major traffic accident via 2 meters; he also announced that Houston QCWA Chapter planning National QCWA convention for 1976. OPS WA5CBT reports SMIRK officers for 1976: W5QDB, pres.; WA5CBT, vice-pres.; K5ZMS, secy.-treas.; K5OOJ, NCS. SMIRK going well in 3rd year. W1HNJ (ex-W5RBB) QNI'd TEX CW on 3770 kHz. OO WA5LES says Gulf Coast DX Repeater 147.96/.36, active in Houston for contesters and DXers. OO K5HGB going NAVMARS. OO/OVS WB5CIT says WR5AGT DOT "O" repeater will be San Antonio output for TX Intercity Relay System (TIRS). OVS K5LZJ QNI'd San Antonio SMIRK Net from over 200 miles distant. ORS WB5HOD signed WW5ITU during the tests; those needing QSLs can get his address from Call Book. Traffic: (Nov.) K5HZR 506, W5UGE 254, W5KLV 224, W5TQP 194, WA5ZJY 180, WA5YEA 109, WB5FMA 77, WB5QDW 72, WB5AMN 68, WB5NUM 64, WA5RKU 62, WA5TKC 34, WB5LTW 30, W5TFW 25, WB5IJR 12, W8UX/5 11, K5ROX 10, W5EZY 8, WB5HRI 8, W5AIR 7, WB5GVO 5, WA5CBT 3, K4RVF 3, WB5GQH 2. (Oct.) W5UGE 262, W5UJJ 195, WA5VBM 166, K5RVF 3.

CANADIAN DIVISION

ALBERTA: SCM, Don Sutherland, VE6FK — Asst. SCM: John Wilkinson, VE6ALR. SEC: VE6XC. We should soon have full mail facilities again. VE6FV is in hospital. VE6SB now at home. VE2MS now VE4IM. CARA will accept Century Calgary Award applications for several months after mail strike. Congratulations and best wishes to president elect of CARA VE6AMU. Traffic: VE6FS 155, VE6FK 147, VE6CS 12, VE6AFO 12, VE6WN 6.

MANITOBA: SCM, Steve Fink, VE4FQ — There was a significant increase in traffic handled on the nets during the postal strike. Improved band conditions the past while has increased on-air activity as well. VE4JX was successful in the Nov. 432 MHz EME tests with WA6LET, while VE4MA has a new 432 installation in North Kildonan. New VHF Repeaters are planned for Pinawa (34/94) and Altamont. MB finally became a three-letter call-area in Nov. when VE4AAA signed on from Winnipeg. The remaining two-letter calls are held for OTs. VE4ZS is on a world-wide tour with some hamming plans before next summer. Now 15 stations on 2-meter RTTY in Winnipeg. We welcome new OPSs VE4JA and VE4CR; OO VE4VV and ORS VE4QY. MTN: 60 sessions, 296 QNI, 110 QTC. MEPN: 30 sessions, 1127 QNI, 25 QTC. Traffic: VE4RO 121, VE4PG 90, VE4EA 51, VE4OW 39, VE4HR 24, VE4CR 16, VE4JA 15, VE4UL 15, VE4UM 15, VE4CA 5, VE4HA 5, VE4JP 5, VE4LU 5, VE4MP 5, VE4NM 5, VE4JK 2, VE4LB 2, VE4AI 1, VE4FK 1.

THE BIG SIGNAL

THE APPROVED LEADING HAM AND COMMERCIAL BALUN IN THE WORLD TODAY.

"W2AU" BALUN $12.95

The proven balun

WITH BUILT-IN LIGHTNING ARRESTER

IT'S WHAT'S INSIDE THAT COUNTS!

1. **HANDLES FULL 2 KW PEP AND THEN SOME.** Broad-Banded 3 to 40 Mc.
2. **HELPS TVI PROBLEMS** By Reducing Coax Line Radiation
3. **NOW ALL STAINLESS STEEL HARDWARE.** SO239 Double Silver Plated
4. **IMPROVES F/B RATIO** By Reducing Coax Line Pick-Up
5. **REPLACES CENTER INSULATOR.** Withstands Antenna Pull of Over 600 Lbs.
6. **BUILT-IN LIGHTNING ARRESTER.** Protects Balun—Could Also Save Your Valuable Gear
7. **BUILT-IN HANG-UP HOOK.** Ideal For Inverted Vees, Multi-Band Antennas, Dipoles, Beam and Quads

NOW BEING USED EXTENSIVELY BY ALL BRANCHES OF THE U.S. ARMED FORCES, FAA, RCA, CIA, CANADIAN DEFENSE DEPT. PLUS THOUSANDS OF HAMS THE WORLD OVER They're built to last

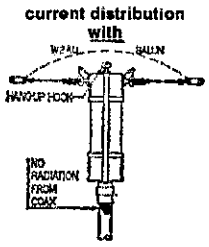
BIG SIGNALS DON'T JUST HAPPEN— GIVE YOUR ANTENNA A BREAK

Comes in 2 models. 1:1 matches 50 or 75 ohm unbalanced (coax line) to 50 or 75 ohm balanced load. 4:1 model matches 50 or 75 ohm unbalanced (coax line) to 200 or 300 ohm balanced load.

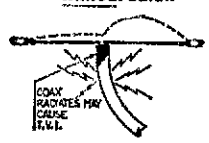
AVAILABLE AT ALL LEADING DEALERS. IF NOT, ORDER DIRECT

The big signal W2AU Balun reflects the type of quality that has kept our product out front and number 1 in Baluns the world over for the past 10 years.
The originator of the Balun with a built-in lightning arrester and hang up hook.

current distribution with



current distribution without balun



We'll GUARANTEE no other balun, at any price, has all these features.

UNADILLA RADIATION PRODUCTS — **MFRS. OF BALUNS** — **Tel: 607-369-2985** — **RD 1 UNADILLA, N.Y. 13849**

TOWERS QUADS TOWERS QUADS TOWERS QUADS.

Quad essentials kits from. . . . . $ 59.95
Complete quads from. . . . . $ 99.95
DeLuxe, Heavy Duty quads from. . . $189.95

Aluminum towers at a discount.
Rotors, cable etc.
Parts sold separately.

Phone night or day (305) 988-4213

SKYLANE PRODUCTS

406 Bon Aire Ave., Temple Terrace, Fla. 33617

LOOKING FOR PARTS?

We stock variable capacitors, inductors, and lots more.

IN STOCK: J. W. MILLER, MILLEN, B & W, JOHNSON, HAMMARLUND, and others.

Johnson 229-203 28 μh Roller Inductor ..... $33.50 ppd.

Send First Class Stamp for Flyer

G. R. WHITEHOUSE & CO.

11 Newbury Dr. Amherst, N. H. 03031

The ***BRIMSTONE 144***

in stock at

REVCOM ELECTRONICS

Ama. net. $650
P.O. Box 811,
Garden City, Kansas 67846
907 E. Johnson
(316) 276-3470 after 5 CDT

Rod Hogg, K0EQH owner

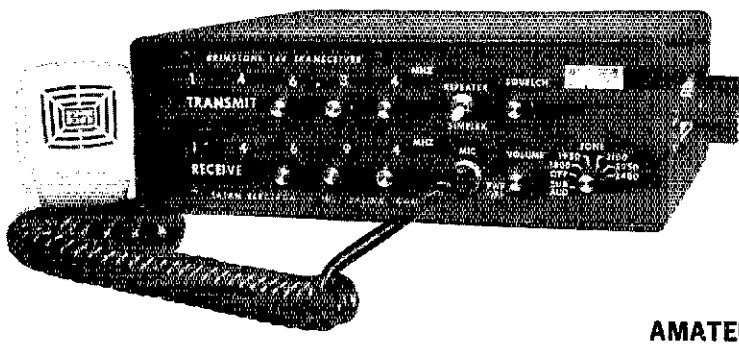
LARSEN-MIDLAND-BRIMSTONE-CUSHCRAFT-CALLBOOK

Please write for **special introductory package price** and completely detailed brochure

BRIMSTONE 144

AMATEUR-WHOLESALE ELECTRONICS
8817 S.W. 129 Terrace, Miami, Fla. 33176
Telephone: (305) 233-3631
PLEASE SEE OUR OTHER ADS IN THIS ISSUE

BANKAMERICARD



THE BRIMSTONE 144

143 to 149 MHZ Extended range to 142 MHZ optional

AMATEUR NET $650.00
(913) 823-2794

THE SUPERIOR 2-METER FM TRANSCEIVER!

* **SUPERIOR APPEARANCE**
* **SUPERIOR CONSTRUCTION**
* **SUPERIOR DESIGN**
* **SUPERIOR PERFORMANCE**
* **SUPERIOR SELECTIVITY**
* **SUPERIOR WARRANTY**

All of this plus optional plug in modules for Tone Burst, Dial Tone, Sub-Audible Tone, and a Touch Tone® interface module.

Send for our six page COLOR brochure which gives you the full story, inside and out!

Touch Tone®—trademark of the Western Electric Co.

SATAN ELECTRONICS, INC.
Airport Industrial Area, Bldg. 317
Salina, Kansas 67401

MARITIME: SCM, Aaron D. Solomon, VE1OC — SEC: VE1ACA. Best Season's Greetings to all VE1s. DX, SS Contest, traffic handling and ragchewing were main occupations for VE1-land for Nov. JAs heard on 75-meter phone. Amongst those working 75-meter phone DX were VE1ASI VE1AIH and VO1JR. VE1ASJ and VE1XG worked 55. Oscar main preoccupation of VE1KG and VE1AAV. VE1RO temp off air. Hopes to be back soon. VE1MX worked 55 countries on 160-meter cw. Ex-VE1CI, VE1KG now VE1GG NS. VE1VE and VE1XU active daily from 4 x 4 and SU handling Canadian Forces traffic. Ex-VE1ASR operating as VE3BGP. New executive of NSARA are VE1AIZ, pres.; VE1UT, 1st vice-pres.; VE1QM, 2nd vice-pres.; VE1IG, secy.-treas. Halifax ARC: VE1FQ, pres.; VE1AYZ, vice-pres.; VE1BAD, 2nd vice-pres.; VE1AFN, secy.; VE1MX, treas. New Yarmouth repeater freq. are 146.01/146.61. VE1ASL skeds VE1BT/W4 and VE3UC/W4 on 3785 kHz AM. VE1AFU works VE7 on sked. VE1ACB now KW5-1/75A-4. VE1AAR lost antenna in recent storm. VE1AY VE1CJ and VE1AQ keep reg. sked on 40-meter phone. VE1VT, ex-VE4QI now active in Dartmouth area after 21 years. VE1AKT secy. to International Repeater Group. Halifax ARC held successful auction with VE1FQ as auctioneer. VO1GW new pres. Humbars. VE1YC new contest chmn. VE1 Contest, VE1XI has new TS-520. Traffic: VE1AAQ 133, VE1AMR 105, VE1ZH 40, VE1OC 21, VO1GW 10. (Oct.) VE1AMB 9.

ONTARIO: SCM, Holland H. Shepherd, VE3DV — A lot of changes took place in the ON NTS cw member nets during Nov. and I sincerely hope that more amateurs will take advantage of the improved service now offered for the transmission and delivery of formal messages. Check with your club for the call of an amateur in your vicinity who is a member of the traffic fraternity or contact me. Congratulations to VE3EFX on becoming a Life-Member of the League. The coming of winter has stopped VE3ECV from his work on supporting antennas with helium balloons. VE3HFS has a 40-metre beam, up 45 feet. VE3HFS VE3EDZ and VE3HPT head up the officers of the Lakehead ARC. VE3EHF a superb cw traffic man moves to Calgary in Jan.; our loss is a real gain for AB. The postal strike delayed the balloting on the Can. Vice Dir. position until Jan. VE3AIB follows Oscar closely. VE3HYY can now be heard on 40 cw, he finally got his call from the DOC. CARTG putting a lot of effort into an award for outstanding RTTY person. They hope to make it an annual award. Foreign DX is quite often very upset on learning that our oddball prefixes i.e. XJ XN etc., are just old VE friends. I personally prefer not to change my radio name to satisfy a local or national event. For the first time in over 30 years PQ now has its own NTS cw Section Net. The net started early in Dec. on 3545 kHz on a daily basis at 0000Z. ONTARS remains the busy service of the 75-metre gang and does a fine job. VE3EWD, mgr. OPN busy with the Windsor ARC Retirees Club. Traffic: (Nov.) VE3GOL 521, VE3SB 422, VE3FQZ 265, VE3FRG 209, VE3GFN 199, VE3DV 191, VE3HJA 191, VE3DPO 183, VE3GJG 177, VE3GT 115, VE3AWE 105, VE3EHF 104, VE3DVE 83, VE3BZB 79, VE3CDK 77, VE3ATR 69, VE3EWD 63, VE3HGJ 39, VE3EBC 19, VE3GCE 19, VE3FGV 11, VE3DH 10, VE3VD 7. (Oct.) VE3CYR 68, VE3EHL 15, VE3FHQ 11.

QUEBEC: SCM, Larry Dobby, VE2YU — Traffic: VE2UN 268, VE2DRC 82, VE2BP 68, VE2CTA 56, VE2EC 37, VE2UY 14.

SASKATCHEWAN: SCM, P. A. Crosthwaite, VE5RP — The odd two meter opening has given amateurs the opportunity to work some long skip DX such as WØJWL of Minot N.D. While the mail strike was on the regional net did a fine job in handling a good lot of traffic. However I was disappointed in the month end traffic count. Please hand in your traffic count to your net mgr. We are getting more interest in the use of 432 MHz for the use of Oscar's 6 & 7. There are some experiments being carried out on 2-meter sideband. Prince Albert will be hosting the 1976 Hamfest. Dates and information to follow in later issue of QST. Traffic: VE5RP 73, VE5II 61, VE5YK 34, VE5BO 27, VE5HP 19, VE5NJ 5, VE5PD 1, VE5UZ 1.

Ham it up for $3.95.

Amateur crystals 144.0-148.00 only for this trim price, plus 25¢ per crystal for handling and postage. Florida residents add 4% sales tax. Send frequencies, make and model when ordering. Our price includes most gear on our free Parts List. For equipment not listed, we'll provide prices on request and slice up something special. Master Charge and Bankamericard telephone orders accepted. No C.O.D.s.

Savoy Electronics Inc.
P.O. Box 5727, Fort Lauderdale, Florida 33310
305/563-1333
Manufacturers of Quality Quartz Crystals Since 1937

When you consider the extra "goodies" — that you don't pay extra for— we think you'll agree that the...

Drake TR-22C is a remarkable 2-meter FM portable

Standard "goodies" included in the price:
- 12 channels — 2 crystalled
- Crystal filter in 1st I.F. for superior intermod
- Microphone
- Charger built-in
- Ni-Cad batteries
- Telescoping Antenna
- AC and DC power cords
- Carrying case
- Traditional Drake service back-up

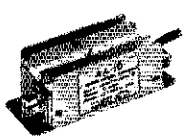
GENERAL: • **Frequency Coverage:** 144 through 148 MHz. 12 Channels, 2 supplied: (1) Receive: 146.52 MHz, Transmit: 146.52 MHz; (2) Receive: 146.94 MHz, Transmit: 146.34 MHz • **Power Requirements:** 13.0 Volts DC±15% • **Current Drain:** Transmit: 450 mA, Receive: 45mA • **Antenna Impedance:** 50 Ohms • **Dimensions:** 5⅜" x 2⁹⁄₁₆" x 7½"(13.6 x 5.8 x 19.1 cm) • **Weight:** 3.75 lbs (1.7 kg)

RECEIVER: • **Sensitivity:** Typically .5 microvolt for 20 dB quieting • **IF Selectivity:** 20 kHz at 6 dB down; ±30 kHz channel rejection greater than 75 dB down. • **First IF:** 10.7 MHz with 2-pole monolithic crystal filter. • **Second IF:** 455 kHz with ceramic filter. • **Intermodulation Response:** At least 60 dB down. • **Modulation Acceptance:** ±7kHz. • **Audio Output:** At least 1 Watt at less than 10% distortion. • **Audio Output Impedance:** 8 Ohms

TRANSMITTER: • **RF Output Power:** 1 Watt minimum • **Frequency Deviation:** Adjustable to ±10 kHz maximum, factory set to 6.0 kHz. • **Multiplication:** 12 Times

Amateur Net **$229.95**

ACCESSORIES

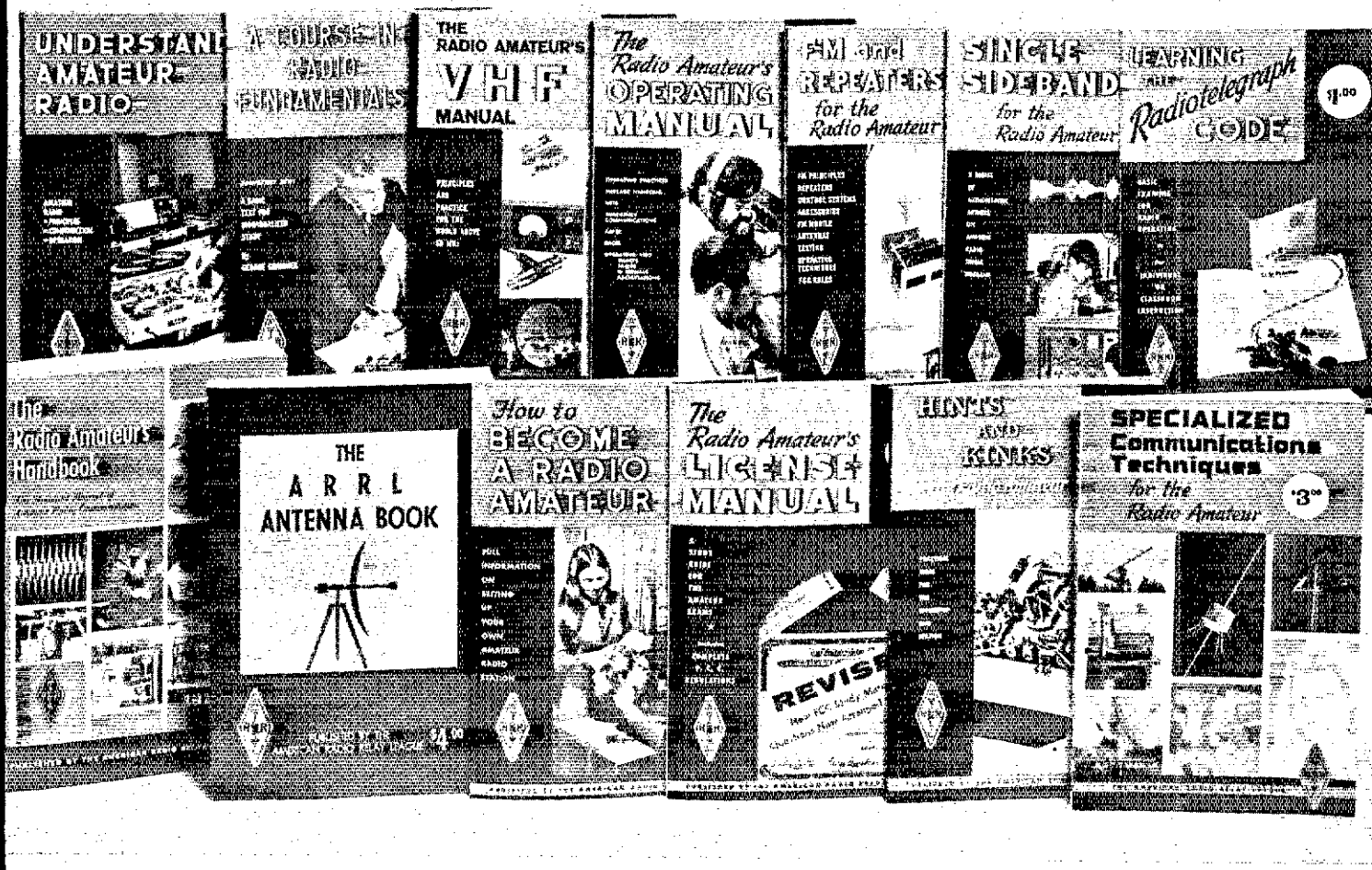


- **Model AA-10 Power Amplifier:** Use with TR-22C or any transceiver up to 1.8 watts output. 10 dB power increase. At least 10 watts output at 13.8 VDC. Automatic transmit/receive switching..... **$49.95**
- **Accessory Crystals**..... each **$7.50**
- **Model MMK-22 Mobile Mount**..... **$9.95**

R. L. DRAKE COMPANY DRAKE®

At your dealers — now! For more details contact:
540 Richard St., Miamisburg, Ohio 45342 • Phone: (513) 866-2421 • Telex: 288-017

»» SEE YOU AT THE DAYTON HAMVENTION ««



- ☐ **ARRL HANDBOOK** The standard comprehensive manual of amateur radiocommunication. 53rd Ed.
  $6.00 U.S. Possessions, **$7.00** Canada, **$8.00** Elsewhere
- ☐ **UNDERSTANDING AMATEUR RADIO** Written for the beginner—theory and how-to-build it. 2nd Ed.
  $4.00 U.S. & Possessions, **$4.50** Elsewhere
- ☐ **VHF MANUAL** A new and thorough treatment of the amateur v.h.f. field. 3rd Ed.
  $4.00 U.S. & Possessions, **$4.50** Elsewhere
- ☐ **LICENSE MANUAL** Complete text of amateur regs, plus Q&A for amateur exams, 74th Ed.
  $1.50
- ☐ **HOW TO BECOME A RADIO AMATEUR** All about amateur radio and how to get started. 29th Ed.
  $1.50
- ☐ **A COURSE IN RADIO FUNDAMENTALS** For home study or classroom use. 5th Ed.
  $3.00 U.S. & Possessions, **$3.50** Elsewhere
- ☐ **LEARNING THE RADIO TELEGRAPH CODE** Based on the accepted method of sound conception. Covers the basics on up to high speed "copy".
  $1.00
- ☐ **ANTENNA BOOK** Theory and construction of antennas. 13th Ed.
  $4.00 U.S. & Possessions, **$4.50** Elsewhere
- ☐ **SINGLE SIDEBAND FOR THE RADIO AMATEUR** The best s.s.b. articles from QST. 5th Ed.
  $3.00 U.S. & Possessions, **$3.50** Elsewhere
- ☐ **FM AND REPEATERS FOR THE RADIO AMATEUR** For the fm buff. 1st Ed.
  $3.00 U.S. & Possessions, **$3.50** Elsewhere
- ☐ **HINTS AND KINKS** 300 practical ideas for your hamshack. Vol. 9
  $1.50 U.S. & Possessions, **$1.75** Elsewhere
- ☐ **OPERATING MANUAL** The techniques of operating your amateur station—DXing, ragchewing, traffic, emergencies, etc. 3rd Ed.
  $2.00 U.S. & Possessions, **$2.50** Elsewhere
- ☐ **SPECIALIZED COMMUNICATIONS TECHNIQUES FOR THE RADIO AMATEUR** About ATV, SSTV, FAX, RTTY, Satellite Communication and advanced techniques. 1st Ed.
  $3.00 U.S. & Possessions, **$3.50** Elsewhere
- ☐ **GATEWAY TO AMATEUR RADIO** Includes *License Manual, How to Become a Radio Amateur, Learning the Radio Telegraph Code* and free booklet "Operating an Amateur Radio Station" (not pictured).
  $4.00

I would like these publications shipped to me postpaid. Ship to:

NAME_____ CALL_____

STREET_____

CITY_____ STATE_____ ZIP_____

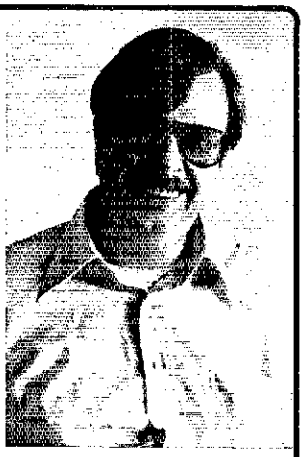
Total enclosed or charge to MC or BAC Account: $_____

Charge to my: BankAmericard No. _____ Expires_____

Master Charge No._____ Expires_____ Bank No._____

THE AMERICAN RADIO RELAY LEAGUE, 225 MAIN STREET, NEWINGTON, CT 06111

What do Jim Ferguson, WA3RSP and Al Pearson, WA1TOU have in common?



WA3RSP

WA1TOU

When WA3RSP listed his Clegg ZEUS transmitter with us, he really wasn't expecting a phone call the next evening from a cash buyer. He sure was surprised to find that listing equipment with BUYERS & SELLERS could have it sold within one day. The same thing happened when WA1TOU called in his Heathkit HO-13. As sellers, Jim and Al listed their equipment free of charge and paid a 10% commission when the sale was completed.

Buyers call at no charge and tell us what they're looking for. Many buyers are surprised at the low prices or incredible package deals that are often available (you set the prices, we don't). Several have even found equipment they'd been chasing after for years! Things like that just happen when you have a nation wide inventory.

So if you're buying or selling, drop us an SASE for our monthly equipment list or give us a call at 617-536-8777 and surprise yourself the way Jim and Al did.

They both sold their equipment 24 hours after listing it with **BUYERS & SELLERS.**

BUYERS & SELLERS BOX 73, BOSTON, MASS. 02215 • 617-536-8777 Monday-Friday, 9am-5pm Wednesday & Sunday, 7pm-midn.

★ COILS ★

FOR HOME-BUILT GEAR
POST PAID

- ★ Balun for Transmatch – '75 Handbook p. 585
  1 kW. $9.75
  2 kW. $12.25
- ★ Transmatch QRP – L1-4 – '74 & '75 Handbook p. 350. ..... $6.00
- ★ Hybrid 10 to 2 Transverter – L1-13, RFC1-3 QST June '75 p. 26. ..... $13.00
- ★ Preselector 80 to 10 M L1-20 – '74 & 75 Handbook p. 265. ..... $15.00
- ★ Mavti-40 Transceiver – L1-17 QST June p.35. . $16.55

Send SASE for list 2A. Includes almost all coils for ham gear in 1975 Handbook

CADDELL COIL CORP.
POULTNEY, VT 05764 802-287-4055
WE LIKE TO WIND COILS—TRY US

ALDELCO SEMICONDUCTOR SUPERMARKET

2N3775 5-watt, 400 MHz	$5.50	2N1866 1-watt, 400 MHz	.49
2N4041 1-watt, 400 MHz	2.45	2N5590 10-watt, 175 MHz	4.15
2N5591 25-watt, 175 MHz	10.95	2N6080 4-watt, 175 MHz	3.40
2N6081 15-watt, 175 MHz	8.45	2N6082 25-watt, 175 MHz	10.95
2N6083 35-watt, 175 MHz	14.30	2N6084 40-watt, 175 MHz	16.50
2N2222 or 2N2907	.19	2N1595	.70
2N3819	.45	2N5496 or 2N6108	.55
Zeners 1N746 to 1N759	.35	Zeners 1N4728 to 1N4764	.35
741 or 709 14-pin DIP	.22	FET/MOS DIP	.99
555 Timer	.75	200-volt 25-amp rect. bridge	1.10
1 amp 1000-volt rect.	.12	3 Amp 400-volt rect.	.49

We stock all any device of any quantity, all items postpaid. $5.00 min. order. Send stamp for catalog. N.Y. State add tax.

ALDELCO P.O. BOX 341 Lynbrook, NY 11563

EVER TRY A QSL SERVICE?

For only 5c each, I will forward your U.S. and DX QSL cards. Tnx es 73, Larry.

W7IZH QSL SERVICE – QJ5
9051 E. PALM SPRINGS PLACE
TUCSON, ARIZONA 85730

IRON POWDER TOROIDS

Chart showing uH per 100 turns

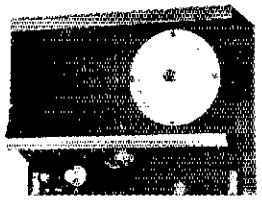
CORE SIZE	MIX 2 .5-30MHz u=10	MIX 6 10-90MHz u=8.5	MIX 12 60-200MHz u=4	SIZE OD (in.)	PRICE USA $
T-200	120			2.00	3.25
T-106	135			1.06	1.50
T-90	55			.90	.80
T-68	57	47		.68	.65
T-50	51	40		.50	.55
T-25	34	27	12	.25	.40

Ferrite beads 20-500 MHz $2.00 Doz.
Wideband chokes 20-500MHz 95¢ Ea.

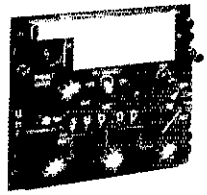
Specify core size and mix. Pack and ship 50¢ USA & Canada. Air parcel post delivery worldwide $2.00, 6 percent tax in Calif. Send for free brochure.

PALOMAR ENGINEERS
BOX 455 ESCONDIDO CA 92025

WANTED FOR CASH

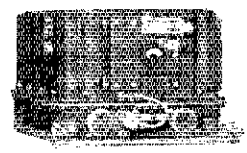


490-T Ant. Tuning Unit
(Also known as CU1658 and CU1669)

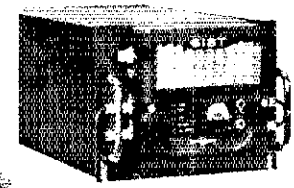


ARC-51 Control Box

R1051 or T827



ARC-51 Transceiver



618-T Transceiver
(Also known as MRC95, ARC94, ARC102, or VC102)

Highest price paid for these units. Parts purchased. Phone **Ted, W2KUW - collect.** We will trade for new amateur gear. GRC106 and PRC74 also required.

THE TED DAMES CO.
308 Hickory Street **Arlington, N.J. 07032**
(201) 998-4246 **Evenings (201) 998-6475**

NEW QTH?

INSURE UNINTERUPTED *QST* BY NOTIFYING US OF CHANGE OF ADDRESS *AT LEAST 6 WEEKS IN ADVANCE.*

Print Old Address or Attach Label

Name _____ Call _____
Address _____
City _____ State _____ Zip _____

Print New Address

Name _____ Call _____
Address _____
City _____ State _____ Zip _____

MAIL TO: **ARRL, 225 Main St., Newington, CT 06111**

Wow! INCREDIBLE PRICES Poly Paks

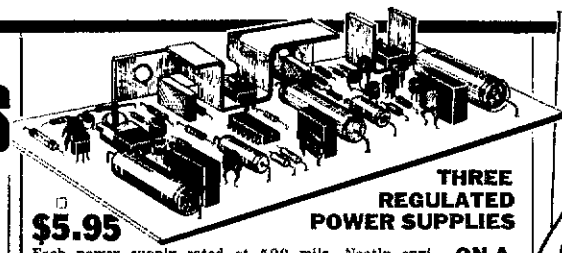
TTL'S

BUY ANY 10 TAKE 15%

☐ SN7400	$.16	☐ SN7462	$.22
☐ SN7401	.16	☐ SN7470	.29
☐ SN7402	.16	☐ SN7471	.49
☐ SN7403	.16	☐ SN7472	.29
☐ SN7404	.19	☐ SN7473	.36
☐ SN7405	.19	☐ SN7474	.36
☐ SN7406	.35	☐ SN7475	.59
☐ SN7407	.35	☐ SN7476	.39
☐ SN7408	.19	☐ SN7478	.79
☐ SN7409	.19	☐ SN7480	.52
☐ SN7410	.16	☐ SN7481	.99
☐ SN7411	.25	☐ SN7482	.89
☐ SN7413	.59	☐ SN7483	1.25
☐ SN7414	1.65	☐ SN7485	1.25
☐ SN7416	.34	☐ SN7486	.37
☐ SN7417	.34	☐ SN7488	3.95
☐ SN7420	.16	☐ SN7489	2.45
☐ SN7421	.45	☐ SN7490	.59
☐ SN7423	.29	☐ SN7491	1.10
☐ SN7425	.29	☐ SN7492	.59
☐ SN7426	.25	☐ SN7493	.59
☐ SN7427	.29	☐ SN7494	.95
☐ SN7430	.16	☐ SN7495	.79
☐ SN7432	.39	☐ SN7496	.79
☐ SN7433	.49	☐ SN74100	1.40
☐ SN7437	.34	☐ SN74104	.44
☐ SN7438	.34	☐ SN74105	.44
☐ SN7440	.16	☐ SN74106	.52
☐ SN7441	1.00	☐ SN74107	.44
☐ SN7442	.70	☐ SN74108	.89
☐ SN7444	1.25	☐ SN74112	.89
☐ SN7445	.89	☐ SN74113	.89
☐ SN7446	1.15	☐ SN74114	.89
☐ SN7447	.99	☐ SN74121	.49
☐ SN7448	.99	☐ SN74122	.48
☐ SN7450	.16	☐ SN74123	.85
☐ SN7451	.17	☐ SN74125	.59
☐ SN7452	.17	☐ SN74126	.59
☐ SN7453	.17	☐ SN74132	1.75
☐ SN7454	.17	☐ SN74140	2.10
☐ SN7455	.22	☐ SN74145	1.05
☐ SN7460	.17		

BUY 100 TAKE 25%

☐ SN74148	2.25
☐ SN74150	.98
☐ SN74151	.75
☐ SN74153	.90
☐ SN74154	1.35
☐ SN74155	.95
☐ SN74156	.95
☐ SN74157	.95
☐ SN74158	.95
☐ SN74160	1.35
☐ SN74161	1.25
☐ SN74163	1.35
☐ SN74164	1.50
☐ SN74165	1.50
☐ SN74166	1.50
☐ SN74173	1.45
☐ SN74174	1.39
☐ SN74175	1.30
☐ SN74176	1.20
☐ SN74177	1.20
☐ SN74180	.95
☐ SN74181	2.98
☐ SN74182	.74
☐ SN74184	1.98
☐ SN74185	1.98
☐ SN74190	1.40
☐ SN74191	1.40
☐ SN74192	1.25
☐ SN74193	1.25
☐ SN74194	1.20
☐ SN74195	.85
☐ SN74196	1.80
☐ SN74197	.90
☐ SN74199	1.75
☐ SN74200	4.95

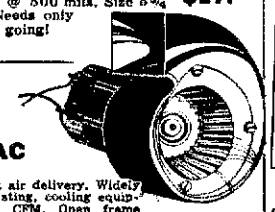


THREE REGULATED POWER SUPPLIES ON A BOARD

☐ $5.95

Each power supply rated at 500 mils. Neatly engineered and precision designed for either solder or edge connecting. IMAGINE! 2 of the power supplies' outputs have adjustable voltage controls. Uses the finest U.S. made parts with famous names as Motorola, Fairchild, RCA, etc. POWER SUPPLY #1 — 12V to 17VAC input, adjustable 9V to 17VDC @ 500 mils. POWER SUPPLY #2 — Same as #1. There it may be used as positive and negative or a dual unit. POWER SUPPLY #3 — 9VAC input, 5VDC output @ 500 mils. Size 5¾ x 8¾ x 1 (G-10) pc board. Needs only input transformers to get 'em going! Heavily heat-sinked! Wt. 6 oz.

☐ 3 for $17.



ALLIANCE SHADE POLE BLOWER 115VAC

Offers maximum efficiency in quiet air delivery. Widely used in heating, ventilating, exhausting, cooling equipment. Direct drive motors 100 CFM. Open frame shaded pole motor, driving a Torrington 2½ x 2" bladed wheel, square 2¼ x 2" intake, 2½ outlet holes. Overall size of housing 5½ x 2½ x 5" deep, Wt. 2 lbs. 3 - 10/32 mtg. holes.

$4.95

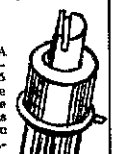
IT'S NEW! "TO-5" MICRO MINI 0-8 ROTARY SWITCH

- TO-5 Transistor Case!
- Screwdriver Adjust!
- 8 Separate Positions!
- 1/4 x 5/16" Space Saver!

IMAGINE! 8 DIFFERENT ROTARY CIRCUITS IN 1/4 x 5/16" Space

$1.95 3 for $5.

We introduced our customers to "7 Switches On A DIP", and now . . . for the 1st time anywhere A MICRO-MINIATURE ROTARY SWITCH shaped like a TO-5 transistor case. That's right! . . . TO-5 case! Imagine 8 different rotary circuits in 1/4 x 5/16" space (a true space saver), 8 pins gold plated! Use for P.C. Features 0-to-8, 45° angle, 0.05" screwdriver adjust shaft on top of case, breakdown voltage 500, 1/2-Meg. insulation resistance. By CHICAGO SWITCH, Type 30-8-08-005. It's the most unusual switch for micro-circuit use.



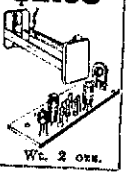
THE MYSTERY BONANZA OF THE YEAR! YOU CAN'T LOSE!

ELECTRONIC "WUT-IZ-IT"

3 for $5.

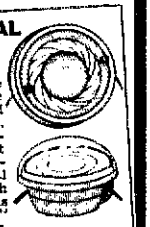
Could be a gadgeteer's parts bonanza (or a gadgeteer's dream). Here's what you get: Mounted in a plastic transistor radio size (3 x 2 x 1½") case is a 2-transistor amplifier attached to a 1¾" diameter PM speaker (excellent for digital beeper clocks), ALSO has a push-push switch, it's powered by an AA battery (not included) in a battery holder. Gadgeteers . . . can you guess? We can't! At this price when you buy the parts alone you can't lose

☐ $1.98



Wt. 2 ozs.

OMNI-DIRECTIONAL MIKE-SPEAKER



Imagine only 1½ x ½". This unusual spiral "space like" capsule with plastic protective cover. Sound travels in any direction. Mike or as speaker. Acoustically one of the highest quality units for many hi-fi, digital & experimental uses. As mike it is high impedance, 20K ohms. As a speaker, finest "beeper" units for digital clocks, whereby the tonal quality is a pure loud tone minus the raspy sounds you may get with standard speakers. With 2-wire leads. 2-Oz.

$2.50

☐ 3 for $6.00

POSTAGE STAMP MOBILE MIKE SPKR ☐ $1.98

This unit is not advertised — anywhere! Made for Motorola Communications at the original cost of $4.50 each (for insertion in their Walkie Talkie Program). It's a 60-ohm imp MIKE. It's an excellent speaker too, covering broad range in sound. Extremely well-made.

INDUSTRIAL SPEED CONTROL ☐ $4.95

A $30 item from G.E. Model 583A (made for Xerox) that controls home, shop and industrial lighting too! A very elaborate circuit for controlling many electrical and electronic devices. Easily controls speeds of electric drills, brush type motors, etc. 115vac, rated at 1100 watts. With variable speed or dimming control in heavy-duty aluminum case. 8 x 2¾ x 2. With diagram and hookups.

NATIONAL LM-340T VR's

* TO-220 Case * 1 Amp * POSITIVE VOLTAGE

$1.50 Each 3 for $3.

Type	Volts
☐ LM-340-05T	5 V
☐ LM-340-06T	6 V
☐ LM-340-08T	8 V
☐ LM-340-12T	12 V
☐ LM-340-15T	15 V
☐ LM-340-18T	18 V
☐ LM-340-24T	24 V

"BLASTAWAY" ON 1N4000 RECTIFIER PRICES

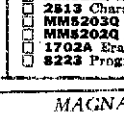
Type	PIV	Sale
☐ 1N4001	50	10 for 45c
☐ 1N4002	100	10 for 55c
☐ 1N4003	200	10 for 65c
☐ 1N4004	400	10 for 75c
☐ 1N4005	600	10 for 85c
☐ 1N4006	800	10 for 99c
☐ 1N4007	1000	10 for 1.29

PROGRAMMABLE TIMER DELAYS UP TO 5 DAYS

XR-2240 14-pin DIP Consists of a self-contained 8-bit programmable binary counter, oscillator, and controlled flip-flop. 4V to 15V supply. Temp. and power supply stability outperforms all others. Power only 12 mW. @ 4V. Programmable capability 256 steps. 8 separate outputs, one for each counter.

☐ $4.95

MICROPROCESSORS! ROMS! RAMS! MEMORIES!



☐ 8008 Microprocessor	$19.95
☐ 8080 Super 8008	100.00
☐ 2102 1024 Static RAM	3.50
☐ 1101 256 bit RAM	1.50
☐ 1103 1024 bit RAM	2.95
☐ MM5260 1024 RAM	1.95
☐ MM5262 2048 bit RAM	3.95
☐ 2513 Character generator	12.50
☐ MM5203Q Eraseable PROM	12.50
☐ MM5204Q Eraseable PROM	9.95
☐ 1702A Eraseable PROM	12.50
☐ 8223 Programmable ROM	2.95

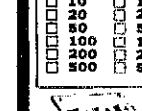
"BEEPER" AND "DATER" CLOCK ON THE CHIPS

☐ MK50250 BEEPER

$6.95

Imagine a chip (MK50250) "Beepin" and audible alarm! All others are external. It also features internal brightness control. The CT7001 requires external triggering of alarm, date of the month and direct drive to LED readouts. Both require minimum current drain and voltages, for either 4 to 6 LED readouts, 12 or 24 hours, AM and PM.

☐ CT7001 Alarm and Date . . . 15.95

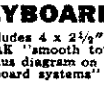


TELE TYPE CHIPS

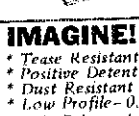
☐ COM2502	UART, 40 pin	$12.50
☐ COM2601	USRT, 40 pin	24.00
☐ KR-2376ST	Keyboard encoder ROM	12.50
☐ NMX-5010	10 channel multiplex	9.95

SPECTROL TYPE 43 RECTANGULAR CERMET POTS

Ohms	Ohms	Ohms
☐ 10	☐ 1K	☐ 100K
☐ 20	☐ 2K	☐ 200K
☐ 50	☐ 5K	☐ 250K
☐ 100	☐ 10K	☐ 500K
☐ 200	☐ 20K	☐ 1 Meg
☐ 500	☐ 50K	☐ 2 Meg



2 for $1.00 ☐ Cermet sealed. Screw driver adjust with idling and stops. Resistance ±10 percent. ¾ watt. Size .750 x .25 x .19.



Touch Tone KEYBOARD KIT ☐ $4.95

Kit includes 4 x 2½" G-10 glass etched pc board, with 10 OAK "smooth touch" white keys with black numerals, plus diagram on "touch tone encoder". Makes many "keyboard systems" readily available. 0-to-9

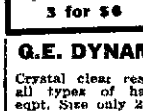
IMAGINE! 7 SWITCHES ON A DIP!

** Tease Resistant Over-Center Switching Action!*
** Positive Detent For Tactile Feel!*
** Dust Resistant Construction!*
** Low Profile–0.3" Max. Height Above P.C.*

Poly Paks exclusive DIP SWITCHES. Provides highly reliable, low-cost means of manually programming a variety of micro-miniature electrical-electronic circuits. Each device rocker actuated. SPST. High reliability. 7 different circuits on a DIP IC type housing makes it ECONOMICAL. Housing of heat-resistant glass-filled nylon material. Fits into 14-pin IC socket, or its phosphor bronze gold-plated connections for PC board use too! Each switch rated at (non-switching) 50 VDC @ 100 ma. Meets MIL specs. Size ¾ x ⅜ x ⅜".

☐ $2.50 3 for $5.

MAGNACRAFT REED RELAY IN A DIP PACK



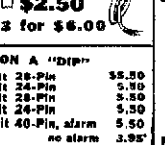
Class 171DIP

$2.50

3 for $6

One of the special outstanding new buys of 1976 for you hobbyists looking for something different in relays. Designed so that you can insert in standard 14-pin IC socket. Rated at 5 volts @ 150 ohm coil, SPST NC contacts. Designed to work with integrated circuits. Max. IC rating 100 mils, breakdown voltage 100 VDC. Needs 1 volt to break circuit. With built-in coil suppression diode.

Q.E. DYNAMIC MIKE



Crystal clear response for all types of ham, audio eqpt. Size only 2½ x 1½ x ⅞". Gray impact case. ON-OFF switch. With multi position stand. 6-ft. of cable for plug and external switch control. 50K ohms imp. 60 to 9000 hz. Wt. 6 ozs.

☐ $2.50

2 for $4.00

CLOCK CHIPS ON A "DIP"

☐ MM5311	6-digit	28-Pin	$5.50
☐ MM5312	4-digit	24-Pin	5.50
☐ MM5313	6-digit	28-Pin	5.50
☐ MM5314	6-digit	24-Pin	5.50
☐ MM5316	4-digit	40-Pin, alarm	5.50
WITH DATA SHEETS ☐ MM5316-A		no alarm	3.95

LED Revolution!

5 for $1

MONSANTO! XCITON! LITRONIX! OPCOA!

.340x.260 Jumbo	.240x.200 Medium
☐ Red	☐ Red
☐ Green	☐ Yellow
☐ Yellow	☐ Green
☐ Amber	☐ Amber
☐ Clear	☐ Clear

Micro .210x.125	
☐ Red	☐ Yellow
☐ Green	☐ Amber

Micro (Axial) MV-50 style
☐ MV-50 Clear . . . . 10 for $1.
☐ MV-55 Red . . . . . 6 for $1.

LINEAR IC'S

CODE: State 1st, 2nd, 3rd Choices of Case Styles. *State Voltages 5 thru 24 (D) = Duals; (Q) = Quads

Buy 3 — Take 10%

RAYTHEON-RCA NATIONAL SIGNETICS

Type	Sale	Type	Sale
☐ LM200	$ .69	☐ LM562	1.95
☐ LM301	.29	☐ LM565	1.95
☐ LM304	.79	☐ LM566	1.85
☐ LM305	1.05	☐ LM567	1.95
☐ LM309H	1.05	☐ LM702	.49
☐ LM309K	1.50	☐ LM703	.41
☐ LM311	.99	☐ LM703M	.41
☐ LM318	1.75	☐ LM709	.25
☐ LM319	1.19	☐ LM710	.29
☐ LM320*	1.25	☐ LM711	.29
☐ LM322	1.75	☐ LM723	.61
☐ LM324 (Q)	1.65	☐ LM733	1.75
☐ LM339 (Q)	1.45	☐ LM741	.31
☐ LM340*	2.50	☐ LM741CV	.31
☐ LM350	.69	☐ LM747(D)	.69
☐ LM370	1.05	☐ LM748	.35
☐ LM373	1.95	☐ LM1458(D)	.69
☐ LM374	1.95	☐ LM1800	3.50
☐ LM376	.49	☐ CA3026	.59
☐ LM377	2.50	☐ CA3045	.59
☐ LM380-8	1.10	☐ CA3054	.89
☐ LM380	1.39	☐ CA3052	.89
☐ LM381	1.69	☐ LM3900	.49
☐ LM382	1.69	☐ RC4195	2.50
☐ LM531	1.95	☐ LM4250C	2.10
☐ LM532	1.95		
☐ LM555	.88		
☐ LM556	2.50		
☐ LM558(D)	.69		
☐ LM560	1.95		
☐ LM561	1.95		

Terms: add postage Rated: net 30
Phone Orders: Wakefield, Mass. (617) 245-3829
Retail: 18-18 Del Carmine St., Wakefield, Mass. (off Water Street) C.O.D.'S MAY BE PHONED

☐ 20c CATALOG Fiber Optics, "ICs", Semi's, Parts

MINIMUM ORDER — $4.00

POLY PAKS

P.O. BOX 942M2 LYNNFIELD, MASS. 01940

Ham-Ads

(1) Advertising must pertain to products and services which are related to amateur radio.
(2) The Ham-Ad rate is 60 cents per word. A special rate of 20 cents per word will apply to advertising which, in our judgment, is obviously non-commercial in nature.
(3) 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.
(4) Closing date for Ham-Ads is the 20th of the second month preceding publication date. No cancellations or changes will be accepted after this closing date.
(5) No Ham-Ad may use more than 100 words. No advertiser may use more than two ads in one issue.
(6) New "commercial" advertisers must submit a production sample of their product (which will be returned) and furnish a statement in writing that they will respond appropriately to customer complaints and will stand by and support all claims and specifications mentioned in their advertising, before their ad can appear.

The publishers of *QST* are unable to vouch for the integrity or for the grade or character of the products or services advertised except those obviously commercial in character.

Clubs/Hamfests

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., 2012 Rockingham St., McLean VA 22101.

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, Westbury NY 11590.

EDITING a club paper? Need public relations help? You should belong to the Amateur Radio News Service. For information write: Sybil Allbright, W6GIC, 8658 Encino Ave., San Diego CA 92123.

THE New York Radio Club invites Hams to club meetings, 2nd Monday of each month, 8:00 PM at the Williams Club, 24 E. 39th St., NYC NY 10016. For information, same address.

THE 21st Annual Ham Auction, America's Largest. Saturday March 13, 1976, at Lucas County Recreation Center, Toledo, Ohio. Auction, Flea Market, Commercial Displays, Prizes, 8:00 A.M. to 5:00 P.M. $1.50 Advance, $2.00 after March 1st. Talk-In 146.52. Send S.A.S.E. Toledo Mobile Radio Association, Box 273, Toledo OH 43696.

RARS 1976 Annual Hamfest, April 11. For details write RARS Box 17124, Raleigh NC 27609.

ROCHESTER Hamfest 1976 combined with the N.Y. State ARRL Convention is Friday thru Sunday, May 21-23. FCC exams. Flea market Saturday only. Your name added to mailing list or information — write Rochester Hamfest, Box 1388, Rochester NY 14603.

25th Dayton Hamvention at HARA Arena April 23, 24, 25, 1976. Technical forums, exhibits, and huge flea market. Program brochures mailed March 8th to those registered within past three years. For accommodations or advance flyer, write Hamvention, P.O. Box 44, Dayton OH 45401.

QSL Cards

TRAVEL-PAK QSL Kit — Send call and 25c; receive your call sample kit in return. Samco, Box 203, Wynantskill NY 12198.

FREE Samples—Stamp appreciated. Samcards, 48 Monte Carlo Dr., Pittsburgh PA 15239.

QSLs, samples 20c. Fred Leyden, W1NZJ, 454 Proctor Av., Revere MA 02151.

QSLs "Brownie" W3CJI, 3035A Lehigh, Allentown PA 18103. Samples with catalog 35c.

DELUXE QSLs, Samples 20c. Petty, W2HAZ, P.O. Box 5237, Trenton NJ 08638.

DON'T buy QSL cards until you see my free samples. Fast service, economical prices. Little Print Shop, Box 9848, Austin TX 78766.

QSLs — Variety, value, quality, custom. Samples and catalog 20c. Alkanprint, Box 3494, Scottsdale AZ 85257.

RUBBER stamps $2.50 includes postage. NJ residents add tax. Clinton Hoar, W2UDO, 32 Cumberland Ave., Verona NJ 07044.

QSLs catalog. Samples 35c. Ritz Print Shop, 5810 Detroit Ave., Cleveland OH 44102.

CREATIVE QSL cards. Personal attention. Imaginative new designs. Send 25c. Receive catalog, samples. Wilkins Printing, Box 787-1, Atascadero CA 93422.

QSL samples 35c. W9CL Press, 15525 Oak Road, Carmel IN 46032.

PICTURE QSL cards of your shack, etc. from your photograph or art work. 500 — $14.00, 1000 — $19.25. Also unusual non-picture designs. Generous sample pack 35c. Half pound of samples 65c. Raums's, 4154 Fifth Street, Philadelphia PA 19140.

DISPLAY and protect your QSL's with 20 frame plastic holders. Seven for $3.00, prepaid. TEPABCO, Box 198T, Gallatin TN 37066.

QSL Cards — Something completely different! Samples: 25c W5UTT; Box 1171C; Garland TX 75040.

QSLs, Second to none. Same day service. Samples 50 cents. Include your call for free decal. Ray, K7HLR, Box 331, Clearfield, Utah 84015.

QSL's, Amateur Radio Commemorative Cup, Stein, Plate, Belt Buckle, Key Chain, Ladies Pendant, free catalog, Rusprint, Box 7575, Kansas City MO 64116.

QSL's — reasonable. Send 2 stamps for samples. Webb's, Box 6, Morganton NC 28655.

QSLs??? "America's Finest"!!! Samples 75c De-Luxe $1. Religious 75c. (Deductible). Sakkers, W8DED, Holland MI 49423.

3-D QSLs — Hallmark of discriminating operators. Samples 25c (refundable). 3-D QSL Co., Monson 2, Mass. 01057.

General

CANADIAN Surplus Catalog and flyers $1. Etcox Electronics, Box 741, Montreal Canada H3C 2V2.

ATTENTION: Sell, swap GLB 400B, 5 kHz, completely assembled. FB shape. VE3EYW/3, 68 Springfield Rd., #3, Ottawa, Ont., Canada. K1M 1C7.

CANADIANS — Wanted Collins S-Line, 32S3, 75S3B. Sell, swap KWM2, NB, mount, ac, dc. Offers? VE6GN, 3615 Underhill Dr., Calgary, Alta., T2N 4E9.

WANTED: Collins mechanical filter type F300K-05. Also F300Z4, F300Z5. Eric Kirchner, VE3CTP, 2 Adirondack Gate, Agincourt, Ont., Canada M1T 3E7.

CASH paid for your unused tubes vacuum variables and good ham and commercial equipment. Send list to Barry, W2LNI, Barry Electronics, 512 Broadway, NY NY 10012.

CALL toll-free (800) 327-7798. 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.

SPIDERS for boomless quads. Heliarc welded aluminum. Al's Antennas, 1339 South Washington Street, Kennewick WA 99336.

VERY in-ter-est-ing! Next 4 big issues $1. "The Ham Trader," Sycamore IL 60178.

TRANSFORMERS rewound, Jess Price, W4CLJ, 507 Raehn, Orlando FL 32806.

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.

MOBILE Ignition Shielding gives more range, no noise. Kits and custom systems. Literature, Estes Engineering, 930 Marine Dr., Port Angeles WA 98362.

TELETYPEWRITER parts, manuals, supplies, equipment. Toroids. S.a.s.e. for list. Typetronics, Box 8873, Ft. Lauderdale FL 33310. W4NYF. Buy parts, late machines.

WANTED: An opportunity to quote your ham needs. 37 years a ham gear dealer. Collins, Drake, Ten-Tec, Swan, Kenwood, Tempo, Regency, Icom, Hy-Gain, etc. Trades, terms. Request catalog. Chuck, WB8UCG, Electronic Distributors, 1960 Peck, Muskegon MI 49441. (616) 726-3196.

BUILD your own radio desk/console cabinet. Design drawings, photographs, $4.75. Bill Morris, WA5RSC, P.O. Box 411 Lubbock TX 79408.

TOROIDS — 44 and 88 mHy 5 — $3.00 P.P. M. L. Buchanan, P.O. Box 74, Soquel CA 95073.

WANTED: Any type of parts for the R-390A. W6ME, 4178 Chasin Street, Oceanside CA 92054.

TELETYPE Equipment for beginners and experienced operators. RTTY machines, parts and supplies. Beginners special: Model 15 Printer and TH5-TG demodulator $125.00. Atlantic Surplus Sales Co., 3730 Nautilus Ave., Brooklyn NY 11224. Tel: (212) 372-0349.

SIGNAL/ONE Repairs. Mandelker (415) 548-1889.

HAM Radio Repair. Expert repair and alignment in our new Lab. Prompt, reasonable. "Grid" Gridley, W4GJO, 3824 Malec Circle, Sarasota, Florida 33581.

MOTOROLA HT220, HT200, Pageboy, and other popular 2M FM transceiver (Standard, Regency, etc.) service and modifications performed at reasonable rates. Hatfield, WA4FRV (804) 272-8403.

UPGRADE Your Ham Ticket Now! Use Posi-Check — original, expertly devised, multiple choice questions and diagrams covering all areas tested over in FCC exams. IBM sheets for self testing. Keyed answers with explanations. New postal rates require new prices. Novice Class now $3.50; General Class (including latest rules and regulations), $5.30; Advanced Class, $4.90; Extra Class, $5.15. Postage prepaid U.S.A., first class only. Also newly revised Radiotelephone Third Class, Elements 1, 2 and 9, now $10.15. Send check or money order to POSI-CHECK, P.O. Box 3564, Urbandal Station, Des Moines IA

WE buy electron tubes, diodes, transistors, integrated circuits, semiconductors. Astral Electronics, 150 Miller Street — Elizabeth NJ 07207. (201) 354-2420.

TEFLON Stock. W9TFY Frank Wirt. Alpha IL 61413.

WANTED: SP-600-JX, SG-3/U, AN/URM-25, TS-588A/U, TS-173/U, TS-174B/U, TS-723/U. Please give your lowest price. John Waskowitz 35-30 73rd St Flushing NY 11372.

DO you need tubes for your rig? Call Bill Salerno — W2ONV (201) 279-7500 - 9-5 P.M. or write 481 Getty Avenue, Paterson NJ 07503.

DESOLDERING aids and hand tools. R. L. Syphers Associates - Box 883 Dept. Q, Bensenville IL 60106.

MANUALS for ham gear before 1967. Large SASE for quote on specific manuals. W@JJK, Hobby Industry, Box Q864, Council Bluffs IA 51501.

NOVICE General and Code Courses are available at the Harrison, New York School of Continuing Education. 10 two hour sessions one evening a week. Contact George Buchanan WB2FVX (914) 761-4183.

AMATEUR Radio vacation paradise! Work and be DX from the lush and plush island of Saint Lucia. Family vacations and DX-peditions. We have the rigs and antennas all set up for you. For reservations and information contact: Planters Inn, Malcom Hobbs VP2LGH, Castries Saint Lucia British West Indies, Tel No. 3352.

HEATHKITS: I've got two, one's for sale. Mint SB104, latest factory mods, receiver sensitivity better than specs, with power supply, speaker, CW filter, $865. Mint SB230 amplifier, $340. All for $1100. Used few hours. Will consider partial trade. You ship. Waters, (516) 541-9355 evenings, weekends.

TELETYPE Model 28: 28RO bases, $35. 3/$100, New Ribbons, $1.50. Typeboxes (WX, COMM or Fractions) $25, ea. ASR base for LXD TD, $25. Base — LXD Stand-alone, $30. M28 cabinets, gears, gearshifts, reperfs TD's, keyboards, terminal units, paper, tape, ASR's KSR's. Send s.a.s.e. L. Pfleger, 532 W. Wilson St., Madison WI 53703.

WANTED: (2) AN/URM 25 D,E,F Signal generators for ARRL Laboratory. 225 Main St., Newington CT 06111.

SERVICE by W9YKA. Professional grade lab, FCC commercial license. Amateur and commercial SSB-FM equipment. Repairs, calibration, modifications, consultation. Low overhead, reasonable rates. Write or call Robert J. Orwin, Communications Engineer, P.O. Box 1032, La Grange Park IL 60525. (312) 352-2333.

PC Board negatives made photographically from your or magazine's artwork. Now obtain professional results quickly, simply 4 X 5 — $3, or s.a.s.e. for information. 19139 Apache Road, Richmond VA 23235. (804) 272-8403.

ICOM, KLM amps for Icoms, CushCraft & Larsen, 2-meter antennas. WØNGS, Bob Smith Electronics, 1226 9th Ave., North, Fort Dodge IA 50501. (515) 576-3886.

CRYPTOGRAPHY devices, machines, books, related material wanted. German Enigma machine especially sought. Leads appreciated. WN2TSK, 17 Alfred Road, Merrick NY 11566. Call collect (516) 378-0263.

FOR SALE: 51J-4 — $1100, with 3 MFS, not surplus, used little, like new. No shipping. See to believe. R. A. Kumada, P.O. Box 6794, Burbank CA 91510.

TV — Serious Experimenters: RCA Military image Orthicon camera, Sync, power supply, 7" monitor, 600 lines resolution, info — Gerry, 34 Newcomb Dr., New Providence NJ 07974.

HEATHKIT: SB-102 — $325; HP-23A with SB-600 — $55; WAØVBG, Loren Hutchinson, RR 5, Trenton MO 64683. Phone (816) 359-2551.

WANTED: information regarding Gonset GSB-2. W1JJR.

STRANDED stainless steel antenna and guy wire, our specialty. Wilcox Electronics, Box 1331, SLC UT 84110.

CW Sendin' machine electronic keyer with memory. Write for complete info: Alan Harp, 718 Magnolia Dr., Lake Park FL 33403.

SELL: 2 meter mobile GE Progress 4 frequency 30 watts complete. Best offer. W9GDM, 811 N. Blanchard, Wheaton IL 60187.

HAMMARLUND HQ-170C, top shape — $110. Eico 722 VFO — $30. Jean Chonoles, 7 Mary Beth Drive, Suffern NY 10901.

HX-10 Marauder with antenna relay and manual — $125. Original owner. W8SGM, 1007 Trinity Ct., Midland MI 48640.

DRAKE TR4-AC-4 RV4 Astatic mike — $575. Heath SB200 — $225. HA1 & key — $65, plus shipping. Holmes, 17 High Field, Madison CT 06443.

HEATH HW-7 QRP, HWA-7-1 PS, MFJ filters — $99; Eico 717 keyer — $65; Johnson Viking Adventurer, mint classic — $50; Gonset IV, 6m — $69. All perfect. WA2OVG, Hank: (212) 796-8617.

WANTED: one each Collins 75A4 filters, 500 Hz, number 455-J-05 and 6 kHz, number 455-J-60. W3BFF, 10 Barstow Ave., Towanda PA 18848.

SB-102 with six figure frequency display — $500. Zack Botwinick, 4721 NW 19 Court, Lauderhill FL 33313.

VENUS Slow Scan II, mint condition — $225. WB2FQH, Larry Satis, 131 Station Road, Kings Point NY 11024. Tel. (212) 343-6620.

RECEIVER — $150. 2 MHz through 32 MHz in four bands. Technical Material Corp. R-5007/FRR-502. Compact — only 28 pounds, including 115 V power supply. This receiver was the heart of the U.S. Navy's AN/FRA-501A receiver system. Just plug into power and antenna, add speaker and enjoy a great receiver! Service manual — $12.50. RCS-3 audio/cw filter — $18.50. RSF-2 audio filter — $10. Auxiliary power supply (not required for R-5007) — $16. W6BKY, Box 1633, Palo Alto, CA 94302.

FREQUENCY meter, LM-21 — $25. "Old Reliable" with original calibration book. W6BKY, Box 1633, Palo Alto CA 94302.

GONSET Communicator IIB (6 V) w/mike, crystals, instr., spare 2E26, 18" whip — $65. FOB 25 lbs. W6LLT, (916) 383-9455.

TECH Manuals — $6.50 each; SP-600JX URM-25D, OS-88/U, BC-348JNQ. Thousands more available. Send 50c (coin) for large list. W3IHD, 7218 Roanne Drive, Washington DC 20021.

WILSON M104 4 el. 10 m monobander, new. W8OY, Frank White, 19601 N. Park Blvd., Cleveland OH 44122.

SELL: Heath SB-303 CW/SSB filter — $350; SB400 — $225. Cables, books, both for — $550. WI dlvr Conn, NYC, West LI, West Mass, V. Paounoff, Woodgate Apt., Enfield CT 06082.

WANTED: Tennalab No. 20G reactance tuned coax gamma with insulator complete, for 3-element, 20-meter beam. Don Rank, 906 Lake, Marblehead OH 43440.

SELL: Drake T4X, R4A with AC-3 power supply — $650 package. Also GC-105 2-meter transceiver — $65. All equipment good condition. You pay shipping UPS. Remit by certified check or money order. Kuklinski, WA2GPF, 14 Grove, Waldwick NJ 07463.

SELL: Eico 753 xcvr — $120; SB101 with cw filter, AC supply, Ameco preamp & SB600 — $365. WB2DXL (212) 324-5463.

WANTED: Heath Phone Patch; pair of matched 572B tubes in good condition. WB2DXL, Bob Uhrlass, 438 E. 239 St., Bronx NY 10470.

SELL: Hammarlund HQ 110A w/clock and manual — $150 shipped or best offer. Used by prospective ham who did not get license. Also sell HW 202 w/manual and car antenna for $100 that has been a headache. WB4NLU, Frank Law, Rt. 2, Ansley AL 36001.

JOHNSON 275 Match-box with SWR meter and book — $75; Eico 730 Modulator-Driver — $45; Gonset III 6 meter with PTT mike — $75. All in first class condition. JE Howe, 92 Lawlor Terr., Stratford CT 06497.

TRADE priceless antique only one in world. Key with memory QST July 1953 for 75S-3 with cw filter. H. Habig, 3531 Beldare, Cincinnati OH 45220.

WANTED: Yaesu FT101B or E, complete Novice station, N.R.I. Ham Texts. McReynolds, 2301 York, Quincy IL 62301.

LAFAYETTE HA-800B w/HE-48C $105; Gonset G-50 6m Communicator $150; Galaxy GT-550A, AC supply, VX-35C, CAL-25, 454HC mike, soft finals $400. WA4KVM, 3205 Tacon Street, Tampa FL 33609. (813) 837-6243.

HEATHKIT SB102 Transceiver with HP23B power supply and SB600 speaker — $400; SBE SB-144 2M FM Transceiver with 12 sets of crystals — $175; National NC-155 Receiver — $80; Hallicrafters HT40 Transmitter — $40. Ron Rech, WB9EPZ, 325 Hickory Dr., Burlington WI 53105.

WANTED: Lafayette HA600 Receiver: working or not, Heath phone patch, Heath Spectrum analyzer. Don Morar, 3663 Hipsley Mill Rd., Woodbine MD 21797.

WANTED: WWII surplus bug by Lionel Corp, good condition. W6PZJ, 260 Margarita Ct., Los Altos CA 94022.

SELL: Telrex 5-element 20 mtr Monobander in excellent condition. Make offer. So. Cal only as you pick up. WA6BXD, 7151 Bel Air, Corona CA 91720. (714) 734-1205.

WANTED: on behalf of an overseas collector, a National SW-3 and a National 1-10. W1RU, ARRL Hq.

WANTED: Power xfmr Eico scope 460. Leo Penn, K7MAG, 824 Chadwick, Silverton OR 97381.

SELL: HRO-60, spkr, coils, xtal cal, nbfm — $200. Leo Penn, K7MAG, 824 Chadwick, Silverton OR 97381.

SELL: Drake TR22C with xtals — $165; HP-25 calculator with application books, case and warranty — $160; HQ-215 rcvr with Collins 500 Hz filter and speakr — $175; HW-7 with power supply — $50; DX-60 — $40. All in A-1 condition, all with manuals. D. Tancig, 1813 Greendale Dr., Champaign IL 61820.

HOOSIER Electronics — Your ham headquarters in the heart of the Midwest. Factory-authorized dealers for Kenwood, Collins, Drake, ICOM, Ten-Tec, Regency, Atlas, Tempo, Swan, Midland, Alpha, Standard, Genave, Hy-Gain, CushCraft, Mosley, Antenna Specialists, Curtis, CDE, and others. For the best deal around on HF or VHF gear, see us first or see us last, but see us before you buy! Write or call today for our low quote and become one of our many happy and satisfied customers. Hoosier Electronics, P.O. Box 2001, Terre Haute IN 47802. (812) 238-1456.

FOR SALE: Kenwood R-599A rcvr, like new — $315. W8SQO, Route 1, ONA WV 25545. (304) 736-6563.

SB102, 630 & 600 w/pwr. Mint condition — $500 takes all. WA2ULK, Lockport NY 14094. (716) 433-7646.

WANTED: Collins 180S-1 Antenna Tuner and CP-1 Crystal Packet. Merle Fulton, W5PQQ, P.O. Box 707, Seabrook TX 77586. Phone (713) 483-4201 or (713) 474-4684.

KENWOOD TS-520 — $500. KLM Echo II — $250. Both like new. WA7AQD, 9880 East Celeste, Tucson AZ 85730.

COLLINS 75S3, 32S3, phone patch console & power supply. Heathkit SB-200 linear; SB-301 receiver with CW crystal filter and 6-meter converter; HW-12A and HP-13B power supply. All mint condition. All for $1500, or make offer on individual items. Sydney Horn, 343 Broad St., Lake Charles LA 70601. (318) 439-4579.

FOR SALE: Swan 500C, no power supply — $285. Phil, WB5HQN, 109 Hollywood Drive, Edinburg TX 78539.

KWM-2, PM-2, CC-1, mint — $695. K6SGD. (415) 364-1256.

WANTED: Pilot Super Wasp, ac or dc. W0GUX, 3957 Minnehaha Ave., Minneapolis MN 55406.

WHO can sell me a drilling template for Ted Crosby's H.B.R16 receiver, October 1959 QST. Paul Brauer, 1318 Lakeshore Drive, Hot Springs Arkansas 71901.

MUST Sell — Hallicrafters Cyclone SB-400 transceiver with break-in CW, R.I.T., sidetone, ALC power supply, w/speaker, good condition, best offer over $450. WB2HJW, Craig Vagell, 6 Crest Road, Cedar Knolls NJ 07927. Call (201) 267-3472 evenings, (201) 538-3188 days.

WALNUT carpenters chest 140 years old. Trade for HRO60. George Hudson, R2, Pine City NY 14871. (607) 733-6984.

WANTED: Freed Eisemann NR 45, a 1925 battery broadcast receiver. Need insides to restore my folks first radio. W7IYY, Rt. 3, Box 1134, Troutdale OR 97060.

GONSET Comm IV, 2 meter, Gonset VFO, both $175. Mint condition. WA2WEW, 182-69 Radnor Road, Jamaica NY 11432. (212) 380-5633.

HEATHKIT SB-220 linear — $350; SB-610 monitor — $75; Viking II transmitter and VFO — $50. B&W TVL complete set coils, QST's back to 1940. W9QMM, 1322 14th St., Bettendorf IA 52722.

SELL: Shure microphone model 444, mint — $22. Plus shipping. W3HZ.

HQ-110C — $75; DX-100, needs work — $50; Hallicrafters S-36 VHF receiver — $50; HW-29A — $20. All with manuals. Want Wilson DB-54, prop pitch. Dale Hammer, Colonial Crest, Apr. 222, Muncie IN 47304.

CLEGG 22er xcver — $125; Clegg 22er MK II xcver, built-in VFO — $175; Gonset Comm-IV, two meters — $125; Deltron portable lag, P/S, volts 15, current 5 amps, fully adjustable and limiting. Two meters — $90; Hallicrafters HA20 VFO, w/SWR wattmeter — $120; Hallicrafters HT44, SX117, PS150-120 — $310. Colella, WA2HQD, 105-18 131 St., Richmond Hill NY 11419.

COLLINS 51J2 — $225; R-390A — $325; Hickok 288X signal generator — $35; Gertsch FM-3 — $90. W4GRP, Bert Kuschner, Rt. 1, Box 982, Eau Gallie FL 32935.

SELL: RTTY model 28 KSR for $250 or will trade for 2-meter equipment. WA9NZO, Leon Kirschemann, Regent ND 58650.

WANTED: a copy of Philips code, any edition. D. Ross, 642 S. 84 St. Oma. NE 68114.

ANTENNAS: dipole, multiple band arrays, 15 thru 75 meters from $59.50. Mobile antennas — CB, 20M, 40M and 2M from $19.50. Baluns: 1:1 and 4:1 — $12.95 ea. Data available. Savoy Electronics, Inc., P.O. Box 5727, Ft. Lauderdale FL 33310.

DRAKE T-4XC transmitter — $415; AC4 power supply — $85; both like brand new. Will sell separately. 1100 foot roll of new, unused RG-8/U — $150. R. Myers, 221 Long Swamp Rd., Wolcott CT 06716. (203) 879-0561.

"DON and Bob" new guaranteed buys. CDE HAM-2 117.00; Belden 8448 rotor cable 13c/ft; CD44 89.95; Mosley Classic 33 179.00; HyGain TH6DXX 192.00; write prices 18AVT/WB; Belden 8214 RG8 foam coax 13c/ft.; 8237 RG8 19c/ft.; RG62B/U 10c/ft.; Raytheon 811A 15.00/pr.; CDE .001/10KV doorknob cap 1.95; Vista XXR 20A/12V DC supply 69.95; quote KLM 20M/40M big sticks; quote TS520, TS700A, Atlas 210X; write needs on items not listed. Collins, handbooks, callbooks, good until March 1. Prices FOB Houston. Madison Electronics, 1508 McKinney, Houston TX 77002. (713) 224-2668. Nite (713) 497-5683.

SELL: TR4C, MS4, AC4 — $525. No shipping. WB2IWH. (201) 523-1437, after 2300Z.

LICENSE plates wanted. Ham plates fascinate me. Starting collection as hobby. Can anyone help me? All postage cost reimbursed. Send plates to Susan Sutera, 1742 Schulte Hill Dr., Maryland Heights MO 63043.

WANTED: Globe King 500 or similar high-power, plate-modulated AM rig. WA4WRZ, Wilbur G. Culpepper, Jr., 203 Cavalier Blvd., Portmouth VA 23701. Phone (804) 399-2166.

QST 290 issues before 1964, make offer, some 1925. SASE for list. W8EYU, 1455 Rochingham, Rochester MI 48063.

WANTED: Heathkit SB-610 monitor scope and SB-630 station console, also SB-220 linear. Norman Breisford, 378 Jackson Ave., Stratford CT 06497. (203) 378-4887 after 5 P.M. or 375-5835 week days.

ROBOT mint 70A 80A macro lense, hoods, cables, cartons, manuals — $550. Will ship C.O.D. WA7VSG. (503) 649-9157.

HALLICRAFTERS FPM-300 — $325; Johnson Matchbox 275W with SWR and TR Relay — $85. Tom Howey, K-20 Fairways Apts., Blackwood NJ 08102. (609) 227-6609.

FOR SALE: Heath SB104 with cw filter, HP-1144, SB604 and HDP-21-A — $700; AR 40 rotor, 100 feet cable, never used — $45; Morgain 75 thru 10 HD dipole still in box — $55; DX60B — $55; Skyland triband 2-element quad with H&H ring x former — $140, never used. Ship all but quad. WB4ZCD, 81 Southview, Fort Thomas KY 41075.

WANTED: Collins F455FD-04 filter, will pay $35. WB4ZCO, 81 Southview, Fort Thomas KY 41075.

SELL: KWM2 - 516F2 - 312B4. N.C.L. 2000, all perfect $1100, including shipping. J. J. Perry, 177 Paris Road, New Hartford NY 13413. (315) 724-5374.

SELL Postpaid: 14AVQ antenna — $43; new Johnson 4, 5 kV, 300 pF, dual differential variable — $22. WA2QEA. (315) 866-0234.

BUY Sell Trade. Write for free mailer, give name, address and call letters. Complete stock of major brands. New and reconditioned equipment. Call us for best deals. We buy Collins, Drake, Swan, etc. SSB & FM. Associated Radio, 8012 Conser, Overland Park KS 66204. (913) 381-5901.

NEW RCA Cassette Recorder; new RCA WT501A, mint Minox IIIs — mtr., flash; KE93-ACPS, mtr.; best offers? Chester Benson, 732 So. 14th, Richmond IN 47374.

COLLINS 75S-1 with cw filter, 32S-1 new finals, 516F-2, manuals, good condition — $638 UPS Paid. WA2DMF. (201) 795-2812.

FOR SALE: HR-10B rcvr — $65; Ameco TX-86 xmtr and Knight VFO — $70, $120 takes all. WB2ZYR, 36 Wolf Hill Drive, Warren NJ 07060. (201) 647-0207.

MY junkbox runneth over! Hallett shielded ignition parts. 500W, 1 kW plug in coils. HRO dial, capacitor. National XR60-63 coil forms. Meter list. Relays. Jerrold wired TV outlets. Keyboard keyer. Viking I parts. TWT amplifier. 100kc standard. VOM calibrator. And more. Gene Hubbell, W7DI, 6633 E. Palo Verde Lane, Scottsdale AZ 85253.

TRISTAO CTL-454 galvanized heavy duty 3 section tower, motorized up down 54 footer — $300. Pickup W2ETB.

HEATHKIT SB-102, SB-600, HP-23B. All mint — $400. John Wallack (K1THO), 6 Otis Place, Boston MA 02108. (617) 227-8976.

WANTED: Ameco TX86 xmtr — ok if not working — state price and condition. W3KBR. D. Klingler, 801 S. 60th St., Harrisburg PA 17111.

WANTED: SB620, HM-2103, FV-400. Sell: QF-1, HD-15. Thurber, 372 Crabapple, Wright-Patterson AFB OH 45433.

LOOKING for used gear? Buyers & Sellers Radio Brokerage has the equipment you want. Call weekdays (617) 536-8777, or send s.a.s.e. for monthly listing. Buyers & Sellers, Box 73, Boston MA 02215.

SELL: Mint condition SB-303 and SB401. All crystals and filters — $575 or $300 each. IM2202 - 3-1/2 digit DVM kit (not built) — $120. D. E. Altwies, 4310 Laurel Drive, St. Joseph MI 49085. Telephone (616) 429-8523.

MODEL 14 Typing Reperf — $30; Vesto 33' tower — $65; new HyGain quad — $125; new Ham II rotator, 100' cable — $100. W8KV, POB 4, Chillicothe OH 45601.

VENUS SS2 monitor, shield and camera adaptor — $325; camera model C1 and tripod — $400; Clegg 22'er MK II, mike and cords — $165. WA1DTN, Box M, Fall River MA 02724. (617) 674-3531.

SELL or Trade: Swan 500C, 508, 117XC; Johnson Kilowatt with desk and Ranger; Hallicrafters S-27, SX-28A, SX-62A; BC-749 Super-Pro; General Radio 736-A, 760-B, 1107-A, 1212-A, 1606-A; H. P. 803A VHF Bridge; Kay 11A Mega-Sweep; Freed 1030A Q-Meter. Much misc. ham gear. Want KWM-2, SX-43, tower, beam, etc. S.a.s.e. Roy Shelso, W6RBV, 18042 Lassen Drive, Santa Ana CA 92705. (714) 633-1855.

FREE with Drake SPR-4 receiver, MS-4 speaker, AL-4 antenna — $480. WN2VYY, Glenn Kaufman, Glen Rock NJ 07452. (201) 444-7099.

NEW Heath IB1100 frequency counter kit complete, packages never opened — $95. Bob Robb, Box 372, Hector MN 55342.

VALIANT 1, Hallicrafter S129, SCR-211-F freq. meter. Best offer. Jack Cook, VE3AMP/W4, 16102 Highland Ave., Lutz FL 33549.

312B-5 — $375; KWM 2 — $900, both rd.; KWM-2 — $525; 312B-5 — $350, both wing; 516F-2 — $110; BTI-2000 — $600. Want 50' Sky Needle, S-line. K6KYB, 5301 Rockledge Dr., Buena Park CA 90621.

WANTED: Delco CVT-1 (spark plug) fm transceiver. K4GBL. (912) 883-7373.

SELL: Minicomputer, BIT Model 480, w/8K core memory, mint, make offer. W2VDN, 19 Schuler, Waldwick NJ 07463. (201) 933-5134.

SELL: Standard SC-ARPT-1 2m repeater, Hal ID-1A identifier. Doug LeFever, 233 E. Ferdinand St., Manheim PA 17545.

PM2, like new, all cables — $75; Omega noise bridge — $20; 6N2 — $50; Tymeter 24 hr. clock — $15. All QST since October 1970 — $35. Swank, 657 Willabar, Washington CH OH 43160.

SELL Hy-Gain vertical 18 AVT/WB-A 10 to 80 meters — $75, you ship. Earp, 8007 Dobbin Road, Richmond VA 23229.

R392 with manual — $159. FOB. Mike Bae, B-11, Southbranch NJ 08881.

GENAVE GTX-2, 18 xtals PL wired, excellent condition — $150. WA2WEW, 182-69 Raonor Road, Jamaica NY 11432. (212) 380-5663.

SELL: Heath SB-101 with HP-23A. Excellent condition — $315 certified, ppd. Lt. R. Ciesla, WA2AKN/3, Army Depot, New Cumberland PA 17070.

WORK the world. SB-200, well worth $200. Pick-up only. George, WA2FCC. (516) 585-3857.

HUSTLER 4BTV 40-10 vertical — $35; Hustler RM75S 3.8 mc. resonator — $15; Cushcraft 21 mc. 3-ele. beam — $35; Heath HG-10 VFO — $30; NPC Company 103R 12 V. 4 amp regulated supply — $25; solar cell panel, sunlight to 12 V dc, 80 mA. Dick Shideler, 3731 Evergreen, Visalia CA 93277.

FOR SALE: Heath SB230 kW amp — $265; Dentron 160 - 10 ant. tuner — $85. Call (213) 349-6543, Ed Schneider, W6SLT, 9514 Vanalden Avenue, Northridge CA 91324.

TOP Dollar paid for Rohn 25, 45 tower sections and associated hardware. Will take down/pick up within several hundred mile radius. Sell HP-120A rack mount scope — needs alignment. Rusgrove, RFD3, Polly Dan Rd., Burlington CT 06013. (203) 584-0776.

COLLEGE is expensive! Must sell HW-101 with HP23 and RP speech processor — $290; TR-22C with 19-79, 52-52, 34-94, 22-94, 94-94, and 16-76 — $190. Both postpaid. Mark Forbes, WB9PHM, 1009 Beech, Normal IL 61761. (309) 452-3462.

2-Meter, 4 channel MOTRAC, T43MHT, all solid state, except driver and final, tuned up with 34-94, 22-82, 16-75, and 52-52. 50 watts output. Very clean, with accessories — $350; CDC AR-22R rotator and cable — $15; Drake VHF converter console, power supply, and calibrator — $15; HP415C power meter without bolometer — $10; Western Electric touch tone pad — $5; used 4-1000A with socket — $10; Shure 404C and Electrovoice 600E mobile microphones — $10, each; homebrew 432 40-watt amplifier — $15; Triolab 0-5 volt VTVM — $5. Including shipping cost with remittance. Bruce Palmer, WA0VPY, 120 East Signal Drive, Rapid City SD 57701. (605) 343-6519.

51J4, KWS1, surplus bargains. W1IOW, 115 Aaron Ave., Bristol RI 02809. (401) 253-8964.

MUFFIN Type Fans — 4-11/16 X 4-11/16 X 1-1/2, 115 V, 50/60 Hz, used, test ok — $7.95 ea., postpaid. C. Taylor, Box 7324, Shawnee Mission KS 66207.

PRECISION, adjustable, solid-state power supply, ±15 V dc at 1-1/2 amps, regulated simultaneously with 10 V dc at 3 amps, unregulated, plus over 900 parts worth $400, list. Includes 182 transistors, IC's, diodes, and FET's, numerous resistors, capacitors, crystals, inductors, varicaps and delay lines. Components have long leads. Transistors will operate in Heathkit TVs. Semiconductor characteristics, circuit diagrams and circuit functions included. New Cartrivision VTR electronics unit — $19.95 plus $1.50 shipping. 50c for brochure. Madison Electronics Company, Inc., P.O. Box 369, D66, Madison AL 35758.

FOR SALE: Hammarlund HC-10 converter with manual, good condition. S. E. Hyatt, Box 629, Canton GA 30114.

HEATH GR-54 receiver, best offer. WN2AVM. (516) 864-2169.

THE need to achieve is coupled with a high task-orientation and a singleness of purpose — the Greene center insulator Balun is all that — brochure — W1CPI.

FOR SALE: Johnson 380 220 MHz fm, 8 watts, 6 channels — $150; 3/4 in., 75-ohm hardline, 250 ft. lengths — $50. After 9 P.M. C. Carroll. (203) 224-4603.

DRAKE DC-4 pwr supply in good shape, for sale — $75. Call Robert Christmann, WB2PRC at (914) 477-3927.

ANTIQUE Radio items purchased and sold. Radio Americana, Box 128, Woodstock NY 12498.

TENTEC; Cohoon Amateur Supply, Trenton KY 42286. Will trade or sell.

WHOLESALE Prices; on Antenna Specialists, Mosley, Hy-Gain, Regency, Tempo products. S.a.s.e. brings quotation. Taled Electronics, Pine Tree Hill Road, Newtown CT 06470.

RTTY — NS-1A PLL TU (RTTY Journal 1/76). Improved version, AFSK, FSK. Wired/tested — $29.95 ppd. S.a.s.e. for info. Net Stinnette Electronics, Tavares, FL 32778.

NEW rf wattmeters for sale: Dielectric Communications Model 1000 — $125; Elements — $35. Direct replacement for Bird 43, accepts all 43 type wattmeter elements. Call Tucker Electronics Co. Toll-free (800) 527-4642. In Texas call (214) 348-8800.

HOSS-Trader, Ed says, "We refuse to be undersold: If you didn't buy it from the Hoss you paid too much. Shop around for the best price, then telephone the Hoss last. New Atlas 210 transceiver — $519; Demo TR4-C — $489; new Display Swan 700-CX — $539; Demo T4XC — $469; Demo HR-2B — $179; new Icom Model 230 demonstrator — $419; new Rohn 50-ft. foldover tower, prepaid — $359; demo Ham-2 rotator — $116.95; new display Atlas 210X — $539.95; Hoss-trader specials: TR-4 — $395; R-4C — $429; new Display L4-B linear — $675. New Collins at old prices, factory sealed, make offer. Moory Electronics Company, P.O. Box 506, DeWitt Arkansas 72042. Tel (501) 946-2820.

WANTED: QST magazine from 1920, 1919 and 1916, ARRL Handbook editions 1, 5, 8. Ed Kalin, WA1JZC, 75 Tumblebrook Lane, West Hartford CT 06117. (203) 233-9915.

DISCOUNTS on all Astatic, Electro-Voice, and Shure microphones. Astatic D-104 w/UG8 PTT stand; 32.68 Shure 444 — $25.87. All units new and guaranteed. Include .95c shipping w/check or request COD. Send for free brochure of microphones, coax cables and connectors. Advance Sound Company, 781 Deer Park Road, Dix Hills NY 11746.

ATTENTION: Interested in Christian fellowship over the air? Write: WA4UIB, Larry Conner, 23102 57th West, Mountlake Terrace WA 98043.

SIGNAL/ONE: CX7B — $1,695, warranty; power transformer — $110. Payne Radio. (615) 384-2224, anytime.

FOR SALE: Eico 753 with 751 p.s., very stable VFO, in good working condition. Asking $160. WA3YRP. (302) 734-7277.

Jobs for Hams

WANTED: For employment in ham store. Technician/sales person. Send resume. Conley Radio Supply, 101 South 31st Street, Billings MT 59101.

COUNSELOR: over 19, Gen. Class Operator, Summer camp in Maine (July-Aug.) Exc. salary + benefits. Allowance for own rig. Write: Steinberg, Director, P.O. Box 178, Carle Place NY 11514.

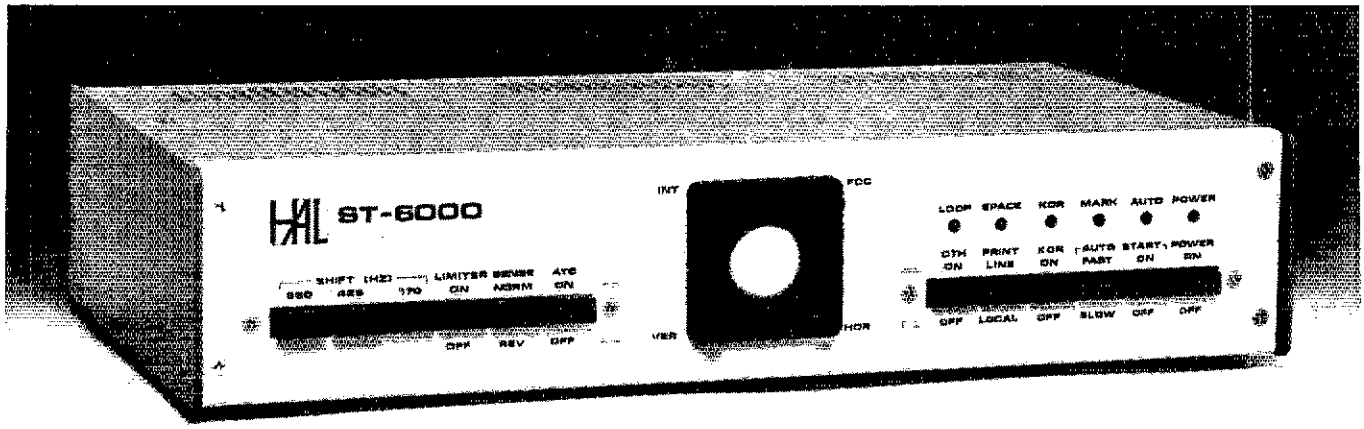
COUNSELORS — Ham radio, electronics, rocketry, auto mechanics, children's camp, NE Penna. Write Corpuel, 633 Barnard Av., Woodmere NY 11598. (516) 295-5544.

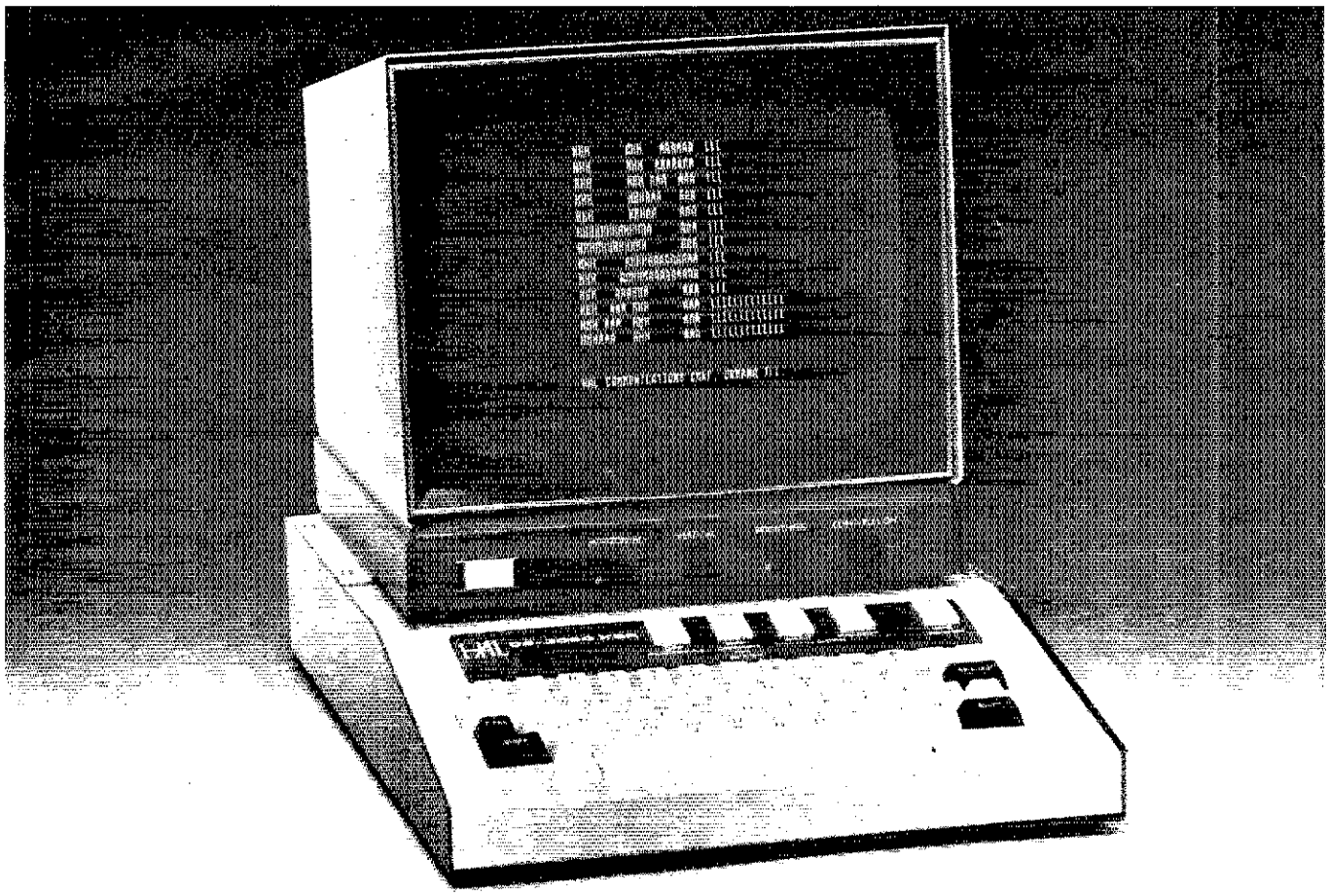
COUNSELOR: Penna. Brother-Sister Camp seeks Ham Radio college man with a General License. David Blumstein, 1410 East 24 St., Brooklyn NY 11210.

WANTED: Electronic Instructor, general. Theory, workshops. Summer science camp. Write Eppstein 4 B, 440 Westend Ave., New York NY 10024.

Index of Advertisers

Stay tuned for future programs.





The HAL ST-6000 demodulator /keyer and the DS-3000 and DS-4000 KSR/RO series of communications terminals are designed to give you superlative TTY performance today —and in the future. DS series terminals, for example, are re-programmable, assuring you freedom from obsolescence. Sophisticated systems all, these HAL products are attractively priced—for industry, government and serious amateur radio operators.

The HAL ST-6000 operates at standard shifts of 850, 425, and 170 Hz. The tone keyer is crystal-controlled. Loop supply is internal. Active filters allow flexibility in establishing different tone pairs. You can select AM or hard-limiting FM modes of operation to accommodate different operating conditions. An internal monitor scope (shown on model above) allows fast, accurate tuning. The ST-6000 has an outstandingly high dynamic range of operation. Data I/O can be RS-232C, MIL-188C or current loop.

The DS-3000 and DS-4000 series of KSR and RO terminals provide silent, reliable, all-electronic TTY transmission and reception, or read-only (RO) operation of different combinations of codes, including Baudot, ASCII and Morse. The powerful, programmable 8080A microprocessor is included in the circuitry to assure maximum flexibility for your present needs —and for the future. The KSR models offer you full editing capability. The video display is a convenient 16-line format, of 72 characters per line.

These are some of the highlights. The full range of features and specifications for the ST-6000 and the DS series of KSR and RO terminals is covered in comprehensive data sheets available on request. Write for them now—and tune in to the most sophisticated TTY operation you can have today... or in the future.

HAL Communications Corp., Box 365, 807 E. Green Street
Urbana, Illinois 61801 • Telephone: (217) 367-7373

NEWS BULLETIN

YOU'LL L♥VE YOUR NEW

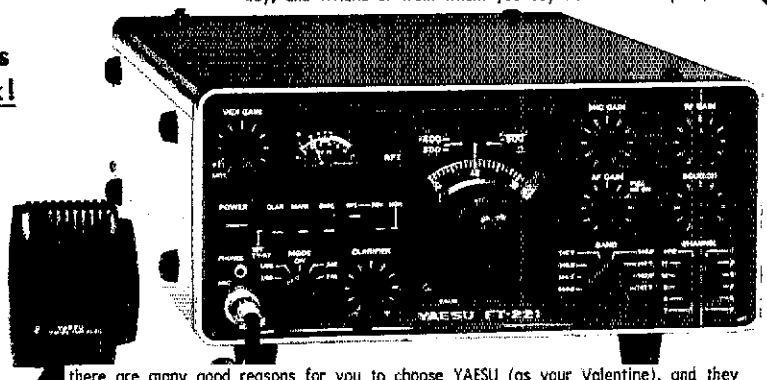
YAESU from Burghardt INC. AMATEUR CENTER

"America's Most Reliable Amateur Dealer"

DEAR OM:

If you've been thinking "YAESU" — but haven't quite decided on just what model to buy, or where you might get the "best deal" — then we've got GOOD NEWS for you!! Believe it or not, BURGHARDT AMATEUR CENTER in Watertown, South Dakota — of all places — has the COMPLETE LINE of YAESU products in stock for immediate delivery, and we're ready, willing & able to serve you NOW!!

We have always held that there are TWO IMPORTANT FACTORS in any purchase of ham radio equipment — the PRODUCT and the DEALER — or, in other words, WHAT you buy, and WHERE or from whom you buy it. In this respect,



there are many good reasons for you to choose YAESU (as your Valentine), and they are best summed up as PERFORMANCE AT THE RIGHT COSTS!! Whether your interest lies in HF or VHF — YAESU truly is "your assurance of performance and quality"!!

Likewise, there are many reasons for you to buy your YAESU from BURGHARDT AMATEUR CENTER — you'll LOVE our Fast-Delivery, Honest-Dealing, Top-Dollar Trade-Allowances, etc. — but mainly it is our RELIABLE/PERSONAL SERVICE that is sure to capture your heart. Since all new YAESU products are warranted for 90-Days EXCLUSIVELY by the selling dealer, it is important for you to know that in the final analysis, the reputation of the dealer standing behind your purchase is worth as much or more than the quality of the product itself.

At BURGHARDT AMATEUR CENTER, we pride ourselves on REAL honest-to-goodness personal SERVICE, and we stand SQUARELY behind each and every item we sell. Our record over the past 38 years as "AMERICA'S MOST RELIABLE AMATEUR DEALER" speaks clearly for itself. When we say "service with a smile" — we MEAN IT, and it's your smile that we're after!! There's no question that YAESU has the RIGHT PRODUCT for you — and there's NO DOUBT that we'll give you the kind of SERVICE you deserve when you're buying the BEST!!

For a "SWEETHEART" of a deal, write or call us today!!

The complete line of YAESU units and accessories . . . Now In Stock!

FT-101E XCVR w/processor	$749
FT-101EE XCVR w/o processor	$659
FT-101EX 80-10M/AC only XCVR	$599
FT-401B 560-Watt/80-10 XCVR	$599
FL-101 80-10M Transmitter	$554
FR-101S 160-10M Receiver	$499
FR-101S/Digital Receiver	$659
ACCESSORIES:	
FL-2100B Linear Amplifier	$359
YO-100 Monitor Scope	$199
FTV-250 2-Meter Transverter	$229
FTV-650B 6-Meter Transverter	$199
SP-101B Speaker Console	$ 19
SP-101PB Spkr/phone Patch	$ 59
FA-9 Cooling Fan	$ 19
XF-30C 600Hz. CW filter	$ 45
MMB-1 Mobile Mount	$ 19
YC-355D 200MHZ. Counter	$289
YP-150 Dummy-load/Watt-meter	$ 74
YC-601 Digital Readout	$179
VHF FM & SSB TRANSCEIVERS:	
FT-221 2-Meter AM/FM/CW/SSB	$679
FT-224 24-Channel/2 Meter FM	$249
FT-620B 6-Meter AM/CW/SSB	$449
200-R "Sigmasizer" 2-Meter FM Synthesized XCVR	$449

Burghardt INC.
AMATEUR CENTER

124 First Ave. N.W. — P.O. Box 73 — Watertown, S.D. 57201

WE'RE FOR REAL!!

There's No Doubt About It!

73's STAN BURGHARDT WØIT
BILL BURGHARDT WNØNBO
JIM SMITH WBØMJY

The radio that makes the most of your money.

Look around anywhere, and we doubt if you'll find a base transceiver with a power-to-price ratio as good as the Yaesu FT-401B. This is a radio with everything you've ever wanted for ease of operation, round-the-world coverage, and feature upon feature in both the transmitting and receiving sections. Including 560 watts SSB PEP, and 80 meter through 10 meter transceiving coverage. What's more, the FT-401B is backed up by a strong warranty, a nationwide dealer network and convenient service.

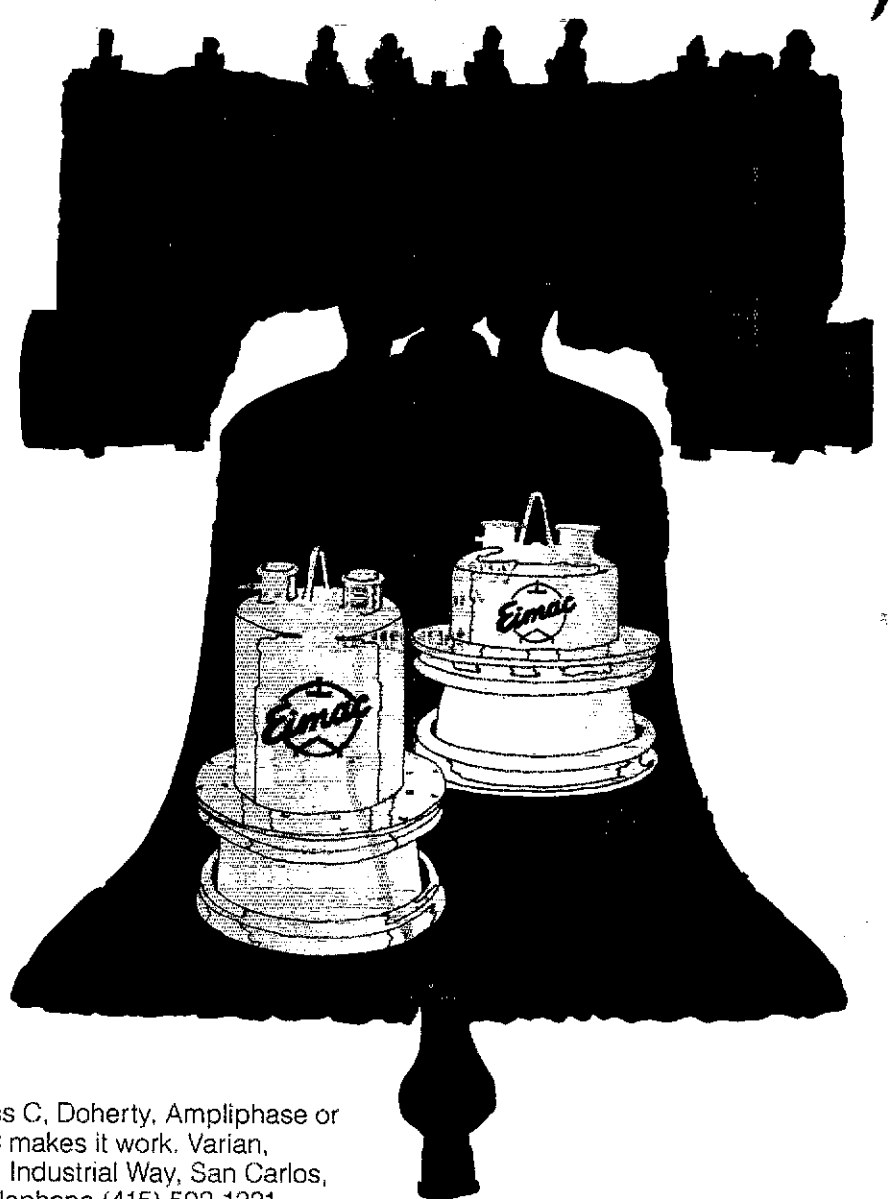
So if you're ready to power up to one of the world's most popular rigs, get the radio. The FT-401B. From the world's leading manufacturer of amateur radio gear.

See your dealer or write for our catalog. Yaesu Musen USA, Inc., 7625 E. Rosecrans, No. 29, Paramount, Ca. 90723.

YAESU

The radio.

When the FCC approves a 750kW power level for 12 clear channel AM stations to better serve the people of the United States, EIMAC tubes will do the job.



Your choice for Class C, Doherty, Ampliphase or PDM service.EIMAC makes it work. Varian, EIMAC Division, 301 Industrial Way, San Carlos, California 94070. Telephone (415) 592-1221.

varian