

QST

devoted entirely to Amateur Radio

July 1976

\$1.00



**Come along, too! The
ARRL National Convention,
Denver, July 16-18.**

INTRODUCING



- *Phase lock-loop (PLL) oscillator circuit minimizes unwanted spurious responses.
- *Hybrid Digital Frequency Presentation.
- *Advanced Solid-state design...only 3 tubes.
- *Built-in AC and 12 VDC power supplies.
- *CW filter standard equipment...not an accessory.
- *Rugged 6146-B final amplifier tubes.
- *Cooling fan standard equipment...not an accessory.
- *High performance noise-blanker is standard equipment ...not an accessory.
- *Built-in VOX and semi-break in CW keying.
- *Crystal Calibrator and WWV receiving capability.

The TEMPO 2020

A BRILLIANT NEW SSB TRANSCEIVER PROVIDING AN UNBEATABLE COMBINATION OF ADVANCED ENGINEERING AND UNIQUE OPERATING FEATURES.

YOU MAY NEVER HAVE OWNED A TRANSCEIVER THAT OFFERS SO MUCH.

Send for descriptive information on this fine new transceiver, or on the time proven Tempo ONE transceiver which continues to offer reliable, low cost performance.

- *Microphone provided.
- *Dual RIT control allows both broad and narrow tuning.
- *All band 80 through 10 meter coverage.
- *Multi-mode USB, LSB, CW and AM operation.
- *Extraordinary receiver sensitivity (.3u S/N 10 db) and oscillator stability (100 Hz 30 min. after warm-up)
- *Fixed channel crystal control on two available positions.
- *RF Attenuator.
- *Adjustable ALC action.
- *Phone patch in and out jacks.
- *Separate PTT jack for foot switch.
- *Built-in speaker.
- *The TEMPO 2020 ...\$759.00.
Model 8120 external speaker...\$29.95.
Model 8010 remote VFO...\$139.00.

Henry Radio

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

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

Tempo VHF/ONE

the "ONE" you've been waiting for

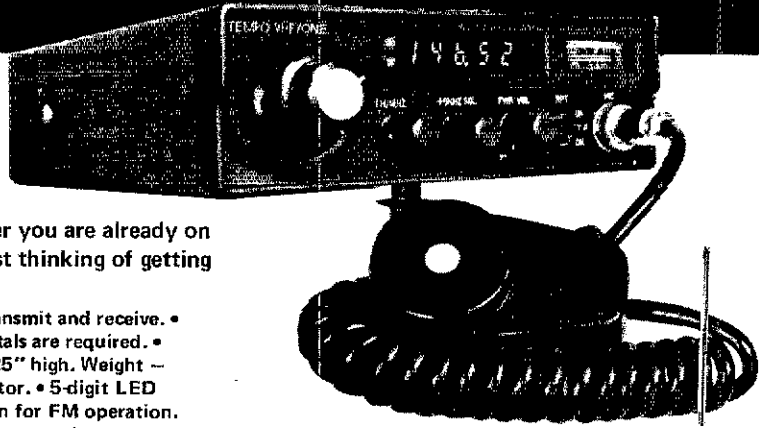
No need to wait any longer — this is it! Whether you are already on 2-meter and want something better or you're just thinking of getting into it, the VHF/ONE is the way to go.

- 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

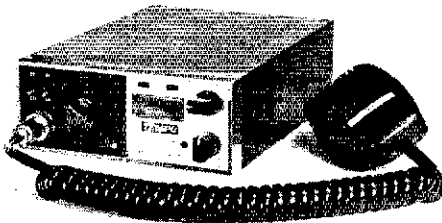
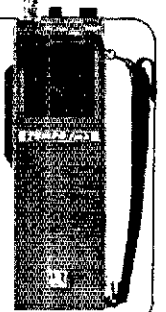


TEMPO/fmh

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 nicad cells, S-meter, battery level meter, telescoping whip antenna, internal speaker & microphone.

FMH-MC for Marine & Commercial service also available.

\$199.00



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

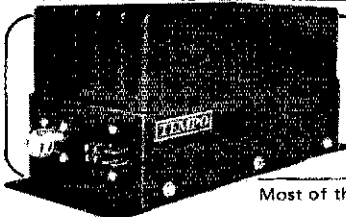
144 to 148 MHz coverage • Multifrequency spread of 2 MHz • 12 channel possible • Metering of output and receive • Internal speaker, dynamic microphone, mounting bracket and power cord supplied. A Tempo "best buy" at \$239.00.



TEMPO 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 100A10 SOLID STATE VHF LINEAR AMPLIFIER. 144-148 MHz. Power output of 100 watts (nom) with only 10 watts (nom) in. Reliable and compact.



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	10W	70W	70D10	\$250
10W	130W	130A10	\$179	30W	70W	70D30	\$210
30W	130W	130A30	\$189	2W	40W	40D02	\$180
2W	80W	80A02	\$169	10W	40W	40D10	\$145
10W	80W	80A10	\$149	2W	10W	10D02	\$125
30W	80W	80A30	\$159				

FCC Type accepted models also available.

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

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.

Congratulations, somebody. You just bought the 27,000th Collins KWM-2A transceiver.



That's right.
In the last 15 years
some 27,000 Collins KWM-2A units have
been sold. Sold to amateur operators
worldwide, governmental agencies,
public and private emergency services,
exploration parties. And used in such
diverse climates as those of the polar ice-
caps and the jungles of Southeast Asia.

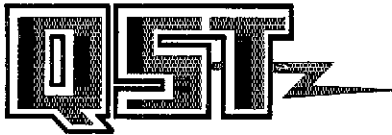
Behind this popularity is Collins'
basic philosophy: "A conservative
design makes a high-reliability design."
And KWM-2A reliability is legend.
So is its high stability and its high
resistance to electrical and physical
punishment. And, as a result, it enjoys
high resale value.

KWM-2A utilizes only U.S. stan-
dardized tubes and components. Because
of its conservative, high-reliability
design, maintenance is comparatively
simple. In fact, many maintenance
operations can be performed by most
any operator. And good parts avail-
ability means air time, not downtime.

When you add the technical assis-
tance, service and support by Collins'
factory professionals, you have plenty
of good reasons to see your Collins
distributor about becoming the owner
of KWM-2A number 27,001.

Amateur Radio Marketing, Collins
Radio Group, Rockwell International,
Cedar Rapids,
Iowa 52406.
Phone
319/395-4507.





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THE COVER

Look for Joe the Prospector at the ARRL National Convention in Denver on July 16-18.



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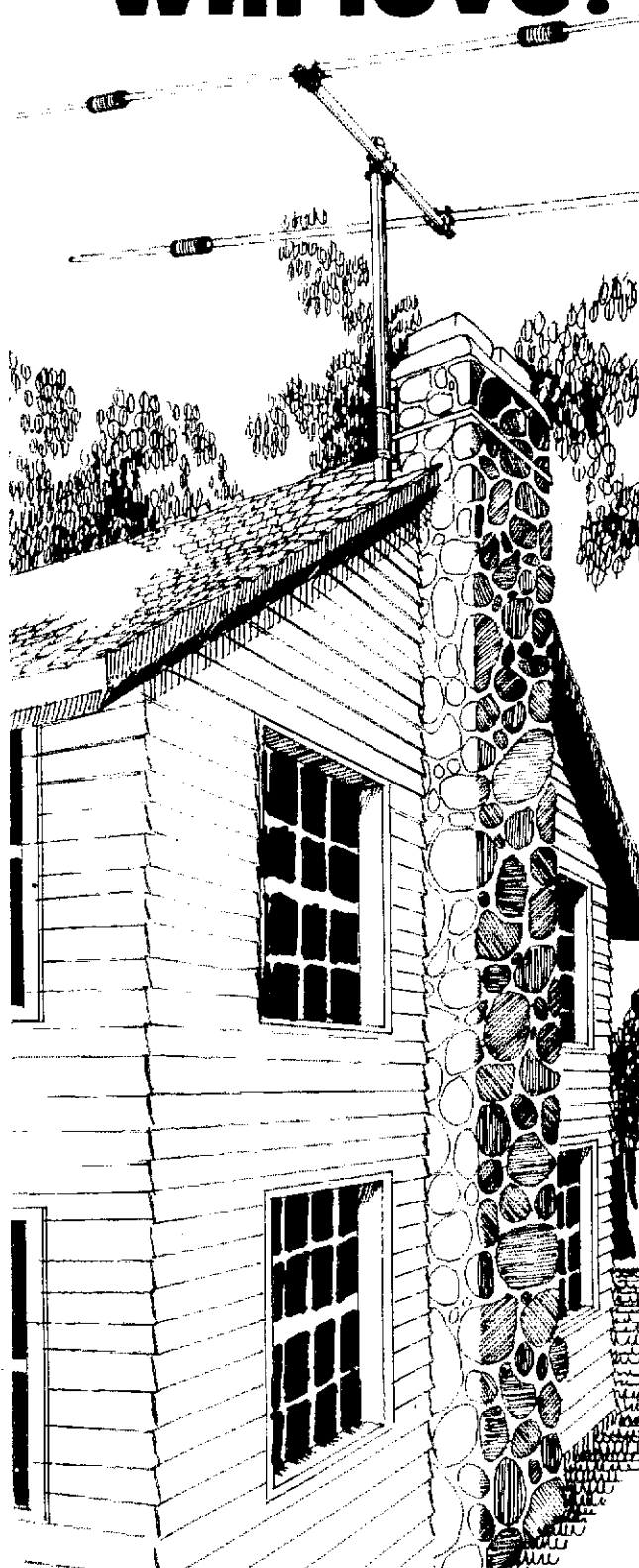
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YES! There is an antenna that your neighbors will love!



We know you're not going to believe your neighbors will like your new 20 meter beam; but just wait until they CAN'T see it.

Introducing a little functional beauty. The new DenTron trim-tenna™ 20 meter beam.

The trim-tenna™ is designed for the discriminating amateur who wants fantastic performance in an environmentally appealing beam.

It's really loaded! Up front there's a 13 feet 6 inch director with precision Hy-Q coils. And, 7 feet behind is a 16 foot driven element fed directly with 52 ohm coax.

The trim-tenna™ goes up on your roof, tripod, or chimney as easily as a color TV antenna.

The difference in on-the-air performance between the trim-tenna™ and a full size 2 element beam is often hard to differentiate. But *oh* the difference between the trim-tenna™ and that dipole, long wire or inverted Vee you've been using.

trim-tenna™ . . . 129.50 post paid U.S.A.
from DenTron Radio or your favorite dealer.

- The secret is proper placement of factory sealed Hy-Q inductors
- Heavy gage seamless aluminum
- Light weight
- SWR less than 2:1 over the entire band

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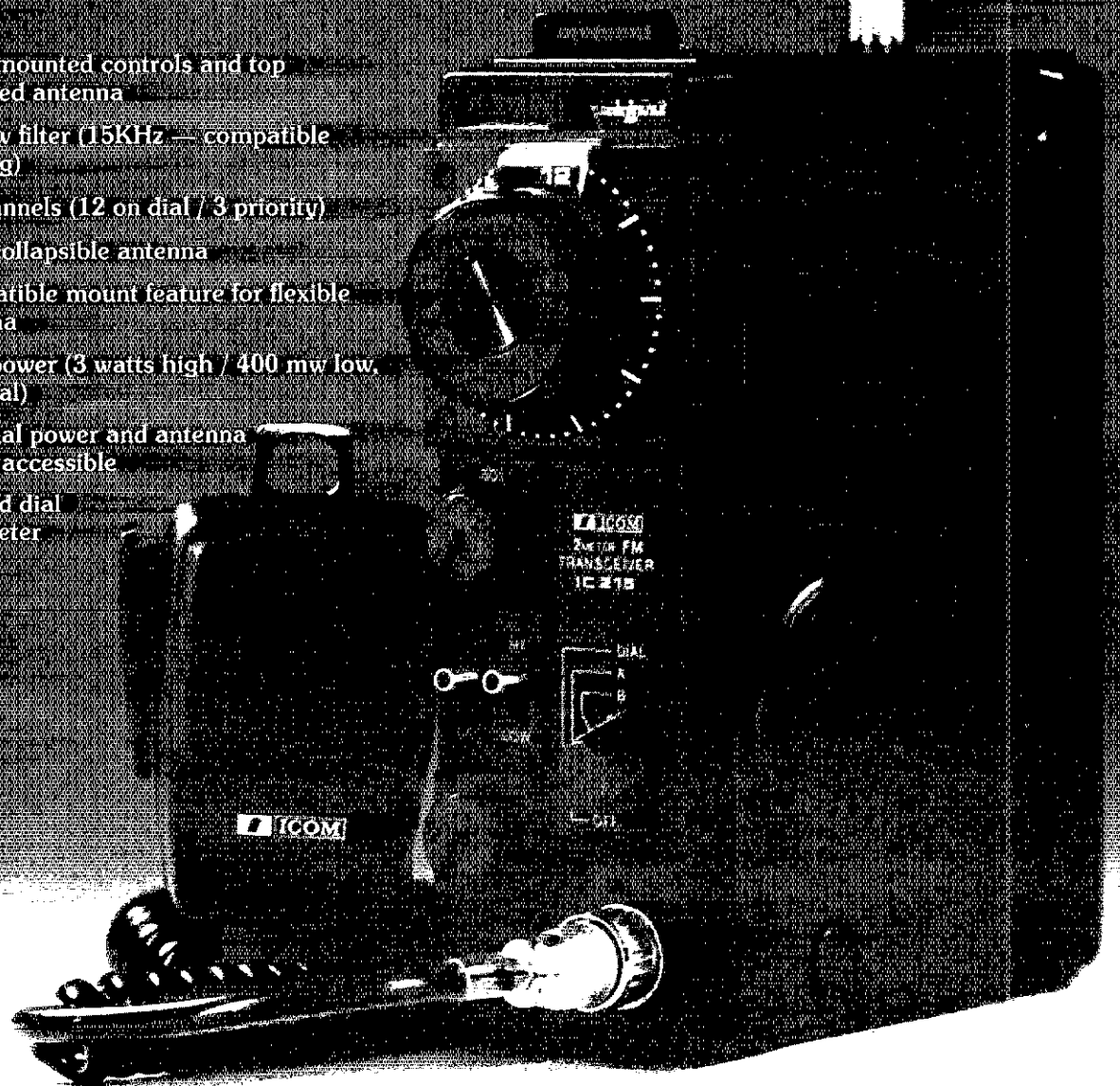


Now ICOM Introduces 15 Channels of FM to Go! The New IC-215: the FM Grabber

This is ICOM's first FM portable, and it puts good times on the go. Change vehicles, walk through the park, climb a hill, and ICOM quality FM communications go right along with you. Long lasting internal batteries make portable FM really portable, while accessible features make conversion to external power and antenna fast and easy.

Grab for flexibility with the new **IC-215** FM portable.

- Front mounted controls and top mounted antenna
- Narrow filter (15KHz — compatible spacing)
- 15 channels (12 on dial / 3 priority)
- Fully collapsible antenna
- Compatible mount feature for flexible antenna
- Dual power (3 watts high / 400 mw low, nominal)
- External power and antenna easily accessible
- Lighted dial and meter



Your new **IC-215** comes supplied with: 5 popular channels; handheld mic, with protective case; shoulder strap; connectors for external power and speaker; 9 long-life C batteries.

VHF, UHF AMATEUR AND MARINE COMMUNICATION EQUIPMENT

Distributed by:



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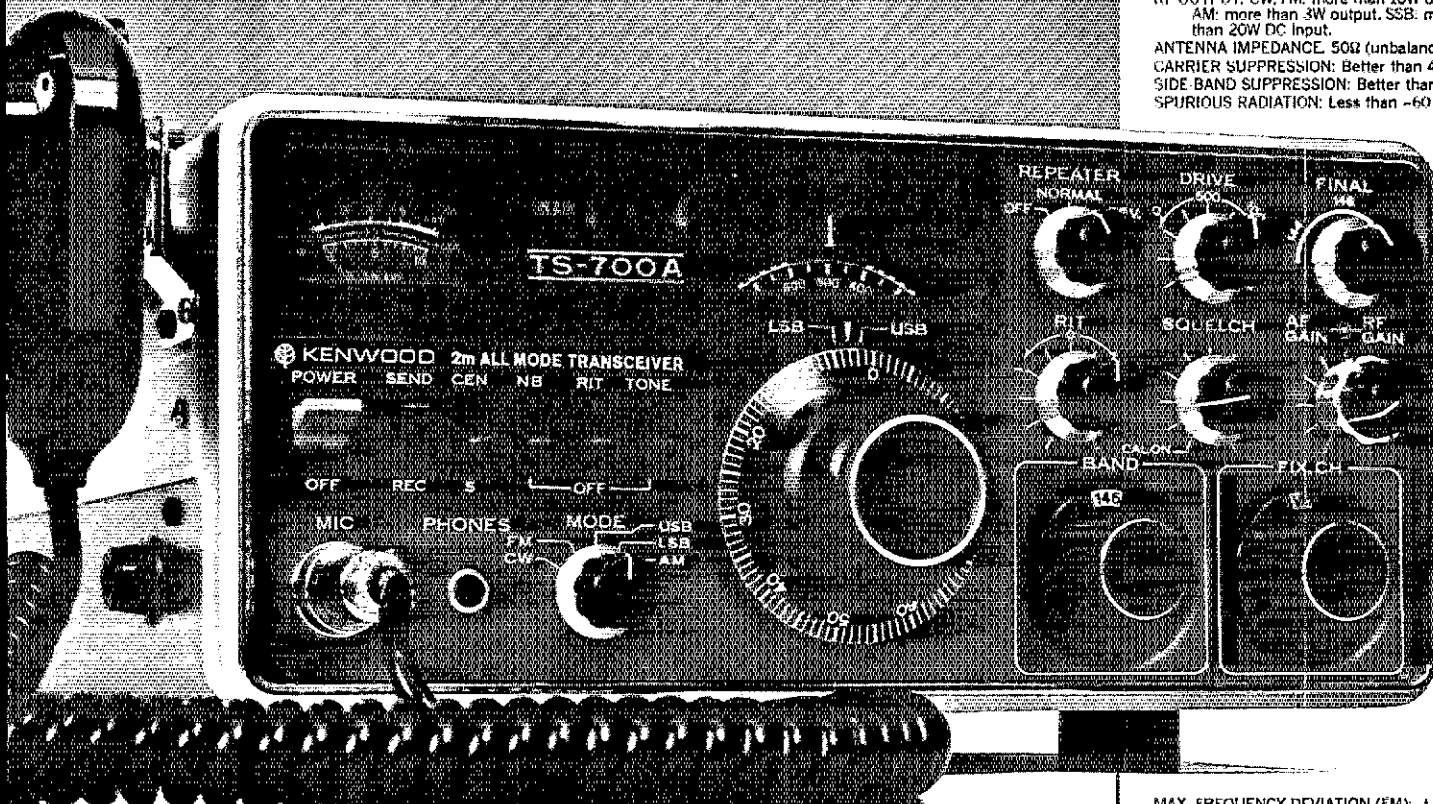
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(206) 747-9020

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Suite 307
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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 dB
SPIRIOUS RADIATION: Less than -60 dB



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 capability 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.

MAX FREQUENCY DEVIATION (FM): ± 5 kHz
REPEATER FREQUENCY SHIFT WIDTH:
500 kHz
TONE BURST TIME: 0.5-1.0 sec.
MODULATION: Balanced modulation for SSB.
Variable reactance frequency shift for FM.
Low power modulation for AM.
MICROPHONE: Dynamic microphone, 500Ω
AUDIO FREQUENCY RESPONSE: 400-2500 Hz
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 = 10
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
2.4 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 during
one hour after one minute of warm-up,
and within 150 Hz during any 30 minute
period thereafter.
POWER CONSUMPTION: Transmit mode: 95W
(AC 120/220V), 4A (DC 13.8V), max.
Receive mode (no signal): 45W (AC 120/
220V), 0.8A (DC 13.8V).
POWER REQUIREMENTS: AC 120/220V,
50/60 Hz, DC 12-16V (13.8V as reference)
DIMENSIONS: 278 (W) x 124 (H) x 320 (D) mm
WEIGHT: 11 kg
SUGGESTED PRICE: \$700.00

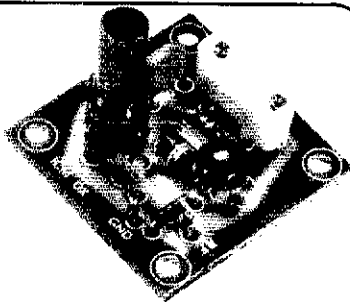
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115 EAST ALONDRA/GARDENA, CA 90248

KENWOOD
...pacesetter in amateur radio

for the experimenter!

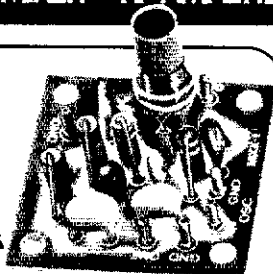
INTERNATIONAL CRYSTALS & KITS
OSCILLATORS • RF MIXER • RF AMPLIFIER • POWER AMPLIFIER



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.

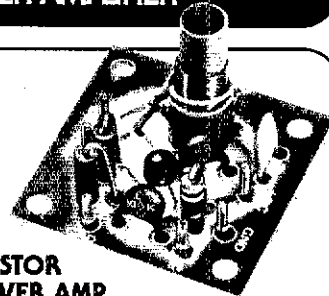
\$3.95 ea.



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.

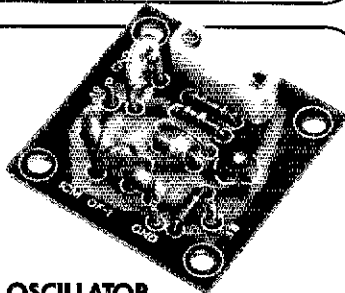
\$4.50 ea.



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.

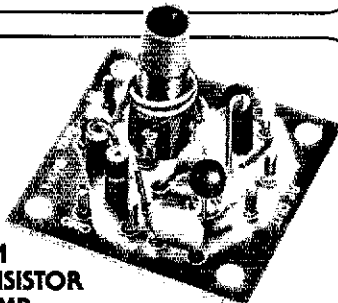
\$4.75 ea.



OF-1 OSCILLATOR

Resistor/capacitor circuit provides osc over a range of freq with the desired crystal. 2 to 22 MHz, OF-1 LO, Cat. No. 035108. 18 to 60 MHz, OF-1 HI, Cat. No. 035109
Specify when ordering.

\$3.25 ea.



SAX-1 TRANSISTOR RF AMP

A small signal amplifier to drive the MXX-1 Mixer. Single 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.

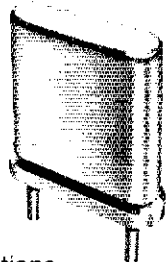
\$4.50 ea.



DAX-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.

\$4.75 ea.



.02% Calibration Tolerance
EXPERIMENTER CRYSTALS
(HC 6/U Holder)

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

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.



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Oklahoma City, Oklahoma 73102

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Box 120, Dayton, NV 89403

Roanoke Division

I. 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 O. Carpenter, K0HRZ
1310 South Tejon St., Denver, CO 80223

Southeastern Division

LARRY E. PRICE, W4DDQ
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 QRS, OPS, OS and OBS. Technicians may be appointed QVS, OBS, or VHF PAM. Novices are eligible for QRS - II. SCMs desire application for the leadership posts of SEC, EC, RM and PAM where vacancies exist.

Canadian Division

Alberta
British Columbia
Manitoba
Maritime/Nfld
Ontario
Quebec
Saskatchewan

*Sydney T. Jones, VE6MJ, 10706 - 57 Ave., Edmonton, ALA T6H 0Y6
H. E. Savage, VE7FB, 4553 West 12th Ave., Vancouver 8, B.C.
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Aaron D. Solomon, VE1OC, 8 Crichton Park Road, Dartmouth, NS B3A 2N8
Holland H. Shepherd, VE3DV, 3016 Cowan Cres., Ottawa, K1V 8L1
Lawrence P. Dobby, VE2YU, 157 Sedgefield Ave., Point Claire, P.Q. H9R 1N8
Percy A. Crothwaite, VE5RP, R.R. 3, Saskatoon, S7K 3J6

Atlantic Division

Delaware
Eastern Pennsylvania
Maryland-D.C.
Southern New Jersey
Western New York
Western Pennsylvania

Roger E. Cole, W3DKX, 345 E. Roosevelt Ave., New Castle 19720
George S. Van Dyke, Jr., W3HK, 4607 Convent Lane, Philadelphia 19114
Karl R. Madrow, W3FA, 718 W. Central Avenue, Davidsville 21035
Raymond E. Clancy, W82GE, 222 E. Knight Ave., Collingswood 08108
Joseph M. Hood, K2YAH, 67 Mountain Ash Dr., Rochester 14615
Donald J. Myslewski, K3CHD, 359 McMahon Rd., N. Huntingdon 15642

Central Division

Illinois
Indiana
Wisconsin

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Michael P. Hunter, W8EED, 701 Robs Court, Beech Grove 46107
Roy Pedersen, K9FHI, 610 Park St., Juneau 53039

Dakota Division

Minnesota
North Dakota
South Dakota

Franklin B. Lappa, K0ZXE, 2021 Swan Lake Rd., Duiuth 55811
Mark J. Worcester, WA0WLP, 1523 N. 20th St., Bismarck 58501
Ed Gray, WA0CPX, Rt. 3, Salem 57058

Delta Division

Arkansas
Louisiana
Mississippi
Tennessee

Sid Pokorny, W5UAI, P. O. Box 4071, Horseshoe Bend 72512
Robert P. Schmidt, W5GHP, 5100 Press Dr., New Orleans 70126
William L. Appleby, W5DCY, 28 Linda Lane, Long Beach 39550
O. D. Keaton, WA4GLS, Rt. 1, Medearis Dr., Old Hickory 37138

Great Lakes Division

Kentucky
Michigan
Ohio

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Allen L. Baker, W8TZZ, 4145 Eighth Street, Newport 48166
Henry R. Greeb, W8CHT, 6580 Dry Ridge Road, Cincinnati 45247

Hudson Division

Eastern New York
N.Y.C. & Long Island
Northern New Jersey

Gary J. Ferdinand, WA2PJL, Sunset Trail, Clinton Corners, 12514
John H. Smale, WB2CHY, 784 Milligan Ln., West Islip 11795
William S. Keller, III, WB2RKK, 27 Albright Circle, Madison 07940

Midwest Division

Iowa
Kansas
Missouri
Nebraska

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Larry G. Wilson, K0RWL, 509 West Ivy, Lee's Summit 64063
Claire R. Dyas, W0JCP, 2933 Dudley, Lincoln 68503

New England Division

Connecticut
Eastern Massachusetts
Maine
New Hampshire
Rhode Island
Vermont
Western Massachusetts

John J. McNassor, W1GVT, 218 Berlin Ave., Southington 06489
Frank L. Baker, Jr., W1ALP, 65 Beechwood Rd., Wallfax 02338
Edward B. Bristow, WA1MUX, 54 Lee St., Lincoln 04457
Robert Mitchell, W1SWX, Box 137-A, Chester 03035
Ronald H. Simonton, K1GMW, 100 Suffolk Dr., North Kingstown 02852
Joel Breakstone, WA1PSK, Box 231, Johnson 05656
Percy C. Noble, W1BVR, Bailey Rd., P. O. Box 5, Lanesboro 01237

Northwestern Division

Alaska
Idaho
Montana
Oregon
Washington

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Harry A. Roylance, W7RZY, Box 621, Harlowton 59036
Dwight J. Albright, W7HLF, 1678 Orchard Home Dr., Medford, OR 97501
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Pacific Division

East Bay
Nevada
Pacific
Sacramento Valley
San Francisco
San Joaquin Valley
Santa Clara Valley

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John D. Weaver, W7AAF, 1501 N. 22nd St., Las Vegas 89101
J. P. Corrigan, K6GGW, P. O. Box 698, Kaneohe 96744
Norman A. Wilson, WA6JVD, Route 1, Box 730, Woodland 95695
Charles K. Epps, W6DAT, 35 Belcher St., San Francisco 94114
Ralph Sarovan, W6JPU, 6204 E. Townsend Ave., Fresno 93702
James A. Maxwell, K6AQ, P. O. Box 473, Redwood Estates 95044

Roanoke Division

North Carolina
South Carolina
Virginia
West Virginia

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Thomas L. Lufkin, WA4DAX, 4337 Flynn Dr., Charleston 29405
Robert L. Follmar, W4QDY, 1057 Dune St., Norkfolk 23503
Mrs. Kay Anderson, W8DUV, 209 Childers Court, Huntington 25705

Rocky Mountain Division

Colorado
New Mexico
Utah
Wyoming

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Edward Hart, Jr., W5RE, 1909 Moon N.E., Albuquerque 87112
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Joseph P. Ernst, W7VB, 502 Ryan St., Thermopoles 82443

Southeastern Division

Alabama
Canal Zone
Georgia
Northern Florida
Southern Florida
West Indies

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Roderick J. Isler, K2ZPI, 352 Aviation Det. Box H, Albrook AFB, APO NY 09825
Alpheus H. Stakely, K4WC, 2220 Lyle Road, College Park 30337
Frank M. Butler, Jr., W4RKH, 323 Elliott Rd., S.E., Fort Walton Beach 32548
Woodrow Huddleston, K4SCL, 219 Driftwood Lane, Largo 33540
David Nowon, KP4BDL, P. O. Box 22758, University Station, San Juan PR 00931

Southwestern Division

Arizona
Los Angeles
Orange
San Diego
Santa Barbara

Marshall Lincoln, W7DQS, Box 1490, Wickenburg 85358
Eugene H. Violino, W6INH, 2839 Canada Blvd., Glendale 91208
William L. Weise, W6CPB, 1753 Iowa St., Costa Mesa 92626
Arthur R. Smith, W6INI, 4515 Melisa Way, San Diego 92117
D. Paul Gagnon, WA6DE1, 1791 Hedon Cir., Camarillo 93010

West Gulf Division

Northern Texas
Oklahoma
Southern Texas

L. E. Harrison, W5LH, 40 Los Robles Dr., Arlington 76011
Leonard R. Hollar, WA5FSN, RFD 1, 710 South Tenth St., Kinshisher 73750
Arthur R. Ross, W5KR, 132 Sully Lane, Brownsville 78521

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



Progress Report — New Training Program

The American Radio Relay League, Inc., is a noncommercial association of radio amateurs, bonded for the promotion of interest in amateur radio communication and experimentation, for the relaying of messages by radio, for the advancement of the radio art and of the public welfare, for the representation of the radio amateur in legislative matters, and for the maintenance of fraternalism and a high standard of conduct.

It is an incorporated association without capital stock, chartered under the laws of Connecticut. Its affairs are governed by a Board of Directors, elected every two years by the general membership. The officers are elected or appointed by the Directors. The League is noncommercial and no one commercially engaged in the manufacture, sale or rental of radio apparatus is eligible to membership on its board.

"Of, by and for the amateur," it numbers within its ranks practically every worth-while amateur in the nation and has a history of glorious achievement as the standard-bearer in amateur affairs.

Inquiries regarding membership are solicited. A bona fide interest in amateur radio is the only essential qualification; ownership of a transmitting station and knowledge of the code are not prerequisite, although full voting membership is granted only to licensed amateurs.

All general correspondence should be addressed to the administrative headquarters at Newington, Connecticut 06111.

Past Presidents

H. P. MAXIM, W1AW, 1914-1936
E. C. WOODRUFF, W8CMP, 1936-1940
G. W. BAILEY, W2KH, 1940-1952
G. L. DOSLAND, W0TSN, 1952-1962
H. HOOVER, JR., W6ZH, 1962-1966
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16 Arbor Lane, Dix Hills, NY 11746

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12927 Popes Head Road, Clifton, VA 22024

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Box 660, Waterdown, Ontario L0R 2H0
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Assistant Secretaries,
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225 Main St., Newington, CT 06111

General Counsel,
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1302 18th Street, N.W., Wash., DC 20036

Associate Counsel,
B. ROBERT BENSON, VE2VW
1010 St. Catherine St. West, Montreal,
PQ H3B 3R5

* Executive Committee Member

By the time you thumb this issue, many of the pieces in the complex fabric of the new League-affiliated club training program (see page 43) will have begun to take shape. Specifically:

□ The display racks of a number of electronics retailers sport the new Novice licensing package, *Tune in the World with Ham Radio*, available also directly from Headquarters. This book-cassette tape combination initiates a fresh approach to amateur radio education. In one easy-to-read, fully illustrated book, the casual beginner can discover everything he needs to know to obtain a Novice license, as well as assemble and operate a station. The cassette is a step-by-step guide to the Morse code, plus practice for on-the-air contacts.

□ A prototype instructional program is undergoing testing by some 25 clubs across the country. Produced by professional educators, it blends the experience of many successful instructors.

□ Simultaneously, the same nucleus of clubs is undergoing pilot testing of the certification program authorized by the FCC on an experimental basis. Test results will be incorporated into the refined program which will then be spelled out in a full announcement early in August to all affiliated clubs. The announcement will detail program particulars, together with registration forms for club participation and certification of instructors and specifics of the promotional support to be provided in cooperation with local retailers. Supplied posters, radio spots and publicity material will eliminate this headache in club planning.

As presently planned, the Novice course consists of 10, two-hour sessions. Preliminary planning, a syllabus for each session, materials for class distribution, wall charts, quizzes, and more — all facets of classroom instruction — are covered in detail in an Instructor's Manual. A companion set of slides and tapes, programmed to complement eight sessions, will also be provided to assist the instructor.

The League training program will be offered to affiliated clubs and other qualified groups and organizations at no cost. (We view this program as an effort to advance amateur radio in accordance with our charter as an educational organization.) While preparation and sale of *Tune in the World with Ham Radio* fill a need for comprehensive

individual instructional material, the actual training course itself does not dictate any specific manual or material for student use. That is for the club or organization conducting the course to determine for its own purposes:

□ *Moving Up to Amateur Radio*, a new League film for CB audiences, will debut in early September. Along with presentation materials, prints will be available for use by clubs and interested individuals, at club meetings, affiliated-club open houses, local hamfests or wherever the CB curious can be gathered together. Designed for a follow-up question-and-answer session, the film features noted TV commentator Roy Neal, K6DUE.

□ These innovations mark just the first steps for the new Club and Training Department at Headquarters. Already its staff has grown to six, with plans underway for expansion of services to clubs in many new areas. As a related responsibility, the department will undertake enrichment of the Oscar Educational Program in which the Oscar 6 and 7 satellites are made available for classroom applications. About 4,000 curriculum supplements, entitled *Space Science Involvement*, have been mailed out to science teachers nationally and internationally. With the help of local amateurs, a first-hand experience in space communications is transported right into the classroom to augment text-book instruction in space science, mathematics, physics and even the social sciences. Clearly, the Oscar satellites are an invaluable resource for putting amateur radio before the public, especially young prospective hams, in a dramatic, exciting way. Planned additions to and updates of materials and instructional aids can only increase and extend its effectiveness.

With full-scale launching of the new Novice program in the Fall, the League and amateur radio enter upon a new era. It is a major commitment to the future of our Service as, for the first time, we make a concerted effort in cooperation with affiliated clubs to attract newcomers in large numbers which in turn will generate renewed vitality as we face the formidable challenges of WARC and the future. The American public is expressing as never before its interest in personal, two-way radio communication. All that amateur radio has to offer has never had more meaning than right now. — Don Waters

League Lines...

FLASH: We have just received preliminary word on "Restructuring." A First Report and Order was adopted at deadline in Docket 20282, which accomplishes the following: 1. Full Novice privileges for Technician Class licensees. 2. A Novice reaching the end of his license term can retest for a new Novice immediately; the one-year wait is discontinued. 3. Novices may run 250 watts d.c. power input. 4. All licensees using the Novice segments of the bands are also limited to 250 watts. 5. Full credit will be granted for examination elements completed by mail; e.g., Conditionals are "grandfathered" to General, Technicians C to Technician. 6. Element 2, the Novice written test, will be a part of all exams. 7. The number of distinct license classes is reduced from 10 to five by this action. 8. The future availability of mail exams is limited to Novices only, except in cases of protracted physical disability. These changes will be effective July 23, 1976. More details in August QST.

In a Public Notice released June 3, 1976 the Federal Communications Commission announced approval of ARRL's Petition for Extension of Time in Docket 20777. This proposal, known as the bandwidth docket, would eliminate all mode restrictions from the amateur rules, and replace them with maximum bandwidths that may be used on various portions of the amateur bands regardless of the form of emission used. The new deadline for filing comments is August 4, 1976, with reply comments due September 3, 1976. Comments, with 11 copies if possible, should be sent to the FCC, Amateur and Citizens Division, Washington, DC 20554. Don't forget to send a copy to your ARRL director, whose address can be found on page 8 of QST.

Canadian ARRL Division Director Ron Hesler, VE1SH, has announced that "due to strictly personal considerations," he will be resigning as director, effective July 18th, 1976. Ron will be working closely with his successor, Vice Director Bill Loucks, VE3AR, so that the transition of directorship will be a smooth one.

President Dannals, W2TUK has appointed WA1SSH and K9UIY to replace W1KID and W9LT on the Contest Advisory Committee -- both will complete terms expiring 12/31/77. CAC roster: K7NHV (chairman), WA1SSH, W2FVS, W3BQV, K4BAI, W5MYA, K6YNB, K8HLR, K9UIY, WA0CVS, VE7CC, K2SJO Board Liaison and W1YL Staff Liaison.

During the next several months, Hq. will be implementing a new system for the fulfillment of simple requests for contest logs, FCC renewal forms, and all operating materials. If you know exactly what you want, please tell us in as few words as possible. Questions and unrelated correspondence in the same envelope will cause processing delays. A simple request and a stamped, self-addressed envelope will guarantee same day return of your materials.

New Repeater Directories are now ready, complete with information on over 2000 "machines!" This year the directory will be furnished without charge (FREE!) as an ARRL membership service. For your free copy by first class mail send an s.a.s.e. of at least 6 X 9 inches with 46¢ U.S. postage, third-class mailing requires 24¢ postage...for one copy, of course.

With ripoffs of mobile CB (and ham!) equipment steadily increasing all over the country, many insurance companies are getting state approval to remove coverage of two-way radio equipment from standard theft policies. In place of automatic coverage, these companies are selling separate policies specifically mentioning the radio equipment, with premiums based on the original cost of the gear. One company's rates ran \$20 per year for a rig costing up to \$200, \$40 for one costing up to \$500. Other insurance firms have other rates and limits, of course. Better check with your agent if you have a rig in the car!

As a sidelight to the above, FCC's John Johnston even had his 2 meter rig stolen from his car last May. See the stolen equipment list each month in QST.

Governor Patrick J. Lucey has proclaimed July 4 thru 10 as amateur radio week in Wisconsin and has urged citizens to recognize the contributions to the public good made by radio amateurs.

A Few Publick-Spirited Hammes

With efforts mustered the message will get through — even if by ye olde horse power.

By John G. Troster,* W6ISQ

*"Listen my children, and you shall hear
Of the midnight ride of Paul Revere,
On the eighteenth of April, in Seventy
five. . . ."*

“W WILL/H this is WP1AUL/H
. . . copy on simplex, Will?”

“Yeah, QRX . . . want to tie up my
horse . . . OK.”

“Been calling you on the repeater
for an hour. Don’t think it’s working.”

“Oh, the repeater’s working fine, but
it’s in somebody’s stable and the anten-
na is only on the barn roof. The
repeater committee couldn’t find no-
body to climb to the top of the steeple
of the olde North Church to put up the
antenna where it’s supposed to be.”

“Yeah, well how do they expect to
‘spread the alarm, to every Middlesex
village and farm’ if they don’t get that
antenna up in the air?”

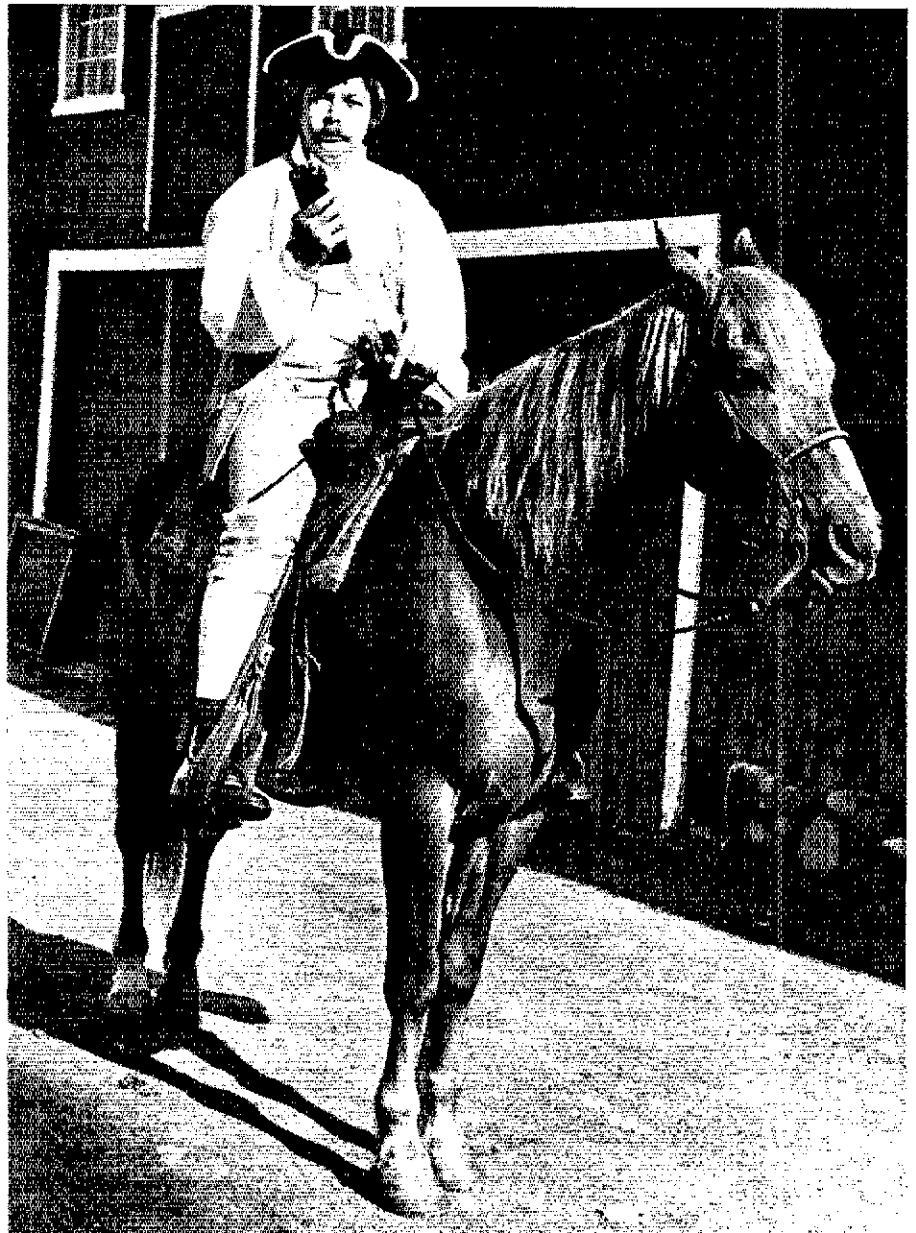
“Oh well, us hams will come through
and answer the call to emergency in our
usual cheerful, resourceful, ingenious
and energetic manner . . . that olde
hamme spirite . . . everybody joining in
. . . pulling together . . . one for all . . .
ahhh . . .”

“Ahhhh . . . huh? What was that?
Listen, with that repeater we could of
called up the whole emergency net clean
from Boston Town to Concord. Now
it’s just you and me, Will. And this
simplex ain’t gonna work all the way.
We gotta think of something better.”

“Yeah, that’s a long way to go Horse
Mobilizing in the middle of the night . . .
and no repeater for company.
WP1AUL/H, this is WWIILL/H.”

“OK . . . so leave us be ingenious.
How about if we try to stir up some
resourceful and dedicated stations on
75! Let ye olde hamme spirite shine
forth and help us spread the alarm this
night.”

“Goode idea . . . here’s our



chance to muster forth the very best our
fellas have to offer . . . we can get the
lads to line up and give us a hand . . .

clamp your whip to your saddle horn
and let’s try . . .”

“Sorry, no saddle horn. Gotta hold

*82 Belbrook Way, Atherton, CA 94025



it . . . I'll try about 3850."
 "QST QST QST here's WPIAUL/H
 Emergency Coordinator. This is a prac-
 tise national Mayday looking for volun-
 teers with ye olde hamme spirite to help
 relay important messages this night . . .
 please check in, giving your call and
 QTH . . . over."
 "Haaaaalllloooo test . . . CQ CQ CQ
 . . . haa wun . . . haa tuh . . . you
 some kind of a clown fella . . . haa
 wunn . . . you're on top of a DXpedi-
 tion to Indian Territory . . . QSY
 . . ."
 "WPIAUL/H this is . . . haa wun
 . . . WWIILL/H . . . QRM . . . haa
 tuh . . . rough frequency . . . CQ CQ
 CQ CQ . . . no publick-spirited hammers
 . . . haaaaallllooo . . . wishing to
 join . . . QSY QSY . . . national
 Mayday . . . down ten . . . try
 haaallllooo . . . Paul down ten . . ."
 "QST QST QST . . . all stations
 QRX. WWIILL/H and WPIAUL/H need
 a clean channel and a few publick-

spirited citizens of Greater Boston with
 ye olde hamme spirite and know-how to
 help out in a national Mayday . . ."
 "You're QRming ye old Ragge
 Chewe Nette, fella . . . QSY."
 "One last chance . . . anybody with
 ye olde hamme spirite who could volun-
 teer a few hours to a national Mayday?"
 "May Day ain't till next month . . .
 and this ragge chewe nette don't QSY,
 SP, RX or RZ for nobody . . . now,
 Nathaniel, you was sayin' about that
 rose fertilizer . . .?"
 "But the British is comin' . . . get
 lost . . . British is . . . Haaaaallllooo
 . . . comin' . . . drop dead . . .
 Mayday . . . simplex . . . crisis
 . . . haa tuh . . . call simplex Paul
 . . . QSY . . ."
 "WWIILL/H . . . yeah, I hear it,
 Will . . . hmmmm . . . here's the
 big chance for us fellas and we can't
 find nobody with that olde hamme
 spirite . . . any ideas? WPIAUL/H by."
 "Try 7250 . . . plus or minus QRM

. . . but monitor here on simplex."
 "QST QST QST WPIAUL/H looking
 for operators with an hour to spare and
 that olde hamme spirite and know-how
 to help out in a national Mayday . . .
 QRZed?"
 "Haaaa . . . this is your friendly
 ALLCARS jammer . . . mmmmmmm
 . . . you there, Paul, . . .
 beeeeeeeepppp . . . Mayday test
 . . . sqwwaaakkk . . . simplex . . ."
 "Forty is worst than 75. Never
 gonna clear out those fellas . . . and
 listen to them foreign broadcasters to-
 night . . ."
 "Waaaaiittt a minute, Will . . .
 listen down a couple a kc's . . . it's the
 BBC . . ."
 ". . . Ladies and gentlemen. This is
 your Boston-based BBC reporter calling
 from Boston Town. I am with the
 advance party of British regulars. To-
 night General Gage has ordered these
 troops to move out on a punitive
 expedition to Concord to find and
 destroy certain caches of arms. . . ."
 "You hear that, Will? The BBC is
 gonna give us a play-by-play."
 "Yeah, but how do we get the
 people out there on the net to tune in
 the BBC?"
 "Say, look over there. Can you see
 them lanterns waving around up in the
 belfry of the olde North Church?"
 "Maybe it's the repeater committee
 trying to put up the antenna . . . or
 maybe it's a signal . . . too late, fellas.
 Oh well, we got the BBC."
 ". . . the troops are now embark-
 ing in boats and after a short ride across
 the river, we will commence the march
 to Concord . . ."
 "We gotta alert the countryside, Will
 . . . the emergency fellas is all moni-
 toring the repeater . . . and no repeater
 . . . and 75 and 40 is chaos . . . and all
 we needed was a few publick-spirited
 hammers . . ."
 "Looks like we gotta ride and holler,
 Paul . . . gotta alert the countryside
 . . . but what do we holler, Paul
 . . . what is the message?"
 "Nothing left to holler now, Will,
 but . . . to arms . . . the regulars are
 out' . . . and monitor the BBC . . .
 see you in Concord, Will . . . to arms
 . . ."
*"In the hour of darkness and peril and
 need
 The people will waken and listen and
 hear
 The hurrying hoof-beats of that steed,
 And the midnight message of Paul
 Revere.
 And so through the night rode Paul
 Revere;
 And so through the night went his cry
 of alarm . . ."*
 Henry Wadsworth Longfellow "Tales of
 a Wayside Inn" QST

Bicentennial Celebration

By Jim Cain,* WA1STN

If you're interested in on-the-air operating, don't schedule anything for the weekend of July 24-25, 1976. Our worldwide Bicentennial Celebration promises to be the biggest 48-hour activity on record. The rewards are worthy of the event, too. The accompanying black-and-white photo doesn't begin to do justice to the certificate, and you'll have to earn one to see it in full color. Complete rules for the activity appeared in March *QST* (page 45) and a synopsis and pictures of the entry forms can be found on page 75 of June *QST*. Request your entry forms now, while there's still time, and enclose an s.a.s.e. for First Class return of same. Good luck!

*Asst. Communications Mgr., ARRL

Bicentennial Celebration

Check one: Single Operator Multioperator

ARRL Certificate No. _____

Call Sign: _____

Operator: _____

Station: _____

Mode: _____

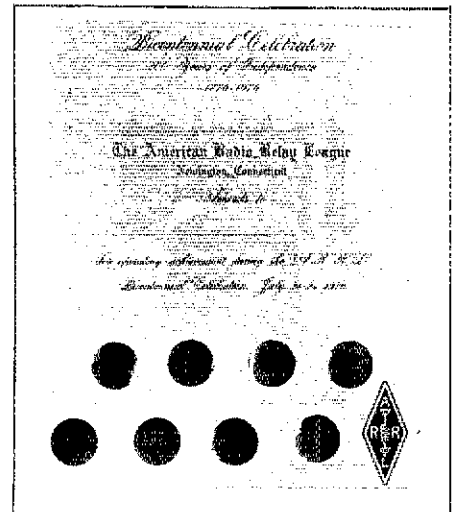
Frequency: _____

Time: _____

Power: _____

Remarks: _____

ARRL, 225 North 17th Street, Newington, CT 06111



Strays

Looking back years from now, how many of these bicentennial mementos will highlight your wallpaper? Your QSOs made during the ARRL Bicentennial Celebration will go a long way toward qualifying you for those below plus many others. Included in this sampling of amateur radio bicentennial knick-knacks are two QSL

cards especially for 1976, four of the finalists in the ARRL Bicentennial QSL design contest (the winning card is not illustrated) and two of many awards especially tailored for 1976 — all, as 1976 draws to a close, rapidly destined to be collector's items.

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Certificate

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WABV70

His Eminence—the Receiver

Part 2: Front end — stay worthy of your vocation with “uncrunchable” distinction! And now the final circuit details.†

By Doug DeMaw,* W1CER

A receiver i-f system should be capable of providing a specific gain, have an acceptable noise figure, and respond satisfactorily to the applied agc. This almost bromidic judgment is not as trite as it may seem, for some designers use a

haphazard approach to this part of a receiving system. Two of the more serious shortcomings in some designs are poor agc (clicky, pumping, or inadequate range) and insufficient i-f gain.

Because of my fringe lassitude and an unwillingness to question past successes, I elected to use a pair of RCA CA3028A ICs in the i-f strip. Somewhat greater i-f gain and agc range are possi-

ble with MC1590G ICs: They are the choice of many builders. However, the CA3028As, configured as differential amplifiers, will provide approximately 70 dB of gain per pair when operated at 455 kHz. This gives an agc characteristic from maximum gain to full cutoff which is entirely acceptable for most amateur work.

Fig. 5 shows the i-f amplifiers, product detector, and Varicap-tuned BFO. Transformer coupling is used between U2 and U3, and also between U3 and the product detector. The 6800-ohm resistors used across the primaries of T2 and T3 were chosen to force an impedance transformation which the transformers can't by themselves provide. Available Miller transformers with a 30,000-ohm primary to 500-ohm secondary characteristic are used. U2 and U3 have 10- and 22-ohm series resistors in the signal lines. These were added to discourage vhf parasitic oscillations.

Agc is applied to pin 7 of each IC. Maximum gain occurs at +9 V, and minimum gain results when the agc voltage drops to its low value, +2 V. The agc is rf-derived, with i-f sampling for the agc amplifier being done at pin 6 of U3 through a 100-pF blocking capacitor.

The 1000-ohm decoupling resistors in the 12-V feed to U2 and U3 drop the operating voltage to +9. This aids stability and reduces i-f system noise. The amplifier strip operates with unconditional stability.

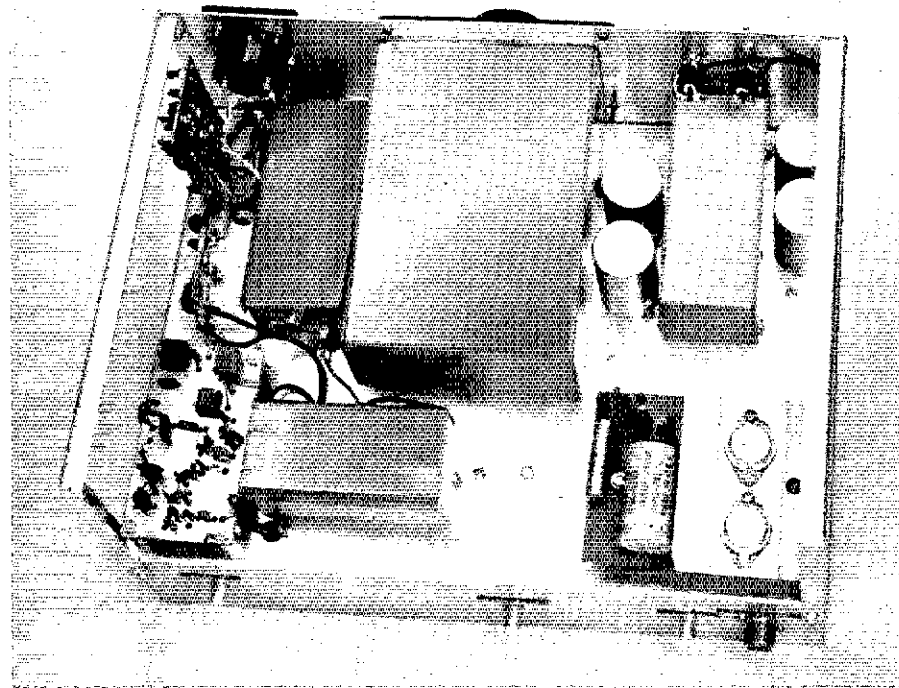
Product Detector

A quad of 1N914A diodes is used in the product detector. Hot-carrier diodes may be preferred by some, and they may lead to slightly better performance than the silicon units I chose. A trifilar broadband toroidal transformer, T4, couples the i-f amplifier to the detector

†Part 1 appeared in *QST* for June, 1976.

*Technical Editor, *QST*

Top-chassis view of the receiver. The R-C active filter and audio preamplifier are built on the pc board at the upper left. To the right is the BFO module in a shield box. The agc circuit is seen at the lower left, and to its right is the i-f strip in a shield enclosure. The large shield box at the upper center contains the VFO. To its right is the tunable front-end filter. The three-section variable capacitor is inside the rectangular shield box. The audio amplifier module is seen at the lower right. The small board (mounted vertically) at the left center contains the product detector. Homemade end brackets add mechanical stability between the panel and chassis and serve as a support for the receiver top cover.



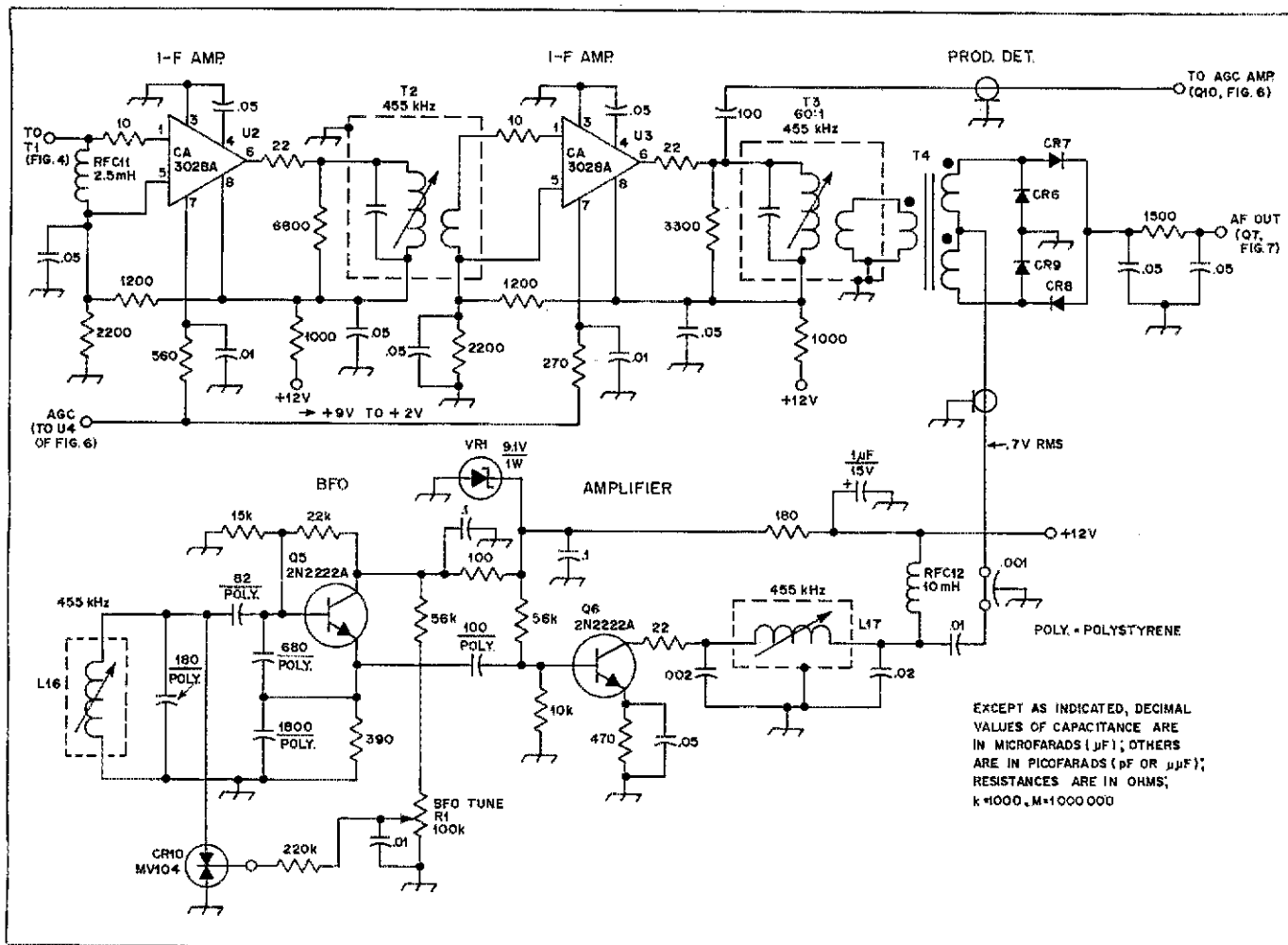


Fig. 5 - Circuit of the i-f amplifier, BFO, and product detector. Capacitors are disk ceramic unless noted differently. Fixed-value resistors are 1/2-W composition. Dashed lines show shield enclosures. The BFO and i-f circuits are installed in separate shield boxes. The R-C active filter and af preamplifier are on a common circuit board, which is not shielded.

- CR6-CR9, incl. - High-speed silicon, 1N914A or equiv.
- CR10 - Motorola MV-104 Varicap tuning diode.
- L16 - Nominal 640- μ H slug-tuned inductor (J. W. Miller 9057).
- L17 - Nominal 60- μ H slug-tuned inductor (J. W. Miller 9054).

- R1 - 100,000-ohm linear-taper composition control (panel mount).
- RFC11 - 2.5-mH miniature choke (J. W. Miller 70F253A1).
- RFC12 - 10-mH miniature choke (J. W. Miller 70F102A1).

- T2, T3 - 455-kHz i-f transformer. See text. (J. W. Miller 2067).
- T4 - Trifilar broadband transformer. 15 trifilar turns of No. 26 enam. wire on Amidon T-50-61 toroid core.
- U2, U3 - RCA IC.
- VR1 - 9.1-V, 1-W Zener diode.

at a 50-ohm impedance level. BFO injection is supplied at 0.7 V rms.

BFO Circuit

In the interest of lowering the cost of this project, a Varicap (CR10 of Fig. 5) is used to control the BFO frequency. Had a conventional system been utilized, three expensive crystals would have been needed to handle upper sideband, lower sideband and cw. The voltage-variable capacitor tuning method shown in Fig. 5 is satisfactory if the operator is willing to change the operating frequency of the BFO when changing receive modes. Adjustment is done by means of front-panel control R1. Maximum drift with this circuit was measured as 5 Hz from a cold start to a

time three hours later. A Motorola MV-104 tuning diode is used at CR10.

To vary the BFO frequency from 453 to 457 kHz, the diode is subjected to various amounts of back bias, applied by means of R1. Regulated voltage (VR1) is applied to the oscillator and tuning diode.

Q6 functions as a Class A BFO amplifier/buffer. It contains a pi-network output circuit and has a 50-ohm output characteristic. The main purpose of the amplifier stage is to increase the BFO injection power without loading down the oscillator.

AGC Circuit

Fig. 6 shows the agc amplifier, rectifier, dc source follower, and op-amp

difference amplifier. An FET is used at Q10 because it exhibits a high input impedance and will not, therefore, load down the primary of T3 in Fig. 5. Q1 is direct coupled to a pnp transistor, Q11. Assuming that Rs and R2 are treated as a single resistance, Rs, the Q10/Q11 gain is determined as: Gain (dB) = 20 log Rc \div Rs. Control R2 has been included as part of Rs to permit adjustment of the agc loop gain. Each operator may have a preference in this regard. I have the agc set so it is fully actuated at a signal-input level of 10 μ V. Agc action commences at 0.2 μ V (1 dB of gain compression).

Agc disabling is effected by removing the operating voltage from Q10 and Q11 by means of S5. Manual i-f

gain control is made possible by adjusting R3 of Fig. 6. Agc delay is approximately 1 second. Longer or shorter delay periods can be established by altering the values of the Q14 gate resistor and capacitor. Agc amplifier gain is variable from 6 to 40 dB by adjusting R2. The arrangement at Q14 and U4 was adapted from a design by W7ZOI. Agc action is smooth, and there is no evidence of clicks on the attack during strong-signal periods. At no time has agc "pumping" been observed.

Audio System

A major failing of many receivers is poor-quality audio. For the most part this malady is manifest as cross-over distortion in the af-output amplifier. Moreover, some receivers have marginal audio-power capability for normal room volume when a loudspeaker is used. Some transformerless single-chip audio ICs (0.25- to 2-W class) exhibit a prohibitive distortion characteristic, and this is especially prominent at low signal levels. The unpleasant effect is one of "fuzziness" when listening to low-level signals. Unfortunately, external access to the biasing circuit of such ICs is not typical, owing to the unitized construction of the chips.

Since "sanitary" audio is an impor-

tant feature of a quality communications receiver, I used a circuit containing discrete devices. The complimentary-symmetry output transistors and the op-amp driver are configured in a manner similar to that used by Jung in his *Op Amp Cookbook* published by Howard Sams. Maximum output capability is 3.5 W into an 8-ohm load. An LM-301A driver was chosen because of its low-noise profile. There has been no aural evidence of distortion at any signal level while using the circuit of Fig. 7. The game played in this situation is one of having considerably more audio power available than is ever needed — a rationale used in hi-fi work.

R-C Active CW Filter

A worthwhile improvement in signal-to-noise ratio can be realized during weak-signal reception by employing an R-C active bandpass filter. A two-pole version (FL5) is shown in Fig. 7. A peak frequency of 800 Hz results from the R and C values given.

The benefits of FL5 are similar to those described by Hayward in his "Competition-Grade CW Receiver" article, which was referenced earlier. He used a second i-f filter (at the i-f strip output) to reduce wide-band noise in the system. The R-C active filter serves

in a similar manner, but performs the signal "laundering" at audio rather than at rf. The technique has one limitation — monotony in listening to a fixed-frequency beat note, which is dictated by the center frequency of the filter. The R-C filter should be designed to have a peak frequency which matches the cw beat-note frequency preferred by the operator. That is, if the BFO is adjusted to provide an 800-Hz cw note, the center frequency of FL5 should also be 800 Hz.

Experience with FL5 in this receiver has proved in many instances that weak DX signals on 160 meters could be elevated above the noise to a Q5 copy level, while without the filter solid copy was impossible. It should be stressed that high-Q capacitors be used from C4 to C7, inclusive, to assure a sharp peak response. Polystyrene capacitors satisfy the requirement. To ensure a well-defined (minimum ripple) center frequency, the capacitors should be matched closely in value (5 percent or less). Resistors of 5-percent tolerance should be employed in the circuit, where indicated in Fig. 7.

Summary Comments

A suitable frequency scheme for some hf-band down converters, plus a circuit for digital frequency display, are given in the receiving chapter of the 1976 *Handbook*.¹ In that example the tunable i-f receiver covers 500 kHz, 1.8 to 2.3 MHz.

The photograph in this article illustrates a modular construction technique. All rf-circuit assemblies are isolated from one another, and from outside energy influences, by means of shield compartments. Signal points are joined (module to module) with RG-174/U subminiature coaxial cable, the shield braids being grounded to the chassis at each end. Feedthrough-type .001- μ F capacitors are used at the 12-V entry points of the modules. The foregoing measures help to prevent birdies and unwanted stray rf pickup.

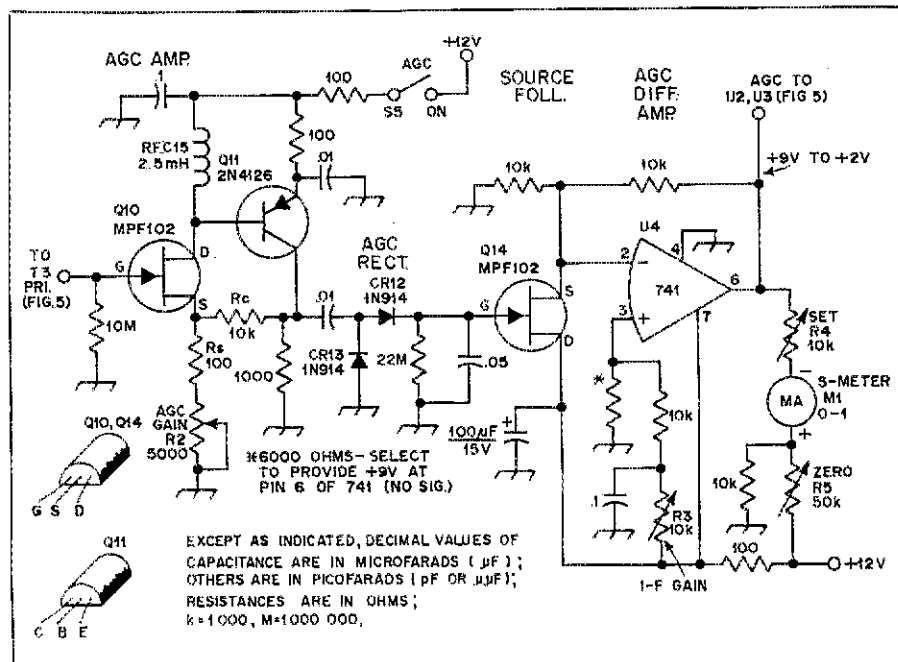
The intent of this paper has been to illustrate some ordinary design principles which can be adopted by those wishing to construct a receiver with wide dynamic range. Some of the ideas offered may inspire modifications to commercial receivers. Because this presentation was not meant as a construction exercise, circuit-board templates are not offered. Most of the pc boards in this prototype have been altered severely during the development pro-

¹A set of high-performance "down converters" with excellent dynamic range has been designed and built by W7ZOI for use with this receiver. The Hayward article appeared in *QST* for June, 1976.

Fig. 6 — Schematic diagram of the agc system. Capacitors are disk ceramic except when polarity is indicated, which signifies electrolytic. Fixed-value resistors are 1/2-W composition. This module is not enclosed in a shield compartment.

CR12, CR13 — High-speed silicon. 1N914A or equiv.
Q10, Q11, Q14 — Motorola transistor.
R2, R4, R5 — Linear-taper composition pc-board mount control.
R3 — 10,000-ohm linear-taper control, panel

mounted.
RFC15 — 2.5-mH miniature choke (J. W. Miller 70F253A1).
S5 — Single-pole, single-throw toggle.
U4 — Dual-in-line 8 pin 741 op amp.
M1 — 0- to 1-mA meter.



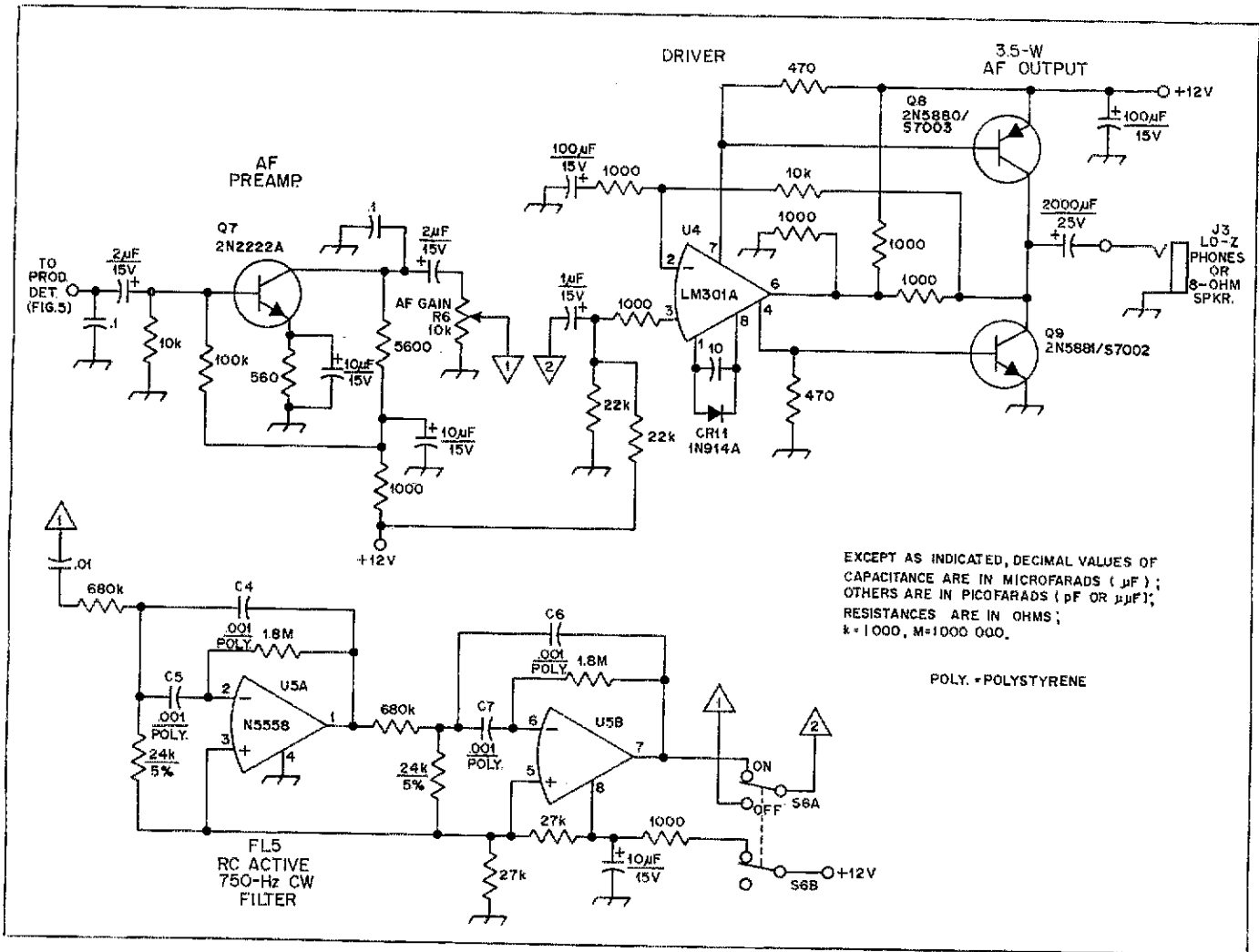


Fig. 7 — Diagram of the audio amplifier and R-C active filter. Capacitors are disk ceramic unless otherwise noted. Polarized capacitors are electrolytic or tantalum. Fixed-value resistors are 1/2-W composition. This circuit is not contained in a shield box. Heat sinks are used with Q8 and Q9.

- CR11 — High-speed silicon, 1N914A or equiv.
- C4-C7, incl. — See text.
- J3 — Phone jack.
- R6 — 10,000-ohm audio-taper composition control, panel mounted.
- S6 — Double-throw, double-pole toggle.
- U4 — National Semiconductor LM-301A IC.
- U5 — Signetics N5558 dual op-amp IC.

cess, and numerous components have been tacked on here and there. For this reason, artwork has not been developed.

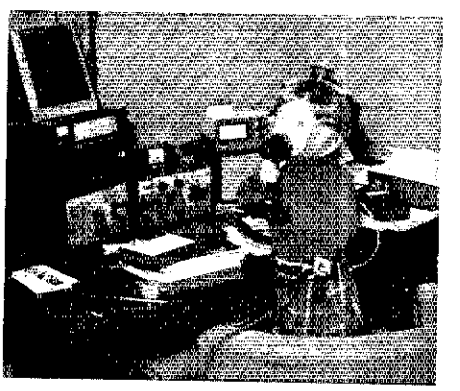
During several months of daily use, there has never been a case of desensitization or IMD noted, despite my near-

ness to WIAW and neighboring contesters and DXers. *His Eminence* is, indeed, uncrunchable!

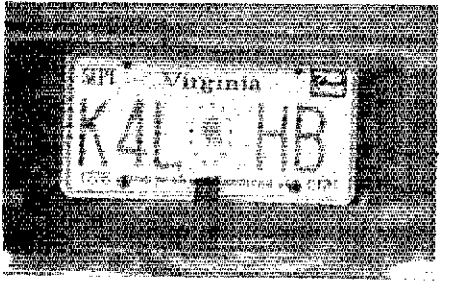
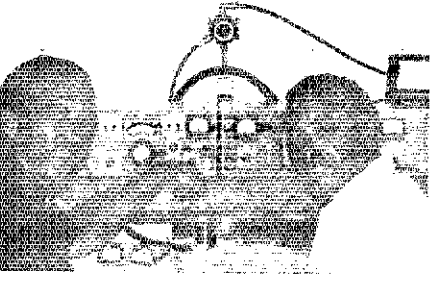
Strays

K2LZQ snapped this shot of his host HP7XJS, Jim, (right) and HP1GD, George, (left) at a recent visit to HP7XJS's jungle hideaway in Panama.

Win some, lose some. Virginia hams can't get their bicentennial-form call signs (e.g., AD4LHB) on their state's bicentennial plates, but they can get the regular call sign on. Even then, you lose some. . . .



Operating aide? Two-year old Jenniter, daughter of Bob Wolos, winds up the 1975 10-Meter Contest in which her father participated. WB2HYO says she added "color" to his log sheets.



Understanding Modern Oscilloscopes

Many hams have some grasp of how a 'scope works. K7OWJ takes us, in simple language, one step further.

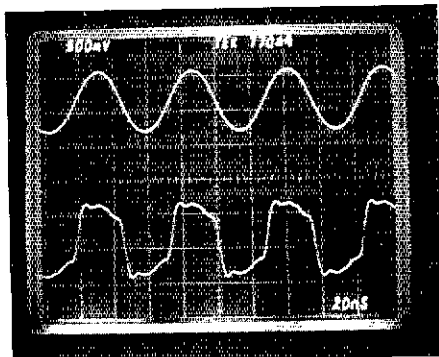
By Denton Bramwell,* K7OWJ

Did you ever wonder what distinguishes a good oscilloscope from an inferior one? Or why various types perform in different ways? It seems that there is a scarcity of information that tells how to distinguish between types of oscilloscopes. And yet there are many hams who would like to know more about these instruments. Here are a few guidelines to help you understand some of the characteristics.

The oscilloscope graphs voltage along a vertical axis against time on a horizontal axis. This can give the user a

*1330 S.E. Walnut, Hillsboro, OR 97123

A distorted 18-MHz signal is shown under two different oscilloscope bandwidth conditions. In the upper trace, frequency response of the oscilloscope has been limited to 20 MHz. Note the slight loss of amplitude and the apparent "cleanness" of the signal. In the lower trace, the bandwidth of the oscilloscope is 160 MHz. Note the clipping and distortion not apparent in the upper trace.



valuable designing or troubleshooting tool. Since it shows graphically what a circuit is doing, the oscilloscope is perhaps the most useful single piece of test equipment available to the radio amateur.

Although there are many different oscilloscope models, there are some common characteristics of all models that the user must evaluate in order to determine how faithfully the instrument will represent the waveform under study. Some of these common characteristics are bandwidth, rise time, sensitivity, maximum sweep speed, and the number of traces available.

Understanding Bandwidth

Bandwidth is a commonly misinterpreted specification. Users frequently purchase, for example, a 5-MHz oscilloscope in anticipation of accurately measuring 5-MHz sine waves, or checking 5-MHz amplifiers for clipping. Neither of these measurements can properly be done with a 5-MHz instrument.

What does "bandwidth" actually mean, then? Vertical amplifiers do not, in general, begin abruptly attenuating signals at their specified bandwidth. Rather, attenuation begins at frequencies much below the specified bandwidth, and increases with frequency. The specified bandwidth refers to the frequency at which the voltage shown on the screen is 0.707 of the actual voltage, or, in other words, is 3 dB down from actual. Hence, a 10-volt, 10-MHz sine wave applied to the input of an oscilloscope with 10-MHz band-

width would produce about a 7-volt display on the screen.

Since clipping introduces 3rd, 5th, 7th, and higher order harmonics, a circuit operating near the bandwidth of the oscilloscope used to test it will appear nearly free of clipping even if the clipping is actually quite severe. As the bandwidth of the oscilloscope is exceeded, even square waves begin to look very sinusoidal.

A good rule of thumb in selecting an oscilloscope is, that for accurate measurements, the bandwidth of the oscilloscope should exceed the maximum frequency of interest by a factor of five. For some uses, a factor of three may be adequate.

Once the frequency roll-off characteristics are determined, the rise time also determined. Bandwidth and rise time are approximately related by the formula: Bandwidth times rise time equals 0.35. If pulse rise times are the measurement of interest, the rise time of the oscilloscope should be five times faster than those of the pulses to be measured.

It should be noted that bandwidth and rise times are usually specified when the signal is fed from a 50-ohm source through 50-ohm coaxial cable, terminated in 50 ohms at the scope, when the signal is applied through a probe attached to a terminated 50-ohm signal source. As these conditions change, so will the apparent rise time and bandwidth. In other words, the time displayed on the screen, or the apparent bandwidth of the scope, vary according to the specified band-

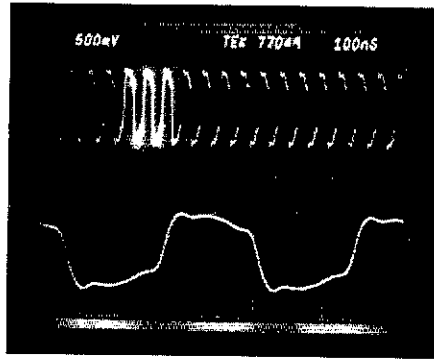
width and the characteristics of the circuit under test.

The main factor in this phenomenon is the input capacitance of the oscilloscope. The rise time of the combination of the circuit under test and the oscilloscope will not be less than $2.2 \times R \times C$, where R is the source impedance of the circuit under test and C is the combined capacitance of the oscilloscope, the input cable, and the stray capacitance of the circuit under test. For example, suppose the input cable contributes 125 pF, and the oscilloscope input contributes 27 pF. Suppose this combination is attached to the collector of a grounded-emitter amplifier stage, and that the stage contributes 3 pF of stray capacitance, and that the load resistor of the stage is about 1000 ohms. An infinitely fast rise time pulse applied through this combination would appear on screen as being no faster than $2.2 \times 155 \times 10^{-12} \times 10^3$ seconds, or 0.341 microseconds. The fastest rise time that can be accurately measured under these circumstances is about 1.7 microseconds. Carrying this a step further, the maximum -3 dB bandwidth is $(0.35/0.341) \times 10^6$ seconds, or about 1 MHz, regardless of the specified bandwidth of the oscilloscope alone.

This situation can be remedied by avoiding high source impedance test points such as drains, plates and collectors, or by reducing the input capacitance presented to the circuit under test, or by some combination of the two. A practical approach to reducing capacitance is the use of a 10-times attenuating probe, since many 10-times probes present a total circuit loading capacitance of less than 15 pF when attached to an oscilloscope. This is why the probes most often used with an oscilloscope are the 10-times attenuating type.

The maximum sensitivity available in modern oscilloscopes may be as great as 10 microvolts/division in some cases. Usually, however, the maximum sensitivity in ordinary oscilloscopes is 5 to 10 millivolts/division, which is adequate for many common measurements, even with a 10-times probe.

Very inexpensive oscilloscopes use an oscillator type of horizontal sweep, where the sweep speeds are indicated in frequency. This type of sweep is much less useful than sweeps linearly calibrated in units of time, such as are found in most present-day instruments. In fact an accurate, calibrated time base was one of the innovations that helped popularize the oscilloscope as a measuring tool. Usually, the fastest sweep speeds are achieved by "horizontal magnification" or increase in horizontal amplifier gain. This is done at some sacrifice in horizontal accuracy,



The upper trace shows the main sweep, intensified. In the lower trace, delayed sweep has been selected and the intensified portion of the upper trace is shown at a higher sweep speed.

but the additional expansion is usually worth the expense and loss of accuracy.

Somehow the sweep must be synchronized with the incoming signal. This can be accomplished either by a synchronization circuit or by a trigger circuit. Synchronization circuits work only with repetitive signals and are used mainly in inexpensive instruments or at very high frequencies where triggering is almost impossible. Trigger circuits will work equally well with repetitive or single-shot events, and tend to be used in medium priced and better oscilloscopes. The trigger circuit can be adjusted to trigger at any point on the incoming wave, and on either the positive-going or negative-going slope.

There is some delay in getting the sweep started and the CRT unblanked, so, unless something is done, the leading edge of the displayed waveform will be lost. This is usually not too important in sine-wave measurements, but it can be a nuisance in pulse work. In faster oscilloscopes, a delay line is inserted between the output of the vertical amplifier and the vertical plates of the CRT, so the signal transit time through the vertical system is longer than through the horizontal system. The sweep actually begins before the event that triggered it appears on the screen, so this system allows examination of the leading edge of the triggering waveform.

Frequently it is useful to examine two signals, such as the input and output of an amplifier, on screen at the same time. This can be accomplished either through dual-gun or dual-trace techniques.

The dual-gun technique calls for the sealing of two electron guns in one CRT envelope and for using two separate vertical amplifiers. This technique is expensive but has the advantage when two single-shot events are to be studied.

For repetitive phenomena, such as

radio signals, the dual-trace technique is much less expensive and just as satisfactory. One gun is sealed in the CRT, and two amplifiers are fed to the gun either by chopping or alternating between the two amplifiers.

In the chop mode, the trace is switched back and forth between the two amplifiers at a rate of a few hundred kilohertz. Blanking is applied to the CRT during the switching, so switching is invisible, and the single gun appears to supply two simultaneous traces. Since the chopping frequency does not vary with sweep speed, a point is reached where the chopping may begin to break up the trace, so chopping is mainly useful for slower sweep speeds.

For faster sweep speeds, the trace is simply alternately controlled for one sweep by each amplifier. This restores the illusion of two simultaneous traces at higher sweep speeds and, where the trigger circuit is sufficiently sophisticated, will allow the apparently simultaneous display of two non-time related signals. Chopping or alternating can be used to create four or more traces if that is required.

Where accurate time measurements are desired, or where it is desired to display one portion of a trace greatly expanded, delayed sweep is useful. Delayed sweep uses two separate time bases, one delayed by the other. The second, or delayed, sweep runs at a speed faster than the first, or delaying, sweep. The point where the delayed sweep begins is controlled by a potentiometer, and, if the potentiometer is accurately calibrated, time measurements accurate to about 1 percent are possible.

If the main, or delaying, time base is selected, a normal display is presented. If the intensified mode is selected and the delayed time base is set to sweep faster than the main time base, a portion of the sweep will be displayed more brightly than the rest. The beginning point on the graticule of this intensified zone is set by the delayed-sweep potentiometer, and its length is set by the sweep speed selected for the delayed sweep. When delayed sweep is selected, the intensified portion of the sweep will be displayed across the full width of the CRT. In this mode, the delayed-sweep potentiometer can conveniently be used to move the beginning-of-sweep point so portions of the sweep downstream from the beginning of the main sweep can be easily examined in great detail.

The oscilloscope is a very powerful tool, capable of giving a great deal of information about the workings of a circuit. When designing or troubleshooting, it can be almost indispensable, and its proper selection and operation are well worth the investment of time.

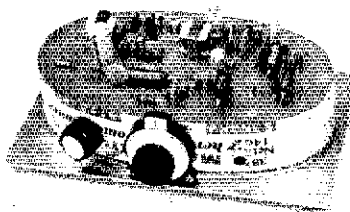
The Herring-Aid Five

Ears for the Tuna-Tin 2. A 40-meter, direct-conversion receiver using no mechanical variable capacitors.

By Jay Rusgrove,* WA1LNO

Not to be outdone by W1CER and his Tuna-Tin 2 which appeared in May '76 *QST*, the writer decided to answer the challenge with a simple direct-conversion receiver. In keeping with the tin-can chassis format, a junket to the nearby supermarket netted (no pun intended) a chassis for the receiver — a Scottish Herring can! The reader perhaps has no idea concerning the amount of torment that one is subjected to when building a project in a herring can. He becomes the target for many a snide comment like, "That receiver sounds mighty fishy to me," or "What's that? A receiver for a person with tin ears?" or "Whew! That receiver really stinks." Or perhaps "What's next? A kipper-can kilowatt?" One should realize that these comments are more than likely caused by fits of jealousy on the observer's part, wishing that he also had a Herring-Aid Five!

Most of the components used in the construction of the receiver were garnered from a local Radio Shack store. Total cost of the project, exclusive of the herring can and the vernier dial (using new components) will be slightly more than \$20. Of course, it can be built for considerably less if the builder



is able and willing to scrounge parts from defunct radios, tape recorders and the like. Armed with a moderately stocked junk box, the builder should be able to duplicate this receiver for around \$10. Several evenings at the workbench should yield a perfectly working model. Alignment of the receiver is quite simple and requires the use of a calibrated transmitter, receiver, signal generator or dip meter.

The Circuit

Simplicity and foolproof were the watchwords for the receiver design in Fig. 1. Signals in the 40-meter band arriving at the antenna terminal are coupled to the source of Q1 through L1-L2. Q1, a grounded-gate JFET rf amplifier, has its source tapped down on L2 to preserve the *Q* of the input-tuned

circuit. Output from this stage is applied to the product detector, Q2, through L3 and L4. Energy from the VFO is coupled to the detector through C1. Bias for this stage is fed through the turns of the coil to the base of Q2. The emitter resistor is bypassed for audio frequencies with a 47- μ F electrolytic capacitor connected from emitter to ground. An interstage transformer, T1, couples the audio signal from the product detector to the af-gain control.

Q3 functions as an audio preamplifier, boosting the output of the detector to a level which is suitable to drive the audio-output stage. Output from Q4 is transformed to a low-impedance level by the output-matching transformer, T2. The circuit was designed for low-impedance headphones. However, there is sufficient output to drive a small speaker. Shaping of the audio channel provides a peak response at approximately 600 to 700 Hz. Many cw enthusiasts consider this the most comfortable frequency range to listen to. The receiver is also usable for ssb and a-m reception, as the audio shaping is not prohibitively sharp.

The VFO is of the Armstrong "tickler feedback" variety. Operating voltage, along with feedback information, is fed to the drain of Q5 through

*Novice Editor, *QST*

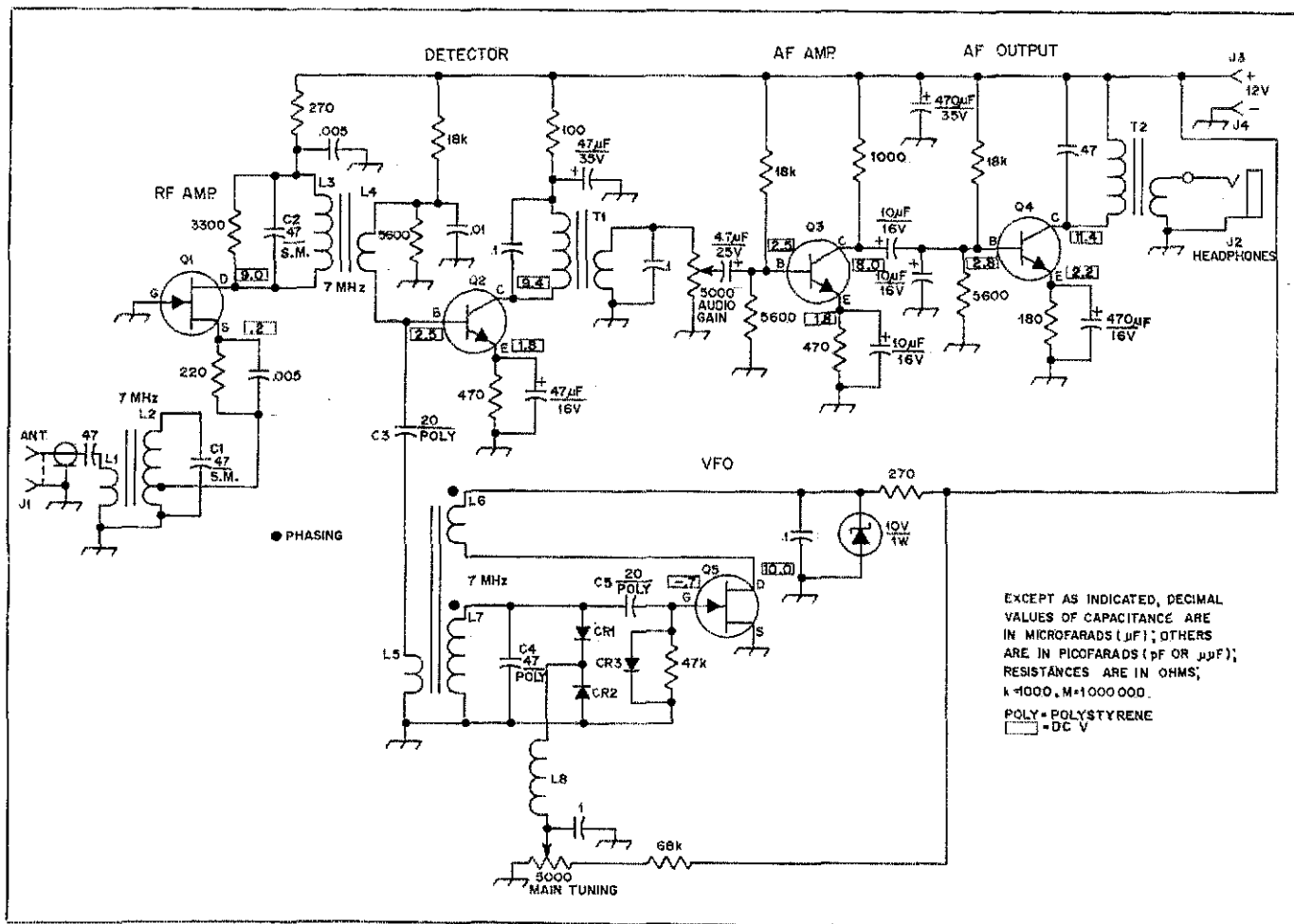


Fig. 1 — Schematic diagram of the Herring-Aid Five. Fixed-value capacitors are disk-ceramic unless specified otherwise. Fixed-value resistors are 1/2-watt composition. The audio-gain control is an audio-taper type potentiometer and the main-tuning control is a linear type potentiometer.

CR1 - CR3, incl. — High-speed switching diode (Radio Shack type 276-1620).

J1 — RCA-type phono jack.

J2 — 1/4-inch phone jack.

J3, J4 — Binding post.

L1 — 3 turns insulated hookup wire wound over (ground) end of L2.

L2 — Radio Shack type 273-101 rf choke. Tap at 4 turns above ground end.

L3 — Radio Shack type 273-101 rf choke.

L4 — 4 turns insulated hookup wire wound over cold end of L3.

L5 — 5 turns insulated hookup wire wound over ground end of L7.

L6 — 4 turns insulated hookup wire wound adjacent to high end of L7.

L7 — Radio Shack type 273-101 rf choke with six of the original turns removed.

L8 — Radio Shack type 273-102 rf choke.

Q1, Q5 — JFET (Radio Shack type RS-2035).

Q2 - Q4, incl. — Transistor (Radio Shack type 276-1617).

T1 — Audio transformer (Radio Shack type 273-1378).

T2 — Audio transformer (Radio Shack type 273-1380).

L6. For the circuit to oscillate, L6 and L7 must be phased properly. Tuning of the VFO is accomplished through the use of CR1 and CR2 connected as a voltage-variable capacitor diode (Varactor). With this type of circuit no mechanical capacitor is needed. As the amount of reverse bias applied to the diodes is changed, the capacitance that they present to the tuned circuit changes. In our VFO the change was quite linear and the calibration of the vernier dial was very close to the actual frequency being tuned. A Zener-diode regulator is used to power the VFO circuit, as this is essential if good frequency stability is to be achieved. CR3 limits the positive excursion of the sine wave, thereby aiding the stability of the oscillator. L8 prevents rf energy from

migrating to the arm of the main-tuning potentiometer.

Construction

The herring can used for the receiver measures approximately 7 × 3-3/4 × 1-1/2 inches. Contents of the can should be removed before attempting to package the receiver within. The writer, not being a connoisseur of Scottish Herrings, enlisted the services of Headquarters staffers WICER and WA6GVC, who were more than happy to dine on the contents of the can! The bottom of the container must be removed in such a fashion that there is an 1/8-inch ridge remaining around the edge of the can to which the foil side of the circuit board should be soldered. This can be accomplished with the aid of a nibbling tool or

saw blade. The circuit board measurements are the same as the top opening of the can, 7 × 3-3/4 inches. The board can be cut to an oval shape by using a coping saw or nibbling tool. (See Fig. 2 for the circuit-board layout pattern.)

C1 and C2 should be silver-mica or polystyrene capacitors. Disk-ceramic types were tried in these positions but they lowered the Q of the tuned circuits to the extent that out-of-band signals caused interference problems. For best VFO stability, C3, C4 and C5 should be polystyrene. This type of capacitor seems less prone to capacitance versus heat changes than silver-mica or disk-ceramic capacitors are. If you can not find polystyrene types, silver mica would be the next alternative, with disk ceramics representing the last (and

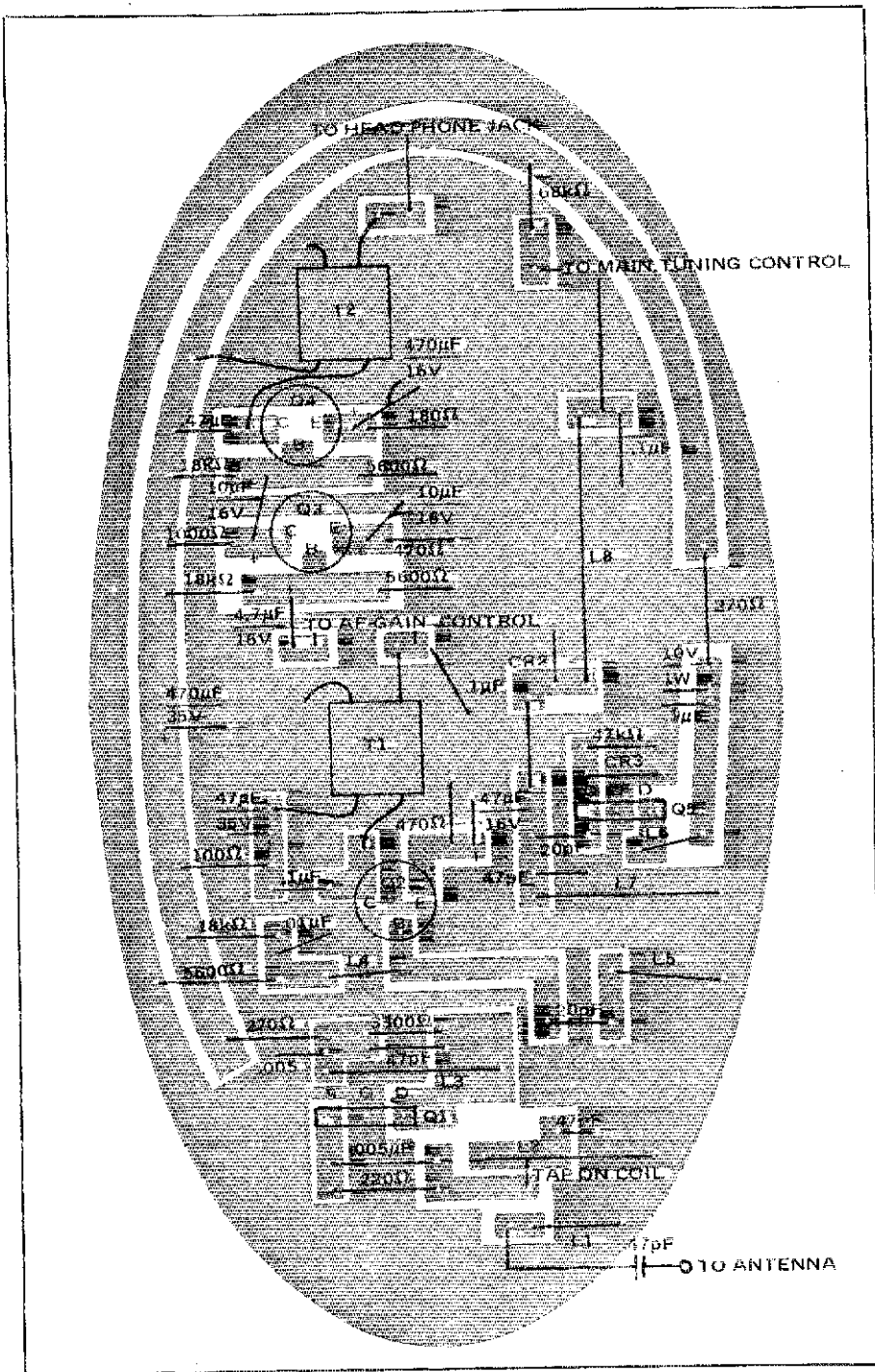


Fig. 2 - Shown here is the full-scale template and parts-placement guide as viewed from the foil side of the board. Gray areas are the foil pattern that remains after etching.

poorest) choice. Reasonable results can be obtained with the disk-ceramic types, however. L7 has six of its original turns removed. The last several turns on the ground end of the coil should be spread out on the coil form. These turns will serve as an adjustment to set the VFO on the proper frequency for the portion of the band to be tuned. L6 is wound on the "hi" end of L7 (C5 end),

adjacent to the L7 winding. Proper phase of the coils must be observed so that the circuit will oscillate. L5 is wound on the "low" or "cold" end (ground end) of L7.

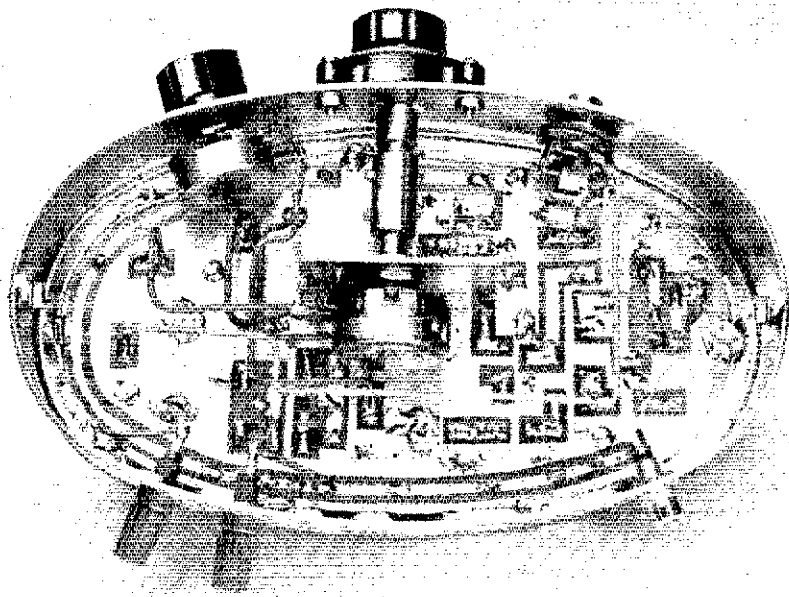
The inside photograph of the receiver shows how the main-tuning potentiometer and the piece of circuit board used to support the potentiometer are mounted. Care must be taken to

ensure that the hole on this board lines up with the front-panel hole for the vernier dial. One simple way of accomplishing this is to drill the hole in the front panel first. Mount the piece of circuit board that holds the potentiometer to the main circuit board. Place the main circuit board in position on top of the can. While holding the circuit board firmly against the can, slip a pencil through the hole in the front panel and scribe a circle on the potentiometer support board that lines up with the front-panel hole. Remove the main circuit board and drill the hole for the potentiometer within the boundaries of the scribed mark. If these holes are not closely aligned, the vernier dial may slip because of lateral pressure being placed on the vernier assembly. When all of the parts are soldered to the board and the tuning-potentiometer assembly is in place, the circuit board may be soldered to the can at several points along the 1/8-inch ridge.

Adjustment

The receiver, as shown in the diagram, will tune any 100-kHz segment of the 40-meter band. For example, if the receiver is to tune 7.0 to 7.1 MHz, zero on the vernier dial will correspond to 7.0 MHz and 10 on the dial will correspond to approximately 7.1 MHz. The tuning range can be extended a bit by removing the high end stop inside the vernier-dial assembly. This will allow the potentiometer to move through its full rotation instead of only a portion of it. An additional 40 kHz or so of tuning range can be obtained in this fashion. Of course, there are no calibration markings past the number 10 on the dial.

Suppose it is desired to set the receiver to tune the range from 7.0 to 7.1 MHz. Set the vernier dial to zero and loosen the set screw on the vernier output coupling. Rotate the tuning potentiometer shaft to the end stop that corresponds to the end stop that the vernier is up against. This should be the position with the arm of the potentiometer connected to ground. Rotate the pot approximately 1/16 to 1/8 turn away from the stop, and tighten the set screw securely. This will allow for the "dead" portion near the end of the control. To set the VFO on frequency, one of several pieces of equipment will be needed. If a calibrated transmitter is available, set it to 7.0 MHz, operate with several watts into a dummy load. Place the latter near the receiver. Spread or compress the bottom few turns of the coil until the transmitted signal can be heard in the receiver. Only a small amount of movement of the turns should be necessary. If a transmitter is not available, a calibrated receiver may be used. Adjust the vernier to zero, and while listening to the calibrated receiver set to



Here is the photograph of the inside of the Herring-Aid Five. Note how the main-tuning potentiometer is mounted on a small piece of circuit board, which is mounted, in turn, to the main circuit board.

MHz, adjust the bottom few turns of L7 until the VFO is heard in the receiver. If a signal generator or dip meter is available it may be used for the calibration. Set the dip meter or signal generator to 7.0 MHz and adjust the turns of L7 until the signal is heard in the receiver. That completes the alignment procedure.

Operation

Laboratory tests show that the receiver is able to copy a 0.1- μ V signal, which is more than adequate for 40-meter work. Using the receiver with the ARRL all-band vertical, the writer has been able to copy numerous VKs, ZLs and a KG6 while listening in the early morning. Evenings, many Europeans, North and South Americans and Caribbean stations have been copied Q5.

If you're looking for a simple and interesting weekend project, the Herring-Aid Five is for you — if you can endure all the disparaging comments, that is!

QST

Strays

The Canadian Amateur Radio Teletype Group (VE3RTT) 15th Annual W/W RTTY DX "Calgary Centennial" Sweepstakes October 4 — 6th, 1975

Single Operator	Score	Call Sign	Score
W3EKT	1,555,340	VE7DLX	51,100
CT1EJ	1,465,228	K4CFJ	46,572
IA2Z	1,235,260	WB9DED	43,448
W4RZ C/ZPS	1,158,636	ON6HE	37,052
IBAA	1,107,400	VE6AYM	36,500
W4CUI	1,068,556	LA5HE	34,088
WB1LUK	971,105	OA4BR	33,112
W9NLR	723,200	WB2QXX	33,032
ISCLC	676,048	PA9RZ	27,608
W2GKJ	632,500	WB6EE	29,672
K6WZ	620,165	DK1AQ	17,812
KBARH	593,925	LA7AJ	14,792
W9OEQ	581,920	CH1LV	14,254
K3USG/8	501,388	VE3CTP	13,206
JH1TF	493,935	VE7BDQ	11,608
VE2JR	470,000	CE3EX	10,440
CE3MA	442,280	WB9IQK	9,372
VE7YB	429,280	DK3NH	8,037
HB9AVK	395,312	VE3RH	2,772
W8JN	374,905	VK5WV	2,748
DL1VR	370,024	VE3PM	2,284
K4GJW	356,450	SM6CAL	2,460
SM6ASD	342,732	W8CAT	2,270
DI BKS	329,960	V56CL	1,830
ON4BK	304,625	VE1AHG	1,668
JH1HF	295,690	VE6ANE	480
WBCEG	292,230	W8TCO	455
W7KS	283,755	SM6GDL	230
K4AGC	263,788	VE3GDZ	44
W4WGL	243,180		
WA9YD/J4	238,088	Multi-operated	
CH1XP	235,935	11PYS	1,659,612
WA6HMA/KG6	235,165	DL0TG	1,002,832
W6JDU	224,820	KA2USA	664,820
G6JF	186,680	W1MX	523,845
W7RCT	185,720	SK5AA	198,920
YK3KF	175,600	OK1KVK	3,294
W6JOX	172,755		
3Z2X	144,800	SWL Printer	
148KM	132,700	Wolfgang Geller	743,348
WA2DHF	129,652	Giannelo Roberto	622,542
SM7BGE	119,280		
W7MI	110,170	Paul T. Menadier	604,620
WA1MICY	109,700		
W7C8Y	101,800	Tosofini Mario	482,240
K8NTK	91,600	Mel La Moreaux, W8VZB	427,065
WA21AP	87,238		
H89HK	84,652	Larry Filby, K1LPS	330,304
OK1MP	82,775		
K6ZDL	74,356	H. Suzuki, JA1-3477	174,750
SM6L DH	58,656		

obtaining parts and rigs. In the Maryland/Virginia area, a new program using cassette tapes now makes available to sightless amateurs *Auto-Call Magazine*, a monthly publication of The Foundation for Amateur Radio. Other features of *Auto-Call* simultaneously accessible are Vic Clark's (W4KFC) "ARRL Report"; "FM News and Views" by Gary Hendrickson, W3DTN, of the FCC and the "FCC Highlights" by Bill Grenfell, W4GF.

A phone call from blind amateur Gale Conard, K3VTA, to Ginny Pinkerton, K4SHE, who with her OM, W4QVL, is editor of *Auto-Call*, sparked the program. He asked if there was any possible way of receiving *Auto-Call*, especially the want-ads, and suggested the use of cassettes. A subsequent brief



Irv Hershowitz, W3HOG, receives his cassette tape of *Auto-Call* from Bonnie Dooley, WN4FYR, daughter of *Auto-Call* Editor Ginny Pinkerton, K4SHE, (center).

blurb in the magazine netted immediate response.

Upon receiving copies of *Auto-Call*, readers record, then mail, a tape to the blind amateur. But at present there are not quite enough readers, so tapes are duplicated by Joe Posch, WA4FXN. It is hoped that the program will eventually run on a one-to-one basis. The volunteers involved are Vince Gambino, WB4QJO; Ward Atherton, W3RVE; Al Magagna, W3RWW; Fred Schall, WA4ABC; Bonnie Dooley, WN4FYR and Joe Posch, WA4FXN.



Bicentennial Firsts: K1DRN, Vernon Dameron, Jr., took the first Bicentennial WAS in Massachusetts as the second Bicentennial WAS recipient. His father, Vernon Dameron, Sr., W1HGA, as number 96 recipient, was not to be outdone: He was the first in Vermont.

Blind amateurs have few handy sources for ham radio want ads, vital to

The Maunder Minimum

Digest of a remarkable paper by John A. Eddy of the National Center for Atmospheric Research, Boulder, Colorado.

By Joseph L. Lynch,* WA6PDE

Modern methods and a fine sense of history have been combined in sunspot research by astronomer John A. Eddy of the High Altitude Observatory of the National Center for Atmospheric Research, Boulder, Colorado. His evidence supports the belief of two 19th century physicists that there have been at least two long periods of very low solar activity since the dawn of human history. Addressing gatherings of fellow scientists, most recently an annual meeting of the American Association for the Advancement of Science in Boston early this year, he has shown plots of solar activity that go back centuries before the invention of the telescope.¹

Eddy concentrates on the period known as "The Maunder Minimum," after E. W. Maunder, superintendent of the Solar Department of Greenwich Observatory, who picked up the work of a German astronomer, Gustav Spörer, after the latter's death. Spörer had studied historical records and concluded that there had been a remarkable dearth of solar activity in a 70-year period beginning about 1645 and a 90-year one beginning about 1460. Maunder summarized Spörer's work in papers presented before the Royal Astronomical Society, and carried on with extensive study of historical records. In his second

paper (1894) Maunder provided more details, indicating that to accept this evidence was to admit that the solar cycle and the sun itself had changed markedly in historic time, and could again. He stressed that the concept had important implications for our understanding of the sun and for studies of solar-terrestrial relationships as well.

In his 1976 paper, Eddy surveys a mass of evidence from before and since Maunder's time, adding modern touches such as use of carbon-14 data to bolster man's observational records. The C¹⁴ data match the two solar minima, and indicate an era of exceptionally high solar activity in the 12th and early 13th centuries. This maximum also appears, though more vaguely, in natural and historical records. All sources raise questions about the validity of the "11-year cycle" as a regular or permanent feature of the sun's lifetime. What follows is a digest of Eddy's extraordinary paper, using Eddy's own words wherever possible.

Solar Observation Over 365 Years

The telescope was invented by Galileo in 1611. Improvements in the instrument and refinements in its use were being made well into the period of the Maunder Minimum, 1645 to 1715. Solar observation was common before the minimum, and sunspots were well-known. Newton invented the reflecting telescope and two major observatories were founded during the Maunder Mini-

um. Important discoveries were being made by astronomical observation through the period, and many famous astronomers were active. The *Rechenbuch der Ursina*, a massive work on sunspots by Christopher Scheiner, was published in 1630. Ample technology and knowledge existed, and while organized sunspot counting came later, there were many capable observers at work. Records surely would have survived if there had been high levels of sunspot activity. Instead, new sunspots were so rare that sightings were reported in scientific literature only as discoveries, and a new spot or group was cause for publishing a paper about it.

Eddy is careful to point out that scientific literature was in its infancy and quite limited in scope. Sunspots were thought to be clouds, and were not considered as important as they have been in recent years. Interest in sunspots may have waned somewhat, as the attention of astronomers turned to other areas. But all these arguments seem weak, and appear to reduce the credibility of Maunder Minimum evidence only slightly.

Aurora Sightings

The eerie quality of the aurora borealis alone would assure some record of its observation throughout history. Because the number, intensity, and geographical distribution of auroras correlate well with solar activity, aurora records dating back to before the Christian era provide some long-term histo-

*P. O. Box 73, Bonita, CA 92002

¹ This and subsequent footnotes will appear on page 26.

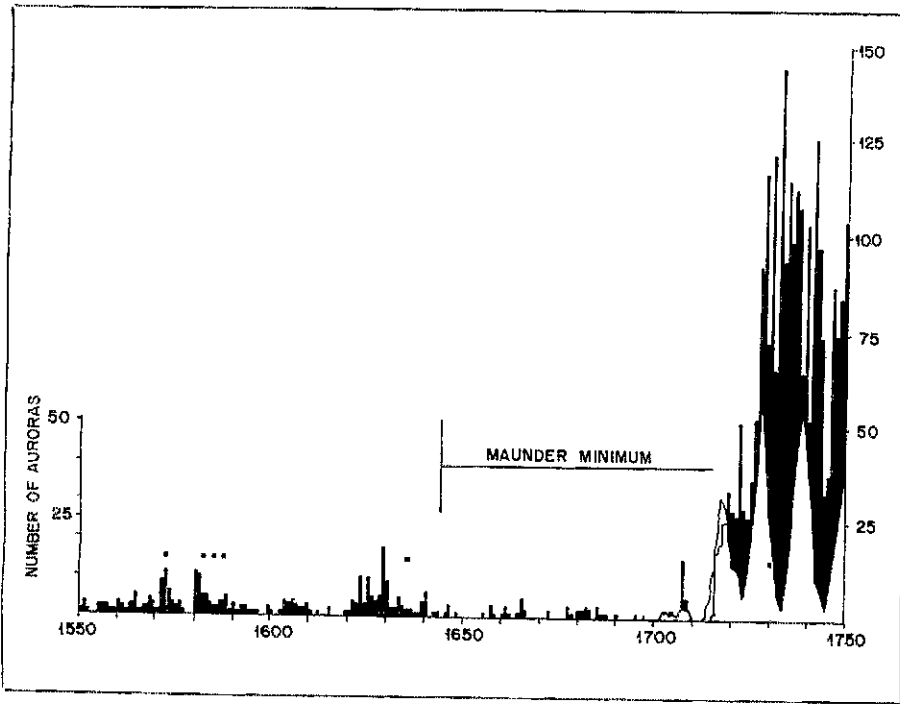


Fig. 1 — Aurora sightings, 1550 to 1750, by year, with annual mean sunspot number superposed. Far East aurora reports are indicated by square dots. Horizontal line marks the period of the Maunder Minimum.

1550 to 1750, Fig. 1, indicate an auroral "turn-on" after the Maunder Minimum. There are 6126 auroral reports for the 18th century, and almost as many for the 19th. Oriental sightings are indicated by square dots. Though auroral records are undoubtedly colored by human factors, it is important to note that they do not increase with time in a manner that a "learning factor" might imply. They rose and fell all through the record, but the longest and most pronounced low is the period of the Maunder Minimum. Had Maunder looked at the Fritz catalog, he could have hypothesized his "prolonged sunspot minimum" from auroral records alone. The sudden rise after the Maunder Minimum includes sociological factors, as well as possible changes in the sun. The Halley paper and other scientific work gave credibility to auroral observation and recording.

Naked-Eye Observations

Large or numerous sunspots can be seen with the naked eye, and have been through all human history. (Look for them that way *only* when the sun is markedly reddened by haze!) Because of the importance of the sun and sunspots in oriental legend and augury, a more detailed early record is available from that part of the world than elsewhere. But here, too, the records give only coarse indications of past solar activity.

After Maunder's death, Sigeru Kanda compiled a comprehensive list of 143 sightings from records of Japan, Korea, and China, covering 28 BC through 1743 AD.⁴ The long-term average of just over one per decade would indicate a likelihood of 6 or 7 events during the Maunder Minimum. It is thus significant that none appear between 1639 and 1720, matching Western Hemisphere data very well. Far eastern auroral observations also provide supportive evidence, if one accepts their limitations.

Carbon-14, and the History of the Sun

Modern confirmation of the Maunder Minimum and other long-term solar-activity anomalies is found in the record of C^{14} content of tree rings. When carbon dioxide is assimilated into living matter (in this instance, trees) the radioactive isotopes begin spontaneous disintegration at well-known rates. Dating is thus possible by measuring the C^{14} content and comparing it with a presumed original amount. The history of C^{14} content of the atmosphere, established by the tree-ring method, serves as a basis for isotopic dating in archaeology. The isotope is formed continuously in the atmosphere by action of cosmic rays, and the level of cosmic rays entering the atmosphere is modu-

cal indication of relative solar activity. Maunder, in his final paper at age 71, drew on the work of Agnes M. Clerke,² who may have been the first to note the correlation. "There is," she wrote, "strong though indirect evidence that the 'prolonged sunspot minimum' was attended by a profound magnetic calm." Historical aurora catalogs confirm that there were far fewer auroras recorded during the Maunder Minimum than in the 70-year periods before and after. There were only 77 auroras reported, and in 37 of the 70 years there were no auroras reported anywhere.

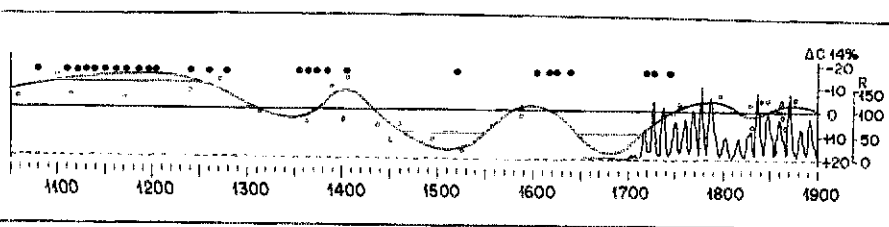
The noted astronomer Edmund Halley saw his first aurora in 1716, after the Maunder Minimum. He was then 61 and had waited most of his life to

observe one. He was so impressed that he wrote a classic paper on his observations.

A weakness of auroral sightings as evidence is their low level prior to the Maunder Minimum. Still, the Fritz catalog³ lists 161 for the 16th century — a higher annual average than for the period of the Maunder Minimum, and the highest total for any century up to that time. Eddy discounts the low level of earlier records in two ways. It is likely that *reports* were scarce, rather than occurrences. Prior to the 16th century, scientific activity was lower than later, and in Europe observation of the heavens was inhibited by opposition of religious leaders of the time.

Statistics from the Fritz catalog for

Fig. 2 — History of relative atmospheric carbon-14 concentration from tree-ring analysis, 1050 to 1900 AD. Black dots mark dates of naked-eye sunspot sightings, from Kanda.⁴ Annual mean sunspot number, after 1610, appears at the right. Periods when relative C^{14} deviation exceeds 10 percent are shaded, indicating the extended high, 1100 — 1250, and the Spörer and Maunder Minima.



lated by solar activity. When the sun is quiet, C¹⁴ content rises, and it is lower in times of high solar activity.

The first major anomaly in the C¹⁴ tree-ring record, called the De Vries Fluctuation after its discoverer, was a large and prolonged increase between 1640 and 1720 with a peak around 1690. The deviation of some 20 percent from normal in this period is in remarkable agreement with the Maunder Minimum. The curve of relative C¹⁴ deviation back to the year 1050 is shown in Fig. 2. Increasing tree-ring content is shown as a downward curve, to permit comparison with sunspot information from Waldmeier⁵ in the righthand portion of the curve. Early naked-eye sunspot sightings from Kanda are shown by black dots.

A deviation of 10 percent or more in the C¹⁴ level is considered significant. By this criterion there are three clear solar anomalies in the last 1000 years: The Maunder Minimum, the earlier one (Eddy suggests it be called the Spörer Minimum) between 1460 and 1550, and a long high in the 12th and early 13th centuries. Eddy calls the high a "Grand Maximum." None of the negative excursions of C¹⁴ data (high solar activity) is as great as that in the opposite direction during the Maunder Minimum. In his paper Eddy speculates that we are heading for another Grand Maximum. In a phone conversation with the writer, he said he felt that the next Grand Maximum could occur in the 21st century. Present-day C¹⁴ records are in some confusion, the steady modern decline being attributed in part to industrial pollution of the atmosphere as well as to a generally high level of solar activity.

Solar Corona At Eclipse

Historical accounts of appearance of the solar corona during eclipse of the sun offer another possible check on past solar behavior, since the shape of the corona varies with solar activity. Coronal streamers seen at times of high sunspot activity are believed to be rooted in concentrated magnetic fields on the sun's surface, associated with sunspots. When the spots fade, so does the corona. With low solar activity the corona is mainly zodiacal light (false corona), the result of scattering by dust and other matter in space.

Eclipse expeditions to the far corners of the world are a modern phenomenon. Early scientific use of solar eclipses was mainly for checking orbital calculations and the relative size of the lunar and solar disks. This work was done in fixed observatories under conditions that prevented detailed observation of the corona. These fundamental differences in methods and objectives severely limit the number of eclipse

observations that can be used for coronal information, as there are very few records or coronal effects. Of 63 eclipses during the Maunder Minimum, only 8 passed through parts of Europe where astronomers were at their daily work, and only a few reached totality near any permanent observatory. The three best observed were in 1706, 1708 and 1715, when sunspots had begun their return.

Descriptions of the corona are found in connection with eclipses of 1652, 1698, 1706 and 1715. They were made, in general, by amateurs and nonconformists, who watched the spectacle with eyes wide open to it all. Every account except that of 1715 is consistent with what zodiacal light would look like in the absence of true corona: Very limited in extent, dull or mournful, often reddish. None of the first three described coronal structure or mentioned the streamers which are seen so readily with the naked eye in times of appreciable sunspot activity.

By the eclipse of 1715, the last in the Maunder Minimum, the annual sunspot number had reached 26, and was rising. The corona was fairly well described, and for the first time drawings were made of it. Also for the first time, coronal structures were mentioned. A description by Cotes, in a letter to Isaac Newton, is typical of what is seen today in times of low (not zero) sunspot number.

While advancing many possible explanations for the lack of descriptive accounts of structured corona, Eddy adds: "It will be hard for anyone who has seen the corona with the naked eye to accept these explanations, and to believe that of the thousands of lookers at hundreds of eclipses, not one would have commented on a thing so breathtaking and beautiful. It thus seems to me more probable that through much of the long period of the Maunder and Spörer Minima, the sun was at such a minimum of activity that the true corona as we know it today was severely thinned, or absent altogether. The same may be true of the longer span before 1400, and for different reasons may apply to the prolonged maximum of the 12th and 13th centuries. Records that far back are so dim that conclusions seem unwarranted, but it may be that the corona as we know it is a modern feature of the sun. It is an interesting question, and another challenge for historians."

Summary and Conclusions

The dearth of sunspots between about 1645 and 1715 is supported by contemporary accounts and is cited in astronomy works of the ensuing century. There was no lack of observing ability; Scheiner and Hevelius, writing

before the Maunder Minimum, described adequate methods. Contemporary drawings show nearly all spot details known today. Where historical records are sparse, search for possible conflicting evidence is a promising path to truth. The lack of such evidence leads Eddy to conclude that the long sunspot minimum was a real feature of solar history, happening much as Maunder described it.

He challenges Wolf sunspot data for the first 50 years of the 17th century, saying that Wolf himself did not have confidence in data available for those years. Eddy quotes Waldmeier as saying that Wolf intended to prove, for a longer period, the sunspot periodicity discovered earlier by Schwabe, who is credited with originating the sunspot cycle concept. Wolf explained that where data were sparse, he assumed the continued operation of the 11.11-year cycle.

Eddy concludes, "There is good evidence that within the last millennium the sun has been both considerably less active, and probably more active, than in the last 250 years. This opens the possibility of long-term changes in solar radiation, and certain anomalies in the flow of atomic particles from the sun, with other inevitable terrestrial effects. . . ."

"The reality of the Maunder Minimum and its implication of basic solar change may be but one more defeat in our long-losing battle to keep the sun perfect, and if not perfect, constant, and if inconstant, regular. Why the sun should be any of these things, when other stars are not, is probably more a question for social rather than physical science."

I would like to thank John A. Eddy for his input to my review, and permission to use some of the artwork prepared for the paper presented in Boston, and submitted for publication in *Science*. I also thank Ted Cochran, W4UMF, for his help, and Ed Tilton, WIHDQ, who provided the encouragement for me to prepare the digest and rendered editorial assistance in readying it for *QST*. □

Footnotes

¹ Eddy, "The Maunder Minimum," presented before the annual meeting of The American Association for the Advancement of Science, and submitted for publication in the Association's magazine, *Science*.

² Clerke, *Knowledge*, 17 (1894).

³ Fritz, *Verzeichniss Beobachter Polarlichter von C. Gerold's Sohn*, Wien, (1873), regarded by Eddy as still the best collection of auroral sightings available.

⁴ Kanda, *Proceedings of the Imperial Academy of Japan*, 9, 1933.

⁵ Waldmeier, *Sunspot Activity in the Years 1610-1960*, Schulthess & Co., Zurich, 1961.

⁶ Wolf, *Sunspot Observations, 1610-1960*, Hale Observatory Library, Pasadena.

A Wide-Range Crystal-Controlled Frequency Standard

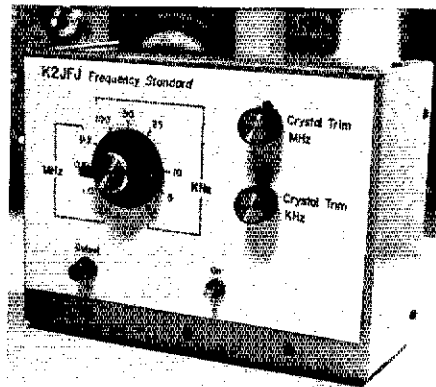
Do you know where you're at? This standard can tell you.

By Jack M. Janicke,* K2JFJ

You say, buddy, that you have a sked on 14,235 kHz and your crystal calibrator only has markers every 100 kHz. How are you going to hit the right frequency? You know that the old dial linearity isn't very good. What are you going to do? Well, friend, you could use that frequency standard that you saw in *QST*. It seems to me that it would give markers almost everywhere you wanted them. In this day of increasing sophistication in amateur radio gear and operational techniques, the need for accurate frequency-measurement apparatus becomes more evident daily. Highly accurate digital frequency counters are available, but even these should be checked periodically against an external standard. The instrument described in this article is low in cost, high in accuracy, and can be assembled by any amateur operator having a limited degree of technical knowledge and shop facilities.

The unit shown in the photographs may have a more extensive range than many operators deem necessary. It fits the author's requirements which include calibration of frequency meters (BC-221) and frequency counters, and general verification of amateur-band operational frequencies. The unit is housed in an 8 × 6 × 3-1/3-inch Minibox; however, it could have easily been assembled on the so-called "peg-board" material, available at most electronic supply houses, without benefit of a cabinet.

Two crystal oscillators were included in the instrument, one at 2 MHz and the other at 100 kHz. An isolation amplifier was required to prevent a slight pulling of the crystal oscillator frequencies as the divider chain was switched into the



The author's completed frequency standard.

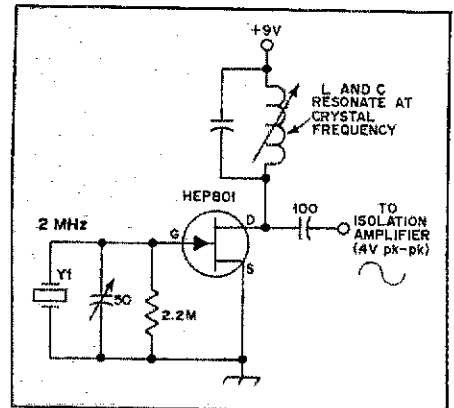
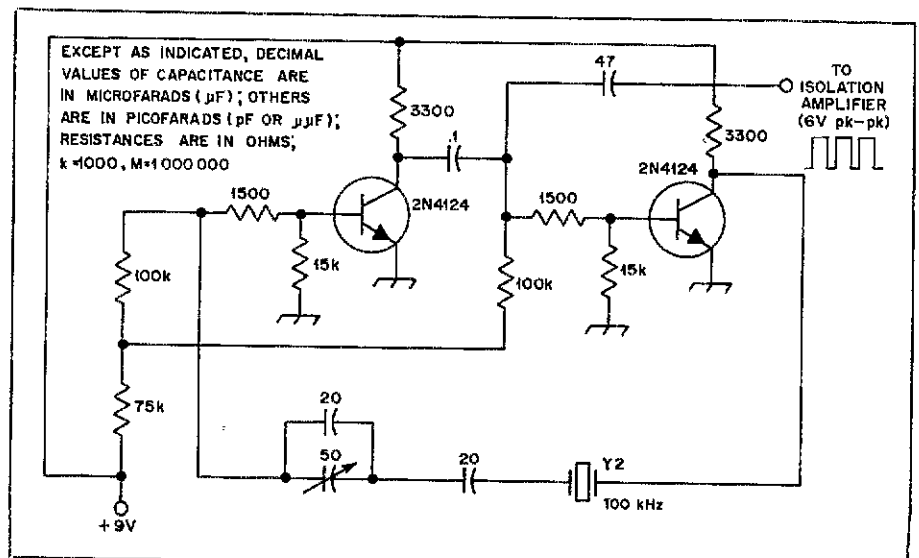


Fig. 1 — 2-MHz FET oscillator.

circuit. The author's unit had the requirements of being self-contained and portable. If it were not for these re-

quirements, any crystal oscillator in the general frequency range could have been used. Thus, the owner of a crystal

Fig. 2 — 100-kHz bipolar oscillator.



*122 Bellevue Ave., Butler, NJ 07405

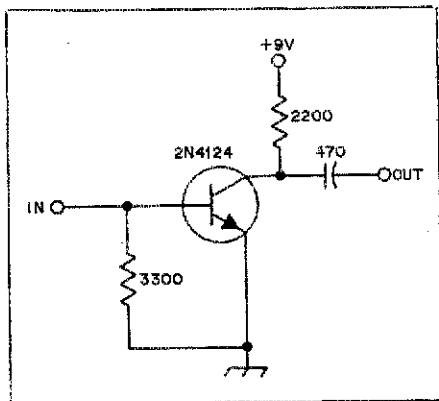
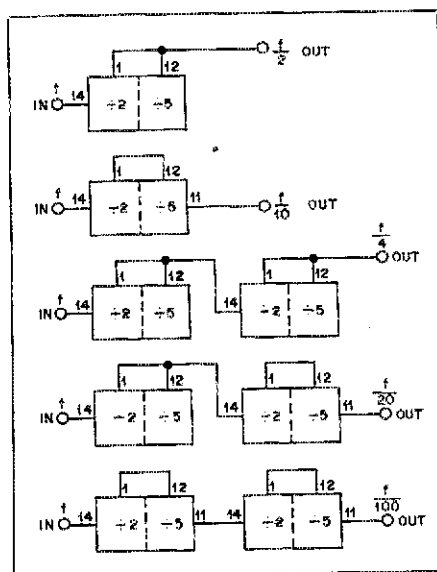


Fig. 3 — Isolation amplifier.

standard can make use of the divider chain and save on buying additional crystals. The heart of the frequency standard is a 7490 decade counter. The chip in the fourteen-pin dual in-line package (DIP) is capable of dividing by two, five or ten. In the K2JFJ frequency standard, two of the packages were used to obtain frequency division of 2, 4, 10, 20 and 100. With the crystals used in this unit, frequencies of 2 MHz, 1 MHz, 500, 200, 100, 50, 25, 10, 5 and 1 kHz are obtained. All frequencies are rich in harmonics and are readily usable through 144 MHz.

The reset gates at pins 2, 3, 6, 7 and the ground at pin 10 must be connected to the common terminal for all modes of operation in this application. Supply voltage must not exceed 5.5. The author used three, size-C dry cells with a total voltage of approximately 4.5. Current drain with both ICs operating is about 30 milliamperes. Each crystal oscillator draws about 4 mA and is supplied from a common 9-volt transistor radio battery.

Fig. 4 — Divider interconnections.



The transistors used in the author's model are npn silicon units. If 2N4124s are not available the HEP S0014 type may be substituted. HEP C3000L is listed as a replacement for the SN7490.

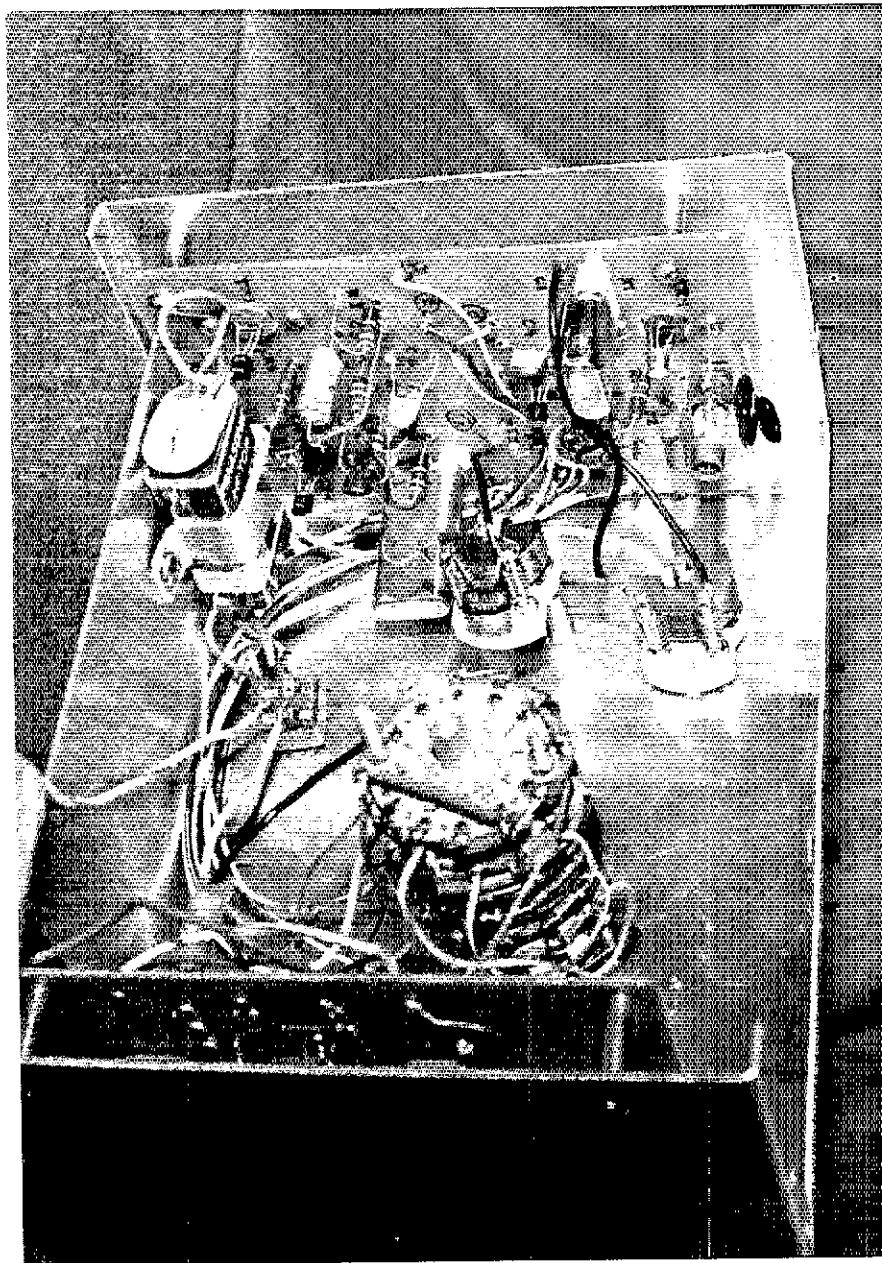
In operational use the frequency standard is set to zero beat against any of the standard frequencies transmitted by WWV or WWVH. The trimming capacitors were required for the oscillators in order to obtain exact zero beat.

Most of the components used in the K2JFJ unit were from the scrap box or the surplus outlet, as is evident from the photograph. A rather complex switching arrangement was used for this unit. The individual builder can introduce switching to meet his particular requirements since the divider chain can be switched

to provide the outputs shown in the accompanying block/connection drawings.

The self-contained features of this unit, its operation from easily obtained batteries, and low current drain will allow the QRP or portable operator to have a reliable frequency standard at hand, no matter where he may be operating. The wide range spectrum covered will enable the vhf amateur to verify frequencies in his area of operation. The panel overlay shown in the K2JFJ unit was made from opaque white styrene material which can be obtained readily at most hobby stores. A lettering set was used to apply nomenclature, but dry transfer lettering could also have been used.

Inside view of the frequency standard.



Enhance the Performance of Your Accu-Memory

Updated information for a very popular keying device.

By James M. Garrett,* WB4VVF

If the sale of circuit boards is any indicator, the Accu-Keyer¹ with the Accu-Memory² may be the most popular keying device ever to be presented for home construction by the amateur. The circuit boards that have been sold number literally into the thousands, and there's no way of telling for sure how many additional builders have made their own boards or used other means of construction.

Shortly after writing the article, I realized that some people may have problems loading the memory because of the free-running clock in the automatic word-space interval. The problem will show up as shortened dashes when you are loading a message into the memory. Although the dashes are recorded properly in the memory, the short dash during the sending of code in the LOAD mode tends to disrupt one's sense of timing, causing him to make sending errors. I have devised a modification that totally eliminates this problem. It does not require any extra parts, if you are using the readout driver board, except for one capacitor.

Refer to pages 14 and 15 of *QST* for August, 1975, the memory diagram. Remove the two 1N4153 diodes shown above and below U4D. In the layout of the memory board on page 18, these are to the left and right of the 7402 IC. Remove the 1500- Ω resistor connected to pin 6 of U4D. This is located between U4 and U10. Change the capacitor

between pins 14 and 15 of U14B from a .001 μ F to a 1 μ F. If you use an electrolytic capacitor, connect the positive terminal to pin 15. Take one of the diodes removed, and connect the cathode (the bar end) to wire 3 and the anode to pin 13 of U14B. This diode may be soldered to the back of the memory board. Connect the cathode of the other diode to pin 4 of U14B and the anode to the base of Q1 in the keyer. You may have to cement this diode to one of the boards. Next, note that one of the sections of the 7402 on the driver board is not used. Connect it as shown in Fig. 1. You can splice into the wires indicated. If you are not using the driver board, you will have to add a 7402.

These changes completely eliminate any loading difficulty. In fact, you can load the memory while you are transmitting. Essentially, the modification causes the clock to resync each time the paddle is touched.

Feedback Information

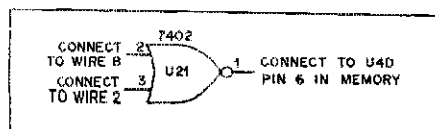
Basically, the Accu-Memory article in August, 1975, *QST* is correct. The only corrections are that some interconnect numbers are not shown on the

memory schematic diagram. They are important, however, because they show the wiring of the switches, as mentioned below. In addition, the 4-input NAND gate at the top of page 15 should be labeled U13B, and not U12B as shown.

With reference to Fig. 4 of the Accu-Memory article, label the wires going to the LOAD/SEND switch as follows. Trace back from the IC pin and label near the switch: Wire 6 - U3D, pin 1; wire 7 - U13B, pin 13; wire 8 - U13B, pin 12; wire 9 - U8A, pin 12; wire 10 - upper wiper; and wire 11 - U7, pin 2. In a like manner label near the reset switches as follows: Wire 14 - U6B, pin 4; wire 15 - U6D, pin 12; wire 16 - U6C, pin 9; wire 17 - U6A, pin 1; wire 18 - U3B, pin 11. Near the RUN switch: Wire 12 - U5A, pin 9; wire 13 - U4A, pin 10. Near the stop switch: Wire 19 - U7, pins 6 and 7.

Here are some supplemental notes regarding Table 1, page 13 of the Accu-Memory article. Wire 1 should be connected to the ungrounded end of R6 in the keyer. Wires 2 and 3 connect to where CR1 originally was in the keyer. CR1 must be removed. Wire 4 should be connected to U7B, pin 6. Let me also mention that the 5-volt pads on all boards are connected to the 5-volt supply. There are extra holes for 5 volts and ground on the memory board which may be used as tie points. The unlabeled triangle near the 5-volt pad on the readout board is the decimal point (connected to wire 13). The return lead from the speaker goes to ground. Q1 is the circle above U10 on the memory board. Its tab should be closest to the

Fig. 1 - Wiring of a previously unused IC section in the Accu-Memory to alleviate the "short dash" problem in the LOAD mode.



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This and all subsequent footnotes will appear on page 30.

pad having the wire jumper. Wire connections to the readout board are made from the foil side. The 21 wires connecting the readout and driver MSB, CSB, and LSB leads will connect in a straight line with no crossing if wired as shown in Fig. 3 of the article. If only the memory board is used without the readout board, omit the wiring to the driver board and connect wire 26 of the memory board to ground. The quadrant readout will now read 0-1-2-3.

It is important *not* to use 74S, 74I, or 74H series logic in the unit as this may cause improper operation. Be *sure*

to shield the unit. Some builders have reported loss of iambic operation. To prevent this, connect a .001- μ F capacitor between pin 3 of U6A and ground, on the keyer board. Also add the 150-ohm resistor and .001- μ F bypass capacitor at pin 1 of U3A as mentioned in the note of Feedback which appears on page 36 of *QST* for October, 1973. It is further advisable to change C1 in the keyer from a 2.2 to a 4.7- μ F capacitor to slow the speed range down — unless you're one of those high-speed key merchants!

Some builders are receiving push-

button switches with the numbers turned sideways. The distributor will correct this problem if the switches are returned. I've also been told that it is possible to pry off the numbers without damaging them, if a pen knife is used with care. Once removed, they may be reinstalled correctly.

Within three weeks of the appearance of the article on the Accu-Memory in August, 1975, over 400 sets of circuit boards were sold. And the orders continue to show an interest in this instrument. In case anyone asks you, cw is *not* dead!

The WA1JZC Accu-Stop

By Edward B. Kalin,* WA1JZC

If the feature Garrett describes above is not added, a simple modification to the WB4VVF Accu-Memory² will allow the keyer paddle to perform the same function as the STOP button. One of the four NOR gates that compose U21 (located on the driver circuit board) is unused in the original circuit. The modification involves the following: Connect a jumper wire between pin 2 of U21 and pin 1 of U3D on the memory board; connect a jumper wire between pin 3 of U21 and pin 8 of U6C on the original Accu-Keyer board; connect one lead of a .001- μ F disk-ceramic capacitor to pin 1 of U21; and run a jumper from the other lead of the capacitor to U7, pin 6 on the memory board.

When the contents of a memory register are being read out, it is now necessary only to tap the keyer paddle either to the dot or dash side to interrupt the memory output. The output can be continued from the point at which it was interrupted by pushing the

RUN button, or alternatively, a different memory quadrant can be selected by pushing the appropriate RESET switch. Fig. 1 shows a diagram of the change.

Footnotes

¹ Garrett, "The WB4VVF Accu-Keyer," *QST* August, 1973.

² Garrett and Contini, "The Accu-Memory," *QST*, August, 1975.

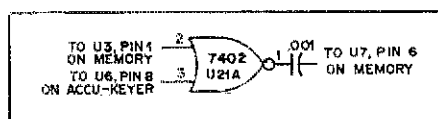
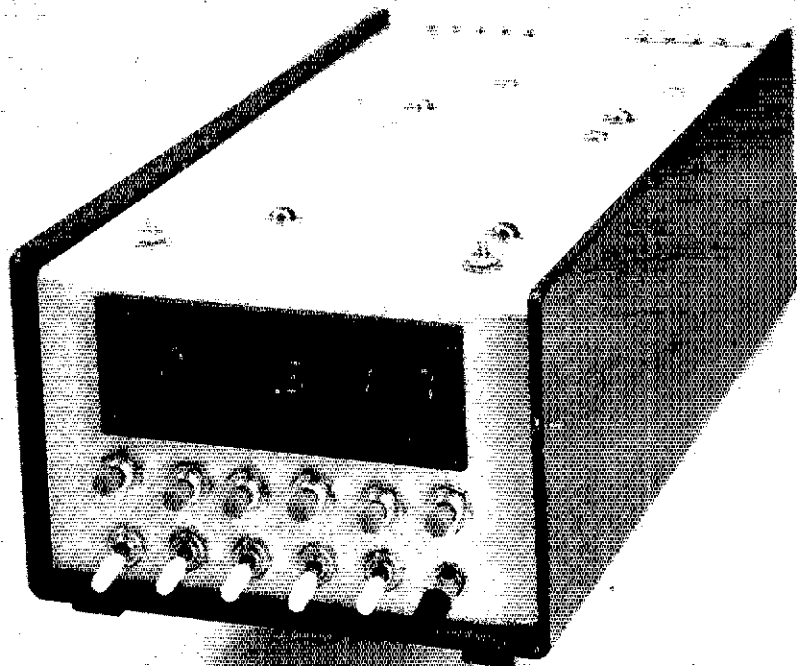


Fig. 1 — Wiring of U21 for the WA1JZC Accu-Stop. This section of U21 is unused in the original version of the Accu-Memory, but is employed for another purpose if the information above by Garrett is followed. If the builder wishes to incorporate both changes an additional 7402 IC may be added.

*410 Memorial Dr., Cambridge, MA 02139



WA1JZC built his Accu-Memory and keyer inside a Bud RC-11100 cabinet measuring 3-1/4 X 5 X 10 inches. The six push-button switches are for the RUN, STOP and MEMORY QUADRANT SELECT functions. The toggle switches provide for loading the memories, for activating the automatic character-space feature, for transmitter tuning and for switching the readout devices off to lower power consumption. The speed control is located at the bottom right.

Learning to Work with Integrated Circuits

Part 7: Put away the shovels 'cuz the ground work is done. It's time to get out the ropes and tie up the loose ends! †

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

We've covered a lot of ground in the first six parts of this series, but that's exactly what it has been — ground work. We've offered you a very basic introduction to this vast area of electronics — integrated circuits. To some it may appear that we've hardly done justice to linear IC devices, and to others we have not spent enough time discussing digital ICs. But this has been just an introduction to working with integrated circuits. From this series, perhaps you've had your appetite whetted enough to go on with the learning process by reading some of the many references we've listed throughout the series. Or at least we hope now you won't shy away from *QST* construction articles just because they show nothing but ICs in the diagrams.

In this part of the series, we'll begin to tie up the loose ends by putting the circuit boards we've been building into a finished unit. Then we can even use this new piece of test equipment for furthering our learning process as we build and check future projects.

Circuit Options

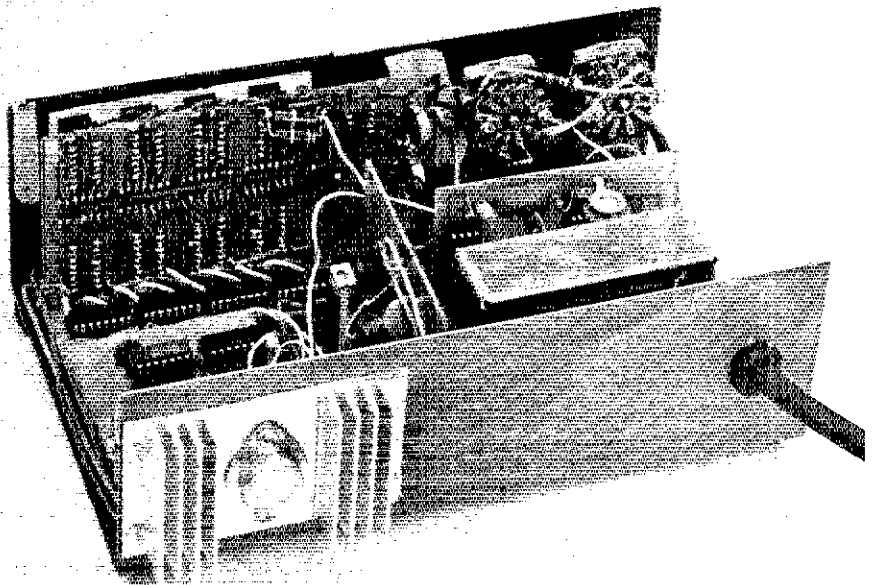
We're certain that as you've been wiring up and testing the various pc boards for this project, having everything all sprawled out on your workbench, you've been muttering, "Why in the world don't those guys tell me what size chassis to build this in? Things would be so much simpler without all these temporary interconnections." Perhaps, but we've had our reasons. Our approach has been to use a modular construction, with each major circuit section of the DVM/counter laid out on

its own etched circuit board. This has allowed a person with limited construction experience to build and at least partially test each board before it gets permanently wired and sandwiched into that proverbial shoebox we've mentioned in earlier parts. An alternative would have been one giant board, with various subsections for each circuit. But that would not allow for one thing we haven't said a whole lot about yet — circuit options.

After you do the construction and testing described in the first seven parts

of the series, you'll have a fine, but basic, digital voltmeter. Five circuit boards will have been used in its construction. It will use the 60-Hz power-line frequency as its standard (or 50 Hz if you live in such an area and choose to make the simple modification necessary to accommodate that frequency). But it will lack a sensitive front end and wave-shaping circuit, a requirement for counting external unknown frequencies. Such a circuit will be described in Part 8 and will occupy a sixth pc board measuring 1-1/4 X 3 inches. (Of course you

The basic digital voltmeter after assembly. The display pc board, function and range switches, and fine-zero control are mounted on the front panel. (Two one-watt resistors were connected in parallel to obtain the equivalent resistance and wattage of the added resistor shown in Fig. 27.) At the near left, the 60-Hz clock board is stacked horizontally above the counter board. The power supply board is mounted vertically at the left and the voltage-to-frequency converter board in front of the power transformer. The case of the 5-V regulator IC is insulated from the heat sink, and its pins extend through an opening in the rear panel.



†Parts 1 through 6 appeared in *QST* for January through June, 1976.

*Associate Technical Editor, *QST*

**Editorial Assistant, *QST*

needn't construct that board if you plan to use the instrument as a digital voltmeter only, never for a frequency counter. And if that is the case, you can get by with a smaller enclosure — and save some cash on its cost.

And there's yet another option — replacing the 60-Hz clock board (CW-LW3) with a somewhat larger board having a crystal-controlled clock. This board measures $2\frac{1}{2} \times 2\frac{3}{4}$ inches and will also be described in Part 8. If you decide to do that, you'll almost certainly want to add a third switch to control the count interval for megahertz, kilohertz, and hertz. That third switch (to be described in Part 8) will be in addition to the function switch and the DVM range switch shown in Fig. 26 and the front-panel-mounted, fine-zero control shown in Fig. 23. These things should be taken into account when you make a final decision on your enclosure size. And there's still another possibility; it would not be unreasonable for you to want to add a couple of additional decade-counter/latch/decoder-driver/readout sections, for a six-digit display instead of four. This would be especially handy if you plan to use the instrument for counting frequencies in megahertz, as there is always a degree of uncertainty in the last digit displayed. We won't be describing this extensive a circuit addition because it would overtax the power supply described in Part 1, but the same circuit arrangement as for U20, U16, U3, and DS1 could be used for each added digit if a bigger power supply was available.

How's that again? What do you mean we're confusing you with too many facts? Okay, let's take another view of all these circuit options. First, you can use the instrument only as a digital voltmeter. In this case, you will have completed your instrument at the conclusion of the proceedings given here in Part 7, using the five basic circuit boards, one potentiometer and two control switches. Its frequency reference will be that of the power line, 50 or 60 Hz. Or second, you can add only the sixth board containing a preamplifier and wave shaper to have a dual-function instrument, a DVM and an audio frequency counter. (Although it will then respond to radio-frequency signals, accuracy will be questionable. And without time-base switching, any frequencies above 9,999 Hz will cause an overflow of the most significant digits, resulting in your not being able to read them. We would discourage the addition of time-base switching if you stick with the power-frequency clock because of its questionable short-term accuracy.) Third, if you wish to use the instrument for rf measurements as well as for voltage and current measure-

ments, you should plan to add both the preamp/wave-shaper board and the crystal-clock board along with the count-interval switch. If you don't want these latter options now but feel you may desire them in the future, we suggest you obtain an enclosure big enough to house the parts but just leave some empty space for now.

You may want to purchase an extra big box, big enough to hold a larger power supply and maybe circuits for the kinds of things we haven't even mentioned, such as a digital clock.¹¹ That basic input of the voltage-to-frequency converter, a range of 0 to 1 volt at high impedance, leaves open a lot of other possibilities, too — perhaps a digital ohmmeter, a barometer, an anemometer, thermometer, wind-direction indicator, beam-heading indicator, and so on. With this instrument you will have the power to convert any voltage or current, from whatever source, into a digital reading.

Selecting the Shoebox — Packaging Ideas for the DVM/Counter

Finding the right enclosure for a homemade piece of equipment can be as difficult as the designing of the circuits which go inside. Most local dealers will probably have few "shoeboxes" to choose from, and you may need to do a bit of shopping by mail (not uncommon these days for many of the parts we amateurs use). The enclosure shown in the photographs was the largest our local Radio Shack store had in stock, an Archer 270-261 (\$6.95 when purchased in 1975). The instrument pictured here is the "prototype" DVM — no frequency counter. This box measures

$3\frac{1}{2} \times 9 \times 6$ inches. Such a size makes for a very compact unit, but one almost has to get out the shoehorn to make everything fit. This small a box might be difficult to work with if you have little or no experience in working with chassis. It's not quite as bad as trying to get a size 10 foot in a size 8 shoe, but almost. Certainly you'll want a bigger box if you plan to incorporate any of the options we've just mentioned. Check your local stores, leaf through the display ads in recent issues of *QST* or other amateur magazines, talk to friends, and shop around. Be prepared to spend upwards from \$20 if you want a good, sturdy commercially made box of generous dimensions.

When you do choose and purchase a box (or build your own if you have the facilities), you'll have to do a bit of metal work before you can begin mounting the parts. Study the photographs, for they reveal how we did it. We could have purchased a fancy bezel for the display readouts, but instead we simply cut and filed a rectangular opening in the front panel. The edges of the opening were dressed up with strips of black vinyl electricians' tape. A layer of two of red cellophane or a thin sheet of clear red plastic may be cemented or Scotch taped behind the opening, in front of the readouts themselves. This will allow the red glow from the readouts to pass through but will filter out other light, causing the background to be dark, almost black in appearance. If you happen to obtain green readout devices, you'll want to use a green filter.

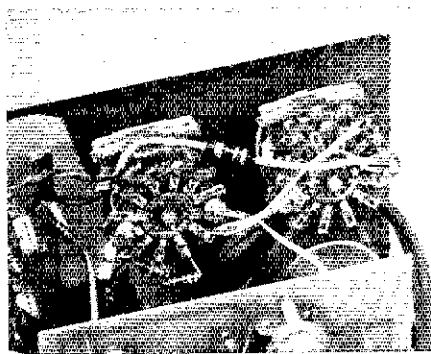
Wiring the Switches — Function and Range

Equally as important as construction and testing each pc-board circuit of the DVM is the wiring of the front-panel switching arrangement. For convenience, as much of this wiring as possible should be done before the boards are mounted. As we've mentioned, two switches are used in the basic DVM (basic, because we have yet added the crystal-controlled timer base and wave-shaper circuit boards). These switches provide for *function* and *range* selection from the front panel of the instrument. See Fig. 26.

The string of resistors follows S1A, with $9.1 \text{ M}\Omega$ at the top and $11 \text{ }\Omega$ at the bottom, forms the input attenuator for voltage measurements. The resistors are sometimes called *multiplier* resistors, because they extend the basic 0- to 1-volt range of the instrument. These resistors are to be used along with a $1\text{-M}\Omega$ resistor in the probe for *voltage measurements*. For all other measurements a probe without a $1\text{-M}\Omega$ resistor must be used, or the resistor must be switched (shorted) out at the probe. This arrangement provides

¹¹ Such a circuit addition will be described in a future issue of *QST* apart from this series.

This close-up view shows the mounting of the switches and associated resistors and wiring. The large resistor connected between the two switches is the one for making dc current measurements. The rectifier components for ac voltage measurements are assembled on a solder-lug tie-point strip which is mounted on the bottom of the enclosure, hidden by the voltage-to-frequency converter board in this view.



11-M Ω input resistance for dc measurements. We have specified five-percent tolerance for these resistors, as they are commonly available in the values indicated. However, the accuracy of the instrument when switching from one multiplier range to another is totally dependent on the absolute values of these resistors. With five-percent resistors you can expect as much as a 10-percent change in the indicated voltage value when you measure the same unknown voltage on two ranges. Resistors having a tolerance of one percent would be much more desirable for those four resistors and the 1-M Ω probe resistor, if you can locate any.

The multiplier resistors are mounted on the terminals of S2A, a section of the range selector switch. With the 1-M Ω probe resistor, the attenuator divides the input dc voltage by 10, 100 or 1000, depending on the position of the switch.

Sections B and C of S2, when placed in the DC-I position, provide a common return path for the 1-ohm, 1-watt resistor used in the current-measuring function of the DVM. Through S2A, J1 is switched directly to the input of the frequency converter. The 1-ohm resistor is a shunt for current measurement, and the DVM will actually indicate the dc voltage developed across that resistor. If one ampere of current flows (1000 mA), one volt will be developed across that resistor and fed directly to the v-f converter input. One volt at its input will cause a display reading of 1000. Thus the reading is direct in milliamperes. In the 10 and 100 positions, decimal points on readouts DS3 and DS4, respectively, will glow. This provides for full-scale readings of 10.00, or 100.0 V. No decimal point is switched on in the 1000-V position, and the display resolution is 1 volt. Power is applied to the unit through section D of S2.

The resistors, capacitors and diodes shown in the lower left corner of Fig. 26 form the ac rectifier circuit. This is a voltage-doubler arrangement, and its output, with suitable voltage division, is fed to the input attenuator section through S1B. The input of this circuit is switched directly to J1 for ac voltage measurements. The ac rectifier, being of low input impedance (low when compared to 11 M Ω), is not intended for making measurements in sensitive circuits with low signal levels. More sophisticated circuitry and more complex switching arrangements, along with an additional switchable voltage attenuator, would be required for that. Our decision here was that simplicity should prevail — something with which the builder could measure power-transformer secondary voltages and the like would be good enough for basic needs. Allow us to issue a word of

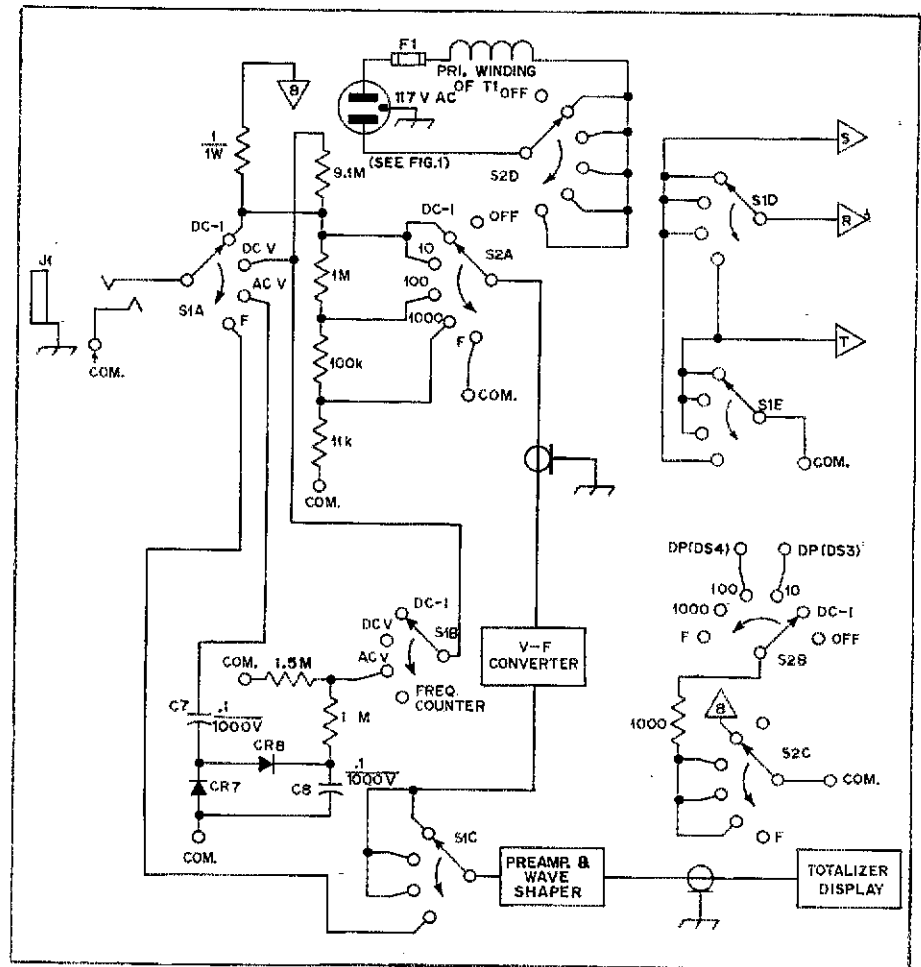


Fig. 26 — Switching diagram for the digital voltmeter/frequency counter. The letters R, S and T in triangles represent connections to the counter board, CW-LW4. See Fig. 18, Part 5. Connect a wire from R to the reset line (pad near U20), from S to the pad at pin 7 of U20, and from T to the pad at pin 3 of U20. Parts required are listed below.

- C7, C8 — 0.1- μ F, 1000-V disk or rectangular ceramic. Two 0.05- μ F capacitors may be connected in parallel for a smaller physical size.
- CR7, CR8 — Silicon rectifier diode, 1-A 1000-V rating, 1N4007 or equiv.
- J1 — Phone jack, three conductor.
- S1 — For basic DVM only: 4-pole 3-position subminiature rotary, shorting (Centralab PSA-210* or equiv.). Omit the F position and the C section shown on this diagram.
- S1 — For DVM/counter: 5-pole 4-position subminiature rotary, shorting (Centralab PSA-220* 6-pole switch suitable; leave one pole unused).
- S2 — For basic DVM only: 4-pole 5-position subminiature rotary, shorting (Centralab

- PSA-210* or equiv.). Omit the F position shown on this diagram.
- S2 — For DVM/counter: 4-pole 6-position subminiature rotary, shorting (Centralab PSA-210* or equiv.).
- Composition resistors, 1/4 or 1/2 W; 1 — 9.1 M Ω , 1 — 1.5 M Ω , 3 — 1 M Ω (includes one resistor for probe), 1 — 100k Ω , 1 — 11 k Ω ; all these resistors should be 5 percent tolerance or better. In addition, 1 — 1000 Ω , tolerance not critical.
- Short length of RG-174/U miniature coax for shielded interconnections.
- *Note: The Centralab switches listed have adjustable stops for the number of positions used.

caution, however. Even though the highest multiplier range goes to 1000 volts, we suggest that you limit your measurements to potentials that are 500 volts or less — on either ac or dc measurements. If you use 1000-volt-rated capacitors in the ac rectifier, as specified, a 500-volt input ac signal will place these capacitors right at their working voltage limit. (The circuit is a voltage doubler, remember?) Also, the measurement of potentials of hundreds of volts with homemade hand-held probes can be

hazardous to your health! Remember that!

You'll note that for some functions, notably DC-I and F, both S1 and S2 must be placed in the proper positions for measurement. This results from our choosing commonly available switch types. Commercial manufacturers of test equipment get around such problems by using wafer switches of special design, so that contact may not be made to every terminal in succession as the switch is rotated. Again, simplicity and

ease of obtaining the necessary parts were the deciding factors.

Construction of the Probes

A probe containing the 1-M Ω resistor can be constructed from materials available from most department stores and from your local electronics supply house. The photograph shows a comparison of the component parts for the probe and the finished product, and the arrows show the approximate points at which to cut the pen as described below.

The body of the probe is fabricated from a Flair felt-tip pen. The pen costs about \$.50 and makes an ideal foundation from which to build the probe. It is advisable to find a pen that has "dried up" since it will be a messy job if you select a new one for the probe construction. This brand of pen proved to be the proper size (1D) for self-tapping the probe tip.

To construct the probe, first remove the tip cap from the pen. Carefully cut off the felt tip just below the point at which it "Flairs" to the larger body size. From the base of the corrugations on the body of the pen (from the tip end) measure up 15/16 inch (24 mm) and cut the body of the pen into two pieces at that point. (Do this step over a sink with the water running.) Remove the felt core and dispose of it in a suitable refuse container. Using a 7/32-inch (5.56 mm) drill bit, enlarge the opening where the felt tip was removed from the pen. This will allow for clearance of a piece of RG-58/U cable. When drilling the plastic pen body, be sure not to overheat the plastic and deform it.

Now take a 5-foot (1.52 m) or 6-foot (1.83 m) piece of RG-58/U coaxial cable and remove about ten inches of the black outer jacket. Compress the shield slightly near the end of the vinyl jacket remaining. Use a screwdriver to separate the shield and pull the insulated center conductor through the braided shield. Now slip the pen body down over the insulated center conductor so that about 1-1/2 inches (37.9 mm) of the shield is folded back over the outer insulation. Make sure the pen does not fit too tightly since this may damage the wire forming the braided shield. Cut off the center conductor 1/2 inch (12.5 mm) above the top of the probe body and strip off about 1/2 inch (12.5 mm) of the insulation. Cut one lead of a 1/4-watt, 1-M Ω resistor to 3/8 inch (9.53 mm) from the body of the resistor. Attach this lead of the resistor to the center conductor of the RG-58/U cable. Slip the other end of the resistor through the gap in the phone tip which will form the end of our test probe. Secure the phone tip to the body of the probe by screwing it into the center of the pen. Now tighten the set-screw cap of the phone tip to hold the 1-M Ω resistor in place. Wrap several layers of electricians' black plastic tape around the base of the pen, oops, we mean probe, to keep the shield from moving. Attach an alligator clip to the shield and the tip of the probe is complete.

A ring-tip-sleeve plug is used for the other end of the test-probe cable. The center conductor is attached to the ring and the shield is connected to the tip retaining the "floating" common or

The materials required for making the probe are shown at the left, and the completed assembly at the right. The probe tip is solderless, a Keystone 1681 or equivalent. Clear heat-shrink tubing or other insulating material should be slipped over the braided conductor before the alligator clip and hood are installed. In use, this clip should be connected to ground of the circuit under test (except for negative polarity dc measurements).

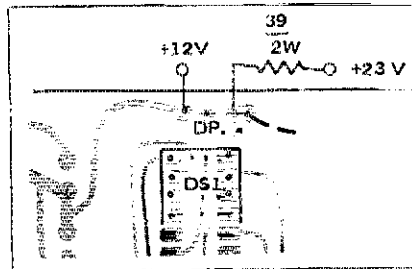
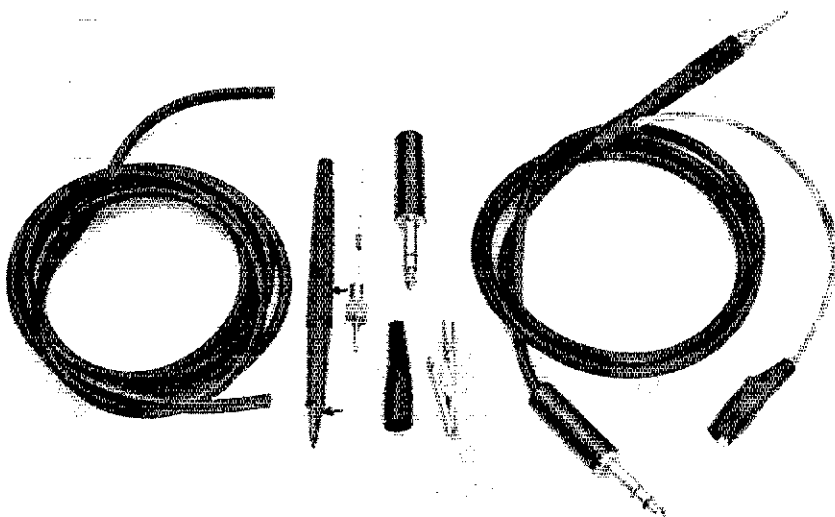


Fig. 27 — Modification to deregulate the voltage supplied to the readout displays. Shown here is a portion of the display board. See text.

ground path for the DVM.

A probe similar to this one except without the 1-M Ω resistor should be constructed for ac-voltage, current and frequency measurements. You may wish to select pens of different colors for the two probes, like maybe blue or black for dc measurements and red for all others.

Hey Gang, We Found a Better Way to Do It

Back in Parts 2 and 3, during construction and testing of the display board (CW-LW3, Fig. 4), we had you wire up the readout devices to operate from the 12-V regulated supply. That's okay, but as the saying goes, "They ain't no need to do it that way." The old 12-V regulator IC gets a bit warm when you're viewing 4-digit numbers very long. In fact it gets more than warm; it gets darned hot. A better way is to operate the readout devices from an unregulated voltage from the power supply. If you look over Fig. 1, Part 2, you'll find that a filtered but unregulated voltage is available at the junction of C1, C2, CR1, and CR2. The potential here is in the order of 23 volts. Perform the following modification to obtain cooler regulator operation and better voltage regulation.

Twenty-three volts is just a bit much to connect directly to the readout devices with only 1000-ohm limiting resistors in use (the 21 resistors mounted on the display board). Each display segment has a maximum continuous current rating of 25 mA, and we'd be pushing that rating without additional current limiting. If we were building the display board from scratch we could put 1800-ohm resistors on the board where 1000-ohm units are shown. But, assuming the board is already assembled, a modification will be quicker and less costly. Refer to Fig. 27 for the changes.

In the original assembly of the display board, a jumper wire was installed between two pads across the top of DS1. This wire is shown as a dashed line in Fig. 4 (Part 2), but is not shown

Fig. 27. Remove this jumper wire from your board. Next, remove the wire coming from the 12-volt supply to the upper right corner of the board, and reinstall it in the hole where the left end of the jumper wire was previously soldered (looking at the board from the component side). This point of connection is shown in Fig. 27, and restores 12-V power to the circuit of U23 (see Fig. 22, Part 6).

Now install a 39-ohm 2-watt resistor in series with a lead going from the second jumper hole to the 23-V unregulated supply (junction of CR1 and CR2 on the power supply board). Here are some tips for the mechanical mounting of that resistor. Drill out the remaining hole (where the jumper was originally located) with a 1/16-inch drill. Insert one lead of the resistor in that hole *from the foil side* of the board. For the other resistor lead, drill a new 1/16-inch hole in the board at a point removed from any foil runs — in the area near U23 is a good place. Leave at least a quarter of an inch of space between the resistor and the board. Solder the wire coming from the 23-V power supply to the resistor lead where it protrudes through the new hole on the nonfoil side of the board, and solder the opposite lead to the board foil. To add mechanical rigidity at the hole where there is no foil, pull on the resistor from the foil side and draw the soldered wire running to the power supply down snug against the board. Then on the foil side, wrap and solder a short length of hookup wire, also snug against the board. (The two soldered wires, one on each side of the board, will act as “retainers,” keeping the resistor lead from sliding around in the hole.) Clip this second wire as short as possible, trim off any excess resistor lead lengths, and you’re done.

This added resistor drops the 23-V potential to a value ranging between 12 and 18 volts or so, depending on how many segments of the readouts are illuminated. You’d think this much fluctuation in voltage would cause changes in the display brightness, but no significant changes are noticeable under conditions of ordinary room lighting.

Conversion of the 60-Hz Clock Board for Operation at 50 Hz

If you live in an area of the world which uses 50 Hz as the power-line frequency, you can still operate your DVM clock from the line. You’ll need to make a few changes to the 60-Hz clock board, including the removal of a foil connection, but this is done rather easily with a pen knife. Refer to Figs. 12 and 13, Part 4.

First remove U8, the 7492 IC. Replace it with a 7490 decade-divider IC. Pins 2 and 3 of U8 in the original circuit were not connected. Use small-diameter

solid hookup wire and connect these two pins to common, available at pin 6, 7, 10, or 14. Next, remove foil to break the connection at pin 8 of U8, the former output from that IC. Leave pin 8 with no connection, and establish a connection from pin 11 of the 7490 (its output) to the circuits formerly driven by the 7492. That’s all there is to it.

In the original circuit, the divide-by-six portion of the 7492 IC was used to divide the 60-Hz input down to 10 Hz. With the changes described above, the 50-Hz input is divided by five in a portion of the 7490, so the output from this stage is again 10 Hz. Operation of the remainder of the clock is unchanged.

Calibrating the DVM

Now that you’ve completed the wiring of the function and range switches, put in the input multiplier-resistor network, modified the display board, and set yourself up for a 50-Hz line frequency if needed, you’re ready to install all the boards in the enclosure. “But whoa! Wait just one minute. I still have some temporary-value resistors on two of those boards, the v-f converter and the display board,” you tell us. “I can’t be changing resistors after the boards are anchored in place.” You’re right. What to do! Little else we can do except go through the calibration procedure with everything wired up but with these two boards not yet permanently mounted. During this procedure we’ll select the final values for those resistors.

“But wait another minute,” you’re saying. “I’ve had to leave the wiper of S1C unwired because you haven’t told me about the preamp/wave-shaper circuit you show in block form in Fig. 26. You’ve left me with nothing connected at the input of the totalizer and display.” Correct you are again. You’ll recall earlier in this part we mentioned that the preamp/wave shaper was a sensitive front end, necessary for operating the instrument as a counter for unknown external frequencies. But we can count the output frequencies from the v-f converter of the DVM without that shaper circuit, just by adding a couple of parts from ye olde junque box. Dig around for a 0.1- μ F capacitor (paper, Mylar, disk, polystyrene, or whatever you have) and a 4700- Ω resistor. Temporarily connect the capacitor between the wiper of S1C and the input marked RF on the counter board (pin 5 of U10). Connect the 4700-ohm resistor between pin 5 of U10 and common.

Now we’re all set to do the calibration. Plug in the line cord, switch the function switch to the dc volts position, and switch the range switch to 10 volts. On the v-f converter board, set the two controls to the center of their range.

The display should indicate some relatively constant value, although some warm-up drift may be noted for the first few minutes. If you disregard the decimal point, the display is indicating the converter output frequency but the counter section is beginning its count from 9000. An indication of 5.73, for example, really means your voltage-controlled oscillator is putting out a frequency of 1573 Hz; a reading of 98.25 means the oscillator is operating at 825 Hz.

Connect the probe containing the 1-M Ω resistor to J1 and ground the probe tip to common. Get out your trusty conventional voltmeter and measure the voltage at pin 6 of U21, the 741 op-amp IC on the v-f converter board. This voltage should be in the range of 9.0 volts. Now connect the DVM input probe to the 12-volt regulated supply bus. “What?” you exclaim. “You told me a while ago to put the instrument on the 10-volt range, and now you tell me to apply 12 volts! What gives?” Well, you might say we fibbed a little bit about the voltage ranges. Each range will give reliable indications at levels up to 25 percent or more above “full scale.” Go ahead, touch the probe to 12 volts; no damage will occur. Again measure the potential at pin 6 of the 741. This time it should be in the neighborhood of 4.0 volts. If the range of these voltages is too high, the value of the 2700- Ω resistor you’ve installed temporarily at R2 is too high and needs to be decreased. Conversely, if the range is too low, the resistor value needs to be increased. Perhaps you can get the voltage in the proper range by trying another 2700- Ω resistor, as each may vary differently in value from the nominal 2700 ohms but still be within its marked tolerance. Another possibility is to parallel the 2700- Ω resistor with a much higher value to obtain decreased resistance — a high value in the order of 100 k Ω or so. The paralleled resistance value may be determined experimentally. In finding the proper resistance for your instrument, keep in mind that the exact voltage values at pin 6 are not as important as the fact that we want to bias the pin-3 input to avoid U21 saturation at either extreme of input voltage at the probe, 0 or 12 volts. If U21 saturates, its output voltage will be approximately 1 volt at one extreme and approximately 11 volts at the other extreme. The 9- to 4-volt range is ideal, but 8.5 to 3.5 or 9.5 to 4.5 would be okay.

Next we’ll select a value for R3, so we can get the proper control range for zeroing the display. Connect the input probe to common and set the front-panel fine-zero control at the center of its range. On the converter board slowly turn the coarse-zero control first to one

extreme and then the other, and note the readings. If the displayed indication goes through .00 as you turn the control, you're in business with the 56-k Ω value of resistance you now have for R3. If you ran out of adjustment on the coarse-zero control before reaching .00, you'll need to modify the value of R3. If your readings were low, in the 90.00 range, use a smaller value resistor. And if your readings were high, use a higher value resistor. The final value of resistance you choose should let you set the coarse-zero control for a .00 reading at a setting removed from either extreme. On occasion the reading may flick up to .01 or down to 99.99, but this small amount of change may be ignored if the reading is fairly consistent at .00. The front-panel zero control can be used for small corrections, and won't be nearly as touchy as the coarse-zero control.

At this point we're ready to do the actual voltmeter calibration. We'll assume the regulated 12-volt supply output is 12.00 volts and use it as our standard, although there may be a departure from this value by as much as 4 percent (manufacturer's specification for the regulator). If you have a means of accurately measuring the regulated voltage, you will prefer to work with that value instead of 12.00 in the following procedure. Each time you take a reading during this procedure, wait a second or so for the display to settle down.

With the probe connected to common, be sure the display is accurately zeroed. Now touch the probe to the 12-volt bus and carefully note the display reading. Subtract 12.00 from the display reading and divide the difference by two. The result is your "correction factor" for calibration. For example, assume the display indicates 11.80. Subtracting 12, $11.80 - 12.00 = -0.20$. Dividing by two gives us a correction factor of -0.10. Remove the probe from the 12-volt bus and again touch it to common. Now adjust the *calibration* control on the converter board (*not* the coarse-zero control) until your display indicates the "correction factor" computed above. Whazzat you're asking? "How in the world can I make the display read a negative number?" Oh, simple. Just algebraically add your negative correction factor to 10.00 and adjust the calibrate control to read *that* number. In the above example, we add -0.10 to 10.00 and end up with 9.90, right? Of course, if you end up with a positive correction factor, you've got no problem — you simply adjust the calibration control for that reading. Once you've set the calibration control as just described, use the coarse and fine-zero controls and again reset the display to .00.

Again touch the probe to the 12-volt

bus and note the reading. It should now be much closer to reading 12.00 than before. There is some interaction between the calibrate and the zero adjustments, so repeat the procedure of the above paragraph until your display indicates a value quite close to 12.00 with the probe touching the supply bus. Since we don't know the exact voltage we're using for this calibration, it isn't too important that the last digit be right on the nose. If your instrument errs, we suggest you have it err on the high side, like maybe indicating 12.08 or more, because this will compensate for a very slight sag in the linearity curve of the overall v-f converter at 5 and 6 volts.

With this procedure completed, your voltmeter is calibrated for all ranges and all modes of operation. Any differences in readings which may be noted when switching from one range to another can be traced to slight departures of resistance values in the input voltage divider network from their marked value. The absolute accuracy on each range and for each mode will depend on individual resistor tolerances as well as on the exact voltage of your 12-volt supply output. The important thing here is that the calibration is performed on the most sensitive range of the instrument, where you'd want the most accuracy. Of course, the big advantage of this voltmeter, even if its absolute accuracy may be somewhat questionable, is that it will indicate very small voltage changes — smaller than would cause visible movement of the needle on an ordinary meter.

Overrange and Reverse Polarity Adjustments

All this while, either or both of the two LEDs for overrange and reverse-polarity indication have probably been blinking at you as you move the probe from common to +12 and back. To aid in adjusting these circuits, go to the junk box again and bring out a potentiometer having a resistance of 1,000 to 10,000 ohms or so. Its taper is not critical. Connect one end of the control to +12 V, the other end to common, and the DVM probe to the wiper terminal. As you rotate the potentiometer from one extreme to the other, the DVM indication should go from .00 to 12.00, or thereabouts. Adjust the test potentiometer for an indication of 10.00 volts. On the display circuit board, adjust the overrange threshold-adjust control until the upper (overrange) LED illuminates. Then back the adjustment off until the LED just goes out. In the unlikely event that the LED remains lit at all settings of the adjustment, you need to replace the 2700-ohm resistor you have at R4 with a smaller value, 2400 or 2200 ohms. Or if you can never get the LED to glow,

install a larger value, 3300 ohms. The exact value is not critical, just so you can adjust the control for LED operation as described above. Once you've arrived at the correct resistor value for R4 and the correct setting for the threshold adjustment, swing the test potentiometer for an input voltage of less than 10. Gradually increase the voltage until the overrange LED glows, and note the DVM voltage reading. You may want to make a minor readjustment of the threshold control so the LED just lights at 10 volts.

The adjustment of the reverse-polarity threshold is a similar procedure. Disconnect the 12-volt test potentiometer arrangement and touch the DVM probe to common. Turn the reverse-polarity threshold control until the LED just glows, and then back it off until the LED is extinguished. Here you will need a higher value of resistance for R5 if the LED glows at all settings of the adjustment, or a lower value if it never glows. If you wish, you can check the adjustment with the aid of a flashlight battery. Touch the shielding lead of the probe to positive and the probe tip to negative of the battery. The reverse-polarity LED should glow brightly the instant you complete the connections to the battery. At this point calibration and adjustments are completed. Now you can mount all the pc boards.

Feedback

It happened — an error in an earlier part of this series. Sorry about that, chief! The boo-boo appears in the parts list for Fig. 17, Part 5. In the 3rd column, the third item should be listed as four 0.68- μ F capacitors, disk or rectangular ceramic.

Another minor point. In Part 2 we neglected to mention in the caption for Fig. 4 that the letter J in the line drawing indicates a wire jumper. You probably knew this already, and that's why we didn't bother mentioning it earlier.

If you are an astute circuit-follower, you may have been puzzled by a slight difference between the circuit-board pattern for the 60-Hz clock and the schematic diagram, Figs. 12 and 13 in Part 4. Pin 14 of U8 is shown as connected to common on the diagram but on the circuit board it is not connected to anything. As far as electrical operation of the circuit goes, it makes no difference. That pin is the input to the unused divide-by-two section of U8. The IC will draw slightly less current from the 5-volt power supply if the input is not connected, as per the circuit-board pattern.

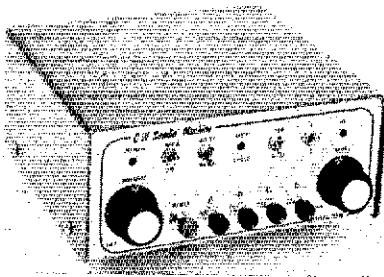
Part 8 will conclude this series and will appear in a subsequent issue of *QST*.

Product Review

The CW Sendin' Machine

There was a time when the only way a person could send cw was by means of a straight key, and untold numbers of amateur and commercial cw operators laboriously pounded brass by the hour. Technological advances brought us the semiautomatic bug, the automatic keyer, and the programmable electronic keyers that "talk back" is the CW Sendin' Machine, made by H. Alan Harp, WA4SVH. The keyer uses two type-2102 random-access memories to provide up to 2048 bits of memory. The basic keyer uses TTL integrated circuits for character generation. The keyer has both dot- and dash-memory logic, and iambic operation is possible with the appropriate keyer paddle. The unit has a built-in sidetone oscillator and speaker, with front-panel mounted level control and speaker on-off switch.

Three toggle switches and five pushbutton switches allow access to, and control of, the memories. One pushbutton switch resets the memory, canceling any READ/WRITE function in progress. A toggle switch selects one of the RAMs, and the other four pushbutton switches connect to one of the four 256-bit memories in the selected RAM switching arrangement, allowing a choice of eight memory sequences. This switching arrangement requires one to remember which IC a sequence was stored in, as well as which memory cell. Failure to place the 1/2 (RAM 1 or RAM 2) selector switch in the proper position may cause one to send QSL when QRZ? is desired! But with practice, one can get the hang of it. To program the keyer, the



1/2 RAM selector switch is placed in the desired position, the READ/WRITE switch is set to write, one of the memory-enable switches is depressed, and the message is loaded into the memory with the key. Placing the READ/WRITE switch to the read position, and pressing the button again will play back the information in storage. A lighted LED located above each of the four memory-select switches indicates when a memory cycle is in progress, and it extinguishes when the memory is played out. A second LED on the front panel indicates power-on, while a third LED lights when the keyer operates in any mode. A toggle switch marked 256/512 allows the user to link the storage sections in each 2102 to give up to 512 bits of memory, very handy for net callups and the like. When the read mode is selected, the programmed message may be halted by pushing the reset switch, or by momentarily closing the paddle. It isn't possible to start a Sweepstakes-type exchange by having the keyer send NR, then pause while the operator manually sends the

serial contact number, and then start up again to conclude the exchange. Once you close the paddle, the memory sequence is halted, and pushing the same memory-enable switch will start the cycle from the beginning. For a busy contest station, this means sending NR manually over a thousand times in one contest, unless NR is programmed into one memory and the rest of the exchange is programmed into another.

The CW Sendin' Machine may provide a good operating aid for the contester, net control station, and the casual rag chaser who doesn't require over 2048 bits of memory. The speed range of from 10 to about 50 words per minute is adjustable from the front panel. There is no provision for adjusting dot weight, a useful feature in heavy QRN, or when driving a sluggish keying relay. The reviewer was pleased to note the unit's resistance to rf when operated near open-wire feeders, due in part to a tight-fitting cover, and the use of a shielded cable run to the paddle. The line voltage in the shack often dropped momentarily to 70 volts — not uncommon in older houses with antiquated wiring — but a message programmed into one memory remained intact for two months, at which time the unit was unplugged. The no-frills CW Sendin' Machine, in the \$130 price class, is an attractive package, worthy of consideration by anyone planning to purchase a programmable keyer but turned off by units having more features (and a higher price) than required. Further information is available from: H. Alan Harp, 718 Magnolia Drive, Lake Park, FL 33403. — *WB2EDW*

NEW ADJUSTABLE KEY FROM HAM RADIO CENTER, INC.

Hooray!! A manufacturer finally realized that not all cw enthusiasts enjoy the same paddle-lever spacing. The HK-1 has, as one of its features, adjustable paddle width — wide or narrow. To switch from narrow to wide or wide to narrow spacing one simply removes the locking screw atop the paddle support assembly, lifts the paddle arms, and moves the paddles to the other side of their respective arms. Reposition the paddle arms and replace

the locking screw. Sound simple? It is simple. Other important features include squeeze-key operation, heavy base with non-slip rubber feet and adjustable tension and contact gap. The paddle-arm support assembly and the two paddles are made from hi-impact plastic which virtually eliminates breakage or part-wearout problems. Ham Radio Center also markets two other versions of the HK-1. The model HK-2 is the same as the HK-1, but less the heavy metal base. This is designed for those who wish to incorporate the paddle assembly in their own keyer. Model HK-4 is a combination of the HK-1 plus a deluxe straight key, both on the same base. The price classes are: HK-1, \$29.95; HK-2, \$19.95; and HK-4, \$44.95. They are available from Ham Radio Center, Inc., 8342 Olive Blvd., P. O. Box 28271, St. Louis, MO 63132. — *W1L1NQ*

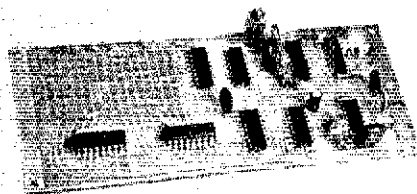
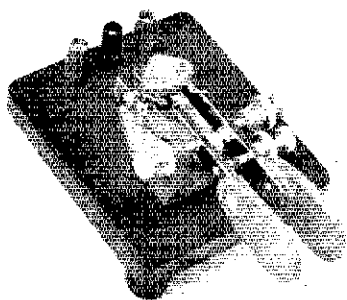
VHF ENGINEERING CW IDENTIFIER KIT

A means of identifying the station is a requirement for all repeaters. Teletype enthusiasts have a need for cw identification in

addition to that being transmitted by the keyboard. Fixed-message transmissions can be useful in ways other than simply providing a required identification — telephone numbers to report reception of beacon transmissions, contest calls, location or coverage information — to mention a few.

Many types of identifier circuits are available, and some of the more compact of them use a pre-programmed memory chip for the encoded message. One type that can be programmed (and changed) at will by the operator requires the use of a diode-matrix scheme, with both complexity and size being somewhat variable.

VHF Engineering has produced an identifier kit that strikes a happy medium between



the size and complexity of many of the matrix types of circuits and the inflexibility of the smaller, but pre-programmed, units. Although designed as an accessory for their line of repeaters, the use of their CW-ID is by no means limited to that purpose. Programming is done by inserting diodes in the proper places on the pc board, and no magic tables are required to do it right; the code can be "read" visually, letter by letter.

Circuitry

There are eleven ICs in the circuit (don't let the photograph fool you — two small ICs placed end-to-end appear as a single unit). A few resistors and capacitors plus a handful of diodes allow an uncrowded assembly.

That popular workhorse of timer chips, the 555, is put to good use here. One is a "clock" generator to provide pulses to the counter and decoder circuits, one is a tone oscillator to provide keyed-audio output, and two are used as timers. One timer is used to control how often the ID sequence will be repeated — the other is used to reset the counter/scanning circuitry to zero after a short period of time following the end-of-message pulse. This feature is desirable to eliminate the necessity of scanning the entire matrix if only a portion of it is used.

On-board controls allow the builder to adjust the speed of the message, the pitch and volume of the audio output, and the length of time between repetition of the message. For repeater use, it is quite common to have the ID sent upon the first activation of the repeater by an incoming signal, and the timing circuit prevents the transmission of another ID until three or more minutes have elapsed. Of course, shorter or longer delays can be obtained by adjustment.

The clock pulses are processed by two divider ICs, one to activate horizontal scanning of the matrix, another to do the same for vertical scans. Two 8-channel multiplexers are used to decode the matrix into elements that key the tone oscillator. BCD outputs from the divider activate data-select lines on one side of the multiplexer and the matrix provides data-input information to the other side. The use of two multiplexers side-by-side allows the matrix to be 16 bits wide and 10 bits high, for a capacity of 160 bits. The first two bits in the matrix are usually left open to allow the circuitry to reset to zero without holding the oscillator on continuously. Several additional blank spaces can be programmed by the builder to provide some time for the repeater user to say a word or two before the code starts.

Construction

A drilled, double-sided pc board is provided with the kit. With the exception of the diodes in the matrix the components can be soldered in place in less than half an hour. The matrix may take a bit longer, but only because you should read the instructions thoroughly, and carefully proceed with the diode placement. No problems were encountered during construction. When the unit was tested everything worked well with the exception of one bad diode that caused a gap in the call letters programmed in the IDer. Errors in programming or diode troubles are easy to locate because the speed can be reduced to a slow rate, providing time to follow the sequence of scanning pulses (monitored at the audio output with headphones)

through the matrix as the message is being sent.

The pc board is designed to be fastened to a chassis by means of screws and spacers through the holes provided. Since the repeater in which this board was to be used had provisions for an earlier ID board, with edge connectors, it was necessary to remove the connector and wire the circuitry to terminals on the new board. It performed like clock-work from the very first time the repeater COR was activated.

The CW-ID kit may be obtained directly from VHF Engineering, 320 Water St., P. O. Box 1921, Binghamton, NY 13902. Price class for the kit is \$40, or for a wired and tested unit, \$50. — *WISL/WRIAAD*

LAFAYETTE HA-146

Lafayette — not the French general who helped back in 1776, but the Lafayette HA-146 transceiver for two meters, a workmanlike rig imported from Japan by Lafayette Radio Electronics Corporation, Syosset, NY. The HA-146 is a 12-channel, crystal-controlled solid-state transceiver capable of either 1 watt (plenty for the local repeater) or 25 watts of phase-modulated phone for 144-148 MHz. It bounced around in my '67 Chevy for about eight months without giving me five minutes worth of trouble. The only place I had "intermod" problems was on the Interstate just below the skyscraper site of both the Hartford repeater and the Hartford police transmitter — and the other four rigs I have used folded up in that same spot! The receiver audio is a solid 4 watts, usually ample even with the window rolled down. The transmitter modulation sounds good at the other end; the infrequent bad report was invariably cured by unswallowing the mic and taming down the vocal chords!

Among the special features not found on some similar rigs is a priority switch, bypassing the rotary channel selector to bring up channel A, in which one inserts crystals for his favorite machine. So the operator can be listening elsewhere and can check his "home" channel by pushing the button once, take a quick listen on Channel A, and then push the button again to go back to the frequency selected by the rotary switch. There's also a TRANSMIT light which glows when the mic button is held down, and a jack at the back for a tape recorder — great if you're doing patches which need to be logged. There is also a jack for external speaker or headphone. Finally there's a DIN-type socket for an external tone encoder, and the owner's

manual tells just how to hook one up.

The rig comes equipped with crystals for 146.94 simplex, 146.34/146.76 (!), 146.76 simplex (! again), and 146.34/146.94. Or at least the transceiver we reviewed did — with standardization leading us away from use of .34/.76 and .76/.76, perhaps changes have been made. Trimmers are available to bring both transmit and receive crystals right to where your local "machine" wants them. The PA transistor is protected against severe antenna mismatch. The schematic diagram is large enough to be read through the tops of my bifocals, and uses actual values, not just parts numbers, for most of the components.

In short, I found the Lafayette HA-146 to be a well-designed, solid, satisfactory transceiver for the 146-148 MHz band. — *W1UED*

The Lafayette HA-146 2-Meter fm Transceiver

Frequency range: 144 — 148 MHz.
RF power output: 25 watts (high) and 1 watt (low), switchable.
Current requirement: 0.8 A receive, less than 5.5 A at 13.8 V transmit.
Price class: \$280.
Available from: Lafayette Radio Electronics Corporation, Syosset, L.I., New York 11791.

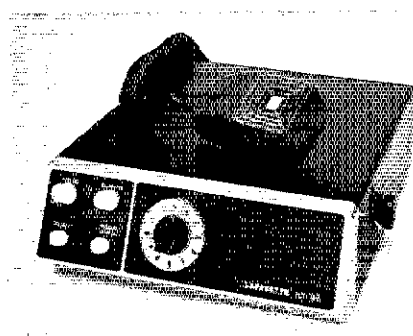
NEW BOOKS

The Solar System, by twelve authors, published by W. H. Freeman and Company, 66 Market Street, San Francisco, CA 94104. Hard-cover edition 9 x 12 inches, 145 pages, price \$8.50. Also available in paper, \$4.50. *Scientific American* book.

This is the widely acclaimed "Solar System Issue" of *Scientific American*, September, 1975, minus advertising and minor features of the magazine, reproduced in book form. Two introductory chapters deal with the solar system as a whole. The sun, Mercury, Venus, the earth, the moon, Mars and Jupiter are treated in separate chapters. Saturn, Uranus, Neptune and Pluto ("a small maverick") are grouped in one chapter, as are "The Smaller Bodies of the Solar System" and "Interplanetary Particles and Fields" which includes information on the solar wind.

The book focuses on what has been learned from space exploration, from unmanned rockets to Spacelab, but there is a fascinating historical perspective as well. The latter is of great value to the lay reader, and extends the range of potential use of the book considerably. The writing is done in an eminently readable style, for an essentially technical work by authors whose names are "household words" in their areas of specialization. Dr. James A. Van Allen, author of the final chapter, above, is an example.

The writing and art work are good enough to make this a "coffee table book" of some distinction. The propagation-oriented radio amateur will find it much more. This reviewer had nearly worn out his copy of the original magazine, in reading it for sheer pleasure and then returning to it again and again for reference work. The hard-cover edition should stand the further handling it is sure to get in years to come. — *W1HDQ*



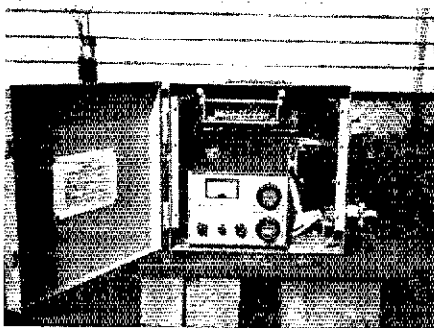
111 Digital & Linear IC Projects provides (in 8 chapters, 210 pages) an assortment of practical circuits with data-sheet information and a well-organized explanation of how integrated circuits operate. Each IC described is accompanied by a base layout, circuit diagram with practical values for circuit components, and power supply requirements. The projects contained in this book cover a variety of useful electronic circuits including test equipment, audio devices, power supplies and many other areas of interest to the home-construction enthusiast. Included in the projects are a zero-crossing detector, receiver circuits, a period timer and a temperature sensor. The final chapter, dealing with digital and analog computations, offers an easy-to-understand, capsule review of differential calculus. *111 Digital & Linear IC Projects* by Don Tuite, Tab Books, 1975, is priced at \$5.95 (paperback). — WA6GVC

LEADER LAC-895 ANTENNA COUPLER

What's in a name? "Coupler" or "Transmatch," or perhaps even "tuner." It depends on where you live and from what era of radio you emerged. In modern jargon we might describe the LAC-895 as a Transmatch (transmitter to line matcher), for that is what this instrument is designed for. It sits on the operating table and looks pretty while providing a 50-ohm load for the transmitter and receiver, even though the SWR looking into the coaxial feeder may be as great as 5:1.

Although the proper place to effect a matched condition is at the feed point of the antenna, sometimes it is beneficial to employ a Transmatch at the rig to maintain a 50-ohm characteristic across a given band, assuming of course that the beam or dipole is not flat across all of the band. Some transmitters simply refuse to cough out maximum rf into loads other than 50 ohms, and tuning into a reactive line can be a nightmare with some brands of equipment. Here's where a unit like the Leader "antenna coupler" shines — disguising that unwanted reactance! It's rather like the old "Now you see it, now you don't," pitch used by circus magicians. SWR be gone — or at least hidden!

The manufacturer included some neat options: Built-in two-range rf power metering; SWR indicator of high sensitivity; 80- through 10-meter coverage (band switched); two jacks and switch positions for routing antennas directly through the built-in power/SWR metering circuit. Single-wire antennas can be used with the Transmatch if they are 1/4



wavelength long, or odd multiples thereof (low impedance feed).

Forward power can be measured in two ranges — 0 to 20 and 0 to 250 watts, front panel selectable. For SWR checking there are two metering positions — *set* and *measure*, and the sensitivity is such that only a few watts (10 or less) will pop the needle up to full scale. This feature saves wear and tear (and possible rf damage) to the transmitter and Transmatch.

The circuit is a modified pi network. The input side of the pi section (transmitter side) is designed for a 50-ohm characteristic, and has fixed-value silver-mica capacitors which are band switched along with the proper coil tap for the frequency of operation. Two variable capacitors (250 pF each) are located at the output of the pi network, and they are controllable from the front panel of the box. One capacitor is connected between the output side of the coil and ground. The remaining one is in series with the line to the antenna from the output terminal of the pi network. The series capacitor extends the matching range of the pi network without need for having additional coil taps and/or variable capacitors at the input of the network. Some harmonic attenuation is afforded by the Transmatch, since pi networks are low-pass filters of simple style.

The LAC-895 is not a high-power unit. The rf-power capability is listed as 100 W continuous, or 200 W at 50-percent duty cycle. This reviewer noted some rf "spitting" when delivering 180 rf watts to the Transmatch after compensating for an SWR of 3:1. There was sporadic arcing across the capacitor plates during cw operation. Lowering the power output to 150 W resolved the problem. Insertion loss during a matched condition was less than 0.5 dB. A 500-W PEP rating is given for the Transmatch, but there was some capacitor arcing noted when that much voice-derived power was applied to the system when an SWR greater than 2.5:1 was being corrected at the transmitter end of the 50-ohm antenna cable.

A redundancy is seen in the doubly shielded cabinet with its numerous screws. Certainly, the box is rugged as a result, but TVI does not originate in a Transmatch, so perhaps a few ounces of metal could have been saved by eliminating the inner shield cover. Even the meter is shielded to prevent rf radiation — TVI-reduction fashion!

The reviewer found an interesting application for the Transmatch when he placed it in a weatherproof metal box at the base of the WICER/WICKK tower. There it serves in combination with a 160-meter T network (see

photo) to provide a match on 160 and 80 meters. The SWR metering and switch-through feature of the LAC-895 permit monitoring of conditions on 160 and 80 meters, and the Leader Transmatch is used for 80-meter matching. A 160-meter size gamma section is used to excite the tower and 20-meter beam combination as a vertical. The same gamma section is used with the LAC-895 for 80-meter operation. In that application one might concede that the device is indeed a "coupler."

It is probably worth saying that among the many practical things one can do with a box of this variety is to use it between an exciter and a linear or Class C amplifier when the input impedance of the amplifier is not 50 ohms. It is small enough in size to be a fine traveling companion for the camper or vacationer who likes to operate ham radio while enjoying his therapeutic respite from the office or mill. From an aesthetic point of view, it is anything but an ugly duckling with its blue cabinet and functional appearance. It looks downright attractive sitting on the operating desk! — WICER

The Leader LAC-895 Antenna Coupler

Dimensions (HWD) and weight: 6 x 8 x 8 inches, 4 pounds.

Power capability: 100 watts continuous, and 200 watts at 50-percent duty cycle, under 1:1 SWR condition.

Frequency range: 3.5 to 29.7 MHz, band switched.

RF power metering: 0 to 20 and 0 to 250 watts.

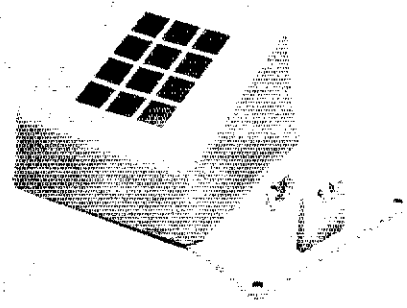
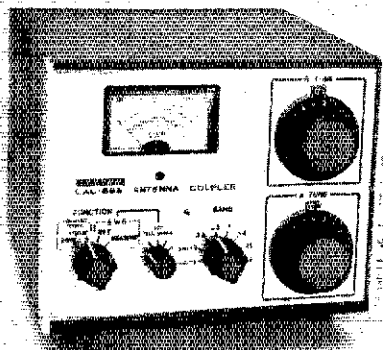
Price class: \$160.

U.S. Distributor: Leader Instruments Corp., 151 DuPont St., Plainview, NY 11803.

STONE-PAD HOUSING

Need a housing for that 12-button Touch-Tone pad that's been banging around the floorboard of your car? Propagation Products Company is offering housings designed for the standard 12-button pads manufactured by Western Electric, ITT, Stromberg Carlson, and others.

Made of Borg Warner Cyclocac, the housings are available in three colors: Black, grey and beige. The pads can be mounted in two different directions to allow for high, low or desk-top mounting. The sides of the housing are hole-free, to facilitate any wiring configuration the user may choose. Further information on price and availability can be obtained by writing to Propagation Products Company, 1855 Cassat Avenue, Jacksonville, FL 32210. — WA6GVC



Silent Keys

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

W1BHQ, Frank G. Bendzinski, Glastonbury, CT

WA1HCO, Leo E. Frechette, Coventry, RI
 W1HFL, Erwin S. Trask, Plymouth, MA
 W1JOS, Raymond S. MacDonald, Danvers, MA
 WA1KAX, Stanley J. Budnik, Webster, MA
 K1KRX, Percy M. Thurston, Elkins, NY
 W1QIE, George Ajootian, Lynn, MA
 K1QOJ, Earle A. Ellsworth, Sr., Brighton, MA
 W1TEW, Dr. Mark D. Archambault, Williston, VT

W1UXZ, Elmer E. Kerwin, Lynnfield, MA
 R1VJT, Bradford F. Ring, Lynn, MA
 W2CNA, Ferris W. Wolfinger, Binghamton, NY
 WA2EID, Leslie E. Wright, New Woodstock, NY

K2ER, Col. Charles A. Porter, Rye, NY
 W2GUS, Seymour Hertz, Flushing, NY
 WB2JLY, Lawrence Levine, Kingston, NY
 Ex-W2JLW, Ernest E. Lail, Athol Springs, NY
 K2KS/W4KS, Clinton W. Janes, Upper Saddle River, NJ

W2TMG, Norman G. Kesel, Syracuse, NY
 WB2UMC, Daniel Bryan, Staten Island, NY
 W2ZDV, Francis H. Sternberg, Elmont, NY
 W3GKB, Harold E. Brown, Palmerton, PA
 W3KXH, James F. Spry, Philadelphia, PA
 W3VPK, Ralph L. Ketterer, Pittsburg, PA
 Ex-41Z, William P. Moore, Tampa, FL
 WA4JSP, Andrew M. Gent, Delray Beach, FL
 W4LUY, A. W. Larson, Naples, FL
 K4MF, Dr. Sherwood A. Chamberlain, Naples, FL

W4OZW, George C. Redfern, Atlanta, GA
 W4ZKQ, Charles E. Weaver, Dunedin, FL
 W5AKB, Landon L. Kohler, Little Rock, AR
 K5CFT, Argus G. Fitzgerald, Sunray, TX
 W5CNG, Howard E. Griffith, W. Monroe, LA
 K5ELJ, Coyo R. Darnell, Bay City, TX
 W5EJU, Carl T. Sheff, Midwest City, OK
 WA5LWW, Delois "Skeet" Horn, Lufkin, TX
 W5SJV, Thomas E. Johnson, Kerrville, TX
 W6APA, Roland S. Fitzgerald, Cupertino, CA
 W6CEA, Edgar T. Caldwell, Whittier, CA
 W6NKN, Richard Murray, Simi Valley, CA
 W6OBM, Henry J. Griffiths, Sherman Oaks, CA

K6TZ, Ernest C. Brelsford, Santa Barbara, CA
 WB6YGB, Herbert A. Nolsheim, Los Angeles, CA

W7CQI, Harry W. Hill, Bremerton, WA
 W7CRJ, Herman V. Venburg, Yuma, AZ
 K7HAJ, Andrew B. Wilson, Salt Lake City, UT
 W7JCO, Fredrick J. Muller, Kingman, AZ
 W7UUG, C. Smithey Shults, Holladay, UT
 W8BKM, Wilburt C. Gross, Conneaut, OH
 W8ACDB, Charles A. Pottenger, Dayton, OH
 W8HEL, George W. Felver, Coshocton, OH
 W8IBA/WB4ELG, L. Frank Briggs, Berkley, MI

W8OPL, Harold J. Gustin, Brooklyn, OH
 W8RAL, Dean W. Wallace, Owosso, MI
 WN8RFK, William C. Pickens, Akron, OH
 K8SXE, C. Albert Wiker, Dowagiac, MI
 W8VFS, Wayne N. Cook, Bloomfield Hills, MI
 K8ZSP, Joseph G. Lapekas, Kalamazoo, MI

W9FZZ, Aldrich E. Sebestik, Lehigh Acres, FL
 W9MBI, Clare B. Reynolds, Sandwich, IL
 WB9MOY, Ruth F. Lawson, Madison, WI
 K9OJT, Oscar H. Bailey, Greenwood, IN
 W9TFB, Gilbert Stowell, Mackinaw, IL
 WA9YEW, Robert A. McFarland, Edwardsville, IL

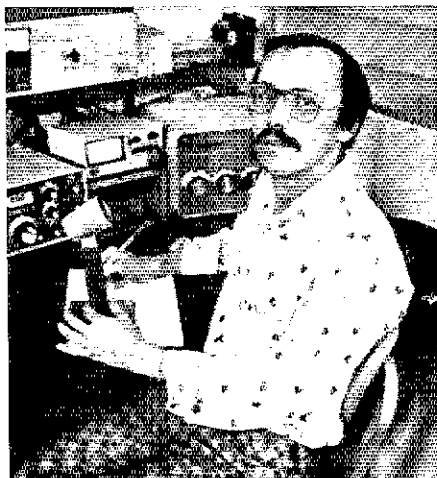
W0CVW, Delbert P. Jondahl, Ruthven, IA
 W0DMB, Edward A. McElwain, Kirkwood, MO
 W0FQK, Glenn E. Johnson, Boulder, CO
 K0HGY, Fred C. Spore, St. Louis, MO
 W0HZK, Robert W. Frykman, Boulder, CO
 W0NCY, Gene D. Sanders, Kansas City, MO
 W0PXB, Nickolas R. Mrak, Duluth, MN
 W0UUI, John M. Black, Bayport, MN
 W0YWK, Charles E. Sheets, Elgin, NE
 VE2AL, Anthony Lawruk, Greenfield Park, PO

VE3ATJ, Stanley C. Else, Belleville, ON
 VE3FN, H. T. Lewis, Hanover, ON
 VE3GFH, William Baker, Renfrew, ON
 VE5EV, W. E. Bethell, Weyburn, SK
 VE5FH, Frank R. Hills, Regina, SK
 VE5GW, E. Kristjansson, Colonsay, SK
 VE5RE, T. H. Halstead, Kindersley, SK
 VE5VB, Tom Van Nes, Prince Albert, SK
 VE6AFQ, Sidney H. Solley, Lethbridge, AB
 VE7KI, William E. Birkett, Maderia Park, BC
 Ex-5CY, Howard Hughes, Acapulco, Mexico

Strays

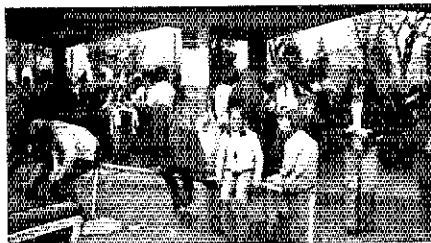
MEET YOUR SCM - KP4BDL

Puerto Rico SCM David Novoa, KP4BDL, was first licensed in 1961 as WP4BDL. Dave is an avid DXer and periodically activates his second station KV4IM. He is a current director, past vice president and bulletin editor for the Radio Club de Puerto Rico. The KP4BDL station consists of an FT-101B and an SB-220; antennas are a TH6DXX, 18AVT-WB-A and an inverted vee for 75 meters. Favorite bands/modes are 75 and 20 ssb, 40 cw and two-meter fm. KP4BDL is a member of Navy MARS, NNNØHGD. Dave works for the government of Puerto Rico and goes up for his Bar exam in September. He says he has no time for other hobbies since he is a DXer and married! (KP4R photo)



The Pause That Refreshes: Weary walkers rest their feet following their 20-mile hike during the Lakewood, Colorado, March of Dimes Walkathon. Thirty-seven mobile stations were posted at check points and functioned as roving mobiles answering calls for assistance and relaying messages from walkers. The event raised \$257,000.

This was the inside of the Castle Rock Repeater Group's net control trailer, stationed at Morris Park. At the conclusion of the walk, 330 autopatches were made by CRRG. Left to right are WBØNTQ, net control; WBØITI, mobile station; and WØBDD, net control.



Club station, WAØHPW, of Nazarene Amateur Radio Fellowship hosted Julio Vera-Cruz, CR4BC, seated. Fellow member, Jorge de Barros, CR4AJ (left); Clint Stetson, WBØKXU (center) and club station manager, Ray Hendrix (right) entertained CR4BC during his stay in Kansas City.

Julio, CR4BC, has been a long-time friend and supporter of the over 500 member NARF organization, which is primarily concerned with world-wide communications with missionaries and overseas members. NARF has been in existence since the late 1950s and is an official branch of the Church of the Nazarene. Most recently, massive coordination was made through NARF members in the airlift of medical and relief supplies to the Guatemalan earthquake victims. During the Hurricane Fi-Fi, NARF played an essential role in coordinating health and welfare traffic into the stricken area, as it did during the Nicaraguan and Peruvian earthquakes of the late 1960s.



Hints and Kinks

ALUMINUM TAPE FOR SHIELDING

In the 1950s we learned that extreme filtering and shielding of our communications equipment was required to avoid creating TVI. Yet today we see manufactured and homemade gear housed in non-metallic or poorly shielded metal enclosures.

The author has found a heavy-gauge aluminum tape manufactured by Spartan Plastics, Inc., P. O. Box 67, Holt, MI 48842, very helpful in fabricating easy and convenient shielding. It is sold under the name "Trim Brite Custom Trim Metal-Mend Tape No. 11822," and is intended primarily for repair of auto bodies. The author bought a 3-3/4-inch by 5-foot roll for \$1.37 in a local auto shop. It should not be confused with Mylar tapes which appear metallized, but are really plastic.

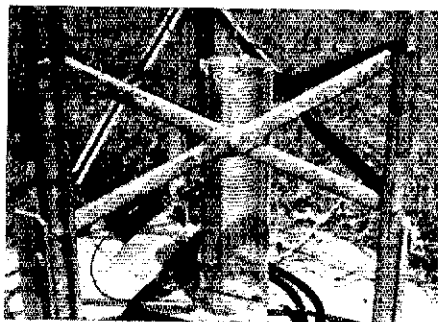
As far as the author knows the adhesive used is nonconducting, so this should be taken into account in any shielding project. Seams should be closed with metal-to-metal covering or 3M Scotch tape No. X-1170, an RFI tape which does have conductive adhesive. The latter is designed for the purpose, but may not be obtained as easily as the Spartan product, especially in the greater width. Obviously, the wider tape should be used for large areas, and the narrow X-1170 with conductive adhesive should be used for corners, seams, etc.

The author has used both tapes in shielding a transistor rig in a partly plastic case, as well as a uhf converter in a plastic case, both of which caused TVI before treatment. — *Edward F. Erickson, W2CVW*

HY-TOWER LOADING COIL

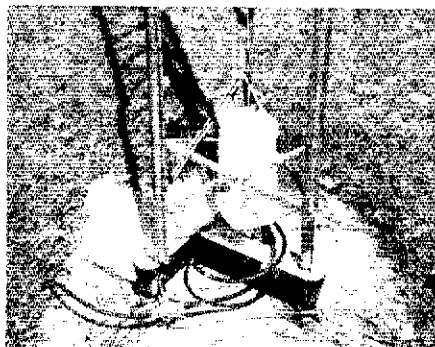
Shown in the photographs is the method that I used to mount a loading coil for my Hy-Tower but it is a system that could be used with any tower. I feel it is superior to the method recommended by Hy-Gain because there is no mechanical strain on the coil.

A plastic block is bolted to the base of the



The coil is mounted over the block. Note the clip lead used for making initial adjustments.

tower using a right-angle bracket as shown. Holes are drilled in the plastic for coil-support points, plus the block edges are rounded so that the coil is a press fit over the plastic. The coil is not electrically connected at the bottom end — the nut and bolt are for mechanical support. The wire that runs the length of the tower section is connected to the upper end of the coil at the upper support screw. The coil tap is electrically connected at the tower-base feed point. Rain protection is provided by a plastic juice container, inverted over the coil. — *Larry Price, W4DQD*



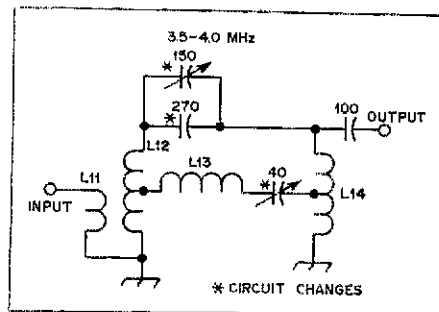
A weather-proof cover is installed.

The plastic block is mounted on a right-angle bracket at the tower base.



WICER RECEIVER MODIFICATION

I had difficulty obtaining ample sensitivity on 80 meters with the WICER receiver described in June and July *QST*, 1974. Investigation showed that the band-pass input network in my 80-meter converter had a center frequency outside the 80-meter band. A trimmer capacitor was substituted for the fixed-value capacitor in the center resonator (see diagram), and another trimmer was added to one of the end resonators. Readjustment of the filter center frequency was done quickly with the trimmers added, and performance was excellent. I can actually copy W and VE



stations now, using only an indoor version of the W3DZZ antenna!

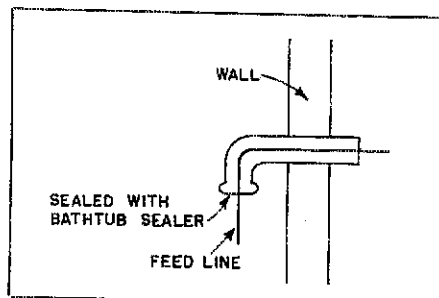
I was unable to cure the inherent crossover distortion in the IC audio amplifier specified in the article. Poor audio quality was noted during weak-signal reception. Removal of the MFJ audio module followed, and a miniature hi-fi amplifier block was substituted. Discrete components are used in the hi-fi amplifier, enabling the builder to correct the biasing if necessary. Now the audio quality is excellent.

Aside from the minor problems just mentioned, the receiver has given very good performance. I am presently building a new version of the circuit. — *Hans Natzger, HB9AQZ*

[Editor's Note: Crossover distortion is a common fault with low-cost IC audio amplifiers, as noted in many ARRL tests. No external means exist for adjusting the forward bias of the built-in audio-output devices.]

FEED-LINE FEEDTHROUGH

I have found that plastic pipe available at hardware and plumbing supply stores works well for running leads from your antenna system through a wall into the shack. It is available in a variety of diameters to suit your needs. I found that a 90° elbow on the outside helps prevent moisture problems and the pipe opening can be sealed with bathtub sealer. — *Keith Gilbertson, WBØ LXM*



LATCHING RELAY SOURCE

For your latching relay requirements, I have found VW electrical systems a good source of supply. They use a latching relay to control high- and low-beam headlight switching with a

single pulse button. My last trip to the local junk yard netted me four relays for two dollars. The quality is excellent and the size is about 1-inch cube. Older VWs are 6 V and newer ones are 12 V. — *Walter LeForet, WA3VCY*

MORE OUTPUT FROM HG-10 SERIES VFO

Users of the Heath HG-10 and 10B VFO with other than Heath transmitters may have encountered problems with low output. The HG-10 is rated at 5 volts rms, and this just wasn't enough to provide adequate grid drive for my hundred-watt, using two 6CL6s as buffer and driver. No amount of work with tube operating conditions, tuned circuits, or improved coupling did any good. The problem was solved by changing the oscillator plate choke to one with a value of 1 millihenry. This change was all that was needed to yield ample drive on all bands. — *Jon G. Harder, W1GVN*

HUM REDUCTION IN THE HW-7

After trying every possible way I could think of I could not rid my HW-7 of a terrible hum, particularly on the 40-meter band. Many things were considered, including additional filter capacitors in the power supply to using batteries — permanently!

Then, while moving the shack around, a different ac outlet was used for the rig, and the hum was gone. Solution: Be sure the outlet has a three-conductor receptacle that has a ground. After checking the old outlet I found that the ground lead was broken inside the wall, but appeared normal in the receptacle box. — *Bruce Ault, WA4UVG*

[Editor's Note: It is important that a good earth ground is installed on the chassis of the HW-7 in order to prevent hum.]

SLIPPING DIAL DRIVE

I had an old receiver in which the dial cord on the tuner was slipping. I tried a variety of things to put some traction into the line, and finally tried alum. A simple wetting of thumb and forefinger on the alum and running the fingers along the line did the trick.

That was twelve years ago and that was the end of the trouble; it has not slipped since. — *A. P. McMonigal, WN3VZW*

MOBILE OPERATING AID

Having the mobile rig microphone handy while driving has become a bit of a problem because many present-day cars have vinyl-covered dashboards. Bolted or magnetic hangers are no longer reliable or desirable. A happy solution comes from the boating scene.

Velcro Corp. Marine Products manufactures a fastening system that becomes very useful for holding everything from microphones and pencils to entire radios. This system suits the inventive nature of radio hams well and it is expected that uses will be found for portable antennas and beams, travel cases, routing wires, holding logbooks and telegraph keys, and so forth.

The Velcro fasteners are made up of thousands of tiny hooks on one piece of

backed material and tiny matching loops on the second piece. The hooks interlock with the loops when pressed together and release rapidly when peeled apart. This non-metallic device can be cut to shape with scissors and sewn, stapled, or cemented in place. It doesn't jam, rust, or corrode, and will hold even when wet. It is practically foolproof.

I have applied one piece (the loops are softer) to the microphone of my Drake IR-22 with the other piece attached to my automobile dashboard. Actually, the hooks were placed in both of two cars so the rig can be used with the same convenience in either car. I also applied the hook part to the IR-22 carrying case so the mic would not dangle to the ground or get squeezed accidentally in a pocket.

A visit to most marine stores should turn up a large floor-mounted display where a variety of sizes are available. For those who are not close to a marina, the product is manufactured by Velcro Corp., Marine Products Dept., 681 Fifth Ave., New York, NY 10022. My wife reports that the sewable variety of Velcro can be found in department-store notion counters. — *Dwight B. Hill, K2KWK*

SCR RELAY CONTROL FOR RTTY, VOX, AND COR

One would expect to find more extensive use of SCRs in present day relay-control circuits, given the desirability of economy, reliability, simplicity, and state of the art. Often an SCR can replace up to several transistorized or tube stages in RTTY, VOX, COR, and other relay-control circuits.

The threshold triggering effect of the SCR can be used to advantage here, triggering being automatically suppressed on low-level noise and similar interference. Because of its turn-off characteristics, ac is easier to control with an SCR than is dc.

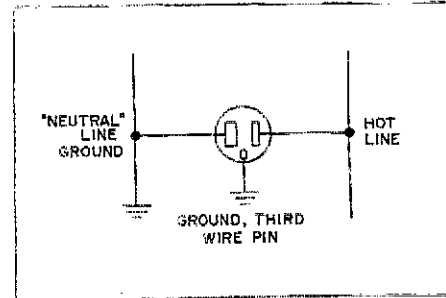
Some experimenters may wish to take the final step: Replacing the relay with an SCR or, if an ac motor is being controlled, with a TRIAC. (SCRs conduct only on half cycles.) Caution: When replacing relays with solid-state devices, always avoid circuits which present potential hazards, such as an ac primary chassis ground.

Here is a representative circuit for SCR relay control which has been used with excellent results in RTTY auto-start/motor-delay sections of homemade RTTY demodulators at WB8DKX and W8KDC. Pick-up/drop-out times can be varied by the combination R1/C1, and also vary considerably with

the SCR type (in this circuit the times are 1 second and 3 seconds respectively). It is virtually immune to cw, voice, etc., and keys only on a RTTY Mark tone (2125 Hz). CR1, 2 are silicon diodes, 50 PIV or greater; R4 is an appropriate dropping resistor, if needed, for the ac relay — the contacts of which should be capable of handling the load being switched, plus a safety factor, of course. — *Dick Weeden, W8KDC*

GROUNDING AC LINES

Howard M. Berlin's (K3NEZ) "Danger Lurks!" article in Feb. 1976 *QST* was excellent. Because of Berlin's familiarity with the subject, I think he may have overlooked supplying information which some hams do not have.

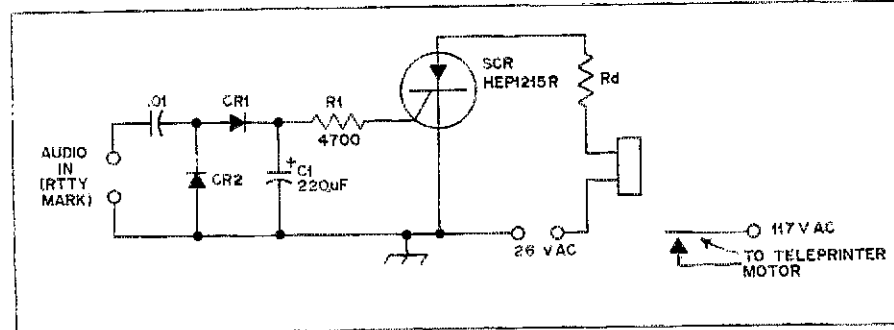


When a receptacle is properly mounted in a wall box, the pin hole GROUND is at the bottom. The line ground (NEUTRAL) is at the left side of the two slots. It is larger than the hot side slot in some receptacles.

The GROUND pin hole is frequently connected to the conduit or BX cable and like many other "pipe" conductors, does not provide the most perfect ground. In non-metallic sheathed cable (Romex) installations the ground is simply a bare wire.

Modern two-lead (two connections) wiring devices will show different colors of metal at connections. The natural brass is the HOT side. The light-colored connection (tinned nickel, cadmium, etc.) is the NEUTRAL (line ground) side. If there is a third connection, as in plug receptacles, it is the ground connection, screw head daubed bluish-green.

In devices with pigtails, the white lead is neutral ground. In ac power wiring, white is almost always neutral ground. It must never be broken with switches, fuses, etc. The hot lead is black or any color except white. — *H. Hansen, W6HOZ*



Affiliated Clubs — a New Look

Affiliated clubs have been one of the great strengths of the ARRL organization from its very beginnings. Now the partnership is about to enter an exciting new era.

By Charles J. Harris,* WB2CHO

The ARRL Club and Training Program is managed by Charles J. Harris, WB2CHO, assisted by Rosalie Cain, WA1STO.

A relative newcomer to Hq., Chod is a graduate of Princeton University where he was president of Princeton ARS, W2PU, for three years. For the past five years, he has been a teacher of science for high school and college credit at the Taft School in Watertown, CT. As advisor to the school's radio club, Chod garnered first-hand experience on the needs of training materials. Licensed since 1966, Chod's amateur radio interests include traffic, DX, and contesting, with a special preference for the latter. The newest facet of operating to pique his interest is Oscar. Chod is a native of Rochester, NY.

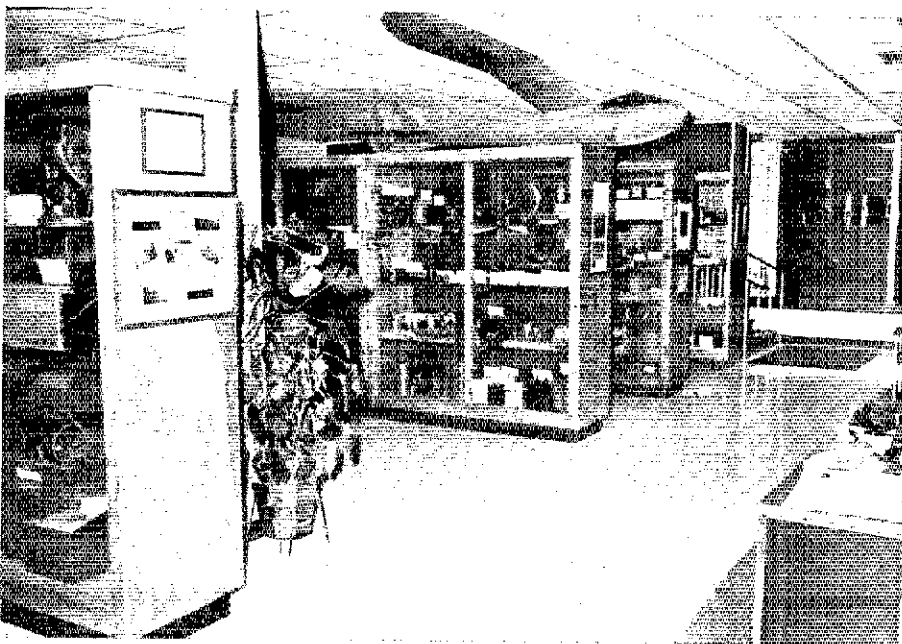
With a BS in Education from Indiana University and a stint of public-school teaching behind her, instructional techniques are a familiar medium to Rosalie. A Headquarters staffer since August of 1973, she is presently completing a master's degree in reading at Central Connecticut State College. She brings to her present position experience as DXCC assistant, public service assistant, and head of the training-aid/affiliated club branch of the CD. A licensed operator since 1970, Rosalie lists Field Day, CD parties and operating special station KJ11TU, KI11TU and PJ9JT, among her favorite amateur activities. But showing her femininity, she says she relaxes to DX cw ragchewing.

*Club and Training Manager, ARRL

Amateur radio clubs have been around since the second person became interested in amateur radio and got together with the first ham. From the earliest days, the local radio club has been and continues to be the backbone of organized amateur radio. The League came along later — and in fact grew out of the efforts of Hiram Percy Maxim and other members of the Hartford Radio Club. Club meeting notices and reports filled the pages of the first issues of *QST*.

It was not long before someone had the idea of establishing some sort of formal relationship between the fledgling League and local radio clubs. That is still one of the best ideas anyone has had in more than a half-century of League affairs. The concept of club affiliation was actually born in August of 1919. A major purpose behind the concept was to further the systematic passing of traffic to augment the limited range of the amateur radio equipment of the day. That, of course, is where the

The amateur radio museum in the lobby of the Hq. building, before it was disassembled and stored to make room for the growing Club and Training Department.





The temporary Club and Training office at Hq., only one week after the museum was removed.

word "Relay" came from in American Radio Relay League.

Over the years, as the nature and scope of amateur radio have changed, the Affiliated Club program too has changed and grown and evolved. It is a relationship which has enormously benefited the League, the clubs and, indeed, amateur radio itself.

Now amateur radio is entering a whole new era and facing new challenges on several fronts — notably the upcoming World Administrative Radio Conference (WARC) in 1979. To help meet those challenges and to serve better the needs of today's and tomorrow's radio amateur, some new dimensions are being added to the Affiliated Club program to create a whole new level of partnership and teamwork.

What does *that* mean? Okay, here it is in essence:

A brand new department, the first in 40 years, designated as the Club and Training Department, has been created at Headquarters. It now has a full-time staff of six and is growing.

As the cornerstone of the ambitious and unprecedented new development program previously announced in *QST*, a brand new, comprehensive Novice course has been prepared and will be tested this summer. Based on the ex-

The new Novice instruction package: Book, code cassette and wall map!



perience of the most successful instructors and club courses around the country, it includes (a) a student package replacing the long-time Gateway, with a new one-volume manual, a code-practice cassette and a call-area map, (b) a complete instructor's package with everything needed to conduct a successful course, and (c) a complete promotional package to attract prospective students to the course and to provide support at the community level.

A field program is in the process of development to provide direct support and assistance at the community level from Headquarters.

The staff is currently working with the J. C. Penney Company, the Heath Company and others to provide retail distribution locally for the training materials, the availability of products for prospective Novices and cooperative promotional support with the local club.

The entire program is built around the local amateur radio club and a closer working relationship with the League. It is in every sense a "grass roots" program because that's where amateur radio is and lives.

"Tune in the World — with Ham Radio"

Anyone long familiar with League publications will hardly recognize the new Novice package to be marketed soon. The basic element, bearing the title above, is a thoroughly modern handbook which covers in a bright, lively fashion everything a beginner needs to know to prepare for the Novice license exam and to set up and operate his or her own amateur station. The chapter headings are indicative of the style of the new manual: Meet Ham Radio, The FCC Speaks, The Fundamentals of Electronics, The Morse Code Hurdle, Getting It All Together, Over the Airwaves — Painlessly. Copious picture treatment, diagrams and other illustrative material enliven the text at every stage.

The second element included in the package is a complete code practice cassette, introduced by Jean Sheperd, K2ORS, noted author, actor and star of radio and television (and himself an enthusiastic cw operator). Step by step, it takes the beginner in easy-to-follow stages through the process of learning the code in a way that makes it fun.

To complete the package, a large, wall-size, full-color call-area map of the United States is included. The course will have wide distribution through many new as well as traditional channels.

Instructors' Package

Over the years many amateur radio clubs have conducted code and theory

Eligibility Benefits of Club Affiliation

1. Receive regular and special mailings concerning club related activities.
2. Special library donation offer of League publications.
3. Partial retention of ARRL membership dues for club treasury.
4. Competition for club awards in ARRL contests.
5. First choice on all training aids and films.
6. Receive visits from local and Hq. ARRL personnel for club meetings.
7. Use of ARRL name in correspondence and publicity.
8. Special membership promotional mailing lists.

(Write ARRL hq. for details on any of these programs.)

classes, the major source, in fact, of new amateurs. Other groups no doubt would do so too if more and better instructional materials and guides were available. Accordingly, what we have attempted to do is to compile the best experience, knowledge and judgment from the most successful instructors into one new, complete course. The new instructors' manual includes everything an amateur needs to prepare for, plan and conduct an effective licensing class. It covers organization, lesson plans, subject matter, classroom techniques, administrative details, and even how to attract students to the course. With it, we will also supply slides and tapes to assist in the presentation.

One of the problems in amateur licensing has been the high "drop-out" rate among Novices. Consistently, about 50 percent have failed to go on to a higher class of license. The League is in the process of conducting a special survey among ex-Novices to determine accurately the reasons. One indication we had from pilot-testing this survey is that some Novices feel they are helped to get their tickets and then, in effect, left to their own devices. Getting on the air and making those first contacts turns out to present a formidable barrier for some. We will incorporate recommendations and how-to suggestions (based on the results of the survey) in the instructors' package to carry new licensees beyond that first step.

Promotion and Publicity

Preliminary and exploratory discussions have been held with the J. C. Penney Company, the Heath Company and others to develop ways in which retailers can provide both a source of supply for manuals and instructional materials, as well as Novice and pre-Novice gear and promotional support to the local club in its recruiting efforts by means of cooperative advertising, display and local publicity. We expect to

develop materials to be available to any retailer and club wishing to participate in a cooperative effort.

Some concern has been expressed by industry sources that this whole League program may push the sale of ARRL materials at the expense of other manufacturers' and publishers' products. Actually the standard course approach in no way limits the use of any particular instructional materials. Any publisher can, in fact, take advantage of the opportunity to supply appropriate training and instructional aids. So far as we are concerned, this is all to the good. The more effort there is behind the program from the more sources, the more new amateurs there will be. We very much hope the program will indeed be a stimulus to the development of all sorts of new and better instructional material and equipment.

Amateur Radio on the Move

Why now? Why is ARRL undertaking a big new expansion and recruiting program at this particular point in time? Simply because the time is unmistakably right. Our nation is in the midst of an unprecedented surge of public interest in two-way radio communications, in personal radio use. A part of it, of course, is the CB phenomenon — and nobody is quite sure how much of that is cause and how much effect. After several years of static numbers, amateur radio itself is experiencing a substantial growth spurt. League membership is up to new highs. (The *QST* print order for June is expected to be 145,000 copies vs. 128,000 a year ago.) Moreover, with WARC coming up in 1979, a visible demonstration of amateur radio's vitality is surely desirable to reinforce the amateur position at the Conference. All this adds up in the judgment of the Board to a clear go signal.

Where it is all going to happen is in every city, town and hamlet across the country. That's where amateur radio is and it is certainly where the new amateurs are. And, as always, it is the affiliated clubs, the backbone of amateur radio, that have the opportunity to do the job. Headquarters can help with the tools; the actual courses to produce new amateurs, as well as the follow-through to sustain the interest of these new amateurs and help them upgrade, will be conducted by the hundreds of present and new affiliated clubs that elect to participate in the program. Full details on all the elements of the new program and descriptions and samples of all the materials to be available will be forthcoming shortly.

For the long haul, this new development program can perhaps be described as Phase I in the League's plan to improve, expand and strengthen its ser-



Club and Training's first home: Behind the file cabinets in a corner of the Communications Department office. Diane Fleury handles affiliation matters.

vices to all affiliated clubs in the years ahead. Affiliation has worked well for both clubs and the League over the years, but there have been frustrations; the affiliation idea is still in many ways an undeveloped resource. That is going to change.

Phase II and Beyond

The new program was first presented as an idea at the January ARRL Board meeting. The creation of a new department and the entire preparation of the new program materials have all taken place since that time. Recruiting and building a staff, launching preparation of the new materials and maintaining existing club services have kept us thoroughly occupied. Yet some additional targets have been identified for the C & T Department.

Following the Novice course, we expect to develop similar materials for other license classes as well, to assist affiliated clubs in carrying on continuing programs.

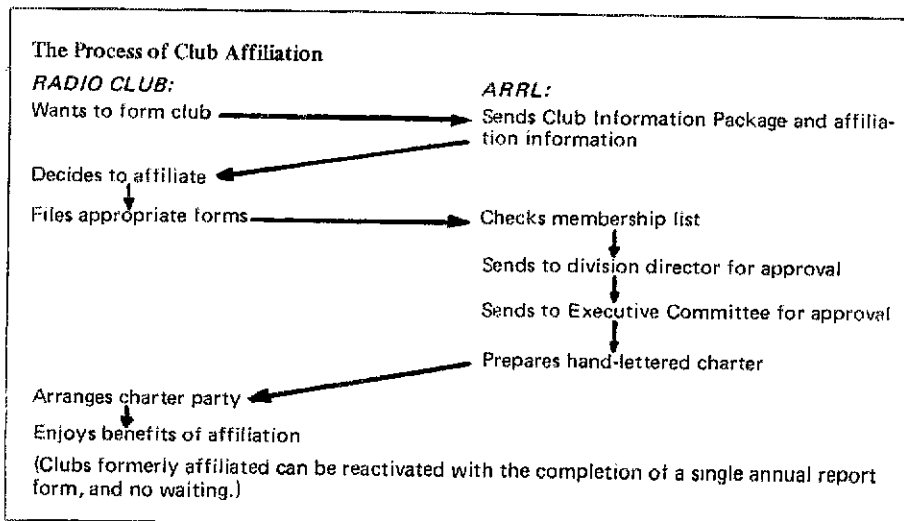
We will review all that is available and should be available in the training-aids library with a view toward upgrading and expanding films, slides, tapes

and visuals for club training, educational, informational and entertainment uses. We feel there is room for much improvement in training aids.

Changes have already been made in the "Radio Club News," the bulletin that goes to all affiliated clubs on a quarterly basis. We will continue efforts to make it a better exchange of good ideas from clubs, together with suggestions and guidelines for program chairmen, membership chairmen, licensing instructors and club news bulletin editors. More than 200 club bulletins are received each month at Headquarters. Each is carefully read and circulated among interested staffers. If we are not on your club's mailing list, we would very much appreciate being added.

None of what is being done in all this planning and preparation is cast in concrete. Comments, suggestions and constructive criticism will be warmly welcomed and much appreciated. Your ideas on how we can together help amateur radio to grow and to retain the vitality and special qualities we all value are what will give the program life. Let us have them.

QST



Miami Conference Brings Region II Amateurs Together

What do hams from 26 countries talk about when they get together? WARC-79, that's what.

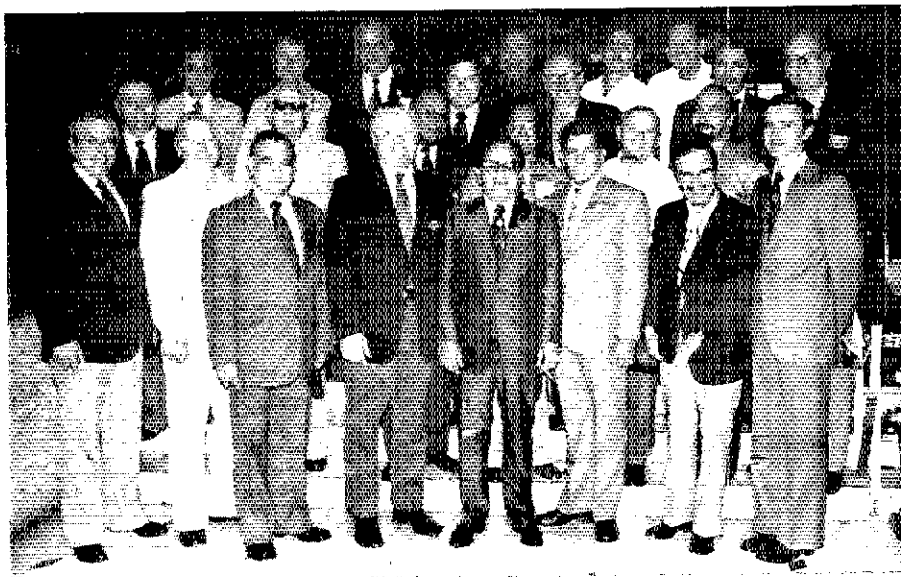
By David Sumner,* K1ZND

The Deauville Hotel in Miami Beach, Florida, was the scene of the Fifth Triennial Conference of the International Amateur Radio Union, Region II Division, from April 11 to 15. The Conference was hosted by the ARRL in celebration of the U.S. Bicentennial. It brought together the representatives of 23 national amateur radio societies throughout North and South America for intensive working sessions on all manner of subjects related to amateur radio, but with special emphasis on actions related to the 1979 ITU World Administrative Radio Conference (WARC-79). WARC-79 will have the power to revise the frequency alloca-

*Assistant Secretary, ARRL



W4WYR at the controls of AI4ARU. Much DX was worked with simple antennas. The fact that the Atlantic Ocean was lapping at the foundation of the hotel 200 feet below the antennas didn't hurt!

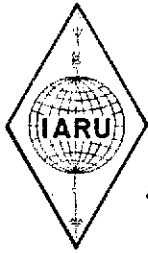


The Region II delegates, retiring officers and Executive Committee. First row (l-r): VE1SH, VE4IM (treasurer), OA4AV (secretary), W2TUK (vice president), XE1HD (president), H18LC, YV5BPG (EC), CE3ABZ (EC). Second row: LU2DX, XE1CCP, HR2BLP, YN1FI, CP5EC, HK3DEU. Third row: OA4OS, HP1AJ, ZP5RS, VP9GO, W1DPL/6Y5, PJ2VD, W4KFC. Fourth row (beginning just above XE1HD): CE3ALD, HC2JP, YV5EC. Not present: TG9CC, HP1JC, 9Y4NP.

tions and regulations of the Amateur Radio Service, and must be viewed as both an opportunity and a threat to the future of amateur radio. The Miami Conference attracted observers from IARU Regions I and III as well as from several national societies outside Region II, which added all the more to the

international flavor of the event. In all 61 amateurs attended as official delegates or observers, and several others from the Miami area dropped in to see what was happening.

The conference was officially opened on Sunday afternoon, April 11 with a keynote address by the IARU



INTERNATIONAL AMATEUR RADIO UNION
REGION II CONFERENCE - MIAMI, APRIL 1976

AI4ARU

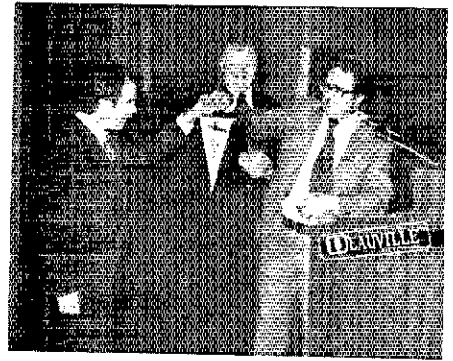
This station was operated from April 9 to 18, 1976, from the Deauville Hotel, Miami Beach, Florida, site of the Triennial Conference of the Union Interamericana de Radio Aficionados/ IARU Region II Division. The Conference brought together the representatives of national amateur radio societies throughout North and South America for the discussion of mutual problems, in particular the preparations underway for the 1979 World Administrative Radio Conference. The assistance of the Dade Radio Club in providing station facilities is gratefully acknowledged. Host for the Conference was the American Radio Relay League.

Confirming QSO	Date	UTC	RST	Band	2X
	April 1976			3.5 7	
				14 21 28	

QSL via:
Evelyn D. Gauzens, W4WYR
2780 NW 3rd St.
Miami, Fla. 33125

73

Operator



YV5BPG (left) accepts a Region I Division pennant from PA0LOU, as W2TUK beams approval.

president, Noel B. Eaton, VE3CJ. Noel, who was treasurer of the Region II Division for more than ten years before he assumed the presidency of the parent organization in 1974, reminded the delegates of the seriousness of their mission. He pointed out that the success of a conference is measured not by how many things people agree to do, but rather by how many things are actually accomplished in the months and years following. He emphasized the need for all radio amateurs to set aside their differences for the next several years so that they might speak with one powerful, effective voice on the subject of WARC-79. Other welcoming remarks were made by the president of the host society, Harry J. Dannals, W2TUK, and by the president of the Region II

Division, Jose Chiquillo, XE1HD.

Following the opening ceremonies, W2TUK was elected Honorary President of the Conference, a post which is traditionally awarded to the president of the host society. Next, the credentials of the delegates were examined and the delegates were divided into three working groups, Organization, Operations and Finance, to formulate recommendations on several dozen proposals which had been submitted for the consideration of the Conference. The working groups remained in session for the remainder of the afternoon, then reconvened on Monday and Tuesday to complete their work.

Following a day off on Wednesday to permit the Secretariat to catch up on the paperwork which was being generated, the delegates gathered on Thursday morning for an all-day plenary session to receive the reports of the committees and discuss their recommendations. Notable among the recommendations adopted by the Conference were the following, which are paraphrased for brevity:

1) National societies in Region II should seek the support of their administrations at WARC-79 for allocations to the Amateur Radio Service as enumerated on page 9, May 1976 *QST*.

2) Support should be sought for additional bands for the Amateur-Satellite Service, especially segments in the 1215, 2300 and 3300 MHz, and certain clarifications of the international regulations should be sought so as to permit maximum flexibility for amateur satellite work. (This also agrees closely with the position previously developed in the U.S.)

3) Member societies should seek support for certain minimal changes in the ITU Radio Regulations, in particular to permit greater flexibility in the handling of international disaster and emergency communications.

4) Member societies should attempt to place a delegate representing amateur radio on each country's delegation to WARC-79.

5) Member societies should schedule regular joint meetings with their administrations to inform them of significant achievements by amateurs.

6) Special efforts should be made to explain the purpose and mission of the IARU to individual amateurs, and to enlist the support of any individuals or groups who will show an interest in cooperating with the Union and the Region II Division.

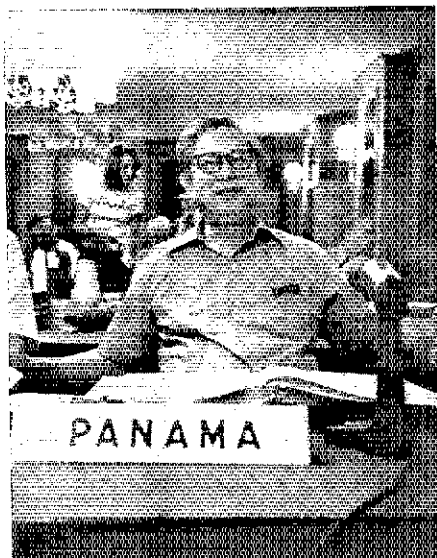
7) While the Conference realizes that not all countries have the capability of creating independent monitoring systems, the need for an IARU Monitoring System (Intruder Watch) for Region II such as is already functioning in

0A4OS and 9Y4NP.



HB9GA addresses the banquet.





HP1JC.

Regions I and III is recognized. Because the U.S. is the only country in Region II with an active Intruder Watch, the ARRL is designated as Regional Office. The Executive Committee is empowered to appoint a Regional Coordinator to provide liaison between member societies and with other Regions.

8) In order to provide sufficient funds for full participation in WARC preparation by the Region II Division, the annual dues are doubled for the next three years.

9) Member societies are requested to educate their members as to proper procedures and restrictions to be observed in the handling of third-party

LU1BAR chats with W1RU.



traffic, in particular that phone traffic should be handled in the lower (below the U.S. phone band) and upper parts of the phone segments so as not to interfere with other international amateur communication.

10) The president is instructed to appoint a special committee to explore the possibility of a region-wide amateur radio alerting system, to assure prompt and efficient response to disaster situations in any of the member countries.

11) The Executive Committee is requested to create a working group to help coordinate the scheduling of on-the-air contests within Region II.

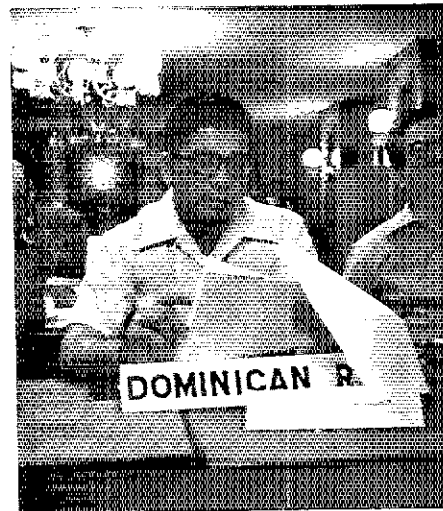
Region II Countries Represented at Miami Conference

Argentina	Jamaica
Barbados*	Mexico
Bermuda	Netherlands Antilles
Bolivia	Nicaragua
Canada	Panama
Chile	Paraguay
Colombia	Peru
Dominican Republic	Trinidad & Tobago
Ecuador	Uruguay*
El Salvador*	United States
Guatemala	Venezuela
Honduras	
*by proxy	

12) In view of the scheduling of WARC-79, the next Region II Conference is scheduled for 1978, in Panama.

The Conference also elected a new Executive Committee, consisting of Vic Clark, W4KFC, president; Pedro Seidemann, YV5BPG, vice president; Gustavo Reusens, OA4AV, secretary; Peter Parker, VP9GO, treasurer; and Luis Caamano, H18LC, Alex Chanes, CE3ABZ, and Fabian Zarrabe, YN1FI, members. (In order to assure fair geographical representation, the seven members of the Executive Committee are elected to represent seven areas of the Region as defined in its statutes.)

While the emphasis throughout the Conference was on the serious business at hand, the social aspects of the occasion were not neglected. The ARRL sponsored a welcoming reception on the Saturday evening before, which was highlighted by the presentation to the ARRL of a beautiful emblem and plaque by the Radio Club Boliviano in honor of the U.S. Bicentennial. On Tuesday evening, the Sociedad Internacional de Radio Aficionados (SIRA), a bilingual group based in Miami, sponsored a reception which featured the viewing of a videotape of amateur radio activities in Guatemala during the recent earthquake. Operators from the Dade

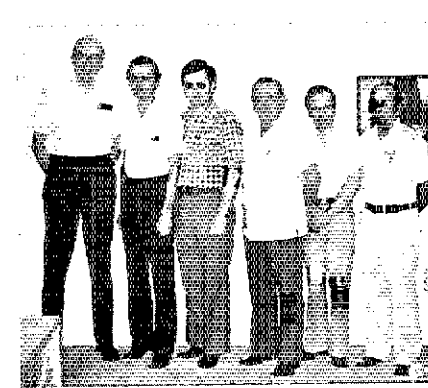


H18LC ponders a document.

Radio Club supervised the operation of special station AI4ARU from the top floor of the hotel, which became a popular congregating spot for the delegates when they were not occupied with other business. The closing banquet on Thursday evening was addressed by Harry Laett, HB9GA, a distinguished Swiss amateur with many years of professional experience in the field of international radio regulation. Harry had been present at the 1962 meeting in Miami which had laid the groundwork for the formation of the Region II Division, so it was especially appropriate that he address the assembly.

Other observers from outside Region II also added considerable expertise and color to the proceedings. They included the chairman and secretary of the Region I Division, PA0LOU and G2BVN; a director of the Region III Association, VK3KI; the president and the IARU liaison officer of the Radio Society of Great Britain, G3FKM and G3GVV; the president of the Japan Amateur Radio

The new Executive Committee: W4KFC, CE3ABZ, VP9GO, OA4AV, YV5BPG, YN1FI (H18LC absent from photo).



League, JA1AN, and his daughter, JG1QIK, who acted as interpreter; and the president of the Wireless Institute of Australia, VK3ADW. Seldom in history have there been so many presidents gathered in one place! The Conference was also fortunate to have Jean-Bernard Wolff, LX1JW, in attendance. Jean is one of only two surviving members of the group which met in Paris in 1925 to form the IARU. In the intervening years he has acquired an enormous wealth of experience which he was quite willing and able to share with the younger attendees.

The overseas observers and several of the Region II delegates remained in Miami Beach for two days following the closing of the Region II Conference to participate in a world meeting called by President Eaton. This was the first time in the history of the IARU that representatives of each of the three regional divisions had had the opportunity to talk with one another and with Hq. personnel on an in-person basis. These personal exchanges have added tremendously to the knowledge of all present and have enhanced the effectiveness of the IARU team. Similar meetings of key people will be taking place in the critical months ahead in order to ensure that proper strategy is being followed and timely actions are being taken.

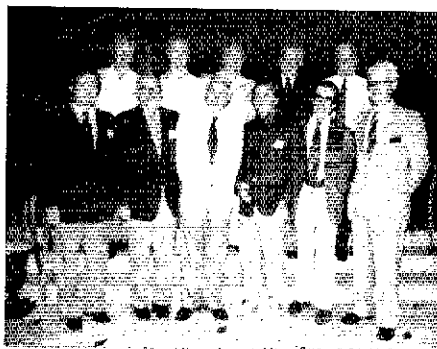
In terms of the number of countries which were represented, the Miami Conference was by far the most successful which Region II has had. This bears testimony to the importance which the member societies place on WARC preparation. Success could also be seen in other, less tangible ways. The development of personal friendships across the barriers of geography, culture and language was not uncommon. Without a doubt, each delegate left Miami possessing a greater sensitivity for the ideas and needs of the radio amateurs of other countries.

So many individuals contributed to the success of the Conference that it would be impossible to list them all. In particular, W4WYR and W4DTJ of the Dade Radio Club provided invaluable assistance at every stage, including early planning, selection of a site, setting up and manning AI4ARU, and acting as QSL managers. WA4ZZG of SIRA made arrangements for excellent publicity on the local Spanish-language television station. Amateur Radio Center of Miami, K4KQ, and WB4AUR provided the equipment used at AI4ARU, and WB4RFB made several colorful signs for the station. Finally, YV5BPG, XE1CCP and LU1BAR went far beyond the call of duty in translating Conference proceedings and documents into English and Spanish. Their language skills greatly facilitated the free flow of ideas between conferees.

QST



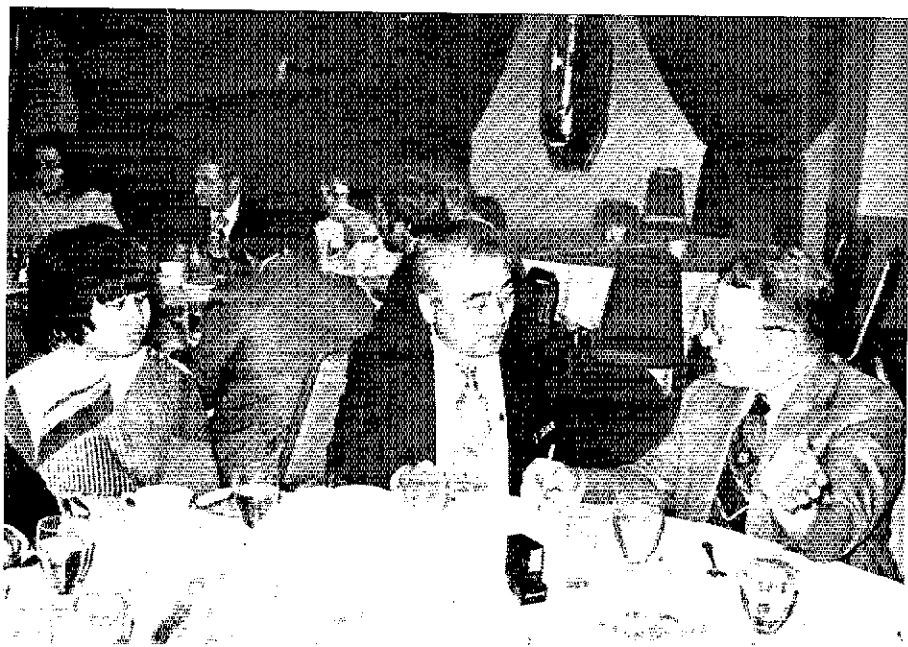
W2TUK and CP5EC flank the plaque from the Radio Club Boliviano commemorating the U.S. Bicentennial.



The British Commonwealth fielded representatives from four continents: (first row) VP9GO, W1DPL/6Y5, G3GVV, VK3ADW, VK3KI, VE3CJ; (second row) G3FKM, 9Y4NP, VE4IM, VE1SH, G2BVN.



After the Miami Conference a small group found their way to Newington for further discussions: (l-r) LX1JW, G2BVN, VE3CJ, VK3ADW, VK3KI.



JG1QIK, JA1AN and W1RU.

Montreal, Olympics '76

There'll be a sure winner at the Summer Olympic Games in Montreal this July — official Olympic amateur station, CZ2O, operating around the clock on six bands!

By Ray Collins,* WA2GBC

The Summer Olympic games in Montreal, Canada, will host an official amateur station, and what a station it'll be! The operating positions of the station CZ2O will be manned around the clock during July. Station equipment will be borrowed from many major amateur radio equipment manufacturers. In addition, visitors to the station will be able to browse through an ARRL Headquarters display.

Location of the station will be just a short distance from the main Olympic site in spacious quarters at Pavillon Champagnat of the College Marie-Victorin, 7125 Marie-Victorin Street in northeast Montreal. The large area allocated to amateur operation will serve a dual purpose. As well as hf and vhf operating positions for CZ2O, there will be exhibits of the latest amateur equipment.

Although propagation conditions are not expected to be optimum at this time, CZ2O will be providing the best possible communications with amateurs worldwide via equipment operating at maximum power into a triband beam atop one of two 52-foot towers installed for the occasion. Wire antennas will be installed for 80- and 40-meter operation. CZ2O will most likely operate cw, ssb and RTTY. For vhf operation, six

single-frequency base stations and one multi-frequency unit will be on the air, along with two-meter repeaters in the Montreal area.

To help with the logging chores, two long-play tape recorders, each capable of recording up to 24 continuous hours of information, will be connected to each phone transmitter at CZ2O. It is estimated that 5000 CZ2O QSL cards will be sent to amateurs throughout the world during the four-week operational period.



The station, operated by members of Radio Amateurs Serving the Olympics (RASO), will be used extensively for public service. CZ2O will provide capability for Olympic athletes, delegates and officials to communicate with their homes via participating amateurs in countries where third-party traffic is permitted. This service will be handled primarily on 15, 20 and 40 meters. Twenty-five hundred cassettes will be available so that those wishing to talk back home may record their messages for transmission during periods of best propagation conditions.

A network of fixed and mobile two-meter stations will provide emergency and back-up communications throughout the Games. This service will give reliable communications to any point within a 75-mile radius of Montreal.

The Organizing Committee of the 1976 Olympic Games will get assistance from RASO during the opening of the Games. As the Olympic flame nears its destination, Montreal, local amateurs will relay the progress of the runner over the 200-km stretch from Ottawa.

The familiar five entwined rings representing world brotherhood as part of the official symbol design for the XXI Olympic Games stress that Olympic ideal at the very core of this undertaking. Undoubtedly, CZ2O will fit right into this ideal. Q&A

*Membership Services Assistant, ARRL

Washington Mailbox

Q. Now that there has been rulemaking action in Docket 20092 allowing Amateur Extra Class licensees to request 1 X 2 calls of their choice, how do I go about applying for such a call?

A. You apply on the usual FCC form 610. Attach a cover note indicating the call sign desired, and include several alternate choices in order of preference. Send the application to FCC, Box 1020, Gettysburg, PA 17325. The filing fee (with renewal) is \$29.

Q. When can I apply for a specific 1 X 2 call?

A. That depends partly on how long you have been licensed and partly on how long you have held an Amateur Extra Class license. If you currently hold a 1 X 2 call, or are eligible for a nonspecific one under the present rules by virtue of having been licensed 25 or more years ago and currently hold an Amateur Extra Class ticket, you may apply for a specific 1 X 2 call beginning July 1, 1976. Effective October 1, 1976, those Amateur Extra Class licensees who obtained that license prior to November 22, 1967, may request a specific 1 X 2 call. Beginning January 1, 1977, Amateur Extra Class licensees who obtained that license before July 2, 1974, may apply. Beginning April 1, 1977, holders of the Amateur Extra Class license who obtained that license before July 1, 1976, may apply; and finally, effective July 1, 1977, any Amateur Extra Class licensee may request a specific 1 X 2 call.

Q. What sort of evidence must I provide

that I did indeed hold an Amateur Extra Class ticket on the required dates?

A. You must provide evidence that can be verified. You may provide an original license, a photocopy of an original license, or a photocopy of a listing from the *Radio Amateur Callbook*. If you submit the latter be sure to include a photocopy of the title page of the publication so it can be verified. Affidavits or sworn statements can not be accepted as they can not be verified.

Q. What if two people apply for the same call sign at about the same time? Who gets the call of his choice?

A. Applications will be processed strictly on a first-come-first-served basis. Be sure to include several alternate choices when you apply to avoid disappointment.

Q. How many 1 X 2 calls can I apply for?

A. Only one to a customer — sorry. This will allow the available supply to fulfill as many requests as possible. (97.51a3-9)

Q. Can I file an application prior to the above effective dates to beat the rush?

A. No. Applications received before the effective dates will be returned.

Q. Didn't Docket 20092 also propose that Amateur Extra Class licensees be allowed to request 1 X 3 calls as well as 1 X 2 calls?

A. Yes, but the FCC did not act on the 1 X 3 portion at this time. Certain data-processing arrangements have to be made before specific 1 X 3 calls can be made available. Since there are fewer 1 X 2 calls, the Commission chose

not to delay action on this part of the docket since the present system could handle the work.

Q. I now have a 1 X 3 call. Can I keep it and also request a 1 X 2 call, or must I give up my 1 X 3 call?

A. While you may apply for only one 1 X 2 call, you may keep your present 1 X 3 call provided that either it or your requested 1 X 2 call is assigned to a secondary station, which must be at a location different than that of your primary station. (97.3i; 97.40c)

Q. I took the Amateur Extra Class exam November 16, 1967, but didn't receive my ticket until a few weeks after November 22, 1967. Can I apply for a 1 X 2 call on October 1, 1976, or do I have to wait until January 1, 1977?

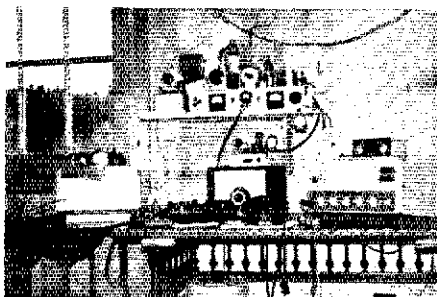
A. The date that counts is the effective date of your Amateur Extra ticket. If the license is dated after November 22, 1967, you must wait until January 1, 1977, to apply, no matter when you actually took the exam.

Q. Suppose I apply for a specific 1 X 2 call, and indicate several alternate choices, but none is available. Will my \$29 be refunded?

A. Yes, in such cases FCC policy is to refund the filing fee. However, when you apply you may state that you will accept, as a last choice, any unassigned 1 X 2 call if none of your specified choices is available. If you don't say this, FCC will return the application with no action.

{Note: Send your FCC questions to Hal Steinman, K1FHN, ARRL, Newington, CT 06111. Questions appearing in this column are typical of those frequently asked of the FCC and other agencies. Answers, prepared at ARRL, have been approved by FCC staff. Interpretations contained herein concur with those of the Amateur and Citizens Division of the FCC. Numbers in parentheses refer to specific sections of the FCC rules.} **QST**

Strays

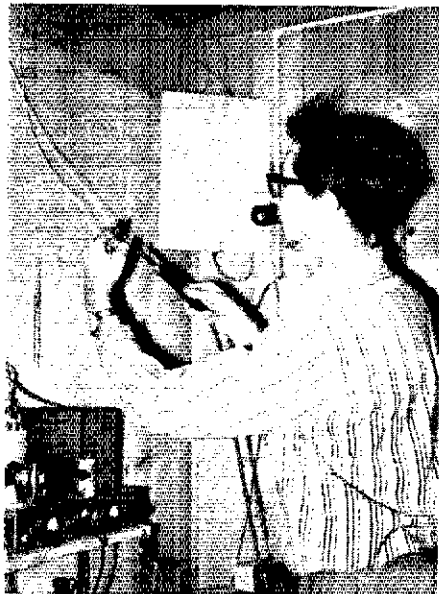


The primary 160-meter "voice" heard from Switzerland is that of HB9CM. Philo has given a new country to many top-band DXers, aiding in that long, difficult climb up the DXCC ladder.

Homemade equipment is used at HB9CM, as can be seen in the accompanying photograph. The transmitter operates from 10 through 160 meters, has an 803 in the PA stage, and runs approximately 220 watts. Philo's station is located at his mountain chalet, some 4000 feet above sea level.

The antenna is a half-wavelength wire, end fed with 800-ohm open-wire transmission line. It is strung between the peak of his chalet and a nearby mountaintop. Philo reports very poor ground conditions at his site — mostly rock and lime deposits, but he has been heard in PY, VK and JA lands.

He puts a fine signal into the USA whenever band conditions are good. The second photograph shows HB9CM soldering his 800-ohm feed line in preparation for some DXing on 160 meters! — *W1CER*



One Year Jump: Ted Karas, WB3ZEA, attained one of his major goals when he passed his Extra Class examination in Washington, DC, on the 19th of March. This culminated a year of study and progress which began when he was licensed as a Novice one year previously. And he's just 13 years old! As such, he may not be the youngest Extra, but surely he is one of a select few.

WB3ZEA operates out of Gaithersburg, MD, on 15- and 40-meters cw on a HW-16 transceiver with a dipole antenna. He has totaled 44 states towards WAS. A member of the Montgomery Amateur Radio Club, Ted also enjoys sports and even finds a moment or two to read a book on ham radio.



RFI Packet Update

Having problems with RFI and don't know whom to contact? Then this supplement might be of assistance.

By Hal Richman,* W4CIZ

If you have sent for the RFI packet, there is a list of addresses for manufacturers of home-entertainment equipment and their policies in dealing with RFI and TVI problems. Here is a supplement that should be appended to that list.

Admiral

RFI complaints are usually handled by the local Admiral dealer service technician. "National service personnel are available to assist the technician when needed. Admiral 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. Admiral provides technicians with various instruction bulletins dealing with rf interference suppression." RFI complaints should be referred to the local Admiral dealer. If front-end overload or cross modulation occurs in areas of extremely high-level transmitter radiation, the National Service Division has suitable traps available at no charge to the customer. Write to the National Service Division, P. O. Box 2845, Bloomington, IL 60701. Attention: Mr. R. E. Gremer.

Akai

Akai products include audio tape recorders, video tape recorders, a-m/fm receivers, speaker systems and related accessory products. Inquiries related to

RFI should be addressed to Akai America, Ltd., Customer Service Department, 2139 E. Del Amo Blvd., Compton, CA 90220. Tel. 213-537-3880. "Upon receipt of these inquiries, we will investigate the situation and, to our utmost, try to resolve the customer's problems."

Altec Lansing

Customer RFI problems are referred to the authorized Altec warranty stations located nationwide and denoted by an information card furnished with each piece of equipment. Unusual situations are, at the option of the warranty station, referred to Altec Customer Service, 1515 W. Katella Avenue, Anaheim, CA 92803. Tel. 714-774-2900 or to the Engineering Department, Altec Corporation, 1515 S. Manchester Avenue, Anaheim, CA 92803. Attention: Chief Engineer, Electronics.

Capehart Corporation

Capehart Corporation, manufacturer of stereo console phonographs and radios, asks that the customer refer an RFI problem in their product to Mr. Elliott S. Scheff, General Manager, Capehart Corporation, 5th Street, Norwich, CT 06360. Tel. 203-886-0111.

Curtis Mathes

Curtis Mathes products include color TVs and stereos (100-percent solid-state) in portable, console and combination configurations. Customer complaints involving RFI should first be resolved at the retail-dealer level. If not satisfied, then the complaint should be

made in writing to the Consumer Relations Department giving all details of the problem, along with the model info, serial number, date of sale, dealer and service history. Each complaint will be handled individually. Write to Curtis Mathes Manufacturing Company, P. O. Box 151, Athens, TX 75751. Attention: Mr. Larry Putnam, National Service Manager. Tel. 214-675-2294.

Heath Schlumberger

Heath Company suggests that, for fastest service on matters related to RFI regardless of the product line involved, customers may now reach the Technical Consultation Department by either writing directly to that department, Heath Company, Benton Harbor, MI 49022, or by using a new direct-line telephone system to the department, 616-982-3302. Do not write to an individual.

J. C. Penney

J. C. Penney Company asks that customers with RFI problems contact their nearest J. C. Penney store for personal assistance. J. C. Penney Company, Inc., 1301 Avenue of the Americas, New York, NY 10019.

MGA Mitsubishi Electric Corporation

Melco Sales, Inc., is the sales and service representative for the Mitsubishi Electric Corporation. RFI reports from the field, beyond the dealer's capability to resolve, in which Melco Sales becomes involved, are handled on an individual basis. "All attempts will

*ARRL RFI Task Group, 3908 Lake Blvd., Annandale, VA 22003

made to give customer satisfaction." Melco Sales suggests that requests for assistance be addressed to Melco Sales, Inc., 3030 East Victoria Street, Compton, CA 90221, or the Service Department may be contacted by telephone on a toll-free number - 800-421-1132. Mr. Chuck Trout is the National Service Manager.

Midland

Midland asks that, should any RFI problems be encountered with their portable black-and-white and color TVs, individuals contact Midland International Corporation, Mr. Gene Pipes, General Service Manager, P. O. Box 1903, Kansas City, MO 64141. Tel. 816-842-5922.

Panasonic Company

When instances of RFI occur, the customer should contact Panasonic at the following address: Panasonic Company, Div. of Matsushita Electric Corp. of America, 50 Meadowlands Parkway, Secaucus, NJ 07094. Attention: Mr. Warren Oppenheimer. Tel. 201-348-7000. Customer should provide model number, serial number and information concerning the problem. Upon review of the problem, the customer will be contacted and advised where to return the unit for corrective repair. "Panasonic will absorb both parts and labor costs in these instances."

RCA Consumer Electronics

RFI problems involving both television and audio products may be referred to Mr. H. L. Carter, 1-455, RCA

Consumer Electronics, 600 N. Sherman Drive, Indianapolis, IN 46201. Tel. 317-635-9000, extension 4255. Requests for filters should include model number and serial number of the RCA television receiver. Filter installation charges will be the customer's responsibility.

Rodgers Organ Company

RFI problems involving the Rodgers Organ may be referred to Mr. Dale T. Justice, Custom Organ Test Department, 1300 N. East 25th Ave., Hillsboro, OR 97223. Tel. 503-648-4181.

Sansui Electronics Corporation

RFI problems should be directed to Mr. Gerald M. LeBow, Vice President, 201 Communications Inc., 201 East 42nd St., New York, NY 10017. Tel. 212-867-3325. 201 Communications Inc. is the advertising and public relations agency representing Sansui. Mr. LeBow will direct the customer to an appropriate Sansui Service Center. Mr. LeBow states that all Sansui products are carefully checked prior to final engineering commitments for susceptibility to RFI. "Units are often taken to high rf-level areas such as New York City to determine any design flaws."

Sanyo Electric, Inc.

In the event an RFI problem should occur, the customer is requested to take the set to the nearest Sanyo Authorized Repair Station. Transportation to and from the shop is the responsibility of the customer. Should the shop not alleviate the problem, either the custom-

er or the shop should contact Mr. Thomas R. Smith, Field Service Manager, Sanyo Electric, Inc., Electronics Division, 1200 W. Artesia Blvd., Compton, CA 90220. Tel. 213-537-5830.

Scientific Audio Electronics, Inc.

Refer RFI inquiries to Mr. Michael L. Joseph, National Marketing Manager, P. O. Box 60271 Terminal Annex, Los Angeles, CA 90060. Tel. 213-489-7600.

Tenna Corporation

Tenna Corporation has not produced home-entertainment equipment within the past two years, but will be glad to help out all past customers if a problem arises with RFI. They will install circuit change at no cost, except postage and handling. All unique RFI problems may be referred to Mr. Tom Beuck, National Service Manager, Tenna Corporation, 19201 Cranwood Parkway, Cleveland, OH 44128. Tel. 216-475-1400.

Toshiba

Customers should contact the nearest regional office for obtaining assistance in resolving RFI problems involving Toshiba televisions, radios, tape products, amplifiers, tuners and receivers. Eastern Regional Office, Mr. Terry Hogan, Field Service Manager, 41-06 Delong Street, Flushing, NY 11355. Tel. 212-939-7400. Western Regional Office, Mr. S. Ito, Regional Service Manager, 19515 S. Vermont Ave., Torrance, CA 90502. Southwest Regional Office, Mr. Tom Underwood, Regional Service Manager, 3225 E. Carpenter Freeway, Irving, TX 75062.

QST

Strays

STOLEN EQUIPMENT

□ Standard SR-C826 MA Serial No. 303053. Call sign engraved on back. Bruce W. Wiley, WB5GZT, 1733 Filmore St., Morgan City LA 70380.

□ Heath HW 202, Series 00316 transceiver stolen from Dick Ellis, W5YCK, 104 West Avenue A, Alpine, TX 79830.

□ Stolen from car: FM 27B has social security no. 410 30 6102 engraved on side and back. Allen Eskind, W4ZLW, 6104 Hickory Valley Rd., Nashville, TN 37205.

□ Taken from our booth at Dayton Hamfest: Genave GTX-IT hand-held transceiver, Serial No. 13-07. Claude L. Henderson, General Aviation Electronics, 4141 Kingman Drive, Indianapolis, IN 46226.

□ Drake TR22, Serial No. 640995, stolen from car on April 8 in Kansas City. Richard A. Witt, KØIDJ, 16413 East 40th St., Independence, MO 64055.

□ Taken from car on April 11, Drake TR 4C, Serial No. 37949. Laurel T. Short, WA9RDL, 3219 Inwood Drive, Fort Wayne, IN 46805.

□ Regency HR-2, Serial No. 04-02604 and Nicad battery pack, Serial No. 7157 stolen from car on March 31 in Arlington, VA. A. D. Abercrombie, W2GJS, 1002 Merrymount N., Turnersville, NJ 08012.

□ Atlas 210X XCVR, Serial No. TH3214 and Lafayette HA-146 XCVR, Serial No. 1111. Les Goddard, WB6URL, 2121 Clark Lane, Redondo Beach, CA 90278.

□ Stolen in Belleville, IL, Drake TR-72, Serial No. 640966. Dennis R. Mueller, WB9EBU - WBØRJP, 319 N. Frederick, Apt. 301, Cape Girardeau, MO 63701.

□ Kenwood TS 520, Serial No. 140579 and ICOM 230, Serial No. 2405651, both engraved WA7WDC. G. M. Chinn, WA7WDC, 906 E. Broadway, Phoenix, AZ 85040.

□ Taken from automobile: TR 22C, Serial No. 850476, on February 20, in Bethesda, MD. David A. Gantz, WA4KSG/K8DOZ, 6227 Loch Raven Drive, McLean, VA 22101.

□ Regency HR-2, Serial No. 03-01388 taken from automobile in San Rafael, CA, on March 3, 1976. Carl Eyman, Jr., WB9EUS, N56 W27616 Hwy. K, Sussex, WI 53089.

QRP— Mountaineering Style

QRP plus the great outdoors —
a therapeutic adventure/pastime!

By Richard A. Simpson,* W6JTH and C. John Grebenkemper,** WA6VBA

A boom in outdoor activities, such as backpacking and mountain climbing, has opened a new world for the radio amateur. *QST*¹ has shown the possibilities of portable commercial gear in the QRP range. Others^{2,3} have recounted the experiences of persons who took amateur equipment to remote locations. This article synthesizes a QRP DXpedi-

¹ This and subsequent footnotes will appear on page 57.

*2339 Santa Catalina, Palo Alto, CA 94303
**Box 8809, Stanford, CA 94305



Beginning the ascent of Mt. Shasta. Long pole was used later for supporting dipoles. Shovel and ice axe (carried in hand) are necessary for wintry terrain.

tion from a number of previous experiences.

The authors have, over the past three years, taken amateur equipment into the field more than 20 times in four western states. Included among these operations were jaunts to the highest points in California and Nevada and a week-long backpacking trip through the interior of the Grand Canyon. Several car camping trips, where no packing of the equipment was required, have also added to the store of knowledge. Conditions encountered have ranged from desert heat to winter cold; two trips were done entirely on skis. In each case the common denominator has been remoteness from civilization and its attendant comforts.

Despite Rain, Snow, Sleet and Hail . . .

In any trip where participants must carry all the equipment, lightness of weight is extremely important. Commonly available backpacking equipment makes choice of major items relatively easy, albeit a bit expensive for the completely committed newcomer. Efficiency — the ability to get along with a minimum number of gadgets — is equally important. A certain amount of hardship — e.g., learning to spread butter with a spoon — is to be expected, but such sacrifices contribute to a lighter load.

Food, shelter, and clothing are the basic ingredients for any outdoor trip. Freeze-dried or dehydrated varieties

most easily satisfy the first requirement. A small gasoline stove is very helpful preparing meals and, although it may seem a luxury to some, provides warmth which can be obtained easily.

For trips into hostile environments a tarp, or preferably a tent, is required. Lightweight mountaineering tents serve admirably for this purpose. Shelter must be sufficient to protect the inhabitant from almost every conceivable type weather condition. After making generous allowances for Murphy's Law, one can consider a tarp adequate only when there will be no precipitation or wind. Even in the best weather, one will discover that the enclosure of a tent provides a great deal of extra warmth during periods of physical inactivity, namely, operating. A good sleeping bag which may be used during those inactive daytime periods as well as at night, is also essential.

The same guidelines that apply to reasonable and impossible conditions should be anticipated — apply to choice of clothing. Garments which can be peeled off or put on in layers are preferred over items which are heavy and warm, but will not be adjustable to the temperature changes. Rain gear and, if snow is possible, winter clothing, must also be brought.

Once out of the house and on the trail, one is free to worry about the revenge Mother Nature will plot for bold an intrusion on her wilderness. At high altitudes one must be alert to

symptoms of hypoxia (oxygen deficiency) and mountain sickness. Hypothermia (exposure), heat exhaustion and sunburn are typical of a wide range of debilities which may strike at any elevation. Among environmental catastrophes the more exciting possibilities include wasp attacks, avalanches, and lightning storms. A beginner who takes modest steps in incrementing his trip difficulties can become acquainted with these through experience. Contacting a local hiking or outdoor club to obtain initial guidance is highly recommended for those in a starting situation, however.

The Ham and His Portable Radio Station

In summer under optimum conditions, one may satisfy the survival requirements and still have a pack weight of no more than 25 pounds. At other times of the year, or under less than ideal conditions, pack weights of 60 pounds may be required for safety and comfort. On top of this is added the radio equipment.

Our experience has been with the Heath HW-7 and a 3-watt transceiver made from modules manufactured several years ago by Ten Tec. Generally, only one transceiver has been carried, but with the addition of auxiliary equipment such as headphones, a key, batteries, antennas, the logbook, and notepaper, the station package usually weighs an additional ten pounds. There is some flexibility in what will be carried. We have experimented in only three of the component areas, however.

First is the power source. A three ampere-hour lead gel rechargeable battery has proven most satisfactory for our backpacking operations. A single charge supplies enough power to run the transceiver through a Field Day weekend or intermittently during a one-week trip such as that through the Grand Canyon. The battery weighs close to three pounds. In terms of reliability, capacity and economy, it has been more satisfactory than the lantern batteries used in earlier expeditions. Lighter weight cells have appeared in recent years but are not at prices we would call attractive.

The second item over which the operator has some control is the antenna. Our experience has been on the bands 80 through 15 meters and, as a result, most of our antennas have been variations on the dipole. Attempts at untangling a ZL-Special, made from string and twin-lead, in a high wind at 13,000 feet were so discouraging that we have been deterred from trying other antennas of that complexity. By using wire sizes of No. 20 in the dipoles, we have been able to make lightweight antennas while retaining physical strength. Our most successful design

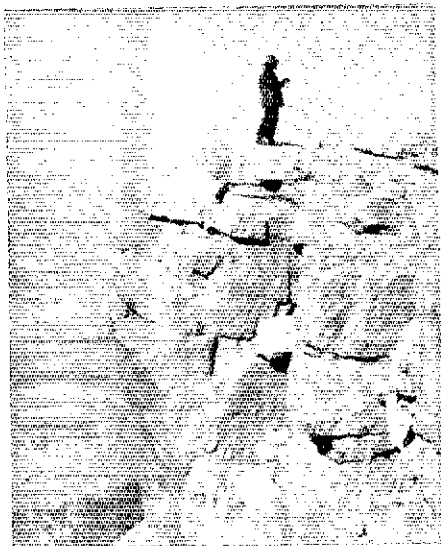


Descent (near top of Mt. Shasta) illustrating proper ice-axe technique. In case of a fall the head of the axe is forced into the snow to arrest the downhill slide.

used a coax connector at the feed point (often used as a physical support point) and a 50-foot detachable length of RG-59/U as the line. Several dipoles can be made up beforehand and strung at the operating site. A change in bands requires only that the coax be moved from one feed point to another (admittedly, under blizzard conditions, this arrangement has been judged mildly inconvenient). A second antenna, which is a half-wavelength 40-meter dipole, fed in parallel with a half-wavelength 20-meter dipole, has also worked well. The 40-meter elements function as a 1-1/2

wavelength dipole on 15 meters. The four arms of the antenna provide a stable support for the feed if the 40- and 20-meter sections are arrayed perpendicularly. A trap dipole has also shown promise during limited tests.

Fixed-wire beams have possibilities in portable operation but, in general QRP work, it is difficult to justify while restricting one's self to a particular compass direction. Further, the requirement that wires be parallel is often hard to meet in an environment where trees and rocks are spaced randomly. Beams made from self-supporting elements are

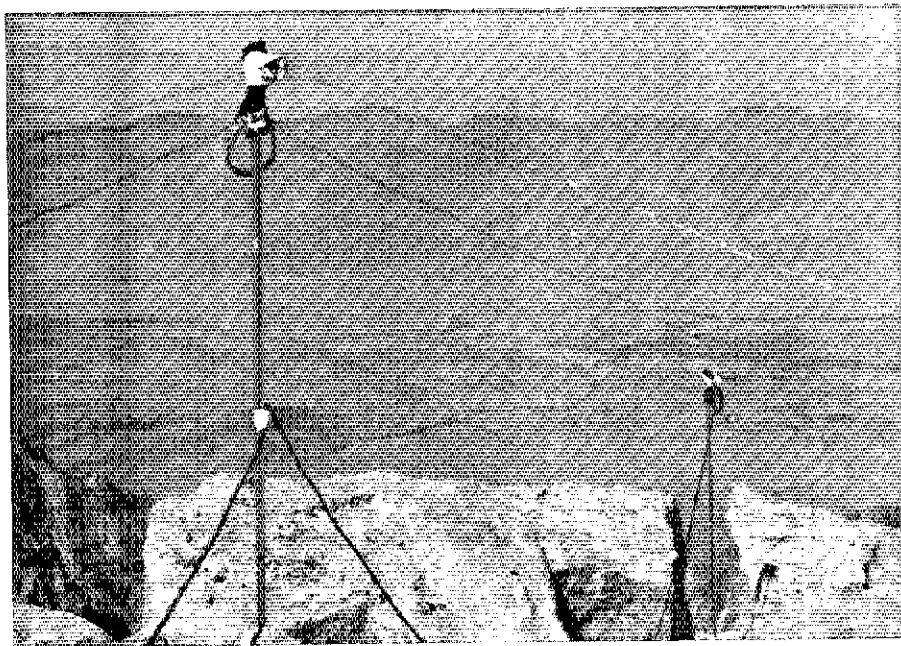


Adjusting tension on the 40-meter dipole at the top of Mt. Langley. Drop to the left is about 2000 feet. Owens Valley, some 10,000 feet below, is in the background.

awkward to carry and, of course, add to the weight.

The third part of the station for which some choice exists is the transceiver. This is the point at which taste enters strongly. Decisions, as to desirable bands and modes and how much power is to run, are sometimes difficult. When we began, cw was the most

Dipoles anchored to ski poles at the summit of Mt. Langley. Owens Valley in the background. Single piece of coax (taped to the pole in the foreground) is switched among feed points when bands are changed.



practical mode, and 3 watts was the maximum power available in an easily carried package. Single-sideband QRP is now a possibility, while hand-held walkie talkies have been used in vhf mountaintopping for years.

Complexity of the transceiver must be played off against its power requirements. For example, the HW-7 averages 40 mA during receive and 400 mA during key-down transmit. In a worst-case situation of equal receiving and transmitting times, the expected 400-mA versus 40-mA times would fall as one to three, and average battery drain would be 130 mA. A 3-ampere-hour battery would just last 24 hours under this load. An ssb transceiver, however, would be expected to draw significantly more current because of the added circuitry and would necessitate carrying a larger (heavier) battery or planning less operating time. The authors lean toward a 5- to 10-watt cw rig for 80-15 meters. Under Field Day conditions it should last 15 hours on the 3-ampere-hour battery. No such unit is commercially available, however.

Get on the Air

Once questions of survival and hardware have been disposed of, the choices to be made in the field can be faced. We will limit this discussion to frequencies, times, and site locations.

Our enthusiasm is biased strongly by past success. Whereas previous mini-



Properly equipped ham mountaineer. Headphones around neck and key secured under the belt. Skis and rope ready for use where required. Remainder of station and support equipment are carried in the backpack.

DXpeditions have done very well on 20 meters,¹ our efforts on that band have been sadly unproductive. We have found 40 meters to be a much more responsive band for QRP, especially in contest situations. Success on 15 has been marginal but has improved with the addition of incremental tuning.⁴ Little time has been invested in studying 80, but that band shows promise. Activity on 30 along the West Coast is at a much lower level than in the east, and the addition of 33 feet of wire to each end of the 40-meter dipole could be a minor difficulty.

Our experience with QRP indicates that periods of short skip and good band stability are best for making contacts. That is, during the day QSOs are more easily obtained than during the night. Sunrise and sunset are compromised times when perseverance may pay off with contacts at moderate distances. Under Field Day conditions contacts to a thousand miles have been possible shortly after sunrise on 40, and we have worked the East Coast, Alaska, and Hawaii on 15 and 20 in late afternoon.

While most of our trips have been amongst and to the top of high mountains, the 1974 expedition into the Grand Canyon offered a very striking contrast in operating conditions. The canyon is as much as a mile deep in places. Our route took us through several side canyons and across

Esplanade, an interior plateau. On the Esplanade we were not bothered by nearby obstacles, but at other times we were boxed in by canyon walls rising 2000 vertical feet or more from points only a few hundred feet to either side of our operating position. At every location, however, we were able to make contacts on 40 meters. During a week of travel we logged over 20 QSOs from Texas to Montana and west, or an average of about one per hour of on-the-air time. In one side canyon, Deer Creek, we scheduled a morning with no hiking activities and operated the radio instead. From this spot we found a virtual pipeline into the Los Angeles/San Diego area and made ten contacts in a row without an unsuccessful call. Our failure to *hear* signals, let alone work anyone, on 15 or 20 must be attributed to a combination of screening by canyon walls and poor propagation conditions on the higher bands at this time.

The *casual* camper may be able to find trees and rocks ideally placed for antenna supports. In making his operation more leisurely he has, however, usually sacrificed elevation for convenience and comfort. In many cases we have done the same and have sometimes found convenient and comfortable locations to be very good radio sites. But our goal has usually been the more bizarre. At those sites there often are no trees and rocks suitable for anything but obstacle courses. Adapting to this environment often reduces to making sure the antenna wires are approximately straight and draped over some of the higher boulders — a performance standard which has raised the eyebrows of more than one low-land ham. On Mt. Whitney, the center point of the dipole was no more than 12 inches above mean ground level for Field Day 1973.⁵ The next year we carried two poles to the top of Mt. Shasta to raise feed points as

much as 8 feet above the snow-covered surface.⁶ Without comparison studies, it is impossible to tell what effect the low antenna heights had on the radiation patterns.

Height of the operating site *does* make a difference. At vhf, and to a lesser extent at hf, the 150 mile line-of-sight from a 14,000-foot peak may be important. Mt. Shasta is very singular in this respect, standing well above the surrounding terrain. Most high mountains are formed in ranges, and line-of-sight advantages in some directions may be lost to screening by neighboring peaks or ridges. In most cases, however, increased elevation after a certain point does very little for one's radio operating success. Thus our exploits in conquering 14,000-foot peaks for Field Day must be justified on grounds other than getting closer to the ionosphere. This is the point at which aesthetics enter; those who have spent time in the wilderness, or in climbing, or just viewing spectacular scenery, are likely to understand this point most easily. The satisfaction in reaching the top of a mountain is a reward in itself quite independent of whether there is an antenna in the pack.

For those who look toward this activity purely from a contester's point of view, we should note that locations with respect to population centers may be equally as important as elevation. Our choice of Mt. Shasta in northern California for 1974 Field Day brought us within easy reach of Portland and Seattle stations and is probably in part the reason for our slightly better success that year. Ms. Whitney and Langley in the southern Sierra Nevada gave us only the Los Angeles and San Francisco high density areas on daytime 40 cw, both of which had also been accessible from Mt. Shasta.

... and Enjoy It!!

Mountaineering with ham-radio gear is not recommended for those who are easily upset by exercise, poor weather, strange food, or frustration. For those with little experience, a knapsack trip to a nearby park, or a drive to an area hill, with a small transceiver, battery, and easily erected antenna, will provide a taste of the sport. This can also be a test of operating skills without requiring a Herculean effort, and at the same time will give the equipment a durability test. If this is satisfying, the next suggestion would be to take up weekend backpacking, becoming familiar with the equipment and requirements for overnight in the woods. If this can also be entered in the ledger positively, addition of the radio equipment is next, followed by a gradual advance in making trips more adventurous. The final test is to haul the whole business to the top of a mountain, have a good time with the



HW-7 operation at the top of Mt. Langley (1975). Tent to the left. Dipoles supported by ski pole anchored in summit cairn in background.

radio, and enjoy the scenery.

In conclusion, we offer a few words of caution to those who may have been inspired. First, conditioning and preparation cannot be overemphasized — wilderness can be very hostile and help is *not* easily or quickly obtained with even a radio. Second, in addition to being hostile, wilderness can also be very fragile; behave as a polite visitor and follow the general guidelines of taking only pictures and leaving only footprints. Third, others visit wilderness to escape radio, television, and other people. Be discreet and as unobtrusive as possible in the camping and radio aspects of any trip. Others will thank you for it, and you'll probably have a better time.

We don't expect to see great numbers of mountaineering hams in the future, but there are probably a few who have mastered the fundamentals already, and will be along shortly. For the others, the opportunities are there, and we won't be surprised to see them before long.

QST

References

- ¹ DeMaw, "The QRP Challenge -- Barbados Style," *QST* for July, 1973, and DeMaw, "QRP Shakedown, Camaman Style," *QST* for March, 1975.
- ² Mattox, "QRPP and the Backpacker," *The Milliwatt*, August, 1972.
- ³ Weiss, "QRPP Low-Low Power Operating," *CQ* November, 1974.
- ⁴ Grebenkemper, "RIT for the HW-7," *QST* for July, 1975.
- ⁵ *QST* for November, 1973, cover.
- ⁶ *QST* for November, 1974, p. 62.



W6JTH and WA6VBA en route to summit of Mt. Langley (background) for Field Day 1975.

A Beginner's Guide to Traffic Handling

Has the Decibel Honor Roll lost its challenge? Is the thrill gone from Zip Code hunting? Then try something new!

By Robert W. Myers,* WA2JZX

Have you ever had a message to send to someone? Perhaps to change an on-the-air schedule with a fellow ham, or to send a birthday greeting to a friend or relative? Maybe you would like to congratulate someone who lives some distance away on an accomplishment, or tell a loved one that you arrived safely after a trip?

There are several ways of doing so, mail, telephone or telegram, but have you ever thought of using your ham station? No, not a "phone-patch"; that would involve contacting a station at the right time and place, which can be as elusive as working rare DX. Well, there is another method: Traffic Nets! Now, before I lose half my readers, traffic nets are not as mysterious or hard-to-fathom as you might think.

To initiate a piece of traffic we have to know how to make up a radiogram in ARRL form, find a net to put it in, and know the procedure used in the net. All of this seems like a monumental task to the non-traffic handler, but I assure you that it's fairly simple.

There are several different types of nets around, affiliated with the National Traffic System, which is a network of nets that meet daily and will get your message to its final destination. The type of net we are looking for is either a local or section net, affiliated with the NTS.

Local nets are usually "Amateur Radio Emergency Corps" (AREC) phone nets, operating on vhf or 10 meters, and meeting once a week or more. These nets serve a local area, village, town or county, for the prime purpose of emergency preparedness, but have a liaison with the NTS. Section

nets can be found on 75 or 80 meters with little exception; some are ssb and others are cw. Of course, there are traffic nets on all bands that meet at various times, and information on which nets serve your area and where and when they meet can be found in the "ARRL Net Directory," which is obtainable for an s.a.s.e. from ARRL Headquarters. Once you have a copy of the directory, simply look up the NTS nets that serve your area.

When you request the directory also ask for a copy of Operating Aid 9 and CD Form 3 which will give you the standard format for ARRL radiograms. The message composition follows a standard form which has been devised over the years to promote accuracy. After all, if the message is not conveyed accurately it is worthless. Operating Aid 9 will give you the proper message form and a basic explanation of its use. CD Form 3, "ARRL numbered radiograms," lists most of the commonly used message texts. If your message fits one listed on the form, you can use it to save time. Instructions for their use are found on Form 3.

Now assuming that we have located a net through the net directory and we have composed a radiogram, the only thing left to do is to check into a net. At this point many people get scared off because the net operates in a way that perhaps seems strange at first. Don't be afraid; remember, it's only a hobby! If you are checking into a phone net, wait until the net control station calls for check-ins then call in listing your traffic. Tell him your location and how many messages (radiograms) you have and their destination. Don't be afraid to tell him that this is your first time in a traffic net. You will get plenty of help.

Cw nets operate basically the same

as phone nets, but rely on Q signals for brevity. You will find that the Q signals listed on the reverse side of Operating Aid 9 will take most of the mystery out of what is going on. If your code speed is slow, look for a slow-speed net in the directory. These usually operate in the Novice bands, but everyone is welcome to check in. If you check into a net using a lower speed than the net is operating at, the net control station will slow down to your sending speed; not, ask him to QRS. Most NCSs will bend over backwards to accommodate a new station. Above all, don't worry about making a mistake! As the cliché goes, "If you never do anything you will never make a mistake." Listening to the net before checking in will familiarize you with the basic procedure.

Detailed information on net procedure, as well as basic traffic handling can be found in the *Public Service Communications Manual, Operating a Amateur Radio Station* and the *Radiogram Amateur's Operating Manual*, all available from ARRL Hq. The first two are obtainable for only an s.a.s.e.

Once you familiarize yourself with traffic handling, you will find that it is not as hard or mysterious as it seems at first. You will find a new facet of ham radio that is both useful and interesting. Most important, you will become familiar with traffic-handling procedure, which during an emergency is our biggest asset. If we amateurs are to survive as a service, we must remain unique and invaluable. "Short-Haul" communicators abound in today's world but people who can send a message around the corner or around the world with speed and accuracy in an emergency situation are certainly "unique and invaluable."

*317 Kensington Court, Copiague, NY 11726

Radio Boys Revisited

The nostalgia surge dredges up yesteryear's wireless memories — plus some additional gems.

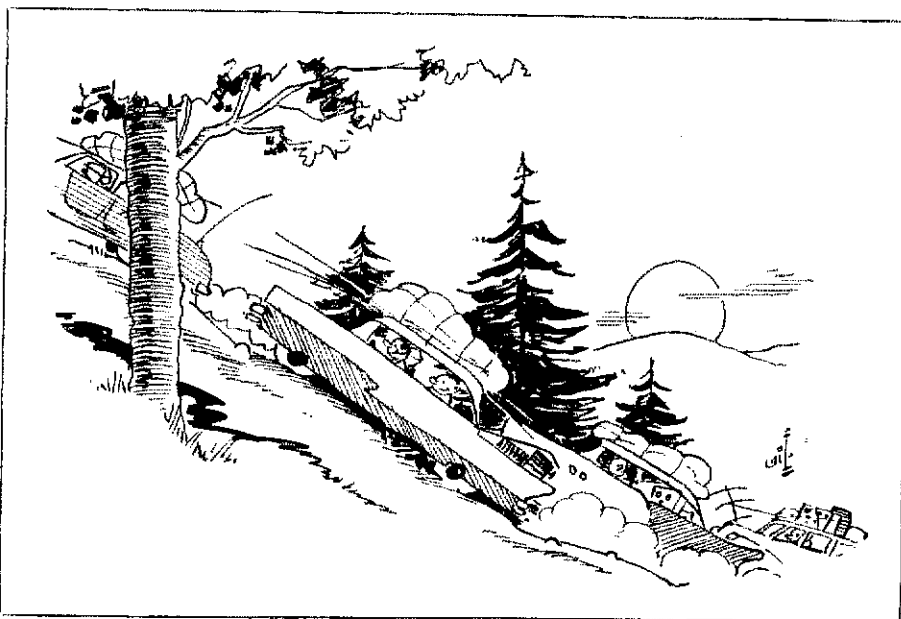
By J. J. McGrath,* W2IOJ

It has been remarked that nostalgia is the remembering of only the pleasant things in the past, while history records both the good and the bad. The number of antique radio collectors fascinated by early radio fiction of the teens and twenties is mushrooming. For the budding radio enthusiasts of that era the most popular juvenile books were the *Radio Boys* series. Yet the number of rival authors gives us an insight into the many competitors for yesteryear's wireless fiction fan.

The earliest entry seems to be the *Wireless Telegraph Boy* written by John Trowbridge and published in October, 1908. Then Victor Appleton's famous *Tom Swift* series had a volume devoted to Tom's wireless feats. Author Allen Chapman's four radio boys started his series off with *The Radio Boys' First Wireless; or, Winning the Ferberton Prize*. Another book series, *The Radio-Phone Boys*, featured a pair of boy radio operators, Curley Carson and his friend, Joe. Author James Craig joined radio, mystery and romance in his 1922 adventure stories. The three heroes of writer Gerald Breckenridge's *Radio Boys* were sons of wealthy parents and thus could afford travel and adventure in faraway places, while enjoying the wonders of the wireless. A bonus of this series was construction plans for building "a small, cheap set which almost any lad handy at mechanics can build." Still

another series authored by J. W. Duffield tells what perils and adventures his four radio boys had faced in common, and how many times they had been within a hair's breadth of death. How they served their government in tracking and delivering up to justice a band of cunning and desperate criminals is fully told in the first book of this series entitled, *Radio Boys in the Secret Service; or, Running Down the Counterfeiters*. While on the subject of things counterfeit, consider still another radio

boys' adventure written by Frank Honeywell and entitled (so help me) *Radio Boys in the Secret Service; or, Cast Away on an Iceberg*. Last and probably least known is a pair of books called *The Boy Inventors' Wireless Triumph* and *The Boy Inventors' Radio Telephone*. In retrospect, it is difficult to determine which of the many similar series are THE ORIGINAL Radio Boys. But the heyday of the 1920s generated an all-pervading interest in the then-new marvel — radio.



*2 Centerview Lane, West Seneca, NY 14224



Beware of overloading

Books for adolescents were a popular pastime so it was a logical sequence that many authors would create adventure stories around the theme of boy chums getting to know and to use the wireless radio-telephone.

The nostalgia wave of the 1970s has

rekindled interest in finding and reading these original books. Less than a year ago, I became interested in collecting these stories and was surprised how many can be located once one begins searching. A recent neighborhood garage sale netted a faded but still very readable copy of the James Craig series. An almost mint copy of Breckenridge's *Radio Boys* was bought from a flea-market book dealer for \$2. This book has its original dust cover showing drawings of a Radiola III and what appears to be a Kennedy 220 regenerative receiver. I have turned up a few *Radio Boys'* novels in the book section of our local Goodwill salvage store. The attic of a friend yielded a pair of books that had been stored in a cardboard box for decades. Just last week a most interesting acquisition came about while I was sitting in my living room watching our educational TV channel. It was their annual fund-raising auction and, among

the various items for home bidding were four of Allen Chapman's *Radio Boys* volumes, two of which still had their "colored wrappers." After telephoning in a bid, I watched the auction board which displayed a higher bid. After a little give-and-take bidding, I was pleased to hear my name mentioned as the successful bidder at \$16. I have also bought and sold books at hamfests and traded duplicates with other collectors. So those of you who would like to relive those thrilling adventures of yesteryear, find a flea market or garage sale and start looking.

As a postscript, in my book and magazine searching, I found an extremely rare item of which only 670 original copies were made. A genuine first edition, the very first issue of *QST*, Vol. Number 1, from December, 1915. I often return to that same flea market but I suspect I won't ever find something as outstanding as that. QST

Strays



Two-time Winner: Ron Hough, VE7HR, of Victoria, BC, accepts the "Ham of the Year" award for 1975 from Floyd Beardsell, VE7HI, president of B.C.A.R.A. and Alan Muir, VE7BEU, president of the Victoria Shortwave Club. Having previously received the B.C.A.R.A. award in 1958, he becomes the first to have been presented the award twice. A licensed operator since 1929, Ron recently retired as ARRL QSL manager after 37 years of service to the amateur radio fraternity.

STOLEN EQUIPMENT

□ Motorola two freq. control head, mic and speaker. Jim Best, WA0RZI, 1923 Alpine Dr., Colorado Springs, CO 80907.

□ Taken from automobile: ICOM IC-230, Serial No. 6774. Todd K. Rogers, WB2NMH, 911 Park Avenue, New York, NY 10021.

□ Clegg FM-27B, Serial No. 27043-1649. Dave Metal, W2FTH.

□ Stolen from automobile: Atlas 180 engraved K5BL and 59 79973 TX. B. Walton Romefelt, K5BL, 7241 Lakehurst Avenue, Dallas, TX 75230.

□ Drake TR-4C, Serial No. 37586, stolen from car in Minneapolis, MN. Bruce L. Humphrys, K0GVW, 3915 Golden Valley Road, Golden Valley, MN 55422.

□ Realistic pocket scanner, social security no. 095 42 1177. James R. Einolf, 12149 N. Piney Lane Road, Parker, CO 80134.

□ Genave GTX200, Serial No. 22-03, social security no. 031 28 9354. Gus McKinney, WB0OPR, 807 Holmes Dr., Colorado Springs, CO 80909.

□ Regency HR-2A, Serial No. 04-10422. Don Billings, W0GOH, 2838 N. Prospect St., Colorado Springs, CO 80907.

□ EBC 144 Jr. Serial No. 50108. Dick Sucher, WA0ZLY, 27 Leaming Rd., Colorado Springs, CO 80906.

□ Atlas 180, Serial No. TD1812 and Drake TR72 — Serial No. 720930. Ivars Lauzums, Pine Tree Blvd., Court N. Apt. 3-C, Old Bridge, NJ 08857.

□ SB 144, Serial No. 460483, Engraved on sides with social security no. 028 28 5454, CT driver's license no. 091355907 and call W1YO. Art Lake, W1YO.

□ Regency HR-2, Serial No. unknown. Dwane Barber, WA0WWO, RFD 3, Box 353, Greeley, CO 80631.



Austrian military hams Karl Kneidinger, OE5CA (foreground) and Joe Schatzberger, OE2SJL, operate the Olympic Special Station OE7XB1 from Innsbruck, earlier this year.

□ Olympic Special Station OE7XB1 worked from Innsbruck, earlier this year, reports poor conditions due mainly to its location, the lowest point of the Tyrolian valley which is shielded against the whole North American continent by high mountains. Gear for the station was operated by Josef Loewl, OE7JLI, Karl Kneidinger, OE5CA and Joe Schatzberger, OE2SJL, on a round-the-clock schedule and on all short-wave bands. Despite difficult conditions, over 190 stations spread over 113 call areas were contacted. Col. Joe Buketits, OE2BS, of the Austrian Military Radio Section, fathered that mission.

Two FM — A Moving Experience

Along with his toothbrush, the traveling ham needs 2-meter fm. To alleviate road fatigue it beats face-slapping, singing, or coffee.

By Daniel T. Davis,* K3DSQ/4

Over the years various products have earned the sobriquet "Traveler's Companion," from chic luggage to stainless steel thermosware to those risqué novels published in Paris and banned in the U.S. and United Kingdom. But progress is progress, and to the list the smart ham traveler today adds two-meter fm — the best companion of them all.

Almost a year ago when I was contemplating a return to active amateur operating after a two-year QRT, a friend began describing the joys and advantages of fm-repeater operations. His litany included a number of items, but the one really catching my attention was the relationship between two fm and the traveling ham. Almost 5,000 miles and some 30 repeaters later, I've learned a great deal about the machines and the amateurs who use them, and the results are rather interesting.

Being in the military, I travel extensively — both for business and pleasure — so anything that can make driving along seemingly endless stretches of interstate a little less fatiguing is automatically going to rank pretty high in my book. But this one aspect, probably the clincher in my case, doesn't overshadow the other favorable features of the system which have been publicized extensively.

After purchasing my rig and crystallizing-up for the local machines, the next step was to decide what other frequencies to add. Perhaps the best advice for anyone planning a trip is to consult the most recent ARRL Repeater Directory to determine what frequencies are in use in the areas through which he'll be traveling. The directory will also

inform you whether the repeater requires tone access, and if so what frequency. But as a point of interest, a glance through the current directory revealed that the "granddaddy" of them all, the most popular two-meter repeater frequency, continues to be 34/94, with about 160 machines using the frequency-pairing. The next twelve most used frequencies, in their order of popularity, are: 16/76 (102); 28/88 (78); 22/82 (70); 19/79 (44); 25/85 (36); 37/97 (34); 07/67 and 13/73 (33); 31/91 (30); 04/64 (28); 01/61 (23); and 10/70 (22).

Naturally, not all parts of the country have repeaters. There are long stretches of a popular interstate in one of the larger states in the Midwest, for example, where one can drive for almost 150 miles and not find a repeater. In areas like this, two-meter fm activity is by necessity limited to simplex operations. Somewhat surprisingly, although 146.52 MHz is termed the National Calling Frequency for the mode and the band, the nationally used simplex frequency appears to be 146.94 MHz — despite efforts to encourage greater use of the former frequency. While it's not a bad idea to carry both frequencies, many rigs are stingy in terms of channel space. If pressed, I'd probably go with 94-direct.

Closely allied to frequency selection is the question of power output. For mobile operations in my local area (where I'm generally not farther away from the machine than four or five miles), I've always been able to hit and hold the repeater with only one watt out. High power, in my case, is a whopping ten watts which I've found to be adequate.

Overall, the traveler can look on two

fm as a three-way insurance policy: Assistance in finding directions, aid in emergencies, and a welcome stimulus to mitigate road fatigue.

I can generally drive from city A to city B with little difficulty, but once I'm within the city limits of my destination and looking for a specific location, it's an entirely different ball game. Who hasn't experienced the nightmare of zipping along an interstate at 55 mph in an endless stream of vehicles only to discover that your exit is a half-mile away and you're five lanes removed from the exit ramp! With a little forethought, you can ask for directions and traffic conditions a couple of miles before you even hit the city limits — via the local repeater.

Concerning the value of repeaters in times of emergencies, the pages of *QST* are filled with examples each month of how tragedies have been averted thanks to the efforts of amateurs who know they can depend on the reliable communications link the machine provides. And it's always a reassuring thought, especially while driving at night, to glance down at the rig and know that help is there when you need it and where you need it.

There are probably few individuals who, while on a long trip, haven't grown drowsy behind the wheel. Over the years I've tried everything to remain alert from slapping my cheeks, to singing aloud, to drinking voluminous amounts of black coffee. About the only tangible results I've had were a crimson face, a severe case of laryngitis, and a frantic need to find a restroom about every 20 minutes. Not anymore, though. Perhaps it's only psychological, but I've found that even a short QSO has a more invigorating effect on my mental alert-

*1700B Ninth St., Langley AFB, VA 23665

ness than all the face-slapping, singing, and coffee-drinking that one can accomplish over a 15- or 20-mile stretch of highway.

But it's not merely enough to sing the praises of the system without reviewing a few of the ground rules which should apply and how they are sometimes disregarded.

One of the more prevalent criticisms of two fm is that the system encourages a spirit of provincialism among the operators who use a particular repeater. Perhaps this is true to some degree; we sometimes become so accustomed to talking to the same group of amateurs day-in and day-out that we unconsciously tend to view new or unfamiliar operators as intruders. On more than one occasion while in a strange area, I've heard quite a bit of activity on the repeater and still been unable to obtain an answer to my monitoring call.

The question of when to respond to a CQ over a repeater is somewhat controversial, but when at home I usually try to respond to an unfamiliar mobile call sign whenever possible as a matter of courtesy — even if it's only to say hello and welcome the amateur to the area. Like everyone else, I've undoubtedly become selective as to which of the familiar call signs I'm going to answer, but the plight of the traveling ham in a strange area arouses in me

strong feelings of empathy which I find hard to ignore.

A second major criticism of repeaters is the allegation that the machines in large cities are monopolized by a select group of operators who have developed the ability to toss a QSO back and forth among themselves faster than a Ping-Pong ball in a Chinese table tennis tournament. In other words, there's just no way someone is going to break into the QSO. I personally feel that this criticism is rather unfair since I've encountered situations in both cities and small towns where I virtually would have needed a hair-trigger push-to-talk button in order to break into the conversation.

But the system is by no means all one-sided, stacked in favor of the traveler. There are a few rules and practices he needs to observe if the system is going to work to everyone's advantage and pleasure.

After the first time I inadvertently brought down a strange repeater, I learned to inquire immediately about the duration of the time-out timer. I'm used to three minutes but, as I embarrassingly discovered, there are, indeed, machines that will come down as quickly as 30 seconds. To spare yourself the special kind of ignominy and chagrin that can come from bringing down a machine, check first about the time-out timer.

Another rule of the road which I've developed concerns breaking into a QSO already in progress. Unless I have a pressing need for immediate assistance I try to keep my finger off the mic button until the QSO has been terminated and only then call one of the stations. In a face-to-face situation we wouldn't think of interrupting a conversation between two strangers just for the sake of adding our own two cents' worth, and I believe that this should hold true for on-the-air behavior as well.

In addition to the above, the general operating practices recommended by the ARRL for repeater users should be strictly adhered to as well: Keep the QSO short, allow for breakers, identify properly, use minimum power, etc. Courtesy is contagious, and courteous operation constitutes the foundation upon which the repeater concept is built.

In summary, two fm may not necessarily be the greatest invention since sliced bread, but with ever-increasing popularity you can pretty well be assured that repeaters (low band, high band and uhf) are going to become more and more numerous. As I indicated above, there are many features which make the repeater system particularly attractive, certainly not the least of which is the role it plays as the traveling companion. QST

Strays



I would like to get in touch with . . .

- other hams who are "rock-hounds" (those interested in the lapidary hobby). Emrend Bude, 12830 West Cold Springs Rd., New Berlin, WI 53151.
- collectors of Israeli stamps. Shaun Breidbart, WB2STZ, 132 Madison, Scarsdale, NY 10583.
- amateurs with indoor antennas in high-rises. Marty Waxman, WA2TUV, 1601-28 Third Ave., New York, NY 10028.
- hams active in SSTV who are also involved with instruction at the college or university level regarding a grant received by WA6WJV for the study of possible uses of SSTV in education. Phillip Cleveland, Asst. Prof. of Theatre, California State University, Fullerton, CA 92634.
- those interested in setting up a sked for chess. Terry Wright, WB8UPO, 525 South Downing St., Piqua, OH 45356.
- hams who are also spelunkers. Dennis Hevener, WB4AZY, Rte. 2, Box 286, Farmville, VA 23901.

- anyone using the W3FFG SSTV video converter. Mike Berlin, WB2FIG, 5221 Av-I, Brooklyn, NY 11230.
- any KL7 station interested in setting up a sked for WAS. Robert Nemeth, WN9RMG, 1017 Wellman Ave., Montgomery, IL 60538.

Certificates Available

- The Cherryland Amateur Radio Club will award a certificate to any amateur station that works club station WB8VKB, uses club repeater WR8AEN, or works five Cherryland Radio Club members. Members will operate WB8VKB all day, every day, during the National Cherry Festival, July 4 to July 10. To receive your certificate, simply confirm your QSO with your QSL card, along with a stamped legal-sized envelope, and enclose fifty cents to W8GI, Kingsley, MI 49649.
- Five QSL cards from members of Saginaw Valley Amateur Radio Association along with one dollar to cover printing and mailing costs will bring a Bicentennial certificate your way. The

cards will be returned with the certificate. Any band or mode will count. Contacts must be made during the year 1976. Contact Secretary of SVAR, WB8KFU, 2115 West Sloan, Burt, IA 48417.

- The 1976 annual August QRP Contest, sponsored by QRP Amateur Radio Club International, Inc., starts 2000 UTC, Saturday, August 21 and concludes 0200 UTC, Monday, August 23. Certificates will be awarded to highest scoring station in each state. One certificate will go to the station showing the "skip" contacts using the lowest power. For more info write E. V. Sandy Blair, W5TVW, 417 Ridgewood Drive, Metairie, LA 70001.
- When Wayne Storch, W9FOC, works a new station, he records in a small alphabetized notebook information which in the future alerts him as to whether a station calling him, or calling CQ, is one he has previously worked. This book gives him a record by call sign instead of by date. Imagine the surprise when he comes back to another operator by name, even though they may not have been in contact for a couple of years. The book, which he keeps handy when going on the air, lists call sign, QTH, name of operator, band and date of first QSO.

My TVI Complaint and the FCC

More than the usually dreaded TVI case, this experience concludes with the ultimate solution even after two clean inspections.

By Jim Jaffe,* WA2VOS

I live in an apartment in New York City and last October my next door neighbor complained, alleging my interference to his broadcast receiver, television set and record-playing equipment. I showed the neighbor my station, indicated my filtering equipment, attempted to explain its operation and demonstrated that my own broadcast receiver and television were not affected during station operation. He became quite upset and threatened to go to the FCC, which he did.

A few weeks later, I received the FCC's form 762-B advising me of the complaint and requiring a reply. As a member of the Hall of Science Radio Club, I requested assistance from the club TVI committee and Paul, WA2HGG, and Gary, WB2CWK, both Extra Class hams, responded to act as my TVI committee.

My TVI Committee Goes to Work

I use a Yaesu FT-101B, 240-watts PEP-dc input, a Matchbox, model 250-23-3, a Drake TV-42-LP low-pass filter, an end-fed, long-wire antenna, an HQ1 quad for 20 meters and a 40-meter dipole. I use an ac-line bypass filter and ground system.

My TVI committee visited my QTH and while I operated at full power in the ssb mode on the various amateur bands between 80 and 15 meters, they made various tests and observed reception on my own television set and broadcast-band radio. They observed a very mild case of cross-hatching on an unmodified

Sylvania CD-63 color receiver equipped with a Drake high-pass filter, model 300-HP-R. The TVI was not noticeable from a distance of several feet from the receiver.

Other observations were made using a Panasonic model RS280S amplifier and receiver. A mild case of audio amplifier rectification was observed. The rectified audio was completely masked when the loudness control was advanced to a reasonable listening level.

The TVI committee then visited the complainant and was allowed to enter the premises for interview and observation purposes. With station WA2VOS in operation, they observed a severe case of audio amplifier rectification on a Harmon Kardon receiver-amplifier when the volume control of the receiver was turned down. A loud buzz was also observed in the receiver whenever the station carrier of WA2VOS was turned on.

Investigating this problem further, it was found that a 1-watt, 2-meter portable transmitter would cause a similar buzzing problem when it was in the vicinity of the Harmon Kardon receiver amplifier. This indicates an undue sensitivity to rf fields. After these observations were recorded, an attempt was made to explain the causes and cures for the problems related to the complainant's amplifier receiver; however, at this point the complainant became boisterous and agitated, forcing the termination of the interview.

Before submitting a report to the FCC, my TVI committee wanted to be sure we were clean as to harmonics. This

required a spectrum analyzer which was not available to us. We asked our local Heathkit outlet manager if we could use his shop unit and he readily agreed. With this we proved that the 2nd and 3rd harmonics were down a minimum of 65 dB.

A few days later we forwarded a report to FCC concluding that the interference problems were not due to station malfunction but that interference to television reception, if it existed, was primarily due to fundamental overload of the front end rather than harmonic radiation, as demonstrated by the lack of TVI and RFI at my location. We also suggested that the major problem of audio amplifier rectification of the complainant's receiver was caused by improper shielding and bypass measures.

Enter FCC

The FCC then assigned an investigator to the case, since we had been unable to placate the complainant. He visited both my QTH and the complainant's, found my station complying with the rules, gave me a clean bill of health, explained the causes and cures to the complainant and I felt that this was the end of the case and was very appreciative of my TVI committee's aid and for the FCC's efficient handling of the matter — all done in less than three weeks.

Exit FCC

Several months went by when the FCC advised me that the case was being reopened. It seems the complainant had

written his congressman suggesting that the FCC people were — shall we say — less than what should be expected. The congressman demanded a recount and he got it in spades but fast.

Re-enter FCC

The local FCC Engineer in Charge became personally involved and assigned two of his best engineers, who incidentally were non-hams, to reinvestigate the complaint. The engineer called me and made an appointment for one week later, advising me to make sure everything was in order for a very intensive test of every piece of gear in the station. During the first inspection, the FCC inspector had given me an FCC diagram showing how to filter TV and audio sets. My TV already had a Drake hi-pass filter grounded to the chassis with a disk capacitor. This seemed to comply with the FCC "cure." My Panasonic stereo receiver was not filtered and I had bypassed it for rf with .001 disc capacitors according to the FCC diagram. I felt I was already as ready as I'd ever be.

The two engineers arrived at my QTH with a load of sophisticated gear, antennas and whatnot that would have put Marconi and Edison in shock. They were all business and no-nonsense and I was sure that if they found anything wrong my license was long gone. Having

my TVI committee on the scene really helped my nervous system.

Before any tests began, a complete visual observation of the station was made. I had to explain in detail the function of every piece of equipment and an inventory was made by the engineers of each item. I then had to explain every position on every switch, how I used it, and the purpose and use of each antenna.

Engineer No. 1 then took my receiver and left my QTH. He set up all kinds of gear out on the lawn. Engineer No. 2 by means of a walkie-talkie was in contact with Engineer No. 1 but stayed in my station. I loaded, reloaded, changed frequencies, changed antennas, used every piece of gear and carried out the instructions of Engineer No. 2 for three hours steady on both phone and cw. Talk about a thorough testing. My rig really got it.

The next operation was a check of my station logs and copies of all communications with the FCC. A discussion was held as to our test procedures in preparing the data used in our report to the FCC. Incidentally, our findings, including the spectrum-analyzer tests using the equipment made available by Heath Co., were verified as accurate by FCC.

The engineers then visited the com-

plainant to inform him that WA2VOS was "clean" and operating in accordance with Part 97. I could hear the screams of protest through the walls and even heard the complainant say he would take the matter further. About 11:30 P.M. two very tired FCC engineers, obviously much anguished, packed up their gear.

Re-exit FCC

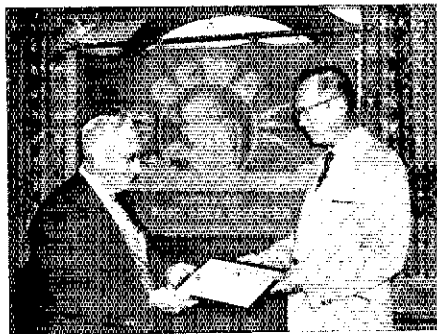
Most of us have read about Congressman Teague's proposed bill HR 351 that would require manufacturers to filter TV sets and fm receivers. The last I heard was that it had been put down by the manufacturers' lobby. Proper filtering would have eliminated the whole event.

Anyway, for one I have had more than ample proof that the FCC in New York City is doing its work well and we amateurs are sure glad it is there.

You Can't Win!

As a result of these second tests, the complainant has dropped his lawsuit against me. The complainant was a landlord. He lost his case but maybe, a way, he won. By the time that this is published, I will be living in my new QTH, my own home, I might add, and doing my hamming in peace. 73, Jim WA2VOS. [ST]

Strays



Lowell Richardson, W5UBW, of Alamogordo, NM, accepted his 25-year certificate and QCWA pin from his father, Rich, W5IGU. The senior Richardson, a charter member and one of the directors of the El Paso area chapter, holds the Golden Award Certificate of 54 years of ham radio.

□ WIUX, Clearing House Manager, announces daily operation of the Clearing House Net began as of April, 1976.

□ Hugh Aitken, WA1FBE, of Amherst College has published *Syntony and Spark - The Origins of Radio*, as part of

the Wiley-Interscience series. Integrating historical narrative with social analysis, the author investigates the earlier developments of radio technology from a fresh perspective. He explains how the works of Hertz, Lodge and Marconi were expanded and transformed into usable technology and how, in turn, an industry was created to utilize that technology.

□ You've heard about these half-baked hams: Helen Morgavi, WA5OVX, passes this tidbit along. "When my OM, Tom, W5FMO, is operating with high power using his linear amplifier, my microwave oven picks up his voice. Question: Is that a half-baked signal?"

□ Finding it annoying to try to locate the proper call area in a hurry in his U.S. *Callbook*, R. E. Ed Dodero, K6NW, uses this method to speed up his search. On the side edges of the pages of his *Callbook*, he places color codes equivalent to corresponding call areas (brown for 2, yellow for 4, etc.). He can locate areas with greater speed and ease that way.

□ Buffs of the TV series "Star Trek" can meet every Saturday at 1530Z on 7250 kHz. The roundtable provides a means of information and opinion exchange for devotees of "Star Trek."

STOLEN EQUIPMENT

□ Heathkit GD-18 Electronic sire, Serial No. 011-4400A and Regen HR2B. Frank J. Pfeifer, J. K9QMJ/W9CSC/NNNØVCX, 4136 Park Avenue, Brookfield, IL 60513.

□ HW-202 transceiver, Serial No. 09512. Joel Humpke, WBØQGF, 5 Zion St., Aurora, CO.

QST Congratulates . . .

□ Frank Maynard, WB8AEV, upon his appointment as Chief Engineer at WLL Lansing, Michigan.

□ Harold Sheets, WØDM, of Grand Forks, North Dakota, honored by the National Weather Service, for his instrumental work in the organization of amateur radio operators into a network of weather observers. "Under his direction . . . North Dakota amateurs have compiled an impressive list of accomplishments . . . all in some way another . . . a benefit to North Dakota citizens."

Amateur Radio and SAR

Witness the joy of reunion between child and parent. Then, put your communications knowledge to work as part of a mountain rescue team.

By Jerry Barber,* WA6ARQ

As more folks take to the hills to "get away from it all," greater numbers of accidents occur in remote wilderness areas. Trained to aid these victims, the Mountain Rescue Association (MRA) is a group of unpaid professionals, highly skilled in the techniques of search and rescue. By virtue of inaccessibility, communication poses an additional obstacle for these teams.

Ham radio working together with MRA teams is needed to assist in these operations. One of the deep-seated traditions of amateur radio has been its service to the public in countless disasters and emergencies. Indeed, one of the chief justifications for the existence of amateur radio is public service. What greater public service is there than the saving of human lives?

During actual MRA operations communication is normally effected on the FCC-assigned emergency frequency of 155.160 MHz. The ham generally acts in an advisory capacity as a communications expert. During this phase, practical suggestions as to procedure, antenna type and placement, and such, can improve communications and facilitate rescue. MRA teams use relays rather than repeaters simply because of logistics. Search-and-rescue operations are generally in the wildest, roughest real estate in the area. Holes, canyons and trees are not conducive to good radio communications. So the solution is a two-man relay on some suitable peak, reached by climbing, a 4-wheel-drive vehicle or helicopter.

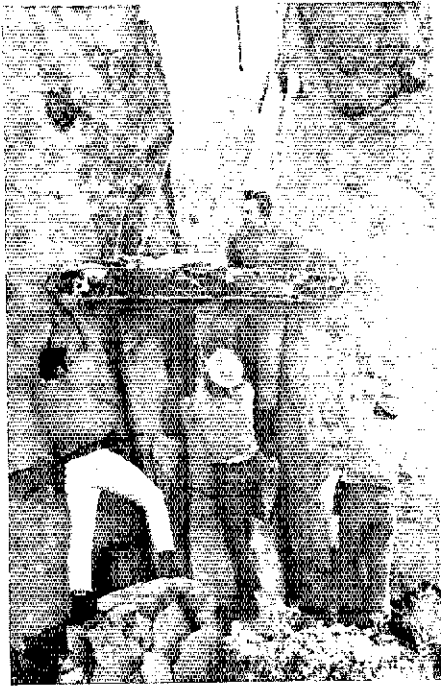
Base-Camp Communications

SAR base camps are seldom near a phone, so amateur radio is the sole link

*Communications Officer, San Diego Mountain Rescue Team

An ordeal ends: Reunited, both child and parents share a moment of joy and that's what SAR is all about.





Rugged terrain makes mountain rescue difficult. Extensive training sessions, such as this at Mt. Woodson, perfect the special skills needed to accomplish rescue under difficult conditions.

from the SAR operation to the outside world. Ham radio functions as liaison between base camp and that person in the rescue team's home area, coordinating personnel exchange, arranging for shipment of needed supplies, and relaying information as to the progress of the search. Geographically, MRA teams come from all over, with frequently three or more teams on a search. Scheduled contacts to several cities may have to be set up. To assist, the base-camp radio operator doesn't need any special rescue or survival training -- just time and desire. A rig as simple as a mobile-equipped Chevy sedan with a sleeping bag, some warm clothes, and a can or two of Dinty Moore beef stew in the back seat, will do.

MRA Equipment

A few years ago, the San Diego Mountain Rescue Team, of which I am communications officer, combed our county for surplus heavy-duty vehicles for use in our search-and-rescue operations. We were given three surplus,

well-used Dodge 4WD power wagons, courtesy of Pacific Telephone Company and the County Civil Defense. The three vehicles were cannibalized, with one vehicle driving away from the wreckage and pile of spare parts. This Dodge 4WD crew-cab power wagon carries a multitude of rescue and climbing equipment and is equipped with rudimentary amateur radio gear.

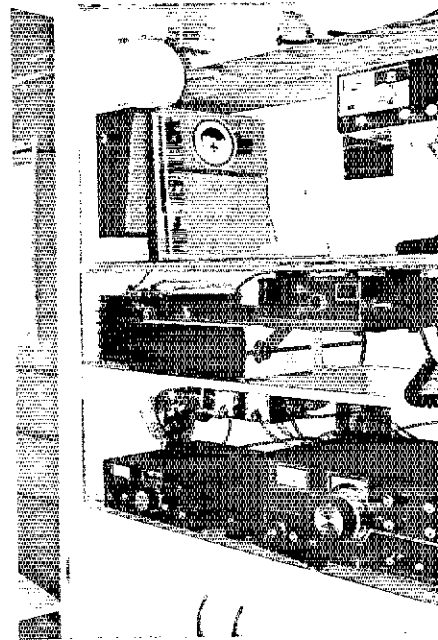
Our primary vehicle is a complete mobile command center. It is a 16-foot GMC van equipped with 100-watt MRA fm radio, a Swan 500CX, an Atlas 180, a Swan FM2X (on loan to the team, courtesy of Swan Electronics), an air-to-ground radio, and a CB radio to link us with some of the other teams that are not ham radio equipped.

The Atlas 180, providing a low drain radio for constant monitoring, is our primary radio at the rescue site. The 500CX is used as a back-up or when extra punch is needed. The SDMRT has for the last few years relied primarily on 40 and 75 meters but is turning more and more to two-meter operations whenever possible. Equipped with a Swan mobile whip, the GM van carries a portable two-meter beam and an inverted V for 40- and 75-meter operation at the rescue site. The van, incidentally, carries the license plates of the rescue team's club station, WB6OIX. All the radios run off 12-V dc from a bank of three 90-amp hour batteries. The batteries are charged by the alternator of the vehicle while traveling, or by a commercial charger run by shore power, or by the 1500-watt Onan generator mounted within the van if external ac is not available.

Flying Antennas

The 40- and 75-meter antenna is mounted on standard interlocking mast sections. When erected, it stands 25 feet at the center and 15 feet at the ends. When 75-meter operation is desired, the ends are lowered and physically connected to the 40-meter section by alligator clips. We have tried numerous antennas utilizing loading coils, but none have worked satisfactorily, primarily because they seem to be supersensitive to the physical surroundings. The super-simple dipole has worked best for us.

One of our team members, Walt Davis, WA6ODQ, has been experimen-



In addition to mountain-climbing equipment and rescue gear, the San Diego Mountain Rescue Team vans carry a variety of radio rig to meet their special communications needs.

ting with several antennas. For several years now, Walt, a pilot, has been trailing a wire behind the Cessna that he flies on some operations. With full flap on and the aircraft flying at just above stall speed, one of the side windows is opened and a 100-foot wire is fed out the window. A plastic funnel stabilizes the end of the wire. When the wire is out, the window is closed, locking it in place, and the aircraft is returned to normal flying attitude. The antenna is matched with a small transmatch and let me tell you, the results are impressive.

The potential of ham radio search-and-rescue operations is tremendous. If you are willing to help, contact your local sheriff, civil defense, or SCIT to get in touch with the rescue team in your area. Many hardships and headaches are shared in the search-and-rescue business, but the results certainly justify every expenditure of time, sweat and money. Come on and join us. You'll save for yourself what it's all about when you actually witness the reunion of a lost and tired child with his parents. I have a great feeling!

Strays

STOLEN EQUIPMENT

□ Genave GTX-200, Serial No. 13-79, W2MPT engraved on chassis. Irvin J. Gordon, W2MPT, 25 Norma Avenue, Lincroft, NJ 07738.

□ Kenwood TS-520, Serial No. 040603, stolen from home. Mort Dunning, K7UZR, 1910 C Valley Ave., N.E., Puyallup, WA 98371.

□ ICOM IC22A, Serial No. 3401802.

Bill Croghan, WBØKSW, 1030 Colorado, Colorado Springs, CO 80901

□ Regency HR-2B, Serial No. unknown. Glenda Butler, WBØOCH, 1509 E. 12th St., Pueblo, CO 81001.

Of, By and For the Radio Amateur

The motto appearing on the masthead of *QST* each month reminds us that the League is to be of, by and for the radio amateur. In order to remain "For the Radio Amateur," year after year, our Articles of Association and By-Laws are set up to be "of" and "by" the radio amateur as well. Which brings us to the point:

Nominations Are Open

It is time for ARRL Full Members in the Central, Hudson, New England, North-western, Roanoke, Rocky Mountain, South-western and West Gulf Divisions to begin picking a director and a vice director in each division for the two-year term which will begin January 1, 1977. From now until September 10, at noon, nominations will be accepted at League Headquarters bearing the signatures of ten (or preferably more) Full Members of a division naming a Full Member of the division as a candidate for director or vice director. The nominee must be the holder of at least a General class amateur license, or a Canadian Advanced Amateur Certificate, must be at least 21 years of age, and must have been licensed and a Full Member of the League for a continuous term of at least four years at the time of the election. No person is eligible who is commercially engaged in the manufacture, sale or rental of radio apparatus capable of being used in radio communication. Neither is a person eligible who is commercially or governmentally engaged in frequency-allocation planning or implementation. Finally, no one can run who is commercially engaged in the publication of radio literature intended in whole or in part for consumption by radio amateurs. The idea behind these rules is to insure lasting interest in amateur radio and the League, legal capacity to make decisions for ARRL, and freedom from conflicts of interest.

Balloting Later

Wherever there is more than one candidate for either office, ballots will be sent to all Full Members of the League in that division who were in good standing on September 10. The ballots will be mailed not later than October 1 and, to be valid, must be returned to Headquarters by noon, November 20. A group of nominators can name a candidate for director, for vice director, or both, but there are no "slates" as such — each candidate appears on the ballot in alphabetical order. If a person is nominated for both director and vice director, the nomination for director will stand and that for vice director will be void. A person nominated for both offices does have the option, however, of declining the higher nomination and running for vice director if he wishes.

Since all the powers of the director are transferred to the vice director in the event of the director's death, resignation, removal out-

side the division, or inability to serve, careful selection of candidates for vice director is just as important as for director.

Nominating Form

The following form for nomination is suggested; it may be copied onto any paper, or a blank following this form can be obtained from Headquarters on request: *Executive Committee, The American Radio Relay League, Newington, CT 06111.*

We, the undersigned Full Members of the ARRL residing in the . . . Division, hereby nominate . . . of . . . as a candidate for director; and we also nominate . . . of . . . as a candidate for vice director from this division for the 1977-1978 term.
(Signature . . . Call . . . City . . . Zip . . . Date)

Nominees or, indeed, any member, may obtain a copy of the Articles of Association and By-Laws, along with a pamphlet outlining the duties and responsibilities of elected League officials.

"Absentee Ballots"

All ARRL members who are licensed by FCC or DOC but are temporarily residing outside the U.S. or Canada are now eligible for Full Membership. These members overseas who arrange to be listed as Full Members in an appropriate division prior to September 10 will be able to vote this year where elections are being held.

Even within the U.S., Full Members temporarily residing outside the ARRL division they consider home may now notify the secretary prior to September 10, giving the current *QST* address and the reason why another division is considered home (as for instance, holding an amateur call appropriate to the division). So if your home division is the Central, Hudson, New England, North-western, Roanoke, Rocky Mountain, South-western or West Gulf Division, but your *QST* goes elsewhere, please let the secretary know, as soon as possible but no later than September 10, so you'll receive a ballot for your home division.

The Incumbents

Presently these persons hold the office of director and vice director in the divisions conducting elections this year: *Central* — Philip E. Haller, W9HPG, and Edmond A. Metzger, W9PRN; *Hudson* — Stan Zak, K2SJO, and George A. Diehl, W2IHA; *New England* — John C. Sullivan, W1HHR, and John F. Lindholm, W1DGL; *Northwestern* — Robert B. Thurston, W7PGY, and Dale T. Justice, K7WWR; *Roanoke* — L. Phil Wicker, W4ACY, and Donald B. Morris, W8JM; *Rocky Mountain* — Charles M. Cotterell, W0SIN, and Maurice O. Carpenter, K0HRZ; *Southwestern* — John R. Griggs, W6KW, and Jay A. Holladay, W6EJJ; *West Gulf* — Roy L. Albright, W5EYB, and Jack D. Gant, W5GM.

In summary: Petitions need ten or more

signatures of Full Members and are due at Headquarters by noon, September 10. If there is only one candidate for an office, he'll be declared elected by the Executive Committee; otherwise, ballots will be mailed not later than October 1 to Full Members of record September 10. To be valid, ballots must reach Headquarters before noon, November 20. The new term will begin at noon, January 1, 1977.

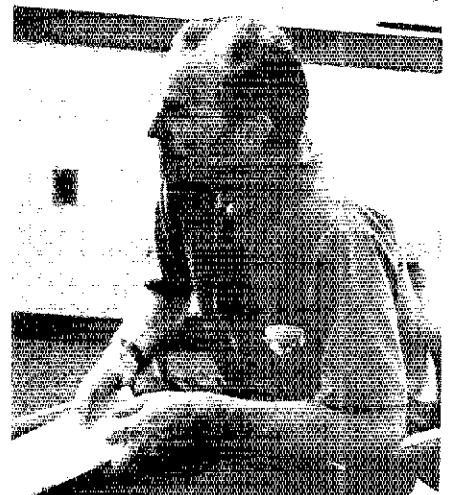
For the Board of Directors:
June 1, 1976

R. L. Baldwin, W1RU
Secretary

BEHIND THE DIAMOND

This month we introduce you to a man who has been at the League over 20 years, has worked in four departments, and can best be described as young at heart. He's Laird Campbell, W1CUT, and he has been the League's advertising manager since 1972. There are a lot of things we could say about Laird. He's certainly never dull. He has a real sharp call and a keen sense of humor. But we won't needle you any longer; on with the show!

Laird grew up in Amarillo and Pampa, TX. He attended Texas Tech at Lubbock. To earn money while in school he did odd jobs in the oil fields of Texas, and also worked as a short order cook. ARRL provided his first full-time job. He came here in 1954 as a contest log checker in the Communications Department, and in 1955 moved over to the Technical Department, as technical assistant. Here he wrote many *QST* articles in the late 50s and early 60s, and was particularly innovative in the fields of mobile noise, QRP, and solar power. In 1965 he became managing editor



*Assistant Secretary, ARRL

for *QST*, and in 1972 advertising manager. As advertising manager he's responsible for maintaining the high standards of *QST* advertising, a tradition which assures members that, "If it's advertised in *QST*, it's gotta be good."

And now for a real-life fairy tale. When Laird arrived at Hq. in 1954 he met Connie, one of the better-looking members of the advertising department. Well, to make a long story short, she's now Mrs. Campbell. At their wedding the bride was given away by none other than the League's own Lew McCoy, WHICP! Connie and Laird make their home in Unionville, CT. They have two children: Michael, 16, and Mary, 13. And to round out this romantic tale, Connie is now W1CIE.

Laird has cultivated many spare-time activities through the years. He enjoys mountaineering and motorcycling. He rides his BMW R50/5 to work when the weather's fair, and believe me, that's one of the biggest German roller skates I've ever seen. Laird also enjoys astronomy, coin collecting, photography, and model railroads. He's a Star Trek fan, and has even jumped out of airplanes (with a parachute) to see what it was like. Like we said, young at heart!

Laird has the unique, and perhaps dubious, honor of being the first member of the "Frisbee for lunch bunch" to be featured in *Behind the Diamond*. Yours truly is also a member. If you're visiting Hq. around lunch hour, and like the taste of Frisbees, come join us! — *K1FHN*

EXPERIMENTAL NOVICE PROGRAM

Under the title, "A New Growth for Amateur Radio," the March *QST* editorial proposed a new system of administering Novice license examinations. FCC has now put the system into use on a limited trial basis as outlined in a Public Notice released May 14:

"As part of its continuing interest in providing more rapid and efficient licensing of applicants in the Amateur Radio Service, the Commission is implementing, on a limited trial basis, an experimental method of examining Novice class amateur radio operators.

"During the experimental program the Commission will relax the rules in some instances to license as Novices those applicants successfully completing Commission-

approved training courses covering examination element 1A, beginners' telegraphy, and element 2, basic law and amateur practice.

"Novice class amateur radio operator training courses will be approved during the experimental program only if they are both comprehensive, covering at the minimum all material included in the Commission's recently released study guide for the Novice class license, and are offered by qualified organizations or educational institutions possessing the resources necessary to carry through with a program of this nature. The Commission staff will closely monitor any training programs approved to ensure that qualifications established by the Commission for the licensing of the Novice class amateur radio operators are met.

"It is emphasized that this is an experimental program only. Applicants not participating in the experimental program are required to obtain Novice class licenses under the existing provisions of Part 97 of the Commission's rules.

"Authority for the experimental licensing program described above is contained in Sections 4, 301, 303 and 318 of the Communications Act of 1934 as amended.

"Further information concerning the experimental licensing program may be obtained from the Federal Communications Commission, Amateur and Citizens Division, Washington, DC."

MODES AND BANDWIDTHS, AGAIN

Last month we mentioned here the Commission's proposal in Docket 20777, which would delete specific references to modes of transmission from the amateur rules. Instead, it would specify bandwidths of 350 Hz, 3.5 kHz, and 35 kHz in what are now the cw bands, the high-frequency phone bands from 160 through 15 meters, and the phone bands above 28.5 MHz, respectively. Bandwidths in excess of 35 kHz would be permitted only above 1215 MHz under the plan.

The expected (by us, at least) benefits of the docket would be freedom to choose teleprinter codes and speeds to match the gear we're able to scrounge; freedom to try facsimile on the hf bands; and freedom to try new narrow-band techniques, such as digital voice.



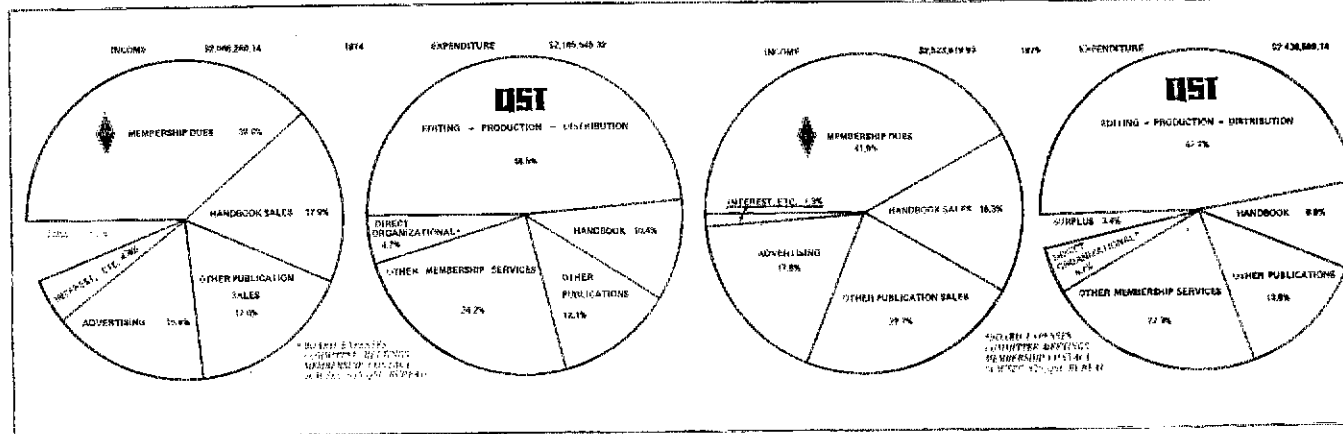
Officials of the ARRL and Sister Cities International (SCI) met March 13 at the Washington Hilton to sign the *Cooperative Understanding Between the American Radio Relay League and Sister Cities International*. From left to right are (seated) Louis Wozar, president, SCI; Harry Dannals, W2TUK ARRL president; (standing) Vic Clark, W4KRC, ARRL vice president; Harry McConaghy, W3SW, ARRL Atlantic Division director; and Dick Baldwin, W1RU, ARRL general manager.

Unexpected effects of the docket would include: Banning of a-m and nbfm below 28.5 MHz; permitting modulated cw on all the cw bands so long as it wouldn't exceed 350 Hz; permitting teleprinter and slow scan in 16 meters; barring 850 cycle-shift teleprinter from the cw bands, but permitting it into the "phone" bands; permitting both facsimile and slow-scan television through repeaters; barring fast-scan TV below 1215 MHz; and barring simultaneous slow-scan television and voice transmissions on one carrier below 28.5 MHz.

Since these latter effects are controversial, to say the least, ARRL has asked FCC to extend the deadline for comments to August 4 (from the present June 23) and for recommendations to September 3 (from the original July 23). If the request is granted, the ARRL Board will make its decision on Docket 20777 at the meeting in Denver July 14-15. Members who have not yet voiced an opinion should get in touch with the appropriate director whose name and address appear on page 8.

Money is always interesting, especially when it's yours and mine. Here are charts showing ARRL's financial performance for the year 1975, with comparisons for 1974. Even more encouraging:

A loss for 1974 operations has been turned into a gain for 1975. The current year continues the happy trend, at least through the first quarter.



Coming Conventions

- July 2-4
West Virginia State, Jackson's Mill, WV
- July 9-10
Central Division, Milwaukee, WI
- July 16-18
ARRL National, Denver, CO
- July 24-25
Atlantic Division, Philadelphia, PA
- July 31-August 1
Roanoke Division, Norfolk, VA
- September 3-5
Pacific Division, San Jose, CA
- September 10-12
New England Division, Boston, MA
- October 1-3
Dakota Division, St. Paul, MN
- October 2-3
Tennessee State, Memphis, TN
- October 8-10
Midwest Division, Omaha, NE
- November 6-7
South Florida Section, Clearwater, FL
- November 13-14
Hudson Division, McAfee, NJ

ATLANTIC DIVISION CONVENTION

July 24-25, 1976, Philadelphia, Pennsylvania

With the Bicentennial City, Philadelphia, setting the stage, the 1976 ARRL Atlantic Division Convention and the ARRL Bicentennial Celebration begins on Friday, July 23, at the Ben Franklin Hotel. Member clubs of the Bicentennial Amateur Radio Convention Committee, sponsor of the event, have arranged a festive, jam-packed program, exhibits of the latest radio gear and some of the oldest radio equipment still in use, prizes, various activities, and ample opportunity to have that promised eyeball QSO.

"The 1976 Convention with the theme '200 Years of Communication' is an appropriate way to celebrate the Bicentennial," comments Dave Zimmerman, W3ZD.

Special room rates have been arranged for those staying at the Ben Franklin during the convention. Rates start at \$26.00 per night for single rooms, \$33.00 for doubles.

Through special arrangements with the Philadelphia office of the Federal Communications Commission, amateur examinations for General class or higher will be conducted at the FCC office, three blocks from the hotel. Advance registration with the FCC is required.

One of the most popular portions of the convention will be the exhibit of amateur radio equipment (both past and present) featuring leading manufacturers and distributors. Admission to the exhibit area and forums is \$3.50 advance and \$4.00 at the door.

A number of forums will be held covering a wide variety of topics including DX, public service, technical areas, an ARRL and FCC forum, plus many more.

Amateur radio's dreaded secret society will meet Saturday night at midnight. The ceremonies will be strictly supervised. Sponsors of the initiation ceremony are promising an extra twist.

A highlight of the 1976 convention is the Saturday evening banquet. The featured speaker will be Ray Schneider, W3MJE, recently retired director of Naval Electronics System Command. He is also experienced in the field of naval aviation. Ray will speak on the progress in the electronics communication fields.

A special program of events is planned for the YLs and XYLs. Highlighting the program will be the YL luncheon. Members of the Ferko String Band will do that Mummer Strut.

This convention is one way of saying you participated in the ARRL, as well as the nation's Bicentennial. Saturday banquet tickets are \$16.00 (\$16.50 at the door). The Saturday Ladies Luncheon is \$6.75 (\$7.00 at the door). A Sunday Brunch, open to all, is \$3.50. For additional convention and hotel information send s.a.s.e. to BARCC, P. O. Box 7170, Elkins Park, PA 19117. Talk-in on .16/.76. A .34/.94 repeater will be operating in the hotel. WM3PEN will be operating from the hotel.

ROANOKE DIVISION CONVENTION

July 31-August 1, 1976, Norfolk, Virginia

With complete airconditioning for both meetings and tailgating facilities for about 200 cars, the Roanoke Division Convention will be staged in the "Scope" convention facility in Norfolk, Virginia.

This first convention in Norfolk will include forums on MARS, Amsat, moonbounce, vhf and the many standard ARRL features. President Harry J. Dannals, W2TUK, will be among guest participants, as will many other Headquarters personnel and elected officials.

Slated for Saturday night in the nearby Holiday Inn-Scope, the banquet will be capable of seating more than 800 at an expected price of slightly under \$10 per person.

Blocks of rooms have been set aside in

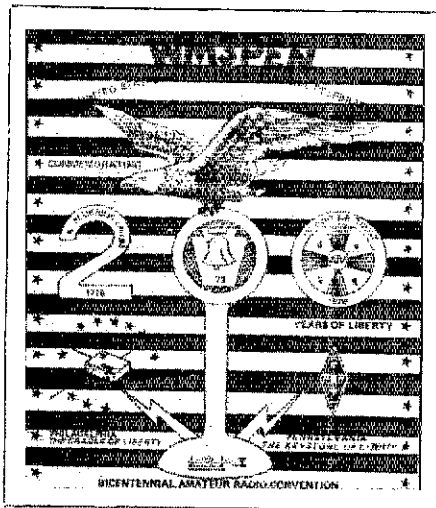
both the Holiday Inn-Scope and the brand new Omni International Hotel, nearby in downtown Norfolk. Programs for the XYLs and facilities for smaller harmonics are all on the schedule.

Advance tickets are available by mail from Tidewater Radio Conventions, Inc., P. O. Box 9171, Norfolk, VA 23505, at \$2.50 each. Door price, \$3.50. Tailgaters' spaces will be \$12 for the two-day period, with exhibitors' tables available at \$15 for two days. Tables are eight feet.

Bonus pleasures will include prizes such as hf and vhf transceivers and test equipment. Recipients need not be present. In addition, there are all the seashore activities of Virginia Beach, which adjoins Norfolk, plus the bicentennial beauties of famed Williamsburg Colonial Restoration, and the newly completed Busch Gardens (sometimes described as Disneyland with beer) and its "old country" theme. More technically minded members of the family might remember NASA at nearby historic Langley Field.

Through W4NV, station of the Tidewater Amateur Radio Club, talk-in will be provided on two of the local two-meter repeaters, 146.19/79 and 146.37/97, as well as 146.52 direct.

The Roanoke Division Convention is being sponsored by all Tidewater, VA, area amateur radio clubs and with the cooperation of individual area amateurs.



WM3PEN official QSL card of the Bicentennial Amateur Radio Convention Committee. John J. York, K3GGA, won the BARCC contest for design of a commemorative QSL card for use during the group's 1976 Convention.

Hamfest Calendar

Arizona: The Ft. Tuthill Hamfest is July 30-August 1 at Flagstaff, Coconino County Fairground (across I-17 from the airport). RV and tent camping. Three days in the tall, cool

pinetrees. Swap meet, tech sessions, contests, pot luck, exhibits. Talk-in 22/82, 34/94, 146.52 MHz and 3992 kHz.

California: The Satellite Amateur Radio Club is sponsoring the Santa Maria Amateur Radio Picnic and Swapfest, Sunday, July 11, beginning at noon, at the Newlove-Union Oil Picnic Grounds on Orcutt Hill. (Watch for the signs marking the turn-off 1 mile south of Clark Ave. on U.S. 101.) Swap tables available at \$3 each. The highlight of the event is the Santa Maria Style Barbecue to be served at 2:30 P.M. (all you can eat), soft drinks

available, bring your own beer. Talk-in on 146.52 and 7280 kHz. The tickets are \$5 adults, \$2.50 for under 12. Send a check to Santa Maria Swapfest, Rte. 1, Box 55A, Santa Maria, CA 93454. Please order in advance so that enough meat can be ordered.

Illinois: The Quad-Co. Amateur Radio Club is sponsoring the 19th annual hamfest of the "Breakfast Club" on July 17-18 at Terry Park, 3/4 mile east of Palmyra. Dancing and movies Saturday night. Bring your own basket lunch. Sandwiches and soft drinks available. Mobile talk-in on 3973 kHz from noon to 11

A.M. Sunday. Games, contests, golfing and fishing. Bring your swap gear. Camping facilities open from Friday afternoon until Monday morning. Pre-registration until July 7, \$1; \$1.50 at gate. Write "Hamfest," c/o Quad-Co. ARC, Box 81, Chatham, IL 62629.

Indiana: The Indianapolis Hamfest is Sunday, July 11, at the Marion County Fairgrounds and will be centered in four buildings. Write Indianapolis Hamfest Assn., P. O. Box 1002, Indianapolis, IN 46206.

Indiana: The Lake County Amateur Radio Club's 2nd annual hamfest is July 18 at the Isaac Walton League in Portage. (Take I-94 to IN 249 exit, then north on IN 249 1/2 mile.) Tickets \$1.50 advance, \$2 at gate. Write Herbert S. Brier, W9EGQ, 409 S. 14th St., Chesterton, IN 46304.

Indiana: The 30th annual Turkey Run Hamfest is at Vigo County Fairgrounds, one mile south of I-70 on U.S. 41, south of Terre Haute. Saturday, July 17, only for overnight campers. For the general public, open Sunday, July 18, 1 P.M. Flea market, XYL bingo, refreshments. Vendor spots under covered flea market with ac service, \$10. Giant shopping mall nearby. Advance adult tickets \$1.50 or 4/\$5. Gate \$2 or 3/\$5. Children under 12 free. Talk-in 25/85 and .94 simplex. S.a.s.e. WVARA Hamfest, P.O. Box 81, Terre Haute, IN 47808.

Indiana: The annual Fort Wayne Repeater Assn. EM Picnic is at the Steuben County Fairgrounds near Angola on August 1. Flea market, special events, \$1.50, 12 or over. Call-in frequencies are 16/76, 28/88, .52 and .94.

Kansas: The annual Pittsburg Repeater Organization Hamfest and Watermelon Feed is Sunday, July 25, at the Lincoln Park shelters in Pittsburg. Location is at 10th and bypass 69 jct. A covered-dish picnic, transmitter hunts, swap fest, talk-in 34/94 and 52/52.

Kentucky: The Lake Cumberland Amateur Radio Assn., Box 285, Ferguson, KY 42533. Hamfest is Sunday, July 11, from 10 A.M. at the Somerset's Outdoorsmen's Club, Somerset, KY.

Michigan: The Shiawassee Amateur Radio Assn. (SARA) of Owosso is hosting the Michigan Buzzards Roost and Emergency Nets Picnic and sponsoring the 2nd annual SARA swap n' shop at McCurdy Park, Corunna. Early-bird get-together Saturday evening, July 17; swap n' shop, picnic, Sunday, 8 A.M.-5 P.M., July 18. Free admission. Tables for swap n' shop, \$2. Overnight trailer and camping space available. Talk-in on 3939 kHz, 146.52 MHz with repeaters on 147.63/03 and 449.30/442.10 MHz. Write SARA, 1302 W. Main St., Owosso, MI 48867.

Michigan: The annual Michigan Upper Peninsula Hamfest is July 31 and August 1 in Houghton at the Fisher Hall on Michigan Tech University campus. Co-sponsors are the Copper Country Radio Assn. and the Michigan Tech Radio Club. Swap n' shop, demonstrations, Saturday evening buffet dinner. Talk-in frequencies are 3922 kHz and 146.94 MHz simplex. For advance registrant's package price, write C.C.R.A.A., P.O. Box 541, Houghton, MI 49931.

Minnesota: The Northern Lakes Amateur Radio Club's annual picnic and hamfest is July 18 at the Itasca County Fairgrounds,

Grand Rapids. Contact Dennis Wilson, WB0QOW, R.R. 6, Grand Rapids, MN 55744.

Minnesota: The Mankato Area Radio Club's annual picnic and mini-hamfest is Sunday, July 25, at Spring Lake Park, North Mankato from 10 A.M.-4 P.M. Ham bingo and family fun. Beverages furnished. Talk-in on 3925 kHz, 146.94 MHz simplex, and 25/85. Contact Dave Miller, WB0HJE, 908 Ptaw St., Mankato, MN 56001.

Missouri: The Antique Aircraft and Amateur Radio Show is Saturday and Sunday, July 24-25, at the Slater Memorial Airport. Registration \$1 in advance; \$1.50 door. Buffalo-burger feed Saturday night and Sunday noon. Talk-in 3963 kHz, 28/88. Write Dale Beilsmith, W0KNE, 807 North Broadway, Slater, MO 65349, (816-529-2173).

Missouri: The Zero-Beaters ARC's annual hamfest is Sunday, August 1, at the Washington, MO, city park. Free parking, auction and bingo for the XYLs. No fee for admission or parking in traders' row. Contact Al Lanwermeyer, WN0QBS, or the Zero Beaters ARC, WA0FYA, Box 24, Dutzow, MO 63342.

New Jersey: The 550 Amateur Radio Club and Oakland Repeater Assn.'s annual hamfest/picnic is at the Westbrook Park Campgrounds, West Milford, on July 31 and August 1. Saturday: All-day flea market, a mid-afternoon auction, followed by an evening campfire. Sunday: Old-fashioned family picnic. Hidden transmitter hunts both days. All amateurs, their families and guests are invited. Talk-in via club repeater WR2AHD 147.49/146.49 MHz and 223.34/224.94 MHz.

North Carolina: The fourth annual Mid-Summer Swapfest is sponsored by Cary Amateur Radio Club, Saturday, July 17, 9 A.M.-3 P.M. at the Lion's Club Shelter, Cary (near Raleigh). Registration and informal buying/selling/swapping/eyeballing/relaxing 9-11:30 A.M. Lunch time 11:30-1. Open auction 1-2. Registration \$1.50. No commission charged. Dealers are welcome. For info, s.a.s.e. to CARC, Box 53, Cary, NC 27511. Talk-in 28/88, 04/64, 146.52.

North Dakota/Manitoba: The 13th annual International Hamfest is July 10-11 at the International Peace Garden between Dunseith, North Dakota and Boissevain, Manitoba. Held in the Canadian Pavilion this year. Excellent camping, contests, party, dance and meetings. For more info contact WB0GFZ or VE4OD.

Ohio: The Van Wert Amateur Radio Club's annual picnic is Sunday, July 25, at Jubilee Park, Van Wert, at the north end of Market Street. Swap table, auction, flea market. Potluck, bring table service and covered dish (coffee and cold drinks furnished). Lunch at 12:30 approx.

Ohio: The Tusco Amateur Radio Club and the Canton Amateur Radio Club's 2nd annual Hall of Fame Hamfest is July 25 at the Stark County Fair Grounds, Canton, Ohio. Perry Williams, W1UED, Senior Assistant Secretary of ARRL will speak. This weekend, by the way, is the National Pro Football Hall of Fame weekend, with the pro game and parade. Write WA8SHP, Box 3, Sandyville, OH 44671, (216-455-4449).

Pennsylvania: Picnic friends of WR3ABE bring family and food at Fort Washington Park in Flourtown, noon, Sunday, July 18.

Pennsylvania: The Two Rivers Amateur Radio Club's 12th annual hamfest is Sunday, July 18. The location is at the Green Valley Fire Department Fairgrounds off U.S. 30 near East McKeesport. Expanded parking facilities and large flea market area.

Pennsylvania: The 39th annual hamfest of the South Hills Brass Pounders and Modulators is August 1 from noon till dusk, at St. Clair Beach, Upper St. Clair Township, 5 miles south of Mt. Lebanon on Rte. 19. Picnic space and swimming for the family. Mobile check-in on 29.0 and 146.52. Pre-registration \$1.50; \$2 at door. Write Fred Schreiber, 181 County Line Rd., Bridgeville, PA 15017. Vendors must register.

South Carolina: The Charles Towne Hamfest is at the Gaillard Municipal Auditorium on Sunday, July 11, in Charleston. Registration is \$2. Activities include an indoor flea market, displays, homebrew contest, copying contest, historic tours and a special program on the Marconi Wells Fleet Wireless Station. Saturday activities include QCWA, MARS, SC SSB Net Banquet and a hidden xmt'r hunt. Highlighting Saturday's activities is the Red Carpet Hospitality Room at the Charleston Inn. Motel accommodations available at reduced rates, reservations urged. Talk-in on 34/94 and 3915. Write Charles Towne Hamfest, Box 4555, Charleston, SC 29405, or check into the SC SSB Net on 3915 at 7 P.M.

Tennessee: The Oak Ridge Amateur Radio Club, Inc.'s annual Crossville Hamfest is in Crossville on July 24-25 at the Cumberland County Fairgrounds. Technical forums held at the Holiday Inn on July 24 and the banquet at the Holiday Hills Country Club Saturday night with a Breeder Reactor Program planned. Sunday, July 25, features a picnic/flea market and a chance for an eyeball QSO.

Texas: The 11th annual Northwest Texas Emergency Net swapfest and picnic is in the city park in Levelland TX, on Sunday, August 1. Bring your own picnic basket. Free registration begins at 9 A.M. Lunch at 12:30. Swapping all day. Tables are provided. This family event is jointly sponsored by the Hockley County Amateur Radio Club and the Northwest Texas Emergency Net. Mobil talk-in frequency on 2 meters only on 28/88 the Levelland Repeater (WR5AFX).

Virginia: The Shenandoah Valley ARRL 26th annual hamfest is at the Ruritan National Fairgrounds, 1 mile west of Berryville and 8 miles east of Winchester on August 1. On July 31 a banquet at Carpe Valley Country Club at \$7 per plate. Social hour at 6:30, dinner at 7:30. Two talk-in 22/82, 90/30 and .52 simplex.

Washington: The Okanogan Valley International Hamfest Assn.'s 27th annual hamfest is on July 24 and 25 at Conconully State Park. The park is located approximately 11 miles northwest of the Omak-Okanogan area. The park has overnight parking but no hookups. There are several private parks with complete hookups, cabins, etc. in Conconully. Plenty of motels nearby. Contact an Okanogan Valley ham and listen for QST's of WARTS Net at 1800 on 3970 and CBN Net at 1900 on 3960, starting July 1.

Wyoming: Wyoming Hamfest sponsored by the Cody Radio Amateurs, July 10-11, at the Meadowlark Ski Lodge.

Feedback

□ The QTH for Silent Key John L. Ritzinger, WB9CFN, is Wisconsin, not Chippewa Falls, Michigan, as listed in QST for May, 1976.

□ In the article entitled "360°-Steerable Vertical Phased Arrays," QST for April, 1976, some terminals in Fig. 3, page 29, are improperly labeled. To yield the pattern shown in Fig. 1, page 28, and the directivity called for in the switching commands of Fig. 3, the following changes should be made in

the terminal identifications:

Change K3 and Antenna 3 to K4 and Antenna 4.

Change K4 and Antenna 4 to K3 and Antenna 3.

Change B (in triangle) to C (two places).

Change C (in triangle) to C' (two places). This brings Fig. 3 into agreement with Fig. 1, and gives the proper phasing of rf currents to achieve the directivity described in the text.

We thank W9JT for pointing out the errors.

□ 1975 Ten-Meter Contest Results (page 77, June QST): K3IGA/4, with a score of 87,408, should have been listed as the fifth highest W/VE scorer in the Top Ten Single Op box.

Strays

I would like to get in touch with . . .

□ other students, formal or informal, objectivism, Daryl Duckworth, WN0SD, Box 1361, Mission, KS 66222.

□ persons with information, especially a Q card of the late Charles Schug, W2BVE. Jam T. Schug, WA2YEL, 6403 72nd St., Middletown, NY 11379.

Correspondence

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

"NEWSPEAK"

□ Probably some do not realize that a date like 11/06/76 is ambiguous. In most places it means 11 June 1976, but in the United States it could mean either 11 June or November 6. A simple solution would be a two-letter abbreviation such as: JA, FE, MR, and so on. Using this system, the day and month can be put in any order without confusion. JE 06 76, or 06 JE 76, or even 76 06 JE, would be perfectly clear to the reader. — *Richard Cave, WA3YNK/PY4ZAH, Bolo Horizonte, M.C., Brazil*

□ In the future you might distinguish between "meter" and "metre" in your publications. As I was looking at my new QST today, I saw an article titled, "10 Meter Repeater," and the first thing that entered my mind was a repeater with 10 meters.

The word "metre" as used by other English-speaking countries means the unit of length. The word "meter" is used to mean a measuring instrument. — *Terry L. Nelson, WA7UEL, Kent, WA*

□ How about a Q-signal that would signify "Is this frequency in use?" — *Fred Comps, K8KUZ, Garden City, MI*

RETURN TO HOME-BREW

□ I just built your Tuna-Tin 2 (QST, May, 1976) and am having a ball after my first QSO with it. From my location, the signal was very strong in Nashville, but bothered by bci.

There were no problems getting the parts or with the construction. 73; now I have some CQing to do. — *Richard A. Zidonis, WB8VBS, Cleveland, OH*

□ This is the "real ham radio" upon which we both agree. But, you need no apologetic tone. Personally, I applaud and salute you. Keep it up, Doug!

Brice Anderson, W9PNE, built a similar rig for 160 cw in a Screts cough-drop box (QST, April, 1973). He wasn't burning up the world with 350 milliwatts, but was solid copy here, about 260 miles away.

Oh yes, that's a nice kitty you have. The shack would not be the shack without Kitty — just like The Old Man! — *Charles F. Rocky, W9SCH, Deerfield, IL*

□ Important modification note for the Tuna-Tin 2, now under construction here: I am using a deviled ham can for the chassis. — *William Lowenberg, Jr., W2OOJ, Delmar, NY*

□ It is encouraging that QST occasionally reminds us that common household materials can be used in the construction of ham radio equipment. Newcomers may be unaware that many rigs of yesteryear were assembled on inverted cake pans, with tomato cans for coil shields. Before the switch to thin aluminum containers, the beer-can vertical was a popular antenna project. The trash can itself has been used as a two-meter resonator.

We now live in the Plastics Age, and the experimenter is surrounded by a wealth of insulating material. With a little guidance from the old timer, the beginner will discover many radio applications for the other fellow's

trash and junk. — *John V. Ellison, W0ERZ, 2 Douglass Lane, Kirkwood, MO*

PSA SPOTS

□ Having heard your public service announcement on a local radio station, I can't tell you how pleased I was to hear what was so badly needed: Someone promoting our great pastime.

Now, if some of the ham gear manufacturers could spend a bit of their profits in non-ham publications, then maybe we could compete on a more even keel with the C.Bers. — *Victor Bush, WB6GLI, South Gate, CA*

□ I just heard your spot about the difference between ham radio and CB. Great work! Keep it up. — *Alan Horowitz, WA2FDG, Boston, MA*

TD COMPLIMENTS

□ Recently, I had a job interview with a local research institute and they were little more than "ho-hum" about my academic credentials. What made them very interested in me was my strong practical background in analog and rf circuitry.

This was not picked up in a high-powered lab series in my EE curriculum; rather, it was from designing and building ham radio projects. Technically oriented articles from QST of the 60s got me started when I was in high school. Even now, QST provides a welcome surprise now and then.

Keep the balance in articles that QST has had. — *Don Lawson, WB9CYY, Madison, WI*

□ I would like to compliment the staff on the fine technical standard maintained by QST over so many years. I am a member of ARRL and also receive *Ham Radio*, *CQ*, and *73* magazines via the VERON library. Simply, I can state that I like QST best of all. That is not to mention the fine work ARRL does on behalf of the whole amateur fraternity through IARU and other important connections.

Keep up the good work! — *Dick W. Rollem, PA0SE, Leiderdorp, Holland*

NEW BREED OF EXTRAS

□ I have been licensed for more than 23 years and have looked forward to my two-letter call eligibility for longer than that.

Under this new procedure (adopted by FCC in Docket 20092 — see "Happenings," June QST) my seniority counts for nothing since I received my Extra Class license in December, 1975. Therefore, I must compete for a limited number of calls with persons who may have been licensed for only a short time.

It would seem far more equitable to base the eligibility for these desirable calls on total years licensed than on time in grade as an Extra Class amateur.

We younger old-timers deserve some consideration. — *David B. Farris, W5PBW, Austin, TX*

□ Why should we people, who obtain our

licenses through hard work and much cw operating, be equated with those who will write down a half-muffled copy, pass, and spend the rest of their lives on phone. Code tests based on comprehension (See "Happenings" May QST) will effectively cancel Incentive Licensing since anyone who picks up a *License Manual* can pass the theory. One minute seems extremely minimal to me.

There is only one way to learn Morse code. Get a receiver and listen, listen, and listen some more. Copy everything. If you hear someone with a lousy fist, don't tune away. Copy as best you can and he will teach you to copy and send better. Dig out the weakest signal, get into a contest, or just listen.

Happy copying. — *Karl Wherry, WA7VCE, Salt Lake City, UT*

"CANDY COMPANY" IS FRIENDLY

□ In April QST, K4MSG reports about the courtesy and helpfulness at his FCC district office. This thought should also be recorded on behalf of the San Francisco District Office. I've always found their personnel courteous. They go out of their way, as far as they can, to help those contacting their office.

Quite a few FCC district offices have hams in their employ and fully recognize an applicant's anxiety. Given a chance, they'll help all they can — short of giving you the answers! — *Gene R. Signor, WA6HAD, Los Gatos, CA*

□ With all the day-to-day operation involved in servicing more than 60 different radio services, it's great to occasionally receive a rose when most of the other correspondence contains thorns. We don't solicit praise, but it was certainly welcome. — *J. J. Freeman, Engineer In Charge, Norfolk, VA*

□ Contrary to recent letters which have led the average reader to envision the FCC examination as a chamber of horrors, I was surprised and delighted to find the entire affair, at worst, challenging.

Attention to the *License Manual* and regular devotion to the excellent W1AW code practice netted this four-month Novice the General ticket with a minimum of difficulty. — *Lt. David G. Long, WN5QVJ, Fort Sill, OK*

QSL — SOLID COPY

□ The funny by W6ISQ in May, QST may be closer to reality than many traffic handlers think.

Recently, my wife and son were visiting my mother in Missouri. With the week to myself, I set about originating a few messages just to keep the nets busy. One went to my XYL with the following text: DOG IS NO COMPANY X SEE YOU SOON. As delivered, the message read: DORIS NO COMPANY X SEE YOU SOON.

My wife, Linda, is an understanding person. — *Robert Davis, K0FFC, Salina, KS*

□ This regards the practice used by most contest operators of giving 59 or 599 reports at all times.

Aside from the ludicrous situation of asking for numerous repeats before confirming a contact, I am struck that a large quantity of potentially useful information is not being recorded. The need for this type of information is especially great at this time when sunspot activity is low and conditions are, at best, mediocre.

Contests, particularly DX events, provide excellent opportunities to observe worldwide propagation on the ht bands. Therefore, operators should be encouraged to accurately record signal reports so that the logs are a valid representation of actual conditions. — *Theodore J. Cohen, W4UMF, Alexandria, VA*

FM Repeater News

Conducted By Lew McCoy, * W1ICP/WR1ABH

HAAT = 100,000 Feet!

At about 7:00 A.M. on Friday July 16th, the first day of the ARRL National Convention, an unmanned balloon carrying a 16/76 repeater will be launched from the National Center for Atmospheric Research (NCAR) facility in Boulder, Colorado. If weather and winds are normal for this time of the year, the 1-watt machine using VHF Engineering boards and lithium batteries should reach an altitude of about one hundred thousand feet in about

four hours. Another two hours of operation should be possible as the four-pound package falls back to earth with the burst of balloons acting as a drag to slow the descent. Workable range at maximum altitude will be at least 500 miles. Most other 16/76 repeaters in surrounding states will be shut down for the duration of the flight.

Stations contacting the convention station, NCØARL, via the "balloon mobile"

machine, will receive a specially annotated Centennial/Bicentennial QSL. A propagation report will be published and QSL/SWL reports should go to WØOQM, P. O. Box 242 Longmont, CO 80501. As an attempt will be made to recover the equipment, stations with directional capabilities are asked to report bearings to NCØARL via the repeater or a low-band net on a frequency to be announced via the machine.

MAINE'S HIGHEST REPEATER

It was well into December, but the WX had not cooperated. There was not enough snow for the lift to be operating, so the fellows went up Sugarloaf on a "cat." While it was a beautiful sunny day in Kingfield, Maine, it was blowing in excess of 90 mph those few miles "up and away" at 4270 feet above sea level!

WRIAGH (22/82) is the baby of KIPMR, KIDAP, WIVLU and WAIQHD are the rest of the crew shown on skis (!) at installation, while KIBXI was contact-man back in Skowhegan.

The other photo shows the fiberglass receive antenna jutting out beyond the ice-loaded microwave dishes on the framework around the shack. Through the framework, to the left of the actual tower, is the 220-MHz control antenna. The Ringo used for transmitting is housed within a section of No. 3 pvc to prevent icing. It had to be relocated when the tower became solidly packed with ice, because the antenna lost a guy, and broke off just above the roof of the shack.

There have been the usual frustrations that come with repeaters, but none has topped that of the first evening. The crew was gathered safely down the mountain, celebrating and toasting their success, when suddenly they discovered that the machine was off the air. It stayed off for about six hours before being turned back on remotely by KIPMR. Later reconstruction of the events revealed that an over-enthusiastic showing of control equipment by KIBXI had resulted in a turn-off.

*VRAC Liaison, ARRL Hq.



Back on the air, results outran all predictions. WAIMUX, with 15 watts and a homebrew 5/8-wavelength whip, was worked consistently from within a hospital building in Lincoln (about 94 miles away). Present indications are that, under favorable terrain conditions, coverage is about 100 miles for mobiles and 150 miles for fixed stations. WRIAGH is running 20 watts, with a GE Prog Line transmitter and GE master receiver.

CTSS STANDARDS

The Texas VHF Society recently set up a committee, under the guidance of the society's technical director, Bob Wolters, W5TPP, to establish standards for CTSS (Continuous Tone Coded Squelch Systems) tones. CTSS systems are sometimes referred to as "PL" (Private Line) or Channel Guard and are used by many repeaters for protection in areas where co-channel repeaters could trigger each other. Also, PL is used by many "closed" repeaters. As more and more repeaters come on the air, there is increasing need for methods to prevent one repeater from accidentally turning on another. CTSS or PL is one generally accepted method. The idea is to come up with some "standard" tones that can be used by transients to open a repeater while the repeater is still protected from being accidentally turned on.

The concept of a standard tone is not new. It was first discussed at an early fm hamfest about eight years ago in Angola, Indiana. At that time, the suggestion was for a repeater to have two tones, one for visitors that would be standard throughout the country and the other for the regular, or local, users. The standard tone chosen at that time was 100 hertz for use throughout the country.

The Texas Society has settled on a standard tone of 103.5 Hz as a "user" tone for Texas. The committee also listed the other commonly used tones: 103.5 (Standard), 114.8, 136.5, 156.7, 179.9, 203.5 and 123.0 (Emergency).

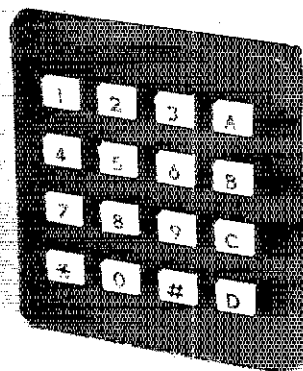
The last tone, 123.0 Hz, has been designated by the Texas Society as an "emergency" standard which tone-protected systems may wish to incorporate. It is intended that this sub-audible tone would set off various types of alarms or would open normally quiet monitor receivers in order that special emergency messages might be broadcast. The technical parameters chosen are: bandwidth: ±2 percent, -30° C. to +60° C. with nominal +25° C. reference; deviation: ±0.5 kHz minimum for narrow-band systems.

ARRL would like to hear from other councils as to what their thoughts are on choosing standard tones. For example, should the national standard be 100 or 103.5 Hz?

DIGITRAN TONE PAD

The tone pad shown in the photograph is a new product manufactured by the Digitran Co. Two models are available, the 16-button unit shown, and another having 12 buttons. The Digitran pad is different from the pressure-sensitive type in that the switches are spring-loaded and produce a positive tactile feel.

The 12-button model is priced at \$8 and the 16-button unit at \$10. They are available from Spectronics, Inc., 1009 Garfield, Oak Park, IL 60304.



Amateur Radio Demonstrated at Trade Fair in Ghana

The Third Ghana International Trade Fair, held in the capital city, Accra, during the first two weeks of February, provided the amateur radio fraternity in Ghana with a two-fold opportunity: To demonstrate amateur radio to a large cross-section of the general public and interested visitors from overseas, and to provide a focal point for renewed interest in the Ghana Amateur Radio Society. Through their cooperative venture aimed at constructing and operating a first-class exhibit, the radio amateurs of Ghana — a diverse group scattered throughout the country — found a common purpose and a need to revive the dormant society.

Expenses had to be kept to a minimum, so assistance was needed from a wide variety of sources if special station 9G1TF was to exist. Exhibit space for the station was made available by the Catholic Church, equipment and antennas were loaned by 9G1AJ and 9G1JW, and QSL cards were provided by 9G1JB, who also performed overall coordination of the project during its planning stages. IARU Region I Division and 9G1GK both provided material to be handed out to visitors.

Visitors to the 9G1TF shack were confronted with a well-lighted and neatly arranged station, decorated with several maps and a collection of QSL cards from many countries and representing all continents. A prominent sign proclaimed, "Amateur Radio Creates International Friendship. Friendly Ham Station 9G1TF Welcomes You." Also on display was an example of home construction by a Ghanaian amateur in the form of a 7-MHz cw/a-m transmitter built by 9G1DM. Whenever possible, two operators were in

attendance so that one could give a running commentary and answer questions from the public while the other was making contacts. A running list was kept, showing all the countries with which 9G1TF had been in contact. The IARU booklets, being professionally printed and relatively expensive, were kept under the table for restricted distribution to those who appeared to have a genuine interest and who seemed likely to pursue that interest further once the Trade Fair was over. To cater to the paper-collecting public, a single sheet of brief notes was duplicated in quantity. Copies of both handouts were posted on the wall of the shack where they could be read by visitors.

It is impossible to relate all of the varied questions that were posed by visitors to 9G1TF, but one visitor is remembered for his scornful comment that as we were only an amateur station, how much longer would it be before we turned professional? He was obviously a sports enthusiast, so it seemed appropriate (especially in 1976) to compare the radio amateur's status with that of a competitor in the Olympic Games. Instantly, amateur radio rose much higher in his estimation. Then there was the excited and breathless shortwave listener who had picked up 9G1TF on his receiver at home and had rushed off immediately to the Trade Fair site to begin what became a two-hour search for the station!

A high point of the exhibition was when 9G1TF received a visit from Col. I. K. Acheampong, Head of State and Chairman of the Supreme Military Council, during the course of one of his daily tours to different parts of the Trade Fair site. In all, almost 600

stations in about 70 countries were contacted. Especially welcome were the contacts with other African countries and with amateurs in other countries which were exhibiting at the Trade Fair. The exhibition attracted exhibits from 29 countries and nearly a million visitors.

Although 9G1TF closed down at the end of the Trade Fair, the 16 amateurs who were involved in its successful operation hope that it signals a new beginning for the Ghana Amateur Radio Society. The many new friendships which have been made and the further inquiries from interested visitors which continue to come in suggest that amateur radio may soon flourish as never before in its 45-year history in this African country. — (Condensed from an article by Andrew M. Pomfret, 9G1LZ, in the IARU Region I News.)



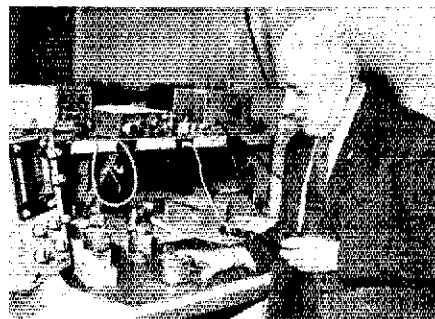
Here are the officers of the Amateur Radio Society of Barbados: (l-r) 8P6CC, 8P6FW, 8P6AZ, 8P6BN, 8P6AK, and 8P6ES. (W1CER photo)

VP OF ITALIAN SOCIETY VISITS HQ.

For one week during April, ARRL/IARU Headquarters was honored to be visited by a vice president of the Associazione Radio-tecnica Italiana (ARI), Marino Miceli, I4SN. Marino serves as IARU liaison officer for the Italian organization and is deeply involved in its preparations for the 1979 general World Administrative Radio Conference. The purpose of his visit was to gain first-hand knowledge of the parallel preparations which are underway here, and to have the opportunity to exchange ideas on how best to proceed with other activities which might have a favorable impact on WARC preparation. Marino also attended a meeting of the Radio Amateur Satellite Corporation (AMSAT) in Washington before returning home.

I4SN is the first of several "IARU Fel-

lows" who will be attending training sessions at Hq. during the next several months. The



Marino Miceli, I4SN, inspects the "Tuna-Tin 2" from May QST during a tour of the ARRL laboratory.

purpose of the IARU Fellowship program is to bring to Headquarters for one week those amateurs who will be playing a major role in WARC preparation in their own countries. Transportation costs are borne by the member-society; Hq. pays other expenses. The program promises to be extremely beneficial in promoting a free flow of information and ideas between the IARU member-societies and Headquarters.

VK5 QSL BUREAU ADDRESS CHANGE

The Wireless Institute of Australia announces that the address of its VK5 QSL Bureau has changed to: Mr. George Luxon, VK5RX, 203 Belair Road, Torrens Park, South Australia 5062. QSL cards for VK5 amateurs may be sent to that address. A complete list of worldwide QSL bureaus, including those for the rest of Australia, is on page 64, QST for December, 1975.

*Assistant Secretary, ARRL



Safe Housekeeping

The YL's major job is housekeeping - be it off the air or in the shack. In the shack our "housekeeping" chores accept the "switch to safety" theme as yet another dimension of our operating. We maintain a check list to make sure that we won't be overloading circuits as new or higher-powered gear is added. Our concern for neatness keeps the wiring out of sight and the floors free from stacks of logs and papers.

Those of us who have a station in the basement or garage make sure that the heaters

are properly vented so that there will be no emergency from asphyxia. We insist that the soldering gun cools away from flammable material and use ashtrays that are the kind that won't let a cigarette roll out into a stack of contest check sheets.

But we have still other hazards to look for. Sharp instruments and drills in the tool chest are the delight of children. One YL found that she suddenly was off the air when her son cut out the antenna lead-in. Another gal discovered her five year old about to chin

himself on the one leg of her inverted V by using a concrete block to stand on.

July is a good time to take preventive measures against any possible hazards that might cause a major worry when the fall-winter activities begin. The lazy summer months, especially vacation periods, are free from most major contests and a good time to make the changes that are needed.

With "housekeeping" checks for safety of all kinds, we can confidently enjoy worry-free operating when the busy season begins.

1976 YL-OM CONTEST RESULTS

The winners: YL cw, WA5VJW; YV5CKR; W4VOZ. YL phone, W7JYX; W4VOZ; 13MWP. OM cw, AC4CHK; W5WZQ; W3ARK. OM phone, AD4JRB; 10DUD; W4CHK.

YL cw: K1NEL, 10,295; K1QFD, 7,937.5*; W1YPH, 6,051.25*; WA1KMP, 2,886; WA2DMK, 7,356.25*; WA2WHE, 6,018.75; K2RUE, 3,517.5*; W2HFR, 1,519; WA2NFY, 862; WA3SMU, 350*; WA4EPM, 2,945*; W5QWL, 3,135*; WA6TOD, 6,500*;

*YL Editor, QST. Please send all news notes to W3WRE's home address: 305 N. Manwelflyn Ave., Glenolden, PA 19036.



Charter members of TYLRUN attend the Net's 21st anniversary meeting: Left to right, Iva, W5SYL; Opal, W5UXW; Lyn, W5RYX; Cindy, W5ZPD.

WA6OZS, 3,997.5*; K8ONV, 12,400; WA8FSX, 4840*; WA8USU, 4,510*; WA0YNC, 11,115*; WA0PDH, 8,640*; VE2FDO, 2,565*; VE3GSQ, 720; D10EK, 384; HB9ARC, 310; I3MQ, 5,719; YU3AE/Y, 1,755*; YU3DOX, 737.5*; YU4OB/Y, 145*; DF4SB, 1558; DF2SL, 900; DK8LE, 1,533; OK3CIH, 1,115; SP5YL, 1,672; SP2FF, 27.5*. OM cw: W1PEG, 875; W2RPZ, 672; K2DNN 195*; W2IP, 100*; AD3RFH, 238; W3ZMN, 225*; W3EHZ, 70*; W3QLW, 49; W3HKS, 30*; K41EX, 800; W4KFB, 522.50*; W4JUJ, 450; AB4WHE/4, 399; AC4MLA, 137.5*; W4ZRJ, 61.25*; K5RRG, 797.5*; W5BWM, 130; W6ZT, 638; W6IC, 517.5*; W6FZX, 475; W6DWJ, 262.5*; AC7BKK, 300; AC7RCT, 210*; K7APJ, 187.5*; W9LNQ, 656.25*; W9DU, 425*; WA0FMD, 747.5*; WA0KDI, 650; WA0CTX, 467.5; VE3EMA, 840*; VE3DMC, 787.5*; VE6UP, 270; VE3EJK, 472.5*; VE7CXE, 237.5*; DK3OI, 4; EL2EB, 480*; I3DUU, 303.75*; I1QJC, 234; IS0XBL, 87.5*; I1FLC, 63; IT9AGA, 35*; OH2LU, 4; OK1DKW, 180*; OK1DVK, 97.5*; OK1KCR, 65; OK1EP, 45*; OK1MNV, 7.5*; OK2BOX, 210*; OK2SLS, 200*; G3NFV, 75*; HP1AC, 495*; YO2BBW, 253.75*; YO2BON, 157.5; YUI5F, 1.25*; YZ3TPJ, 40.

YL phone: LU1BAR/3, 21,538; WA3HEN, 3,456.25*; W4LYC, 1,770*; WB5LMZ, 6,000*; K5IMD, 49; WA6ISY, 2,450; K6DLL, 1,505*; K8ONV, 18,276*; WA8FSX, 487.5*; W9VNG, 24; WA0YNC, 11,115*; WB0MPH, 412.5*; VE7DKC, 2,626; VE5FK, 192.5*; DF2SL, 698.75*; D10EK, 27,936; DJ0YL, 1,644.5*; DJ1TE, 25,302.50*; DJ5UAC, 8,112.50*; DK5TT, 7827.50*; DK9SN, 3,900*; F5RC, 3100.40*; HB9ARC, 1,392*; HC2YL, 35,055; IR1UGX, 507; JA2VIO, 101.25*; X14NC, 2,720; YU1EMN, 3,802.5*; YU2BQR, 1,520; YU3DOX, 1,182.5*; LZ2KKZ, 14,937; VK3AYL, 252*; VK3KZ, 800*; OK1OW, 900*; SZYZA, 182*. OM phone: W1PEG, 80*; WINLA, 1.25*; K2LFG, 522.5*; WA3KSQ, 227.5*; W3QLW, 121; K4KFB,

625; W4JUJ, 178.75*; AB4WHE/4, 110; WB5GRI, 175*; WASAKO, 165; W7AHZ, 165*; WA7YJX, 90*; WA7RCT, 70*; W9LNQ, 906.25*; WA9MFZ, 70*; W0GNX, 1,440; VE2QO, 61.25*; CT1DE, 100*; DF2RG, 225; DL9XN, 648; DL8YB, 396; DL7SU, 50; DK9RC, 9; G3NFC, 192*; HB9AFI, 204; HC2OM, 144; JA8KMV, 56.25*; JA3CMD, 70*; JA2HXL, 15*; JA6CNL, 11.25*; LA1RN, 5*; OH2LU, 72; OK1AGN, 450*; OK1KIR, 140*; OK1XN, 90*; PA0IKW, 24; VK3XB, 52.5*; X13EJK, 137.5*; X4JEM, 135*; YO2CJ, 105; YU1ODS, 157.5*; YO3RF, 160; YU2CFM, 487.5*; YU3TJA, 1,128.75*; YU3RS, 900; YU3YDX, 357.5*; YU3URB, 180; YU4VRT, 287.5; YZ3TRJ, 49.

*Indicates low-power multiplier.

At age 15 Liz Riemer, WB7AIX, operates with an Extra Class ticket. The high school sophomore spends much of her operating time on the Novice bands, however, helping Novices to increase their speed. (K7YDO photo)



The World Above 50 MHz

Conducted By
William A. Tynan,* W3KMV



Deregulation and the World Above 50 MHz

The present trend at FCC is toward less regulation for the Amateur Radio Service. This trend will be felt particularly by those of us who operate 50 MHz and higher. It is in the vhf/uhf range that the greatest diversity of activity exists, ranging from message-handling to moonbounce. Generally, these various activities are not compatible with each other. For example, an ATV station can really wreck reception of weak signals such as moonbounce, the Oscar beacon, or long-haul tropo. By the same token, a strong signal from an fm, a-m, ssb or cw station can obliterate an ATV picture. Since the various activities of the inhabitants of the world above 50 MHz are not necessarily compatible, we must find methods of co-existence. This adjustment will primarily involve our establishing, among ourselves, frequency segments for the carrying out of our various pursuits. Such portioning is dubbed "band plans." We do have band plans of a sort now, but we will probably have to revise them as new rulings come from Washington.

The recent waiver of the rules to permit operation of ATV repeaters *anywhere* in the 70-cm band is a good example. We have all witnessed what repeaters can do to stimulate

activity. This is certainly a good thing. We have also been spectator to the tremendous growth in the number of repeaters. This is good also, as long as there is sufficient frequency space to accommodate them without disruption to other types of operation. ATV repeaters will certainly attract many more hams into ATV, which is fine; but this, in turn, will lead to the establishment of a number of ATV repeaters in many of the major metropolitan areas. If all of them are in the 70-cm band, it won't take many such ATV repeaters in an area before it is impossible to accomplish any of the other things we do now, or may want to do in the future. This particular facet of deregulation is mentioned as an illustration of what we face when government protection is removed.

Another less crucial piece of deregulation is the recent FCC proposal to drop the requirement for signing portable or mobile when away from the home QTH. The Commission in effect is saying, "If the amateurs feel that it is important to indicate portable or mobile operation, they have the option of doing so, but it will no longer be a legal requirement, subject to citation for non-

compliance." Think of the havoc that could be caused by one signing KH6- when operating in California on one of the vhf bands. On 20 meters it wouldn't cause much of a stir, but on six it would shake up a lot of people. What FCC is telling us is that government money will no longer be spent to enforce unnecessary rules and if amateurs want certain procedures to be used, they will have to institute them and encourage compliance themselves.

There are indications that the present rules confining repeaters to certain segments of the vhf bands may be dropped altogether or modified considerably. Such a removal of a government-imposed protective umbrella or straightjacket, depending upon one's point of view, would certainly impose additional responsibilities on us to preserve order in our bands and provide adequate space for all of our various pursuits. It is essential that, in this task of "running our own show," we consider the interests and needs of the other guy, whether or not we are particularly "turned on" to his thing. If we don't, Amateur Radio, particularly that part of it that lies above 50 MHz, is in serious trouble.

EME DXPEDITION TO SOUTH AMERICA

The first moonbounce WAC is close at hand. The block to such an accomplishment in the past has been the lack of South American activity. In order to fill this gap, the Mt. Airy VHF Radio Club of the Philadelphia area, known as "The Pack Rats," in cooperation with the Colombian Radio Club, will be operating a 70-cm EME station from Barranquilla, Colombia, for 2 weeks beginning about July 24. One thousand pounds of equipment, including a 1-kW rig and a 16-Yagi array, will be air-lifted to HK-land along with the crew consisting of K3JJZ, W3HMU, W3HQT, K3BPP, HK1AMW/WB3AOP and HK1CMW/WB3AFY. They will be joined by HK1BYM and other interested local hams to set up the station and start putting Colombia on the 70-cm moonbounce map.

CONFERENCES

A very interesting and informative Second Annual Eastern VHF/UHF Conference was held in Burlington, MA, over the weekend of May 15 and 16. As last year, the gang putting on the affair did a bang-up job and even bigger things are planned for next year when the conference returns to the University of New Hampshire at Durham. This year's session featured talks on a wide range of subjects from speech processing (K1YZW) to solid-state design for vhf and uhf (W1JAA and WA2ZZF). In the antennas and propagation

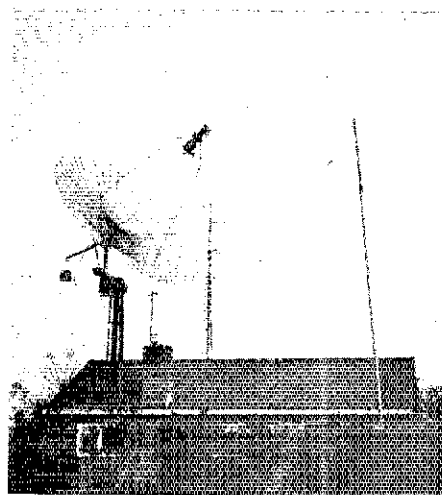
field, G3BYU/W1 addressed the controversial subject of stacking for arrays, and W2BOC presented an informative dissertation on Es, or "intense sporadic E," as he prefers to call it. This talk was particularly interesting to those assembled because of the occurrence last July 20 of a widespread "E-skip" opening on two meters and Mel's presentation included detailed data on this opening. WA3LND challenged the vhf/uhf community to try some special signal-processing techniques in order to improve weak-signal detection especially for EME. Tom also filled everyone in on details of the Amsat Phase III project. K2RIW discussed two subjects, one pleasant and the other quite unpleasant, but nevertheless vital to all of us. The pleasant one concerned set-ups involving radiometry for making antenna gain measurements. The unpleasant subject was that of biological hazards from rf radiation. Dick's message was "be very respectful of rf and make sure that your rig is well-shielded." An up-to-the-minute talk on power MOSFETs in vhf applications was presented by W9PRZ. Ed, who is with Siliconix, excited the group with a glimpse of this new device which promises to be very useful and yet moderately priced.

The after-dinner speaker was W2AZL who provided an overview of vhf through the years, recounting some of the more exciting occurrences. The *Ham Radio Magazine* plaque for outstanding contributions to vhf/uhf went to Joe Reisert, W1JAA, for his promotion of EME and for his encouragement of many hams taking advantage of this fascinating mode of communication.

While on the subject of conferences, the Central States VHF Conference, which is a must for serious vhfers, is scheduled for August 20, 21 and 22 at the Astroworld Hotel in Houston, TX. Central States President W5SXD and his able staff have a fine program lined up. For information, send an s.a.s.e. to Ted Mathewson, W4FJ, 1525 Sunset Lane, Richmond, VA 23221.

NATIONAL CONVENTION BALLOON FLIGHT

In connection with the ARRL National Convention to be held in Denver in a few weeks, a two-meter repeater package will be sent aloft by a high-altitude weather balloon launched by the National Center for Atmospheric Research in Boulder, CO. The 146.15/76 device should be workable over distances of approximately 500 miles in the Denver area.



It's from this exotic-looking antenna site that signals of well-known Netherlands 70-cm EME-er, PA0SSB, start their journey to the moon and back.

*Send reports to Bill Tynan, W3KMV, P. O. Box 117, Burtonsville, MD 20730 or call 301-384-6736 and record your message.

if expected wind conditions allow it to reach the design altitude of 100,000 feet. Reception may be possible over much greater distances, however, and the fellows running the convention are desirous of receiving any and all reports on the flight which is slated to commence about 0700 MDT, Friday, July 16. [See the "FM Repeater News" column, page 72, for further details.]

"SPACE NET" CONTEST

The Space Net Contest, conducted each year by Tony, K4AWS, ex-WB2MTU, has become somewhat of a tradition on the vhf bands. This year's affair salutes the successful Apollo/Soyuz mission and will be run on the four weekends in July. Times are 1800 local each Saturday until 2100 local each Sunday. Use all bands 50 MHz and above. Each QSO counts two points and you can work the same station over again on different bands, and on the same band during different weekends. Exchange includes your zip code. Stations outside the U.S. are to use their post office town names in lieu of a zip code. Repeater contacts are a no-no but Oscar and the moon are OK. Calculate your score by adding up all two-point contacts and multiplying by the number of different zip codes and foreign post office names you have worked. Send logs to P. O. Box 15, Sumterville, FL 33585. A plaque will be awarded to the top scorer in each of four power input categories: 100 watts to 1 kW, 25 to 100 watts, 5 to 25 watts, and less than 5 watts.

ON THE BANDS

6 Meters - As everyone is undoubtedly aware, the summer E_s season is well under way. The first report received on openings came from WA10UB, Manchester, NH. Bob states that, for him, the first major opening of the current season occurred from 1550 to 1800 UT, April 25. Twenty-one stations were worked on ssb. States contacted were IL, MO, KS, NE, WI and SD. Signal levels were reported to have been extremely strong. The 50-MHz section of the WASIYX report lists E_s activity on April 17, 21, 25, 26, 27 and 30. Of these, the 25th was by far the best with ten stations in CO, AZ and CA listed between 0830 and 1120 CST, at which time Pat had to leave.

The aurora that occurred during the evening of May 2 was particularly good for six-meter work. WA4MMP near Norfolk, VA reports working a string of 1s and 2s, including WA2WNI near Albany who was running only 10 watts. Also in the QRP department, WB9FZU near Milwaukee, using his 3-watt IC-502 into a 5-element beam, worked WA0SBZ near Minneapolis who was running another 502 into a 3-element beam. Marsh says that the aurora signals were not as strong as were those from the stations running several hundred watts, but good copy was maintained nevertheless.

It all the DX stations which are reported to be on, or ready to go on, six meters this season actually come through, we should have an interesting time, indeed. YV5ZZ informs me via the 20-meter Amsat Net (Sun., 1800 UT, 14280 kHz) that he should be active on 50 MHz by the time this appears in print. Venezuela should be within single-hop range of Florida and double-hop range of much of the eastern half of the country. VP2LAW on St. Lucia should be another good catch. WB4PKW indicates that an SB110 and 3-element beam have been shipped to John. Bob's trip to C6A and the sojourn of WA2HJF at the same place should be history by now if contemplated plans were fruitful. From the much-sought-after state of Alaska, KL7HMU writes that he and KL7IPG, WA7NNI/KL7 and KL7IGN hold nightly skeds on 50.110 ssb and a-m. Beams are kept pointed southeast from their Fairbanks QTH. According to the *Lambda*, the publication of the Mid-South VHF Association, YN1FWN should be active this year also. From somewhat farther afield, VK5LPL, writing in the Wireless Institute of Australia's *Amateur Radio* says that conditions down under during their summer E_s season (our winter) were very interesting with such tidbits as VK9ZNG on Norfolk Island, and a number of P29s

livening up the festivities. No, Virginia, this is not the DX Column!

WASIYX's muf summary for March lists 11 days on which 35 MHz was exceeded and two days that the F2 went over 40 MHz. Pat notes that the solar flux hit 92 which, he says, is the highest observed during any March since 1973. He wonders why, with such high solar activity, the F2 mufs weren't higher. WASIYX also comments that the magnetic storm of March 26 was probably the most severe for a March disturbance since the one which occurred March 8, 1970, which was the largest of the solar cycle. Pat's April F2 muf summary shows 12 days over 35 MHz and none over 40 MHz.

In the displaced-persons department, WH4OSN notes in his OVS report that K8BBN is now W4MIL and hails from Lakeland, FL. Joe says that Jim is active on all bands from six meters through 76 cm.

2 Meters - The ever-increasing activity on two-meter ssb and cw is beginning to pay off in more openings being caught. WA4GPM, writing in the Tidewater SSB Net Report, recounts a good tropo opening along the East Coast on April 19. Beginning about 2000 local time, repeaters as far away as Nova Scotia were coming into the Norfolk area. Hearing some activity to the south also, K1FJM/4 phoned K4IXC, Melbourne, FL, and set up a sked. The result was S5 signals on both ends of the QSO and state number 11 for K1FJM/4, WA4GPM and WA2CJ/K/4 also QSOed the Florida station. All of the Norfolk area stations managed QSOs with W4USW Charleston, SC, and WA4GPM contacted K1WHS in Maine. Another station taking advantage of the April 19 festivities was WA4GFL. Running 25 watts of fm to a 7-element Yagi at 60 feet, Gene hooked up with VE1AFU in Nova Scotia on 146.58 simplex.

We covered the April 1 aurora in last month's column but we now have an additional report which certainly bears mentioning. WB0SBG in Ames, IA, recounts having worked WBSEWH on fm through the Akron, OH, 04/64 repeater, WR8ACG. This is the first instance that I know of in which a two-meter aurora contact has been made via fm. If there have been others, I would like to know about them.

Looking for Florida contact on two meters and not having much luck? Maybe you're not looking on the right frequency. From W4BWS via the 75-meter Amsat Net (2100 EDT Tues., 3850 kHz) we learn that the standard ssb frequency in the Sunshine State is 145.3 MHz. About 2100 local seems to be the most popular time. Speaking of hi nets devoted to vhf topics, WA4MVI reminds us of the Central States Net which meets each Sunday at 2130 CDT on 3980. Jim notes that it is a fine place to set up vhf skeds. W0PMN, net control, urges every serious vhf'er to call in and emphasizes that one does not have to be a

member of the Central States VHF Society in order to take part.

WA4MVT also provides the glad tidings that he has joined the two-meter EME club with contacts on April 11 and 13 with WA7BJU, OR and WA7KYZ, WA. These two, Pacific Northwest boys must be busy, as K5MWH also reports having worked them off the moon during April.

W7UBI has also recently joined the two-meter EME ranks. With his 80-element collinear, and 600 watts out, Keith has worked, guess who? That's right, WA7BJU and WA7KYZ, plus K1WHS, for his first contacts off the moon so far. Other stations have been heard and it certainly won't be long before the rare state of Idaho is salted away in more two-meter logs. In addition to his EME activity, W7UBI has been running successful tropo skeds over the mountainous 400-mile path between him and W7FN and K7OFT Seattle. Skeds with W6PO have, as yet, not been productive but they are still trying. Keith expresses surprise at what an EME array at 40 feet will do on long tropo paths and solicits more schedules.

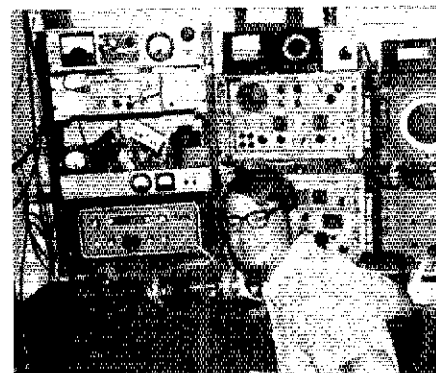
Sunday evening May 2 produced a fairly good aurora. WB0IUT of Lincoln, NB submitted one of the several reports received to date. Doyle worked 9 states using an SB-500 transverter. Among the stations he contacted were: WB0HHM SD, K9MRI IN, W8KPY OH, W0RLI MN, WA9JEM WI, WB8BGY MI, K0DAS IA, WA9WHI IL and W0PMN KS. WB2YQU Millbrook, NY, managed to snag K4GL SC and W4WDH GA. Bruce says this is the farthest south he has ever worked on aurora. In addition, he had 10 other QSOs in the more common places for aurora contacts. He says that the newly acquired kW amplifier along with 22 elements really helped. WA4MMP near Norfolk, operating under the handicap of having to stay above 145 MHz, nevertheless hooked up with WA10UB NH who was S5 on ssb. Another station taking advantage of this May 2 buzz-session was K9KQK. Dick managed 25 QSOs in 13 states, including such relatively rare ones as K4GL SC and K5WVX OK. WBSLUA and W5SID near Dallas caught the fringes of the aurora, making contact with W8KPY OH and WA0CHK MO.

70 Cm - A familiar call on two-meter moonbounce has now joined the ranks of the 70-cm EME-ers. It is WBSLUA near Dallas who has now worked VE7BBG and K2UYH. The contact with K2UYH brings WASLUA's 70-cm state total to nine. The set-up responsible for this initial success is 650 watts out to 8 K2RIW-Yagis. An NE-01 presently handles the receiver preamp chores. W1JAA reports that he is converting as much of his station to solid-state as possible. Latest in this effort is the 70-cm up-converter. Joe is now getting 1 watt out, which drives a 10-watt solid-state amplifier. He says that 432-MHz activity in New England seems to be picking up. The same trend is noted here in the Washington area. How about hearing from some other parts of the country?

W0ZOG of St. Charles, MO, is interested in 70-cm fm operation and inquires as to established simplex frequencies. The principal one seems to be 446.0, Dave. At least it appears to be a good place to start. Of course for the long-haul cw/a-m/ssb work, it's just above 432.0 MHz.

23 Cm and Down - Monday and Thursday evenings at 2200 local time is the appointed hour for the Mt. Airy VHF Club to get together on 1296 MHz, according to a telephone report from WA3JUF. Regulars include W2EIF, K3GAS, W2OMS, K3JUV and WA3JUF. K1PKX has also been worked on occasion. From Plano, TX, near "Big D," K5GMX reports that he and K5TUD in Allen, TX, work regularly on the 5-cm (5650 MHz) band. The distance of about 5 miles is covered well with 1-watt rigs. Plans are afoot to go to 10-watt TWTs soon. Additional microwave converts are sought. A few area hams have already expressed interest. Bill points out that this particular band is easily accessible because of the availability of surplus equipment from a nearby common-carrier band. Those wishing more information for getting on 5 cm may contact K5GMX at 3720 Yosemite Plano, TX 75074. QST

Outstanding moonbouncer Al Katz, K2UYH, does his "thing" from this station at his Trenton, NJ, QTH. (W3BLC photo)





Elmer Strikes Again - and Again

Indefatigable Elmer pops up at any old time in any old place. He is, as you should know by now, the helpful OM (or YL) whose big kick is escorting wide-eyed newcomers along the winding road to Hamland. Let's check a few more nominations showing up in recent "How's" mail.

Found Elmer lurking among my college fraternity brothers in the person of WA1FSZ. Dale patiently aided WA1RMJ, WN1VKO and me into the world of hamdom, and there's another interested frat brother in Montana now working toward his ticket. When problems arise for a Novice it's great to have Elmer available. (WN1VKN) . . . I'm indebted to the Hawaii Air Force State MARS Group for being my Elmer. Their code course was just what I needed to get me licensed in April of '75. (WH6IOZ) . . . I've found a Stateside Elmer in W3EKT. He's helping me become active on RTTY. (A2CED-G3WKJ) . . . Glad to find a place in your pages to record my thanks to K2JY for encouraging WN2BTR, me and others toward amateur status. Mr. Landolina spent long hours teaching us electronic theory, hints and kinks. After administering our exams he helped us get our stations ready for the great day. K2JY is a good example of the type of person every ham should be. (WA2ARG)

Like ham radio itself, Elmer has to be an international phenomenon. From the halls of Montezuma to the shores of Tripoli and all that. In Finland you might find the encounter going something like this:

I was introduced to ham radio in a curious way. As a teen-aged school kid around 1957 I happened upon a Boy Scout magazine that featured a story on short-wave listening. This turned me on immediately. I showed the article to a couple of friends who got interested as well. We started learning the code with a

homemade buzzer and crude key. Once we had been assigned our SWL "calls" we began sending reception reports to hams all over the world. We also dropped SWL cards into the letter boxes of locals. Transmitting amateurs, you see, seemed to us quite awesome creatures whose door bells we dared not ring. One, however, caught us red-handed slipping our cards into his mailbox. He invited us in for a chat and gave us our first look at a real amateur radio station. We were almost frozen with excitement as we entered that holiest of all holy places - his ham shack. There we saw a shining Gelsoso receiver and a homemade

50-watt transmitter.

This was OH3TQ, later to become our Elmer. Kake's code and theory course was most helpful in getting us started. I've met OH3TQ on the air many times since, QSOs that always bring back fond memories of my early days as an amateur. (OH2BN)

Your conductor vividly remembers his own breathtaking first visit to a Real Amateur Radio Station. It was W9UDO at Union, Illinois, and we can still see those blue mercury-vapor rectifiers magically pulsating as Roy hit the mic on old 160. Hooked! How about *your* Elmer?



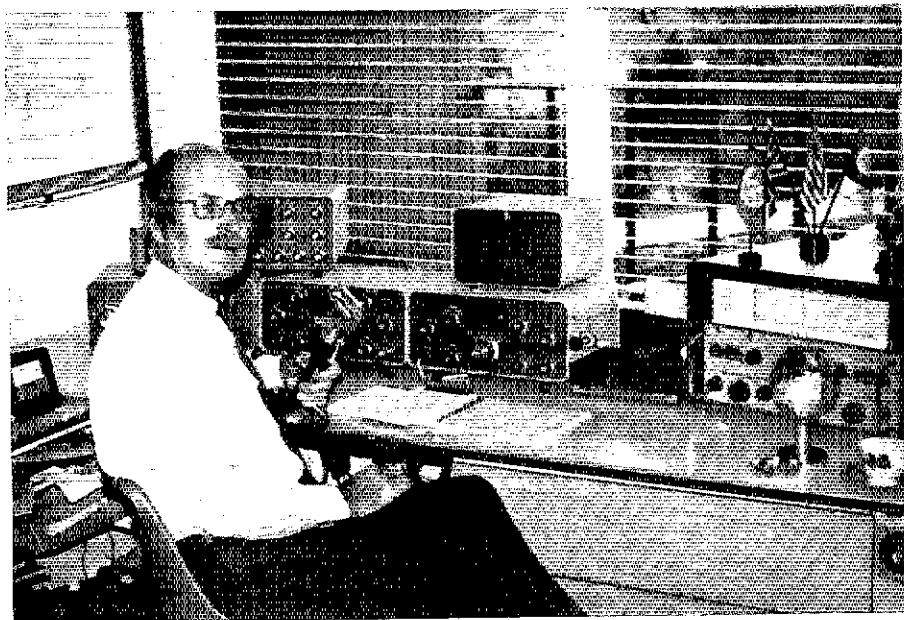
GETTING 'EM ON THE WALL

NORTH AMERICA: This has been said in your pages many times but it cannot be overemphasized: When QSLing overseas amateur stations direct, cultivate the habit of NOT alluding to amateur radio on outside covers. Failing to heed this caution can result in nondelivery, missing International Reply Coupons, etc., and in some parts of the world will definitely endanger our species. (Call withheld) . . . Barely escaped with my life when a flash fire destroyed my home in early March. Along with radio equipment, logs and the like, I also lost a batch of DX QSLs newly arrived via bureau, about half not yet answered. My regrets to any QSLer concerned. (W8BL) . . . Correcting your March data, PJ prefix numerals go PJ2 Curacao, PJ3 Aruba, PJ4 Bonaire, PJ5 St. Eustatius, PJ6 Saba, and PJ7 St. Martin. PJ8s are Netherlands Antilles reciprocal calls, PJ9s likewise for Bonaire, and PJ0s are contest or other specials. (KV4FZ-PJ8HS) . . . I find QSL receipts

running about ten percent for my first ten thousand AJ3AA contacts logged from the first of the Bicentennial year to April 28th. (KV4AA) . . . Latest indications are that old-style International Reply Coupons will continue redeemable beyond year's end. (WCDXB) . . . Hint, hint - VP2DQ's daughter manages his QSLing and is an avid stamp collector. (VERON) . . . When one reaches the 90-country mark, those overdue DX QSLs take on added urgency. (K3HWL) . . . Soaring costs of IRCs and postage may find many of us broke before we reach coveted DXCC. (WB5KUJ) . . . True. Bob - DXdom's QSL bureaus network becomes more important with each rates boost. (W9BRD) . . . We volunteer our services as QSL managers for stations at the DX end, the rarer the better. (W1GMR, WA3ZXL 6SST, WB9PYE and WN9TFI) . . . Thanks to "Halp!" from readers Ws 6ISQ 7PHO, KSDEC and KH6CF, I succeeded in tracking down some vexing QSL holdouts. (W7HPI) . . . 'Alp! Parenthesized brethren plead for a push toward QSLs from holdouts mentioned: (W3OJS) ZK1DX, 4X4FU; (W9MTN) HR6SWA '74, JK2FX '74, ZL1AA/c '74, 9G1AR; (K3HWL) HC1AD,

OC4A, TA2AY, ZP5PG; (K4M7E) FW8DA; (K7ZLO) OY3MH; (WA6EPN) GM3AGC; (WA8FIO) VP2LAW, YS1GWE; (WB4WHE) KA6LJ; (WB0CGJ) TF3SV '74; (W. Hahn, 91 the Chesils, Coventry, England) KR6s KS and LM of 1966. Any shoves? . . . "How's" correspondents Ws 1CDC 7HPI 7YF, Ks 3HWL 4KCK 4SMX 7ZLO, Ws 3ZXL 6ARP 6EPN 8FIO, Ws 4WHE 0CGJ and VE3DU nominate your "QSLers of the Month" for particularly prompt pasteboard production: CP1EU/6, CR9AJ, CX2CS, DJ4TR, DU1JA, EAs 6AA 8LM, EI9J, F6BHX, FC9UC, FG7AT, FO8EL, FPOYY, FY7AS, G4s CUN DJC, HC2SL, HD5EE, HIs 3PC 8MOG, HM1IJ, HP1AC, I1ZEU, IS0XKF, JA8s AYN ZO, JD1ABO, KC6AQ, KG4s FL FU, KL7s HRP PI, KM6EA, KP4EAS, KS6FF, KV4s AA AB BV II, KZ5BC, LA8CI, LU1AJQ, M1B, ONs 4HX 6BN, OX3AB, PIs 8AA 9JT, PZ1DR, T12BEV, T7SAN, TU2GI, UK6AAU, VEs 1BFV 8RE, VK2s BOQ OO, VPs 2A 2DX 2GE 2M 2MEV 5BS 9HO, VR8B, VS6BL, W0OAW/C6A, WB9AJF/6Ys, WP4s EEY EGN, WS6FL, YN1s AZ FWN, YS1EMW, YV4AGP, ZF1AL, ZK1DA, ZPs AL AO, ZSs 1Y 6JK, 3B8DO, 4U1IU.

*c/o ARRL, 225 Main St., Newington, CT 06111



DXpeditioner Bob Roberts, G2RO, famous for worldwide activity in the 1950s and 60s, still finds time to report code activity in ARRL's February and March DX Competition, 1976 — style.

5T5CJ, 5X5NK, 6Y5BF, 9GIAR, 9H1s DZ EW and 9I2BO, together with QSL aides Ws 2KW 3HNK 4QL 5LEF 5MYA 6RGG, K3KWJ, WAS 3HUP 4CAD 5OQN 8TDY, WB9s EBO IWN, DLIRK, JA1BA and SM3CX5. Fine show!

EUROPE: I'm now stationed at the Pentagon after a Crete DX career from May 26, 1974, to January 22, 1976. The small percentage of contacts still needing confirmation will be taken care of via my current Maryland QTH. (WA6AXY/3) . . . Almost made DXCC before a single Russian card came through but UK2GAS broke the ice. Let's all be more careful in filling out our QSLs! Many arrive bearing serious discrepancies in dates, times, calls, etc. (WB4WHE) . . . The gang might as well not bother to enclose IRCs, stamps, etc., with their QSLs via Moscow's Box 88 bureau. Correspondence from Russia assures me that only the cards get through. (WA6HRS) . . . My GO suffix has recently been used illegally with various Italian prefixes for QSOs that cannot be confirmed. (I9GO) . . . I've sent out 925 QSLs for 4U1TU operation by K4IIF on October 25-26, 1975, via bureaus but can confirm no other QSOs by 4U1TU. (W4KA) . . . Anyone lacking a 4U1TU card for a voice-contest QSO February 7-8, 1976, should contact me. I mailed about 200 catch-up QSLs direct to U.S. and Canadian stations in April. Furthermore, any other 4U1TU QSOs by operator Dex from January 18 to February 6, 1976, can be confirmed from my log. (K3KWJ) . . . Among recent unorthodox Russian prefixes are 4J3 (UA3), 4J6 (UG6) and UX3 (UA3). (VERON) . . . There are, of all unlikely things, many unclaimed Albanian ZA2RPS QSLs still on hand. (DL7FT) . . . W6TCQ holds OY1M logs up through August 4, 1975, at which time Mike knocked off for Copenhagen. (WCDXB) . . . HB9AAA says his May QSOs from rare Valais canton will be confirmed 100 percent via bureaus. (DXNS) . . . Maybe I'm doing something wrong. Only eight QSLs to show for 145 U.S.S.R. stations worked in the past two years although I've QSLd 100 percent with repeats. (WICDC) . . . 3Z5KMB was a Warsaw special on 15 and 20 sideband in April. (I2CBM) . . . As soon as stock arrives I'll QSL all my SV0WY contacts of March 13-15, 1976, via bureaus. (DA1DS-K5KVK)

AFRICA: To the best of my knowledge I've QSLd all of the 4800 air-mobile contacts I made from Europe, Africa and Asia in the past two years. Anybody inadvertently missed can reach me through ARRL's WB4 Bureau branch or at Box 282, Devine, Texas, 78016.

(WB4JUT/5) . . . I'm able to QSL all ZD7HH contacts past, present and future in response to s.a.s.e., or s.a.e. plus IRCs. (K2PAY) . . . TL8AR QSL tender I2YAE says that many eagerly sought C.A.R. cards will hit the mails this month. (DXNS) . . . To correct scattered misimpressions I do not act as ST2SA's QSL manager. (WA4NRE) . . . QSOs by FB8XO (F6DHV) are confirmed through me but F5VU handles QSLs for other Kerguelens stations. (F6CRT) . . . I can confirm 9Q5DM contacts by op Doug dating from April 1, 1976. Previous 9Q5DM staffer Doctor John departed Zaire with a promise to clear his QSL backlog before year's end. (WB5OAV) . . . W3KLE disclaims connection with 3D6BH QSLing (K4GUS, WB4WFT) . . . I'm quite excited about my first QSL managerial assignment, 5Z4s PG and RG. (WB9MFC) . . . Some operators complain to me that old ET3USA-9E3USA did not send them deserved QSLs. Is anyone in charge of their old fogs? (DK5EC/ET3)

OCEANIA: Some logs are missing but I can confirm most of the 1974-75 VK0DM QSOs made by Dave Meldrum, also the contacts of OM-XYL A35s AF and AL. Self-addressed stamped envelopes, or s.a.e. plus IRCs, please. Contrary to some info I do not handle QSLs for VK9JA and ZK2BD. (WA4NRE) . . . I can confirm FK8BG and VP2KN QSOs made after January 1, 1976, on the customary s.a.s.e., or s.a.e. plus IRCs, basis. (W7OK) . . . Closed KG6EU in May, all received QSLs answered. Anyone with further inquiry can reach me via my Pennsylvania QTH. (WA3DYP) . . . As new manager of the Kwajalein bureau I've inherited a few hundred QSLs destined for various KX6 operators who have left the atoll. We're compiling data to solve this problem and would like help from ex-KX6s. Please advise Kwajalein Radio Club, KX6BU, of your old call, period of operation and present address. Except for individual direct QSLing our bureau handles all incoming and outgoing Marshalls cards. (KX6LX-WA7TW) . . . WA6RPL/FO8 of Bora-Bora requests QSLs via the League's Sixland Bureau branch. (DXNS)

SOUTH AMERICA: I manage VP8ON's Keppel island QSLing as of the first of this year. Mail from the Falklands is very slow — patience! W9MR/CE0's most recent Easter Island cw logs are on hand and I'd like to close these out for Wayne. (WA4NRE) . . . CX2CS, who likes to work 21-MHz Novices, wants self-addressed envelopes for direct QSL response. (WA8FIO) . . . PY1NEW contacts with W/VEs during this year's ARRL DX Test cw sessions may be QSLd via K9LSB. (DXNS)

My own cw ARRL DX Contest QSOs from PZ1DR were confirmed via bureau last month. Some QSLs went out earlier in response to s.a.s.e. requests. (W3GXF) . . . QSLs for W7MPZ/HK3 contacts between September 20, 1973, and mid-June of '76 are available from my Oregon QTH on the usual s.a.s.e., etc., basis. Likewise for my San Andres W7MPZ/HK0 activity on August 3-14, 1975. It is my understanding that all HK0AA Serrana Bank cards for June '75 DXpeditionary contacts have now been cleared via bureaus. (W7MPZ)

ASIA: The widow of W. G. Schuster in Frankfort, New York, W2KV about ten years ago, receives numerous QSLs for 9N1MM contacts. Please stress that these be directed to the proper QSL manager. (W2VYX info) . . . I have several years of VU2LE logs on hand. My service should be much faster than QSLing Bala direct. (WA6MWG) . . . As of January 1, 1976, I handle RV2B's single-sideband QSLing in behalf of K3RLY. Tim Chen's cw QSLing is managed by WB2UKP. Use only my latest *Callbook* address. (WA4NRE) . . . Yes, DXers do themselves more harm than good by referring to ancient and obsolete *Callbooks*, especially when they attempt to use my defunct 1972 address. S.a.s.e. for TA1ZB and VP1MPW cards should be oversized because the QSLs are biggies. (WSQPX) . . . Let's check the fresh crop of individual QTH suggestions fluttering from your "How's" mailbox, bearing in mind that each recommendation is not necessarily accurate, complete or "official". . . .

- A35s AF AL (via WA4NRE)
- A6XQ, A. Clappitt, Box 2943, Dubai, U.A.E.
- CP1EU/6, M. Long, Casilla 8019, La Paz, Bolivia
- CR5LB, L. Beirao, Box 147, Sao Tome & Principe Republic
- D2ACK, Box 1000, Luanda, Angola
- FM7AZ, Box 619, Fort-de-France, Martinique
- FP8JP, Box 227, St. Pierre, St. Pierre & Miquelon
- FY0GE, R. Little, 68 School St., Weston, Massachusetts, 02193
- G3TJE, 118 Glebe Rd., Deanshanger, Milton Keynes, MK19 6LZ, England
- HU2SL, A. Solines, P. O. Box 5757, Guayaquil, Ecuador
- HK3DEU, A. Sjaio, Apdo. Aereo 584, Bogota, Colombia
- JE1OMO/HP1/HP7, M. Yukota, 3-11-16 Minamioigikubo, Suginami-ku, Tokyo 167, Japan (or via JARL)
- JT0UEF (via CRC attn. UK9UCF)
- KJ6DK, PSC, Box 276, APO, San Francisco, California, 96305
- KS6FR, Box 581, Pago Pago, U.S. Samoa 96799
- PZ5AA, Ageliuslaan 54, Paramaribo, Surinam
- ex-SV0WKK, A. Edler, WA6AXY/3, 13226 Warburton Dr., Oxon Hill, Maryland, 20022
- TJ1BB, B.P. 126, Yaound, Cameroon
- U0AFX (via CRC attn. U03AFX)
- VK3s BCO BCP (to WA6s OET MWG)
- ex-VP8KF, Reservoir Cottage, Redhill, Nottingham, NG5 8PE, England
- VQ9MHS, Box 14, Mahe, Seychelles
- W8LKW/C6A, J. Herro, 4419 Bascule Bridge Dr., Apt. 1321, Dayton, Ohio, 45440
- WA6RPL/FO8 (see text)
- WB4JUT/am/1/2/3 (see text)
- XE3TL, Box 108, Taxco, Yucatan, Mexico
- XW8s BP CN (via DL7FT)
- YB8ACK, Box 2761, Djakarta, Indonesia
- ZL2s BJV BJZ (to WA6s MWG OET)
- ZS6BNF/3D (via SM3CX5)
- SWIAX, P. O. Box 1025, Apia, Western Samoa
- 9G1KE, Box 171, Tamale, Ghana
- 9X5JB, Box 980, Kigali, Rwanda
- 9X5RK, Box 1100, Kickeria, Rwanda
- A2CJP (R5GB)
- AH3FR (KS6FR)
- AH7AE (KM6AE)
- AL4AAC (K7ODK)
- AP2ZR (R5GB)
- BV2B (see text)
- C31BL (DL3CB)
- C5AU (G3LQP)
- CP1HW (G3NUF)
- CT2AK (W3HNK)
- DM8UST (DM3WMJ)
- EL2X (W3HNK)

DX Century Club Awards

Administered by R. L. White, W1CW

The following listings show DXCC Awards issued by Headquarters during the period from April 1, through April 30, 1976.

New Members

cw/f

318	W2RHE	138	W2JGR	YU5FGF	104	DL3EO	OK1IBF
WA00AH	203	DJ7UB	115	107	K4NV	DL6SC	WA1RGU
315	JA7GLB	125	JA7UIH	WB6EGQ	WB4KVM	JA0XD	100
K4BBF	188	GM3WIL	109	106	Y03KBC	W4OVG	KL7HDX
297	YB0ABV	121	W4NBP	EA4MV	103	WA4VCC	VE3AHB
ON5KD	180	JA1FGW	WA6DHS	105	K4KEW/5	101	VE3GFN
208	SM5RH	120	108	WA2BJN	102	K2ZGC	WA4DBG
							WB6MWK

Radiotelephone

207	185	130	107	105	120MF	YS1JWD	100
I3DHN	I6AYS	K3JGI	I5MXP	W4LWP	W4UYC	101	K2SNK
201	142	109	106	104	103	DJ1TE	W5LEL
JA7GLB	W4KN	W3DQJ	W2JGR	DL8PQ	WB4AMU		

cw

110	104	W7LR	YB0ABV	OZ3Y	101	SM0CCE	100
SV0WTT	JA1UQP	103	102	WB2FMK	I5BDE	WA5VDH	WA4EWX
105	K2JX	K5ETA	JHINMO	W3CG5	K6DT	W9KB	W6ID
K4DAS	K6DSX	WA8ZDF					

5BDXCC

#485	#486	#487	#488	#489
W5MCO	JA3MXR	ON5NT	W1ESN	YU3BU

Endorsements

In the endorsement listing shown, totals from 120 through the 240 level are given in increments of 20, for 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.

cw/f

355	W2IRV	WA4WIP	DJ4PI	300	CX1RY	220	160
K6ZO	W6ONZ	W8PR	F8RU	DL7CS	K6DT	G4BUE	I3MMM
W1BIH	W9MQK	W9NLJ	JA1OQA	K6OJO	W5TMN	WB4TDH	K6DSX
W5KC	335	320	JA1UQP	W0HCAB	W0HBB	WA6QR	VE5XV
W0ELA	K1IXG	K4YFQ	K1NOL	W3KA	270	W0VIP	WB2LOF
350	K2TQC	K9WEH	K2AGZ	W4UF	W8QBG	200	WB1F
K6OJ	W4NJF	W4BRE	K6ZXW	W4YUU	WA9QAM	K4IRQ	WB9FKL
W2AO	W5HJA	W4UKA	W1HGA	W5KKZ	260	K9UTN	YU3TJA
W3CWG	W0AUB	W9JGD	W1JFL	W8KJ	260	VE3DMC	140
W4TM	330	WA9IVL	W4HHN	W9DE	K4OMR	WA4UFW	DJ2MH
W8KIA	K6GLC	W0PAH	W2HUG	290	W2HUG	W8CVU	DJ9ER
345	OH2BH	315	K4CKA	K4DCKA	250	180	G4BVB
W1JNV	W2AEB	K1JHX	K4DXO	W1ABW	W82HNO	G32QW	HB9EQ
W1NU	W5RDA	K8VUR	W3QLW	W0JS	W0JS	K4HLJ	K2GAT
W2AX	W6KTE	K0BUR	W4SIJ	W0YZB	YU2AKL	W2AFU	W8CTR
W2AYJ	W6F	KV4FZ	305	W6VBI	W6LLY	W20XR	W9LUH
W3WGH	W8RT	SM1CXE	K6PZ	W6LLY	W9DDL	W4WXZ	W9NGA
W4EEE	325	WA3KSQ	W6G6	W9DDL	240	WA4ENJ	XE2MX
W5HDS	K1RQE	W8RCM	W6G6	W9LJU	DL9NA	WB5HVY	120
340	K4CFB	WA6DUG	W7ORH	W9LJU	K3LWM	WA6DNM	K4ZVS
K4PDV	K4MPE	W9OW	W7PK	WA0TLT	W8IRG	WB8KNZ	K9KGA
K6RQ	VE3MJ	WA0CPX	W8CFG	ZLIAMO	WB5EAZ	WA9MOE	W9YH
VE3BWW	W4MGN	310	W9KNI	280	W8GIO	WA9ZWL	WA9WKA

Radiotelephone

345	325	W4BRE	W8JTD	W8CFG	K6PZ	WA9QAM	K8GWM
W3CWG	VE3MJ	W8GKM	305	W8YK	W2MPK	240	W5ZV
W4EEE	W3EUV	W8VHY	F8RU	WB8EUN	WB4SIJ	KP4BBK	W7OK
W4QCW	WA4WIP	W9QLD	JA1UQP	W0BK	270	WA8UUY	W9QEE
W5IO	W9JT	WA00AH	KV4FZ	290	W5NQN	220	160
W0CM	320	KH6BB	W8GHN	JA1RWE	W5TMN	K6DT	DA2QW
340	KH6BB	W9JQD	WA9IVL	W5KKZ	WA5AUZ	W11YN	W20XR
W3WGH	W9JQD	310	EABJ	W6HUR	WA6LLY	W1VRK	WA4UFW
335	K1IXG	315	JA1OQA	W6RTA	260	W8QBG	140
K1IXG	K6T XR	K4BYM	K6OJO	W9DDL	W9YRA	W9DE	200
VE3MR	K9WEH	K4CFB	K6ZXW	280	K4CKA	VE4JK	G4BUE
W2FGD	K0BUR	K8VUR	W4ELB	K4DXO	W8CGC	180	VE1AYE
W4NJF	W1BIH	W1HGA	W6LQC				W3FZE
	WB2WOU	W6ARJ					

cw

220	180	120	K4LRO
W9KNI	K4YFQ	DL8AN	W4KN
	K9UTN		WB6ZUC

EP2NC (I2YAE)
 EP2SN (WA3BZA)
 F0CJA (WB8PTP)
 FK8BG (W7OK)
 FK0KG (W6RGG)
 FM7AU (I2YAE)
 G4BKI/VP9 (G4AMJ)
 HC1XG/HC8 (WA6PDE)
 HD2TV (I0WDX)
 HK0AA (HK3DEU)
 IE9CBM (I2YDX)
 IV3VLS (I3PRK)
 K8WHS/HR1 (WA4UPR)
 KA6JH (OH5ZAA)
 KG6JAR (W5VEP)
 KG6JEU (WA3DYP)
 KG6JHB (K3CET)
 KG6RI (WA7JCB)
 KS6DV/KB6 (WA6QFO)
 KX6LX (KX6BU)
 KX6MJ (JA0CUV)
 OE6DK/YK (OE5REB)
 OG8AA (OH8AA)
 OX3ER (OZ1U)
 P29MM (K4MQG)
 P29PJ (ZL2FA)
 PY1NEW (see text)
 PY0UG (PY5UG)
 PZ1DR (see text)
 SV0WY (see text)
 TA1MB (DK3GL)
 TA2MM (DJ0RR)
 TI9BY (TI2BY)
 TI9WD (TI2WD)
 TL8AR (I2YAE)
 TT8AN (W5LEF)
 VK0DM (WA4NRE)
 VK0XX (WA7ABK)
 VP1MPW (W5QPX)
 VP2KK (W3HMK)
 VP2LCC (K0KJS)
 VP2MEE (F6BBJ)
 VP2MOC (K2JOC)
 VP2MPC (FY7AH)
 VP2MU (VE3HD)
 VP5TI (G3RWU)
 VPRON (WA4NRE)
 VQ9DF (ON6FN)
 VQ9HS/3B6 (W4UMF)
 VR1AK (JA0CUV)
 VR4CW (JA0CUV)
 VR4DA (WB8OFG)
 WB9AJF/6Y (WB9HBO)
 XJ0NEH (VE1FQ)
 YJ8CW (JA0CUV)
 YS1GMV (W3HMK)
 ZD7HH (K2PAY)
 ZD7PS (G3TJE)
 ZD8RW (G8BXU)
 ZF1DB (K0VVO)
 ZF1RD (W4BAA)
 ZF1SM (W5SMM)
 ZK1DA (WA5OCN)
 3A0GY (WB2EZG)
 3A0HI (WB8PTP)
 3A0HK (DL7RT)
 3D2KG (W6RGG)
 3Z5KMB (SP5TXI)
 4S7CF (VE3BOZ)
 4U1TU (see text)
 5N2NAS (WB9MFC)
 5Z4NG (DJ3NG)
 5Z4QQ (K7DVK)
 6P6HN (W0OIR)
 9L3SL (9L1JM)
 9N1MM (see text)
 9Q5DM (see text)
 9V1SO (G3XGY)
 9V1SQ (VE3FFA)
 9X5SP (DL8OA)
 9Y4AC (VE7BZC)

For these specifications we're indebted to correspondence from Ws 1CW 7HPI 7MPZ 7OK 7YF 9DY 0OIR 0OXN, Ks 2PAY 4KCK 4SMX 4GUS 4MZE 5KVK 7ZLO, Was 3DYP 6SST 7TWI 8FIO, Wbs 2EZG 2CHO 4WHE 4WFT 5KUJ 9CGJ, VEs 3DU 7BZC, DK5EC, 12s CBM YAF and KH6FLC, plus literature of clubs, groups and individuals to be credited subsequently. More!



For the third year the Mount Tom (MA) Amateur Repeater Assn. cooperated with the

St. Patrick's Parade Committee to provide operational and emergency communications. The monitoring began at the marshaling area and followed through to the dispersal area with about 12 units in between, plus a control station with ac power and telephone ties. Last buses and parade units, ambulance

calls, progress reports, program-order shuffling and TV information were the order of the day for the network. Early conclusion of the parade precipitated by rain and a reported twister added to the hectic operation, though all was concluded safely with the help of the MTARA advisory services.

Storm Warning

Various AREC groups around the country have developed a program of assistance to the National Weather Service. NWS's Office of Community Preparedness told ARRL representatives (in a recent Washington confab) that they would like many more amateur groups to get involved. They're also telling their stations throughout the U.S. to welcome amateur participation. It is obvious that our repeater stations can do the job.

Ron Moorefield, W8ILC, is emergency coordinator for Montgomery and Greene counties in Ohio. He has worked out the details and put into practice an excellent plan for an Amateur Radio Weather Watch. We'll quote portions of his outline:

"The National Weather Service needs accurate local reports during periods of Tornado Watches and Tornado Warnings. Amateur radio is ideally suited to make these reports and arrangements have been made with the NWS office . . . to have a station and operator on duty during these times.

"The two most important requirements of weather reporting are accuracy and speed. Accuracy is important because equipment and information available are not sufficient to pinpoint precisely the location of tornados. NWS personnel depend on trained local observers to identify and report conditions in their area. Speed is needed to give as much warning as possible to areas in the path of tornados.

Many lives can be saved by early warning.

"The Miami Valley FM Association has been given the responsibility of organizing and training amateurs to participate in this weather watch in cooperation with the ARRL Emergency Coordinator.

"Anyone taking part will be required to take a short course in weather reporting given by the MVFMA. This consists of a slide presentation, short lecture and the reading of two booklets furnished by the NWS. This course will be presented at radio clubs and repeater association meetings in the area.

"An MVFMA net control station will activate the Weather Watch on 04/64 when alerted by the NWS or the media. An operator will be immediately dispatched to the NWS office . . . Other stations will be designated as liaison with other repeaters in the area . . . Reports of weather in specific areas will be requested from time to time by the meteorologist when conditions indicate.

"Please do not report without being requested unless one or more of the following conditions exist: (1) Actual tornado sighted (2) Hail (3) Severe damaging winds (4) Continuous lightning. Give your location, speed and direction of wind, cloud cover, etc., as briefly as possible when reporting . . . Maps of the area will be furnished by the MVFMA and some units may be asked to go to other locations as needed.

"During severe weather situations, the National Weather Service uses all information relayed to them to flesh-out the picture they have on their instruments and radar scope. The weather unit Service Radar System serving this area is the most sophisticated unit available, but it does have its limitations. This is where we come in - Weather Radar will tell you where severe activity is located and a relative degree of severity but for specific details they need visual reports.

"Weather Radar also suffers from what is called 'ground clutter.' This is the radar receiving echoes from hills, trees and buildings in the vicinity of the radar station. This creates a *blind spot* in the radar display that we are responsible for filling in. We are the eyes of the National Weather Service.

"The statistical data that the Amateur Radio Stations relay to the National Weather Service after the storm has passed is used in the important job of documenting severe weather occurrences. This increases the Weather Service's knowledge of storms, making future warnings of more value in saving lives and property."

The NWS troops know what ham radio is and they're aware of the benefits of constructive repeater communication. Repeater and/or AREC groups interested in providing a similar service to the NWS should contact the NWS office in their vicinity.

PUBLIC SERVICE DIARY

- Southern New Brunswick - February 2. Severe blizzard conditions caused major property damage, power outages and knocked-out telephone lines. Over 40 amateurs stepped into the breach to handle communications. (VE1OC, SCM Mar/NFid)
- Kent Co., MI - March 2-4. During an ice storm, Kent Co. AREC members supplied communications for American Red Cross shelters scattered throughout various locations in the area. (WB8ESK)
- Washington Co., WI - March 3-10. During the worst ice storm in the county's history, over 20 amateurs provided emergency communications for the local power company, a broadcast station, the sheriff's dept. and the Red Cross. (K9OSK, EC Washington Co.)
- Pittsfield, ME - March 19. W1R1W/mobile observed an emergency situation on an interstate highway. He checked into the Maine Seagull Net (3940 kHz) to obtain help. WA1FCM, SEC ME, called the state police. (WA1MUX, SCM ME)
- Montgomery Co., MD - March 22. K3CMY spotted an assault and possible kidnapping. He called the Montgomery Co. police through the Rockville repeater's autopatch. The perpetrator was apprehended. (WA3ZOR)
- Lincoln, NE - March 29. Sixteen counties in Nebraska were blacked-out by a severe ice storm. The Lincoln Amateur Repeater Club (WR9ACD) provided communications for the state c.d. agency. (W9CHV)
- Lowell, MA - April 1. The Billerica, MA AREC was activated to assist policemen (who were without communications) during a large

fire. Eight operators, under the direction of K1PAD, participated. (W1ALP, SCM EMass)

□ Cleveland Nat'l Forest, CA - April 5. When two small boys were lost in the Santa Ana Mountains, the Riverside RACES assisted authorities in the search and rescue. Simplex and WR6ACJ were used. (W6KIJ)

□ Pacific Ocean - April 6-9. A woman on the yacht *Mandoria* was desperately ill with hepatitis. The radio operator aboard, HP9XAW, put out a distress call on the Pacific Maritime Mobile Net. Authorities were notified and communications were maintained by Y18AN, C21KM/mm, HP2BKZ/mm, WA7HNY and many others, until a rescue ship reached the yacht. (ZL1A1H)

□ St. Petersburg, FL - April 6-11. The SPARC Repeater Team provided communications involving public safety, emergency medical services and coordination of activity in connection with the Festival of States celebration in this city. (K4SCL, SCM SFla)

□ Monroe Co., NY - April 7. AREC/RACES handled vital communications when telephone service at a nursing home was disrupted. At one point, an ambulance had to be summoned and this was done via WR2ABF. (WB2EDT, SEC WNY)

□ Pacific Ocean - April 8-9. K17HAY was in QSO with W7SRU and WB9PHZ on 20 meters when he heard a weak MAYDAY. The breaker was W6YLT/mm (operating from battery power) aboard the 62-foot sloop *Sorcery*. The sloop had suffered a 360-degree roll during a storm, 12,000 miles north of the Hawaiian Islands. This caused the loss of all power, masts, commercial radio gear and life rafts. WA6EAZ phone-patched W7SRU and K17HAY into the San Francisco Coast Guard, who in turn alerted the Juneau, AK, Coast Guard. Rescue vessels and aircraft were

dispatched. Communications were sustained for a period of 30 hours, until the evacuation took place. (W7JWJ)

□ Atlantic Ocean - April 13-14. The radio operator aboard the *S.S. Tamara*, W4OTY, suffered a heart attack. His rig was set on the Maritime Mobile Net frequency. The ship's captain, unfamiliar with any of the other radio equipment, called for help on the net. Continuous contact was maintained by the net controls until a Coast Guard vessel made a rendezvous with the ship. During the vigil, K9RQF (a doctor in Colorado) advised the captain how to administer a drug to ease some of the stricken man's pain. (KV4II, KV4IJ, WB9OWN)

□ Asuncion, Paraguay - April 20. A rare drug was needed to save the life of a young girl in that city. A request for aid was made on the Inter-American Traffic Net on 21,415 kHz. WB4PHM and WA4LZN located the medicine and arranged for its shipment. (K4GOS)

□ Repeater Log. According to reports received to date, repeaters were used to report eight traffic accidents and related occurrences, two fires, two searches and one crime in progress. Repeaters involved were: WR2ABR ADA ADT, WR3AFZ, WR4s ACO ANE, WR6AJL, WR9ABY and WR9ADU.

□ For the month of April, 36 SEC reports were received, showing a total AREC membership of 12,765. Last year at this time, 39 reports were submitted, listing a membership of 13,439. Sections reporting were: Alaska, Alta, Ariz., Colo., Conn., Del., EBay, ENY, EMass, Ga., Ind., Ky., Me., Mich., Miss., Mo., NLI, NC, NFla, NNI, NTex, Ohio, Okla., Ont., Org. Pac., SDgo, SBar, Sask, SFla, SNJ, STex, Utah, WVa, WMass, WPa.

*Communications Assistant, ARRL

NATIONAL TRAFFIC SYSTEM

"It goes without saying that the fine gentleman from Calgary, VE6FK, will be sorely missed by many throughout NTS who have had the privilege of knowing him and working with him in the System." — W8MCR.

A somewhat underwhelming response from region managers with regard to SET reports. Remember, QST, not the late file, is the official record. Traffic and propagation have improved in April. Many certificate qualifiers this month: W2FR WA2ZGR (2RNd), WB4ZNB (4RNd), K4GCN W4GOG K4MC W4MEE WB4WQL (4RN), WB5KGP (RN5d), VE5LZ VE7MW (RN7d), K9MZO WA9OBP WB9TOG (9RN). 2RN annual certificates went to: W2BIW WB2LCV WB2QIX WB2WZL — 2nd annual; 3rd annual — WA2DRC WA2DSA WB2FLF WA2ICB W2MLC WB2PYM; 4th annual — WA2PJL; 5th annual — W2CU; 6th annual — W2FZK WB2LZN; 7th annual — WB2RKK; 8th annual — W2MTA; 9th annual — W2FR W2RUF. CAN first-timers went to: VE4PG WB4SKI WB5FHA W5HNN K5TTC WB9KTR WB0HBM WB0HSP W0MOQ WA0NZA K0ZXE. Another two of our *ironpersons*, VE6FS and WA5ZZA, have resigned their managerships. Our thanks for an outstanding effort in the organization and guidance of daytime activities.

Transcontinental Corps

K5MAT reports that April was the biggest traffic month (outside of December) since he became director of TCC-Pacific. And conditions were good!

	1	2	3	4	5
Eastern	120	88.9	2265	864	
Central	90	92.2	1082	520	
Pacific	120	95.0	2088	1036	
Summary	330	92.0	5435	2420	

1 — AREA
2 — FUNCTIONS
3 — % SUCCESSFUL
4 — TRAFFIC
5 — OUT-OF-NET TRAFFIC

TCC Roster

The TCC roster (April): Eastern Area (W2FR, Dir.) — W1s NJM GYY, K1s EIR GMW, WA1s MSK WEM, W2s FR GKZ, K2HI/VE2, WA2s DSA ICB PJL UWA, WB2s PYM RKK UBW, W3EML, K3MVO, WA3VBM, W4UQ, K4s GTS KNP, WA4VFW, W8PMJ, K8KMQ, WA8HGH, WB8ITT, VE3s GOL SB, Central Area (W5GHP, Dir.) — WB4s DXN SKI, W5s GHP MI RB UGE UJJ, WA5IGU, W9s CX Y DND NXG, WA9EED, WB9NOZ, W0s HH HI INH LCX QMY, K0s AEM CVD, WA0TMM, Pacific Area (K5MAT, Dir.) — W5RE, K5MAT, WB5KSS, W6s BGF EOT MLF TYM VZT, K6s HW QPH, WA6DEI, W7s OZX GHT KZ, K7s IWD NHL QFG, WA7WXY, W8s IW LQ LRN, K0DRL, WA0KKR/7, W0s DJY HCK QOT, VE7ZK.

WA4EUD	K3KAJ	WB0HCK	W0NUB
K4TH	K30IO	VE3DVE	WB0QOT
W4UVP	AA3QIA	VE3GOL	41
WB5FMA	WA3WPY	VE3GT	WA1UOU
VE4UL	AA3YKK	VE3SB	WA2ZJP
46	WB4DJU	43	K5BY
WB2EMU	WB4GHU	W1RWG	W7LG
WB4DXN	WA4MWF	42	40
WB5FHA	WB4SKI	WA1MJE	WA3SXU
44	WB4TPR	K4YRL	WA3UUX
WB2FLN	W6RFF	K7VZT	W5UJJ
WB2RMK	K7VZT	K9TKE	WB9KPX
WA3DUM	K9KHI	K0EVH	

Brass Pounders League April 1976

BPL Medallions (see December, 1973 QST p. 59) have been awarded to the following amateurs since last month's listings: WB2VTT.

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 April Traffic

1	2	3	4	5	6
W3CUL	318	1291	1521	38	3168
W0WYX	56	1053	295	758	2162
K9CPM	0	405	89	756	1250
W3VR	296	194	401	16	907
AB0HOX	20	371	378	20	789
WB6EIG	7	322	322	0	651
VE1AAO	2	315	311	2	630
K3NSN	15	300	300	0	615
K5HZR	0	267	306	1	574
K4TH	16	271	199	86	572
WB0MTA	0	259	289	0	548
WA1UGJ	55	251	216	12	534
W5TI	5	256	90	174	525
W6YBV	38	218	237	21	514
WA1UAX	77	182	241	9	509
WB4OBZ	6	262	235	3	506
WB6PKA	23	230	249	4	506
WB0QOT	1	232	263	7	503

BPL for 100 or more originations-plus deliveries

W5OAD	352	WA4EYD	137
VE1BDT	241	WB6YD	129
K7VWA	221	WB80IE	126
WA0RWM	213	WB8DQX	111
WA3ATQ	200	WB6AOG	110
WA0GLI	180	WA4WBM	109
K0YFK	180	K0RYU	106
K4KDJ	157	K4KDJ (Mar.)	108
W7TZK	156	W4FMM (Mar.)	106
W0FIR	153	K4KDJ (Feb.)	127
KC6DK	140	VE7ZK (Dec.)	120

1 — CALL
2 — ORIG.
3 — REC'D.
4 — SENT
5 — DEL.
6 — TOTAL

April Reports

1	2	3	4	5	6
EAN	30	2018	67.2	1,325	97.2
DEAN	60	675	11.3	620	83.9
CAN	30	1035	34.5	860	99.4
DCAN	54	143	2.6	149	83.0
PAN	30	1422	47.4	1,088	100.0
OPAN	50	102	2.0	136	71.1
CTN	28	333	11.9	477	92.2
1RN	58	642	11.1	489	93.5
1RNd	30	142	4.7	334	76.1
2RN	87	630	7.2	382	92.5
2RNd	60	351	5.8	442	94.0
3RN	60	396	6.6	402	93.8
3RNd	30	160	5.3	431	97.7
4RN	56	615	10.9	374	90.2
4RNd	59	241	4.1	243	54.9
RN5	59	730	12.2	435	92.3
RN5d	30	149	4.9	233	79.1
RN6d	30	206	6.8	213	97.9
RN7	60	443	7.3	544	84.7
RN7d	40	65	1.6	144	36.6
8RN	46	355	7.7	397	72.2
8RNd	28	140	5.0	564	83.3
9RN	60	440	7.3	336	77.5
9RNd	30	118	3.9	235	83.3
ECN	61	620	10.1	586	96.0
TWN	60	443	7.3	294	96.3
TWNd	20	23	1.1	054	48.0

TCC					
Eastern	104 ¹	864			
Central	83 ¹	528			
Pacific	114 ¹	1036			
Sections ²	3719	16723	4.5		
Summary	4965	31778	6.4		
Record	6256	36367	19.1		

1 — NET
2 — SESSIONS
3 — TRAFFIC
4 — AVG.
5 — RATE
6 — % REP.

¹ TCC functions not counted as net sessions.
² Section and local nets reporting (117): BCEN (BC), MTN (MB), OPN (ON), WQV/UHF (PQ), AENB AEND AENJ AENM AENR AENW (AL), ASN (AK), ATEN HARC (AZ), NCN SBARECN SCN SVN (CA), CWN (CO, WY), CN CPN NVTN (CT), DEPN DTN (DE), FMTN FPTN GN NFPPN GN NFPPN QFN SRN TPTN (FL), GSBN (GA), IMN MTN (ID, MT), ILN (IL), I75MN TLCN (IA), KPN K5BN KWN (KS), KNTN KTN KYN (KY), LAN LRN LSN LTN (LA), SGN (ME), MDCFN (MD), WMN WMPN (MA), MACS MNN M16MN WSSB QMN (MI), MAWX MSM MSPN PAW (MN), MSBN MSN MTN (MS), M0N MOSSB MOSSN PHD (MO), NAN WNN (NE), BARTEN NJN NJPN NJSN (NJ), SWN (NM), NLI NLS NYPN NYR NYS (NY), CN GCEN NCSSBN PX SCSSBN (NC SC), BNR BRN BRN MASER OSSBN O6MN OSN (OH), OAN OFON OLZ OPEN OTWN STN (OK), BSN GSN (OR), EPAEP & TPN PFN WPA (PA), TN TPN (TN), TEX TTN (TX), BUN UCN (UT), VN VSN (VA), NSN (WA), WVN WVMD WVNN WVPN (WV), BWN WIN WNN WSN (WI).

Independent Nets (April)

1	2	3	4
Central Gulf Coast			
Hurricane	30	79	1777
Clearing House	30	263	323
Hit & Bounce	60	1380	485
Hit & Bounce Slow	17	81	195
IMRA	26	394	984
Mike Farad	27	57	260
North American SSB	26	402	363
Washington Region PON	13	34	219
20 Meter ISSB	20	417	304
75 Meter ISSB	30	664	1152
7290 Traffic	43	582	1740

1 — NET
2 — SESSIONS
3 — TRAFFIC
4 — CHECK-INS

Public Service Honor Roll April 1976

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.

71	K5TTC	55	49
WA5ZZA	WB6BDL	WB8JGW	WB2LZN
WA0GLI	W7CXX	WB0DAG	WA2WIW
70	W8IBX	54	WA3VBM
WA1UGJ	WB0HBM	WA4NID	K3YHR
60	WB6YID	W5KLV	WB4EKJ
67	58	53	WB5KPL
WA5RKU	W6GTVA	WB4OXT	WB5KQJ
65	57	WB5PVL	WB5NUM
WB0HOX	57	52	W6INH
64	WB9ICH	WA1VMV/3	W7GHT
WB2VTT	56	K5MAT	WB8DQX
WB4OBZ	WA1FCM	WA7MEL	K9ZTV
WB5KGP	WA2DSA	W9OTF	K0CVD
61	W2MLC	51	K0MRI
WA1MSK	WB2RUZ	WB5EKU	VE3FRG
K1PAD	WB2UBW	WA5IQU	VE3GFN
W2MTA	WA2VPA	WASPRI	48
WA2PJJ	W5UGE	50	W40GG
WB2PYM	WA5YEA	50	WB8NCD
WB2WRT	W6RNL	WA2WKH	47
WA4FBI	W7VSE	WA4EPJ	W1BVR
W5GHP	WA0KKR/7		WB2RKK
WB5NKD	VE3JGJ		WB2VRJ



1976 ARRL International DX Competition High Claimed Scores

The following are high scores received as of May 10, 1976. Complete results will appear in October *QST*. Do not request DXCC credit until that time. Asterisks indicate one-weekend expeditions.

DX - CW

Single Op - All Band	Score
KP4EAJ	3,870,045-4905-263
PJ2VD	3,715,401-4471-277
KF4EKI	3,495,270-4430-263
KH6LI	2,512,488-3377-248
KH6HKM	2,145,468-3236-221
W2P2MOC	1,739,000-2852-250*
PJ8IT	1,669,120-2832-220*
KV4IO	1,659,960-2610-212
KH6CF	1,609,089-2542-211
EZ2IA	1,438,478-2709-177
KC4AAC	1,286,640-2240-187
EL2T	1,177,920-2045-192
G4BUE	1,084,425-2125-185
G3F X8	1,083,750-2129-170
IG3NG	1,057,815-2137-185
IZ4XG	1,047,540-2054-170
T2RWX	1,004,892-1709-196

Single Op - High Band	Score
VY1OB	494,340-1540-107
VY1BCD	484,800-1600-101
OX3AB	307,673-1181-89

Single Op - Low Band	Score
VK2AR	289,170-1071-90
VK3MR	229,548-814-94
IB6GI	212,400-944-75
YU3ZV	196,320-818-80
KH6JAC	186,732-684-91
VK3QI	151,641-581-87

Multi-Single	Score
ZF1AL	2,100,636-2967-236*
DP6HN	1,145,664-1836-208*
DK8TU	810,810-1755-154
DL7BG	649,936-1552-143
OK1KSO/P	590,814-1618-141
J4YBA	425,448-1370-114

Multi-Multi	Score
PJ8CO	1,989,756-2909-228*

W/V/E - CW

Single Op - All Band	Score
W3LPL	2,269,656-2174-348
W7RM(K7VFP,opr.)	1,752,480-2434-240
W5WZQ	1,696,960-1726-320
K4YFQ	1,584,234-1698-311
W2GXD	1,569,412-1787-292
K4GSU	1,501,515-1641-305
W3BGN	1,464,414-1666-293
W6OUN(WB6OLD,opr.)	1,409,589-1887-249
K4VX(WB4SGV,opr.)	1,389,264-1648-281
W1HFB	1,322,400-1520-290
W6PAA	1,238,202-1902-217
W7IR	1,233,045-1551-265
W1DAL	1,229,238-1453-282
W6RTT	1,119,360-1698-220
K5PF1	1,103,232-1352-272
WA1STN	1,089,040-1507-240
K2LE	1,077,255-1355-265
K6CQF(VK3DKV,opr.)	1,065,213-1667-213
K2BNI	1,043,118-1233-282
WA1ABW	1,042,176-1387-256
W3GRF	1,041,768-1272-273

Single Op - High Band	Score
W2DXL	775,890-1398-185
AD4BAI	595,335-947-196
W4WSP	518,010-1114-155

Single Op - Low Band	Score
K1NOL	340,200-700-162
W4YWX	273,918-643-142
K1RQE	237,600-528-150

Multi-Single	Score
W1MX	1,998,747-1977-337
W2VD	1,817,127-2171-270
W1KID	1,640,364-1892-289
W5MYA	1,586,061-1647-321
AA4LZR	1,429,632-1632-292
K7NHV	1,372,272-2024-226

W1NRF/I	Score
W6NGG	1,262,079-1541-273
W6NGG	1,277,824-1842-224
W1LLNQ	1,141,686-1394-273
AC4MYA	1,005,312-1309-256
W6GLLV	1,003,128-1706-196

Multi-Multi	Score
W3WJD	4,862,364-3692-439
W4AI	4,787,508-3596-441
W4BVV	4,119,984-3179-432
W2PV	3,902,076-3039-428
W3FRY	3,819,360-2920-436
W3CPE	3,406,572-3012-377
K6RCE	2,900,898-3003-322
W3GM	2,822,526-2394-393
W1ZM	2,590,968-2426-356
K6RR	2,258,820-2670-282
W3BWZ	2,198,160-2130-344

DX - PHONE

Single Op - All Band	Score
VY4AGP	5,195,232-6013-288
K25BC	4,433,247-5413-273
KH6J	4,080,384-5152-264
W9AJF/6Y5	3,791,644-4716-268
XE1LLS	3,713,769-4743-261
LUBAJG	2,945,880-4008-249
GW8FP	2,773,713-4073-227
LUBA	2,593,500-3458-250
AH6HML	2,599,296-3428-244
PJ8JT	2,399,400-3225-248*
AH6BZF	1,948,600-2868-225
EL2T	1,844,520-3236-190
VP2EE	1,842,120-2924-210*
KCAAC	1,399,299-2001-233
CT4AT	1,386,264-2599-178
VE2AQS/109	1,339,272-1958-228
VY1FVN	1,332,450-2350-189

Single Op - High Band	Score
VN1RWG	1,048,572-2394-146
K9EJE	1,043,460-2805-124
PY2ELV	626,364-1589-137
PY4KL	567,243-1269-149
H1MGG	448,077-1123-133

Single Op - Low Band	Score
W4EV/VP9	713,241-1843-129
K4LRQ/HC1	423,096-1186-122
ZS6DW	183,976-586-87
G3TJW	129,924-583-72

Multi-Single	Score
KH6GQW	3,595,428-4932-243
VY1AVO	3,125,538-4218-247
W6NAR/6Y5	2,004,015-2795-239*
6Y8ED	1,861,461-3087-201
W1GNC/VP9	1,808,400-2740-220*

Multi-Multi	Score
R18CO	3,947,872-4656-254*
HD5EE	3,285,150-4625-242*

W/V/E - PHONE

Single Op - All Band	Score
W6HX(WB6OLD,opr.)	1,830,840-2090-292
W1ZM(WA2CLQ,opr.)	1,796,464-1702-344
W3LPL	1,393,269-1354-343
W2HMH	1,192,608-1212-328
W1HFB	1,148,028-1211-316
W7SFA(K7VFP,opr.)	1,141,650-1478-258
K4VX	1,072,224-1241-288
K9HMB	1,012,713-1129-299
W2GXD	997,030-1160-275
W3CRE	917,352-1116-274
K6CQF(VK3DKV,opr.)	881,637-1273-223
W1YK(WA1JLD,opr.)	837,293-1201-231
W4QCVS(WB9DJV,opr.)	829,260-1084-256
800.961	827-381
K5PFL	729,468-881-275
W41ABW	664,956-846-262
W4U7T	664,956-846-262

W6YK(WA7MQX,opr.)	Score
W5UDK/I	676,898-1282-160
W7FML	676,751-803-23
WA7WY	566,844-1079-17
WA4FLB	562,019-760-23
K6LJL	546,060-958-19
K2FL	530,651-683-28
W2GUH/9	512,635-718-23

Single Op - High Band	Score
W6PXP	692,070-1357-17
W4WSP	592,416-988-20
K1RQE	436,760-852-21
W6NDM	817,293-1127-15
W6P6X	616,834-1261-15

Single Op - Low Band	Score
W8ZDF	214,638-431-16
W4YWX	177,750-375-18
W4SRTG	136,452-332-11
K4YFQ	116,443-303-12
W4GOL/6	98,208-498-6

Multi-Single	Score
W1KID	1,327,536-1317-33
W1ABV	1,267,476-1337-31
AA4LZR	1,249,380-1262-33
W1NRF/I	1,221,297-1309-33
W1ZM	1,116,350-1278-33
AD3GJD	1,116,120-1310-21
W1MX	1,105,218-1286-22
W5QKK	1,069,686-1674-23
K8SVL	1,014,390-1445-23

Multi-Multi	Score
AC2PV	4,549,779-3153-41
W3AU	4,361,526-2843-41
W3WJD	4,187,376-2872-41
W4BVV	3,689,248-2572-41
W3GM	2,816,553-2014-41
W3PHM	2,176,264-1784-41
AA3NGS	2,173,389-1907-41
W6ONV	2,019,312-2274-41
W5OOE	1,913,538-1738-31
W3FRY	1,786,752-1851-31
W3GRF	1,489,356-1508-31

50 Years Ago

July, 1926

Loss of advertising revenue and experimenter interest is bothering many radio magazines, as broadcast radio becomes accepted form of family entertainment. But Warner projects era of growth for ham radio and *QST*, and advertising is bearing him out. Reason: "We have a patent on the most interesting form of radio - two-way communication."

Technically the accent is on antennas and propagation, and 5-meter progress is featured. Kruse and Windom discuss "Tuning the Antenna," and there is talk of something called "standing waves." Clyde Darr sets the antenna theme, with a cover showing 2-man team checking antenna performance. One hangs by an arm from the top of the antenna pole, binoculars trained on rf meter at the antenna feedpoint, as he shouts down readings to operator below. There are antenna ideas from Alexander and Pickard.

Five meters is booming. Kruse, 1XAQ, and Phelps, 2EB, have spanned 120 miles. This may have been the first transpacific work on

record - they have made it only twice many tries, both on fair calm days. Next is International 5-Meter Week, with cooperating stations in Europe, Australia and New Zealand. Director Woodruff's 5-meter receiver pictured.

Windom, 8GZ, has won the Jewell Cup for QRP work with Australia, New Zealand and South Africa, using a UV-199 peanut tube, under 0.6 watt, plate and filament power, 17,820 miles per watt.

Hatry discusses shortwave receivers, Ham transmitting coils, and Clayton crystal holders. Amateur radio stations pictured include 1AOF, Greenfield, Mass., 6OI, Stanford University, California, and Australian 5BG. Look of history here, for our bicentennial issue!

25 Years Ago

July, 1951

Editorial hand of welcome is extended to the Novice; the new easy-entry way into the game being set for July 1. Other FCC news has familiar ring: Paper work far behind, but don't add to work load by writing Washington. If you applied before expiration date, continue operating until you hear from FCC on renewal. But apply early!

Minutes of the 1951 Board Meeting show significant steps. Headquarters is instructed to start a YL column and a TVI department in *QST*, and to develop special Novice and Technician programs. Handy honored by election to post of ARRL Vice-President.

TVI figures heavily in *QST* technical content. W1FTX has fully TVI-proofed 813 rig for 10 through 80. W3CPC shows a Phone Man's VFO for the hf bands - with reactance modulator for fm. W1HDQ capitalizes on the TV situation, using a TV receiver tuner as a converter for 28, 50, 144 and 220 Mc. W1DX goes back to basics with "How to Lay Out a Transmitter." No transistors or circuit-board nonsense here. W4AED shows how to key a BC696. There is a modern-looking switchable

vertical array by W2OOM.

Extra!!'s used in reporting California-Texas 2-meter work, 1200 to 1400 miles, latter a new record. We speculate on the propagation medium, tropo or E_s, tending favor the latter. There was 2-meter tropo, to W4LAW worked W5ONS, the first across-tropo gulf work on 144 Mc., May 30.

DX column photo shows young-looking Hq. DXers, surrounding W4GVU (IA3GV/p3AA) as he receives DXCC Award from C. Budlong.

Most-advertised equipment this month HRO-50T1 and NC-183 receivers. Don't miss the incomparable Gil Field Day cover! W1HDQ

A Hard Day's Night: Results of the 1976 Simulated Emergency Test

By Robert Halprin,* WA1WEM

I ran the gamut from a "bicentennial blizzard" to a "blood emergency" with an actual volcanic eruption thrown in for good measure.¹ Yes, the 1976 Simulated Emergency Test called for a lot of hard work by amateurs, since last year's all-time high for local activity was reached and surpassed. A two-month leeway was permitted for the two-day test but, with the exception of Southern Florida, the majority of the activity centered on the target weekend of January 24-25.

In case you might be wondering, the following are the objectives of the SET:

1) to test the capability of the local amateur communications organizations (primarily AREC and RACES) under emergency conditions.

2) to test the ability of nets (primarily NTS) to function under overload conditions.

3) to demonstrate to served agencies (Red Cross, c.d., etc.), the public, and the mass media, amateur radio's value as an emergency communications service.

4) to provide operator training and experience in emergency communications practices.

305 emergency coordinators/radio officers and 202 net managers reported their activities to Hq. this year. As WA1FCM mentioned last year, what you see is what we got.

Looking at the statistics, we see local activity was up in all categories, with the exception of EC/RO written reports (four more reports than last year, overall). Despite the drop in mail reports (nine less), the total score breaks last year's all-time high by close to 10,000 points!

It's evident that there is a great increase in the number of stations with emergency-power capabilities. Most of this gear is on two-meter fm and so is most of the local activity. We all know the importance of having emergency-power capability. If you don't have it, then you won't be able to provide communications when the power is knocked out in your town. During a hurricane or an ice storm, etc., there ain't no sunshine when you're gone. And more and more repeaters are getting involved in SET exercises, which is an encouraging trend.

Statistics don't tell the whole story of course. Since net totals are down, don't get the idea that traffickers took the weekend off. More net reports were received this year; unfortunately, band conditions were much worse than last year. Many net sessions were completely wiped out. Net operators were in there fighting, trying to deal with the things that did and *didn't* go bump in the night.

But propagation problems weren't confined just to the evening. For example, it played havoc with the Day-time Eastern Area Net. DEAN didn't get any high marks on Sunday (the 25th) as traffic came to a virtual standstill. EAN was activated twice that day and succeeded in clearing up the backlog. Does this negate this year's *laissez faire* approach to NTS activities (i.e., no planned extra cycles) or is this spontaneity good practice for what might happen during a real emergency? The Eastern Area Staff is working on some recommendations along these lines. How about yours?

For comparison purposes, the "average" local group had 36 registered AREC/RACES members with 24 participating in the local test. This is an increase from last year, which sported 30 and 16 respectively.

The following sections (11) managed more than 2000 total points: Alabama,

Connecticut, Georgia, Indiana, Michigan, North Carolina, Northern Florida, Ohio (the top score), Southern Florida, Virginia and Western Pennsylvania. Last year only nine sections reached this goal.

Total scores of participating groups are listed with scores based on the sum of the following: 1 point for each AREC registrant or RACES operator; 2 points for each amateur participating in the local test; 1 point for each message from an AREC/RACES member to the SEC or state RO (limit one per amateur); 1 point for each message sent by participants to friends (limit two per amateur); 5 points for each mobile, self-powered portable or fixed station using emergency power; 5 points for each agency for whom messages were originated; 10 points for each community in which agencies were contacted; 10 points for a release to the news media; 10 points for submitting an

A simulated communications emergency was conducted by the Milwaukee County area Amateur Radio Emergency Corps, to test their ability to provide communications between 33 hospitals in the area and the Milwaukee Blood Center (assuming normal communications were disrupted). Manning the control station at the center were: Emergency Coordinator WB9NNJ, pointing at the map showing hospital locations; WB9EUS, on the mic; WB9FPZ, logging; and K9UUT, using the hand-held unit. (Milwaukee Sentinel photo)



*Communications Assistant, ARRL

¹ Oh yes, the bicentennial blizzard was held in Connecticut with a unified effort by AREC, NTS, MARS and RACES. The simulated blood shortage was staged in conjunction with several hospitals in the Milwaukee, Wisconsin, area and Mt. Augustine did its thing in Alaska.

emergency plan; and a quality point ranking from 1 to 10 based on how the local group performed overall. Last year's points are listed in parentheses.

The average section or local net handled 73 messages in 240 minutes with 21 participants (five participating in emergency-power-only sessions), had four different net control stations and three liaison stations.

Net totals in the following states surpassed 2000 points: Alabama, California, Connecticut, Florida, Georgia, Indiana, Kentucky, Massachusetts, Michigan, Mississippi, New

Jersey, New York, North Carolina, Ohio, Pennsylvania, Virginia - only one less than last year! Again, Ohio was number one.

Total points for nets are based on the following: 1 point for each message handled; 1 point for each minute the net was in useful directed session; 2 points for each different station participating by handling traffic; 3 points for each different station reporting into emergency-powered-only sessions; 5 points for each different net control station; and 5 points for each different station performing liaison to a higher

level NTS net.

Soapbox

Best MSN report so far: Good check-ins and cooperation. -- (K00NK, RM MO) First emergency power session went well. -- (K1EIC, RM CT) For SET we staged a mock invasion of Utah by British troops. -- (WA7ZBO, SEC UT) Band conditions were their usual poor shape but we had an interesting time. -- (WA0GLI, PAM MN) Both late sessions were completely bombed out. -- (K0MRI, RM KS) Suggest that Field Day be combined with SET.

Area of Jurisdiction Reported by Total Points

Area of Jurisdiction	Reported by	Total Points
CANADIAN DIVISION		
Alberta (0)	Monroe Co. WA2VKU/9 194 Ohio Co. W89JKU 71 Perry Co. K9UZA --- *Porter Co. D16RD/W9 133 Shelby Co. W9NNAQ 10 Tipton Co. WA9OHX --- Vanderburgh Co. WA9OCF 538 Vigo Co. K9MKM 610 Wabash Co. W89PUM 125 Warlick Co. K91KE 135 Whitley Co. W89FPK 84	
British Columbia (0)	Wisconsin (342) 233 *Dane Co. K9QXY 168 Manitowoc Co. W9BZU ---	
*Massey VE7HQ ---	Milwaukee, Ozaukee, Washington, Waukesha Cos. W89NNJ --- Portage Co. W9CF5 --- Waukesha Co. K9PAK 65	
Maritime/Offid. (732) 589	DAKOTA DIVISION	
Cape Breton VE3IG 166	Minnesota (283) 367	
Halifax VE1BK 160	Blue Earth Co. K9KLY 101	
Moncton VE1AC 160	Mower Co. W9AZR 115	
Prince George VE1ACA ---	Olmstead Co. W9OXN 191	
Prince Edward Island VE1AIC 263	South Dakota (0) 243	
Sydney VE1ACA ---	Hand Co. WA9ZXY 78 Lawrence Co. W9DVB 166	
Ontario (547) 521	DELTA DIVISION	
*Grantford Hamilton VE3SB 194	Arkansas (143) 417	
Kemptville & Merrickville VE3GNW 110	Northwest AR W5TXA 417	
*St. Catharines VE3DVE 217	Louisiana (2583) 137	
Saskatchewan (2463) 1223	St. Tammany Parish WASWU 137	
Prince Albert VE5BO 484	Mississippi (653) 1525	
Saskatoon VE5RJ 341	District A WASMPQ 318 District C K5UBL 77 District E W8EFL 152 District F W81LF 229 District M W85GQI 249	
South West Sask. VE5AQ 398	Tennessee (2810) 1817	
ATLANTIC DIVISION	Bristol & E. Sullivan Cos. WA9WVW 149 Bradley Co. W84BK 93 Cumberland Co. W84PHW 111 Davidson Co. WA4BCS 328 Putnam Co. W84DDV 167 Sevier Co. W86SL 26 Shelby Co. W40QG 470 Sullivan Co. K4LRL 413 Weakley Co. WA4ZQX 60	
Delaware (0) 75	GREAT LAKES DIVISION	
New Castle Co. K3YHR 75	Kentucky (2379) 1666	
E. Pennsylvania (1879) 1756	District 4 K4UDZ 980 District 8 W84ZML 984 District 11 WANVE 61 District 18 K4AVX 21 District 19 W84IBO 20	
Berks County WA3VUE 193	Michigan (1126) 4816	
Bucks Co. WA3IWX 849	Calhoun Co. W89FRJ 165	
Lancaster Co. WA3QNK 517	Clinton Co. W81SC 771 Ingham Cos. W81OY 42	
Montgomery Co. W3IU 97	Delta Co. W81OY 42	
New York Co. K3F0B ---	Charlevoix Cos. W8AXF 83 Isabella Co. W8BAPN 31 Jackson Co. W8BMT 475 Kent Co. W8BESR 475 Lenawee Co. W8MPD 221 Macomb Co. W8MPD 221 Midland Co. W8QOI 21 Monroe Co. W8AFK 778 Oakland Co. A8SZC 56 Ottawa Co. W8BBZF 105 Sanilac Co. W8CUP 296 Washtenaw Co. K8UR 346 Wayne Co. W8RFD, K8JTT 954	
Maryland, DC (519) 563	Ohio (5986) 7081	
Calvert Co. W2ZNV 89	Adams Co. W8CFX 215 Brown Cos. W8JBS 241	
Howard Co. WA3JWS 201	Belmont Co. W8RQV 162 Monroe Cos. W8BCLF 212 Butler Co. W8VZE 171 Clermont Co. W8TSX 242 Clinton Co. K8CKY 53 Hancock Cos. K8CKY 53 Harrison Cos. W88MB 698 Wayne Co. W8ERD 1033	
Prince Georges Co. WA3RSG 166	NEW ENGLAND DIVISION	
St. Marys Co. W3HJH 107	Connecticut (1325) 2115	
S. New Jersey (472) 705	Greater Bridgeport WA1JYP 143 Bristol WA1LRO 285 CT Civil Preparedness Hq. K1GGC 189 Greater Hartford WA1LMV 171 Meriden WA1NGL 323 Newark Middletown WA1RZ 28 Norwalk, Darien, New Canaan, Westport, Wilton WA1RXA 261 North-Central WA1OPB 78 CT CT CT CT CT	
R Burlington Co. K2QIJ 696	RACES Area 1 W1BGT 127 RACES Area 2 W1ZCO 150 RACES Area 3 K1MNV 215 RACES Area 4 W1HHR 36 RACES Area 5 W1DND 109	
Princeton WA2TRK 9	E. Massachusetts (605) 136	
N. New York (1365) 338	Bellingham WA1EQH 136 Billerica K1PAD 121 Bedford WA1LE 226 Northwood WA1DLY 70 Pittsford W1KZT 36 Winthrop W1BBS 44	
Onondaga Co. WA2PEA 338	Maine (218) 157 West Virginia (391) 292	
W. Pennsylvania 3745	Berkeley, Jefferson, Morgan Cos. W8BEKG 140 Fayette K8CFY 18 Hancock Co. K8QEW 94	
Allegheny Co. WA1JBQ 734	ROANOKE DIVISION	
Beaver Co. K3VYV 136	North Carolina (2323) 2522	
Blair Co. WA3IYU 38	Alamance Co. W44FFW 216	
Butler Co. WA35XC 509	Avoye, Burke, Caldwell, Catawba Cos. K4A1 16 Cherokee, Clay, Graham Cos. K4AH 48 Cumberland Co. W8AFM 950 Currituck Co. W8KZG 308 Pitt Co. W8KZG 151 Union Co. W4L8 85 Waikes Co. W4FMN 745	
Cambria Co. K3J5V 213	Virginia (1181) 2299	
Centre Co. WA3LJW 286	Area 2 W84ODZ 302 Area 7 W4GCE 129 Area 12 W4ACC 143 Alexandria W4YU 139 *Fairfax WA4YU --- Norfolk W4BKY 146	
Clinton Co. WA3AZ 63	Northern, Wise Cos. W4CFV 6 Petersburg W84MUH 170	
Crawford Co. K3HVL 180	Prince William Co. WA4GFS 487 Stafford Co. WA4HUB 352 Southampton Co. W84ZNB 87 Va. Beach W84WUX 348	
Fayette Westmoreland Co. WA3SSU, W3RUK 1409	West Virginia (391) 292	
Indiana Co. K3CWL 29	Berkeley, Jefferson, Morgan Cos. W8BEKG 140 Fayette K8CFY 18 Hancock Co. K8QEW 94	
McKean Co. W3CGR 93	ROCKY MOUNTAIN DIVISION	
Vinango Co. W3RUL 30	Colorado (1128) 420	
CENTRAL DIVISION		
Illinois (1032) 704		
Cook Co. W9HPG 582		
Wabash Co. K9DFE, W9FJP 122		
Indiana (2411) 3904		
*Allen Co. W89IHR ---		
Bartholomew Co. WA9CLM 139		
Blackford Co. W89BPB/ W89RQZ 98		
Cass Co. W89EAT 128		
Clark Co. WA91JS 250		
Dearborn Co. WA9RLA 27		
Elkhart Co. W93GE 13		
Fountain, Tippecanoe and Warren Cos. W9NGW 363		
Gibson Co. K9NPN 196		
Huntington Co. WA9GWP 93		
Jay Co. WA9KWH 83		
Johnson Co. W89AYB 81		
Lake Co. W89HCH 387		
La Porte Co. K9HYV 267		

*Reported by radiogram or letter only.

(K7NHL, mgr. Pacific Area Net) Combined operations with Red Cross, RACES, AREC and REACT. It worked out quite well and we got several prospective hams from the CB ranks. — (WB2VUK, EC Westchester Co., NY) Condx nearly QNP evening of January 24. Liaison with three WMass repeaters. — (W1DVV, RM WMass) Improvement over last year due to use of WRIADR. — (W1LE, EC New Bedford, MA) Net control operated with emergency generator power and our repeater, WR0AIF, which is located atop a grain elevator, was also operated from emergency power. — (K0MST, EC Scott Co., IA) I'm tired — I suggest that all messages be held to 20 words or less. — (WB9BPB, EC Blackford Co., IN).

- A—Messages handled
- B—Minutes in directed session
- C—Stations participating
- D—Stations in emergency-power-only sessions
- E—Net control stations
- F—Liaison stations

AREA/REGION NETS

Net Name	A	B	C	D	E	F	TOTAL
Eastern Area	466	297	63		4	8	949
Eastern Area(d)	192	146	66		3	13	517
Central Area	250	120	56		2	7	527
Central Area (d)	35	120	16		15	7	247
Pacific Area	276	180	33		5	11	582
Continental Net	178	304	20		5		527
First Region	98	157	22		3	4	358
First Region(d)	140	218	72		11	5	580
Second Region	83	92	29		3	8	288
Second Region(d)	230	254	50		6	16	694
Third Region	42	130	15		3	9	242
Third Region(d)	93	153	16		1	2	286
Fourth Region	167	231	21		2	12	510
Fifth Region(d)	145	271	27		2	4	490
Region Six(d)	119	385	34		2	2	608
Region Seven	76	180	51		5	5	286
Region Eight	42	315	16		3	7	449
Region Eight(d)	80	6	4	11	264		
Ninth Region(d)	60	120	17		2	2	234
Eastern Canada	184	20	16		6	6	245
Worldwide Region	119	267	25		2	8	486

SECTION/LOCAL NETS

Net/Mbr.	A	B	C	D	E	F	TOTAL
Atlantic Provinces, VE1AAQ	39	166	6		3	3	247
Caribbean Emerg., VE1H4	35	120	15		4	1	255
Grey Prince, VE3DPO	45	144	17		4	1	238
Manitoba Net M, WATXM	21	110	8		3	5	187
Manitoba Traffic, VE4PG	52	120	17		3	1	230
Saskatchewan	35	270	15		6	9	430
Vico Co., WA9KRS/W9IHO	301	450	34		15	5	789
Ala. Emerg. Net B, WB4EKJ	7	78	2				121
Ala. Emerg. Net D, WN4JDH	22	238	9		1	2	306
Ala. Emerg. Net J, WA4EEC	22	170	10		3	2	328
Ala. Emerg. Net M, WATXM	300	666	35		9	2	1011
Ala. Emerg. Net N, WA4GQD	19	120	19		36	1	217
Ala. Emerg. Net R, W4QAU	20	170	6		3	2	307
Delaware	24	60	2		2	126	
Sand Mountain Emerg., WB4BFO	96	172	22		2	3	353
Alaska Snipers, KL7HOV	97	150	92		26	7	604
California	31	109	13		3	2	191
Indian Wells Valley Emerg., WA6KZV	6	378	3		6	3	428

Local Activity

RESULTS ARE SUMMARIZED IN THE FOLLOWING TABLE:

	1976	1975
EC/ROs submitting mail reports or mail and radio reports	284	293
EC/ROs submitting only radio or informal reports	21	8
Number of sections reportedly active	62	56
Total AREC/RACES membership of participating stations	10453	8915
Total reported participation	6876	4613
AREC/RACES messages to SEC/State RO	2743	2745
Emergency-powered stations	4169	2673
Total number of points	73158	63218

Net Activity

NET RESULTS ARE TABULATED AS FOLLOWS:

	1976	1975
Nets reporting	202	195
States/provinces reporting	46	41
Number of messages handled	14639	15471
Minutes in useful directed session	48627	46094
Different stations participating	4329	5581
Stations reporting into emergency-power-only sessions	1004	1119
Number of different NCS	713	682
Number of different liaisons to higher level of NTS	646	729
Total number of points	80520	91585

St. Tammany, WA5WUJ

12	15	5	2	2	3	68
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MAINE

Pine Tree, K1M2B	23	95	9			3	166
Sho. Guilf, K1GUP	182	536	31			6	844

MARYLAND

Howard Co. AREC, WA3SWS	44	360	9		1	459	
Md.-DC-Del. CW, W3FZV	59	211	20		3	2	335
Md. Emerg. Phone & Traffic, WA3EOP	63	380	23		6	6	562
*St. Marys Co. CW, W3HJH							

MASSACHUSETTS

Bellingham AREC, W1EQH	45	300	14		4	2	415
Berkshire Trn. AREC, W1K2S	22	120	14		3	2	470
Eastern Mass. Phone, K1PAD	41	100	12		4	3	200
Norwood ARC Emerg., W1OLV	5	81	1		1	1	129
Sharon AREC, W1PGY	5	20	2		1	1	29
S.E. Mass. Emerg., W1LE	15	200	24		5	4	313
West. Mass. ARC Repeater Assn., W1PLS	2	168	2		10	3	219
West Mass. CW, W1DWO	23	128	6		2	2	183
West Mass. Emerg., W1DNB	17	111	5		6	2	181
West. Mass. Phone, A1MJE	35	214	27		18	5	402

MICHIGAN

Calhoun Co. AREC, WBZEJ	35	155	14		3	1	292
Kent Co. WB8ESK	12	111	16		3		505
MACS, K3LNE	279	680	72		2	4	1154
Mich. Thumb, WB8EMV	150	420	18		2	2	679
Mich. Wolverine SSB, WB8JIX	38	128	19		2	2	204
Mid-Strait AREC, WB8SC	359	900	95		11	7	1969
North Branch AREC, WB8HKL	8	30	6		1	1	60
Wayne Co. AREC, WB8DRT	106	540	32		2	3	808

MINNESOTA

MN Independent Novice, WB8MBE	11	200	8		6	2	261
MN Slow Speed, K8RYU	12	90	5		2	2	132
MN Weather, W8GLI	12	140	8		2	2	188
Picnet All-Day Watch, W8VVT	131	840	40		10	4	1121
Rochester AREC, W8QXN	35	90	7		3	3	169

MISSISSIPPI

Hernando Repeater, WA4EPF/5	64	180	20		18	2	360
Miss. Sideband, WA5ZLX	155	900	126		11	7	1395
Miss. Traffic, WB5FHA	48	368	48		6	9	587

MISSOURI

Adair Co. Emerg., W9OTF	2	18	3		1	2	41
Indian Footfalls, W8KNF	4	20	6		2		64
Mo. Slow Speed, K8QNK	21	250	13		5	4	342
Springfield Disaster Services (SARS), W9SIV	8	720	9		5	3	773
Vernon Co. AREC, WA8FKD	2	120	3		1	1	138

MONTANA

Montana RACES, W7IXD	2	2	2		1	0	17
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NEW HAMPSHIRE

NH Emerg. Phone, K1RSC	29	450	12		4	2	585
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NEW JERSEY

Bayonne AREC/RACES, WA2FU1	27	120	8		3	1	207
*New Jersey CW, WB2LCV	63	289	14		2		358
New Jersey Phone, WB2VTT	366	818	81		9	3	1466
New Jersey Slow, WB2RMK	35	209	18		7	8	355
Ocean Co. Emerg., WA2PCF	18	134	7		1	1	171

NEW MEXICO

Southwest CW Trf, K5KPS	41	240	12		4	6	355
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NEW YORK

Babylon Town AREC (2 meters), WA2JZX	22	120	14		10	2	213
Babylon Town AREC (10 meters), WA2TGT	13	108	13		3	1	163
Columbia Co. AREC, W2KHK	45	441	12		9	1	547
Huntington AREC, W2GLE	116	168	4		6	3	331
NYC-LI CW, WB2LZN	14	107	11		4	4	183
NY State CW, WA2PIL	65	128	37		4	6	317
Westchester Co. AREC, WB2VUK	90	248	33		29	4	551

NORTH CAROLINA

Alamance Co. AREC, WA4FFW	90	250	22		15	4	459
Cape Fear AREC, W4EHF	423	615	38		38	12	732
Guilford Co. Emerg., WB4VPY	23	120	22		22	5	298
Rockingham Co. AREC, WB4I2P	33	600	10		2	2	671
*Tar Heel Emerg., W4WXZ	187	615	63				928

NORTH DAKOTA

N.D. RACES, WA9SUF/WB9A TJ	33	359	50		2	1	507
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OHIO

Adams & Brown Cos. AREC, WB8CFX	293	880	16		2	3	1236
Balmont/Monticose Cos. AREC, WB8GV	22	480	18		7	13	634
Clark Co. Emerg., W8VZE	10	60	7		14	5	146
Callia, Jackson, Meigs Cos., W8R1	20	60	18		2	3	157
Knox Co. Emerg., W8BAYM	32	120	5		2	1	179
MASE R, WB8BGR	225	393	28		24	5	786
*Ohio Novice, K8IKD							
Ohio SSB, W80IL	621	1095	116		6	15	2146
Ohio 6 Meter, W8BSJ	64	180	9		6	1	200
Ohio Slow Speed, W8BJG	17	53	8		2	3	111
Ottawa Co. AREC, W8BHG	23	180	6		6	1	243
OSN, W8R1	101	311	40		3	5	542

OKLAHOMA

Stephens Co. AREC, WB5EOR	50	105	16		10	2	242
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PACIFIC

*West. Pac. CW Trf, K6GJAJ							
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PENNSYLVANIA

Boyer Co. Emerg., K3VYY	5	90	3		8	2	135
Cambria Co. AREC, K3JUV	29	140	12		1	1	203

Central Co. AREC/RACES WA3WKS

30	120	12		5	4	219	
East PA. CW, WA3OGM	31	99	7		3	3	124

East PA Emerg. Phone & Traffic, WA3PZO

115	225	23		3	3	460	
Fayetteville AREC, WB3RUK/WA3SSU	138	2400	38		24	8	2981
West. PA CW Trf, W2KAT/3	31	60	11		2	5	148

RHODE ISLAND

Aquidneck Island Comms, W1JFF	23
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Class V Official Observers

The requirements for Official Observer appointees have been higher than those for any other appointee, station or leadership — yes, even higher than those for the SCM. This is so because the OO is a critical appointee — and this can be interpreted any way you like. We need the best amateurs we can get in this appointment.

Today, amateur radio operating is moving toward the vhf's. No question about it, more and more hams, even among the old timers, are showing up on repeaters. The common channels on 2 are getting crowded, more channels are opening up, and repeaters are getting a foothold on 220 MHz and above, not to mention some that already existed on six meters. Yet, most of our observers do their observing on the high frequencies. Not very many venture into the vhf's to try to keep amateur operating there under control — under self-control, that is.

At the ARRL Board Meeting last January, a motion was made to the effect that a vhf observing program should be set up. The motion was lost, but it seems to us that there is a very real need for such a program, and the best way to get it started is by getting some vhf observers on the job. Who operates on vhf? Why, lots of hams, but a big percentage of them are Technicians. If we want to get a vhf program started, the Techs have to be dealt in.

Why Class V? Well, we already have four classes of observer. Class I is for precision frequency measuring, Class II for general

frequency measuring, Class III for phone observing, Class IV for cw and RTTY observing. The new Class V OO will be a specialist in vhf observing.

Requirements for appointment? The appointment will be made by the SCM, of course, and the requirements will be the same as for the other four classes — except that Technician class licensees are eligible. That is, the requirements will include ARRL membership, a Technician class license or higher for at least four years, monthly report to the SCM, and maintenance of regular activity in sending out notices. SCMs will be urged to exercise their judgment in selecting amateurs to hold this appointment, same as all other appointments. A prospective appointee must meet the basic requirements above, but a less precise requirement is that he must stack up with his SCM as one who can adequately fulfill the duties.

What will the duties be? Pretty much the same as Classes III and IV, but in the vhf segments. First and foremost, sending of notices or otherwise informing errant amateurs of violations of the FCC rules; such things as lack of i-d, sub-par signal quality, profanity and obscenity, and even violations of commonly-accepted repeater ethics, about which there is some difference of opinion — so this part of the function will have to be spelled out in more detail.

Applications for Class V OOs are invited, but bear in mind that OOs are not, in effect, volunteer policemen. They are just what the

name implies; they observe amateur operation in the amateur hands. Yes, we said *amateur* operation, not CB or commercial or even strictly speaking, bootleggers. That's a different ARRL program, called the Intruder Watch. OOs monitor, observe, notify. In doing the latter, they use standard forms supplied by Headquarters, although a personal word in addition is not considered out of line. Their function is to notify only, on the assumption that the recipient is not aware he is doing something out of line, or not doing something he should be doing, and will want to correct it. A couple of OO notices to deliberate violators will also let them know that they are not going unnoticed and thereby perhaps act as a deterrent. But there are no threats, no insults, and side remarks are optional and usually best avoided. If you want to help clean up operation on vhf, we need your help. If you want to satisfy repressed urge to be a policeman, forget it.

Operation on vhf is probably no worse, but and large, than operation in any other part of the spectrum. We don't mean to single it out. But there are many OOs on the hf part of the spectrum, not enough on vhf. Heretofore Tech licensees have not been eligible. All that is changed, now. We still need that experience factor, and we still require ARRL membership, and appointees will be expected by the SCMs to maintain a high standard of conduct as with all appointments.

Anybody for Class V observing?
W1NJK

WIAW 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. Please note that the station will be closed July 5 and Sept. 6.

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. 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 News. The 0130Z practice is omitted four times a year on designated nights when Frequency Measuring Tests are sent in this period.

*Communications Manager, ARRL

Speeds	EDST	UTC
5-7 1/2-10-13-20-25	9 A.M. MWF 9:30 P.M. TThSSu	1300Z MWF 0130Z MWFS
10-13-15	4 P.M. M-F 7:30 P.M. Dy	2000Z M-F 2330Z Dy
35-30-25-20-15	9:30 P.M. MWF 9 A.M. TTh	0130Z TThS 1300Z TTh

To improve your fist by sending in step with WIAW (but not over the air!) and to allow checking the accuracy of your copy on certain tapes, note the UTC dates and *QST* text to be sent in the 0130Z practice from the May issue of *QST*.

7/2 It Seems to Us	7/27 Public Service
7/8 Correspondence	8/2 World Above
7/21 League Lines	8/4 YL News

Bulletins

Columns indicate times in EDST-PDST-UTC(Z).

Phone Bulletins (1.82 3.99 7.29 14.29 21.39 28.59 50.19 145.588 MHz):

2100 Dy	1800 Dy	0100Z Dy
2330 M-S	2030 M-S	0330Z 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	2030 M-F
2000 Dy	1700 Dy	0000Z Dy

CW Bulletins at 10 wpm (same frequencies as above):

0000 M-S	2100 M-S	0400Z T-Su
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RTTY Bulletins at 170 Hz shift are repeated at 850 Hz shift when time permits (3.62 7.095 14.095 21.095 28.095 MHz):

1730 M-F	1430 M-F	2130Z M-F
2300 M-S	2000 M-S	0300Z T-Su

Oscar Bulletins (18 wpm on cw frequencies)

0840 M-F	0540 M-F	1240Z M-F
1400 M-F	1100 M-F	1800Z M-F
1600 Su	1300 Su	2000Z Su

Oscar RTTY:

1700 Su	1400 Su	2100Z Su
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In a communications emergency monitor WIAW for special bulletins as follows (times in UTC):

Phone: On the hour.
RTTY: At 15 minutes past the hour.
CW: On the half hour.

April Open CD Party High-Claimed Scores

The following are high-claimed scores. They read, from left to right, call, score, QSOs, sections, hours of operation. Final scores appear in the July CD Bulletin. — WA1STN

CW	AA9NVZ	215,900-	631-68-18	W2AZO	124,800-	411-60-11	WB9DJY(WB9QHV,opr.)	438,170-	71-75-20	W7GHT	153,765-	452-67-12
KP4EAJ(WA2UQG,opr.)	WA2DSA	113,860-	621-68-17	K4LAN	124,110-	390-63-9	WB9HAD	402,190-	108-3-74-20	WA1STN	146,200-	424-68-5
W6PAA	WA1QNF	210,120-	614-68-13	WA1STN	122,610-	396-61-5	WB9WUJ(WA3SWF,opr.)	386,170-	109-10-73-20	K4EBV*	145,440-	404-77-18
WB9DJY	K3MNT7(WA1KKM,opr.)	208,035-	600-69-19	K3HXS	119,560-	388-61-14	WB9WUJ	358,920-	99-72-20	WA4DCP/4	145,245-	421-69-14
W6RTT	WA3VBM	207,030-	612-67-17	WBFAW/4	118,470-	353-66-3	WB9WUJ	358,920-	99-72-20	WB6JCS	147,560-	396-72-17
AD4PUZ	AD7RSC(WA7UJQ,opr.)	205,700-	601-68-19	WA7VUP	115,575-	342-67-18	WB9WUJ	358,920-	99-72-20	K4KZP	140,250-	420-66-12
W6DGH(WB6ZVC,opr.)	WB2JYM/5	204,000-	600-68-14	WB6TQ5*	115,375-	351-65-15	AB5GWX(WB5QDQ,opr.)	347,190-	97-71-20	W1FCC/3	129,645-	387-67-13
348,940-	AA3JSU/1	201,280-	584-68-17	W6PRP	111,020-	358-61-18	WA1WEM	331,920-	914-72-19	K3HXS	127,575-	401-63-14
949-73-20	WB3QW	196,860-	572-68-16	WA4KC0*	110,450-	376-59-10	WB6JZN	324,120-	88-3-75-11	WA2EKW	127,075-	388-65-9
W2YD(WA2SRD,opr.)	WB3QW	191,100-	588-65-20	WB2RKK	109,120-	433-64-5	WA7UWE*	313,390-	847-74-20	WA2UO	125,950-	400-62-10
337,250-	WB3QW	191,080-	562-68-13	AB8DCR*	108,800-	340-64-14	WB4FZG	300,440-	812-74-16	WA3UYB	121,225-	370-65-19
944-71-20	WB3QW	188,800-	562-68-13	WB9NH	106,920-	317-66-6	WB4FZG	275,280-	768-72-19	WB6RIU*	115,200-	360-64-13
W3LPL(WB45V,opr.)	WB3QW	178,365-	512-69-12	W7YHW7KWY,opr.)	107,055-	347-61-13	WA3WIK(WA35ZX,opr.)	249,560-	705-70-12	WA2YBF*	112,500-	375-60-18
323,025-	WA4RKE	168,960-	523-64-13	K4VVE	101,700-	339-60-8	W1MX(WB2MZE,opr.)	244,950-	710-69-18	AD3HP*	109,935-	341-63-3
879-73-20	WA4RKE	165,580-	480-68-10	WB9JY	100,160-	310-64-13	AA6MQS/6*	239,775-	695-69-20	WB2RRK	109,440-	337-64-4
WB9WUJ(WA3SWF,opr.)	W4NQA	156,860-	500-62-8	K1OEY(multi-op)	142,350-	438-65-18	WB2RBP(WB2UJF,opr.)	212,850-	637-66-14	WA7TZO	106,950-	345-62-13
317,520-	K3DPQ*	151,200-	477-63-17	W6MAR(multi-op)	112,545-	362-61-6	WB2RBP	212,850-	637-66-14	K9EYA	104,780-	338-62-19
874-72-20	W1FCC/3	148,830-	451-66-16	PHONE			AA6MQS/6*	239,775-	695-69-20	AA5ITB	101,060-	319-62-7
WB6ION(WA6TLV,opr.)	AC2FV5	148,800-	460-64-12	W6HX(WB6LD,opr.)			WB2RBP	212,850-	637-66-14	W6MLPK(+WB6DSV)	258,085-	720-71-11
315,360-	WB6WKQ	147,420-	463-63-19	W6PAA	558,750-	1483-75-20	AC1JUB	212,160-	624-68-8	W7YH(multi-op)*	251,135-	699-73-17
869-72-20	AA6VEF	146,880-	459-64-20	W6PAA	486,375-	1290-75-20	AA3TKJ*	189,060-	648-69-13	WB9AGY(multi-op)	205,020-	599-64-18
WB5QWX*	WB4VEF	144,870-	436-66-13	K6QVJ(WB6ZVC,opr.)	477,789-	1305-74-20	WB9CT/8	186,660-	545-68-7	WB8NF(WB8DC,opr.)	182,523-	549-67-20
306,010-	WB4VEF	136,680-	491-67-11	WB6YBL*	482,850-	1298-74-20	AB5CEP*	182,700-	522-70-12	W8BNF	153,660-	449-68-16
859-71-19	WB4VEF	136,090-	439-62-15	WA98WY*	449,180-	1210-74-20	K3MNT/7*	171,820-	478-71-8			
W5ZSX*	WB4VEF	134,080-	418-64-5				W4WHK	164,910-	473-69-13			
297,780-	WB4VEF	133,250-	408-65-17				K9FV1/5	162,180-	474-68-14			
811-72-20	WB4VEF	133,250-	398-65-11									
W7TML	WA5RRC	132,950-	398-65-11									
291,740-	WA5RRC	131,040-	410-63-15									
807-72-20	K5RRR	128,640-	379-67-18									

Operating Events

JULY

- 1: British Virgin Islands QSO Party, p. 83 June.
- 3-4: YV Contest, phone, VHF Space Net Contest, p. 84 June.
- 3-18: N6V Operation by the Jet Propulsion Lab. ARC commemorating the Viking I anticipated spacecraft landing on Mars. Frequencies: cw 3530 7030 14030 21030 28030, phone 3810 3930 7230 14225 14325 21360 28630, Novice 3730 7130 21130 28130 kHz. The N6V special call derivation: N for NASA, 6 for 1976, V for Viking.
- 4: Straight Key Night, p. 81 June.
- 7: West Coast Qualifying Run, W6OWP prime, W6ZRI alternate, 10-35 wpm at 0400Z (Universal Coordinated Time, abbreviated UTC, Z used as a designator), on approximately 3590/7090 kHz. This is 2100 PDST the night of July 6. Please note that dates are always shown at least two months in advance and times are always the same local "clock time," i.e. 9 P.M. local Pacific time. Underline one minute of the highest speed copied, certify copy made without aid, and sent to ARRL for grading. Please include your full name, call (if any) and complete mailing address. A legal-size stamped addressed envelope (s.a.s.e.) will help to expedite your award.
- 10-11: VHF Space Net Contest, p. 84 June.
- 15: WIAW Qualifying Run, 10-35 wpm at 0130 UTC transmitted simultaneously on 1.805 3.58 7.08 14.08 21.08 28.08 50.08 and 145.888 MHz. This is 2130 EDST (9:30 P.M. local Eastern time) the night of July 14. Underline one minute of the top speed you copied, certify that the copy was made without aid (typewriters OK), and send to ARRL grading. Please include your full name, call (if any), and complete mailing address. A large s.a.s.e. will help to expedite your award/endorsements.
- 17-18: HK contest, VHF Space Net Contest, p. 84 June.
- 17-19: CW County Hunters Contest, p. 84 June.
- 24-25: ARRL BICENTENNIAL CELEBRATION, p.45 March and p. 75 June issues; VHF Space Net Contest, p. 84 June. Danubien Bent Activity Contest, sponsored by the Radio Amateur Society of the County Pest

(HA), to increase activity; cw the first 24 hours, phone the last 24 hours. All bands, call CQ DD. Categories: Single op. single band, single op. multiband, club stations multiband. Points: QSOs with stations in your own country count 1 point, other countries on your own continent 2 points, contacts with stations on another continent worth 10 points. HA7 QSOs count 10 points. Exchange RST(I) plus serial starting with 001. Multipliers are those on the ARRL DXCC list. Log separately per mode/band. Score equals sum of points per band multiplied by the sum of multipliers on all bands. Awards. Logs must be postmarked by Sept. 1. Send to P.R.A. Sz. H-1387, Budapest, Box 36, Budapest, Hungary.

31-Aug. 1: Illinois QSO Party, YV Contest cw, p. 84 June.

AUGUST

- 5: West Coast Qualifying Run.
- 6-12: N6V Operation commemorating the Viking II arrival at Mars. See July 3-18 listing.
- 7-8: Independence of Bolivia Contest, sponsored by the Radio Club Boliviano, starts 1700Z Aug. 7, ends 1700Z Aug. 8, ssb only. This contest is for single station, single operator only; 15, 20, 40 and 75 meters. Stations in the Americas work each other in as many of the American countries and CP districts as possible. Exchange report plus consecutive serial starting with 001. Call CQ Bolivian Independence Contest. Points: For contacts with stations in your same country 1 point, with stations in other American countries 3 points, with CP stations (other than CP5A) 5 points, with CP5 stations (other than CP5AA) 7 points, with the official station CP5AA 10 points. (CP5AA will concentrate operation on 3700 7060 14175 and 21250 kHz.) Multipliers are the American countries plus the CP districts (maximum of 9). Repeat contacts (for points) permitted on additional bands. With your report describe your station, show number of contacts, etc. Give the name of the operator and full usual log info. Your report must be mailed within 30 days of the contest and sent to: Radio Club Boliviano Contest, Casilla Correo 1900, Cochabamba, Bolivia, South America. Awards. All participants arriving at a final score within 25 percent of the top scorer will also receive an award.

Please make sure that your log indicates the point values of your QSOs and shows each new multiplier. YO DX Contest, sponsored by the Romanian Amateur Radio Federation, 24 hours starting 1800Z August 7; 80-10 (no crossband). CW, phone (no crossmode). Entries single op. single band, single op. multiband, multiop. single band, multiop. multiband. The object is to contact as many YO stations in as many YO counties as possible. EU stations may also be worked by the W/E contingent. One may contact the same stations on other bands/modes but only after at least 1 hour lapse. Exchange RS(T) and QSO no. starting with 001, regardless of band or mode. Non-EU stations earn 2 points for each EU QSO, 10 points for each YO station. Each YO county and each country is a multiplier. Abbreviations of counties in each YO call area as follows: YO2 AR CS HD TM, YO3 XA XB XC XD XE XE XF XG XH, YO4 BR CT GL TL VN, YO5 AB BH BN CJ MM SJ SM, YO6 BV CV HR SB MS, YO7 AG DJ GI MH OT VL, YO8 BC BT IS NT SV VS, YO9 BZ DB IF IL TR PH. Score equals QSO points times multiplier. Logs must include band/mode, time(Z) stations, serials, multiplier column (filled in if new multiplier), QSO points. Include a summary with computations, name, address, equipment description plus usual declaration. Awards. Logs must be postmarked no later than Sept. 1 and addressed to Romanian Amateur Radio Federation, Box 1395, Bucharest 5, Romania. Decisions of the Contest Commission are final. Ten-Ten Net Summer QSO Party, open to all, the full 48-hour period, UTC. All contacts to be made on ten meters, any mode. Logs to include date/time, station, name, QTH and 10-10 number. Participation by non-members welcomed but non-members are not eligible for awards. To become a member (and receive your number) send a list of 10 members worked (DX work 5) and \$3 to the manager in your district. Members score 1 point per QSO, add a point if with a member, add a point if contact is outside your state, province or country (maximum 3 points). Give the name of your chapter to receive credit for chapter scores. Awards. Further info. on the club and logs by Sept. 30 to Grace Dunlap, K5MRU, Box 13, Rand, Colorado 80473.

- 13: WIAW Qualifying Run.
- 14-15: European DX Contest cw (WAEDC), sponsored by the Deutscher Amateur Radio Club, full UTC period, 80-10 meters. (Note: Phone Sept. 11-12, RTTY Nov. 13-14.) Single op. all band; multiop. single transmitter. Only 36 hours of operation out of the 48 are permitted for single ops. The 12 hours of non-operation may be taken in one, but not more than three periods any time during the contest. Non-EUs work EU stations only. Exchange RS(T) plus serial number starting with 001. Each QSO worth 1 point. Stations may be worked only once per band. Each

confirmed QTC (given or received) counts 1 point. The mult. for non-EUs is determined by the no. of EU countries worked on each band. The multiplier on 80 may be multiplied by 4, the mult. on 40 by 3, the mult. on 20-15-10 by 2. Score is the total QSO points plus QTC points multiplied by the sum total of multipliers from all bands. A QTC is a report of a confirmed QSO that has taken place earlier in the contest and later sent back to a EU station. It can only be sent by a non-EU to an EU. A QTC contains the time, call and QSO no. of the station being reported. A QSO can be reported only once and not back to the originating station. A maximum of 10 QTCs to the same station on all bands is permitted. You may work the same station several times to complete this quota. Only the original contact, however, has QSO point value. Keep a uniform list of QTCs sent. QTC 3/7 indicates that this is the 3rd series of QTCs sent and that 7 QSOs are reported. Certificates. Usual disqualification criteria. Contest Committee decisions final. Log 40 QTCs or QSOs per sheet (sheets are available from the DARC). Separate logs per band. Deadline for cw logs Sept. 15; for phone entries Oct. 15, RTTY Dec. 1. North Americans may send their applications/logs to: Hartwin E. Weiss, WA3KWD, 323 North St., Millersburg, PA 17061. WAEDC committee address is Box 262, D-895 Kaufbeuren, Germany.

21-22: SARTG Worldwide RTTY Contest, sponsored by the Scandinavian Amateur Radio Teletype Group. The only change this year is that each VK district counts as a multiplier. Periods: 0000-0800Z and 1600-2400Z Aug. 21, and 0800-1600Z Aug. 22. Use all band, 3.5-7-14-21-28 MHz, open to all. Classes: Single op. up to 100 watts input, single op. over 100 watts input, multi-operator single transmitter (no limit), SWL. Exchange RST and QSO no. Points: QSOs with own country 5 points, other country but same continent 10 points, other continent 15 points. In USA, Canada and Australia, each call district will be considered as a separate country. The same station may be worked once on each band for both QSO and multiplier credit. Only two-way RTTY QSOs will count. Use DXCC list and each W/K VE/VO and VK district for multipliers. Points = the sum of QSO points \times the sum of multipliers. Mailing deadline Sept. 18. Usual log info., separate sheet for each band. Include your

comments with your logs, please. Awards. Logs go to: SARTG Contest and Awards Mgr. C.J. Jensen, 022CJ, Meisnersgade 5, 8900 Randers, Denmark.

21-23: New Jersey QSO Party, 17th annual, sponsored by the Englewood Amateur Radio Association Inc., open to all. Contest period is from 2000Z Sat. Aug. 21 to 0700Z Sun. Aug. 22 and from 1300Z Aug. 22 to 0200Z Aug. 23. Phone and cw are considered the same contest. A station may be contacted once on each band; phone and cw are considered separate bands. Duplicate QSOs may not be made by or with bicentennial calls. NJ stations may work other NJ stations. Suggested freqs.: 1810 3535 3905 7035 7135 7235 14035 14280 21100 21355 28100 28600 50-50.5 144-146. Suggest phone activity on the even hours, 15 on the odd hours (1500-2100Z), 160 at 0500Z. Exchange QSO no., RS(I) and QTH (ARRL section or country). NJ stations will send county. Out-of-state stations multiply no. of complete contacts with NJ stations times the no. of NJ counties worked (maximum of 21). NJ stations count 1 point for W/K/VE/VO QSOs; DX QSOs count 3 points. Multiply total no. of points times the no. of ARRL sections (including NNJ and SNJ, max. of 74). KP4, KH6, KL7, KZ5, etc., count as both 3-point DX contacts and as section multipliers. Certificates. Logs must show date/time in UTC, band and emission. They must be received not later than September 18. The first contact for each claimed multiplier must be indicated and numbered and a check list of contacts and multipliers should be included. Multipliers should be noted and calls of all participating operators listed. Logs and comments should be sent to the Englewood Amateur Radio Assn., Inc., 303 Tenafly Road, Englewood, NJ 07631. A no. 10 s.a.s.e. should be included for results. Stations planning active participation in NJ are requested to advise the EARA by Aug. 7 so that full county coverage may be planned. Portable and mobile operation is encouraged.

28-29: All Asian DX Contest cw. These are additional rules updating those shown on page 83 of the June issue. The contest is a 30-hour period from 1000Z Aug. 28 through 1600Z Aug. 29. Single op. permitted single band on 160-10; other categories are single op. multi-band and multi-multi. Logs and summary by November 30 to the JARL, Box 377, Tokyo, Japan. Arizona QSO Party, sponsored by the

Motorola ARC, from 1700Z Aug. 28 through 1700Z Aug. 29. The full 24-hour period may be worked and the contest is open to all. Out-of-state work AZ only; AZ stations work all. Stations may be worked on both phone and cw once per mode per band, 30-10 meters. Stations are encouraged to use their bicentennial calls. Exchange RS(T) and AZ county for AZ stations, state/country for non-AZ stations. Score 1 point per sbs QSO, 2 per cw QSO, 4 per Novice QSO. AZ stations are in two scoring categories, single and multiop. AZ stations receive a bonus of 50 sbs QSO points for operation outside their home county. AZ stations multiply QSO points (+ any bonus) by the no. of states/VE provinces/DX countries worked. Out-of-state stations multiply total QSO points by the total no. of AZ counties worked on each band. (There are 14 counties per band possible). Suggested frequencies: Cw 3560 7060 14060 21060 28060; phone 3935 7235 14285 21360 28575; Novice 3725 7125 21125 28125. Awards. Include a station description and usual signed contest declaration with your full log. For a copy of the results (and any award) send a legal-size s.a.s.e. by Sept. 30 to Motorola ARC, 8201 E. McDowell Rd., Scottsdale, AZ 85252.

31-Sept. 15: N6V operation commemorating Viking II landing on Mars. See July 3-14 listing.

SEPTEMBER

4-5: Savaria (HA) CCS Contest.

4-6: Four-Land QSO Party.

5: Frequency Measuring Test, LZ DX Contest.

8: West Coast Qualifying Run, to include 40-wpm section!

11-12: VHF QSO Party, WAE phone Pennsylvania QSO Party, Washington QSO Party.

14: WIAW Qualifying Run.

16-18: YL Howdy Days.

18-19: Scandinavian Activity Contest, cw.

21: WIAW Morning Qualifying Run.

25-26: Scandinavian Activity Contest phone Delta QSO Party.

October 8-10: CD Party, phone.

Oct. 16-18: CD Party, cw.

Strays



What's new at the Maxim Memorial Station? Here's W1AW operator WA3JSU adjusting the Oscar 6 satellite standby ground command transmitter.

□ Want to QSO the 1976 ARRL National Convention? Look for NC0ARL on 3576, 7076, or 14076 on cw; 3990, 7240 or 14300 on sbs. The cw station will alternately monitor 7103, and QNI national, regional, and local section nets throughout the day to pass traffic originated from the convention. An attractive QSL will be sent.

□ The dissertation by WH0OP in April *QST* prompted this addition by William Bonnell, WSTI: "As an old spark man, I have always missed the beautiful chord note made by a twelve-tooth wheel driven by a sync motor. To achieve this great old sound, I simply used four reeds from an old harmonica and mounted them 90 degrees apart on the aluminum headphone diaphragm. Use reeds that produce the notes E-G-B-D to get this chord effect."

□ Focus Amateur Radio: Dr. Peter Cross, W0OXN, a Consultant in Internal Medicine at the Mayo Clinic was the guest speaker at the Mayo Chapter of Sigma Xi. His lecture was HAM RADIO: THE WORLD AT YOUR FINGERTIPS - THE HOBBY PAR EXCELLENCE. Dr. Cross' lecture included a discussion of the history of ham radio and its role as a hobby and as a service to our nation. He spoke of the difference between ham radio and citizen-band communication.

Since the Sigma Xi lectures are for a very cosmopolitan audience, Dr. Cross emphasized who was eligible to become a ham and demonstrated very graphically and with audi-

tory aids the role of the code in communication and in obtaining a license. He demonstrated the speed of 5 words a minute, 10 words a minute and then indicated that a portion of the amateur fraternity used code at a rate of 18-25 words per minute and that this was almost as fast as normal speech. Dr. Cross' lecture was very well received. It was a model of how ham radio can be described and demonstrated. — J. C. Cain, W0AGL

□ Most hams are familiar with call-letter license plates and are aware that there are collectors across the United States and Canada. But have you ever heard of trying to collect call-letter plates for each state and province and for every year which they were issued? A letter recently arrived at Headquarters informing us of such an attempt asking for assistance, especially in the quest for Connecticut plates, since they are permanent and hard to come by. Susan M. Suter, 1742 Schulte Hill Dr., Maryland Heights, MO 63043, is a damsel in distress with the dragon of despair at her door and is desperate for defense in the form of donated plates (especially from Connecticut). She would appreciate your sending her any spare call-letter plates you may have littering your shack garage.

I would like to get in touch with . . .

□ any hams interested in antique Gamewell fire alarm systems. Gary S. Carino, 805 W. 3rd St., Duluth, MN 55806.

□ amateurs who are members of ILER (Internacia Ligo de Esperantaj Radistoj). Russell S. Finn, WN3YSW, 84 Isles Dr., Pasadena, MD 21122.

Station Activities

SCM X AREC X ORS X OVS X SEC X OBS X TCC X OO X NTS X WAC X
CP X A-1 OPR X EC X DXCC X CLUBS X RM X OPS X RCC X PAM X WAS

CANADIAN DIVISION

BRITISH COLUMBIA: SCM, H. E. Savage, VE7FB — Net Manager. VE7DFY BCEN reports net check-in much increased. Welcome to the addition of new cw OPS. BC PSC Net 3755 welcome. It's new. Net Manager VE7HQ. With the success of the Hobby Fair in Victoria VE7CCJ brought considerable traffic to the cw net. We do have some sad news, VE7RQ VE7LL VE7BY and VE7II have lost their dear wives in the last three months. VE7DZ has returned from in the UK and VE7CB is home from spending the Italian KH-land. Traffic: (Apr.) VE7DFY 129, VE7ZK 127, VE7CDF 120, VE7MW 30, VE7FB 12. (Mar.) VE7HQ 76. (Dec.) VE7ZK 405.

MANITOBA: SCM, Steve Fink, VE4FQ — RM; VE4PG, PAM; VE4JP, Activity has been rapidly increasing on our cw net, MTN, with a number of new and formerly-active stations joining the net. A special slow-speed cw net has begun: MSN meets daily at 2000 CDST on 3660 kHz and everyone is invited to join. VE4UL is the MTN/MSN station. VE4QU and VE4JM handled emergency medical traffic in mid-Apr. and a number of VE4s were active during the Italian earthquake. The Manitoba Shop and Swap net, operated by VE4HE, is heard after the Sun. session of MEPN. VE3CU now signing VE4JJ. Have a good summer! MTN: 31 sessions, 291 QNI, 139 QTC. MEPN: 30 sessions, 993 QNI, 94 QTC. Traffic: VE4UL 137, VE4OW 109, VE4PG 98, VE3ZR 36, VE4IX 10, VE4QU 16, VE4JA 9, VE4JP 8, VE4AAJ 7, VE4QJ 6, VE4FK 4, VE4LN 4, VE4LU 4, VE4NM 4, VE4CR 2.

Maritime & Nfld: SCM, Aaron D. Solomon, VE1OC Asst. SCM, Maurice Gladden, VO1FG, RM and APN mgr. VE1JA, Nfld Traffic Net Mgr.: VO1VG, APN and NTN report. VE1A, VE1AA, VE1AAJ, VE1BTD BPL for Apr. NTN in operation. Recent hospitalizations include VE1FC VE1HO VE1OC VO1LU. VE1YE white cane operator, Moncton, winner of LOLA contest. Recent arrivals Halifax area: VE1BFZ VE1BY VE1BL K2SQM/VE1 and XYL back at Peggy's Cove for summer. VE1AOZ lost all equipment recently. VE1AGS, VO1HP, sent to Toronto, VE3-Land, SEC and Asst. Dir. VE1CA resigned appointments. New Asst. Dir. VE1ST, VE1APY/SU sends greetings and reports heavy phone patch tlc. Valley ARC reactivated with VE1CD, pres.; VE1AFA, secy.; VE1AMZ giving Advanced License instruction. HIX area, SONRA Executive incl. VO1NP, pres.; VO1IN, VO1HP, secy.; VO1ML, treas.; VO1KM VO1LP VO1FK, dir. SONRA issued very attractive 1976 VO Callbook. VO1AB & VO1BV honored by SONRA by receiving NCS plaques. VO1CC relayed info. to CBC Radio on activities of fishing dragger Norma & Gladys in Mediterranean. VO1N VO1DR installing new beams over 6 meters. Nfld Traffic Net meets 3654 kHz, 2100Z M-S. Sessions 29, QNI 144, QTC 300. NTN: Sessions 22, QNI 71, QTC 30. Traffic: VE1AAO 630, VE1BTD 594, VE1ZH 243, VE1BFV 75, VO1GWS 115, VE1KG 58, VE1AMR 40, VE1OD 10, VE1AX 19, VE1G 18, VE1ST 17, VE1AMN 13, VO1K 13, VE1YO 12, VO1NP 8.

ONTARIO: SCM, Holland H. Shepherd, VE3DV — I am sure you will join me in saying thank you to VE3GOL for doing such a fine job for us during my two months as Pres. A big thank you to VE3SB for ram rodding the bag SET for the last but not least an expression of gratitude to all those ECs and their crews who did so well during that same Exercise. Congratulations to new Life Members VE3CNS and VE3GSA and an invitation to continue the good life by applying to the SCM for a Station or Leadership appointment with the SCM and Organization. A warm welcome to the Georgian Bay ARC by joining an affiliated club. Again I extend a warm invitation to join in the field organization by applying to the SCM for a Station or Leadership appointment. A very special vote of thanks to those wonderful people who handled disaster traffic during Hurricane Eloise last Sept. and who are really the backbone of the Public Service Certificate. Busy VE3GFN, EC Toronto took time out to make the coveted DXCC in Apr. I wish to acknowledge with regret the reports of VE3AHA, Ottawa and VE3APA, Lakefield joining the Silent Keys. Our deep sympathy to their families. VE3RL of Belleville is on the way to the highway sounders and telegraph keys. Mark Oct. 20-22 on your calendar for the RSO Convention. Now that ON finally has amateur call sign license plates we should rightly thank VE3FAA, VE3ACL and VE3GFW but let us not forget the many hours spent in the past by many dedicated amateurs and clubs. VE3EBE and VE3EEL are now using amateur TV gear in Hamilton. VE3AE has taken over as pres. of BARC in VE3FON. Congrats to VE3GJK on getting his Advanced. Traffic: (Apr.) VE3GDL 354, VE3SB 302, VE3FRG 213, VE3GFN 154, VE3GJG 130, VE3DPO 118, VE3GT 116, VE3DV 111, VE3CDB 101, VE3EWD 75, VE3E 64, VE3EKC 51, VE3DVE 44, VE3GNW 37, VE3ZR 26, VE3AT 22, VE3AT 19, VE3HQ 16, VE3DH 14, VE3HEG 10. (Mar.) VE3AE 63.

QUEBEC: SCM, Larry Dobby, VE2YU — VE2II VE2IZ VE2AK VE2LZ and VE2SH are busy testing out communications links for the Olympics. Please give the Olympic group your full support when they ask for your assistance during the games. Traffic: VE3W 276, K2HS/VE2 107, VE2YU 97, VE2DUB 35, VE2DRC 15, VE2AP 14.

SASKATCHEWAN: SCM, P. A. Crosthwaite, VE5RP — The Western Broadcasters Assn. had its conference in Saskatoon. VE5XW was in attendance with a display of Amateur Radio equipment. The response from the dealers was most favorable. The Saskatoon Club are going to take a field trip to the RRCL and donate to the Saskatoon Public Library the complete package of ARRL books. Under these circumstances you can receive the package for 50% discount. The Regina Club meet at the Regina T.V. station for a tour of the station. Perhaps we'll see the Regina Amateur giving a public display on television. Manitoba will be helping Sask. out during the summer months on the Regional Net. Traffic: VE5TT 27.

VE5DN 12, VE5RP 10, VE5ET 9, VE5WM 8, VE5YK 6, VE5SM 4, VE5HE 2, VE5LC 2, VE5OL 2, VE5PD 2, VE5RB.

ATLANTIC DIVISION

DELAWARE: SCM, Roger E. Cole, W3DKX — SEC: K3KAJ. PAM: WA3DUM, RM: W3EEB. PSHR: K3YHR 49, WA3DUM, K3KAJ, WA3WPY 44 each. Delmarva Hamfest, Wilmington College US 13 & Del. 14) near Greater Wilmington Airport, Wilmington, DE Aug. 15th. Plenty of parking space available. Talk-in frequencies: 3900 kHz, 146.13-73 MHz and 147.75-15 MHz. WR3AKG received Bi-Cen WAS No. 444. WA3WIY has moved near Millsboro and passed his Advanced Class exam. K3KAJ moved to Milford in June. Banks Holcomb, F6CPH/WA3MEK renewed acquaintances in New Castle Co. while on a visit from his home near French Riviera, DTN: QNI 366, QTC 66; DEPN: QNI 86, QTC 11. Traffic: W3EEB 113, K3KAJ 91, WA3DUM 57, AD3YHR 46, W3DKX 41, WA3WPY 38, AA3GAY 26, W3YAH 12, WA3UUN 11, W3WD 5, WA3WIY 3.

EASTERN PENNSYLVANIA: SCM, George S. Van Dyke, Jr., W3HK — SEC: W3FRF. PAMs: W3AVJ WA3PHG. RM: W3EML, W3EML, K3MVO, WA3OGM WA3PHG. Net reports: PFN QNI 406 QTC 369; EPAEP&TN QNI 328, QTC 151; CM6 QNI 16, QTC 0. OO reports: W3NCC K3NSN W3KCM W3KEK K3RDT; OBS reports: W3AVJ W3LD W3CL W3KFT. QVS reports: W3GOA W3CL W3ABJQ W3AKFT WA3NDQ. BPL: W3CUL W3VR K3NSN WA3ATQ, PSHR: K3XK, W3CUL. W3CUL may be our organist at Atlantic Div Conv. Mirny keeping W3VR busy. W3EML says condx have cut into tlc. W3WRE got another key! School is taking its toll of operators. WA3MVP got his 20 wpm sticker. W3BUR was eligible for FD from home QTH during remodeling! LRTS working with NQAA might get job of maintaining a new 40 mhz tower at Conover. Lancaster has new 220 MHz rpt 223.3/224.9 located in Straburg. LRTS graduated 22 Novices now setting up for General classes in fall. WA3YAY waiting for help to get rig on. WA3WSB got his big A ticket. Nice newsletter from PSARC. New officers for the Anthracite Repeater Assn. are: K3KJK, pres.; W3BSA, vice-pres.; K3RHI, secy.; WA3TMV, treas.; K3ATM, exec. comm. Lancaster reports their 450 MHz repeater on the air. WA3GSL and WA3VR got their A tickets. WB3BHC is tech. New officers at Lancaster are: WA3UNR, pres.; W3NOI, vice-pres. Hope you all attended the Atlantic Division Convention in Phila! Again mark the calendar for reports to be on time. Also if your net does not show up get after the RM or PAM. Hop you had a nice summer and did all the repairs needed prior to the fall season. WA3THT thought an echo box would increase his talk power! Net controls, try to keep stations on one freq (ssb) if interference develops move the net plus or minus a kHz rather than have an on the air argument. Traffic: W3CUL 153, W3VR 907, K3NSN 615, WA3ATQ 350, WA3THT 311, W3EML 186, K3GJL 143, WA3SXU 122, AA3PZO 120, W3IPX 117, K3DIO 94, K3MVO 72, WA3UKZ 67, WA3YJG 56, W3LD 55, W3WRE 52, WA3EY 33, W3ATJ 28, WA3VMV 28, WA3AVJ 23, W3WJL 14, W3CL 14, W3CUL 12, WR3ABZ 10, WB2RBA/3, 6, W3AXA 6, W3KX 6, W3ZRE 3, K3DCB 3, WA3CKA 2, WA3MVP 2, WA3ZRE 2, WA3BJL 1, W3BUR 1, W3EU 1, W3GOA 1, W3KCM 1, W3KEK 1, WA3VDQ 1. (Mar.) K3DIO 117, WA3YJG 12.

MARYLAND — DISTRICT OF COLUMBIA: SCM, Earl R. Medrow, W3FAC QOS WA3KCV WA3NSA AA3UJH WA3JSZ and W3IJA, mkr. Apr. reports: WN3BAL and WN3BCQ join the AREC. WN3YJY moved to W6-Land in June. WB3AUK in an ex-G Radio Club man. W3CDQ looks forward to a visit by Z56GH. EC W3HJH putting St. Mary's on the AREC map. Thanks to W3YBV for giving the Novice exam to 2 new prospects, and for his W6 area job of registering stolen equipment. WA3JFW studying to be a medic in Mexico. WB2TNC/3 of the Goddard ARC successfully trained 21 prospective Novices. The Antietam ARA Hagerstown has Novice classes. Call WA3EOP or WA3QON for details. AA3YKK reports the Tenet net meets on 28.775 MHz at 8 PM local time Wed. and Fri. The EC president of the IYD PCN has a summer net so says W4LRG. WA3UJH has the East Coast RTTY net in full swing on 3605 kHz at 8 PM local daily. MEPN met 23 times with traffic at 60 and QNI avg. of 226. The WR PON activity 13/34/22.7. MDCTN 17/62/18.7 and the MDD 59/263/28.2. MEPN 1oppers WB3AJUK W3ALQ and other W4LD. MDCTN Top Honors to AA3YKK WA3UYB WA3ZEE WA3ADQ and WA3EOP. MDD Top Brass: W3FZV AA3YKK and K3KAJ. W3SHE is publicity man for the Mountain Ark in Cumberland. WA1VMV/3 is QRL on the air and at work. WA3UYB a busy alternate NCS on all the Four nets despite a 4 1/2 month. W3EOP stays out for a change. WA3SJV visits PJ7L and likes the island. Congrats on W3FCI a new Advanced. WB3AGQ does all right with end test quarter wave horizontals and verticals. W3LDD keeps that grass cut. W3FCS busy refurbishing. WA2QNT/3 looking for a 3 call. AC8BYZ/3 leads the traffic hounds. WA3UYF has the Hi Voltage power supply parking a full output. AA3QA well-wisher during the summer vacation. W3DFW puts a mean signal into FL PON. WA3EOP mans W3CWC in a busy sked of nets. WA3PRW is getting his Boy Scout skeds all firmed up. W3FZV worked WITTO his first QSO as WN4TFX after 26 years and visited dad, WA1A in FL plus enjoying the FL QSO party. Add WA3ZAS down with power supply troubles. MDCTN/MEPN/MDCTN Picnic Sat. Aug. 21, McKeldin Area No. 501 Patapsco State Park. Traffic: (Apr.) AC8BYZ/3 133, AA3YKK 103, WA3UXU 98, W3FZV 96, WA3UYF 82, WA1VMV/3 75, W3FA 73, WA3UYB 62, WA3SJV 51, WA2QNT/3 50, WA3EOP 45, AA3QIA 38, W3EOP 16, W3LDD 16, WR3AGI 16, WA3PRW 8, W3FCS 7, W3BHE 2. (Mar.) AC8BYZ/3 103.

WESTERN NEW YORK: SCM, Joseph M. Hood, K2YAH — SEC: WB2EDT. I am pleased to announce that W2MTA has accepted an appointment as Asst. SCM for WNY section. He will assist in coordination of NTS matters as well as providing an alternate representative for clubs and groups in other areas of



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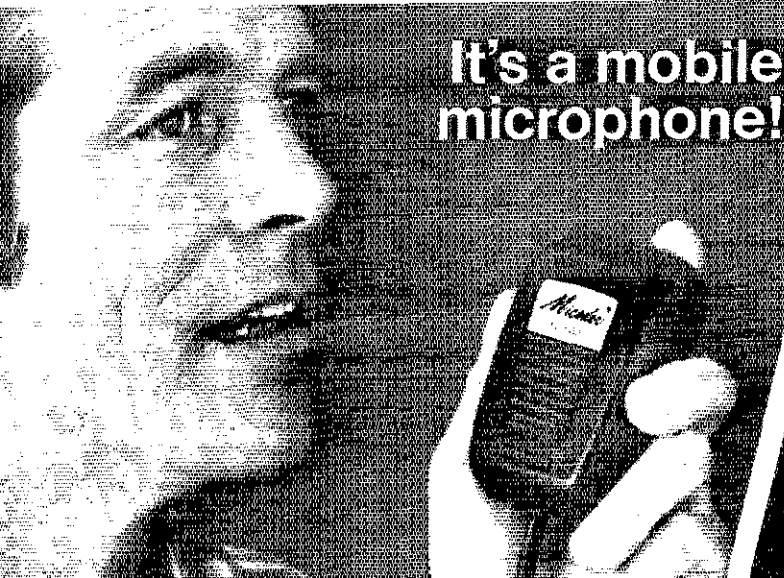
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- SP-101PB Speaker/patch 59.00
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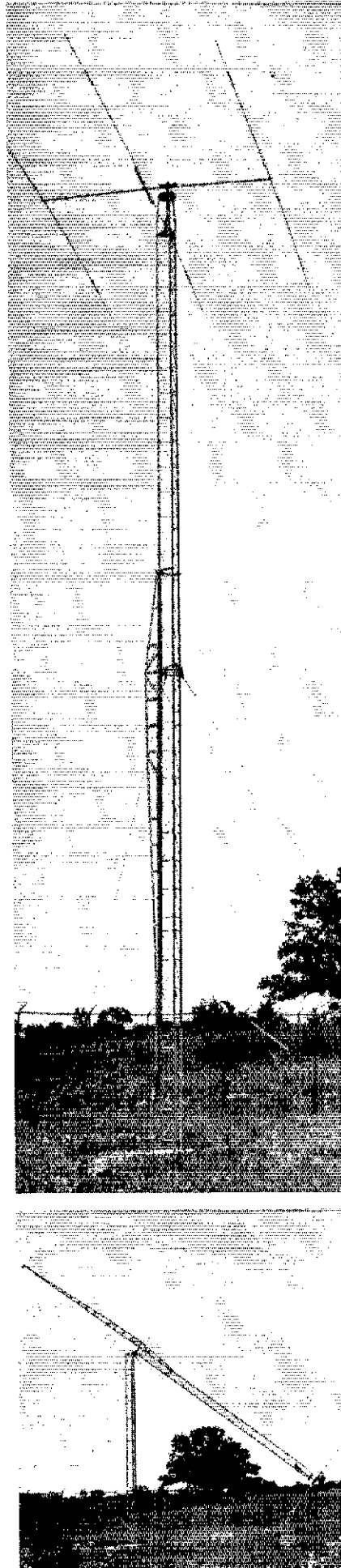
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the section. WA2KND WA2UGJ W2LCH WB2DPT WB2EDT WA2GCK W2MPM W2ICE W2DD W2GEE and yours truly made it to the Dayton Hamvention where W2MPM won the grand prize at the FM Bash — a Clegg FM DX. K2KWK continues yeoman service as OBS on several area repeaters. Other stations are urged to consider if it makes an excellent means to keep Technician and other VHF only ops. informed. Congratulations to WA2ZJP who is waiting for his Advanced ticket. W2RQF has a new monitor scope and S8-220. A warm welcome to the WNY Novices graduating from RaRa code and theory course. WNY: EJU EJV EKW EKI EKJ EKK EKL EKP EKQ EKS EKY ELL ELC ENY and EVF. Hats off to WB2NSC and K2SQI course instructors. New RaRa officers for the 76-77 season are: WB2EDT, pres.; W2MPM vice-pres.; WB2ZFM, secy.; WA2ZNC, treas.; WB2RUE W2NV. WA2LKR WB2HP WA2CFR WA2KND and WA2UGJ dir. RRA installed a new WR2AL with higher power and more features on May 15. W2HXE reported a two alarm fire via WR2AL and WA2AAC during the last week of Apr. Traffic: WB2UBW 192 W2MTA 155, WB2VRJ 91, WA2IPC 68, W2PZL 60, W2RUT 45, W2RQF 34, WA2DRC 31, W2ZFK 25, WA2AIV 23, WA2ZJP 23, K2OPV 22, W2EAT 13.

WESTERN PENNSYLVANIA: SCM, Donald J. Myslewski, K3CHD — SEC: W3ZUH, Asst. SECs: K3SMB WA3LJW, RM: W2KAT/3 W3NEM W3LGS W3KUN.

Net — Freq.	Time/Day	Sess.	QNI	QT
WPA CW Traffic	3545.0	7:00 PM	Dy	
Pa. Phone	3960.0	5:00 PM	M-F	
WPA RACES	3990.5	9:00 AM	Su	

The appointment of PAM is available and open to any WPA member who can qualify. Contact me if you are interested in this important appointment. New appointment, WA3ZAO as OBS. The annual WPA picnic will be held at Cook's Forest State Park on Sept. 12. It was a pleasure to meet many of the WPA members at the Dayton Hamvention. Meadville hamfest and Breeze Shooters hamfest this past spring. K3J5O's XYL is a new Novice as WN3BYE. Also congrats to WN3BTX, a new Novice; to WA3AV and WA3YJR who passed their General Class; to WA3YS, WA3BJ and WA3WK who passed their Advanced Class. Penn State ARC conducted their annual chess match with Southside Virginia Community College. Mercer County ARC has a new club house and is conducting Novice and theory classes. Also, Mercer CO. ARC announces the following officers for 1976-1977: K3ZFD, Pres.; K3QMR, vice-pres.; WA3WIK, secy.; WA3FAT, treas. Get well wishes to WA3AHP. WA3TPM is moving to IN. W3EGJ got all rigs going and is active handling traffic. W3UJH and WA3EBA acquired new antennas. Congrats to W3LQG for 50 years as a licensed Amateur. WA3SPG is busy building an HW-101 and WA3YDP is back on the HF bands with a 14X-C. The Foxhills ARC with the help of WA3RJD are building a triode generator for Field Day use. Indiana County ARC repeater is now operational on 146.31/91 MHz. Conemaugh Valley ARS provided communications for the annual Cancer Drive. Clinton County has been issued the first RACES license in the 3rd call area (W3AAA). The WPA CW Traffic Net has been discontinued. 77 messages with 326 QNI. W3SN had perfect QNI for Apr. PSHR credits WA3VRM 49. Traffic: WA3VBN 300, W2KAT/3 286, K3MIY 88, W3UT 48, W3EG 45, W3KUN 39, K3HCT 33, WA3SWF 30, W3SN 26, WA2UDS/3 19, K3CHD 18, W3DDO 13, WA3ZAO 12, K3RXK 8, W3YD 7, K3QYB 3, K3VGV 2.

CENTRAL DIVISION

ILLINOIS: SCM, Edmond A. Metzger, W9PRN — Asst. SCM: Harry Studer, W9RYU, SEC: W9AES RM: K9ZTV, PAM: WA9KFK, Cook county EC: W9HPG.

Net — Freq.	Time/Day	Sess.	QNI	QT
ILN — 3690	2330/0300	Dy	60	388
ILL Phone — 3915	2145	Dy	—	821
NCPN — 3915	1700		26	650
NCPN — 3915	1700		26	545

This column's sympathy to the family and many friends of WAVEY who passed away May 7th. Dan Ham of many years was well known by all the traffickers of this Section. He was also instrumental in helping hundreds of amateurs in code & theory and getting their licenses and putting them on the air. The East Coast Radio Teletype Net and Independent Traffic Net is being held at a PM 1530 at 3605 kHz. Increased stations please QNI WA3UJ net mg. K9ZTV's the proud father of a first harmonic. AB9EBO received Bicentennial Prefix award No. AK9RMG received the District's Award No. 2 and No. 3. For info send s.a.s.e. to P.O. Box 981, Oak Brook IL 60521. WB9BIO and W995NA have passed the Extra Class exams. WB9NLQ, a 20-meter 10-meter to hunts held by Chicago Suburban Radio Assn., Sun nights on 28665 kHz. Newly elected officers and directors of the Northern IL DX Assn. are W9JLU W9NB WA9JCO WA9FWY WA9IVL WA9LZA and K9WEH. The Sangamon Valley Radio Club (of Springfield) will hold their first annual Hamfest on Sept. 2 at New Berlin Fairgrounds. WB9EBO has just completed his around the world trip. WA9AIB completed a two week stay in Trinidad with the call 9Y4NI. WB9NOZ has a new Yaesu, TR4C for cw. W9ZAV now Advanced. W9PEA W9NHVC and W9NOL passed their General Class exams and waiting for the new ticket. W9NEM W9HVV W9HVD W9HSE and W99LNQ were elected officers of the Wheaton Community Radio Amateurs. K9IRG of Spectronix received a lifetime membership plaque from the Chicago FM Club for his invaluable help to the club. Hamfesters' annual picnic will be held in Santa Fe Park on Sun. Aug. 8 and the Chicago FM Club will sponsor their Hamfest Expo 76 on Sat. 18 and 19, at the Lake County Fairgrounds. Traffic: WB9NOZ 24, W9NJP 214, W9VGW 185, WA9KFK 125, W9HUC 117, WA9CBP 104, W9JXV 100, WA9JJE 8, WA9AQN 82, W9OYL 73, K9ZTV 67, K9KHI 6, W9LNQ 63, WB9IWT 46, AB9DED 40, WB95NA 1, W9PRN 14, WB9NIO 12, W9RYU 12, W9NXG 10.

INDIANA: SCM, M. P. Hunter, WA9ED — SEC: W9UMH, Cass Co. Radio Club has moved its 78/ repeater to its new home. Welcome to ham radio the following: W99X TUG T9R TWR and UA WA9BWW suffered lightning damage to his year again! W9UEM has come home from the sunbath state. ITN has added a session at 2130Z on Sun. WA1DJC reports he is forced to hide his antennas in the roof at Notre Dame. The Indy DXers held their annual banquet with W9NTP as the featured speaker. WB9QZW is the new net secy. for QIN. WB9OMX and K9DCX are both reporting good activity on their net. W9JOO accomplished better than 35 ppm in the F

I-M.T. Congrats to WA9BWY for top Central Div. honors in the SS contest and to the Indy DXers for seventh place club. Congrats to WB9OMX and WB9KTR for A-1 Op. The Ft. Wayne Radio Club has a new call - W9TE. WB9UDV is trying to reorganize the old radio club in New Castle, anyone interested should contact him. Net traffic: ITN 407, IPON 2, GIN 238, Hoos VHF 22. Traffic: (Apr.) W9QLW 184, WB9SOM 172, WB9KTR 442, W9QZV 29, W9HUP 117, W9IWH 106, K9DCX 104, W9SFD 73, W9NUU 61, W9GGW 63, WB9IHR 60, WB9SKA 56, WB9OMX 46, WA9OHX 43, W9LTU 42, WA9TJ 38, WB9NAQ 35, K9TKE 34, WA9OLM 29, K9YBM 29, K9LZN 23, W9KWB 20, WA9OKK 19, W9PMT 18, AB9HCH 16, W9RPF 16, K9JQY 15, WB9KGR 15, WA9QZC 14, W9JEM 14, W9T 13, W9RT 10, W9DZC 8, K9RWQ 8, K9FZX 7, W9L 6, K9RCF 5, K9WJ 5, K9DIY 4, WA9LXP 4, WB9DP 1, W9CM 1, K9HMC 1. (Mar.) W9QLW 127, WA9QCF 30, AD9MDS 26, W9PMT 6, W9CMT 7, K9DIY 2, W9BDP 1, W9VAY 1.

WISCONSIN: SCM, Roy A. Pedersen, K9FHI - SEC; K9PKQ, PAMS; WA9YK, K9UTQ, WA9RW. RMs: WB9ICH, W9MFG, K9LGU, K9KSA, Nets, FTime, QNI, QTC, Mgr.: BWN, 3985, 11452 M-S, 501, 380. WA9YK, BEN, 3985, 1700Z, WA9LRW; WNN, 3725, 2215Z, Dy, 75, 7, WB9ICH; WSBN, 3985, 2230Z, 1087, 241E, K9UTQ; WIN-E, 3662, 0000Z, Dy, 229, 122, W9MFG; WIN-L, 3662, 0300Z, Dy, 196, 120, K9LGU; WSSN, 3862, W9PMT 20, K9KSA, WI Expo Net, 3925, 1701Z, M-F, 657, 39, WA9NIX. K9UTQ has new linear SB-220. K9FHI attended one of the Milwaukee ARC meetings, also attended Swapfest and Banquet of the Neenah-Menasha ARC. New ham in Randolph W9T VR. I regret to report WB9MM made last W9LW call and due to the K9FHI to those who expressed condolences and cards they are very much appreciated. Don't forget WNA Ltd. picnic July 25 at Baraboo, lets have a good turnout, also the Central Division Convention July 9-10 in Milwaukee. Madison swapfest Sun, Sept. 19, mark your calendar. K9CPM made W9LW call and due to the ice storm has modified his antenna system. WA9AVT busy house hunting. WB9NME has new FT101EX, has worked OZ1 GM3 HA6 UK6 UV3 SP8 AGJ UL7 G13 F12, etc. on 20 cw, sb. WSSN now on summer schedule. WB9PFR passed General. W9N0EC now WB9OEC. WA9LRW happily married, congrats. Traffic: (Apr.) K9CPM 1250, W9PMT 24, WB9KTR 70, W9PVH 153, K9MZO 136, K9LGL 73, WB9NME 76, WB9ICH 73, WA9YK 66, K9FHI 65, WB9HLS 48, K9UTQ 44, K9JPS 42, WB9LW 39, WB9JW 35, W9MFG 33, W9IEM 29, W9ZBD 27, WB9YQ 25, WB9SHK 22, W9YFW 18, WA9QVI 14, WB9QXO 14, W9SFL 14, K9ANV 10, WB9LKC 8, WB9OEC 8, W9RWRZ 4, WB9UJ 4. (Mar.) W9RTP 3, (Feb.) W9RTP 4. (Jan.) W9NPKJ 7, W9NFR 6.

DAKOTA DIVISION

MINNESOTA: SCM, Frank Leppa, K0ZXE - SEC; WA0DFZ, PR Asst.; WB0NGX. The MN Repeater Council has elected a new pres, K0FVF and WA0IAW is the new state frequency coordinator. There are 14 repeaters active in MN. Please consult with WA0IAW before ordering repeater crystals to discuss frequency usage and solutions. The MN State Fair radio exhibit committee is active, please contact WA0EFW to become involved in this interesting yearly activity. The Mobile AR Corp. participated in the Diabetes Assn. Bike-a-thon May 15, 16, 18, 20, new Novices WB0SCO, WB0SNC; Tech. WB0KYB, Extra K0AVY, WB0MEB. The Dakota Division ARRL Convention is tentatively Oct. 1, 2 and 3. Be sure to attend. The Northern Lakes ARC picnic is July 18 at the Itasca Co. fairgrounds in Gr. Rapids. The annual St. Cloud Hamfest will be Aug. 8 at 11 AM in the Sauk Rapids Municipal Park; camping available. Attention Novices: The MN slow speed net meets Mon, thru Fri. at 5:30 PM. W0IMY, W0IRJ and W0UUI are Silent Keys. ARRL Official Appointments are available; write the SCM for information on qualifying. In regards to the Apr. SCM election, I appreciate your support and gratification. In the next two years plans will be to further revitalize ARRL field activities in MN. Murray for the BPLers this month: K0RYU, WA0GLI, AB0HOX. Traffic: (Apr.) AB0HOX 789, WA0GLI 491, K0RYU 242, K0CVD 215, K0ZXE 155, W0QMY 148, K0CSE 139, WA0YVT 118, W0P0G 119, W0BPK 65, K0KX 60, WB0CP 58, WB0MAO 52, K0ZHI 49, WA0URW 49, WB0CP 42, W0BJY 42, WA0TFC 40, AB0LDV 38, WB0NZB 37, K0RMX/0 31, WB0TQ 27, W0MEE 26, WB0QCV 24, WA0ADX 23, W0OBB 17, W0HZU 14, W0HNS 14, WA0JPR 11, WA0VOV 11, W0ALW 6, WA0IAW 5, W0P0N 3, K0FLT 3. (Mar.) K0RYU 87, WA0URW 56, K0PZ 41, W0JFZ 10, W0KE 5.

NORTH DAKOTA: SCM, Mark J. Worcester, W4DWLP. DAKOTA: K0PVG, Fargo-Moorhead Rept. Assn. provided Communications for M. S. Bike-a-thon May 2 for about 8 hours. New Contd. in Grand Forks area are WB0QEA and WB0SCD at Pecan. A class in I.C. Logic is planned by the Bismarck Rept. Group. The YLWX Net has closed down for the summer. A class was presented by the National Weather Service in Bismarck with K0GFM, WA0RST and WA0RWM in attendance. WA0RST is playing chess with Capt. Andrew DeStefano in Cavalier using WB0PP as a relay. Net - kHz CDST/Days Sess. QNI/QTC Manager VLYWX 3996.5 0730/5-5 15 250 225 WA0RWM WA0GRX Traffic: WA0RWM 470, WA0SUF 119, WB0BMG 34, W0DM 25, WA0JPT 7.

SOUTH DAKOTA: SCM, Ed Gray, WA0CPX - The Black Hills ARC will be operating a bi-centennial special events station NS0DAK at Mt. Rushmore National Memorial, in the Black Hills of SD, on July 3, 4 and 5. We hope to operate ssb and cw on General and Advanced portions on 80 thru 10 meters and 2-meter (m. Special QSL cards will be available. Please QSL with K0ZC, 4715 San Marco, Rapid City, SD 57701. Our authorization is good through Sept. 5, so watch for us on other weekends and holidays. WB0MDH is a new Technician Licensee. Appreciation is extended to the Sioux Falls groups for hosting the 1976 SD Picnic. Net reports: Morning - 292 QNI and 69 QTC; NJQ - 664 QNI and 33 QTC; Evening - 131 QNI, 38 QTC; SDN CW - No report; YL Net - 20 QNI; Traffic: WA0VRE 123, W0HOJ 64, W0IG 33, WB0EVQ 24, WA0NZA 6.

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- Time & freq std, WWV xtal kit 26.00
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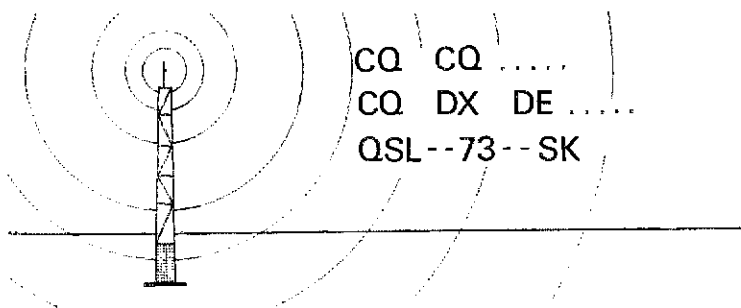
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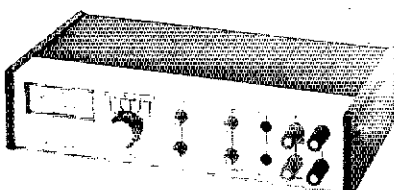
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DELTA DIVISION

ARKANSAS: SCM, S. M. Pokorny, WSUAA — SEC. WABVNV. PAMS: W5POH WASZWZ. RM: W5MYZ. Net, kHz, Time/Day, QNI, QTC, Mgr. QZK 1/30 0000/3y, 1400-4, W5MYZ, APN, 1937, 1100/MS 0000, 47, W5POH; M-Bird, 3927, 2130/M-F, 624, 16, WASZWZ; ARN, 3995, 2330/DV, 375, 31, Act. WSUAA. Welcome to AR newest hams: WB54 RXC RZW SBW SCF SC1; WNS5 RYO RYP RZM RZS RZO RZP RZQ RZR RZS RZT RZZ SAA SAR SCS SDJ. Regret to report as silent Keys, W5BAW W5VFW W5AB1. Welcome to WABVNV. AR new SEC. W5BOHD mgr. for ARN for a month had to give it up as he had a change in work shed. Now need someone as net mgr. for ARN as well as more net control sta. How about it some of you boys. Also need more AR sta. for DRNS. W5CQG and WSUAA are conducting a Novice class at Horseshoe Bend, Thur. at 7:00 PM at First National Office. your SCM request news from radio clubs, as to Novice classes, or any other activities. Thanks to JARC F5AHC & NWAARC for their news bulletins. PSHR: W5POH 41, WSUAA 18, W5GGQH 10. Traffic: W5HNN 141, W5MYZ 34, WSUAA 28, W5AGWU 27, W5POH 17, WASZWZ 16, W5BD 10, W5GGH 3.

LOUISIANA: SCM, Robert P. Schmidt, W5GHP — Asst. SCM; John Souvestre, W5GHI — SEC.; W5TR1 RM: W5SPR; PAMS: W5FKU VHF PAM; W5VXE LA was well represented at the Delta Division Convention at Jackson, MS. K5TTC made Bicentennial VAS Regret to report the resignation of W5ZLA as mgr. of Daylight Central Area Net (CAN-D). The L. Council of ARCS has appointed W5T1D as a trustee for the state. He will work with W5MLE who will coordinate 2-meter repeater frequencies for the southern part. New Orleans VHF Club having great success with their code transmission on their 1676 repeater — Tue, Wed and Thur. from 10 to 9:30 PM. The club would appreciate reports or reception. L. Club W5YK pres. W5LSH new Advanced W5MXX and K5VJ received the Advanced licenses after a wait of nine and one half weeks. SELARC in Hammond have graduated 5 new Novices in their spring class. K5IFG, New Orleans formerly of Baton Rouge, very active on LAN and RNS. W5NVB active on LSN, W51QA active on RTTY. Remember the Alexandria Hamfest on Aug. 15.

Net — Freq. Time/Days QNI QTC Manag
LAN — 3615 7&10 PM Dy 454 180 W5PFP
LTN — 3910 6:45 PM Dy 275 57 W5EKK
LSN — 3703 8:30 PM M-F 139 30 K5T1
LRN — 3587.5 7:00 PM Su 14 6 W5GH
Traffic: W5GHP 74, W5ZLA 347, W51QG 37, W51G 4, K5TTC 152, W5MI 142, W5VGE 84, K5IFG 78, W5SPR 59, W5EKK 50, W5LRR 34, W5NVB 30, W51QA 25, W5KKQ 12, W51KI 10, W5QVN 10.

MISSISSIPPI: SCM, W. L. Appleby, W5DQY — Asst. SCM; C. E. Gibbs, W511. I've been advised that I have been re-elected as MS SCM thru Sept. 1978. Thanks to all for the support and confidence. Delta Div Convention was a huge success at Jackson. Don't forget MTN had a slot in the 1978 class 11:30. Remember a W5GDC W5LXX W5LVA are doing FB job representing the section on DRNS but they need immediate help. 7290 at 2130Z daily, contact me for assignment. W5EHP/5 now W5EHN. W5LSG W5EPEO heard on MTN. Apprs: W5BNV K5ECH, W5BJA, K5OAF, W5YIA, K5YIA, W5Y2, K5UR1, K5YTP, ORS; W5SHAS W5SNPM W5EFX W5MPQ K5YTA W5YIA W5VOR K5UR K5TFV W5SNX K5YTP W5YTN W5LX W5LFG, QPSS; W5KDV W5SHK, W5UC K5YTP QVSS; K5VXV PAM; W5MDP RR W5BMP. RTN class 11:30. Remember a appointments are now for two years! Will all section amateurs encourage activity by newcomers and Q Timers alike on the MS Sig Net. MTN Cert issued to W5BNV K5ECH/5. MSN Cert issued to W5LFP W5LXX, W5EZO and W5JHS heard on VHF in W5SHV. read SWAN. Welcome to new MS amateurs: W5SAX, W5NRY, W5RZ1, W5NRY, W5SEJ, W5NRY, W5SAN, W5RZY, W5NRY, W5SAK, W5NRY, 16-76 Jackson Repeater back on air per K5GRV, W5RQ working QRP-DX. W5B read 60-yr award from GCWA.

Net Time(2)/Day Mgr QNI Manager
MSN 1118/DV 95 1048 W5ZL
MTN 2345/DV 75 194 W5FHA
MSN 0000/MWF 12 36 W5SMO
W5SM1
ORCHN 0100/Dy 7504 1777 W5BLTV
Traffic: W5FHA 128, K5DAE 105, W5Y2W 7, W5KLU 62, W5DQY 39, W5FD 65, W5WZ 3, W5SHV 23, W5LXX 23, W5LVA 18, W5HW 1, W5LSG 9, W5YTN 7, W5LL 4, W5NSC 2.

TENNESSEE: SCM, O. D. Keaton, WA4GL5 — SL. WB4DYJ. PAMS: W54PFP, W5LSP, RM: WB4DUJ.

Net — Freq. Time(2)/Days Sec. QNI QTC Manager
TPN — 3980 1040 M-F 81 3943 1
WB4YPO
WA4EWW 1145 M-F
W4PEP 0030 M-S
1400 0300 SuH
0030 M

ICN — 3980 5 118
WB4MPJ
LTVHFN — 50.4 1900 MWF 14 110
WA4WZJ
ETVHFN — 145.2 1900 TT 9 44
WB4DZG
MTN — 28.8 0100 TF 9 77
W5EAY
TN — 3635 0000 Dy 34 209 1
K4YFC

Congrats to the Memphis amateurs who helped in the March of Dimes Walk-A-Thon; there were 28 amateurs participating with 17 mobile, 6 hand held transceivers winning 7 check books over the 20 mile walk. During the month of Mar. the WTWN operated 29 hours, W 158 QNI and 132 QTC. WTWN during regular session had QNI 172, QTC 1 for 12 sessions. MTARS also operated a comprehensive weather watch during Mar. they had a QNI of 34 covering middle TN and northern AL. Remember that the Crossville Hamfest on July 24, 25. K4J5J has been appointed OPS at the ORS appointments are WA4IDN and WB4LRC. I report to the SCM monthly on their activities. Traffic: K4CNY 337, W4OQG 105, W54LRC 95, W4RZZ 2, K4J5J 64, W4BKF 31, WA4IDN 31, W4B4YPO, WB4RUF 22, WB4MPJ 18, K4WVG 18, WA4GL5, WB4GT 13, W54DDV 10, K4AMC 9, W4SFI, WB4FT 5, W4TYW 5, WB4GZF 4, WB4WHE

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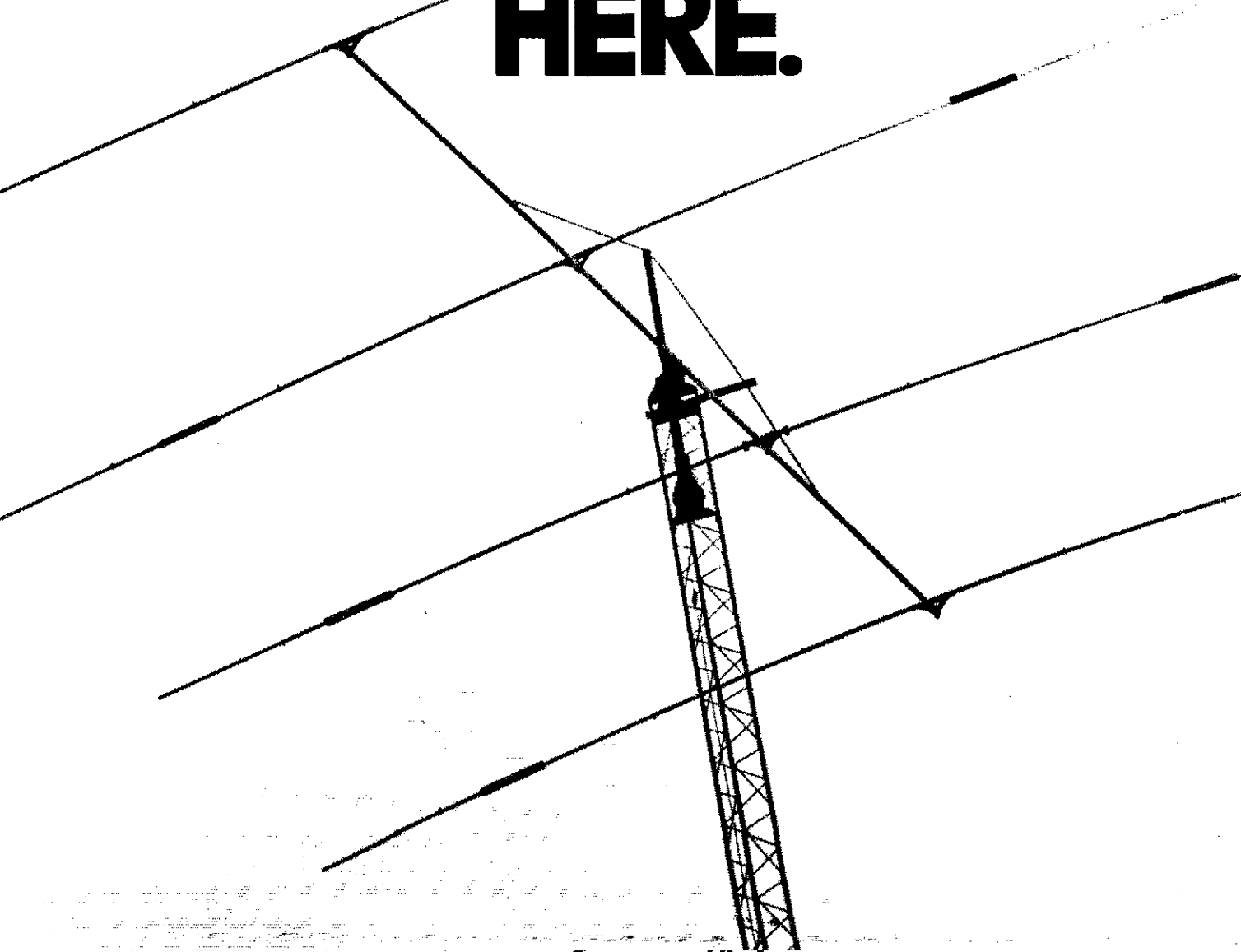
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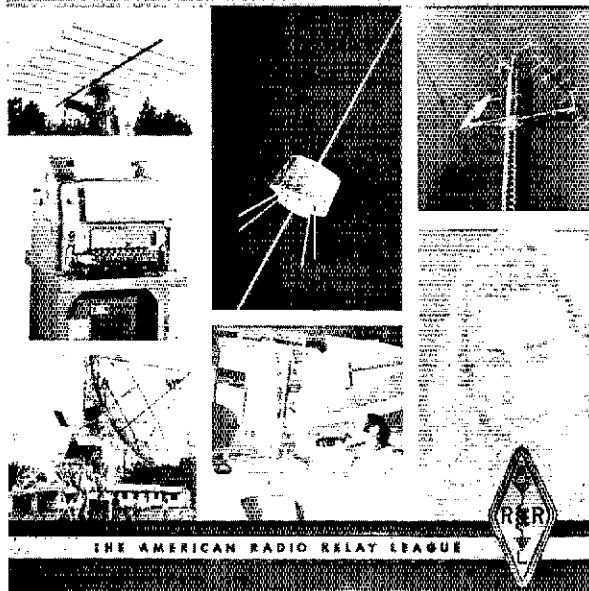
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NEWINGTON, CONN. 06111

Presenting
KENWOOD

... the Pacesetter in Amateur Radio



the
TS-700A

Kenwood's TS-700A offers the ultimate promise of 2-meters . . . more channels, more versatility, tunable VFO, SSB-CW . . . and Kenwood quality.

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 (operate from your car, boat, or as a base station through

its built-in power supply) • 4 MHz band coverage (144 to 148 MHz) • Automatically switches transmit frequency 600 KHz for repeater operation. Simply dial in your receive frequency and the radio does the rest . . . simplex repeater reverse • Or accomplish the same by plugging a single crystal into one of the 11 crystal positions for your favorite channel • Transmit / Receive capability on 44 channels with 11 crystals.

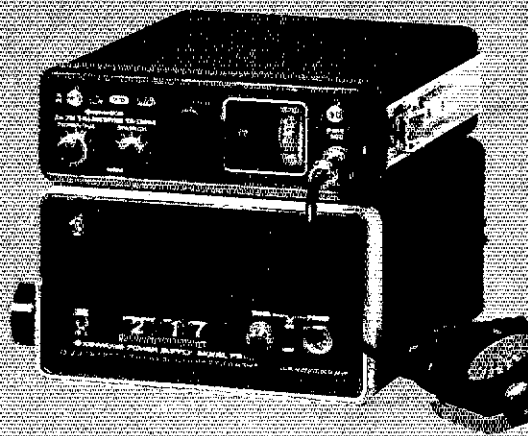
TR-2200A

Kenwood's high performance portable 2-meter FM transceiver . . . completely transistorized, rugged and compact. 12 channel capacity • Telescoping removable antenna • External 12 VDC or internal ni-cad batteries • 146-148 MHz frequency coverage • 6 channels supplied • Battery saving "light off" position • Hi-Lo power switch (2 watts-400 mW)

TR-7200A

Kenwood's superb 2-meter FM mobile transceiver. Designed to withstand the most severe punishment while providing consistently excellent performance. Packed with features like the PRIORITY function

Put your favorite crystals in channel 7, and the 7200A switches there with the push of a button . . . no matter what channel you are on. 146-148 MHz coverage, 22 channels, 6 supplied. Completely solid

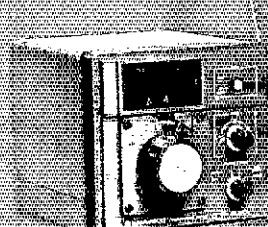
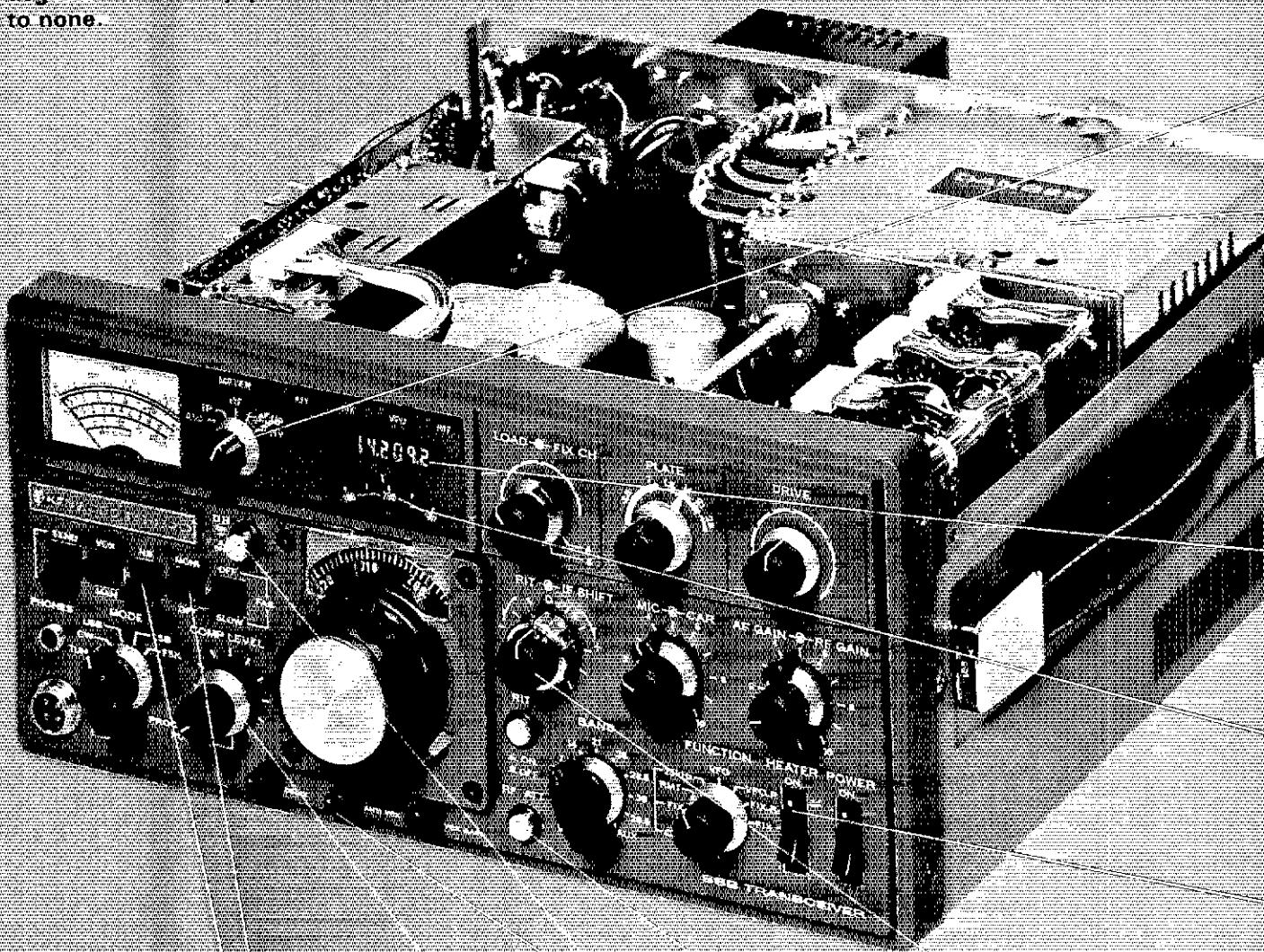


The perfect companion to the TR-7200A is the PS-5 AC/DC power supply. Together they provide an efficient and handsome base station. Complete with a digital clock and automatic time control feature

KENWOOD'S TS-820 *the Pacesetter*

Kenwood's well deserved reputation for fine craftsmanship and superb performance has never been more evident than in the TS-820. As a result of a host of innovative features being brought together, the 820 offers a degree of versatility, performance and pleasure second to none.

The Kenwood TS-820 is destined to be the world's new standard of excellence in amateur radio for years to come... a true "Pacesetter".



VFO-820

The VFO-820 is a solid state remote VFO designed exclusively for use with the Kenwood TS-820 *Pacesetter*. The VFO-820 has its own BJT circuit and control switch. It is fully compatible with the optional digital display in the TS-820. *The perfect extra to any Pacesetter station.*

- **RF MONITOR** • Built-in monitor circuit allows you to hear your own voice by sampling the RF signal. Especially useful for adjusting the RF Processor.
- **NOISE BLANKER** • The TS-820 uses an efficient noise blanker circuit, another Kenwood exclusive. A special crystal filter assures unsurpassed efficiency in eliminating unwanted pulse noises.
- **DIGITAL HOLD** • A single pushbutton switch offers the operator unprecedented versatility. The digital hold circuit will lock the counter and display at any frequency, but will allow the VFO to tune normally. Ever wanted to return to a certain spot on the band and forgotten the frequency? That won't happen again with the new digital hold feature on the Kenwood TS-820.
- **SPEECH PROCESSOR** • An HF circuit provides quick time constant compression using a true RF compressor as opposed to an IF clipper. Amount of compression is adjustable to the desired level by a convenient front panel control.
- **IF SHIFT** • The IF SHIFT control allows the operator to shift the IF passband without changing the receive frequency. This "IF shift" control is located on the front panel and provides excellent unwanted signal reject control or "pass banding." The 820 moves the signal across the IF pass band not the pass band across the signal.
- **RF ATTENUATOR** • Easy one touch activation of the attenuator supplies 20 dB of padding on receive.
- **VOX** • A voice-activated microphone circuit is built into the TS-820. VOX GAIN, ANTIVOX, and VOX LAY controls placed on the front panel for convenient adjustment at any time.

Features

160 METERS • Full band coverage

PLL • The TS-820 employs the latest phase lock loop circuitry. The single conversion receiver section performance offers superb protection against unwanted cross-modulation. And now, PLL allows the frequency to remain the same when switching sidebands (USB, LSB, CW) and eliminates having to recalibrate each time.

RF NEGATIVE FEEDBACK • The linearity of the TS-820's final amplifier stage is now one of the best on the air. Third order intermodulation products are 35 db or greater below the output signal. RF Negative Feedback from the PA plate circuit to the driver cathode permits a high degree of linearity at the high power level of the final tubes.

FULL METERING • During receive, an easy to read meter functions as an S-meter. The same meter displays ALC level, plate current, RF output, and plate voltage during transmit. Includes COMP setting for adjusting the compression level of the built-in speech processor.

FINAL AMPLIFIER • The TS-820 is completely solid state except for the driver (12BY7A) and the final tubes. Rather than substitute TV sweep tubes as final amplifier tubes in a state of the art amateur transceiver, Kenwood has employed two husky 5-2001A (equivalent to 6146B) tubes. These rugged, time-proven tubes are known for their long life and superb linearity. The input power of the TS-820 is conservatively rated at 160 W DC, 200 W PEP. Tubes run cool with the aid of a noiseless fan (standard) mounted on the rear panel. The above tube and power combination minimizes the possibilities of TVI and helps to maintain the Kenwood reputation for excellent audio quality.

DIGITAL READOUT DG-1 • (optional) A digital counter display can be employed as an integral part of the VFO readout system. Counter mixes the carrier, VFO, and first heterodyne frequencies to give exact frequency. Figures the frequency down to 10 Hz and digital display reads out to 100 Hz. Both receive and transmit frequencies are displayed in easy to read, Kenwood Blue digits.

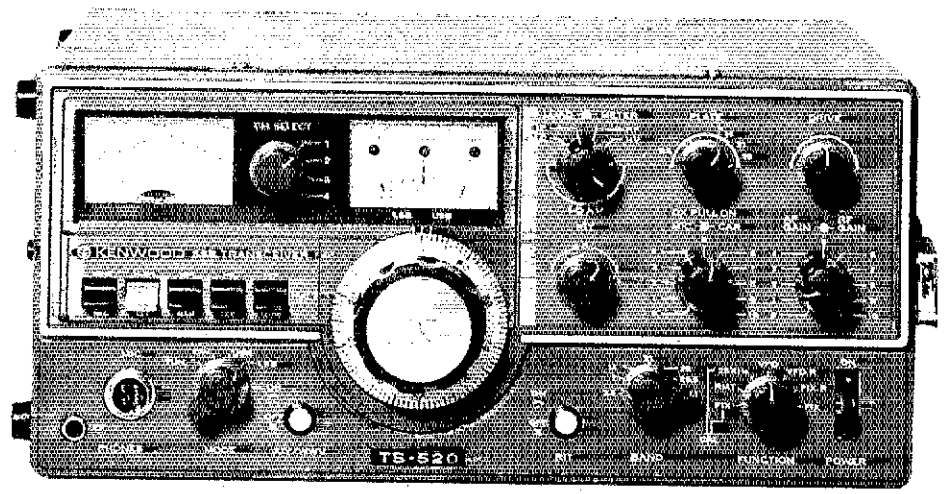
DRS DIAL • Includes the same satin-smooth planetary drive found on other fine Kenwood models plus special, high-precision gears to add a new "monoscale" feature for easier frequency readout. LSB, USB, and CW operating frequencies can be accurately read from the same pointer.

HEATER SWITCH • The filaments of the three vacuum tubes may be turned off during periods of "receive only".

CW AUDIO CHARACTERISTICS • During CW reception, a special filter is used to alter the audio frequency response to provide a more comfortable, easy to copy tone.

HIGH STABILITY VFO • The VFO heart of any SSB transceiver, is an exclusive Kenwood design using FET technology.

- Other features include:
- Built-in 25 kHz calibrator
 - Built-in speaker
 - CW Sidetone and semi-break in
 - Rear panel terminals for linear amplifier, IF OUT, RTTY, and XVTR
 - Handy phone patch IN and OUT terminals



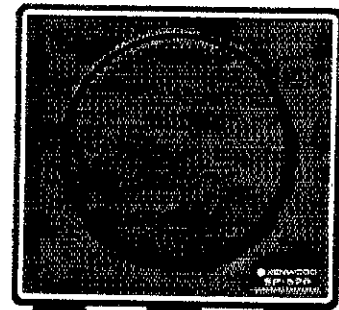
the TS-520

Why wait any longer for a rig that offers top performance, dependability and versatility... the TS-520 has proven itself in the shacks of thousands of discriminating amateurs, in field day sites, in DX and contest stations, and in countless mobile installations. Superb craftsmanship is evident throughout... in its engineering concepts as well as its construction and styling... craftsmanship that is a Kenwood hallmark.

Maybe the Kenwood TS-520 is the one you have been waiting for

*Fine accessories
designed to increase
the versatility of your*

TS-520



SP-520

The SP-520 is an external speaker designed for use with the Kenwood TS-520. The SP-520 can be used in place of the transceiver's built-in speaker for better readability. The speaker's cabinet matches the TS-520 front panel to provide a clean looking integrated station.

VFO-520

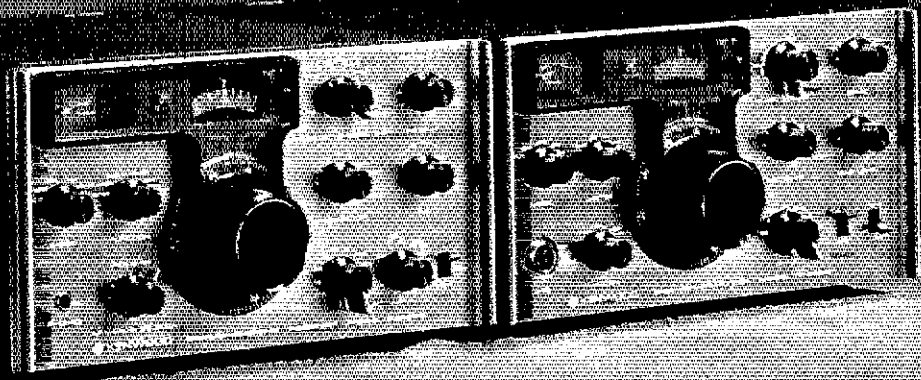
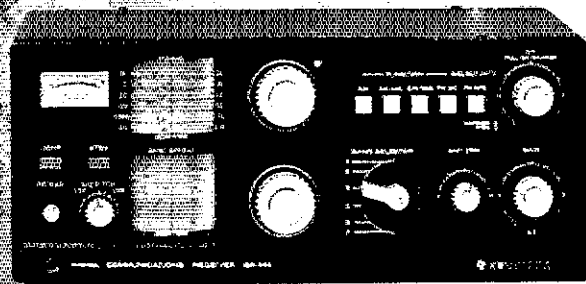
The VFO-520 is a solid state remote VFO designed to match the TS-520 perfectly. It allows VFO controlled cross channel operation when connected to the transceiver. A built-in RIT circuit, with an LED indicator, permits receiver incremental tuning.

TV-502

The TV-502 transverter puts you on 2-meters the easy way. Simply plug it in and you're on the air. Operates in the 144.0-145.7 MHz frequency range with a 145.0-146.0 MHz option. The TV-502 is completely compatible with the TS-520 and the TS-820.

KENWOOD'S

Finish



*For the
very best in
world listening*

KENWOOD'S QR-666

- Solid state circuitry assures dependable operation and compact size.
- Frequency range: 170 KHz — 30 MHz
- Receives AM, SSB and CW with superb sensitivity
- 3-way power supply (AC/battery/external DC) allows you to take it anywhere
- Automatically switches to battery power in the event of AC power failure
- Built-in antenna and jack for external antenna
- Easy to read drum type dial for fast tuning
- Dials are not illuminated when operating on DC unless turned on manually (battery saving feature!)
- An optional SWL Bandspread drum is available
- The QR-666 is available at Kenwood Communications dealers throughout the U.S. (Batteries not included.)

Kenwood developed the T-599D transmitter and R-599D receiver for the most discriminating amateur.

The R-599D is the most complete receiver ever offered. It is entirely solid-state superbly reliable and compact. It covers the full amateur band, 10 through 160 meters, CW, LSB, USB, AM and FM.

The T-599D is solid-state with the exception of only three tubes, has built-in power supply and full metering. It operates CW, LSB, USB and AM and, of course, is a perfect match to the R-599D receiver.

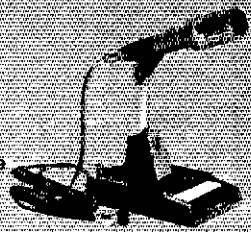
If you have never considered the advantages of operating a receiver-transmitter combination, maybe you should. Because of the larger number of controls and dual VFOs the combination offers flexibility impossible to duplicate with a transceiver.

Compare the specs of the R-599D and the T-599D with any other brand. Remember, the R-599D is all solid state (and includes four filters). Your choice will obviously be the Kenwood.



HS-4

The Kenwood HS-4 headphone set adds versatility to any Kenwood station. For extended periods of wear, the HS-4 is comfortably padded and is completely adjustable. The frequency response of the HS-4 is tailored specifically for amateur communication use. (300 to 3000 Hz, 8 ohms).

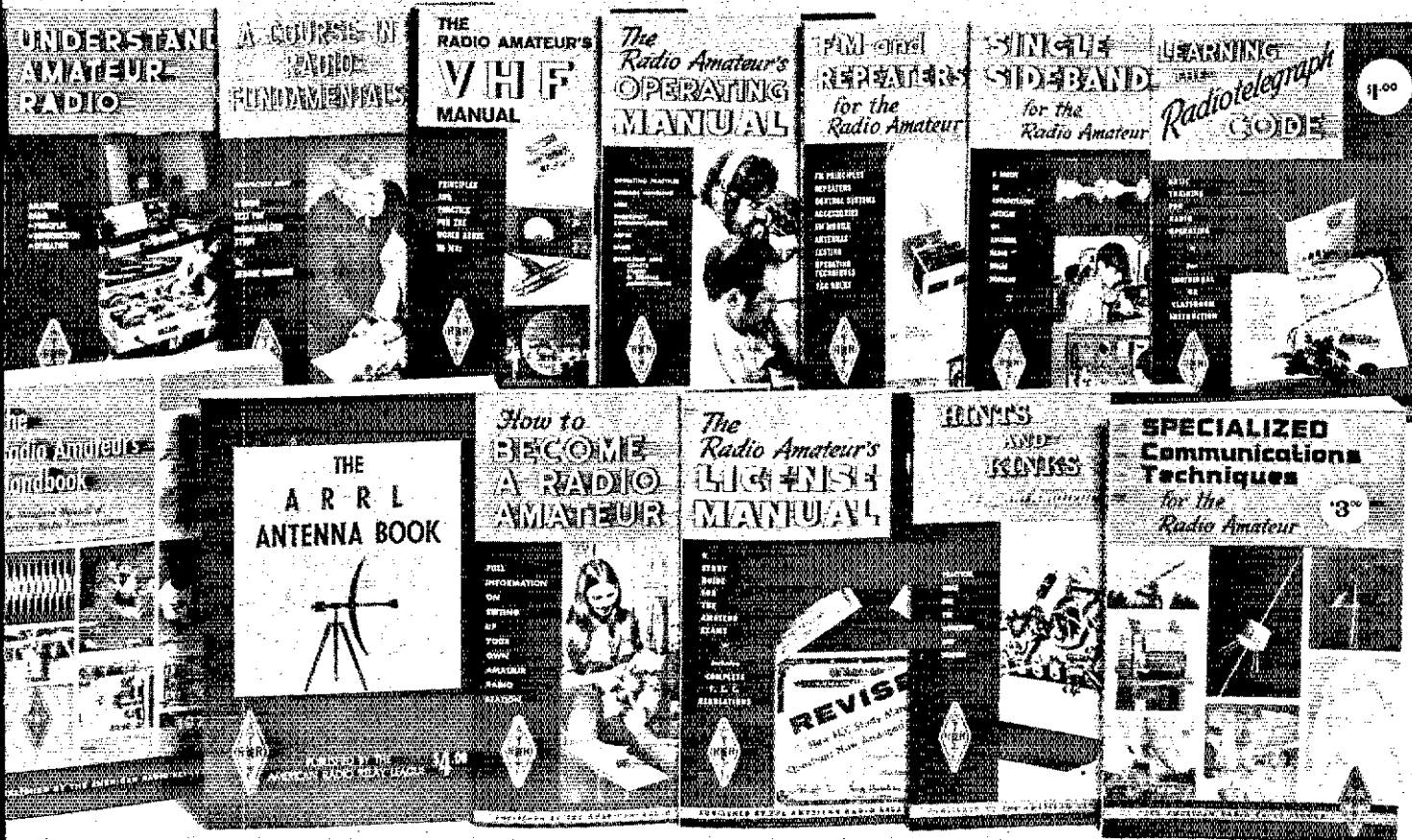


MC-50

The MC-50 dynamic microphone has been designed expressly for amateur radio operation as a splendid addition to any Kenwood shack. Complete with PTT and LOCK switches, and a microphone plug for instant hook-up to any Kenwood rig. Easily converted to high or low impedance. (600 or 50k ohm).

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- ARRL ELECTRONICS DATA BOOK** 128 pages of useful tables, charts and diagrams. 1st Ed. \$4.00 U.S. and Possessions, \$4.50 Elsewhere

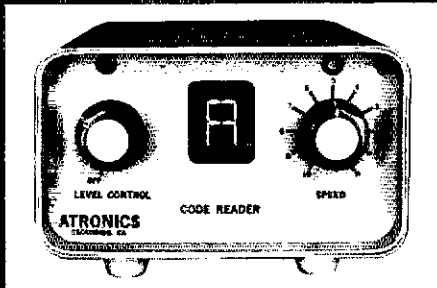
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I would like to become a member of ARRL and help support its many services to amateurs and amateur radio. Here's my \$9.00 (\$10.00 in Canada, \$10.50 elsewhere). Sign me up for a year's membership and twelve big issues of QST! Additional family members at the same U.S. or Canadian address, memberships only (no QST) \$2.00. Multiple year memberships in the U.S.: \$17 for 2 years; \$24 for 3 years; \$31 for 4 years and \$38 for 5 years.

My name..... Call

Street.....

City..... State..... Zip

(Please see the other side of this page for a list of available League publications.)

THE AMERICAN RADIO RELAY LEAGUE, INC., NEWINGTON, CONN. 06111

GREAT LAKES DIVISION

KENTUCKY: SCM, Ted Huddle, W4CID — SEC: WA4GHQ.

Net	QNI	QTC	Net	QNI	QTC
KRN	363	42	KYN	270	106
MKPN	397	76	KRN	108	54
KTN	143	20	6JAREC	106	48
KPON	50	6	8DAREC	75	11

Long skip continues to cause problems on our nets. The Rebel Net (KRN) particularly had problems during Apr. W84EHT W84JTA and W89JVL provided assistance via 2 meters recently in a fatal accident on 7-1. K4AVX reports the hazard of a repeater is giving good coverage to that mountainous area. I have received inquiries from an out-of-state group concerning a proposed East coast RTTY Net. Anyone interested in organizing a KY contingent? The No.KY ARC will sponsor an exhibit at the Cincinnati CB Fair. This should be an excellent opportunity to expose Amateur Radio to these areas. Traffic: W84QVS 76, W84AUN 71, K4UNW 52, K4UFM 49, W84ZML 42, K4DMU 41, WA45VV 41, W4CID 31, K4HRF 36, W4NACR 34, W84EOR 34, WA4IG2 27, WA4AGH 11, WA4FAF 11, W4IOZ 9, K4TRT 8, K4HF 4.

MICHIGAN: SCM, A. L. Baker, W8TZZ — SEC: W8PJD. RMs: W8CQ, K8KMQ, W8YIQ. PAMS:

K8LNE	WB8JX	VHF PAM	W8WVY	PAMS:
Net - Freq.	Time/Days	QNI	TFC	Sess.
QMN - 3663	2300/0200 Dy	1000	507	86
MACS - 3953	1500 Dy	848	304	34
BRMN - 4930	2030 Dy	562	175	30
W8RN - 4935	2301 Dy	444	33	39
W8 - 3720	2100 Dy	213	77	26
GLTN - 3932	0930 Dy	411	40	26
M16M - 50.7	2300 Dy	236	33	26
MAREC - 3932	2200 S	15	27	4
VHF PAM Report		509	6	20

W8ZEJ is new 6M net Mgr. All clubs reporting Novice class graduates waiting for licenses. Election results: Branch County ARC: W8KHG, pres.; W8QAP, vice-pres.; W8NRYR, secy.; W8NRYD, treas. Livonia ARC: K8LUU, pres.; W8SWD, vice-pres.; W8WGL, treas.; W8BQOT, secy. Shawassee ARC: K8HKM, pres.; W8ABM, vice-pres.; W8BBYB, secy.; W8BRZJ, treas. New appointees: OHS: W8AZV, W8WGF, W8GKB, W8CVC, W8WCM, OHS: W8BQZ, W8DLS, LCA: W8VW, K8BSW, OHS: W8NDJ, K8SWW hopes to be FPAG in July. W8SRZ received WAC award. Daylight Saving Time has affected the net schedules. Please check the time listing for your net and advise me if it is incorrect. Milford ARC has 3 new generators. K8GXV has new Cushcraft beam for 2M. Amateurs of the Month, MACS Net - Jan. W8POL, W8VW, W8VZ; Mar. W8KCF. New licenses: Novice, W8NRYG; Tech, W8BTC; General, W8SSO, W8RMH, W8SFF; Advanced, W8GKE. Congratulations. Regrettably I report K8JGS, W8GJM, W8SIQ as Silent Keys. Traffic: (Apr.) W8DKQ 370, W8IT 205, K8LNE 192, W8OIE 191, W8WKK 176, W8SH 147, W8PDL 136, W8KQJ 131, W8JYA 117, W8WZ 113, W8NDJ 111, K8DYL 98, W8RXI 95, W8NOH 75, W8TZ 70, W8YIQ 70, W8OW 63, K8AMU 59, W8BYB 57, W8RVG 57, K8ZJU 55, W8SJK 46, W8LWV 46, K8WRJ 46, K8JED 42, W8RFBG 38, W8VDM 38, W8BEU 32, W8BOB 31, W8RMH 29, W8IHX 25, W8TBP 24, W8JFS 24, W8TBL 21, W8LT 17, W8SD 16, W8TJ 15, W8LUC 13, W8BTD 13, W8BTD 11, W8DCN 10, W8GKB 8, W8IXM 8, K8DTJ 7, K8GXV 7, W8SCW 7, W8CUP 6, W8LDS 6, W8WVV 6, W8IMI 5, W8LOU 5, W8UPB 5, W8WV 5, W8HKL 4, W8LOE 4, K8SWW 4, W8JAX 3, K8PYN 3, K8HGA 3, W8JUP 2. (Mar.) W8TEL 48, W8BPY 17, W8RKF 17.

OHIO: SCM, Hank Greeb, AC8CHT — Asst. SCM: William K. Shaeffer, W8MCR. SEC: W8KPN. PAMS: W8DIL, W8SSI. RMs: W8JGW, K8IKD, W8AWK.

Net - Freq.	Time(Z)	Sess	QNI	QTC
OSSEN - 3.9725	1430/2000/		902612	881
OSN - 3.577	2210	28	123	48
ONN - 3.708	2230	14	59	27
OMN - 50.160	0100	30	238	59
BNR - 3.605	2200	30	106	217

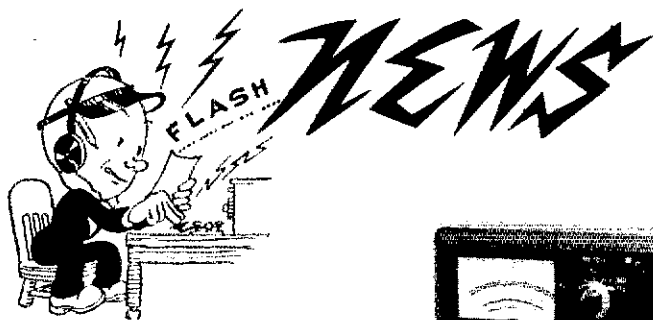
K8JUSC will be operating from Perry Peace Monument, Perry, W8BYB, W8CHV, W8BYB, W8BSK, Darke (& surrounding) Co. AREC Net meets Mon. on 146.19/79. Apricot Net (Cleveland) solicited Easter Messages via news media. Marietta ARC provided communications for Mid-America Regatta on the Ohio River. Central Ohio AREC and Queen City Emergency Net (Cincinnati) provided communications for their respective American Cancer Society drives. W8DWL is back on CBS skeds from West Jefferson. Burning River Traffic Net (Cleveland) reports 26 sessions, QTC 18, QNI 123. ONN Certificates issued to W8WKB, W8VLR, W8BUN, W8BTA, W8BTPZ, W8TMD, W8JGW and K8IKD. Activity reports are cordially solicited - by the 7th of the month. Traffic: W8HSH 44, W8BMJ 42, W8BKWD 363, W8MCR 348, W8ALS 202, W8DIL 159, W8BHL 150, W8BOMQ 148, W8KKI 143, W8QZK 120, W8JD 110, AC8IBX 108, W8BUN 80, W8LTA 78, W8JGW 72, K8BYR 68, K8ONA 62, W8BTRK 56, K8LXA 54, W8SED 49, W8SSI 48, W8RGG 42, W8GQP 41, W8TH 41, W8CE 35, W8WH 34, W8HSH 33, W8HSH 32, K8BYC 29, W8CJU 28, W8BGR 26, W8WEC 26, W8BET 23, W8BHW 22, W8AMA 22, K8LGA 21, AC8CHT 20, W8CXM 19, W8NVL 17, AD8LP 15, K8QPV 13, W8AYC 12, W8DWL 12, W8AR 11, W8DCX 10, W8RXN 9, W8QX 8, W8UQ 4, W8PWP 7, W8LAU 6, W8ABOV 4, W8DPV 4, W8FG 4, W8IM 3, W8TSX 3, W8WKB 3, W8MCG 2.

HUDSON DIVISION

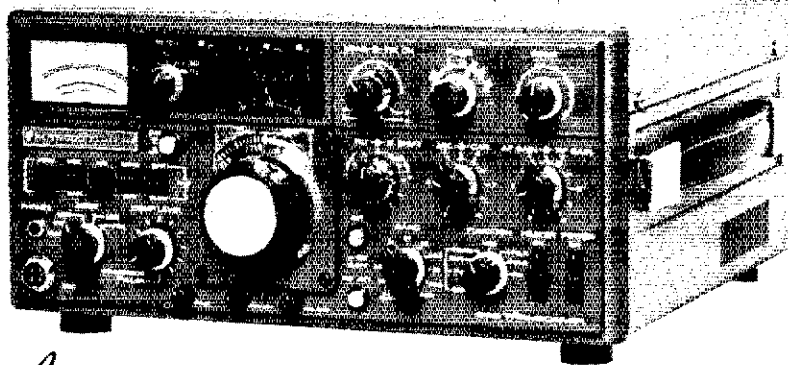
EASTERN NEW YORK: SCM, Gary J. Ferdinand, W8PJJ — SEC: K2AYQ. RMs: K2OYQ, W8BIX, W8PAM. W8ZQEI. Renewed appointment: W2QFR a CBS. Congratulations extended to: W2EWH, W2EQP, W2EQN, W2EQO for their new calls; to W2EKM for the new Extra Class ticket; to W2ZCY for the Albany AREC service award; and to W2FY for winning the Albany AREC QLF contest. Communications were run for two walkathons - one in Westchester by the RACES group, and one by W2SZ with W2OEU, W2QCI, W2SES, W2BXP, W2SCA, W2FBI, W2JRZ, W2LKK, W8UAS and W8IGT manning the posts. W2LGA has hit upon a different way of publishing the club's advertising announcements. The one I am emphasizing the difference between CB and ham - very objectively. Got something to sell or looking for something to buy? Check into the Horsetrader net at 7 PM Tue. on 50.4 MHz.

HUDSON DIVISION

EASTERN NEW YORK: SCM, Gary J. Ferdinand, W8PJJ — SEC: K2AYQ. RMs: K2OYQ, W8BIX, W8PAM. W8ZQEI. Renewed appointment: W2QFR a CBS. Congratulations extended to: W2EWH, W2EQP, W2EQN, W2EQO for their new calls; to W2EKM for the new Extra Class ticket; to W2ZCY for the Albany AREC service award; and to W2FY for winning the Albany AREC QLF contest. Communications were run for two walkathons - one in Westchester by the RACES group, and one by W2SZ with W2OEU, W2QCI, W2SES, W2BXP, W2SCA, W2FBI, W2JRZ, W2LKK, W8UAS and W8IGT manning the posts. W2LGA has hit upon a different way of publishing the club's advertising announcements. The one I am emphasizing the difference between CB and ham - very objectively. Got something to sell or looking for something to buy? Check into the Horsetrader net at 7 PM Tue. on 50.4 MHz.



BULLETIN



It's Here Now . . . *the Pacesetter*

... KENWOOD'S TS-820

Dear OM:

THE PACESETTER Transceiver is here . . . the fruit of an all-out effort by KENWOOD'S engineering department to produce a progressive ham rig for the amateur who wishes to experience the ultimate! Kenwood's well-deserved reputation for fine craftsmanship and superb performance has never been more evident than in the new TS-820. As a result of a host of innovative features being brought together, the 820 offers a degree of versatility, performance and pleasure . . . second to none!

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In keeping with our policy of selling (AND SERVICING) only TOP-QUALITY, brand-name merchandise, we at BURGHARDT AMATEUR CENTER — in Watertown, South Dakota of all places!! — are proud to add this new beauty to our ever-expanding line-up of new equipment. And, at the same time, we want you to KNOW that when you order your new "PACESETTER" from us you'll find us ready, willing and able to give you our ALWAYS prompt PERSONAL ATTENTION and INDIVIDUAL CONCERN. The TS-820 will be available in LIMITED QUANTITIES shortly after the first of July, but you can rest assured that you will get a SQUARE DEAL from us that will include HONEST evaluation of your trade-in(s), FAST DELIVERY (subject only to supply), DEPENDABLE SERVICE and GUARANTEED SATISFACTION — all at NO EXTRA CHARGE!!

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We KNOW that Watertown "ain't exactly the cornerstone of civilization" — but we are ON THE MAP, and we'll go a LONG-LONG way to take VERY GOOD CARE OF YOU!! Remember, OM, HAM RADIO is our ONLY business, and if we cannot continue to give YOU the kind of SERVICE you deserve when investing your hard-earned dollars in a sophisticated piece of equipment like the new TS-820 — then we're OUT OF BUSINESS!!

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TS-820	Transceiver	\$830.00
VFO-820	Deluxe Remote VFO	\$139.00
CW-520	500-Cycle CW Filter	\$ 45.00
DG-1	Digital Display Kit	\$170.00
DS-1A	DC-DC Converter	\$ 59.00
TS-520	Transceiver	\$629.00
VFO-520	External VFO	\$115.00
SP-520	Speaker Console	\$ 22.95
CW-520	500-Cycle CW Filter	\$ 45.00
TV-502	2-Meter Transverter	\$249.00
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TR-2200A	2-Meter FM Portable	\$229.00
TR-7200A	2-Meter FM Xcvr	\$249.00
PS-5	Power Supply	\$ 79.00
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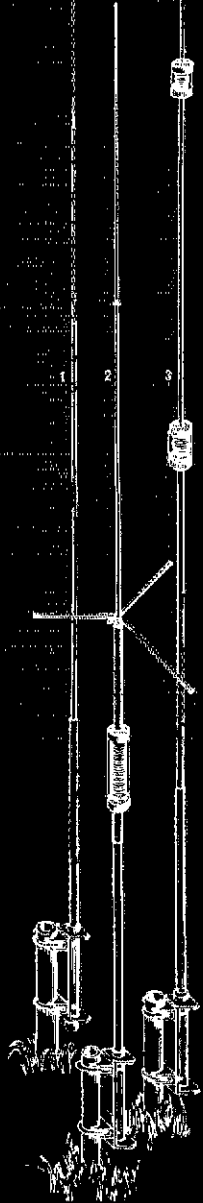
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WB2YQU reports seeing sunspots thru a telescope and the working on a SC on others on two meter SS aurora. Net mgr. WB2RIJ reports that the NYSPT&EN Annual Picnic will be held Aug. 14, the same day as the NYS CW Net Picnic. WA2CJY has a new 150 foot V, intended KH6 DX turned out to be Europeans. W2YJR is enjoying the 75-meter traffic net scene with his watt rig. Net totals: CHN (QNI) 223, QSP 263, NYPCN (QNI) 491, CQ 129; NYS (QNI) 636, QSP 273; NYR (QNI) 120, QSP 54; Traffic: WA2JPL 401, WB2EMU 274, WB2RUZ 82, WB2TGL 50, K2OYQ 47, WA2UYL 40, WA2RKI 25, WB2VVS 23, WB2FKM 20, WA2PAU 18, WB2CUC 17, AK2YXY 12, W2WSS 11, WB2GOJ 10, WA2CJY 8, WB2ELA 4. (Mar.) WB2CUC 20.

NEW YORK CITY — LONG ISLAND: SCM, John H. Smale, WB2CHY — Asst. SCM, Art Malatzky, WB2WFL, SEC, K2HTX, RM, WB2LZN, PAM, WB2PYM. The following are major AREC/RACES nets: Join one.

Bronx	28.64 MHz	50.35 MHz	146.88 fm
Kings	28.64 MHz	50.35 MHz	146.88 fm
Richmond			146.88 fm
New York	29.5 MHz		146.88 fm
Queens	29.5 MHz	50.52 MHz	145.52 am/fm
Nassau	29.5 MHz		145.52 am
W. Suffolk	28.73 MHz		145.59 am
(Hunt)	28.65 MHz		147.21 fm
(Smith)	28.610 MHz		146.94 fm
(Babylon)			146.82 fm

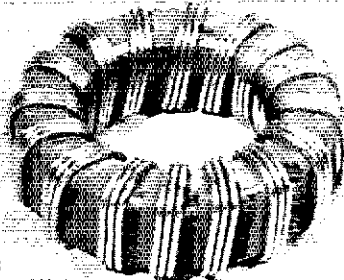
E. Suffolk
NOTE: Net Times between 2000 and 2100 local on the 1st & 2nd are looking for people to help fill the gaps in most of the towns in Suffolk Co. With the exception of Hunt, Smith, Babylon and Riverhead, ECs are needed. If you are interested, please contact either K2HTX or myself, we will gladly give you all the help and info needed. Now is the time to start making serious plans to attend the IARCC convention the dates are Nov. 13 and 14. Also, the annual NLI Picnic will be held in Aug. I hope that FNY and NNJ can at least field a team to try to take the directors trophy from the NLI section. WA1UHN enjoyed a weeks stay in the section. WA2VPA has passed his Extra. The Wantagh Public Library requested of the Wantagh ARC a speaker to address the adult Prog. Adult Program, there is a possibility of another Novice class in the Wantagh area if enough interest is generated. By the way, for all you old time movie buffs, the Wantagh ARC shows different movies at each meeting, contact WB2GMI, who by the way is now the proud daddy of his first harmonic, a boy. WA3UXJ reports that the East Coast Radio Teletype Net is being held at 2000 local on 3505 kHz. Interested stations QNI, WA2JUDS is back in NLI for the summer from college, WB2YKG is back from a trip to Las Vegas and the Grand Canyon. WA2YET reports that he built the Tuna Tin 2 from May QST with good results, he has also been operating in a local 160m ham Net on 142.80 MHz at 1600 and 1930 local, all are welcome. Hopefully I should be moving into my new QTH in June. Moving right next door to WA2JZX will prove to be quite interesting. Look for articles in upcoming issues of QST on how two active traffic and AREC stations can live in peace and harmony and the joys of finally being able to put up a full 160-meter antenna. Congratulations to WA2BDV who passed his Advanced. Traffic: (Apr.) W2FC 293, WB2WRT 215, WB2L7N 213, WB2PYM 170, WB2YKG 113, W2MLC 104, WA2WKH 78, WA2YAY 69, WA2VPA 52, W2HXT 27, WB2FLN 26, WB2BML 23, WA2CZ 19, WN2ZPV 12, K2GCE 11, K2JFE 10, WB2VPE 7, WA2JZX 6, WA2JQT 6, WA2UHN/2 5, WA2PLI 2. (Mar.) AA2VPA 40, AB2SJG 19, AB2YSP 2. (Feb.) AA2VPA 83, AB2SJG 24.

NORTHERN NEW JERSEY: SCM, William S. Keller III, WB2RKK

Net - Freq.	Time(PM)/Days	Sess.	QNI	QTC
Manager				
NJN - 3965	7:00 Dy	30	410	143
WB2LCV				
NJN - 3695	10:00 Dy	30	197	52
WB2LCV				
NJPN - 3950	6:00 Dy	30	582	329
WB2VT				
NJPN - 3950	9:00 AM Su	4	43	18
WB2VT				
NJSN - 3730	8:15 Dy	30	233	69
WA2WIV				
PVTEN - 145.71	8:00 Dy	30	No report	

WA2DPY
SEC: WB2BQO, PAMS: WA2QPY (VHF), WB2VTI (H), WA2WIV, ECs appointed in APR.: WA2ELI (Union), WA2CNW (Elizabeth), WA2CQJ (Westfield) and WB2SQO (Morris Plains). Anyone residing in or near these towns and interested in becoming a part of the local ARCC should contact the appropriate EC. Apr. QO reports received from WB2CST, WA2DNY, K2EK, K2JF and W2THI, the Oakland Repeater Assn. sponsored a hidden transmitter hunt, attended by 16 amateurs. Prizes awarded to the first 3 to find the hidden station. The NJ Institute of Technology RC K2MFF, is getting ready to put WR2AI on the air. The Sussex Co. ARC recently provided communications for a bike hike held by the county Assn. to Retarded Citizens. WN2ALH, WA2BAW, WA2BCI, K2UNW, WB2GUR, WA2EP, WB2LPX, WB2FHM, WA2UNN, WA2YSS and WB2ZIH were among the participants. The NJDXA again provided the best hospitality suite at the Dayton Hamvention. The Old Barny RC has just graduated Novices from their spring radio class. RC WA2NPP, sec. WA2NPP, pres. WB2EH, pres. WA2SHQ, vice-pres.: WA1NPV, sec. WN2EHR, treas. The Wireless Institute of the North east scored about 10 million points in the ARRL DX test, probably one of the biggest aggregate scores in the US. They are still looking for interested contesters to join. NNJ welcomes new Novices WN2EUD and WN2EYF (New Brunswick Home Radio Assn. who has helped us in the PRR). Congrats to the following amateurs on upgrading their tickets: WN2IRF, WN2YAY and WA2BAW, Generals WA2UAX and WB2RMK, Advanced, K2QBW Extra Class; WA2WIM, Technical, K2QBW reports working a JA and KX6 on 75, while WA2GEZ reports working his first SWL. W2ODY has a brand new frog, while WA2RMZ's antennas did not hold the spring winds. K2EK working 2 FM. WA2DBD and others are planning a hidden transmitter hunt for Aug. and also working on a radiotelescope at Sheep's Hill. K2JF appointed CD/DC Director for Butler, while WB2HUV has become PQ for Pt. Pleasant. WA2RMZ spending his off-the-air time on the program for the New Hudson Division Convention. WA2JUX again on the air. W2JBI working 160. WA2GSP was recently /KH6

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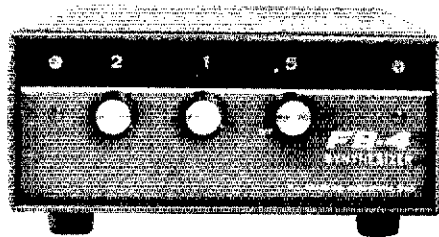


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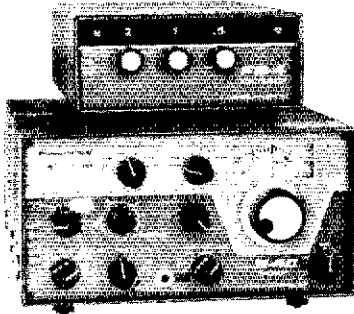
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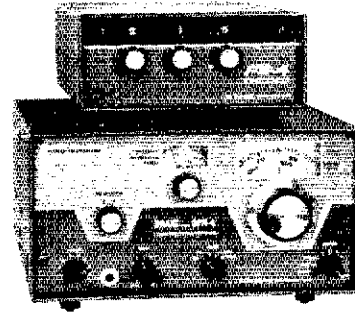
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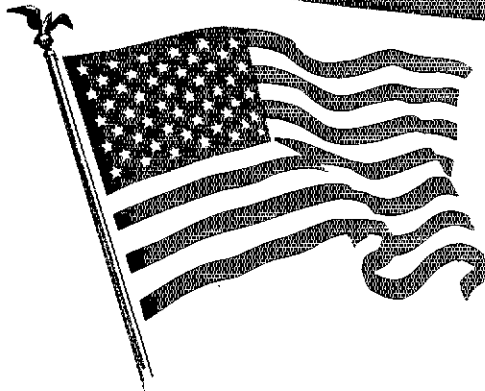
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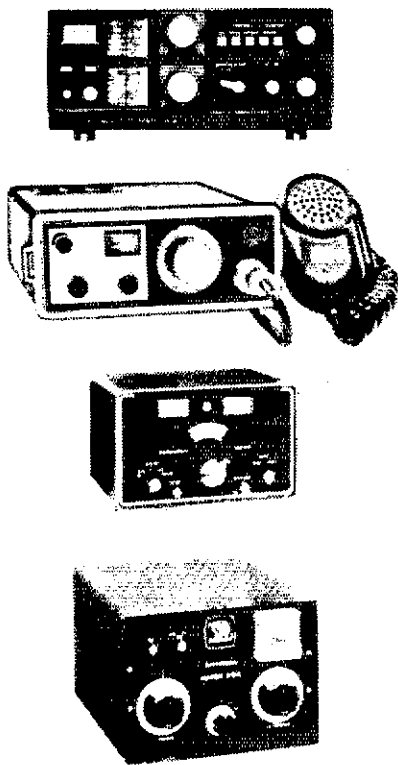
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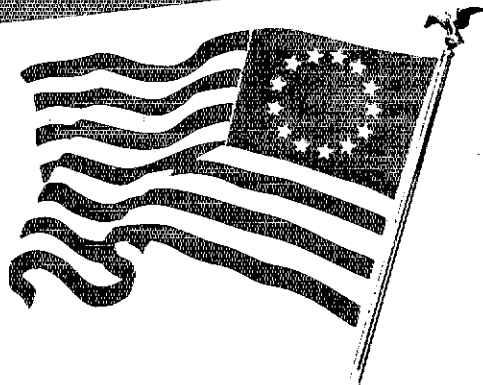
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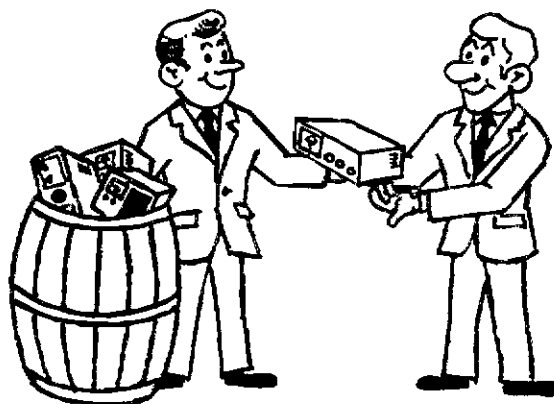
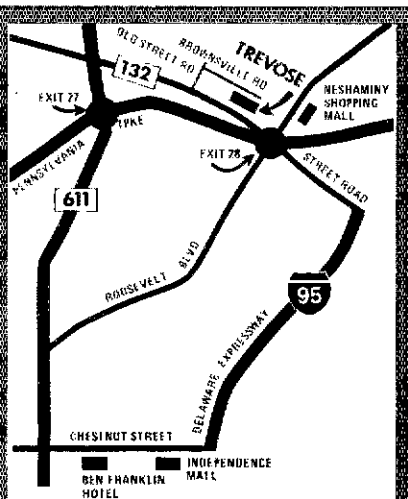
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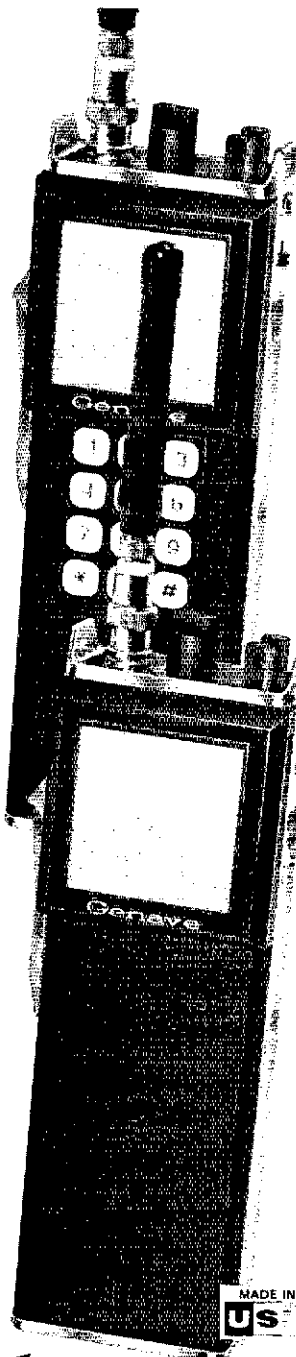
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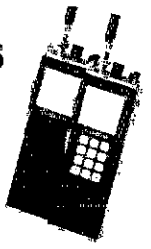


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1000 Su
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High QNI: CN - WICTI WIEFW KIEIR & WIKAM
CPN - WINQO and WAIUOU. SEC WIDGL expects reports from all ECs - a vital role when need arises - be sure your Area is ready and able to deliver. Director WIIHR Newsletter includes info on World Radio Conference & a run-down on ARRL Training Program for benefit of all - not limited to ARRL members - please read. The 23rd Annual Net Dinner with CN, CPN, VHF-2 members was well attended. Section Net Certificates awarded and the 2nd Annual WIMPW High QNI Awards went to WICTI WINQO & WAIURR; EC Merit Award to WAIKXA Affiliated Club Bulletin now Radio Club News and issued quarterly as part of the Club and Training Program; please circulate at all Club meetings. New officers for Stamford ARA - KIJWX, pres.; WAIQNX, vice-pres.; WAIUOT, secy.; WIGUW, treas. Northern Ct. ARC - KIRKJ, pres.; WAI5VF, vice-pres.; WAI5TU, secy.; WAIQOE, treas. ICRC 28/88 Newsletter notes Auto-patch should be used in emergency or Priority needs. Note to cheer up the Southwestern ARA had RTTY demonstration by WAI5FO. Tri-City trained 17 potential Novice ops. WAI55H is 1st Area CAC Rep and will appreciate comments and Bulletins from Contesters. Congratulations to WAIUAX Apr. BPL; WAIUHN Advanced Class; WIEFW High QTC VHF-21 Summer means Field Day, Vacations mean Mobile QSO's - Happy vacation! Traffic WAIJAX 309; WIEFW 294; WAI5GH 237; WAIWEM 218; WAIURR 154; WAI5YL 121; WIAW 75; WAIURA 71; WAI5PW 68; WAIUOU 63; WICTI 61; WIDGL 42; WAIHLP 41; AAIDB 38; WIGVT 34; WAIUOT 30; WAI5RZ 25; WAIURR 24; W2BDN 23; WAI1KN 23; WRA4DYI 21; WIKW 21; WAI1CG 16; AKIVGP 16; WIKAM 14; KIVGS 13; WIGV 11; KISRF 10; WAI1ZK 7; WAIUOT 7; WIBDI 6; WICUH 4; WAIJYP 4; WIIWEE 3; WAI5FH 2; WAI1XM 2.

EASTERN MASSACHUSETTS: SCM, Frank Baker, WIALP - SEC WIAOG received reports from ECs: WAI1RP, WIRAB, KICCV, WIEPK, WAI5XU, WAI1KJ, WAI1KJ, WAI1GH, WAI1GH. Endorsements: WIIAA WIALP as DVS; WIEGM WIEW WIFJJ WIMNK WIBB DRS; WIAOG WIIGL WIBB WIAAR WAI5YY OPS; WIIGL WIALP OBS; WIIYD WIIJF WIPST WIRPF ECs. Bilerica AREC assisted in Lowell fire says KIPAD, Nortolk Co. ARA held their annual banquet and election of officers; WIIJA, pres.; KIJW, vice-pres.; WIIJN, secy.; WIIJY, treas. The following provided communications for a Bicentennial parade in Medford: WAI1R WIAOG KIVUZ KIVTE KJUAQ WAI1HDN, WIGKM on 80 cw & 2M fm. WUUX reports WAI5GC had an operation and K2BO working on antennas. New England Chapter QGWA and the 4 AFrs had a luncheon in High. WIIJY visiting in AK. WIIJFL says the N.E. DXCC Banquet will be held Oct. at the Waltham, MA, Holiday Inn, write to him for info. WIGUD moving to OH. WAIUWS has Extra Class. WIIJF WAI1MQA are Silent Keys. WITFP had operation. WIIHY back in NH. WIIJLJ has his Advance. KIPPP holding papers. KIKK, KIKK, now a Lt. in Coast Guard and living in VA. On 2M fm: WAIWXI WAIWGC WIIPA KIBUG KIGWE WIGKM WIKIA WII5U WIZGC WIFB. KICLM told to slow down his activity. New officers of T9 Club: KIMB, pres.; WIKGH, vice-pres.; WII5S, treas.; WIMNK, secy. WAIMKP still sick. WIMWC on 15 and 40. WAIKZT trip to CA. EC WAI1JG has 6 in his team. WIEGH says AREC will supply communications and exhibit at FAIR in July. WIDMS feeling better. WAIQKD helped in parade in RI. WIPJ has his call for 54 years. WILE is now asst. to Navy MARS Coor. for MA/RI. KZDP-WIAGN now in AZ. WAIEMN WAI1TG have Hingo Hangers. KIKK, WIKSK on 2M fm. EM2MN had 77 QNI, 36 QTC. EM/RI PN had 101 QTC, 505 QNI. NEEPN had 52 QNI, 26 QTC. EM/RIN QNI 401, QTC 370. WAIUGJ has assumed mgr. of the Heavy Hitters Net. WAI1LU moving to the Cape. WAI1EB has mobile rig back. WIIUGJ has a Wilson. WAI1EB members of the Newton ARA are getting interested in the new 160 to 1900 kHz or 1750 meters, anyone interested write to WILMU, WIAVA on 160. KIFEM on 6. WILMU on 6 & 2. Quannapowitt RA had a talk by "Surveillance Unlimited" Mr. Denomme and WIIHB. WAI1UGJ made BPL. New officers of the Waltham ARA: WAI1GP, pres.; WAI1ZT, vice-pres.; WIEUC, secy.; WAI1WU, clerk; WIIQXX WIIOP, dir. KIMON also as trustee. WIIWSN spoke on "Bio Feedback". WBSMSV is son of WINJN. WNIWSI son of WAI1RH. WAI1RCN on 2M fm. WIPOL in hospital. EM/RIN (Mar.) 334 QTC, 511 QNI, EASN 50 QNI, 10 QTC from WNITYX. WIGRN set up a ham radio demonstration at the Science Museum in Boston. On 2 fm WIAQX WIIHB. WAI1VOK editor of "The Minuteman" for the MMRA, which now has 4 repeaters. WIGXT got married. WIIJOF now retired. Traffic: (Apr.) WAIUGJ 334, WIEPK 385, WAI1MHJ 365, WAIMSK 307, WIIJX 195, WAIUG 162; KIPAD 124; WIEH 114; WIEHC 56; WIDMS 22; WAI5YF 18; WAI5PAZ 15; WIIABC 15; WIIABC 12; WAI1QKD 12; WILE 8; WIIPL 7; WAI1FE 6; KILCG 5; WIALP 3; WIDMH 3. (Mar.) WAIMSK 489, WIEIH 182, WIIABC 12, WAI1FE 10.

MAINE: SCM, Ed Bristow, WAIMUX - New RM WIRWG KIMZB resigned, thanks Boh for FB job. New EC KIZIT. Nets: NE Barnard QNI 857, QTC 14; MSSN QNI 37, QTC 19, net will not meet during summer. New in ME: WNI5T WIF WIM; WAI1WU (c), WUK (c), WUL (c), WUM (c), WUY (n), WUZ (t). Welcome aboard. PSHR: WIRWG WAI1FC. AAIEUO received these American Bicentennial Awards: Activity Award No. 3, Pretix Award No. 7, and District Award No. 10. Fall Annual ABBY Awards on Aug. 28. We are pleased to add to WAI1GHA for this event. Former WNI5KI now WAI1WH, congrats. New repeater at Boothbay, WRIAES sponsored by KIIYF is on 146, 1979. Sec. on-air meetings suspended for summer. WNI1TV has passed his General. WIRWG on 2 meters. NE DXCC Banquet on Oct. 2 in Waltham, MA. Further info available from WIIJF. WAI1RE has 60-ft. tower with 6 & 2 meter beams. For the RTTY addicts, WAI3XU organizing an East Coast RTTY Net. For info on Bicentennial Awards send s.a.s.e. to Bicentennial Awards, PO Box 981, Oak Brook, IL 60521. WRIADS not timed out once in a month, some kind of record? Traffic: WAI1FCM 337,

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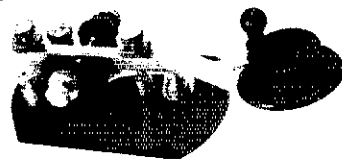
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NEW HAMPSHIRE: SCM, Robert C. Mitchell, W1SWX - SEC: K1HSC. RM: WA1GCE, PAM: K1YSD. Attention DXers: Don't forget the New England DXCC contest Oct. 2 at the Waldham, MA Holiday Inn. Details from chmn. W1JFL. Welcome to WA1WSW. AA1KGF/1 antenna system is a 133-ft. end fed long wire, four-element yagi and 10-meter squalo. AD1ACL received his biennial WAS award. W1WBM is back on the air with a KWM2-A plus 75A3 and 32V-3 combo. K1LMS working on a more efficient antenna system. W1N1WHW is a new novice in Keene. WA1PSI working on the Centennial 1976 WAS award. WA1VJI moving to a new QTH. W1N1WJE has a new Drake receiver. It is sad to report the passing of K1KRX. He will be remembered by all of us who attended the Elkins GNEB get togethers. W1BYS back from FL. Don't forget the Central New England Net get together on Sept. 18 and 19 at Saunders Bay Motel, Gilford, NH. Traffic: K1PQV 65, K1LMS 46, WA1GCE 43, AD1ACL 22, K2SIL/1 10, W1BYS 4, W1SWX 2.

VERMONT: SCM, J. Brakstone, WA1PSK - SEC: W1VSA, Nets: Vt. 5SB (Mgr. WA1SV5) QNI 56V, QTC 91, Vt. RD (K1BQB) 64/9, Green Mtn. (W1JLZ) 523/50, Vt. Fone (W1KKM) 107/7, Carrier (W2DSK) 64/9. I here will be an FCC Examiner at the International Field Day site Aug. 14. SAT Exams will be held for general advanced and extra class. Remember to stick around for the Field Day activities on Sun, the 15th at the Old Lantern Campgrounds in Charlotte. Details in last month's station activities column. K1DFZ has an NCX-3 for bid or barter. Congrats to new amateurs W1WUN (Plainfield) and WA1WVS (W. Windsor). WA1HSG's novice class reports 9 have passed code test, awaiting arrival of written exam. (3 ex-CBers)!

WESTERN MASSACHUSETTS: SCM, Percy C. Noble, W1EVR - W1UD in Leominster now taking Worcester Co. traffic on WMN, then relaying southern co. traffic to K1HPW who distributes thru 2 meter repeaters. Many thanks to both of you! When you are reading this, AA1MJE will probably be canoeing in W9 and W1LAD and New Orleans. W1HFC is on assignment. W1TM. PAM AA1MJE reports WMPN held 22 sessions, QNI 252, t/c. 32. W1UKR K1RGG & AA1MJE nearly 100% attendance. CW RM W1DVG reports WMN held 30 sessions, QNI 114, t/c. 94. Old BVR missed 1 session. SEC WA1DNE says WMEN held 4 Sun. sessions, QNI 91. 43 from 2mtr repeaters thru Hanson 1-1-co. I/HF/VHF. PAM WA1BLS says WM AREC net held 22 sessions, QNI 92. I/HF/VHF PAM W1KZS reports Berk. Co. AREC Net held 3 sessions, QNI 23 (for 2 sessions). K1KKBQ says the Mt. Tom Repeater holds a Wed. net at 7:30 PM with K1TQA as Net Control. Also Mt. Tom members performed outstanding job of Public Service and Emerg. coord. at the annual St. Patrick's Day Parade in Holyoke, MA on Mar. 21. Remember, it is the Public Service part of ham radio that justifies our existence. Training in nets is excellent preparation for operation during emergencies. Please consider joining some of our nets (calls of those in charge may be found in the above) Traffic: (Apr.) W1TM 179, W1EVR 98, AA1MJE 91, W1DVG 90, W1KK 49, K1RGG 6. (Mar.) W1TM 72.

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NORTHWESTERN DIVISION

ALASKA: SCM, Roy Davle, KL7CUK - The Ketchikan Club played a major role providing communications for authorities during the plane disaster at the Ketchikan. The club's Public Service section for details. New EC, KL7HIX is back at Kodiak after a long tour of duty in NC. WA8ZHZ writes he will be back at Mt. McKinley this summer and will be checking into the nets. The AKS Net had 715 check-ins for the month. Don't forget code practice by the Fairbanks gang 5 nights a week on 3735 kHz right after AKS net at 6:30 PM. The Fairbanks Club now has the auto-patch going on the 34/94 repeater. They also held a Flea-Market with great results. The SCM had an ARRL booth which also was a big success. KL7GCH fighting the antenna problem when high winds come along.

ASN	3920 kHz	0300 GMT	7 days a week
ASN	3725 kHz	0600 GMT	5 days a week
APN	14292 kHz	1730 GMT	5 days a week
SEAN	3920 kHz	0200 GMT	5 days a week
SDN	3915 kHz	0330 GMT	5 days a week

IDAHO: SCM, Dale A. Brock, WA7EWV - SEC: W7JMH, PAM: WA7HOS, RM: WA8KKR/1, Net - Freq. Time/Days Sess. QNI QTC

Manager	FARM - 3.935	0200 Dy	26	1219	13
	WA7VOH		23	181	66
	IMN - 3.635	0300 M-F	23	724	7
	W7GHT				
	RACES - 3.99	1415 M-F	23	724	7
	W7KDB				

W7EIS now vacationing in CA enjoying the sunshine. W7IWU retired from Western Union in Apr. and was presented with a Morse Key and Sounder mounted on a plaque. WA7Y5O and K71RY can now be heard on 420 MHz. Pocatello Amateur Radio Club provided communications for the Pocatello March of Dimes Walk-a-Thon. K7NHV and K7VI have added another harmonic. Traffic: WA8KKR/1 247, W7GHT 229.

MONTANA: SCM, Harry A. Roylance, W7RZY - Asst. SCM: Bertha A. Roylance, K7CHA, SEC: WA7ZR, PAM: WA7PZO, Soiry to report K7BMT as a Silent Key. BARC used 2 meters to assist the 4x4 Club with an obstacle course and hill climb. They also used 2 meters to help the Bar-B-Burgue with their stage show. WA7PZO is getting started with the Green Key machine. W7QIO had short stay in the hospital. W7LSF is a proud dad with a Jr. op named Ryan. Eastern M1 ham picnic will be held at James Kipp state park June 20. M1N had 772 check-ins, 21 sessions and 26 traffic. IMN had 181 check-ins, 23 sessions and 26 traffic. Traffic: W7LBB 39, K7CHY 16, W7NEG 9.

OREGON: SCM, Dwight J. Albright, W7HLE - Asst. SCM: Daniel T. O'Connell, WA7DZ, SEC: WA7UHC, PAM: K7RQZ, RM: K7OUF, Net - Freq. Time(Z) QNI QTC Sess. Manager

PDX AREC - 147.93/33 0330				
K7WWR				
AREC JC - 147.06/06	0215 WF	54		9

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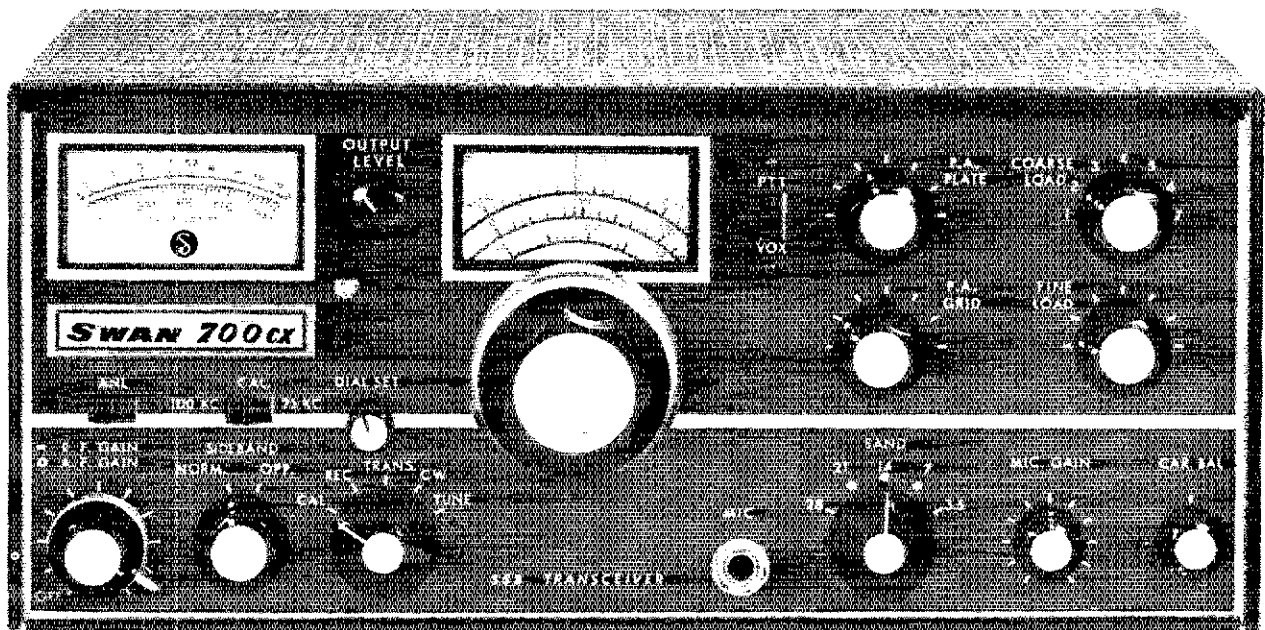
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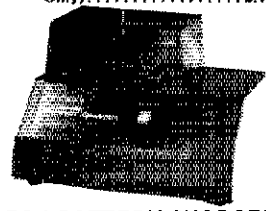
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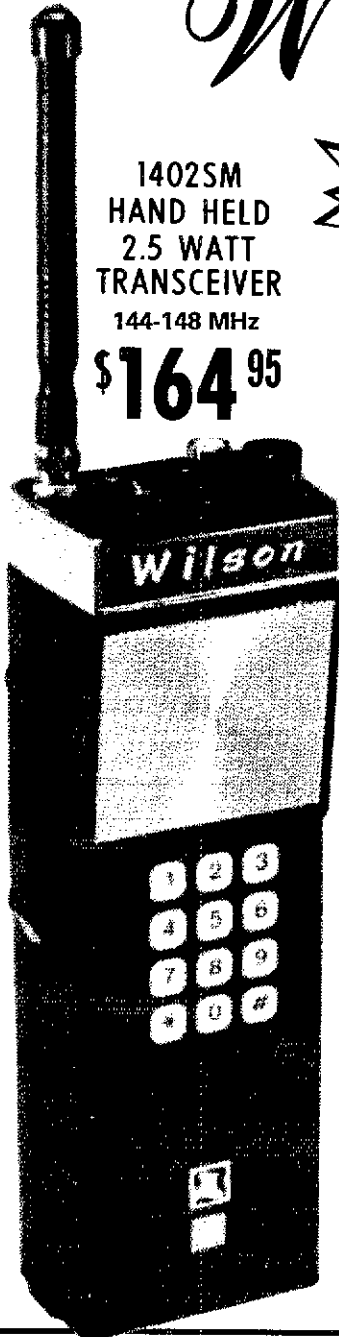
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C.		I.	
D.		J.	
E.		K.	
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(SPECIFY FREQUENCY _____)

ENCLOSED IS _____ CHECK MONEY ORDER
 MC BAC

CARD # _____

EXPIRATION DATE _____

NAME _____

ADDRESS _____

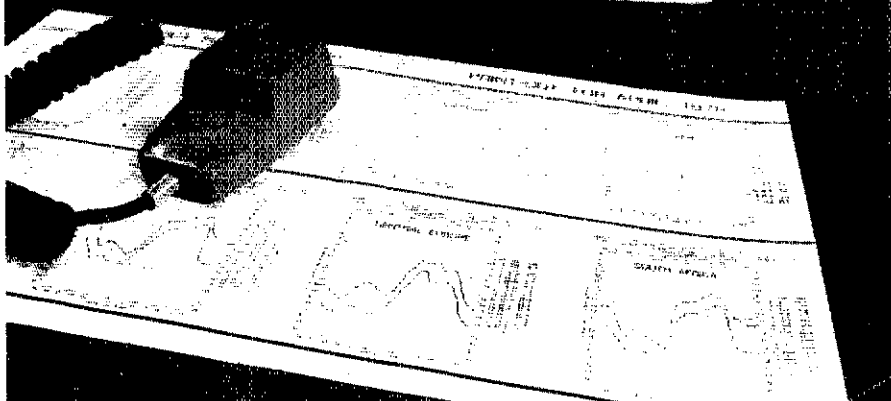
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W/JUGE	ARECOR - 3993.5	0200 Dy	262	4	30
WA7NEQ	CSB85	0145 Dy			
K7IWO	HSN - 3908	0030 Dy	236	34	29
WA7MHP	NSN - 3701	0200 Dy	336	134	30
WA7UJO					

OBS: WA7JKX WA7RQS WA7IXU and WA7ZAP. Contact them for time of bulletin if you wish to hear them in your area. WA7HLE gives CW review at 5 PM on Wed. WA7NJA received WAS No. 56, AC7ULC prefix award No. 13, districts No. 21, activities No. 5, FB. WA7VGA No. 62 W/VSE No. 64 both WAS. Some of you are forgetting the 10 min ID requirement. Flat topping problem looks a lot better now. Do you have a 3840 (OEN) xtal Advanced license, wanta get on (phone) (lowpower or cw) a transistor ymmitter is something to build if you wish, have fun, Traffic & Tests only? See Apr. '73 QST pg. 43. It works. Good for Novice too. The YL Dinner in Albany on May 1st was a success. PDX AREC rpt handling Bike-a-thon for retarded. Traffic: W/VSE 230, K7IWO 210, K7OUF 178, WA7TXV 95, W7DAN 75, WA7UJO 70, WA7YEU 48, W7IWN 35, WA7MHP 30, W7L1 19, WA7RKN 12, WA7ZAP 1.

WASHINGTON:	SCM, Mary E. Lewis, W7QGP -				
Net - Freq.	Time	QNI	QTC	QSS	
WSN - 3590	0230	307	120	30	
W7LG					
NW5SH - 3945	18:30	276		30	
W7VDR					
NTN - 3970	11:30	1740	72	30	
W7PWP					
WA7IS	3970 18:30	2080	60	30	

W7QGP Spokane Dial Twister ARC and guests proved true Sister City Hospitality to JA3CZY during his visit to attend the banquet. A few problems with U.S. Customs on gifts for ham "friends." W7JRF and 180 RVs are back from Panama after 3 months of a very enjoyable trip. WA7DKA new EC for Clark Co. K7GWE reports Aurora opened on 8 and 2 meters during the week instead of sun. mornings. K/VSW held a very informative seminar on working thru Oscar 6 & 7 at Skagit Hamfest. Skagit Hamfest was a sell out event as in past years. K7MWC/KL7 working in Anchorage and helping to promote SEA-QDX in the north. Pacific Northwest Hamfest ARC had a fine night. W7QGP that the NOAA vessel Surveyor was floating without power after the loss of gear assembly during the night. Marine and Coast Guard freq. were out because of Sporadic "E" period. W7SRU KL7HAY and WA6FAZ and others held the 20-meter freq. after a Mayday from W7YL/TMM2 and 30 hours of active service was in force. Thanks everyone who stood by in case you were needed. Traffic: W7LZX 398, W7HAL 52, W7LG 44, W7APS 37, W7PWP 23, WA7BDD 21, WA7OJI 20, W7BUN 16, W7AIB 12, W7IEU 10, W7JFR 7, WA7DKA 5, WA7VGB 3.

PACIFIC DIVISION

EAST BAY: SCM, Charles R. Breeding, K6UWR - Ass. SEC: Ronald Martin, W6ZF. S.E.C.: W6HRPK. Ass. SEC: W6BDSJ. New officers for the Lake County AR Society are W6JKX, pres.; W6SRU, vice-pres.; W6BWWG, secy. Best of luck to all. The Mt. Diablo ARC provided communications for a trail ride on Mt. Diablo. The Grizzly ARC had a fine attraction with a great turnout. A very good time was had by all. VF7AQV/W6 attended the PC '78 Electronics Show in Las Vegas. This was in connection with the new radio store he is opening in Concord soon. With the possible changes for Extra Class call, you may want to upgrade your license. A fine way to work on your code speed and copy interesting information is to copy the West Coast Bulletins of W6ZF. They are transmitted on 3540 KHZ at 9 PM local on the 1st and 3rd Mon. of the month. The speed is 22 wpm. From CTRC the following were listed as new calls in the section. W6HIN, W6BHA, W6BMM, W6BHLA, W6BIRZ, W6IXA, W6BSJ and W6BUS. Be sure to plan to attend the Pacific Division Convention in San Jose on the Labor Day Weekend. Traffic: K6HW 461, W6LYM 300, W6BPI 178, W6JXK 161, W6BHK 43, W6CAZ 16, W6BMM 15, W6BVEW 5.

PACIFIC: SCM, Pat Corrigan, KH6GQW - SEC: KH6GMP, EC E. Caroline Isl.: KC6DK. Sign up for AREC with your local EC. K2BML was atop Mauna Kea on business and had visit with W1ZPB/KH6 from Kamuela recently SAROC-Hawaii will be at Kailima Hotel Aug. 28. Congrats to KH6LOZ who went from Novice-Adv by Mar 78 less than a year. Pac. Div. Convention will be Labor Day Weekend in San Jose. Congrats once again to KH6CZ on great score in Feb. FMT: 4.3 ppm. Have received grand booklet from IARU Reg. II outlining org and purpose. Anybody is welcome to borrow it. Have you noticed the speed-up of delivery of USIT? Some marked improvement for those of us in the Pacific. KH6CWA regular on 40 cw DX hunting. Big Isl. ARC and the Emerg. ARC continue to upgrade their fine state repeater system in Hawaii. All repeater users should support their local rpt stn. The VHF/UHF freq. coord is KH6FOX for the state of Hawaii. All rpt plans should go thru him to avoid serious problems. Sailed from Nau 14. MARS has been in touch with Hokule'a on its historic Polynesian voyage. K6BJAQ and spouse on nice trip thru Hawaii in June. Traffic: KH6IQU 382, KH6JAC 359, KC6DK 348, K6BJAQ 132, W1ZPB/KH6 28, KH6GQW 28, K6GJFE 18.

SACRAMENTO VALLEY: SCM, Norman Wilson, AA6IVD - SEC: W6SMU; W6ZRJ, Pacific Div. Dir. was quest speaker at the Apr. meeting of the North Hills ARC. W6AJY was the banquet speaker at the Fresno Hamfest. The John I Sabin Pioneer RC, K6NP, provided communications for the Placerville March of Dimes Walkathon. The U.C. Davis RC assisted the Century Bike race and the Radio Amateur Mobile Society worked check point for the Mustang time and distance rally. W6GIFY has moved to Marysville and is active on 2 meters and HF with his K7M2-A. W6DEF has a new 20-meter dipole up. The RAMS are building a new solid state repeater. Sierra College is reported to be offering an amateur radio course. The radio course at U.C. Davis produced 6 new Novices. Traffic: W6DEF 34, W6GORW 12.

SAN FRANCISCO: CM, Rusty Epps, W6AOT - Marin Co Assemblyman Michael Wornum has introduced into the state legislature a bill 4271 designed to place CA amateur call letter license plates in the same

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(cont. duty)	Lo Range 200 W	100 W
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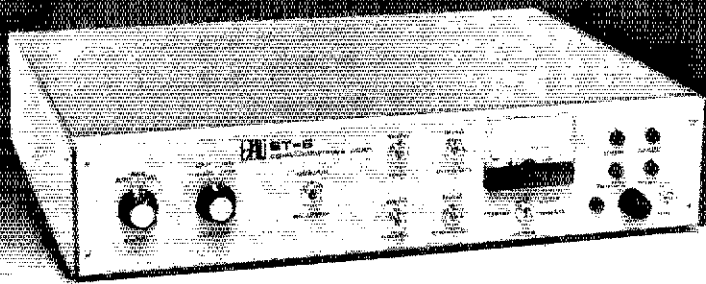
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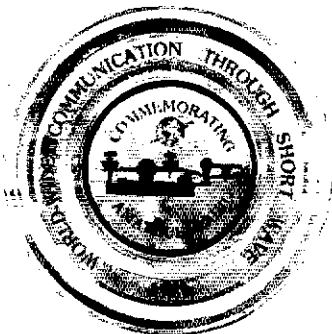
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category as "vanity" plates with a \$25 original application fee and a \$10 annual fee (compared to our present \$3 application and no annual fee). Please help prevent passage of this Bill by writing your local assemblyman and Walter Ingalls, Chairman of Assembly Committee on Transportation, Room 4018, State Capitol, Sacramento 95814. Congratulations to The Petaluma DX & Exp. Soc. upon ARRL affiliation to WB6LNM who received her Tech license; to K6SHM upon his appointment as 5F SEC; and to WB6ITN and WN6MDS who were elected pres. and vp. respectively of the Terra Linda High Electronics Club. The San Rafael HS radio club "Novice All-American" award to any Novice contacting all 10 US call districts — contact WB6QBJ for full details. MARC has done a beautiful job of compiling a directory of Marin Co. amateurs. Traffic: (Apr.) K6TF 236, W6RNL 224, W6IPL 146, W6NLL 116, W6BDDL 48, W6BITN 3, W6SLPV 6, W6CAT 1, (Mar.) AA6HPF 26, W6BITN 2.

SAN JOAQUIN VALLEY: SCM, Ralph Haroyan W6JPU — The Fresno Amateur Radio Club held their first exhibit of Amateur Radio from Apr. 12-17 at a major shopping center and attracted a lot of attention. Many "old timers" and youngsters showed great interest. Those attending the exhibit and explaining Amateur Radio were K6BKZ W6DPL W6YLP W6BFRQ W6B5HI and others. They had transmitters on all bands, and had an Amateur TV demonstration, which was very popular. The FARC held their annual hamfest on May 1-2, 1976 and had over 300 in attendance. W6MHZ who was the first editor of "K6TIP" in 1968, is still the only state of town who attended were W6FBL W6APE K6RAL W6IRV W6UCZ W6A11P and W6P5G, W65YDI won a multimeter. K6HZH won the main prize, which was a Triasto tower. W66CFI has a four-element quad or 10-15-20. W6SMS has a free standing tower with a TH6DXX tri-band beam. W6CJA and XYL also attended the Hamfest. K6GJK is an advanced Class and is also on 2 meters FM. AA6CPP qualified for the Commonwealth DX certificate. W6UHT has a sixteen element beam on 2 meters. Traffic: W6GRK1 147, W6DPD 5, AA6CPP2.

SANTA CLARA VALLEY: SCM, Jim Maxwell, K6AG SEC: W6RKB W6YBY made BPL, W6RFF made PSHR. The West Coast VHF Club conference was a resounding success, reports W6ASA. Numerous excellent presentations and displays livened up the Conference. NCN Mgr. W6RFI reports NCN t/c up 107% over Apr. last year. K6TCN, locked in by the hills surrounding Felton, nevertheless managed to work into the L.A. area on 2M. W6JGS is zeroing in on the Bicentennial Press. The only state outstanding. The NCDXG reports that ex-SGVF DJ6RX has picked up Bicentennial CA Award No. 1. W6AUC has been GRV with KH6 phone patches. Orchids to the West Valley ARA for their recent support of the Paul Masson 26 Mile Marathon and the Wheel Chair Olympics. A new tri-band quad has sprouted above the hills with excellent results. The PAARA gang still holds fourth every Mon. at 8:00 PM local on 147.45 fm and 147.24 a.m. PAARA member G3PPE now ID's locally as W6LGG. The Santa Clara Valley Bike-A-Thon was helped during May by the Mt. Chual gang — W66ADE. The ADE group plus others performing valuable public service functions above the hills. Will The new Asst. Mgr. for NCN is W66PI, over in the EBay Section. Those interested in more info on NCN are cordially invited to check in on 3630 after 1900 or 2030 daily, or write to Mgr. W6RFF, Asst. Mgr. W66PI, or secy. K6TF, K6TF's monthly NCN Relay is a joy to behold. Contact K6TF for info on receiving copies. Traffic: W6YBV 314, W6RNL 161, W6BESF 32, W6AUC 49, W6K7J 47, W66FLD 16, W6JGS 16, W6OIL 14, W6ZRJ 14, W6YBV 5.

ROANOKE DIVISION

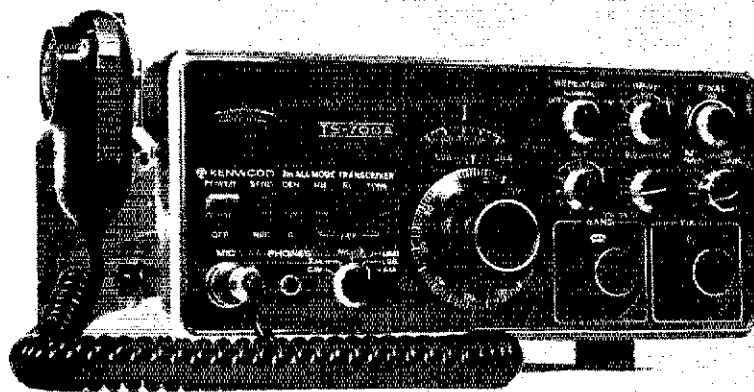
NORTH CAROLINA: SCM: Chuck Brydces, W4WXZ SEC: W4LHF. PAM: W4QFO. VHF PAM: K4GHR RM: K4MC. The 1976 League Officials Meeting (Roanoke Div) was hosted by the Alamance ARC. Burlington and many good resolutions were adopted for your Director, W4RYL, to carry to the ARRL Board of Director meeting. The Mtg is an annual affair discussing the latest topics in our great hobby and thanks to Alamance ARC for their hospitality. Ed of the Month is K4AIH covering primarily Cherokee County but looking for support from Clay, Graham, Macon and Swain counties. So if you are in these areas please give him your support. W4MNN made BPL in Mar. congrats. Carolina's Novice Net (CNN) 3718 kHz 5:30 EDS1) broke all records in Apr. with 241 QN and 77 QTC so check in with WN4UKU on CNN. Thanks to W4EJF who did a great job running the Tar Heel Emerg. Net and congrats to W84MXG the new net mgr. and to K4ODX who is now Director and Asst. Net Mgr. Congrats to Greensboro XYL WA4NOY WA4NOC WA4MHH and WA4JC1 either upgrading or getting tickets. WB4KZG went to 31 countries by hooking CR9AJ and plans 75-meter DX. The second annual Antique Wireless Assn. Meet will be held at the Holiday Inn North, Winston-Salem on July 9-10 with a banquet 8-9 p.m. so if you enjoy old equipment, parts, magazines, contact W4DBT or W4WXZ for details. If you have daytime operating time please remember the Daytime Fourth Regional Net (D4RN) meeting at 1800Z on 7240 and 2100Z of 3435 srb, check with WA9NEW/4 for details. Traffic: (Apr.) K4GCN 252, W4MNN 142, K4FTB 107, W4QFO 91, WA4ASD 64, K4EZH 42, WB4PZU 62, W4RWL 39, WB4OXT 36, WA4CBB 21, WB4MXG 15, WN4SRD 15, W4WWR 14, WB4CES 6, W4EHF 4, K4TTN 3, W4WHI/4 3. (Mar.) WA4KPP 26.

SOUTH CAROLINA: SCM, R. H. Miller, WA4ECJ SEC: W4ZMZ. RM: W4DBZ. PAM: WA4DZG. We lost a good PAM when WB4CGH moved to Savannah. Our loss is Georgia's gain, for John is an experienced traffic handler. The Palms are now being ably filled by WA4GJ managing the Palms to Traffic Exchange. WN4UKU, mgr. of Novice NET, says, "Suddenly we are the fashion." Many thanks to the Generals, etc. who help with CNN liaison. Several of the best traffic men in the section are performing this function. Welcome SSBN, Anderson ARC and Blue Ridge 2-meter net to the ranks of reporting nets. Now WB4CAK has begun assignment of keeping several nets informed via bulletins, as W4EGH has been doing to SC Phone Net for nearly 2 years. Net activity: Blue Ridge 2-meter net: 30 sessions, 811 check-ins, 4 msqs. CNE: 31 sessions, 351 QN1, 183 msqs. CNL: 3 sessions, 263 QN1, 93 msqs. CNN: 241 QN1, 77 msqs. PX: 30 sessions, 2 check-ins, 14 msqs. SSBN: 96 check-ins, 103 msqs. Anderson ARC: 396 check-ins, msqs. Traffic: WB4OBZ 506, WB4ARJ 352, W4NT

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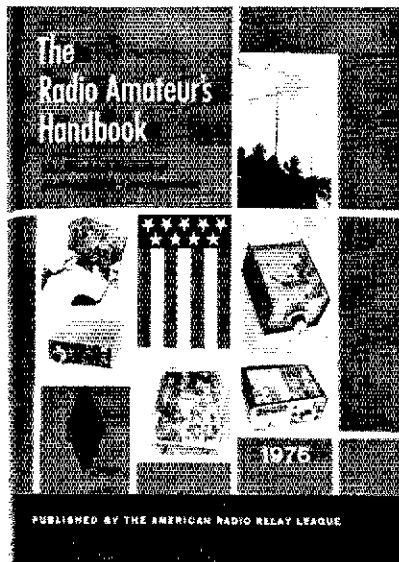


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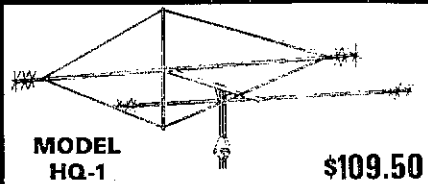
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86, W4FMZ 76, WA4ECJ 55, WB4CGH 43, WB4CAK 39, WB4HNQ 27, W4ANK 22, WB4TZW 2, WA4BDG 1.

VIRGINIA: SCM, Robert L. Follmar, W4QDY. SEC: WA4YIU. Asst. SEC: WA4PBG. PAM: WB4YKM. Asst. PAM: K4VVK. RMs: K4IAF WB2VYK/4. W4SHJ. Good bulletins and club papers received. AMARD is activating a repeater on 147.81/21 from Lyons' Corner and primarily intended for RTTY. TERRA with W4RNT - coordinated efforts for the Amateur Radio display at the Naval Air Stn Norfolk in celebrating the Azalea Festival & attended by President's daughter, Susan Ford. Kudos to WA4BUE & WA4MMP. IARC planning 6-meter mobile hunts. WA4MMP publishes T55BN an FB rpt on QV5 activity. WB4NTV rpts Franklin-Southampton EC 8, gear, demonstrated 2-meter auto-patch at Franklin school on May 15. K4MSG rec'd CP 15 and passed Advanced. W4WSF picked up 2 new states & 4 countries on Oscar. OO WB4KCL has a new 5B104. CBers appearing in ham bands from other rpts. W4WUX getting ready for summer camping. K0PIV getting back in the swing. K4GT's busy with 1c, 1one patches & foreign admins on Post-1979 Amateur Radio. K4VVK confirms 31/91 for new Farmville repeater. K4BKX holds CP25 & amateur Extra. W4TZC rpts too much company, gud WX & work. W4HHG's rig back to Drake for repairs. W4OKN V5BN also active on 2 mtrs. OBS WB4DRG sold Clegg 1-M-27 & ordered 1-M-44. W4HJU busy with party; also rpts his 2-meter rig stolen from car! WA4CLK in Puerto Rico most of month. W4THM's student, rec'd his Novice call WN4NOB, FB! W4KFC attended LO meeting. Reg. II IARU meeting in Miami. W4WBC moving to FL. WB4IBO negotiating for a new hilltop QTH near Warrenton. K4CQY with the help of 20 or so supplied communications for the Cherry Blossom Parade in Washn, DC. W4ZAU rpts "Hams Wide World" to Ruritan Club. WA4AJF showed serious problem with HX-10 control circuitry & bldg a new HW2021. Net mgrs. K4IAD VN, WB2VYK/4 V5N, WB4YKM V5BN and W4SHJ 4RN need NCS help! If you can spare a night a week as NCS please get in touch with these net mgrs. Traffic: (Apr.) K4LDL 317, WA4VFW 245, WA4EPJ 174, K4KNP 165, K4GR 155, W4QDY 147, WA4JVO 143, W4UQ 143, K4MLC 137, K4JM 91, K4IAF 86, W4ZDN 81, W4SUS 77, WA4PBG 56, WB4DTG 48, WB4WUX 47, WB8MCO/4 44, W4SHJ 36, WA4KPP 28, WA4YIU 25, WB4KIT 24, K4GTS 23, WA4VVK 23, K4MSG 17, WA4CLK 15, K4BKX 14, W4TMN 13, W4YZC 13, K4KA 10, W4MK 8, WA4ANN 7, W4KFC 6, W4LGM 5, W4TZC 5, K4CGY 4, WA4HHG 4, W4OKN 4, WA4WQG 2, W4ZM 2, W4ZAU 2, W4KX 2, W4DM 1, W4WSF 1. (Mar.) K4KDJ 217, WB4DZL 96, WB4FLY 65, WA4CLK 20, W4ZDN 20, W4TZC 13, WA4ANN 8, WA4VVK 8, WB4DRV 2. (Feb.) K4KDJ 258, W4OKN 3. (Jan.) W4OKN 6.

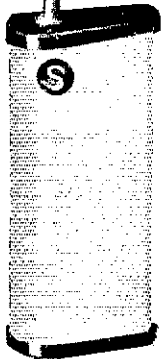
WEST VIRGINIA: SCM, Kay Anderson, WB0DUV. SEC: W4SDY. RMs: WB4ZA WB4WJ. PAM: WB8DQX. YLs K8LSN K8AVP and WB8DQX operated station at Jaycees Home Show in Clarksburg Apr 8, 9 & 10 giving WV traffic totals a big boost. Congrats to WB8DQX on passing the Extra Class exam in D.C. K8MYUJ's brother is now WN8ZER in Huntington. Also in Huntington, a new 2nd net operator Wed. at 7:00. The WB8DH (146.04-146.84) repeater. WB8FER presently NCS, looking for volunteers for NCS duty. Charleston, Huntington and Morgantown amateurs provided communications for their area's Walk-a-thons for charity. WA8NDY planning coordinations for the Strawberry Festival in early June at Buckhara. New 2nd net operator getting all out to make this year's convention something special; c u there July 2, 3 & 4. WB8ZFV couldn't wait for next exam day in Huntington so drove to Detroit, took General test, and passed. Congrats! Net Sess., Check-ins, Traffic, mgr.: WV Novice 30, 188 32, WB8TDA, WV CW 15, WB8ZB, WB8ZA, WV Midday 30, 637, 143, WB8DQX; WV Phone 30, 916 320, WB8DQX. Traffic: (Apr.) WB8DQX 706, W8EUE 97, W8HZA 66, K8AVP 61, K8LSN 48, WB8WJ 30, WB8ZP 28, WB8TDA 23, WB8PAV 21, K8BCF 20, WB8III 17, WB8CNN 14, WB8CKX 10, K8BAK 9, WB8JM 9, K8ZDY 9, K8GEW 6. (Mar.) WB8IHW 61, W8SOS 8.

ROCKY MOUNTAIN DIVISION

COLORADO: SCM, Clyde O. Penney, WA0HLQ. SEC: K0FLQ. RM: WB0CK. PAMs: K0CNU, WA0YQG. Newly elected officers for the Mile-Hi DX Assn. are WB0JF, pres.; WB0NHG, vice-pres.; WB0CGJ, secy-treas. WB0GLQ of Oakbrook, IL who is award coordinator for Bicentennial Awards, advises that AC0BXK received American Bicentennial Activity Award No. 4, and Bicentennial Prefix Award No. 4. Congratulations to AC0BXK on winning these outstanding awards. Net Traffic for Apr.: Columbine - QNT 1270, QTC 76, Informals 347, 1643 minutes. Hi-Noon - QNT 1113, QTC 26, Informals 154, 36 sessions. 1211 minutes Traffic: (Apr.) WA0YVY 161, WB0MTA 548, WB0QOT 503, K0YFK 360, WB0NOH 205, W0IIV 125, WB0HCK 120, W0HXB 81, W0KLE 64, K0TIV 64, WA0YNP 62, WB0BAL 58, WB0PVT 54, K0DTU 50, K0RTO 44, WA0YQG 41, WB0NHA 30, W0LAE 28, W0RE 28, WB0IZO 23, W0WQEY 5, WA0YED 7, W0GW 5, WA0TMA 6, WB0QHV 4. (Mar.) W0LG 71, W0DQN 5.

NEW MEXICO: SCM, Edward Hart, Jr., W5RE. Asst. SCM: K0L. RMs: W5PDY, SEC: W5ALR. PAMs: W5DMG W5PNY. RM: K5KPS. Southwest Net (SWN) 246 stations report in and handled 206 msgs. The net meets daily on 3585 kHz at 7:15 PM MDST. New Mexico Road Runner Net (NMRRN) meets daily a 6:00 PM on 3940 kHz. This month handled 52 msgs and 1463 BPs. Check-ins, W5RMD formed from productive two months at Princeton where he operated the club radio station W2PLL, just like he operated when he was a student there. W5YTX now has worked 102 countries. The Mesilla Valley Radio Club heard feed drew about 400 hungry hams. W5OB, NMSU club station held open house and got money for student association to move at new location to a better location. Traffic: (Apr.) W5DAD 352, W5JOV 315, K5MAT 278, W5UW 221, K5KPS 200, W5YTX 135, W5ENI 113, W5PDY 91, W5WRE 62, W5DMG 41, W5PSL 36, W5MIY 18, W5YQ 12, W5QNG 9, W5QNR 8. (Mar.) K5MAT 192, W5DAD 174, K5KPP 140, W5ENI 150, W5UW 131, W5RE 88, W5YTX 61, W5WRE 25, W5QNR 16, W5QNG 13, W5DQ 12, W5SOHI 12, W5DMG 11, W5MIY 10, W5RMZ 10.

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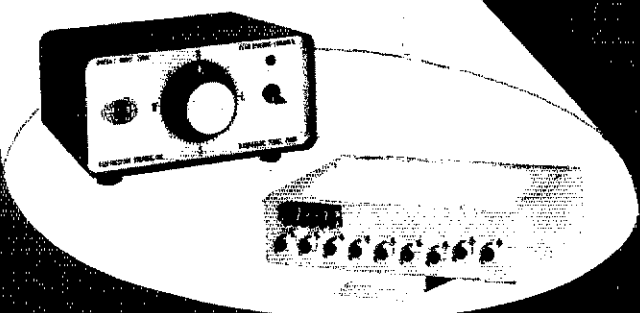
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UTAH: SCM, Ervin Greene, W7EU — SEC: WATZBO RRM, W7OCX Congrats to AB7AVN on receiving American Bicentennial Activities Award No. 2 Prefix No. 10. Several VHF stations now working Las Vegas direct since interlinking WR7AAA and Utah Hill repeaters. WR7AGI, Hidden peak to be part of the group soon making really wide coverage on VHF. A very worthwhile meeting was held by the VHF Society relative to free coordination. Plans established for entire area. K7RGY doing a great job. If you plan on repeater or otherwise, contact him for coordination of freq. SSB use on 2 M growing. Users include W7JG WA7MHO W7JDE and WA7ZBO on new Multi-2000. Sorry to see WA7ARK leave the area. New baby to W7ETR and K7L K7ZY holding a Novice class for ex-clubbers. Reports they are doing super. UARC made series of four radio spots promoting Ham radio. Being aired over 50,000 watt KSL and Night Cap Stations includes over 100 stations throughout USA and Canada. Utah people busy planning WIMU this year. Program chmn WA7ZBO and WA75VY. Special flash from WA7ZBO finds there are no hams in Ogden Traffic: K7HLR 139, WA7JRC 88, K7ZVI 83, WA7MEL 69, WA7TEH 46, W7OCX 35, WA7OAI 22, W7DKB 21, W7EU 5, W7BE 4, WA7VWQ 2.

WYOMING: SCM, Joe Ernst, W7VB — Thov WY Hamfest will be at Meadowlark Lake, Ski Lodge, July 10-11. The Cody Radio Club says the will have a Swap Table, Bunny Hunt, PR Contest among others. The event is K7DEJ upgraded to Extra Class at Rapid City the last of Apr. K7BMT passed away Apr. 21st. Congrats to those working Bicentennial WAS Contest. WA7ZZ got No. 419, K7AHO No. 152, W7LZY a frequent check-in to our WY nets, got the 3rd in MT No. 318 WA7NHP giving his motorhome a good workout this summer. W7VB going to scout camp above Goddard this year in late July. W7VB attended the Southwestern Division Conv'n. in Tucson Apr. 9. K7VWA new member of AREC. K7ITH and K7WR regulars at Alcova fishing. K7TAQ headed for the west coast in May. The Sweetwater ARC after one year of operation held election of officers in early May with WB7AMP pres. W7BJX, vicerecy. WA7MGA, secy. treas. Traffic: K7VWA 446, W7TZK 331.

SOUTHEASTERN DIVISION

ALABAMA: SCM, Jim Brashear, WB4EKJ WB4LUNY, Mobile ARC hamfest chmn reports the Mobile Hamfest was a big success, both in attendance and in ticket sales — 300 persons registered and estimated 500 plus in attendance. The sat night banquet, fashion show and beer shop quartet very popular. Don't forget the North AL hamfest (Huntsville), 3rd week end in Aug. To honor "Hap" Mahaffey, the Decatur ARC new call is W4ATI. K4UMD finally got WAS; he also got (he hopes) WA4WLG on 75. Sorry neither of them on any prize at the Hamfest. Regret to hear of WA4LA a Silent Key. We need help desperately on our AENB net (including liaison between ALNM/AENB/RN5) and daytime RN5. Please let me know if you have a free afternoon or evening and would like to lend a hand. Appointed WA4TMG as ORS. Endorsed WB4KDI, ORS. Welcome to the following new stations: WA4KJG K4K0 K4C KNLU K4CF K4COM K4KSF K4SN K4T K4T K4TP K4TW K4X K4Z K4UA K4UG K4UK K4L K4US K4UU K4UZ K4VC K4V K4VJ K4VL K4X LCF LH LKD LKT and LLP. WR4s K4LL K4PO K4VN LBL and LKL. Thanks to WN4JDM for all his help while NW AEND. Congrats to WN4RND as new NM, AENB Traffic: (Apr.) WB4EKJ 241, W4RQS 132, WA4EU 87, WN4C 84, W4Z 72, W4A 44, WA4MWF 4, WB4RCF 36, WB4UHC/4 19, K4CUU 19, K4UMD 1, WA4MLK 15, WB4ZOG 2, (Mar.) WN4RND 1, K4LYY 8, WA4MLK 8, WB4UHC/4 7.

CANAL ZONE: SCM, Frederick J. Isler, KZ5PI (Mar.) Late report. KZ5SF was this year's coordinator for F.U. Hope we did much better than last year. Plan that we go to higher power to get the station on QRM. A new communicator net now operates on meters each week day from 1600 to 1700 and thus activity is increasing. Results of this year's hamfest very outstanding and all are looking forward to next year. We have added to the club treasury as a result of ticket sales. All club members have bright new call letter name plates, sponsored by the CZARA.

GEORGIA: SCM, A. H. Stakely, K4WC — SE: K4KZP, PAM: K4JNL, RM: W4VHC. Congratulation to W4UVP and K4YRL on making P5HR and WN4CYN for a 15 wpm code certificate. A full page article in Rome News-Tribune gives well deserved praise to the Coosa Valley Emergency Net organization and operations as well as a history of hams from 1911 to date. K4YRL is deserving of great praise for his efforts in making emergency communication preparedness in Northwest GA a model for all to copy. WB4AEG reports very poor conditions on 6 during Apr. Loss of WB4QGN will be felt on G5N as he becomes W9GXQ. Try Atlanta Radio Club Net Sun 0100Z 146.22/82, W4BTX completing 172 wpm-30-meter rig. W4JDM like many is allowing work interfere with his hamming. ORS appointments include W4AAV W4AAKU W4DOC W4DQD W4ADTF W4W4ALLI W4NET W4VTA W4WQU K4YRL. ORS includes W4AAV W4AQL W4A8AA K4BAI W4BT W4CZN W4EEP W4FDN K4FLR W4ATGX K4JF K4JQ W4AP W4APM W4A45 WB4JH WB4VW W4AWX W4AZH W4AF makes P5HR. Traffic: (Apr.) W4UVP 133, WB4QGN 113, K4JQ 4, WB4WQL 46, K4YRL 29, W4ALLI 17, W4BTX K4WC 6, A4D8AI 4, K4FLR 4, WB4KEY 4, W4JDM (Mar.) K4FLR 54, K4KZP 2, WB4MZO 2.

NORTH FLORIDA: SCM, Frank M. Butler, W4RKH, SEC: WB4G8I, PAM: WB4VDM/75, WB4BSZ/VHF, RN Certificates earned by WA4BAX WA4WBM and W4WNY on D4RN 2 by WB4TPR on DRN5. W4SI7 earned SNC on TP — it now meets 7 days/week. QFTN now QFN5; met at 8:00 PM EDT on 3/15. NF-PN holds late session 0300 GMT. W4WNY named "Gator of the Month" SCM. WB4AMP appointed MJO. Pensacola F.U. meets temporarily at WA4ECY Gorry Station. K4L and WB4PKW conducting Novice training. WB4K passed Extra Class exam, WB4BNT forming radio club at Tate High School. W4C55 has new TS-700 2 looking for sub/cw QSOs. K4JEM assembling HW-2021 HT. W4KIX had 60 QNT last month. QFTN, W4BPI is a Silent Key. Owner of the Florida Atlas 210X W4Z1 earned ARRL 50 wpm. WB4PEJ & W4AYPY gave program at GARS sightless hams. GARS won prize at Jax Hamfest most club members attending. WN4HRG WN4JNM active on QFN5. JNM has passed Genie Class exam; WB4WYX passed Extra Class. K4M graduated from F.U.C. as a result of his duties as AEND received Bicentennial Prefix Award No. No. FL DX Club operates flash repeater

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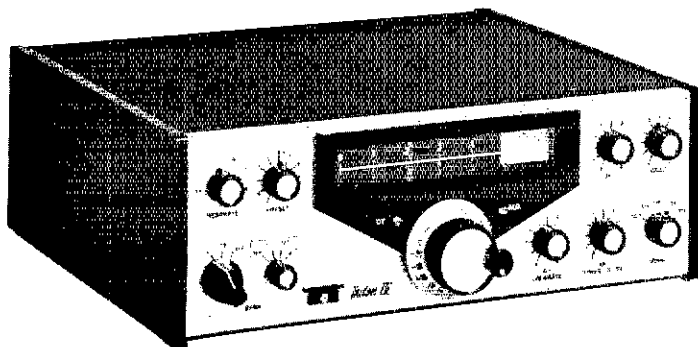
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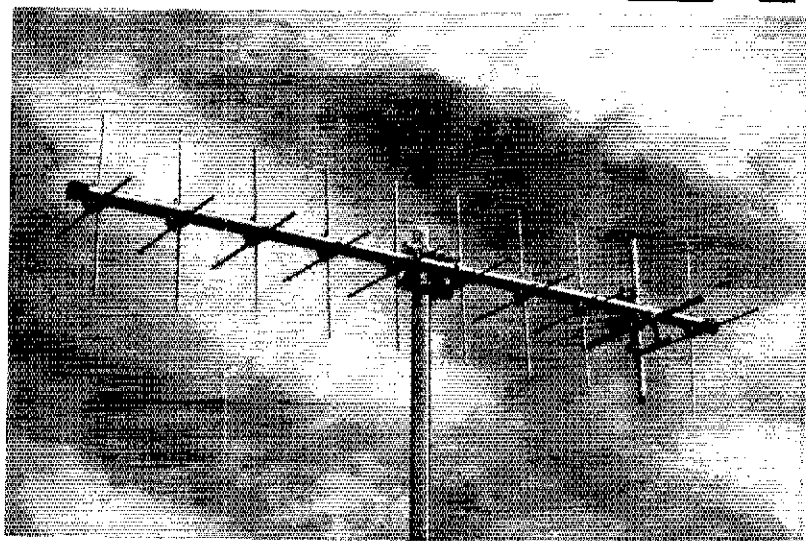
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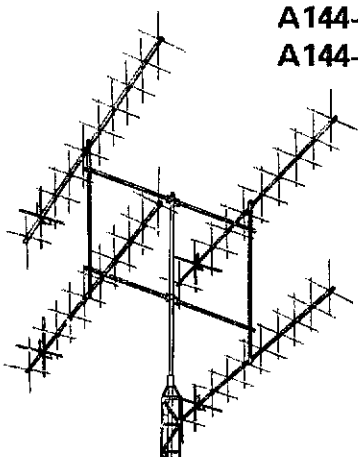
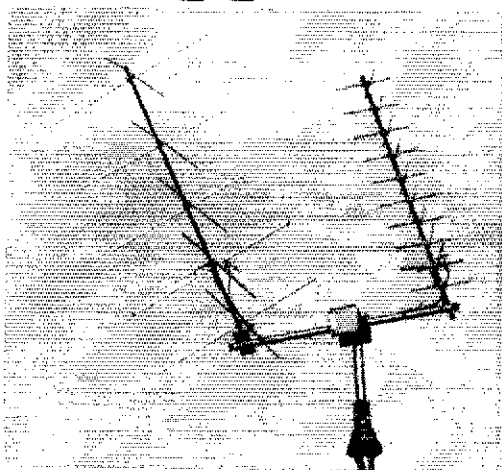
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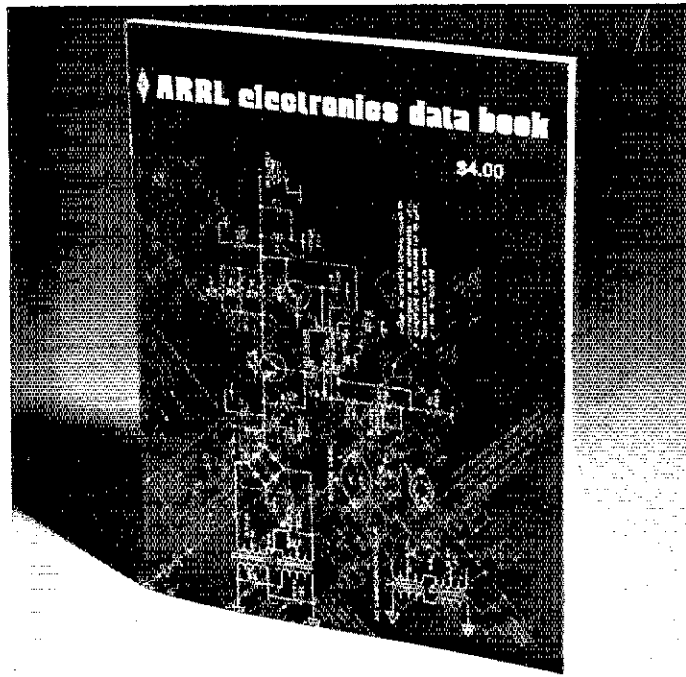
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of WR6ABE, probably the most popular repeater in this area. Congrats to WB6ZVC on his taking over as chief RM of SCN net. Free has long been active on the net and can help many in net operations. Between going to school and building an antenna farm, Chief RM duties can be time consuming. WB6OYN will carry on as Asst. SCM while attending Cal Tech. WeCK successfully hosted the annual meeting of the Morse Club for the fourth time and gave an auto-mobile away as the door prize. As usual a very entertaining event. K6SD back on the air after a 25 year absence, his former call was W6YWY, says ham radio is better than ever. WB6AOQ made EPL this month by his large amount of Orig. Traffic. W6NAA staff officer for the RACES group has been appointed. Field Day coordinator for the L. A. County area lets get behind him and help. K6CCW says they are not making twin-lead as good as they could, has to replace his antenna due to twin-lead falling apart after only 12 years of svc. The Six Meter Metro net has been very active judging from their recent traffic totals. Traffic: WB6PKA 506, W6INH 436, W6OBY 284, W6GYD 190, W6HJJ 174, W6BTE 158, W6AOQ 121, W6NKE 118, W6USV 105, W6BEA 95, W6BKV 15, W6AIT 14, K6CL 14, W6SGZ 14, W6BRO 12, W6JFD 12, K6UYK 6, W6ELWY 4, W6FEJ 3, W6OYD 2.

ORANGE: SCM, William L. Weisa, W6CPB — Asst. SCM; Dick Birbeck, K6CID, SEC; W6TVA, RM/PAM; W6AKR. Members of the Anaheim RC and Fullerton RC provided communications for the Great Bear Grand Prix motorcycle races during Apr. Ham license plates may be in jeopardy. Assembly Bill 4271 would increase your fee to \$25, renewal to \$10, and transfer fee to \$3. Please write to your representative in Sacramento NOW objecting to this change. I enjoyed meeting many of you at the Tucson convention. Sorry I missed some of you, should have checked at the ARRL booth. Hope all had a good time. There will be an operating station at the Orange Co. Fair again this year. Dates July 19-25. Anyone who can't help please contact your SCM or SL. New officers for Desert RAIS are W6ALW, pres.; W6BJD, vice-pres.; W6BJB, secy.; W6SMT, treas. W6VOZ has a new sixteen-element 2-meter beam. Will put it up on his tower soon. W6BUB received a 54 year sticker for his QCWA award at the Tucson convention. Congrats. W6AKR has a new fourteen-element 2-meter skeleton slot beam on his tower. Vacation time is near. Those who will travel be sure and drive carefully. We want you back in the fall. Many changes are taking place in FCC rules. Be sure to tune in on the OBS stations in your area for the latest changes. Congrats to W6PNS for his quick action in reporting an accident on the Golden Gate Bridge. Results — prompt action by Highway patrol. Traffic: W6EIG 651, W6TVA 26, W6AKR 24, W6WRJ 23, W6YWS 9, W6CPB 5, W6GBD 4.

SAN DIEGO: SCM, Arthur R. Smith, W6INI — SEC; W6GFB, CA State Assembly commanded Southern CA amateurs to dedicate public services in Resolution No. 395 then came up with AB 4271 to raise ham plate fees. Write your Assemblyman, without delay opposing this. New officers for SD Amateur Radio Council: W6VIQ, pres.; W6GSD, vice-pres.; W6GDC, secy.; W6GPN, treas. Installation took place at Amateur Night at Organ Power Pizza in Pacific Beach. Police recommendation engraving all gear with CA driver's license number for ready identification of owner. Novices invited to take part in AREC Novice Nets Sun, 0830 local, on 3725 kHz (Mgr. K6SCY) and 1700 local, on 3730 kHz (Mgr. W6YWS). New AREC members: W6BJB W6NGKJ, K6CCJ, W6RKM, K6VRS, W6VY, aprd. Asst. Editor for 75-meter Central District. Home Show exhibit by SD Amateur Radio Council draw much attention from show visitors. SANDRA's exhibit at Mission Valley Shopping Center in April was well organized and impressive. A special SANDRA luncheon meeting in El Centro attracted 80 hams and their XYLs. Upgraded W6GRI, W6KQ, Paloma Club Flea Market produced new LA-1 linear for W6DEY. Traffic: W6HCF 179, W6PZL 58, W6DEY 26, W6UFY 11, W6CFT 3.

SANTA BARBARA: SCM, D. Paul Gagnon, W6ADE — We regret to note the passing of K6Z, Ernie, vice secy. of the Santa Barbara ARC and instrumental in the rebuilding of the club. WA7VBS busy handling cv traffic again and obtained a model 15 for RTTY. K6TOD busy DXing on two ish into the San Fran area. W6ITW has installed a 54-foot tower with beam from 10 thru 40 for his phone patch work with Antarctica. W6STL, W6ADT, K6GYL and W6KHC are sporting new 220 rigs in preparation for WR6AIN repeater in Camarillo. W6DMU is new General. Congrats. W6WYD passed fifty msgs of Navy MARS. AB6CWE is another graduate of the Fiesta City net on the Southern CA Net (3600 daily at 1830) and is even doing liaison duty to Region 5. W6BJK and W6KMN are retired and back on the air in the Central Coast area. W6TMQ has worked over 250 Japanese Counties and receive several more awards. The Poinsettia ARC in Ventura sponsoring two awards this year; one for working station in each call area and another for spelling the name of the club during the latter activity. Contact W6KYW for details. W6ATM heads the Novice Practice Net which meets on 2114 each night at 2000. Stations upgrading or getting licenses due to this net are W665 KYW, GHB, KG, W665 AGX, EIF, W665 KAL, KAM, IJZ plus many others awaiting licenses. W6NKK is a silent key. Jut 11 is for the big satellite ARC picnic at Union Oil grounds near Orcutt. Many fine prizes are offered. Contact any satellite member for tickets. Write your Congressman to defeat the bill in the C assembly which will put our license plates in the class with Vanity plates. Assembly Bill 4271. PSHP W6VBS 36, W6DEI 44, W6BXM 30, W6LEB 42, Traffic: (Apr.) W6VBS 376, AB6CWE 35, W6DEI 37, W6KPS 35, W6BXM 35, (Mar) W6LEB 64, K6QPH 8, W6POU 4.

WEST GULF DIVISION

NORTHERN TEXAS: SCM, L. E. Harrison, W5LR Asst. SCM: Frank E. Sewell, W5IZU, SEC: W5DW PAM: W5GSN, Kilocyte Club Ft. Worth has new 5 officers effective Apr. 1, W5UXP chmn; K5DA secy.-treas.; W5GSI, pub. Eddie is 20 yr man as Rith K5DAB, ARRL Pres. W7TUK, visits Austin Apr 5/7, TX VHF Mtg. W5T1 pres. W5G5 Gen Conv. in Arlington TX. CB case being appealed. The C up fined \$100.00 for violation of noise ordinance. Panhandle ARC meets 1st Wed monthly Red Cro Bldg, 1800, So Harrison, Amarillo per W5U1U

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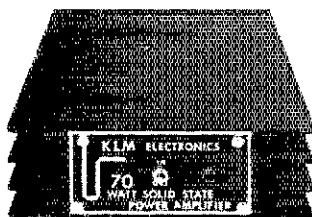
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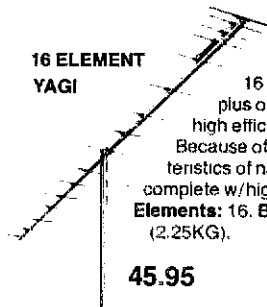
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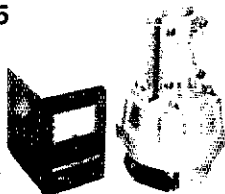
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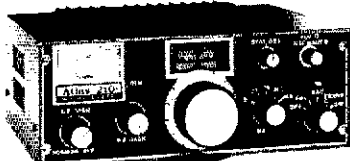


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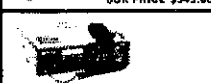
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Novice classes FB, WB5LWB, pres. DARC has fine crowd at his shop. FB OM, Arlington ARC recognizes the treatment plus from G. G. G. believe it or not, many CBERs are becoming disenchanted with the CB bands as such, we believe such could be used to our advantage if we so desired and applied in the proper manner. Executive Committee met May 11th. The Dallas ARC sponsored Q1 night Apr. 6th, some 200 or more turned out. G. G. G. comm. trailer for emergency & W5DWL installing eqpt. W5RHI preparing data to write QTH Dallas. Irving ARC met Thur. Apr. 22 for field trip American Airlines Flight Simulator depicting DC-10 eqpt. as guest of K5PTC. New members are W5BMZP & W5SMUJ. W5DV lost his GTX 200 plus a transceiver. All properly marked W5MNTN forwarded new QRP certificate. Hope this one not lost in mail OM, W5KR SOTX SCM editor "Off Resonance" TX, Southmost ARC Inc, PO Box 3561 Brownsville TX 78520. Most Winter Texas hams have known ART over a period of years & look forward to the Winter Valley Ham Meetings. Traffic rpts show cards from W5L W5DWL W5BCB W5ASIN WA5AKU W5BCKM W54HON/5 W5BJJQ W5FEWR/5 W5ACEE/5 K5SOR W5W5V W5VQZ W5A2VP W5AGRT W5MBR K5BSW W5BGGD & W5BJJQ. The last 7 named stns. active on Temple 22/82 rptr Weather Watch. K5BDC needs endorsement letter. Not 2 Ham Clubs reminded K5SB Net & ARTS availability on 1103 kHz at 1300Z to 1900Z daily. W5DWL SEC NTX rpts normal activity. W5BFX CRS appt. cancelled, he moved. Dallas QCWA suggests make reservations Texoma now last weekend Oct. K5ARG planning a very active QO program. RN5 of NTS rpts sessions 30, QTC 149, W5ession 4.95. W5CN W5BMMQ. Traffic: W5Q2 W5B5DB W5YK WA5AKU 18, W5ASIN 7 W5LR 7, K5SOR 4. (Mar.) W5DWL 8.

OKLAHOMA: SCM, Leonard Holtar, WA5FSN — Enid, Granite and Muskogee have new Repeaters on the air, or still in the testing stage. W5ASP5 had an excellent article on FM frequency and deviation in ART QO Club Paper. W5NLI reports 9 new Novices or Tech's in Mustang area. K5CA has 8 new ones at Enid. W5LHG reports 15 new ops at Holdenville and a new club being formed. K5GBN and W5MRE recent upgrades. W55QYV moved from Sallisaw to Blackwell. W5QGMF new Novice at Deer Creek. You SCM recently visited the reorganized North Fork ARC at Elk City. Spring storm season has been good to us so far. Enid Group provided communications to coordinate Million Dollar Tri-State Band Parade. W5JGU new ORS. Many of our stations meeting NTS Nets on a regular basis resulting in an increase in traffic being handled on the Section Nets. Why not support your Section Net, and do your part? Nets: DEON, 1700 M-F, 5:15N, 7:30P, 3:50P; DTWXN, 1745, M-S, 3:00P; GIAN 1830 M-S, 3:05P; DLZ, 1900, M-S, 3:68Z.5, OPEN 0800 S, 3:00P. Traffic: W5BNC 249, W5BKG 223, W5PML 184, W5BNC 140, W5RB 120, W4REC 112, W5BVP 107, W5FW 96, W5RLR 43, W5A2C 39, W5EL 33, W5KLC 30, W5LJG 28, W5LJG 28, W5FEN 17, W5OJU 12, W5AOUV 9, W5FFW 6, K5ZDB 5, W5BMMZ 4.

SOUTHERN TEXAS: SCM, Arthur R. Ross, W5KR — SEC: W5IQP, RM: W5UJG, PAM: W5BAMN. OCS reporting this month: W5BFMA W5SCIT K5HGB. OVS reporting this month: W5SCIT, QO K5HGB. New dipole and is back on ft. OPS K5RVF and Mrs. attended Delta Division Convention. OO/OVS W5SCIT says 20-meter RTTY has had some DX; copied CO2DZ and an incomplete LA. OVS W5KLV (also ORNS Mgr.) kept busy with four bulletins, 56 reading on 13 nets. OO W5BFMA needs schematic and parts list for Marconi 7F700B signal generator. OPS W5ZBJ checking into RTTY nets. W5WKS has new antenna operating. AggieLand W5AC lost brand new 58-104 to thieves; has new tribrander for hf and active on fm. OPS W5LYH advises code and theory classes going good in Beaumont; nine new Novices awaiting FCC exams with more to follow. El Paso ARC, W5SE, collecting call-letter license plates to decorate their club house. W5LCLN W5ASKYV K5FIE W5BKNU and W5AZAY used 2-meter DF techniques to locate a stolen two-meter rig being used illegally. W5RAD has new Distinguished Rifleman medal. Houston has a new open repeater, W5AJK, on 146.25.25, dedicated to "meaningful messages, and no ragchewing. K5DC back in the air originally licensed as 923 as W5JJ, he dropped out quite a few years ago but is again enjoying Amateur Radio. Corpus Christi ARC and 2-meter gang provided communications for Buccaneer Days parade. W55PWY is conducting weather observer classes in Corpus Christi. W55GWI upgraded to Extra Class; W5OCQ upgraded to Advanced Class; W5NDDO W5BNWJ and W5BMMQ waiting general class licenses; new Novices W5SKKA W5SSHO W55FA getting on air. Traffic: (Apr.) K5HZR 547, W5UGE 295, W5KLV 275, W5UJJ 198, W5BFMA 104, W5BNU 93, W5KPL 82, W5ARKU 73, W5ASYA 67, W5ZBJ 44, W5GO 43, W5SLFW 36, W5TOP 32, W5FWY 22, W5FWY 21, W5GQW 15, W5GQW 13, W5AC 9, W5LYH 5, W55PSC 2. (Mar.) W5UJJ 157, W5SLTW 47, AC5AC 2.

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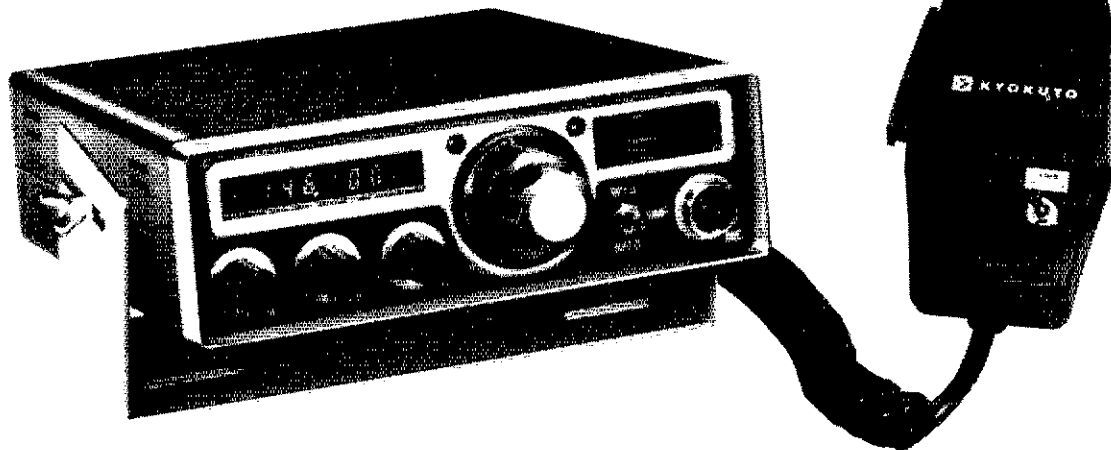
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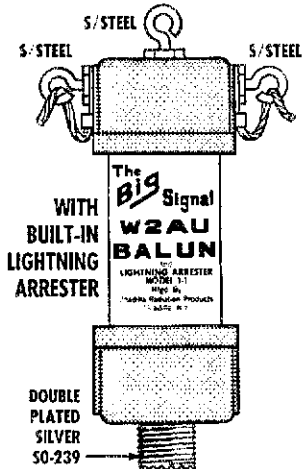


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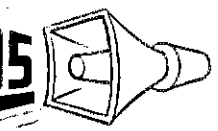
BIG SIGNALS DON'T JUST HAPPEN — GIVE YOUR ANTENNA A BREAK

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.

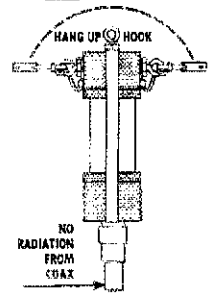
AVAILABLE AT ALL LEADING DEALERS. IF NOT, ORDER DIRECT

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.

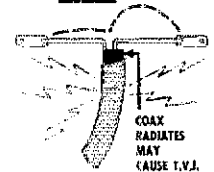
The originator of the Balun with a built-in lightning arrester and hang up hook.



CURRENT DISTRIBUTION WITH W2AU BALUN



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We'll **GUARANTEE** no other balun, at any price, has all these features.

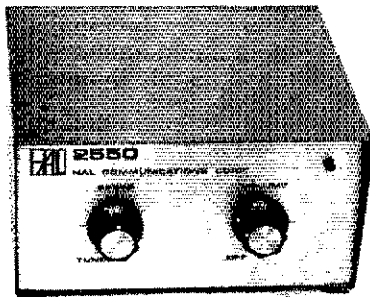
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Put your best fist forward.

To be one of the best fists on the air, all you need is a little practice and the HAL 2550 Keyer and its precision-built companion, the FYO Key.

The 2550 features a triggered clock pulse generator, sidetone monitor, iambic keying and dot memory. There's an optional tailor-made ID too.

Many amateurs remember the famous



HAL Communications Corp., Box 365, 807 E. Green Street
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FYO Key, a key infinitely adjustable to every fist. Now it's back again, better than ever, and available only from HAL. The 2550 Keyer and the FYO Key make a great combination. So to put your best fist forward, send today for a detailed brochure on these two great products.

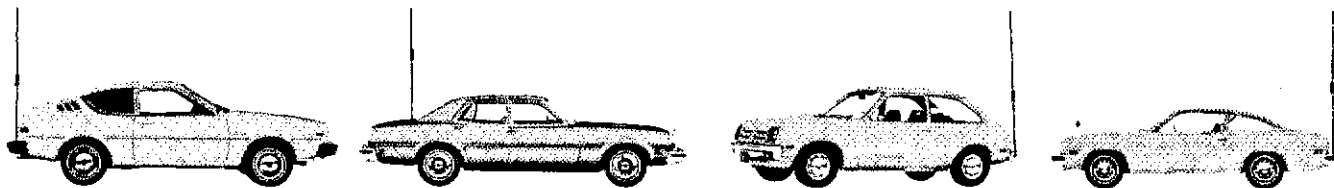
BUILDING A TRANSMATCH?

All Transmatch parts in stock. Here are some examples:

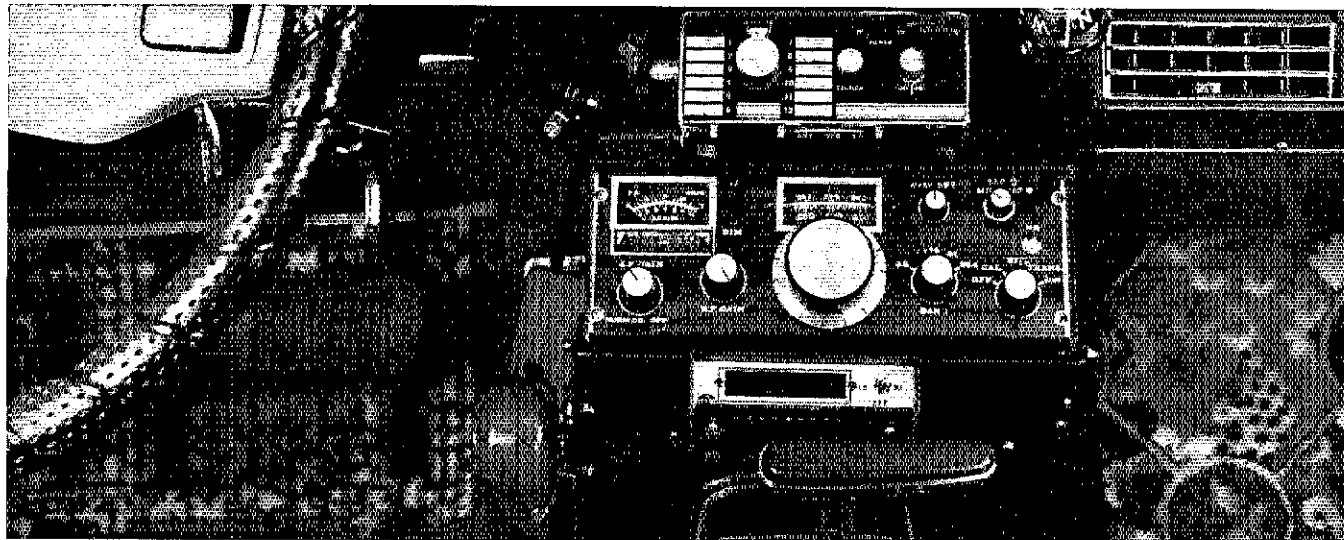
Johnson 154-10, Single section, 23-347 pf for KW transmatch	\$34.20
Millen 16520, Single section, 37-203 pf for KW Transmatch	\$35.30
Millen 16520A, Single section, 37-203 pf for 300W transmatch	\$24.75
Johnson 154-507, Dual section, 15-196 pf for KW transmatch	\$46.20
Millen 16250, Dual section, 2-255 pf for KW transmatch	\$43.25
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B & W Model 375 Protax Antenna Switch with automatic grounding, 6 position, rear mtd., SO239 connectors ..	\$18.50
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We've got the perfect mobile rig for you.

The Atlas 210x or 215x measures only 9½" wide x 9½" deep x only 3½" high, yet the above photograph shows how easily the Atlas transceiver fits into a compact car. And there's plenty of room to spare for VHF gear and other accessory equipment. With the exclusive Atlas plug-in design, you can slip your Atlas in and out of your car in a matter of seconds. All connections are made automatically.

BUT DON'T LET THE SMALL SIZE FOOL YOU!

Even though the Atlas 210x and 215x transceivers are less than half the size and weight of other HF transceivers, The Atlas is truly a giant in performance.

200 WATTS POWER RATING!

This power level in a seven pound transceiver is incredible but true. Atlas transceivers give you all the talk power you need to work the world barefoot. Signal reports constantly reflect great surprise at the signal strength in relation to the power rating.

FULL 5 BAND COVERAGE

The 210x covers 10-80 meters, while the 215x covers 15-160 meters. Adding the Atlas Model 10x Crystal Oscillator provides greatly increased frequency coverage for MARS and network operation.

NO TRANSMITTER TUNING OR LOADING CONTROLS

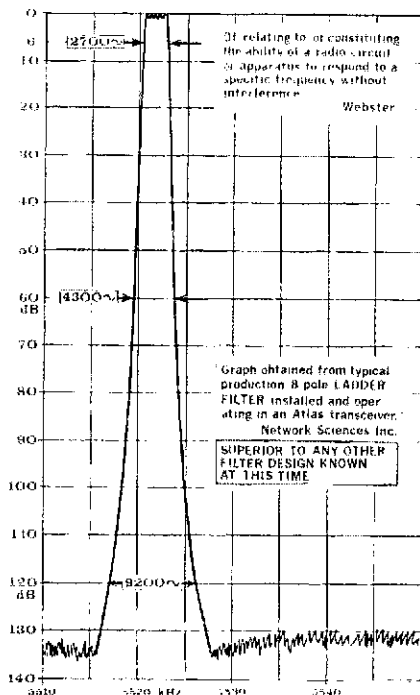
with Atlas' total broadbanding. With your Atlas you get instant QSY and band change.

MOST ADVANCED STATE OF THE ART SOLID STATE DESIGN

not only accounts for its light weight, but assures you years of top performance and trouble free operating pleasure.

PLUG-IN CIRCUIT BOARDS

and modular design provides for ease of servicing.



PHENOMENAL SELECTIVITY

The exclusive 8 pole crystal ladder filter used in Atlas transceivers represents a major breakthrough in filter design, with unprecedented skirt selectivity and ultimate rejection. As the above graph shows, this filter provides a 6 db bandwidth of 2700 Hertz, 60 db down of only 4300 Hertz, and a bandwidth of only 9200 Hertz at 120 db down! Ultimate rejection is in excess of 130 db; greater than the measuring limits of most test equipment.

EXCEPTIONAL IMMUNITY TO STRONG SIGNAL OVERLOAD AND CROSS MODULATION. The exclusive front end design in the receiver allows you to operate closer in frequency to strong neighboring signals than you have ever experienced before. If you have not yet operated an Atlas transceiver in a crowded band and compared it with any other receiver or transceiver, you have a real thrill coming.



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Whether you're driving a Honda in Kansas City or a Mercedes Benz in West Germany, there's an Atlas dealer near you.

210x or 215x	\$649
(with noise blanker installed, \$689)	
ACCESSORIES:	
AC Console 110/220V	\$139
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Plug-in Mobile Kit	\$ 44
10x Osc. less crystals	\$ 55
Digital Dial DD-6B	\$229

For complete details see your Atlas dealer, or drop us a card and we'll mail you a brochure with dealer list.



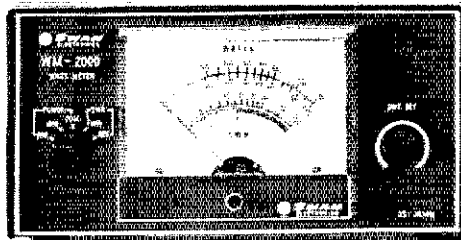
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Phone (714) 433-1983

SWAN METERS HELP YOU GET IT ALL TOGETHER

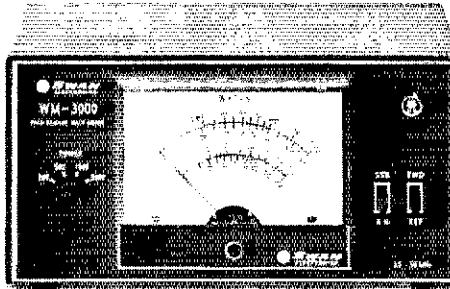
These wattmeters tell you what's going on.

With one of these in-line wattmeters you'll know if you're getting it all together all the time. Need high accuracy? High power handling? Peak

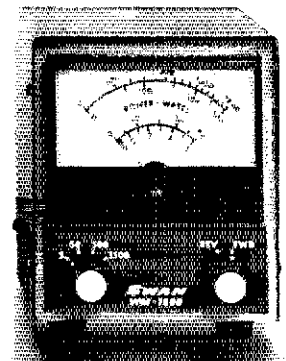
power readings? For whatever purpose we've got the wattmeter for you. Use your Swan credit card. Applications at your dealer or write to us.



WM2000 In-Line Wattmeter With Muscle. Scales to 2000 watts. New flat-response directional coupler for maximum accuracy. **\$49.95**



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Frequency Counter Only \$139.95 Kit

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11 Megohm Input Impedance. 100% Overrange except 1 amp range. AC-DCV 0-1,000, 10,000, 100.0, 1000. AC-DCMA 0-1,000, 10,000, 100.0, 1000. OHMS 0-100, 0-10K, 0-1 Megohm. Input protection, auto polarity, overrange and negative sign indication.

Add \$3.00 Shipping/Handling
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FOR THE EXPERIMENTER ASSEMBLED — TESTED MODULES

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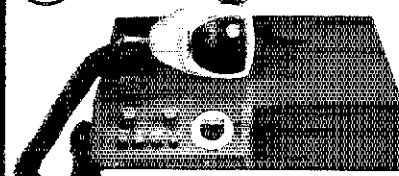
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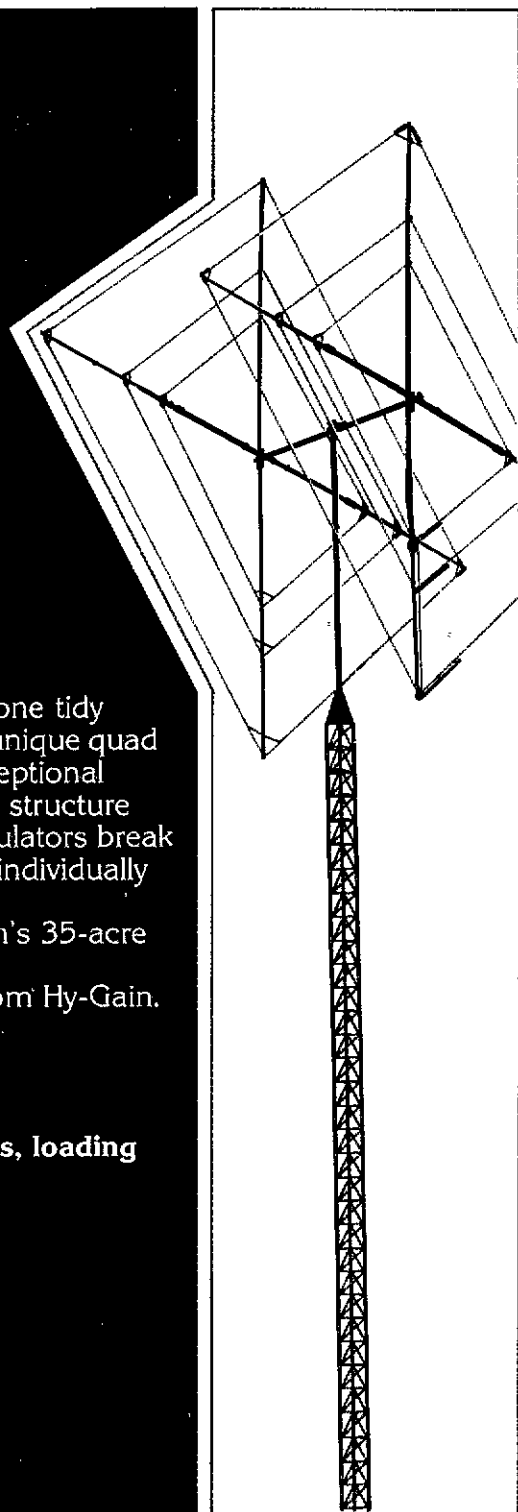
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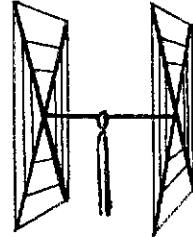
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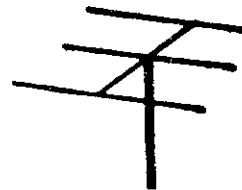
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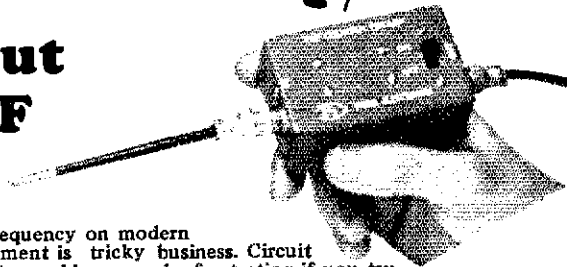
- 12 El 2M Beam..... \$40.
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New! 2, 6, and 10M Beams Shipped Prepaid to the 48!

COD phone service on PREPAID antennas: 1-305-573-2080. Send stamped envelope for literature on entire line.

Counter Preamp/Probe

Sniffs out weak RF



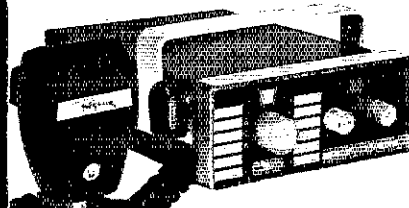
Measuring oscillator frequency on modern communications equipment is tricky business. Circuit density and accessibility problems can be frustrating if you try using clip leads, loops, or coils. You might short out something or pull the oscillator off frequency with close coupling and be unable to get a reading because there just isn't enough signal to drive the counter. Also the counter input cable itself may load the oscillator even though the counter is high impedance. The COUNTER PREAMP is designed to solve these problems. It has 20 dB of gain which increases the sensitivity of your counter ten times. The low capacity insulated probe can pick up the signal just by holding it near the oscillator crystal, coil, or any active component. Sometimes it is possible to read the oscillator thru a plastic case. The preamp has BNC connectors on both ends and can be used as an in-line preamp for scopes, detectors, RF meters, etc., as well as counters. Input is high Z and output is low Z to drive 50 ohm cable. Another serious problem when aligning receivers is that many signal generators shift frequency when the attenuator is moved from high output to drive the counter to low output to make adjustments or check receiver sensitivity. The preamp will give 20 dB of isolation and eliminate the error. Customers have commented that having used the preamp they are now unable to get along without it. Many have made repeat purchases. The preamps are battery powered with three pencils at 25 ma. Output level is 200 to 300 millivolts RMS. One year warranty, money back guarantee. Shipped with probe, less batteries, postpaid cont. USA. Foreign add \$5.00. Call 213/342-2714 for COD or save money by sending check to Pagel Electronics.

VHF Preamp, 100 KHz to 200 MHz \$35.00
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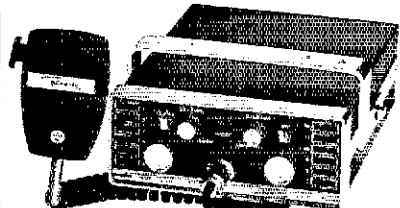


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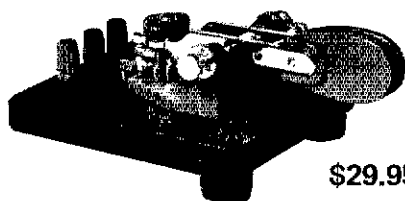
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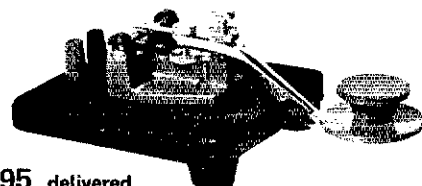


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- For use with all electronic keyers
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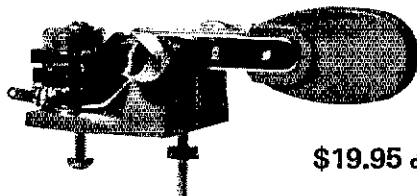


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- Velvet smooth action
- Heavy base with non-slip rubber feet.
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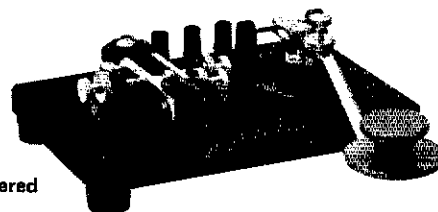
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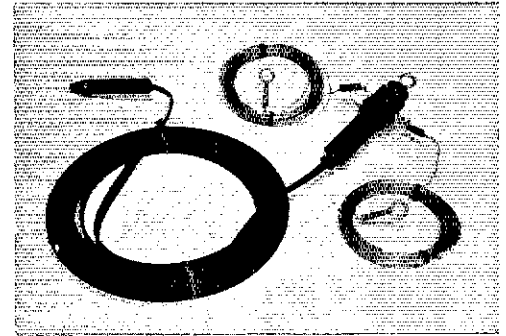
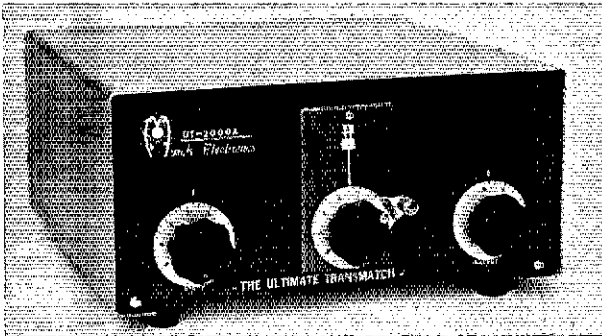
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12" w 12" d x 5 1/2 h, 12 lbs shipping weight

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- Coax fitting to connect twin lead to 52 ohm transmission line (68 feet or more, not included)
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Line/Load Reg. 20 mV typ.
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20 mV typ.
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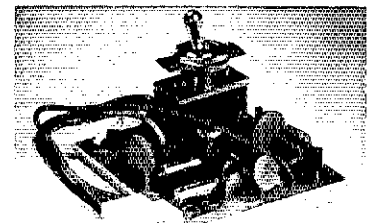
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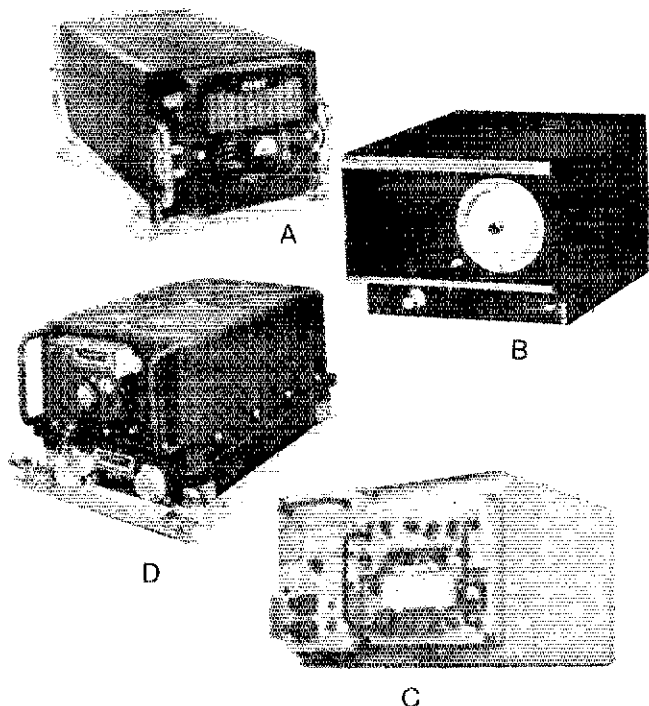
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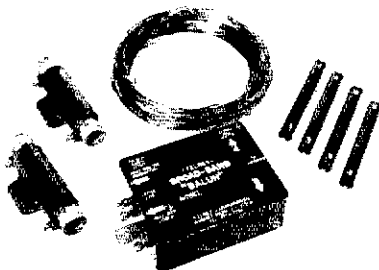
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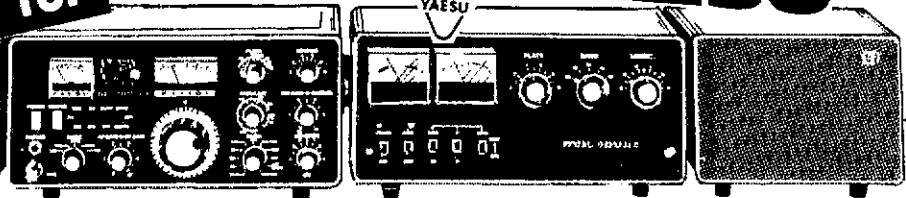
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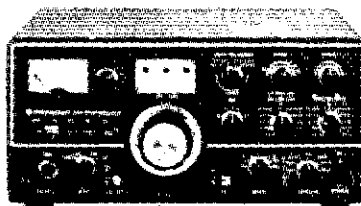
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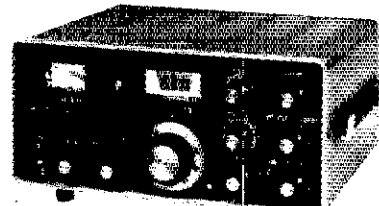
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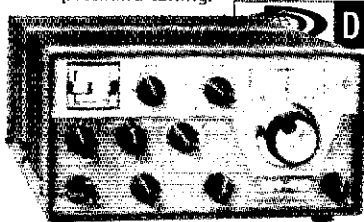
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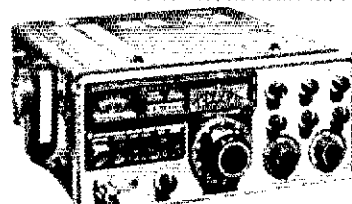
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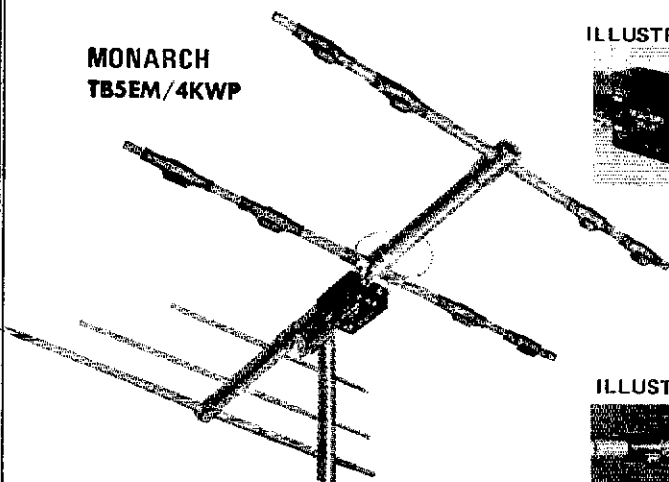


ILLUSTRATION BALUN



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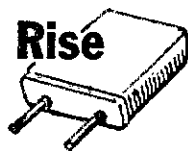


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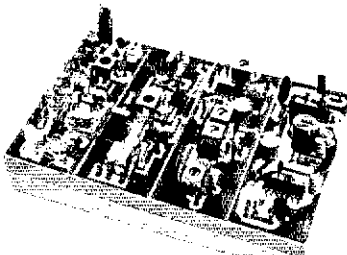
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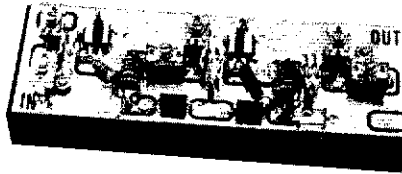
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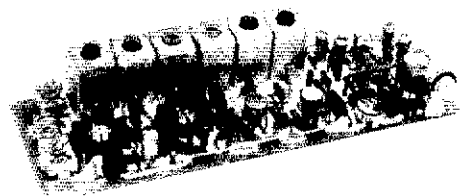


PA144/15 - 15 Watt Power Amplifier



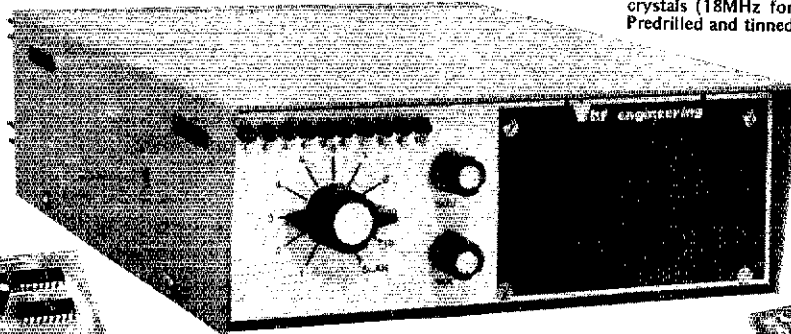
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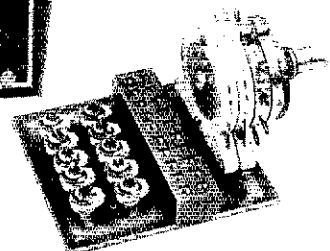


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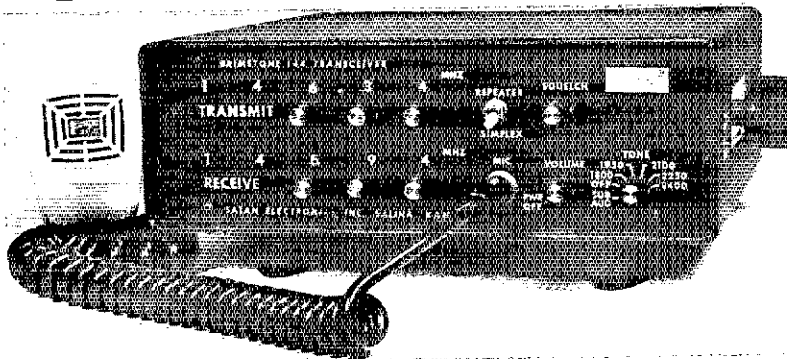
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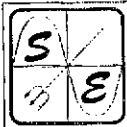
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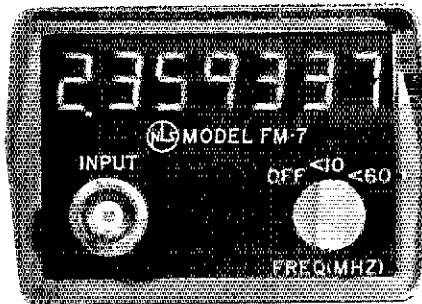
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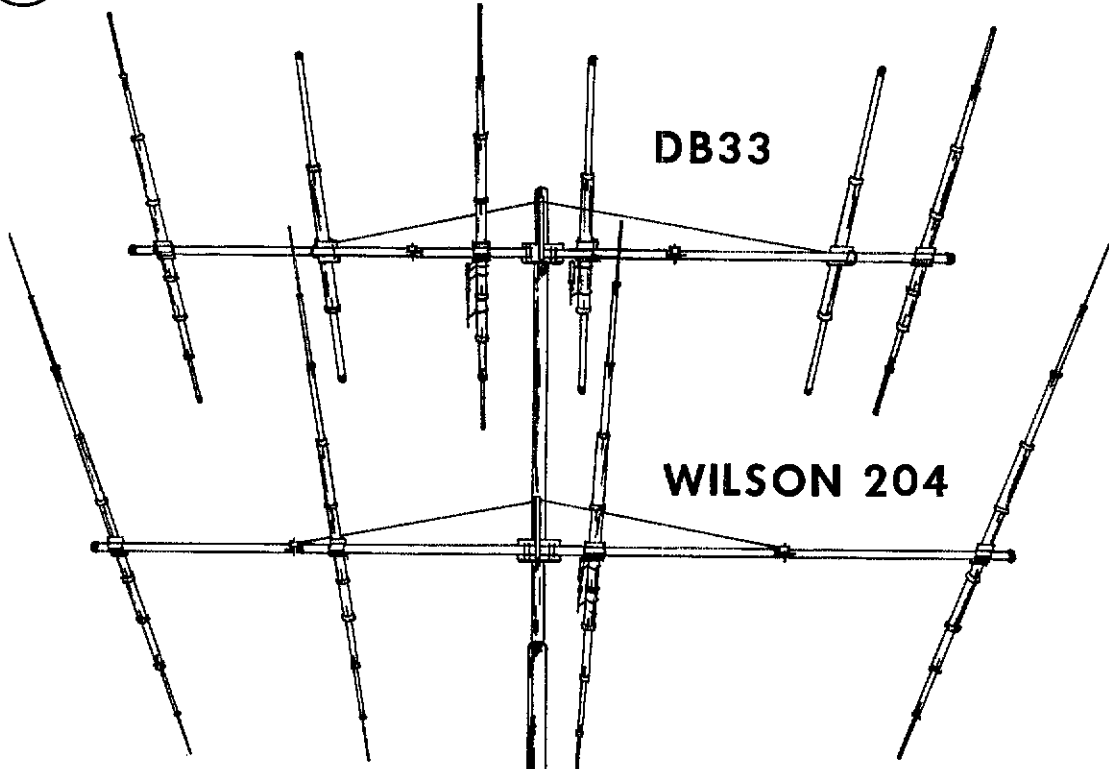
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WILSON AMATEUR ANTENNA SPECIFICATIONS

Boom Length (ft)	Number Elements	Turning Radius (ft)	Surface Area (sq ft)	Wind load at 80 MPH (lbs)	Assembled Weight (lbs)	Shipping Weight (lbs)	Price
M520 40	5	27'0"	5.0	125	90	96	269.00
M204 26	4	22'6"	3.9	100	46	49	139.00
M155 26	5	18'0"	3.7	93	41	44	139.00
M154 20	4	15'9"	3.0	75	30	32	89.00
M106 31	6	18'1"	2.9	73	34	36	99.00
DB54(20) 40	5	27'0"	7.9	198	105	119	289.00
(15)	4						
DB43(15) 19	4	15'8"	4.3	108	36	38	119.00
(10)	3						
DB33(15) 17	3	12'2"	3.8	95	31	33	89.00
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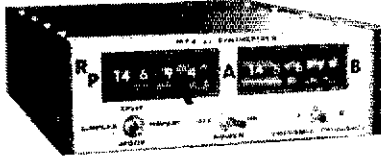
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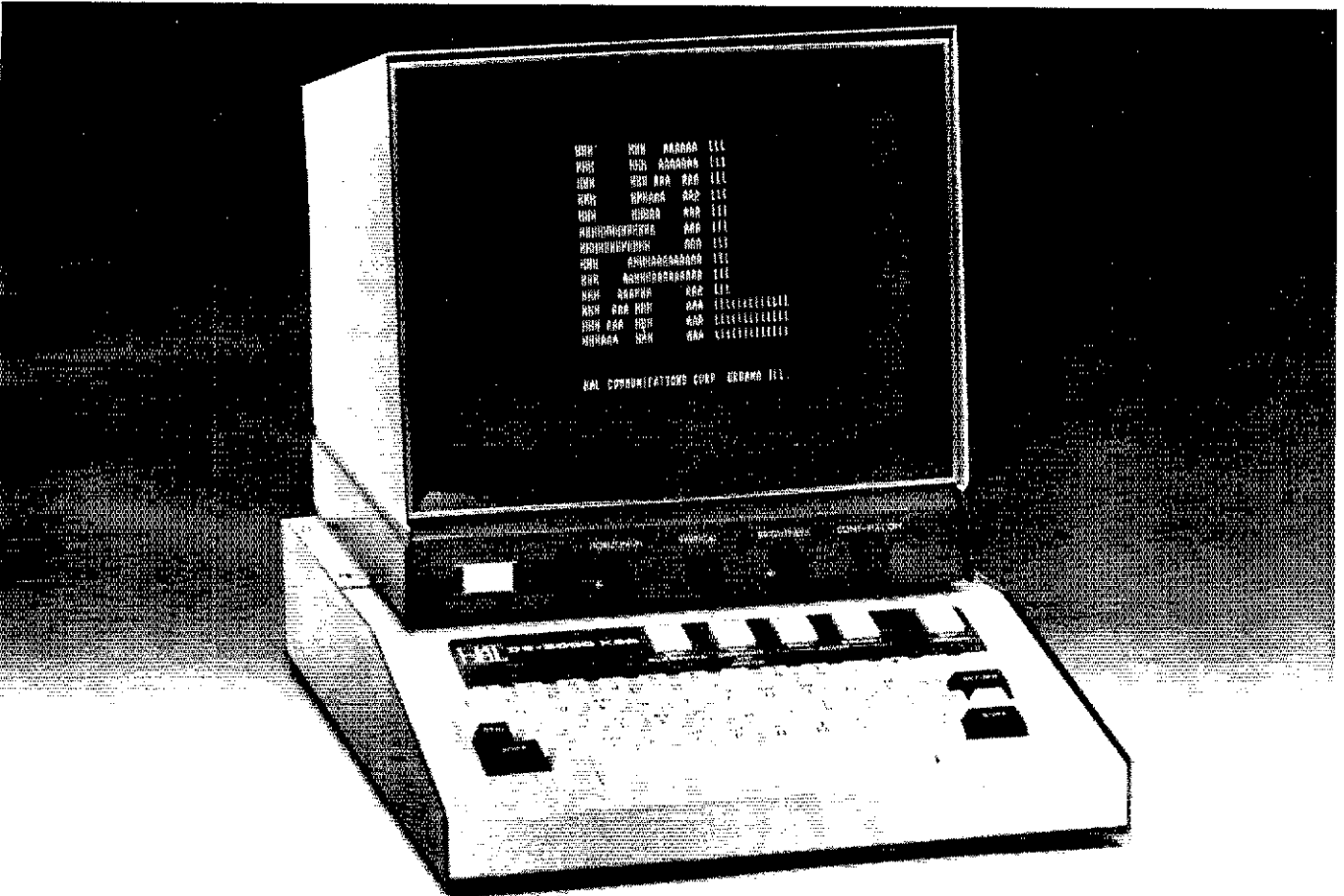
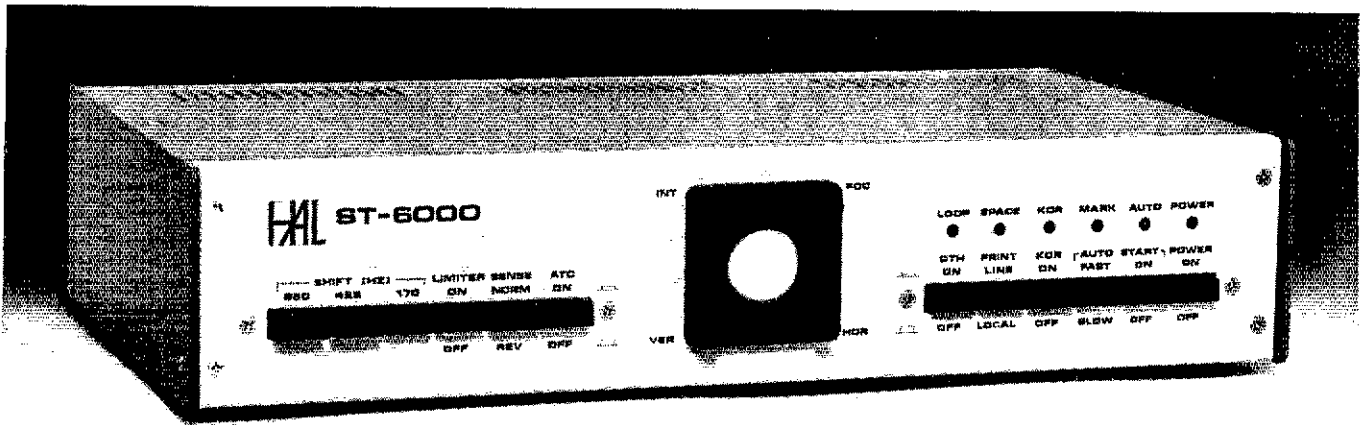
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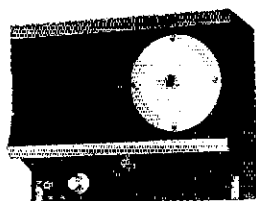
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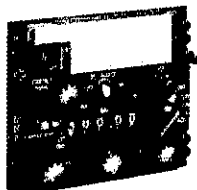


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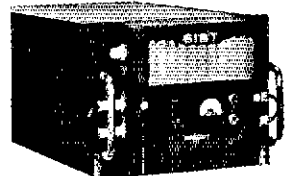
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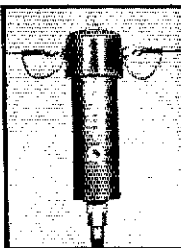
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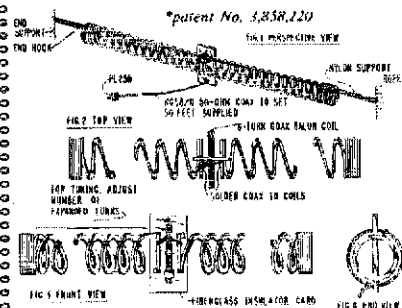
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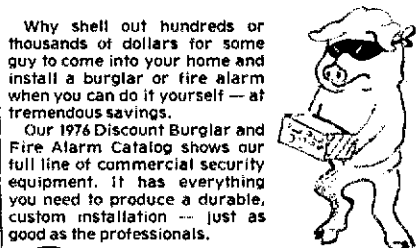
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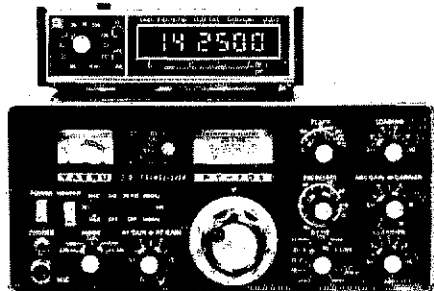
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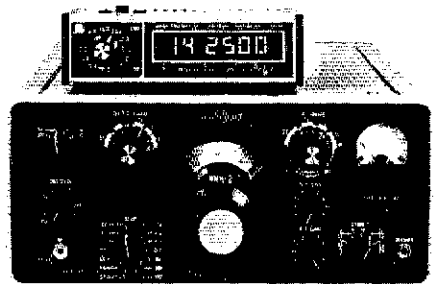


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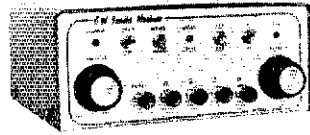
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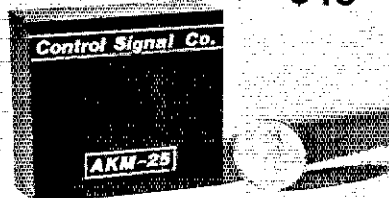
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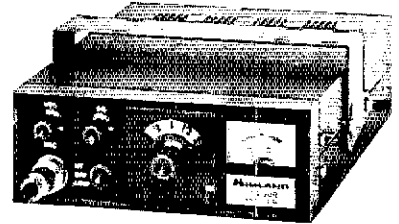
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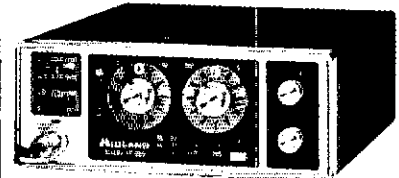
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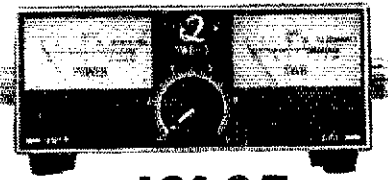


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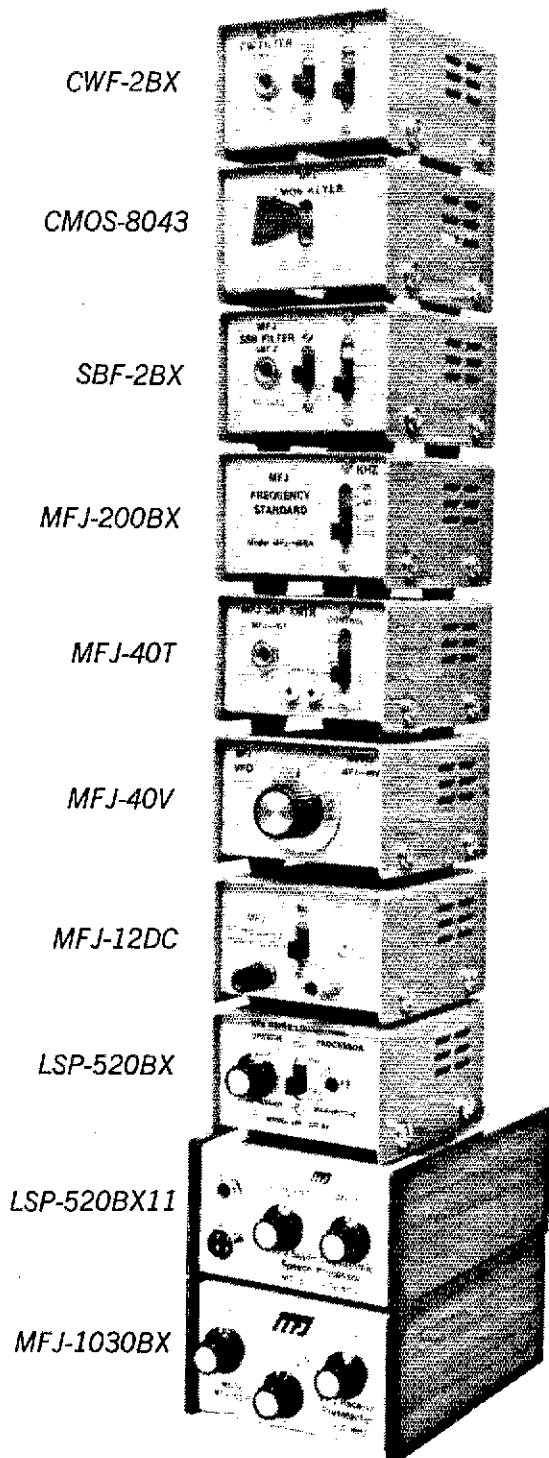
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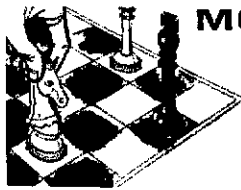
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Frequency Counter..... Kit 012 + Kit 030 + Kit 016 +Time Base
RPM Counter..... Kit 012 + Kit 030 + Kit 020 + Kit 018

KIT 016 FREQ. COUNTER

Features FET input front end with trigger circuit for measuring complex waveforms. Measures from 0.1Hz to 10MHz when used with Kit 015 or 018. Measures from .01Hz to 35MHz when used with Kit 013 and 014. **\$24.50**

KIT 017 DVM

1.999V as basic, with polarity indication. 1 M ohm input impedance and accuracy to 1% if properly adjusted **\$73.50**

KIT 020 RPM COUNTER

Counts from 1 to 100,000 RPM. RPM counter kit contains components and PC board. **\$8.95**

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*Input voltage: 25V max. *Output current: 1 amp max.
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(Contains all parts except transformer)

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1 Mhz crystal chain time base divider. Outputs: 1Mhz-100Khz-10Khz-1Khz-100Hz-10Hz-1Hz-0.1Hz. Accuracy better than .005% with proper adjustment.

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Kit 018 60Hz chain time base using line frequency for Kit 020 RPM counter.

*Outputs: 6 sec. = 100th of RPM
6 sec. = 10th of RPM
60 sec. = full revolution

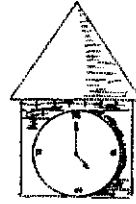
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4-DIGIT DECADE COUNTER KIT **\$19.95** KIT 012

One chip 4 digit decade counter kit, with both 7 segment and BCD output.

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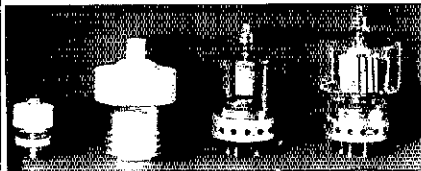
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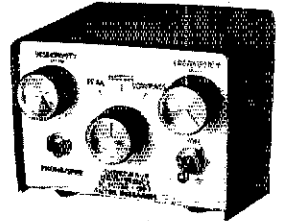
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PC Board for 4 digit display DL727	\$2.25
PC Board for 6 digit display DL727	\$3.00
PC Board for 4 digit display FND70	\$1.75

All PC display boards are multiplexed for adding additional digits.

\$\$\$ SAVE! 4-DIGIT ALARM CLOCK

KIT NO. 1 \$13.95
 (with PC Board)

FEATURES:
 Direct drive display outputs, * Current control regulation on chip, * Low power brightness control on chip, * RFI eliminating slowup circuitry, * Sleep Radio feature, * 24 hr. snooze alarm, * Independent digit setting, * Non multiplexed output circuitry. 12VAC CT 1/2 amp transformer for Kit No. 1 **\$2.00**

***KIT NO. 2**
 Complete kit with components, PC Board, Transformer, wood grain case and filter for display window. Includes .25 in. readouts. **\$21.50**

KIT NO. 3
 Complete kit with components, PC Board, Transformer, wood grain case, and filter for display window. Includes .5 inch readouts. **\$22.50**

* Components for Kit No. 2 or Kit No. 3 sleep radio feature, add **\$5**

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MM5316 - 4-6 digit alarm clock 40 pin dip w/spec	\$ 4.25
7002 - 4 digit counter/latch decoder; 7 segment and BCD outputs. 28 pin dip w/spec	\$12.50
7005 - 4 digit counter/latch decoder; 7 segment output only. 24 pin dip w/spec	\$ 9.50
7007 - 4 digit counter/latch decoder with BCD output only. 16 pin dip w/spec	\$ 7.00
70250 - 4-6 digit alarm clock 28 pin dip w/spec	\$ 5.50
PC Board for 70250	\$ 4.25
70380 - 4 digit non-multiplexed radio alarm clock featuring direct drive display output 40 pin dip w/spec	\$3.50
PC Board for 70380	\$ 3.75
8008 - 8 bit parallel CPU	\$19.50
2102 - 1K static RAM for 8008	\$ 2.25
MM5203 - 2K UV erasable PROM	\$12.25
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75492 - digit driver	\$ 0.45
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(Example) Set your alarm for 7: a.m., set timer for 15 min. At exactly 7: a.m., the appliance will start; at 7:15 your clock alarm will wake you.

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Features 4-digit temperature display; Fahrenheit or centigrade; complete C-Mos application; uses 7002 4-digit counter.

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 Kit No. 70250-2R (DL727 readouts)..... **\$28.50**
 Kit No. 70250-3R (FND807 readouts).... **\$29.50**

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7404 - .21	7449 - .94	74154 - 1.00	4002 - .24
7406 - .29	7473 - .42	74161 - 1.04	4006 - 1.49
7408 - .21	7474 - .42	74163 - 1.24	4007 - .24
7410 - .21	7475 - .70	74164 - 1.94	4008 - 1.15
7413 - .54	7476 - .44	74165 - 1.54	4009 - .59
7420 - .21	7483 - .90	74174 - 1.34	4010 - .55
7427 - .29	7490 - .74	74175 - 1.44	4011 - .24
7430 - .21	7492 - .80	74181 - 2.80	4012 - .24
7437 - .44	7493 - .80	74192 - 1.30	4013 - .59
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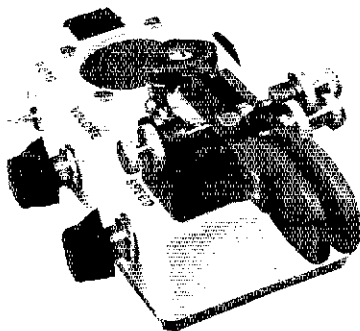
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WARREN, Ohio Hamfest, August 22, 1976. Moved to Trumbull Expo Center, north of city, bigger flea market, plenty of close-in parking. Displays, talk-in, \$2.00 reg. donation, Family recreation nearby State Park. Arrive sign in from Interstates 80, 90, Ohio Rtes 5, 11, 305. Details? QSL WARA, Box 809, Warren OH 44482.

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HAMFEST July 25, Stark County Fairgrounds, Canton Ohio. Call 216-455-4449 or write WA8SHF Box 3 Sandvillle OH 44671 for information.

PEORIA Hamfest - September 19, Peoria, Illinois. Same place as last year. For further details see Hamfest Calendar. Chuckwagon dinner Saturday September 18, 6:30 P.M. at hamfest site - \$6 per person - reservation deadline September 9. For dinner reservations write Larry Pearsall, W9FDY, 2224 W. Herold, Peoria IL 61604. For hamfest tickets, \$1.50 advance (\$2 at gate), write Earl Kimzey, WA9SCA, RFD 1, Hanna City IL 61536.

30th ANNUAL Turkey Run Hamfest. New place!! New day!! Vigo County Fairgrounds one mile south of I-70 on U.S. 41 (south of Terre Haute). For overnight campers only - open Saturday July 17, 1976 1700Z. For general public - open Sunday July 18 1300Z. Midwest's finest flea market, XYL, Bingo. Refreshments, valuable prizes. Vendor spots under covered flea market with AC service \$10. Giant Shopping Mall nearby. Advance Adult tickets \$1.50 ea./4 for \$5. Day of event \$2. ea./3 for \$5. Children under 12 free. Talk-in 25/85 and 94 simplex. S.a.s.e. WVA9A Hamfest, P. O. Box 81, Terre Haute IN 47808.

ELMIRA, NY Hamfest, Sept. 25, 1976, Chemung County Fairgrounds. Flea market, dealer displays, technical talks, Talkin 10/70 - 146.52, \$2.00 advance sale \$2.50 at gate. For further information, WA2SMM, 320 W. Ave., Elmira, NY 14904.

HAMFEST - Northwest Ohio ARC Lima, Ohio, Sunday Oct. 10 at the Allen Co. Fairgrounds. Advanced tickets or information write N.O.A.R.C. P. O. Box 211, Lima OH 45802.

RADIO EXPO '76 - September 18, 19 - Lake County Illinois Fairgrounds between Chicago and Milwaukee. Dozens of exhibits by Amateur Manufacturers and Distributors. Forums including FCC's John Johnston, ARRL, OSCAR program, more. Giant Flea Market with plenty of indoor and outdoor space opens Friday night. Plenty of room for campers, trailers on the grounds. Prizes. All for only \$1.50 advance. Box 1014, Arlington Heights IL 60006.

BLUEFIELD, WVA Hamfest August 29, bigger this year. Big flea market, free space. For information contact KB2DY, Otho, 1401 Woodland Ave., Bluefield WV 24701.

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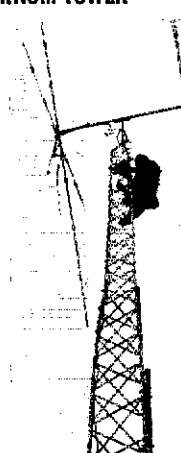
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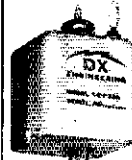
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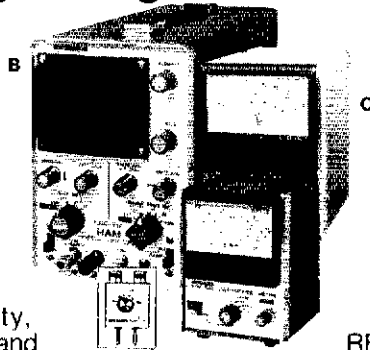
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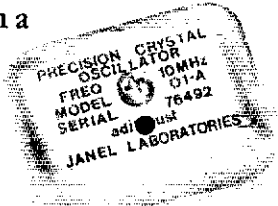
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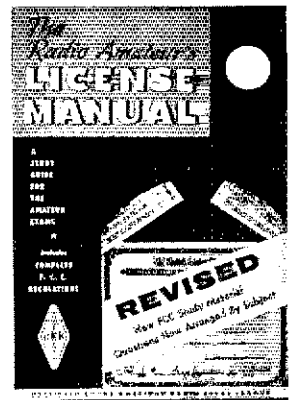
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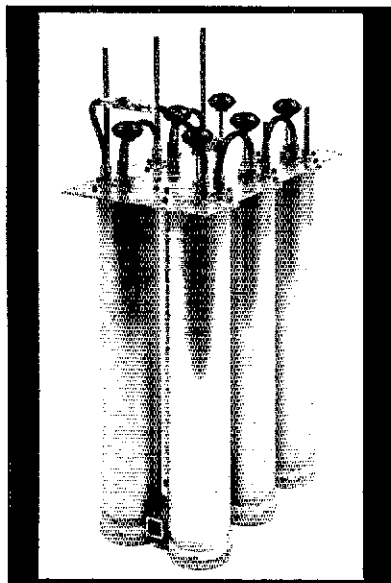
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BARREL KIT #22 TRANSISTORS WITH A HOLE IN IT 50 for \$1.98 Untested. Can't name factory but we bought barrels of 26 watters with hole in middle. EN'S and NPN'S. Cat.No.7M2610	BARREL KIT #35 NEON LAMPS 40 for \$1.98 100% good. Famous NK-2's. All prices, but factory made millions and barrel'd 'em. Your advantage! Cat.No.7M2613	BARREL KIT #36 GERMANIUM DIODES 200 for \$1.98 Untested. Famous maker, popular item. Never grows old but this is the way the RE-TESTERS have 'em from the factories. Cat.No.7M2614	BARREL KIT #37 1 AMP "BULLET" RECTIFIERS 100 for \$1.98 Untested. Famous style, ass't. voltages, silicon, ass't. includes all types of voltages to 1KV. Cat.No.7M2615	BARREL KIT #39 2N3055 ROBEY TRANSISTORS 15 for \$1.98 100% good. From factory to you, these fellows of the famous 2N3056. We have 10 barrels. Cat.No.7M2617	BARREL KIT #40 POPULAR POWER TRANSISTORS 20 for \$1.98 Untested. Popular germanium 70-3 case units, now available at "good ole barrel" prices. Cat.No.7M2618 100% good.	BARREL KIT #46 2-3 WATT AMP TRANSISTORS 25 for \$1.98 Untested. Hobby type, factory failures, we purchased them in barrels. These are unknowns. Cat.No.7M2624		
BARREL KIT #50 SIGNAL SILICON DIODES 200 for \$1.98 Untested. Includes many, many types of switching, signal silicon types, all ass't. leads. Some may be reners. Cat.No.7M2628	BARREL KIT #52 "DISCS" 500 for \$1.98 Untested. The bargain of a lifetime! First time ever offered by anyone. Color-coded, molded bargain hunters. Cat.No.7M2630 100% good.	BARREL KIT #53 JUMBO RESISTOR PAK 100-pc. \$1.98 Untested. Assortment metal film, precision, carbons, metal oxide powders, from 1/4 watt to 1/2 watt. Color-coded & 100% good. With 210. Cat.No.7M2721	BARREL KIT #58 SLIDE SWITCHES 30 for \$1.98 Untested. All shapes, sizes, ass't. leads, monostables, etc. Treatment shop pack for 100's of switching projects. Cat.No.7M2726 100% good.	BARREL KIT #73 TRANSISTOR ELECTRODS 50 for \$1.98 Untested. It "bugs" us why the factories dump 'em in barrels. We don't wish to separate wide ass't. voltages & values up to 300 mV. Cat.No.7M2747	BARREL KIT #59 POWER TRANSISTORS 40 for \$1.98 Untested. 15 watt Bendix B-8000 metal transistor, non all good, purchased from a protester, have millions of 100% good. Cat.No.7M2727	BARREL KIT #60 DTL'S IC'S 75 for \$1.98 Untested. This is price barrel material. Includes 741's, 742's, 743's, 744's, 745's, 746's. Your gain is for us to separate. 100% good. Cat.No.7M2728		
BARREL KIT #65 MIXED READOUTS 15 for \$1.98 Untested. Factory returns... each number as MAN-2's, MAN-3's, MAN-4's, 11 barrels, no time to separate. Cat.No.7M2733 Untested.	BARREL KIT #68 2 WATERS 100 for \$1.98 100% good. Nobody seems to want 'em! So make up suppliers don't count, but throw 'em in the barrel. It's a 1/2 gold mine. All marked. Cat.No.7M2735	BARREL KIT #71 CAPACITOR SPECIAL 100 pcs. \$1.98 Untested. Empty stockrooms into barrels of resistors, capacitors, molded, plastics, ceramics, disks, etc. Nifty 100% good. Cat.No.7M2738	BARREL KIT #77 NATIONAL IC BONANZA 100 for \$1.98 Untested. Factory dumps into barrels. Types 8000, 7400 series, DTLs, ROMs, registers, clock & calc. chips, etc. Cat.No.7M2860 Untested.	BARREL KIT #87 NATIONAL IC BONANZA 100 for \$1.98 Untested. Factory dumps into barrels. Types 8000, 7400 series, DTLs, ROMs, registers, clock & calc. chips, etc. Cat.No.7M2860 Untested.	BARREL KIT #91 SILVER MICAS 100 for \$1.98 Untested. For the first time silver micas are low in price! Ass't. axial, red and variety of physical sizes & values. Big savings from distributor. Cat.No.7M3018	BARREL KIT #94 "BUBBLE" READOUTS 12 for \$1.98 Untested. DTL-388 bubble magnifiers, Segs missing. Truthfully so. Ass't. values. "We don't care, but we don't care." Cat.No.7M3034		
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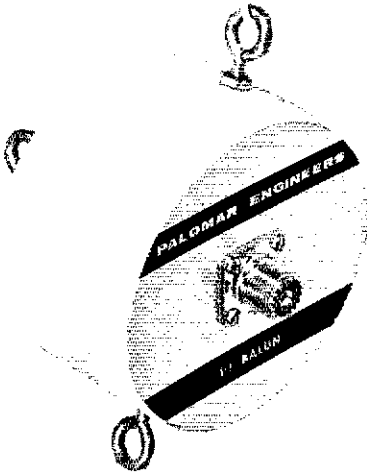
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SELL - Hallicrafters SX-24, good condition needs alignment, also earlier SX model. Best offer either or both. All replies acknowledged. G. Roberts 2020 Himrod St., Brooklyn NY 11237 212-366-4845.

FOR SALE: HT32B, SX-101A Sell as a pair \$325. Mary King, 3522 Lorain Dr., Waterloo IA 50701. 319-234-1331.

WANTED - Heath DX-40 or Johnson Navigator - must be absolutely mint. Mark Rauchlous, 308 Vanderbilt Rd., Biltmore Forest, NC 28803.

HAM/electronics magazines and books wanted by collector. Buy or swap. Donald, 6059 Essex, Riverside CA 92504. 714-687-5910.

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WANTED: Viking Valiant 1, Ranger I or Five Hundred transmitter. Tony Stockard, Box 317, Rhome TX 76078. 817-636-2263 nights.

SELL: Complete Drake Station: R4B (Extra Xtals) T4XB; AC 4, M.S.4; MN 4; Shure Microphone, Mint. \$875. K41PC, Box 128, Dyersburg TN 38024. 901-285-0906.

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COLLINS KWM-2 w/ac power supply, noise blanker, DX enrg. r/ speech processor. \$850. Certified check or call weekends only. 203-678-1982. 64 Hitchcock Lane, Avon CT 06001. Anderson.

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RTTY el-cheapo - new Kleinschmidt page printer and keyboard still in crate make offer model 28 printing reper head nr \$25. Motor \$10. Tape holder with switch & reel \$3.50. Paul R. Gassman, WB9RW, 2666 Fair Oaks Ln., Cincinnati OH 45287. 1-513-731-8164.

HEATH SB-614 Monitor scope, brand new. Factory aligned, \$135. Laver, 28 Gallatin Drive, Dix Hills NY 11746.

HW-100/HP23/SB600 \$240. Absolutely mint cond. Swap: Hustler 4BTV & 80M 1kW coil & radials, new cond. For monitor scope, or antenna tuner or Ham-M 01? Need manual for Comen RT-616/VRC 51 2M xcvr. Paul Wintzer, K9ABC, 16265 Finland Ave., Rosemont MN 55068 612-422-8106.

SELL: Complete 2 meter station: Regency - HR-2B; crystals for 11 channels, mobile mounting bracket; Regency P109 a/c power supply; touch tone pad; leather case, battery pack, batteries, built in ant., with shoulder strap for portable use. All equipment 8 months old in mint condition. Original Cost \$428.50. First certified check for \$265 has it. - Dr. Bruce Ealka, WA1TRP 226 Knollwood Dr., New Haven CT 06515. 203-397-2281.

HEATH SB620 Ham Scan \$95. SB630 console \$75. 640 VFO (no carrier) \$95. Kaar Marine Radio Telephone new \$175. W2FNT Hillcrest Ter., Linden NJ 07036.

HEATH SB230 amplifier, new but can't use in apartment. \$230. Herb Smith, W8AIU, 2202 Acacia Park Drive, Cleveland OH Phone 216-461-7171.

WANTED SB33 or SB34 in any condition. Anthony Tamburino, 111 So. Crescent, Rome NY 13440.

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SB-102, HP-23B, SB-600 excellent condition \$450. 313-549-2353. K8CVV.

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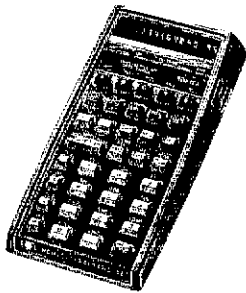
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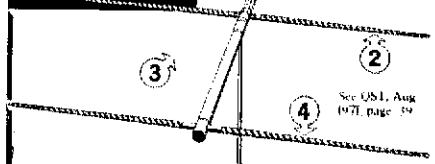
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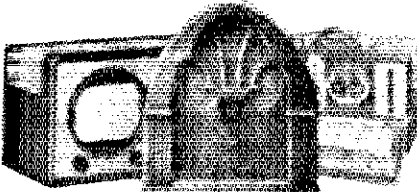
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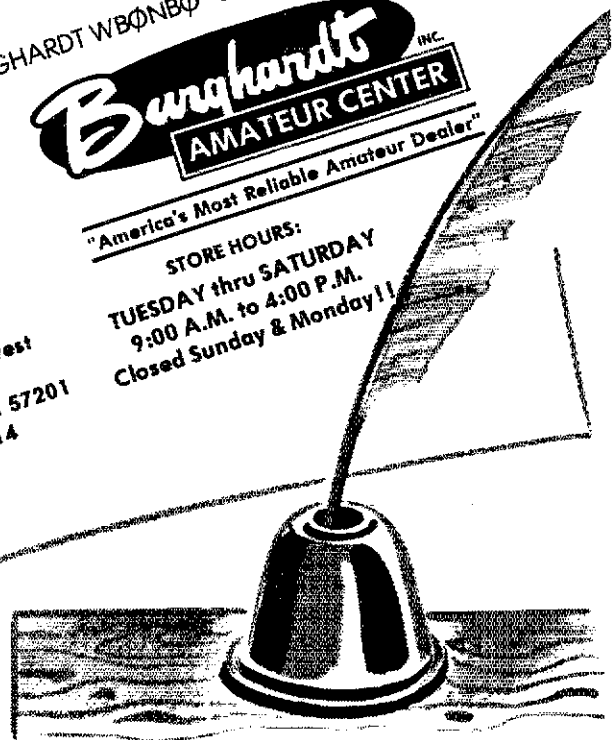
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