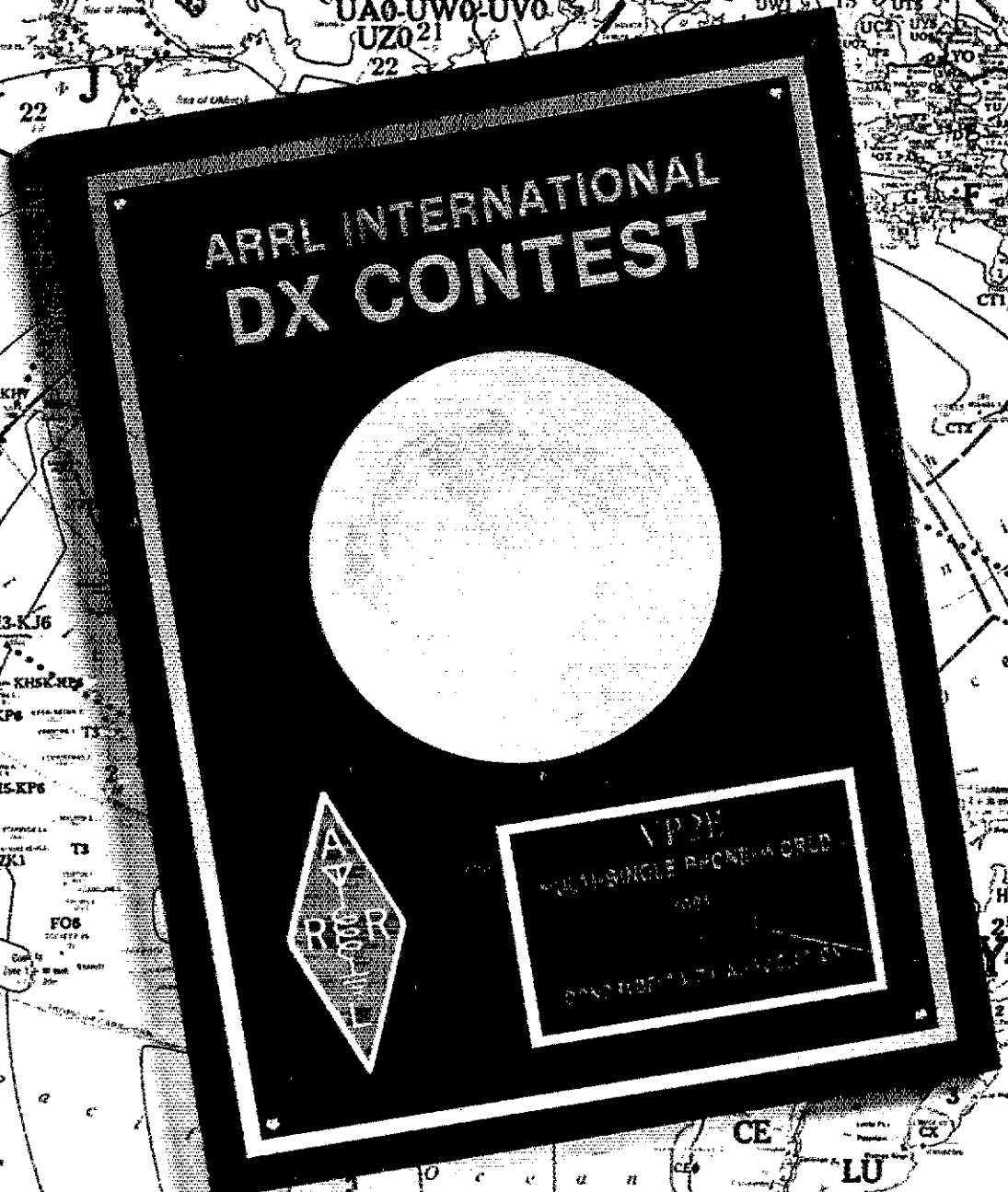
QST

devoted entirely to Amateur Radio

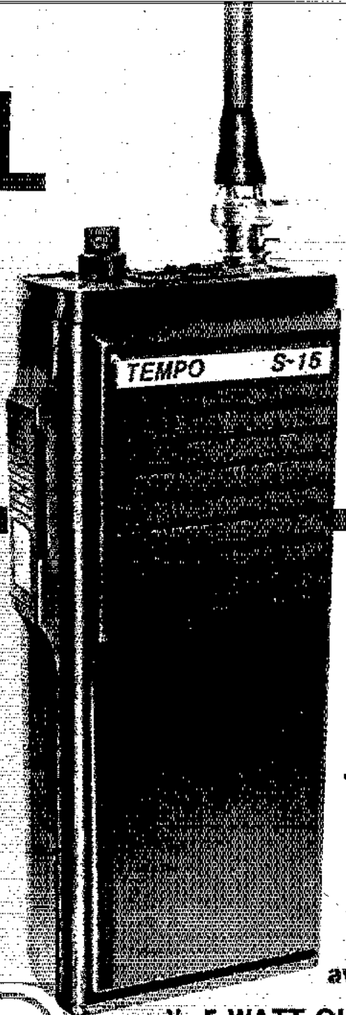
February 1982



Win a DX Contest Plaque

Page 77

the ALL NEW tempo S-15...



...more radio ...less money

TEMPO'S ALL NEW S-15 SYNTHESIZED HAND HELD OFFERS IMPORTANT FEATURES AT A PRICE THAT DEFIES COMPARISON.

Compare these features with any other hand held available... the S-15 is the obvious choice

- **5 WATT OUTPUT (1 watt low power switchable)**
- **"EASY REMOVE" BATTERY PACK**
- **1 HOUR QUICK CHARGE BATTERY SUPPLIED (450 ma/HR)**
- **BNC ANTENNA CONNECTOR & FLEX ANTENNA**
- **EXTREMELY EASY TO OPERATE**
- **PLUG FOR DIRECT 13.8 VOLT OPERATION**
- **3 CHANNEL MEMORY. (1 channel permits non-standard repeater offsets. 200 micro amp memory maintenance (standby)).**
- **VERY SMALL AND LIGHT WEIGHT (only 17 ounces)**
- **10 MHz FREQUENCY COVERAGE: 140-150 MHz (150-160 for export customers)**
- **AMPLE SPACE FOR PROGRAMMABLE ENCODER**
- **SPEAKER/MICROPHONE CONNECTOR**
- **ELECTRICALLY TUNED STAGES (receiving sensitivity and output power are constant over entire operating range)**
- **LOW PRICE...$289** S-15 with touch tone pad... $319

SUPPLIED ACCESSORIES:
Rubber antenna • Standard charger • Ear phone • Instruction manual • 450 ma/HR battery (quick charge type)

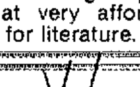
OPTIONAL ACCESSORIES:
1 hour quick charger (ACH 15) • 16 button touch tone pad (S15T) • DC cord • Solid state power amplifiers (S-30 & S-80) • Holster (CC15) • Speaker/mike (HM 15)

Tempo S-2
Enables you to use 220 MHz repeaters throughout the U.S.. The S-2 is thoroughly field tested and offers a long life of dependable service. A good way to get into 220 MHz operation if you're not on yet and with the addition of a Tempo power amplifier you can build a small base station or a powerful mobile rig. $289 S-2T...$319

NEW REDUCED PRICES!

Tempo S-4
The first 440 MHz hand held and still a winner...offers the perfect way to get into an uncrowded band. Check one out at your local Tempo dealer or write Henry Radio. $289 S-4T...$319

Boost the power of your hand held or mobile unit with a Tempo solid state power amplifier. A broad range of power outputs available at very affordable prices. Please write for literature.



Tempo M1
Tempo does it again! This time with the world's first and only ALL CHANNEL synthesized hand held marine transceiver. The Tempo M1 operates on all marine channels...both U.S. and international, plus four weather channels. This is a real working tool and a hobby rig with hundreds of uses. It is skillfully engineered and built to provide endless hours of hard use. 1 watt low power—2½ watts high power positions. And the price...LESS THAN $500.

Available from Tempo dealers and **Henry Radio**

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CT2100

HAL Puts MORE Behind The Buttons

45-1200 Baud RTTY
1-100 WPM Morse
Code

2 Page
Display

72 or 36
Character
Lines

Status
Indicator
on Screen

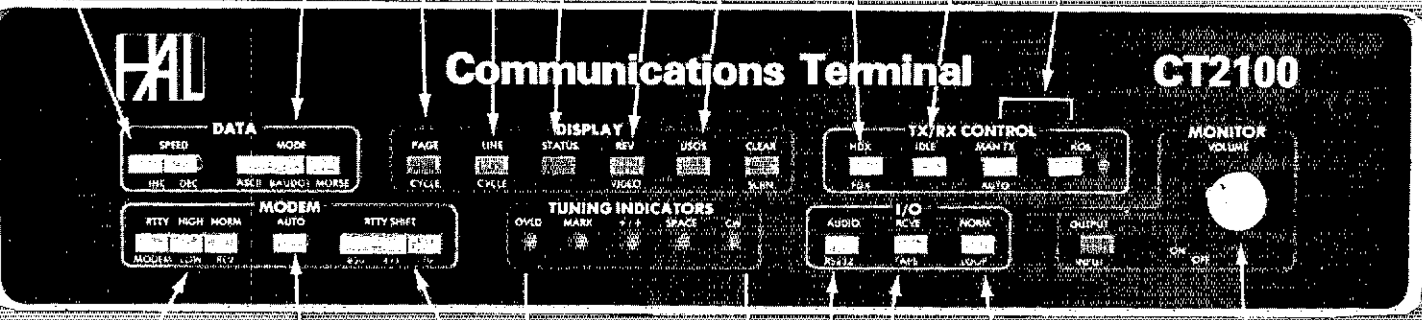
Black
or
White
Characters

Unshift
on
Space
(For Baudot)

Half
or
Full
Duplex

Synchronous
Idle
("Diddle")

Auto
TX/RX
Control



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RTTY Demodulators
- High Tones (U.S. Standard)
- Low Tones (IARU Standard)
- 103 Modem (1070/1270 HZ)
- 202 Modem (1200/2200 HZ)

Auto
Mark-Hold

All 3 RTTY
Shifts
(High or Low Tones)

LED Tuning Indicators
Plus
On-Screen Tuning Bar
Plus
Ext. Scope Connections

Audio or
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Data

Input Audio
From
Receiver or Tape

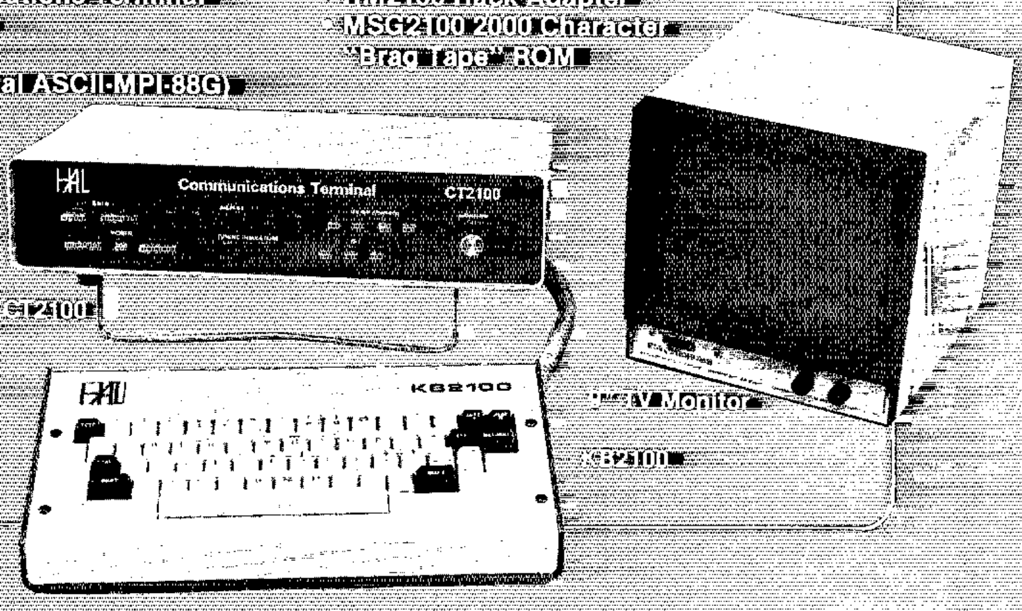
Transmit
and Receive
With RTTY Loop Devices

Audio Monitor
For Either
Input or Output
Signals
Internal Speaker
Plus External Output

CT2100 System:

- CT2100 Communications Terminal
- KB2100 Keyboard
- Video Monitor
- Printer (300Bd Serial ASCII-MPI-88G)
- RM2100 Rack Adapter
- MSG2100 2000 Character "Brag Tape" ROM

- 24 Line Display
- 2 Pages of 72 Character Lines or 4 Pages of 36 Character Lines
- Split Screen (with KB2100)



CT2100

TV Monitor

KB2100

HAL COMMUNICATIONS CORP.
Box 365
Urbana, Illinois 61801
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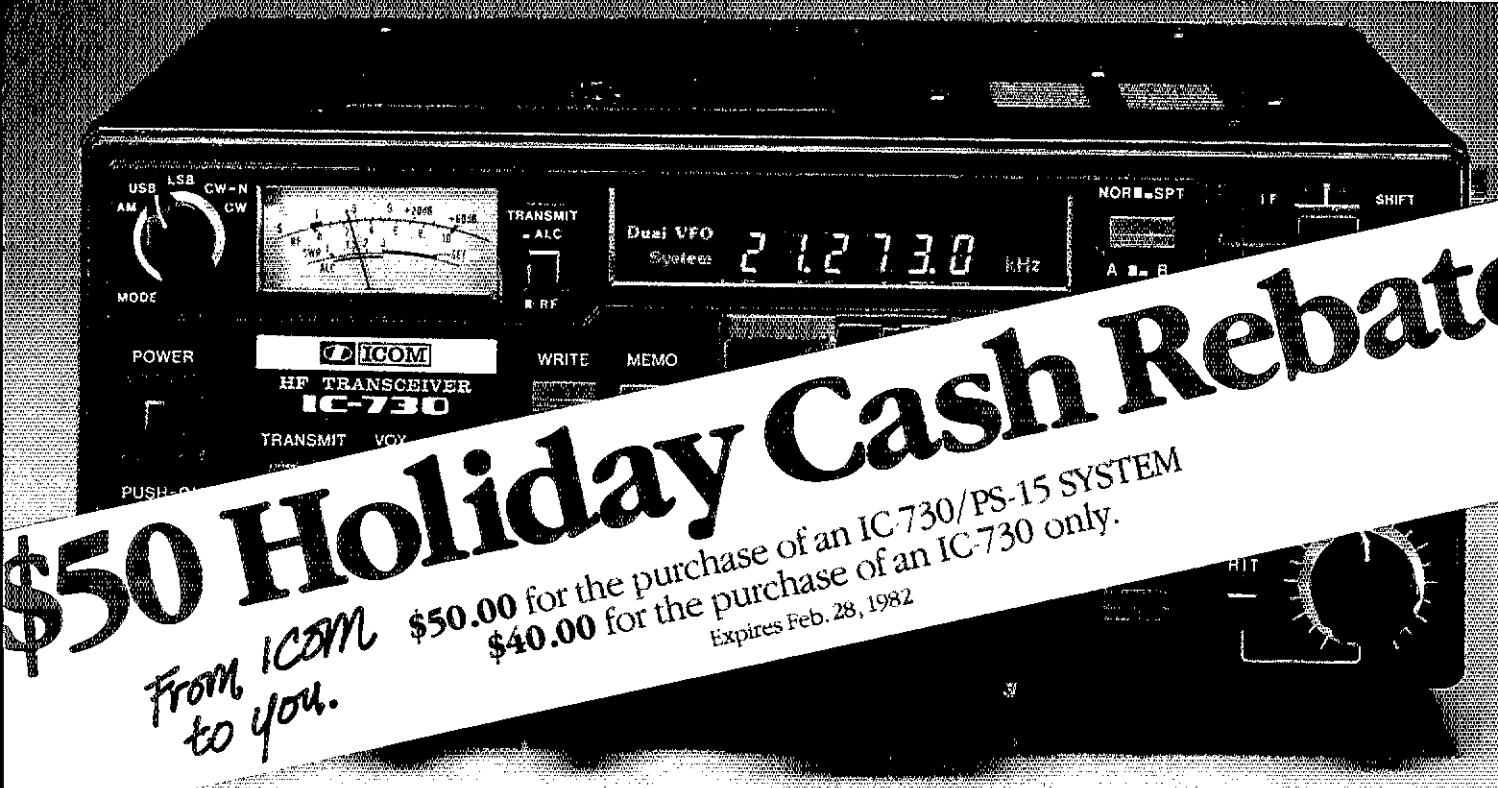
NOW! HAL Equipment is in stock at leading Amateur Dealers. See page 100 for the location of your nearest dealer.

ICOM IC-730

ICOM's Go-Anywhere HF Rig for Everyone's Pocketbook



$50 Holiday Cash Rebate

From ICOM to you.

$50.00 for the purchase of an IC-730/PS-15 SYSTEM
$40.00 for the purchase of an IC-730 only.

Expires Feb. 28, 1982

Compact.

Only 3.7 in (H) x 9.5 in (W) x 10.8 in (D) will fit into most mobile operations (compact car, airplane, boat, or suitcase)

Affordable.

Priced right to meet your budget as your main HF rig or as a second rig for mobile/portable operation.

Convenient.

- Unique tuning speed selection for quick and precise QSY, choice of 1 KHz, 100 Hz or 10 Hz tuning.
- Electronic dial lock, deactivates tuning knob for lock on, stay on frequency operation.
- One memory per band, for storage of your favorite frequency on each band.
- Dual VFO system built in standard at no extra cost.

Full Featured.

- 200W PEP input—powerful punch on SSB/CW (40 W out on AM)
- Receiver preamp built-in • VOX built-in
- Noise blanker (selectable time constant) standard
- Large RIT knob for easy mobile operation
- Amateur band coverage 10-80M including the new WARC bands
- Speech processor—built-in, standard (no extra cost)
- IF shift slide tuning standard (pass band tuning optional)
- Fully solid state for lower current drain
- Automatic protection circuit for finals under high SWR conditions
- Digital readout • Receives WWV • Selectable AGC
- Up/down tuning from optional microphone
- Handheld microphone standard (no extra cost)
- Optional mobile mount available

ICOM

2112 116th Avenue N.E., Bellevue, WA 98004
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February 1982 *Volume LXVI Number 2*

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THE COVER

Plaques such as this one will be awarded to many of the top operators in the 1982 ARRL International DX Contest, the largest, most prestigious DX event in Amateur Radio. See page 77.

Contents

Technical

Beginner's Bench

General

Operating

Organizational and Regulatory

Departments

ST-144/μP, 2 Meter FM

It's Time!

■ It's time you got your share of the excitement of full-feature synthesized handheld operations. ■ SANTECnology zaps to the lead of the state-of-the-art in 2 meter handhelds with the new ST-144/μP. ■ Only SANTEC hands you all the up-to-the-minute features of this "clockwise" precision jewel.

■ The 24 hour format digital clock on the LCD display is uniquely SANTEC, and it typifies the thoughtful operator-oriented design incorporated throughout the ST-144/μP. ■ Not only does it give you accurate time checks whenever you want, but also it can display the time instead of the frequency, while this handful of radio continues to operate on your "favorite" frequency.

24 Hr Clock provides time of day even while the radio is turned off, or it can be selected by the front panel switch while in QSO.

Full Frequency Display showing offset selected, battery condition and current scan mode. At turnon, the contents of M-1 are loaded into the operating register, and the display looks like this.

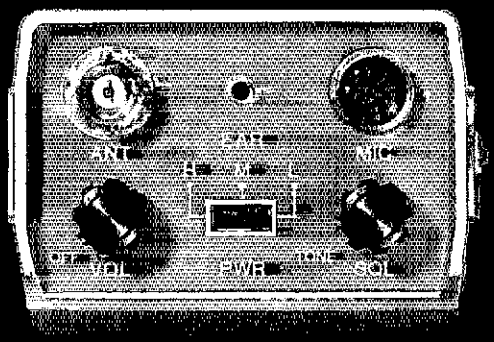
The Memory Mode is indicated by the small "M" above "+", the "5" indicates that the data were stored in Memory 5 before recall. The "+" indicates that the + offset was stored with the frequency.

Memory Scan with "Priority Scan/Auto-Resume" has stopped on Memory 9 to listen for a few seconds.

Transmit is indicated on a minus 600 kHz offset from 146.820 MHz which was stored in M-6. Activity on Memory 6 was found by using the "Search" mode of Scan.

■ The 10 frequencies that you put into the memories are stored with your repeater offsets, and you can have them scanned, searched or instantly recalled at the touch of a button. ■ Memory 1 even gets priority treatment in the memory scan mode. ■ That's timely complexity made amazingly simple: and the high power option of 3.5W (nominal) is simply the greatest reach you've ever held in your hand.

■ "Battery saver" function by the computer to hoard battery power when the frequency is quiet ■ Programmed limits for both ends of bandscan ■ Simplified frequency entry only by keyboard ■ Full capacity, low impedance audio output to drive an external speaker ■ Wide band span for MARS, CAP, AF MARS: 142.00-149.995 MHz ■ Quick-change 500mAh battery ■ Separate level controls for MIC, TT, PL and DEV ■ & so much more that we don't have space to mention ■ SANTEC hands it all over, while others can't even give you the time of day.



All stated specifications are subject to change without notice or obligation.

Accessories for SANTEC Handheld Radios
clockwise from upper left:
- Leather Case (ST-LC)
- Base Charger & Power Supply (ST-5BC)
- Remote Speaker (MS-50S)
- Mobile Charger (ST-MC)
- Speaker Microphone (SM-1)

Export Orders Invited.

Encomm, Inc.
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Plano TX 75074

Please send me more information about:
☐ The ST-144/μP
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YOU MAY SEND A DUPLICATE OF THIS FORM.

The ST-144/μP is approved under FCC Part 15

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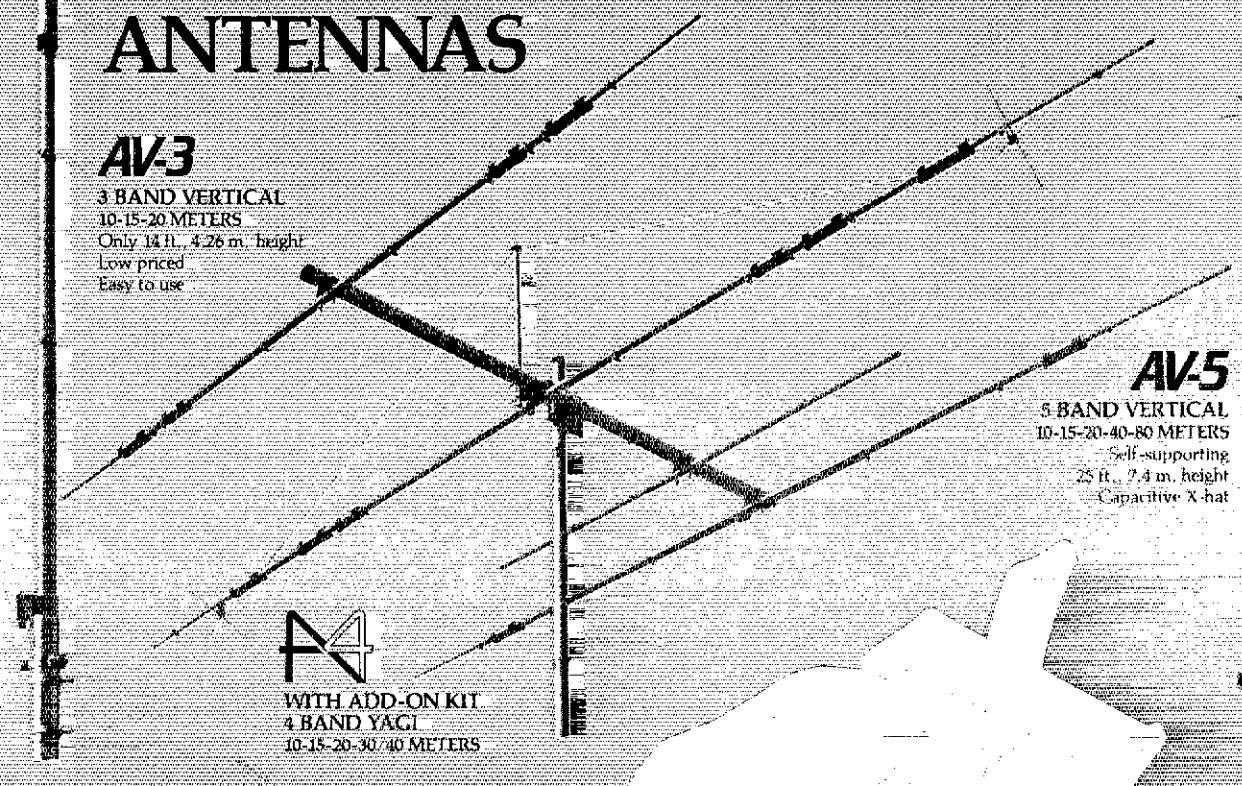
CUSHCRAFT HF MULTIBAND

CONTEST WINNING ANTENNAS



AV-3

3 BAND VERTICAL
10-15-20 METERS
Only 14 ft., 4.26 m. height
Low priced
Easy to use

AV-5

5 BAND VERTICAL
10-15-20-40-80 METERS
Self-supporting
25 ft., 7.4 m. height
Capacitive X-hat

A4

WITH ADD-ON KIT
4 BAND YAGI
10-15-20-30/40 METERS

A3

3 BAND YAGI
10-15-20 METERS

R3

3 BAND VERTICAL
10-15-20 METERS
No radials
Remote tuning
Better than average performance
22 ft., 6.7 m. height

THE CHOICE, A FAVORITE FOR DX-PEDITIONS

The world renowned Cushcraft HF Multiband antennas are chosen time after time for DX-peditions to far corners of the globe. Their excellent gain, outstanding radiation pattern, 2kw power rating, easy assembly, and high strength-clean profile aluminum construction enable the adventurous DX-er to travel further and make more contacts.

For your home QTH, DX-pedition, field day, or contest select a high performance Cushcraft antenna available through dealers worldwide.

A3
Broadband, excellent gain and f/b ratio, 2 kw power rating direct 50 Ω feed. Boom 14 ft., 4.26 m., longest element 28 ft., 8.5 m. weight 27 lbs., 12.9 kg., turn radius 15.5 ft., 4.7 m., mast dia. 1¼ in. to 2 in., 3.18 cm. to 5.08 cm., material 6063-T832 seamless aluminum.

A4
Broadband, excellent gain and f/b ratio, 2 kw power rating, direct 50 Ω feed, boom 18 ft., 5.48 m., longest element 32 ft., 9.7m., weight 37 lbs., 16.8 kg., turn radius 18 ft., 5.48 m., mast dia. 1¼ in. to 2 in., 3.18 to 5.08 cm., material 6063-T832 seamless aluminum.

cushcraft CORPORATION
THE ANTENNA COMPANY
P.O. Box 4680
Manchester, NH 03108 USA
TELEX 953050

TS-130S/V

"Small wonder"...speech processor, N/W switch, IF shift, digital display

The compact, all solid-state HF SSB/CW mobile or fixed station TS-130 Series transceiver covers 3.5 to 29.7 MHz, including the three new bands.

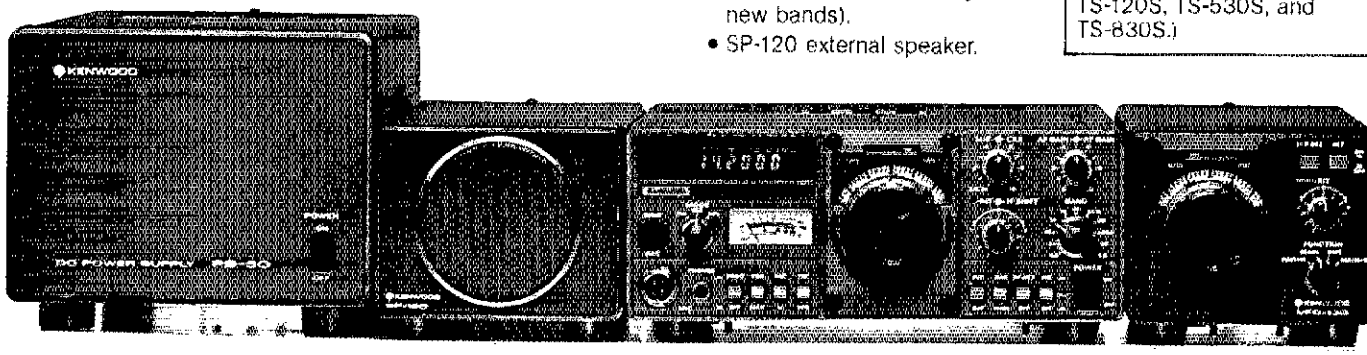
TS-130 SERIES FEATURES:

- 80-10 meters, including the new 10, 18, and 24-MHz bands. Receives WWV.
- TS-130S runs 200 W PEP/160 W DC input on 80-15 meters and 160 W PEP/140 W DC on 12 and 10 meters. TS-130V runs 25 W PEP/20 W DC input on all bands.
- Built-in speech processor.
- Narrow/wide filter selection on both CW (500 Hz or 270 Hz) and SSB (1.8 kHz) with optional filters.
- Automatic selection of sideband mode (LSB on 40 meters and below, and USB on 30 meters and above). SSB REVERSE switch provided.
- Built-in digital display.
- Built-in RF attenuator.
- IF shift (passband tuning).
- Effective noise blanker.

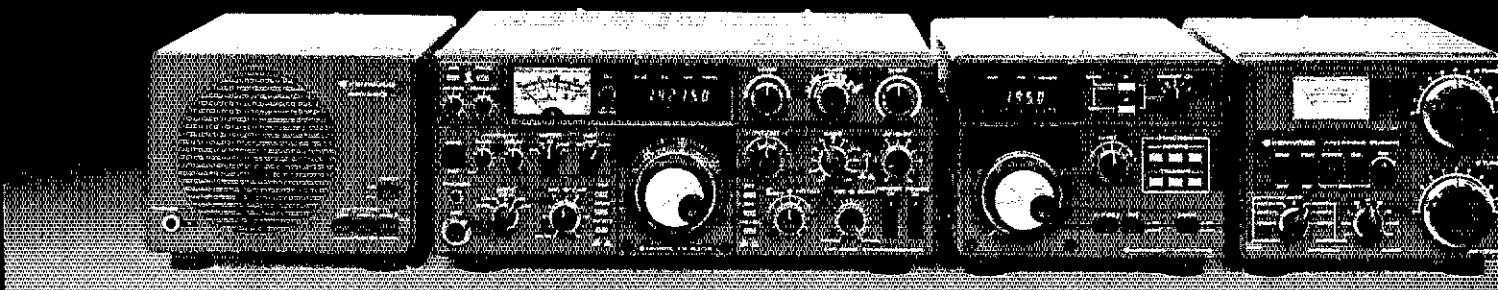
OPTIONAL ACCESSORIES:

- PS-30 base-station power supply.
- YK-88C (500 Hz) or YK-88CN (270 Hz) CW filter.
- YK-88SN (1.8 kHz) narrow SSB filter.
- AT-130 compact antenna tuner (80-10 meters, including three new bands).
- SP-120 external speaker.
- VFO-120 remote VFO.
- MB-100 mobile mounting bracket.
- PS-20 base-station power supply for TS-130V.

Optional DFC-230 Digital Frequency Controller
Frequency control in 20-Hz steps with UP/DOWN microphone (supplied with DFC-2 Four memories and digital display. (Also operates with TS-120S, TS-530S, and TS-830S.)



PS-30 SP-120 TS-130S VFO-120



SP-230 TS-830S VFO-230 AT-230

TS-830S

"Top-notch"... VBT, notch, IF shift, wide dynamic range

The TS-830S has every conceivable operating feature built-in for 160-10 meters (including the three new bands). It combines a high dynamic range with variable bandwidth tuning (VBT), IF shift, and an IF notch filter, as well as very sharp filters in the 455-kHz second IF. Its optional VFO-230 remote digital VFO provides five memories.

TS-830S FEATURES:

- LSB, USB, and CW on 160-10 meters, including the new 10, 18, and 24-MHz bands. Receives WWV.
- Wide receiver dynamic range: Junction FETs in the balanced mixer, MOSFET RF amplifier at low level, and dual resonator for each band.
- Variable bandwidth tuning (VBT). Varies IF filter passband width.
- Notch filter (high-Q active circuit in 455-kHz second IF.
- IF shift (passband tuning).
- Built-in digital display (six digits, fluorescent tubes), analog dial, and display hold (DH) switch.
- Noise-blanker threshold level control.
- 6146B final with RF negative feedback. Runs 220 W PEP (SSB)/180 W DC (CW) input on all bands.
- Built-in RF speech processor.
- Narrow/wide filter selection on CW.
- SSB monitor circuit to check transmitted audio quality.
- RIT (receiver incremental tuning) and XIT (transmitter incremental tuning).

OPTIONAL ACCESSORIES:

- SP-230 external speaker w selectable audio filters.
- VFO-230 external digital V with 20-Hz steps, five memories, digital display.
- AT-230 antenna tuner/SWR and power meter/antenna switch 160-10 meters, including three new bands
- YG-455C (500 Hz) or YG-455CN (250 Hz) CW filter for 455 kHz IF.
- YK-88C (500 Hz) or YK-88CN (270 Hz) CW filte for 8.83 MHz IF.
- KB-1 deluxe heavyweight k
- (VFOs for TS-830S, TS-530 TS-130 Series, and TS-120S are compatible with all fou series of transceivers.)

KENWOOD

TRIO-KENWOOD COMMUNICATIONS
1111 West Walnut, Compton, California 90220

TR-2500

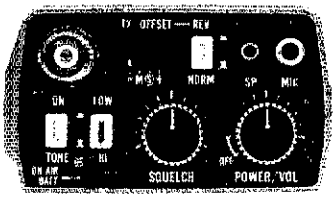
BIG performance, small size, smaller price!

The TR-2500 is a compact 2 meter FM handheld transceiver featuring an LCD readout, 10 channel memory, lithium battery memory back-up, memory scan, programmable automatic band-scan, Hi/Lo power switch and built-in sub-tone encoder.

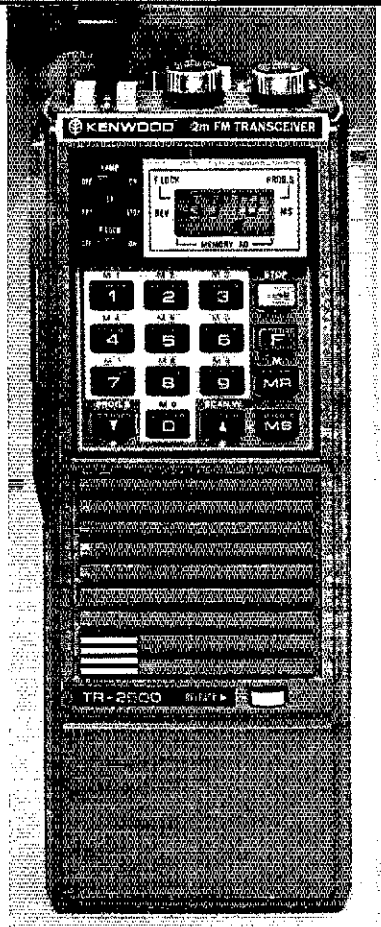
TR-2500 FEATURES:

- Extremely compact size and light weight 66 (2-5/8) W x 168 (6-5/8) H x 40 (1-5/8) D, mm (inches), 540 g, (1.2 lbs) with Ni-Cd pack.
- LCD digital frequency readout, with memory channel and function indication.
- Ten channel memory, includes "M0" memory for non-standard split frequencies.
- Lithium battery memory back-up, built-in, (estimated 5 year life) saves memory when Ni-Cd pack discharged.
- Memory scan, stops on busy channels, skips channels in which no data is stored.
- UP/DOWN manual scan in 5 KHz steps.
- Repeater reverse operation.

CONVENIENT TOP CONTROLS



- 2.5 W or 300 mW RF output. (HI/LOW power switch.)
- Programmable automatic band scan allows upper and lower frequency limits and scan steps of 5 KHz and larger (5, 10, 15, 20, 30 KHz... etc) to be programmed.
- Built-in tuneable (with variable resistor) sub-tone encoder.
- Built-in 16 key autopatch encoder.
- Slide-lock battery pack.
- Keyboard frequency selection across full range.
- Extended frequency coverage: 143.900 to 148.995 MHz in 5 KHz steps.
- Optional power source, MS-1 mobile or ST-2 AC charger/ power supply allows operation while charging. (Automatic drop-in connections.)
- High impact plastic case.
- Battery status indicator.
- Two lock switches for keyboard and transmit.



STANDARD ACCESSORIES:

- Flexible rubberized antenna with BNC connector.
- 400 mAH heavy-duty Ni-Cd battery pack.
- AC charger.

OPTIONAL ACCESSORIES:

- ST-2 Base station power supply and quick charger (approx. 1 hr.).
- MS-1 13.8 VDC mobile stand/ charger/power supply.
- TU-1 Programmable "DIP switch" (CTCSS) encoder.
- SMC-25 Speaker microphone.
- LH-2 Deluxe top grain cowhide leather case.
- PB-25 Extra Ni-Cd battery pack, 400 mAH, heavy-duty.
- BT-1 Battery case for AA manganese or alkaline cells (not Ni-Cd).
- VB-2530 RF power amplifier.
- BH-2 Belt hook.
- WS-1 Wrist strap.
- EP-1 Earphone.

TR-7850

40 W, 15 memories/offset recall, scan, priority, autopatch (DTMF)

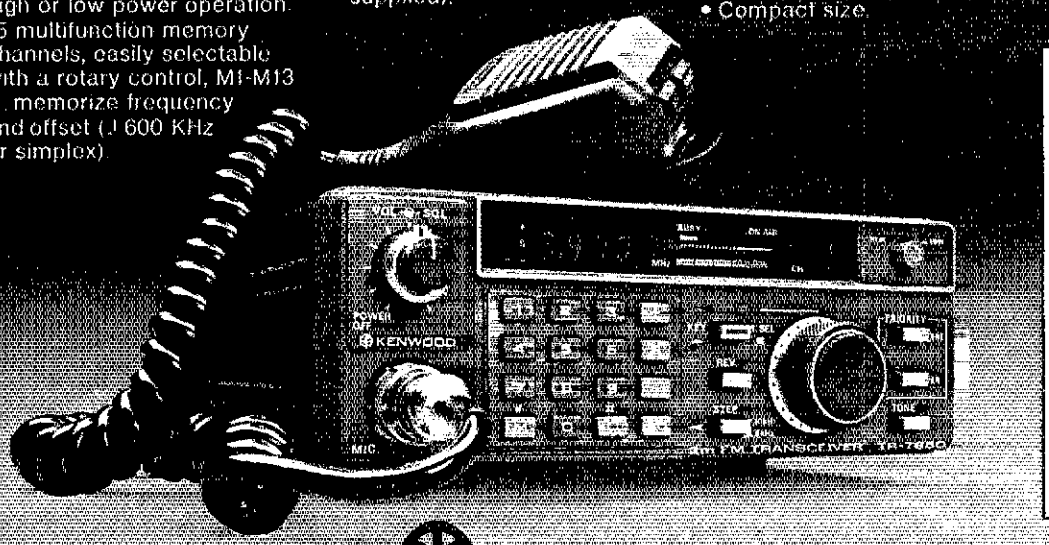
Kenwood's remarkable TR-7850 2-meter FM mobile transceiver provides all the features you could desire, including a powerful 40 watts output. A 25 watt version, the TR-7800 is also available.

TR-7850 FEATURES:

- 40 watts output, with selectable high or low power operation.
- 15 multifunction memory channels, easily selectable with a rotary control, M1-M13 ... memorize frequency and offset (±600 KHz or simplex).
- M14 ... memorize transmit and receive frequencies independently for non-standard offset. M0 ... priority channel, with simplex, ±600 KHz or non-standard offset operation.
- Internal battery back-up for memories. Requires four AA Ni-Cd batteries, (not supplied).
- Extended frequency coverage, 143.900 148.995 MHz in 5 or 10 KHz steps.
- Priority alert. Beep alerts operator when signal appears on priority channel.
- Built-in autopatch encoder (DTMF). All 12 plus four additional DTMF signaling tones. (With simultaneous push of REV switch.)
- Autoscan of memories and entire band. Scan resumes automatically.
- Front panel keyboard.
- Compact size.
- UP/DOWN manual scan of entire band and memories, using UP/DOWN microphone (supplied).
- Repeater reverse switch.
- Separate digital displays for frequency and memory channel.
- LED S/RF bar meter.
- Tone switch.

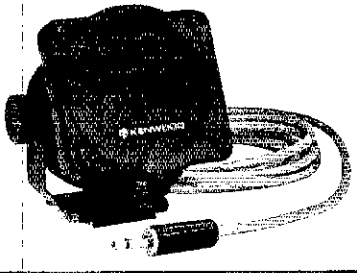
Matching accessories for fixed station operation:

- KPS-12 power supply (for TR-7850)
- KPS-7 power supply (for TR-7800)



SP-40

Compact mobile speaker
Only 2-11/16 W x 2-1/2 H x 2-1/8 D (inches)
Handles 3 watts of audio



TRIO-KENWOOD COMMUNICATIONS
1111 West Walnut, Compton, California 90220

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PAUL GRAUER, WØFIR, Box 190, Wilson, KS 67490 (913-658-2155)

Vice Director: Claire Richard Dyas, WØJCP 2933 Dudley St., Lincoln, NE 68503 (402-476-2438)

New England Division

JOHN C. SULLIVAN, W1HHR, Whitney Rd., Columbia, CT 06237 (203-228-9111)

Vice Director: Richard P. Beebe, K1PAD, 6 Tracy Circle, Billerica, MA 01821

Northwestern Division

MARY E. LEWIS, W7OGP, 10352 Sandpoint Way, N.E., Seattle, WA 98125 (206-523-9117)

Vice Director: Mel C. Ellis, K7AOZ, S. 4302 Altamont, Spokane, WA 99203 (509-448-0595)

Pacific Division

WILLIAM J. STEVENS,* W6ZM, 2074 Foxworthy Ave., San Jose, CA 95124 (408-371-3819)

Vice Director: Jettie B. Hill, W6RFF, 22410 Janice Ave., Cupertino, CA 95014

Roanoke Division

GAY E. MILIUS, JR., W4UG, 1416 Rutland Dr., Virginia Beach, VA 23454 (804-481-5095)

Vice Director: John C. Kanode, N4MM, RFD 1, Box 73-A, Boyce, VA 22620 (703-837-1340)

Rocky Mountain Division

LYS J. CAREY, KØPGM, 13495 West Center Dr., Lakewood, CO 80228 (303-986-5420)

Vice Director: Marshall Quiat, AGØX, 1624 Market St., Suite 200, Denver, CO 80202 (303-333-0819)

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FRANK M. BUTLER JR., W4RH, 323 Elliott Rd. S.E., Fort Walton Beach, FL 32548 (904-244-5425)

Vice Director: Mrs. Evelyn Gauzens, W4WYR, 2780 N.W. 3rd St., Miami, FL 33125 (305-642-4139)

Southwestern Division

JAY A. HOLLADAY, W6EJJ, 5128 Jessen Dr., La Canada, CA 91011 (213-790-1725)

Vice Director: Peter F. Matthews, WB6UIA, 3403 S. Walker Ave., San Pedro, CA 90731 (213-547-5816)

West Gulf Division

RAYMOND B. WANGLER, W5EDZ, 642 Beryl Dr., San Antonio, TX 78213 (512-733-9632 home, 512-684-5111 business)

Vice Director: Thomas W. Comstock, N5TC, 1700 Dominik, College Station, TX 77840 (713-693-1181)

*Executive Committee Member

Section Communications Managers of the ARRL

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Alberta — E. Roy Ellis, VE6XC, P. O. Box 2, RR 1, Fort Saskatchewan T8L 2N7
British Columbia — H. E. Savage, VE7FB, 4553 West 12th Ave., Vancouver V6R 2R4 (604-224-5226)
Manitoba — Peter Guenther, VE4PG, Box 178, Morris R0G 1K0 (204-746-2218)
Maritime-Nfld — Donald R. Welling, VE1WF, 36 Sherwood Dr., St. John, NB E2J 3H6 (506-696-2913)
Ontario — L. P. Thivierge, VE3GT, 34 Bruce St. W., Renfrew K7V 3W1 (613-432-5967)
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Saskatchewan — W. C. "Bill" Munday, VE5WM, 132 Shannon Rd., Regina S4S 5B1 (306-586-4963)

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Southern New Jersey — William C. Luebkemann, Jr., WB2LCC, 116 Country Farms Rd., Marlton 08053 (609-983-8844)
Western New York — William Thompson, W2MTA, RD 1 Rock Rd., Newark Valley, 13811 (607-642-8930)
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Indiana — Bruce Woodward, W9UMH, 6208 Bramshaw Rd., Indianapolis 46220 (317-251-5606)
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Dakota Division

Minnesota — Helen Haynes, WBØHOX, 3101 N.W. 18th Ave., Rochester 55901 (507-288-2437)
North Dakota — Lois A. Jorgensen, WAØRWM, Box 55, Abercrombie 58001 (701-553-8724)
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Mississippi — Paul C. Kemp, WB5SNB, 3581 Beaumont Dr., Pearl 39208 (601-939-7612)
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Ohio — Allan L. Severson, AB8P, 1275 Ethel Ave., Lakewood 44107 (216-521-1565)

Hudson Division

Eastern New York — Paul S. Vydareny, WB2VUK, 259 N. Washington, North Tarrytown 10591 (914-631-7424)
N.Y.C. & Long Island — John H. Smale, K2IZ, 315 Kensington Ct., Copiague 11726 (516-226-4835)
Northern New Jersey — Robert E. Neukomm, KB2WI, 404 O'Brien Ct., Wyckoff 07481 (201-891-3064)

Midwest Division

Iowa — Bob McCaffrey, KØCY, 3913-29th St., Des Moines 50310 (515-279-9848)
Kansas — Robert M. Summers, KØBXF, 3045 North 72nd, Kansas City 66109 (913-299-1128)
Missouri — Larry G. Wilson, KØRWL, 5415 E. 97th St., Kansas City 64137 (816-966-8953)
Nebraska — Shirley M. Rice, KAØBCB, 510 East 16th St., Scottsbluff 69361 (308-632-4337)

New England Division

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Eastern Massachusetts — Richard P. Beebe, K1PAD, 6 Tracy Cir., Billerica 01821 (617-667-5609)
Maine — Clevis O. Laverty, W1RWG, 17 Fair St., Norway 04268 (207-743-2353)
New Hampshire — Robert Mitchell, W1SWX/W1NH, Box 137-A, Chester 03036 (603-895-3456)
Rhode Island — Gordon F. Fox, W1YNE, 13 York Dr., Coventry 02816 (401-828-6045)
Vermont — Robert L. Scott, W1RNA, 9 Large St., Swanton 05488 (802-868-4944)
Western Massachusetts — William Hall, W1JP, Prospect Hill Rd., Brimfield 01010 (413-245-7140)

Northwestern Division

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Idaho — Lemuel H. Allen, Jr., W7JMH, 1800 S. Atlantic St., Boise 83705 (208-343-9153)
Montana — L. C. "Les" Belyea, N7AIK, P. O. Box 327, Belgrade 59714 (406-388-4253)
Oregon — William R. Shrader, W7QMU, 2042 Jasmine Ave., Medford, 97501 (503-773-8624)
Washington — Joseph N. Winter, WA7RWK, 819 N. Mullen St., Tacoma 98406 (206-759-9857)

Pacific Division

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Nevada — Ralph E. Covington, Sr., W7SK, P. O. Box 7750, Reno 89510 (702-322-7988)
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San Francisco — Robert Odell Smith, NA6T, 320 Park St-P.O. Box 1425, Fort Bragg, CA 95437 (707-964-4931)
San Joaquin Valley — Charles P. McConnell, W6DPD, 1658 W. Mesa Ave., Fresno, CA 93711 (209-431-2038)
Santa Clara Valley — Jettie B. Hill, W6RFF, 22410 Janice Ave., Cupertino, CA 95014 (408-255-6714)

Roanoke Division

North Carolina — Ian C. Black, WD4CNR, Rte. 5, Box 79, Murphy, 28906 (704-837-5684)
South Carolina — Richard McAbee, W4MTK, 205 Jewel St. N.W., New Ellenton 29809 (803-652-2596)
Virginia — Byron C. "Luck" Hurder, WA4STO, Box 167, Seven Fountains 22653
West Virginia — Karl S. Thompson, K8KT, 5303 Pioneer Dr., Charleston 25312 (304-776-4352)

Rocky Mountain Division

Colorado — Lawrence E. Steimel, WØACD, 1750 Roslyn St., Denver 80220
New Mexico — Joe Knight, W5PDY, 10408 Snow Heights Blvd., N.E., Albuquerque 87112
Utah — Leonard M. Norman, W7PBV, 933 South Cedar Knolls, Cedar City 84720 (801-586-9859)
Wyoming — Richard G. Wunder, WA7WFC, Box 2807, Cheyenne 82001 (307-634-7365)

Southeastern Division

Alabama — Hubert H. Wheeler, W4IBU, 2100 Buckingham, Huntsville 35803 (205-881-9168)
Georgia — Edmund J. Kosobucki, K4JNL, 5525 Perry Ave., Columbus 31904 (404-322-2856)
Northern Florida — Billy F. Williams, Jr., N4UF, 911 Rio St. Johns Dr., Jacksonville 32211 (904-744-9501)
Southern Florida — Woodrow Huddleston, K4SCL, 219 Driftwood Ln., Largo 33540 (813-584-0984)
West Indies — Julio Negroni, KP4CV, Georgetown, No. 269, Rio Piedras, PR 00927 (809-764-8099)

Southwestern Division

Arizona — Erich Holzer, N7EH, 3526 E. March Pl., Tucson 85713 (602-326-8976)
Los Angeles — Stanley S. Broki, N2YQ, 2645 North Marengo Ave., Altadena, CA 91001 (213-798-8827)
Orange — Fred Heyn, WA6WZO, 962 Cheyenne, Costa Mesa, CA 92626 (714-549-8516)
San Diego — Arthur R. Smith, W6INI, 4515 Melisa Way, San Diego, CA 92117 (714-273-1120)
Santa Barbara — Robert N. Dyruff, W6POU, 1188 Summit Rd., Santa Barbara, CA 93108 (805-969-3073)

West Gulf Division

Northern Texas — Phil Clements, K5PC, 1313 Applegate Ln., Lewisville 75067 (214-221-2222)
Oklahoma — Leonard R. Hollar, WA5FSN, RFD 1, 710 South Tenth St., Kingfisher 73750 (405-375-4411)
Southern Texas — Arthur R. Ross, W5KR, 132 Sally Ln., Brownsville 78521 (512-831-4458)

THE AMERICAN
RADIO RELAY
LEAGUE, INC.

"It Seems to Us..."

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 worthwhile 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.

A New Strain of RFI Virus

Amateurs and other users of the radio spectrum have become victims of a new strain of RFI virus — CATVI, cable television interference. And, FCC antigens have been rendered ineffectual in combatting it. It seems that with every turn made by the home-entertainment industry to meet the omnipresent demand for its goods and services, infringement of the rights of radio amateurs is a pronounced side effect. We saw it in the 1950s, and are seeing it again today in the form of CATVI.

On paper, cable systems are nonbroadcast facilities; that is, *off-air* carriers of television programming contained within their pathways, *closed* to the outside rf environment. By this definition, then, the decision of which frequencies to utilize in the system becomes purely one of economics — the configuration that yields the least costly means of distribution will be chosen. No other factors need be considered. Channel arrangements are generated within industry boundaries with minimal government intervention, and often include amateur frequencies.

In the field, however, the situation is wholly different. Many cable plants are leaking rf at these amateur frequencies, most notably in the highly populated vhf bands, in violation of FCC leakage standards. These same systems also allow ingress of amateur signals. The result? Harmful interference — inflicted upon amateurs in their lawful operations, and upon hapless CATV consumers who suffer degradation of TV picture quality. And when complaints are registered, many cable companies promulgate the myth that the amateur is at fault! The paradox is that the responsibility actually lies with the company etself.

The problems exist because (1) eur is at fault! The paradox is that the responsibility actually lies with the company itself.

The problems exist because (1) cable plants use poorly shielded components, and fail to maintain equipment properly, (2) CATV operations occur at amateur frequencies and (3) FCC is in the throes of a fiscal crisis by the hand of the current Administration, willing but unable to enforce its rules effectively to curb irresponsible CATV operating practices. The problems are exacerbated by the close geographic proximity of the amateur and cable services — both are inherently residential, so colocation is unavoidable.

With the diagnosis in hand, it is time for treatments. Responding to many requests from members around the country, the ARRL Executive Committee directed the staff to prepare and file a petition with FCC to effect removal of cable operation from amateur frequencies.

The League is also filing comments in opposition to a Commission proposal to relax allowable leakage standards. Such a proposal, if adopted, would simply serve notice that FCC and spectrum occupants will tolerate poor CATV operating practices. ARRL offered support in the portion of the proceeding that called for FCC retention of authority to terminate cable system operation should harmful interference occur.

Cooperation with industry representatives is an important objective. Municipalities must be advised to adopt franchise agreement covenants to help resolve CATVI matters at the local level. With effective treatments, the prognosis is positive.

Amateur Radio needs your help. On page 11 of this issue, you will find an article that provides a good background in the technical and operating facets of cable systems; a special edition of "Washington Mailbox" (page 13) covers the regulatory angle. Your participation is hereby solicited; please direct any input you may have to the CATVI desk here at ARRL Hq.

The solution is for cable industrialists to become responsible members of the community by adopting the philosophy that sound engineering practice is more than simply a cost of doing business. Until such time as this occurs, our only recourse is to see that cable television operation is banished from our bands, and that our rights as radio amateurs are restored. — *Richard Palm, K1CE*

League Lines...

Although amateurs in some countries now have 10-MHz privileges, U.S. amateurs do not, despite efforts by the League. As discussed in last month's League Lines, our government is still implementing the WARC-79 Final Acts. Monitor W1AW for further 10-MHz news. U.S. amateurs are cautioned against any operation that would bring discredit to the amateur service.

If you are planning a DXpedition or vacation to a foreign country this spring or summer, please send Hq. your request for information as early as possible. Normally, applications for reciprocal operating permits are made through the mails, and directly with the telecommunications authority in the host country. Processing times vary from two to six months! Mail your request for information and forms to the Membership Services Department, specifying the countries you'll be visiting. Remember that Canada and the U.S. now hold an "open" agreement so that reciprocal operating privileges are automatic; no written permission is required (but keep your original license with you).

A new tape of radio public service announcements is now available from Hq. The PSA features seven spots by well-known personalities Gary Owens, Bill Bixby, Lorne Green and Dick Van Dyke. Send your request to ARRL Office of Public Information.

ARRL has filed comments in opposition to an FCC proposal to relax leakage standards for cable television systems in Docket 21006. Additionally, a League petition for rulemaking requesting removal of cable TV operation from amateur frequencies will be filed with the Commission shortly. In response to continuing complaints of interference from cable operations, a CATVI desk has been established; please direct any correspondence to Rick Palm, K1CE, at Hq. Details on the League's actions will appear in next month's "Happenings."

The Club & Training Department has an immediate opening for a Training Assistant. Beyond routine correspondence, responsibilities include assisting in the preparation of training materials, contributions to Instructor's Newsletter and some typing. An Amateur Radio license is required. Contact Steve Pink, KF1Y, at Hq.

The new "ARRL Program For The Disabled" booklet is now available. The booklet describes sources of Amateur Radio materials in other-than-printed forms, and lists various services and organizations of interest to the handicapped. Please send a 9" x 12" s.a.s.e. (88¢ postage) along with your request to the Special Request Department, ARRL Hq., 225 Main St., Newington CT 06111.

DXCC Note. By action of the ARRL Executive Committee, the January 1 cutoff date for receipt of confirmations of cross-mode contacts for single-mode DXCC awards has been suspended pending Board review at the annual meeting in March. All such contacts must be dated prior to October 1, 1981.

When Congress ended its first session late in December, the bills affecting Amateur Radio were still stacked up in the House Subcommittee on Telecommunications, Consumer Protection and Finance. Capitol Hill will resume its activity late in January. Another round of letters from ARRL members to their Representatives in the two weeks following receipt of this QST could turn the tide. The letters should express support for HR-5008, the Wirth/Swift "Communications Technical Amendments Act", but ask for its amendment to include the RFI standards and Section 605/Secrecy language of Senator Goldwater's bill S-929. Letters from ARRL members in the 22nd and 24th Districts of California; 2nd, Colorado; 7th, Illinois; 2nd, Iowa; 3rd, Louisiana; 7th, Massachusetts; 16th, Michigan; 12th, New Jersey; 11th, New York; 10th, North Carolina; 2nd and 23rd, Ohio; 24th, Pennsylvania; 3rd, Texas; 3rd Virginia and 2nd, Washington will be particularly helpful since these Representatives serve on the Subcommittee.

The ARRL Foundation is now accepting applications for scholarships. For information and scholarship applications, write ARRL Foundation Secretary Andrea T. Parker, K1WLX, 225 Main St., Newington, CT 06111.

ARRL Offices will be closed this year on the following dates: Monday, February 15; Friday, April 9; Monday, May 31; Monday, July 5; Monday, September 6; Thursday, November 25; Friday, November 26; and Friday, December 24. Tours of ARRL Headquarters are given Monday through Friday, 9 A.M. to 11 A.M. and 1 P.M. to 4 P.M.

Entertainment and Interference: The Two Faces of CATV

Heard any good TV on 2 meters lately? Are the neighbors watching your transmissions? Here are the ins and outs of cable television.

By Robert V. C. Dickinson,* W2CCE

Cable television (CATV) was known originally as "community antenna television." Today it represents the broad area of entertainment and other services carried over coaxial cable networks to various subscribers. As implied by the name, the original purpose of CATV was to serve communities with entertainment television service where TV reception was poor. The idea was to find one good receiving site, pick up signals from local and distant TV transmitters, and relay these signals by way of coaxial cable to residents of the community. This concept was applied widely, and many people enjoyed satisfactory TV reception through these systems.

In the early days a few channels were distributed within the vhf band. The limit was generally the 12-channel capacity of the standard vhf television receiver. Many 12-channel cable systems are still in operation. Cable television has not always been an economic success. Therefore, in recent years, systems have been enlarged to carry many more channels with particular emphasis on premium entertainment services such as Home Box Office and Show Time.

Today, sophisticated CATV installations offer high capacity and quality in essentially closed communication systems. A wide variety of quality equipment is available from a number of manufacturers to construct the systems and implement the services. CATV systems serve mainly residential subscribers; they are installed on a franchise basis in each community. There are nearly 20 million cable homes across the United States. Cable TV systems have also proved popular in Canada. Large CATV installations can be found in various other countries around the world.

Many of the recent franchise requirements have called for increasingly sophisticated systems with high capacity and interactive services. In order to better understand the relationship of the amateur operator to CATV, we will look at a typical system. We will then look at the possibilities of interference to and from Amateur Radio.

Typical CATV System

A typical cable television network is illustrated in Fig. 1. This simplified drawing illustrates the principles of CATV. At the headend, off-air television signals are received and processed. The processing involves filtering to eliminate out-of-band signals, adjustment of the sound carrier level (which is regulated by the FCC to be 15 ±2 dB below the video carrier), and frequency translations as required to carry a uhf signal in the vhf band. In addition to the off-air signals, satellite receiving stations are often used to pick up the satellite premium entertainment packages. More than 30 of these packages are now available. Additional program material may include local originations plus information channels using alphanumerics, graphics and the like.

At the headend the signals are properly processed and formatted; all signals are then combined and broadcast throughout the CATV system to the subscribers. From the humble beginning of 12 channels, CATV formats have gone to 20, 26, 30, 36 and now as high as 55 channels. CATV systems with more than 12 channels employ "converters" to expand the subscriber TV set capacity. These converters are merely tuners that can select any channel in the system and convert it to a single TV channel. Converter output is usually on channel 3 or 4. Fm broadcasts may also be carried, often in the standard 88- to 108-MHz fm band.

Once inside the coaxial cable, the signals are routed throughout the community. Obviously, there are losses where the signals are split in power dividers as well as losses in the cable itself. The cable losses are greater at higher frequencies. Tilt equalizers are used to attenuate the low-frequency end, restoring a flat response; amplifiers then restore the operating levels.

The main distribution path of the cable

*E-Com Corp., 320 Essex St., Stirling, NJ 07980

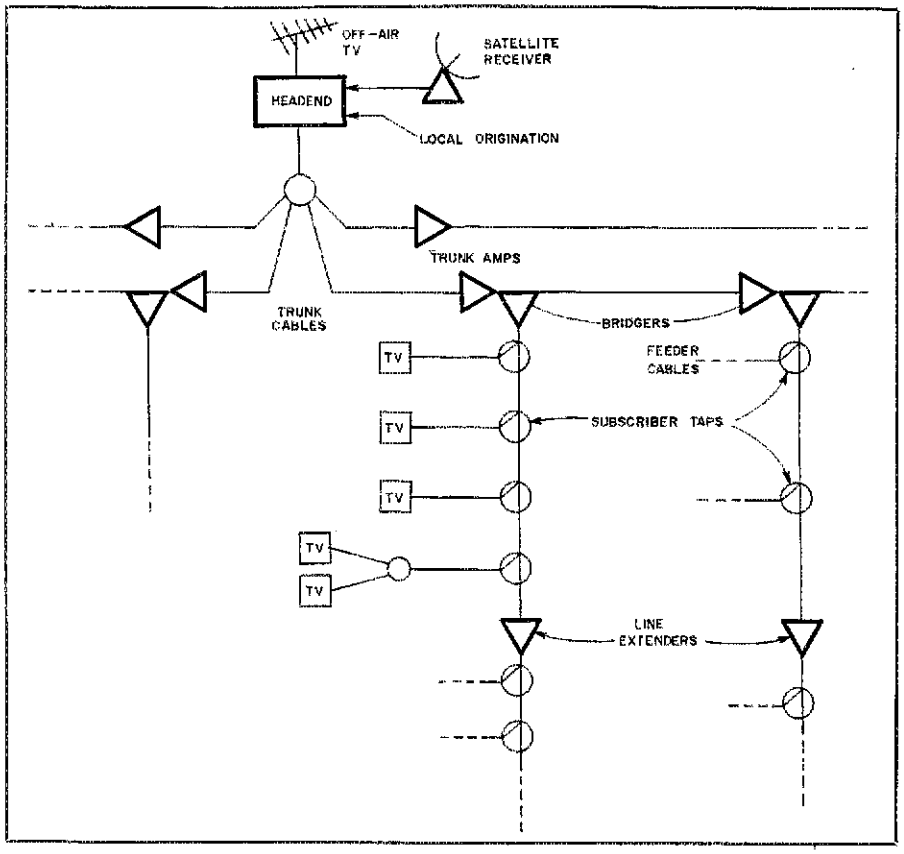


Fig. 1 — A typical CATV installation consists of the headend, trunk and distribution systems. Cable signals originate at the headend. The trunk system carries the signals to the various parts of the service area. Individual subscribers receive their signals from the distribution system.

network is known as the trunk system. A trunk system carries the signals to the various areas of the community but does not feed subscribers directly. Trunk amplifiers are appropriately placed to make up for cable or system losses and to maintain the signal quality. Normally, signals for distribution to subscribers are extracted by power division and reamplification. This is accomplished by bridger amplifiers that are located inside the same housing as the trunk amplifiers.

The bridgers feed the distribution system, which is tapped with passive directional couplers to supply the subscriber drops. At the point where the losses in a distribution leg reduce the signal to a predetermined level, distribution amplifiers commonly known as line extenders are added. The CATV trunk system may extend for many miles and employ dozens of amplifiers. The distribution system, on the other hand, seldom uses more than two or three line extenders in any leg. The line extenders are operated at levels 10 to 20 dB above the trunk amplifiers. Transmission of analog signals, such as television, requires that signal levels be run as high as possible to obtain the best carrier-to-noise ratio. The limiting factor on the level is the distortion in the broadband amplifiers. There is a noise contribution by each amplifier so that the noise floor increases as the number of cascaded amplifiers increases. The levels of operation along the trunk system are such that the distortion buildup and the noise buildup both become objectionable with about the same number of amplifiers in series. This obviously is the maximum useful system length. In the distribution system, high-quality signals are delivered by the trunk. The line extenders can be run at higher levels than the trunk since very few series line extenders are employed. Higher levels allow feeding more customers per amplifier and hence have economic advantages.

There are many different cables available for CATV, all having a 75-ohm characteristic impedance. The trunk and distribution cables have solid aluminum outer conductors; they range from less than 1/2 inch[1] to approximately 1 inch in diameter. This choice allows the system designer to optimize performance and cost. The final feed to the subscriber generally uses RG-59/U or RG-6/U flexible cable, supplied usually with several layers of shielding. The shielding may be braid or foil, or various combinations of the two.

One of the greatest achievements of cable television technology is the ability to amplify a broad band of frequencies. A 36-channel system generally occupies the frequency range of 54 to 300 MHz; 55-channel systems range from roughly 54 to 440 MHz. CATV amplifiers are able to amplify this spectrum with very low ripple in the response. Many semiconductor developments have contributed to this. The most important is probably the development of hybrid amplifier modules.

It is important to be aware of the levels at which signals are carried on the cable system. In CATV a new unit of measure has been established. This is the *dBmV*, which is the voltage level in decibels referenced to 1 millivolt across 75 ohms. (Since the impedance is fixed, this also represents a reference power level.) The signal arriving at the subscriber TV set is required by the FCC to be equal to or greater than 0 dBmV. This equals -48.75 dBm, where 0 dBm is equal to 1 mW. The TV signal carrier level arriving at the customer set, therefore, is in the range of 0.013 microwatt to a little less than 1 microwatt — not very much power. It is possible to see in a TV picture interfering signals that are as much as 65 dB below the visual carrier level. Minus 65 dBmV is approximately 4×10^{-15} watts or 4×10^{-9} microwatts — an exceedingly small power level. The level of a TV signal at the output of a bridger amplifier or line extender is in the range of +38 dBmV to perhaps +50 dBmV, and that at the output of a trunk amplifier in the order of +30 dBmV. The point of this is that CATV works on low power levels, particularly when compared with transmitters running 1000 watts (+60 dBm or +108.75 dBmV). Gain antennas concentrate power and can further compound the situation.

CATV Channels

When off-air signals are carried on the broadcast frequencies, interference from or to an amateur station is generally not experienced. The frequency relationship of amateur signals to the CATV channels are the same as those to the off-air channels so that any disturbances are generally caused by harmonics or overloads. Because of the shielded system this does not usually occur. When the CATV coverage is virtually continuous from 50 to 300 or 450 MHz, a number of amateur frequencies are utilized inside the cable. It is helpful to know the frequency locations used on the cable system. Table 1 shows three commonly used channelization plans. A channelization plan is selected by the cable operator.

The plan of channelization designated as "standard" is based on the standard broadcast frequencies of the low and high vhf channels and is very commonly used. Even the small amount of harmonic and intermodulation distortion in a CATV amplifier causes products to occur at the sum and difference frequencies of the various signals. In the standard plan these distortion products often fall at frequencies that cause visible interference to the

[1]mm = in. × 25.4

Cable Television Regulations

Conducted By Richard K. Palm,* K1CE

The preceding article presents a tutorial on the technical and operating facets of cable television (CATV) as well as a discussion on systems' interference potential. This special edition of "Washington Mailbox" covers the matter of federal intervention in these areas.

As with the Amateur Radio Service, the Cable Television Service is regulated in this country by the Federal Communications Commission. The FCC is the government agency charged with the task of rulemaking in the CATV service and enforcement of the standards and regulations applicable to systems operation. As the familiar Part 97 affects amateurs, it is Part 76 of the Commission's rules that concerns cable system operators.

Q. How is cable TV defined by the Commission?

A. FCC defines a cable plant as follows:

> Cable Television System. A nonbroadcast facility consisting of a set of transmission paths and associated signal generation, reception and control equipment, under common ownership and control, that distributes or is designed to distribute to subscribers the signals of one or more television broadcast stations, but such term shall not include (1) any such facility that serves fewer than 50 subscribers, or (2) any such facility that serves or will serve only subscribers in one or more multiple unit dwellings under common ownership, control or management.

Key words include *nonbroadcast facility*; e.g., cable systems do not broadcast programming to subscribers. Programming is distributed by a closed system of cables and associated equipment — pathways which, by definition, do not utilize the airwaves.

The purpose of Part 76 is detailed in Section 76.1:

> The rules and regulations set forth in this part provide for the certification of cable television systems and for their operation in conformity with standards for carriage of television broadcast signals, program exclusivity, cablecasting, access channels and related matters.

Q. What is the substance of Part 76?

A. Subpart A provides the aforementioned purpose of the rules as well as a reference to applicable rules contained in other Parts. Definitions of key terms, information on special relief petitions and discussions of enforcement actions are also included in Subpart A.

Other subparts are concerned with registration and certification, federal-state/local regulatory relationships, carriage of TV broadcast signals in various market situations, nonduplication protection and syndicated exclusivity, cablecasting, diversification of control, forms and reports, technical standards and operation requirements. While discussion of most of these areas is beyond the scope of this treatise, subpart K, the technical standards portion, is of interest to amateurs in the matters of CATVI.

Q. What are the technical standards?

A. Just as amateurs are required to ensure that their operations meet certain technical standards, cable system operators must also comply with similar federally imposed standards.

The frequency boundaries for CATV channels are found in Section 76.605(a)(1) and generally conform to television (broadcast service) channel arrangements. However, other configurations may be approved by the Commission.

The limits for allowable radiation from a cable system are contained in Section 76.605(a)(12) of the rules:

Frequencies	*Radiation Limit (μv/m)*	*Distance*
Up to and including 54 MHz	15	100
Over 54 up to and including 216 MHz	20	10
Over 216 MHz	15	100

The rules also provide for the method of measurement of these parameters.

Section 76.609:

> (h) Measurements to determine the field strength of radio frequency energy radiated by cable television systems shall be made in accordance with standard engineering procedures. Measurements made on frequencies above 25 MHz shall include the following:
>
> (1) A field strength meter of adequate accuracy using a horizontal dipole antenna shall be employed.
>
> (2) Field strength shall be expressed in terms of the rms value of synchronizing peak for each cable television channel for which radiation can be measured.
>
> (3) The dipole antenna shall be placed 10 feet above the ground and positioned directly below the system components. Where such placement results in a separation of less than 10 feet between the center of the dipole antenna and the system components, the dipole shall be repositioned to provide a separation of 10 feet.
>
> (4) The horizontal dipole antenna shall be rotated about a vertical axis and the maximum meter reading shall be used.
>
> (5) Measurements shall be made where other conductors are 10 or more feet away from the measuring antenna.

Q. What are the rules pertaining to interference?

A. Section 76.613 regulates interference from cable television systems. Paragraph (a) defines harmful interference as "any emission, radiation or induction which endangers the functioning of a radionavigation service or of other safety services or seriously degrades, obstructs or repeatedly interrupts a radiocommunication service operating in accordance with this chapter."

Of critical significance as far as amateurs experiencing CATVI are concerned is paragraph (b):

> *(b) The operator of a cable television system that causes harmful interference shall promptly take appropriate measures to eliminate the harmful interference.*

Paragraph (c) provides authority to an FCC engineer-in-charge (EIC) for the suspension of a cable system operation should harmful interference to radiocommunication involving the safety of life and protection of property not be promptly eliminated by the application of suitable techniques. Paragraph (d) states that "The cable television system operator may be required by the EIC to prepare and submit a report regarding the cause(s) of the interference, corrective measures planned or taken and the efficacy of the remedial measures."

Q. What should I do if I experience CATVI?

A. The first step is to determine the origin of the interfering signals: Where is the leak? Then, write a letter to the system operator outlining the problem and the steps you have taken thus far, and reminding him of his obligation under the rules to clean up the interference. Try to seek out someone within the company who has the technical background necessary to deal effectively with the problem. If possible, enlist the support of other amateurs who are experiencing similar interference. Should the cable company adopt an unresponsive or uncooperative attitude, write again, outlining the continuing problem, and send a copy to the local FCC district office and to the municipal government exercising local control over the company's operation. It is normally in the best interest of the company to be responsive to complaints, as it can face federally imposed fines and local enforcement action by towns' authority in franchise agreements.

The ARRL is becoming increasingly concerned with the escalating incidence of CATVI. On page 9, you will find an editorial treatment of the problem and a description of the measures taken and proposed by the League. Your input is invited in this matter; please direct any information or questions to K1CE, CATVI Desk, ARRL, 225 Main St., Newington, CT 06111.

*Assistant Manager, Membership Services, ARRL

Table 1

Common Channelization Plans

Channel Name		Visual Carrier Frequency Standard	HRC	IRC
2		55.25	54.0	55.25
3	Low	61.25	60.0	61.25
4	VHF	67.25	66.0	67.25
5		77.25	78.0	79.25
6		83.25	84.0	85.25
A-2		109.25	108.0	109.25
A-1		115.25	114.0	115.25
A		121.25	120.0	121.25
B	Mid	127.25	126.0	127.25
C	Band	133.25	132.0	133.25
D		139.25	138.0	139.25
E		145.25	144.0	145.25
F		151.25	150.0	151.25
G		157.25	156.0	157.25
H		163.25	162.0	163.25
I		169.25	168.0	169.25
7		175.25	174.0	175.25
8		181.25	180.0	181.25
9	High	187.25	186.0	189.25
10	VHF	193.25	192.0	193.25
11		199.25	198.0	199.25
12		205.25	204.0	205.25
13		211.25	210.0	211.25
J		217.25	216.0	217.25
K		223.25	222.0	223.25
L		229.25	228.0	229.25
M		235.25	234.0	235.25
N	Super	241.25	240.0	241.25
O	Band	247.25	246.0	247.25
P		253.25	252.0	253.25
Q		259.25	258.0	259.25
R		265.25	264.0	265.25
S		271.25	270.0	271.25
T		277.25	276.0	277.25
U		283.25	282.0	283.25
V		289.25	288.0	289.25
W		295.25	294.0	295.25
AA		301.25	300.0	301.25
BB		307.25	306.0	307.25
CC	Hyper	313.25	312.0	313.75
DD	Band	319.25	318.0	319.25
EE		325.25	324.0	325.25
.		.	.	.
.		.	.	.
.		.	.	.
UU		421.25	420	421.25
VV		427.25	426	427.25
WW		433.25	432	433.25
XX		439.25	438	439.25
YY		445.25	444	445.25
ZZ		451.25	450	451.25

TV picture. In the harmonically related carrier system (HRC) all of the visual carriers are related harmonically (normally with a 6-MHz separation). The major distortion products fall on the carrier frequencies and are, therefore, less visible. The HRC system is being used increasingly in systems with 36 or more channels. The IRC or incrementally related carriers system performs somewhat better than the standard system, but is not as effective in reducing beats as the HRC system. In Table 1 the "Channel Name" column gives only one of the various designation systems that are used. When you are dealing with a CATV interference complaint it may be hard to know which cable channels are involved, much less the actual frequencies. For instance, it is not unusual for a cable system to take an off-air channel from uhf and put it on some midband vhf channel (120 to 174 MHz) so that channel 58 might now be called channel G. As you can see, things could become extremely frustrating without some knowledge of the facts.

Interference

CATV-related interference is a two-edged sword. As with normal TV interference the amateur can be the cause of picture disturbances experienced by CATV subscribers. It is also possible that leaks from the CATV system will produce interference signals in the amateur bands such as channel E in 2 meters, channel J and K in the 220-225 MHz band, or channels UU, VV, WW, XX, YY in the 432-450 MHz band. There are yet more possibilities, as we will see later.

As was said before, the cable system is, or at least should be, a closed system. Interference is usually caused by a leak in the CATV system that allows signals to escape from the system or to get in from the outside. The biggest offender is generally the flexible drop cable from the pole to the home. The shielding is less effective than the solid aluminum cable on the pole. The drop cable encounters more mechanical motion since it is flexible and moves in the wind. The F connectors used in CATV are low-cost items (about 10 cents each), and are subject to certain difficulties. These difficulties are usually caused by poor installation rather than a connector fault. They may be the result of physical damage, such as caused by pulling sharply on the coaxial line and thus separating the shield from the connector body. A recent survey by the Federal Communications Commission found that a high percentage of the leakage in cable systems occurs on customer drops. (Some have run a piece of 300-ohm twin-lead to their neighbor's house. Other "modifications" may result in the same kind of leakage.) Self-made taps and extensions on the cable drop should never be made. Not only are they morally wrong, they also open the door to interference problems.

Other problems result from poor connections arising from corrosion. The subscriber drop leaving the line normally comes to a hanger under the eave of the house, down the side of the house through a grounding block. Two types of grounding blocks are shown in Fig. 2. The shield is connected through a heavy copper wire to a ground in the electrical system, the cold water system or some other ground point accepted by utilities or the state regulatory agency. Rules and codes vary widely throughout the United States. Corrosion of the fittings on either side of the grounding block or poor ground connections often cause leakage or rectification of strong local signals.

The distribution and trunk sections of

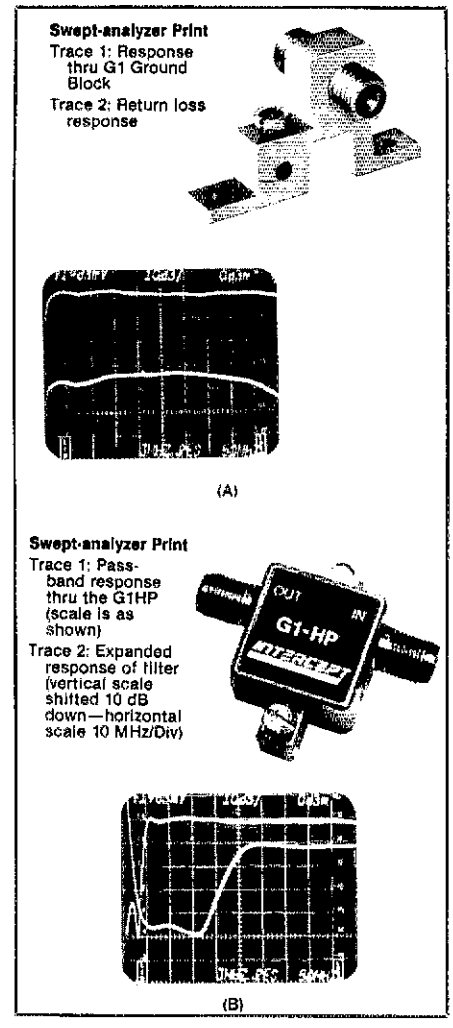


Fig. 2 — Grounding blocks are used at the subscriber drops. A typical unit is shown at A. The version at B contains a high-pass filter. *(photos courtesy of Intercept Corporation)*

the CATV system are usually much tighter than the subscriber drops. There are, however, two major areas of leakage. The first is related to the use of old-style connectors that provide no clamping support for the sheath of the aluminum cable. This is true for both splices and connectors where the cable enters the housing of amplifiers or passive components (power dividers, directional couplers and so forth). Mechanical motion caused by the wind will often cause cold flow in the aluminum and hence a poor or intermittent connection. Leakage may also arise from cracks in the outer shield of the cable. This condition is less frequent in newer systems because improved installation techniques are used.

A subscriber drop cable leaves the distribution line from a housing that includes passive directional couplers. The latter are used to tap off the proper amount of power to feed the subscriber's TV set. Usually there are four drops from each housing, which is called a "four tap." When an amateur experiences interference from pickup of his high-power

radiation, it is possible that one or more of these taps is unused but not terminated. Tap terminations cost but a few cents since they are merely an F fitting with a 75-ohm resistor soldered inside. Resistors sometimes have their leads shaped and are plugged in without the use of an F fitting or solder. This procedure is suspect. The addition of the F connector (for 10 cents) by maintenance personnel is recommended.

The ultimate problem of amateur interference to CATV probably occurs when an amateur runs high power into a beam antenna directed at a portion of the cable system. In this case connectors and housings for amplifiers and taps may not have enough shielding. Since the power differential can be over 150 dB, it may be too much to ask that the cable system shield against this enormous differential. The potential for interference seems to be largely in the vhf region where amateur power may be somewhat lower, and where it is a lot easier to get antennas up higher (over the CATV system).

In some cases amateur interference is picked up on the connecting cable between the converter and the TV set. The viewer then sees the interference on all channels. The solution to this problem generally follows standard TVI elimination procedures. It is not directly related to the CATV system.

Two-Way Cable

The newest CATV systems provide bidirectional capability. If the description of a typical system did not excite your interest, notice that we are now adding an upstream path from every subscriber to the headend. All kinds of two-way services may now be implemented. Currently these include home security, power company load control, meter reading, traffic control, point-to-point communications, surveillance camera control and a host of others including the broad scope of interactive services to the home. These services will include banking, shopping, graphics, home computer services, catalog displays and services that have not yet been conceived.

To provide bidirectional transmission, the cable is fitted with reverse amplifiers, usually covering the range of 5 to 30 MHz. The configuration of 50 to 300 MHz or more downstream (from the headend) plus 5 to 30 MHz upstream is referred to as a "subsplit" CATV system. In cases where there are numerous industrial users or multiple residential cables, the "midsplit" system is often employed. Typical frequencies for a midsplit system are 5 to 120 MHz upstream and 174 to 300 MHz or more downstream.

Perhaps you begin to sense a potential problem. Some CATV systems are now operating in all of the amateur frequencies from 7 to 28 MHz where high power and large antennas are generally employed. One of the worst problems that operators of two-way cable systems have had to date is with citizens band transmissions. There are many CB transmitters, mostly mobile, making it difficult to locate the source of the interference. The matter of leakage from the cable system to the amateur on the upstream frequencies so far has been almost nonexistent because of limited use of two-way operation to date.

Interference entering the cable system on upstream frequencies results in an interesting problem. In the earlier description a typical system was shown to resemble a tree whose root is the headend. The system branches to feed different areas until finally it reaches the subscriber, which you might liken to the end of the twig on a branch. Consider signals being transmitted from subscribers to the headend. There is a situation where there can be thousands and thousands of "twigs" generating signals that all come together at the headend. Should an interfering signal enter the system, it is impossible to tell where it originated. This means that curing the interference may take a long time. In that time it can do a lot of damage since an intruding signal in an upstream data channel can totally obliterate the service. Cable operators are becoming aware of this problem and are taking steps to avoid it. The most flexible solution utilizes remotely controlled switches to selectively divide the system into areas. This technique can be used to locate the vicinity of interference entry. This section is then shut off, allowing the rest of the system to function while corrective action is taken.

Responsibility and Assistance

The responsibility of the cable system operator is defined directly and indirectly by FCC regulations. There has been a great deal of attention given to leakage from cable systems that might cause disruption of aircraft navigation and communications channels. These include the frequencies of 73.5, 108 to 136, and 225 to 440 MHz. Part 76 of the FCC regulations defines the leakage allowed. This is presently 15 microvolts per meter at 100 feet at frequencies up to 54 MHz, 20 microvolts per meter at 10 feet from 54 to 216 MHz, and 15 microvolts per meter at 100 feet above 216 MHz. The extra attention given to the FAA services had led to numerous other regulations and will doubtlessly lead to change (possible loosening) of the limits cited. A leak of 20 microvolts per meter at 10 feet can certainly be received by nearby amateur equipment, although this amount of leakage from a single point is not significant at relatively long distances. A leak of this magnitude will permit significant signal entry from a nearby high-power amateur transmitter.

The legal responsibility of the amateur in regard to cable television is no different than that of any other service. FCC regulations do not preclude all interference from amateurs to CATV viewers nor all interference to the amateur service from minor CATV system leaks. The amateur's role should be that of a diplomat and an ambassador for a fine and highly respected technical fraternity.

There is one major difference in dealing with CATV problems rather than complaints from neighbors. When the cable TV viewer has a complaint he will go to his cable system operator. When the amateur has a complaint he will go to the same operator. The cable-system operator is at least one, if not many, technical levels above the average neighbor. He runs a sophisticated communications network and can be expected to understand much of what the amateur has to say. As a matter of fact, there are many Amateur Radio operators in the CATV business. All in all, amateurs are at least one leg up when dealing in this environment. The CATV operator may also have a good deal of sophisticated equipment and personnel who know how to operate it. They generally have convenient devices such as portable field-strength meters and spectrum analyzers. Perhaps most important, they have legal, economic and moral incentives to recognize in satisfying their viewers. It is quite likely that one of your best friends in the community could be the chief technician of the cable company. You can help him make his service better, and he can help make your hamming more enjoyable.

There are industry groups in the cable business that can be helpful in providing technical information and even specific assistance in knotty cases. These include the National Cable Television Association, 1724 Massachusetts Ave., N.W., Washington, DC 20036; The Society of Cable Television Engineers, P.O. Box 2665, Arlington, VA 22202; and Community Antenna Television Association, 1100 17th St., N.W., Washington, DC 20036. All of these groups have strong ties with both the cable industry and the Federal Communications Commission.

It is also well to note that the local cable operator has some responsibility to represent the community and often to produce programming for his network. By working with the CATV operator in your community you may be able to do much for Amateur Radio (in terms of public relations).

In summary, we can say that cable television does bring a potential new set of problems for the amateur operator in this world of congested communications. On the other hand, location and elimination of these problems may well be more easily handled than those of normal RFI because of the opportunity to work with a technically oriented group that has a vested interest in getting to the bottom of the problem.

Let's Make the "Hentenna"

No, this antenna won't lay eggs, but it will produce an excellent signal at your fixed or portable location.

By Koji Sugihara,* JJ1UMS

Have you heard of the Hentenna? This antenna is very popular in Japan, especially on 6 meters. A recent survey revealed that 10% of hams active on 50 MHz in Japan are using the Hentenna.

At first glance, a reader might assume this antenna is somehow related to a female chicken. This is not the case, however, as the "hen" in the name is a transliteration of the word "interesting" or "unusual" in Japanese. Let's take a look at the Hentenna and see why it got its name.

The Antenna

Fig. 1 shows the basic design of the Hentenna. On inspection, it would appear that the Hentenna is vertically polarized. Not so! The antenna is *horizontally* polarized. This is the first unusual aspect of the Hentenna.

Another oddity is its dimensions — a 5- to 10-percent variation won't adversely affect the performance of the antenna; in fact, a "fork" Hentenna is only half of a Hentenna. Mr. Ota, JJ1CCH, constructed a 11.5-foot-high[1] Hentenna for 50 MHz, and it still worked well. Distances of 280 miles have been covered on 6 meters with 1-1/2 watts and a Hentenna. This performance is outstanding considering the simplicity of the antenna.

The Hentenna structure is fairly simple, which lends it to portable operation; the few components for construction are relatively small and easy to carry. Set-up, adjustment and disassembly can be accomplished in a few minutes, which can be handy if rain or lightning threatens while operating in the field.

The radiation pattern of the Hentenna is shown in Fig. 2; the main lobes are broadside to the element, with nulls appearing off to the sides. To fully realize the performance benefits, some method of rotation must be employed. This should not pose too great a problem, as wind loading is negligible because wind tends to blow *through* the element rather than acting on it. The author uses the "Armstrong" method of rotation, although any small TV rotator should handle the job.

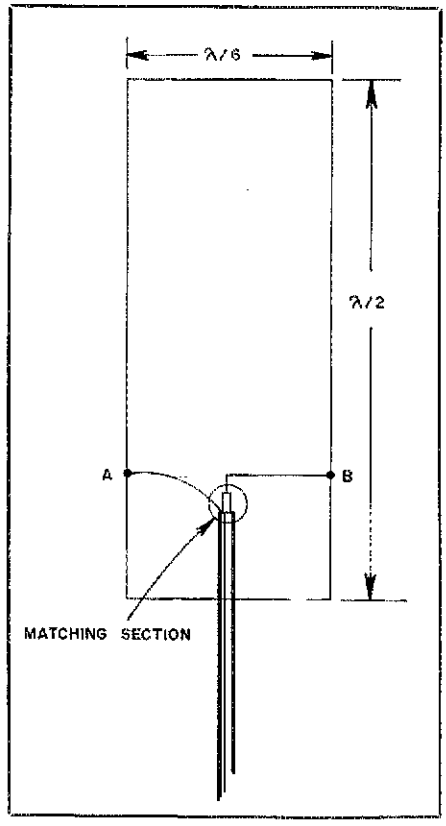


Fig. 1 — The Hentenna is fed through a Bazooka match coupled to the element at points A and B.

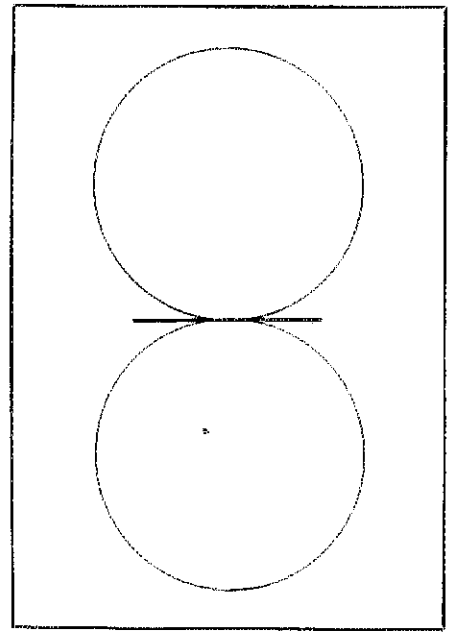


Fig. 2 — Directivity of the Hentenna. The pattern shown is perpendicular to the element plane.

Construction Methods and Details

There are three methods commonly used in Hentenna construction. The first is to use a bamboo framework and attach the wire element to it. This is the simplest method, and the technique will be explained later in this article.

A portable version of the Hentenna can be constructed with aluminum tubing for the top and bottom of the element, with wire employed at the sides. While this method is more difficult than that of the wooden framework, it is much easier to set up and break down after initial construction.

Above 50 MHz it becomes practical to construct the entire element from aluminum tubing. This technique is commonly used for construction of Hentennas for 144 and 430 MHz.

The simplest method of construction will now be explained. First, firmly attach the top and bottom supports to the mast at the appropriate places. These supports must be attached securely to ensure the durability of the installation. Next, connect both ends of a 26-1/4 foot piece of stranded no. 14 wire together to form a closed loop. Firmly connect the wire loop to the framework. Strong string or wire should be used to keep the loop attached to the framework during adverse weather conditions.

The Hentenna may be fed with 50- or 75-ohm coaxial cable. A bazooka match is

[1]M = ft × 0.3048; km = mi × 1.6; mm = in. × 25.4.

*27-3-404 Matsugaya, Hachio ji Tokyo, 192-03 Japan

recommended. To make one, remove a 1/2-inch-wide strip of insulation 40.6 inches from the end of the feed line, as shown in Fig. 3. A length of braid, sufficient to cover 39 inches of the cable, is carefully soldered to the point where the insulation was removed. Use a soldering iron of sufficient size to quickly flow the solder before the inner dielectric of the cable melts. Slide the braid toward the end of the cable and neatly trim it 1-1/4 inches from the end of the cable. The other end of the coax should now be fitted with a suitable connector for coupling to the transmitter. A continuity test is recommended at this time to ensure that both the matching section and connector have been attached properly. Tape both ends of the braid to prevent water from entering the coax at these points. Take your time and do a neat job — the better the seal, the longer the cable will last.

The feed line may now be connected to the element. Cut a 55-inch length of tinned antenna wire in half and attach one end of each to a center insulator. Solder the prepared end of the coaxial cable to the insulator, making sure the cable is not heated sufficiently to melt the center dielectric. Attach the tinned wire to the element with alligator clips, making sure the wire is pulled taut.

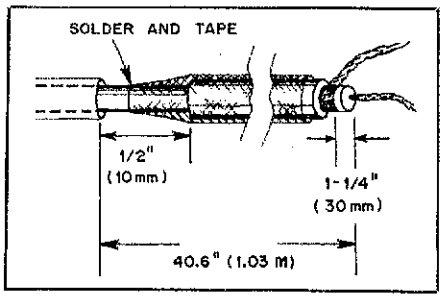


Fig. 3 — Bazooka matching section for the Hentenna. After construction, both ends should be taped and the entire length weatherproofed.

Adjustment

Tune up of the antenna is straightforward. It is set up on a short mast, the coax attached to the output side of an SWR bridge and power applied to the antenna. The clips are now moved up and down the element until the best match (lowest SWR) is obtained. Remove the clips and solder the wire to the element at these points. The antenna is now ready for permanent installation, either atop a tower or TV mast. Once in place, the Hentenna can provide years of operating pleasure.

[Editor's Note: After this article was prepared for publication, the author informed us that his original design was for 28 MHz.]

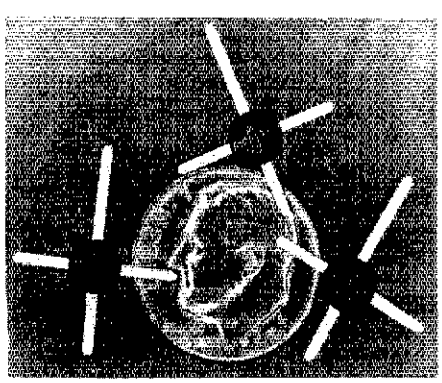
New Products

NEW MOTOROLA SEMICONDUCTOR

☐ The slogan is "Performance up, cost down," in new low-power rf transistors, as noted in some recent Motorola promotional literature that describes the MRF559 0.5-watt bipolar transistor which has a recommended operating range of 250 MHz to 1.5 GHz.

Effective emitter ballasting (protection against hotspotting) is ensured by the current techniques in geometry, processing and packaging. This type of design in overlay transistors improves the operating linearity and enhances the reliability of the device. The metalization of the semiconductor "sandwich" uses nichrome, titanium, tungsten and gold to eliminate the corrosion malady that is referred to in the industry as "purple plague." This is said to improve the transistor longevity by a factor of 10.

The MRF559 is contained in a Macro-X plastic package, rather than in the more familiar TO-39 case. Four 10-mil-thick, silver-plated copper leads extend at 90-degree increments from the case, and aid cooling of the semiconductor junction.



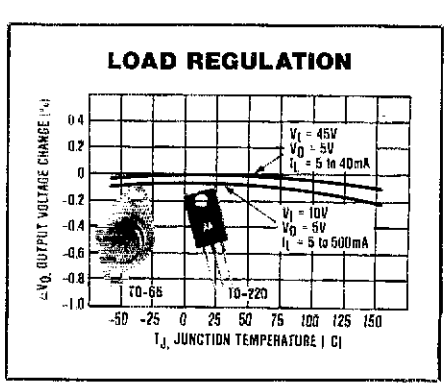
Although the new transistor is characterized mainly for use in MATV/CATV systems, it should be excellent for amateur applications at vhf and uhf. Its ratings at 870 MHz are: P_o = 0.5 W; Gain = 8 dB (min); Eff. = 50%; V_{cc} = 12; 1-dB compression greater than +20 dBm (typ). The f_T is rated at 3 GHz and the noise figure at 1 GHz is 4 dB [I_c = 40 mA (3 dB at 500 MHz)]. P_D is 2 watts at a case temperature of 50° C. Price class: $1.80 in 100-999 lots. Available from Motorola distributors or the factory in Phoenix, AZ 85036. Phone Tom Bishop at 602-244-6394 for additional information. — *Doug DeMaw, W1FB*

MOTOROLA LINEAR VOLTAGE REGULATORS

☐ The LM117M/217M/317M are adjustable, three-terminal linear voltage regulators. These devices are capable of supplying in excess of 0.5 A over an output-voltage range of 1.2 to 37 V. The regulators are very easy to use and require only two external resistors to set the desired output voltage. They employ internal current limiting, thermal shutdown and safe-area compensation, making them virtually failure proof.

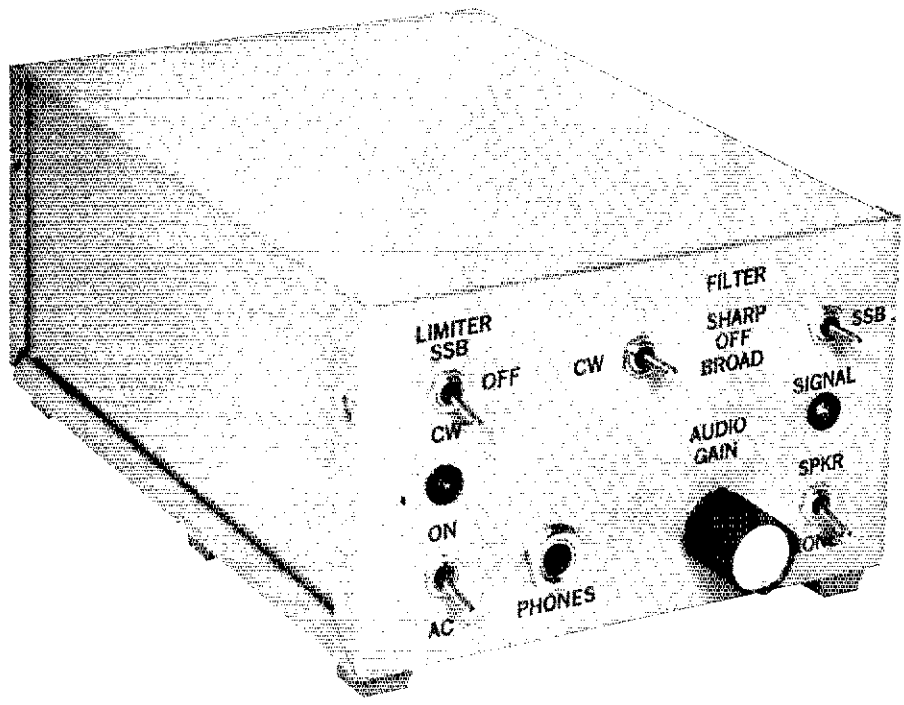
Serving a wide variety of applications including local, on-card regulation, the devices also make simple adjustable switching regulators and programmable output regulators. By connecting a fixed resistor between the adjustment and output terminals, the units can be used as precision current regulators.

These devices are available in TO-66 and TO-220 cases; three temperature ranges are offered. The TO-220 plastic package is available only in the lower temperature range of 32° to 257° F (0° to 125° C). Device variations and pricing in 100 to 999 quantities are: LM317MT, 32° to 257° F (0° to 125° C), TO-220 case, $0.80; LM317MR, 32° to 257° F, TO-66 case, $1.25; LM217MR, −77° to 300° F (−25° to 150° C), TO-66 case, $3.57; LM117MR, −130° to 300° F (−55° to 150° C), TO-66 case, $5.07. For further information, contact Mr. Roger Janikowski at Motorola Semiconductor Products Inc., P.O. Box 20912, Phoenix, AZ 85036, tel. 602-962-2124. — *Paul K. Pagel, N1FB*



Build an Audio Filter With Pizzazz!

Ssb and cw enthusiasts. . . STOP!. . .LOOK!. . . and LISTEN (finally) to what you want to hear.



By Robert E. Lee,* K2TWK

Here's an ssb/cw audio filter with a lot to offer. It provides variable degrees of cw and ssb audio selectivity and a means of limiting the audio level at your ears without the need for constantly adjusting the receiver audio gain control. The annoying effects of cw key clicks and static crashes are reduced or eliminated by a limiter circuit. When operating cw, a panel-mounted LED blinks in unison with the received signal when it is centered in the filter passband. An external sidetone may be mixed with the incoming receiver audio, and level adjustments are provided.

Description

Fig. 1 is a block diagram of the unit. Audio is taken from the speaker output jack and may be passed around or fed through a limiter circuit. The signal is then delivered to a cw bandpass-filter section or to a high-pass/low-pass filter section for ssb operation. During cw operation the signal is also passed to another filter that feeds the signal-indicating LED driver. A tone/summing amplifier follows the filter circuits. Here, sidetone from an external source can be added to permit monitoring cw transmissions. An audio amplifier provides for speaker or headphone operation and a tape recorder take-off point. Power for the unit is taken from a well filtered and regulated 12-volt supply.

The cw filter is designed for a center frequency of 750 Hz. If your equipment has a different frequency offset, the filter center frequency will have to be changed. Information for such changes is given in the Appendix.

Operational Theory

U1 of Fig. 2 is an inverting unity-gain amplifer. Diodes can be switched across the feedback resistor between pins 2 and 6 to provide limiting action. Limiting occurs at 0.4 V peak-to-peak (p-p) with the LIMITER switch in the CW position and 1.2 V p-p in the SSB position.

The cw filter employs U2 as a 4-section, 8-pole, multiple-feedback, active bandpass filter with unity gain. It has a center frequency of 750 Hz. The bandwidths at the −6 and −60 dB points of the filter are 120 and 1125 Hz, respectively.

For ssb, U3 is used as a 4-section series of 3-pole unity gain, multiple-feedback Butterworth-response filters. U3A acts as a high-pass filter with a 300-Hz −6 dB point. U3B, C and D are low-pass filter sections with −6 dB points at 2.2-, 2.0- and 1.5-kHz, respectively. Each filter section exhibits a roll-off of 18 dB per octave.

U4 and Q1 are part of the signal-indicator circuit. The IC operates as a 2-pole multiple feedback active filter with a gain of 10 and a center frequency of 750 Hz. The U4 output drives Q1, which has the SIGNAL LED in the collector circuit. The resulting bandwidth of this filter when cascaded with the cw filter (U2), is approximately 40 Hz.

An external sidetone signal may be fed to U5A. This permits the amplitude of the sidetone signal to be adjusted to a comfortable level for speaker or headphone operation. U5B performs as a unity gain summing amplifier. It is used to mix the sidetone signal and incoming receiver audio.

U6 provides over 1 watt of audio power output. The frequency response of the amplifier has been limited to a range of 340 to 3900 Hz at the −3 dB points. The basic design of this amplifier was done by Robert Sherwood.[1] C1 and R3 were added to provide feedback and ensure stability.

*69 Kinderkamack Rd., Park Ridge, NJ 07656

[1]R. Sherwood, "New Audio Amplifier for the Drake R-4C," *Ham Radio*, April 1979, p. 48.

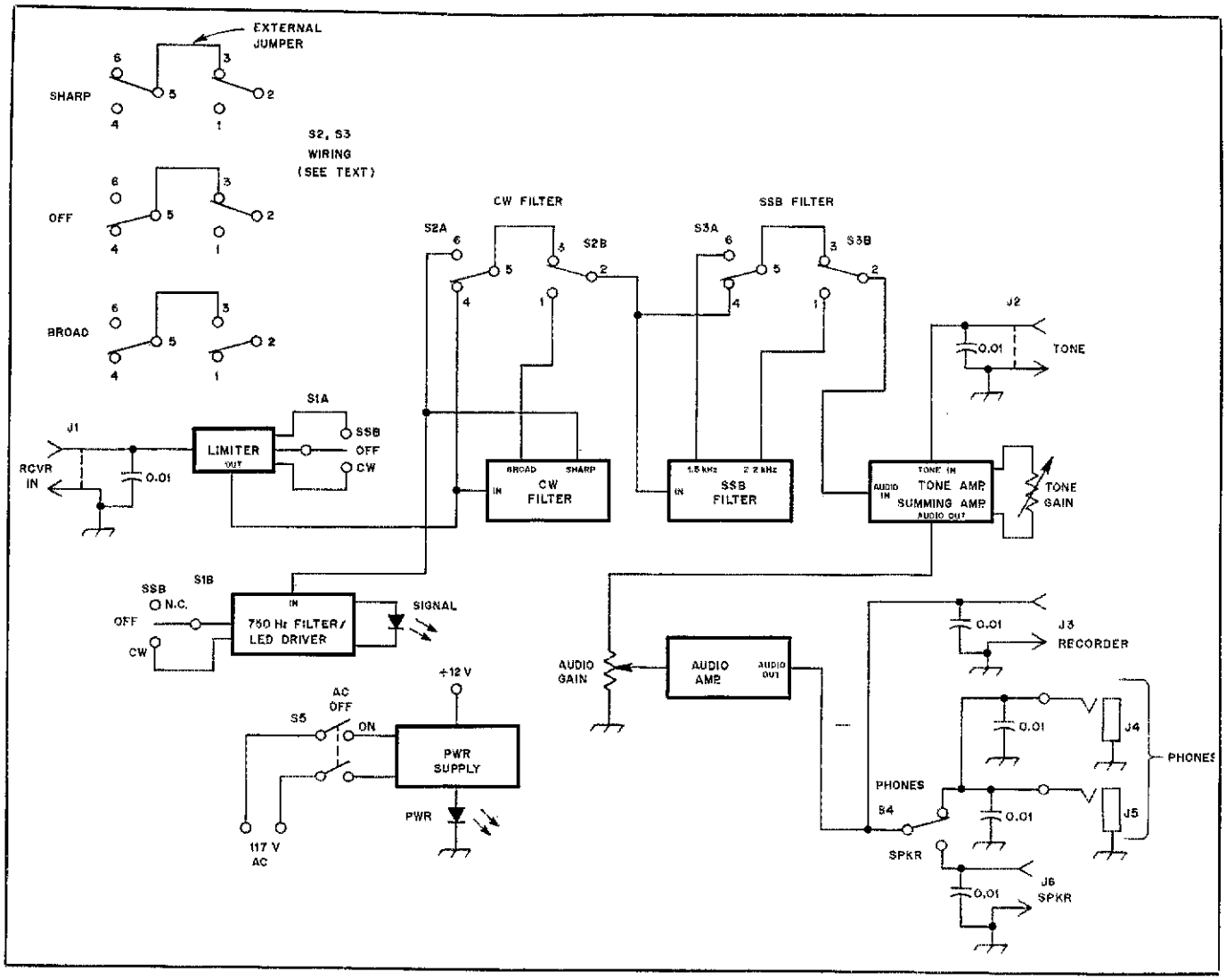


Fig. 1 — Block diagram of the audio filter. S2 and S3 are shown in the OFF position. These switches are special types that are not operated as ordinary dpdt toggle switches.

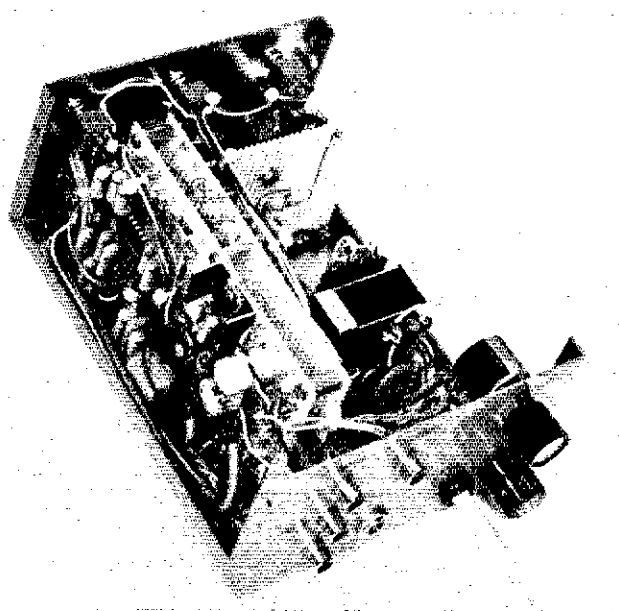
Power for the unit is supplied by a full-wave bridge rectifier. An LM-340T-12 provides voltage regulation.

Construction

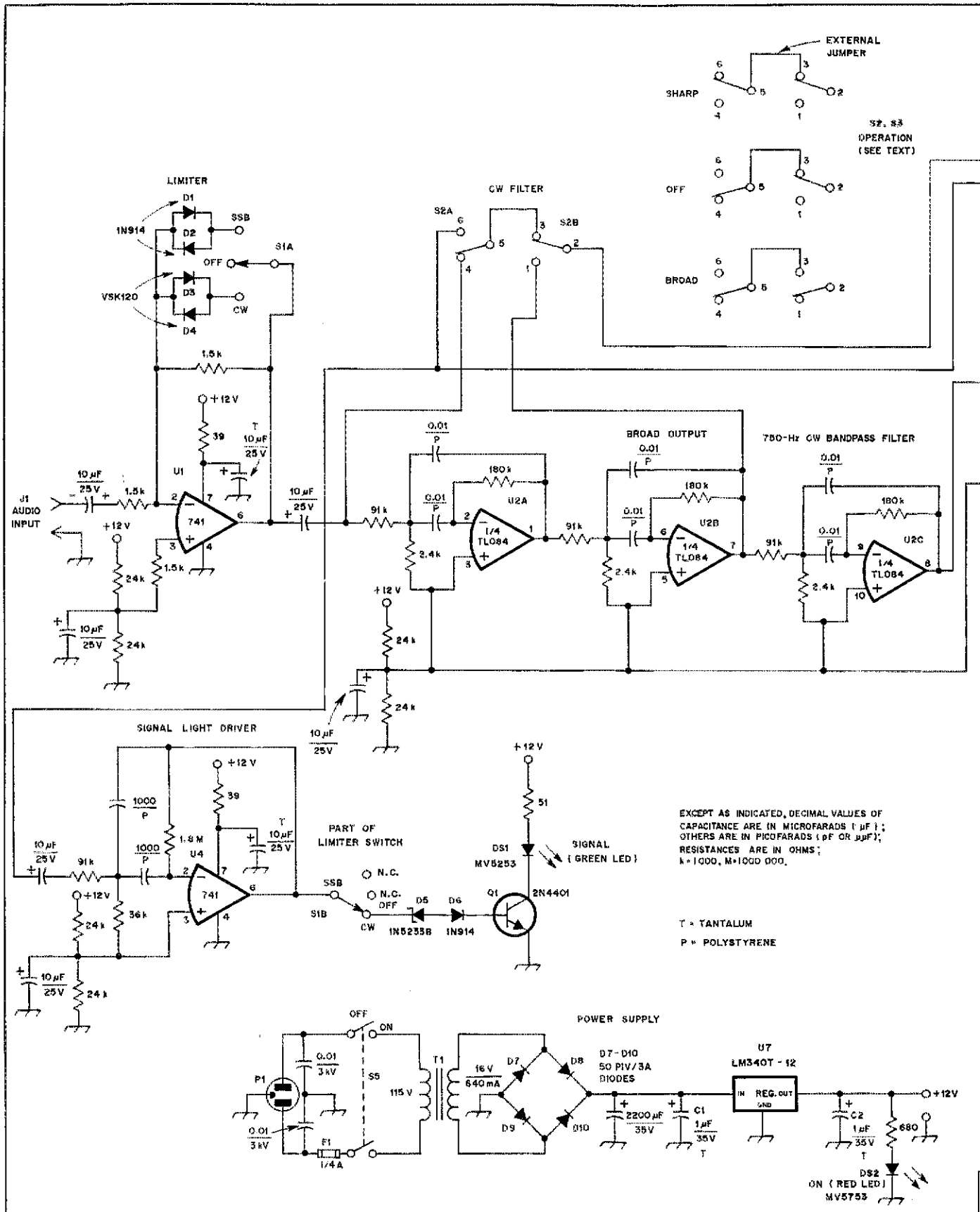
The filter unit must be constructed in a shielded enclosure. I used a 7 × 5 × 3-inch (mm = inches × 25.4) Bud box (CU-2108-B), but would recommend use of a larger enclosure. Three perf boards hold the circuit components. The power transformer is mounted on the box bottom. All transformer and ac wiring should be kept as far away as possible from the filter/amplifier boards. This will prevent 60-Hz hum pick-up. Small heat sinks should be used on U6 and U7.

When wiring the unit, follow good construction practices and keep leads between the switches and boards short. The audio-amplifier layout should follow that described in the original article. AUDIO GAIN control wiring should be done using small-diameter shielded audio cable with the low side of the AUDIO GAIN control connected to the cable shield and the shield connected *only* to pin 3 of U6. C3 should be connected between pins 3 and 4 of U6 using 3/4-inch lead lengths.

The switches used for S2 and S3 are not ordinary dpdt toggle switches. These switches have a special toggling arrangement. This permits them to be used as 3-way toggle switches when an external jumper wire is added between terminals 3 and 5. Use of these switches instead of rotary types enhances compact construction.



An inside view of the filter. The two large boards to the left of the unit contain all of the filter components. Power supply components are mounted on the small perf board toward the front of the enclosure.


EXTERNAL JUMPER
SHARP
OFF
BROAD
S2, S3 OPERATION (SEE TEXT)
LIMITER
D1
1N914
D2
SSB
S1A
OFF
VSK120
D3
CW
D4
1.5k
+12V
39
T 10µF 25V
J1 AUDIO INPUT
10µF 25V
1.5k
U1
741
24k
10µF 25V
CW FILTER
S2A
S2B
0.01 P
180k
U2A
1/4 TL084
91k
2.4k
BROAD OUTPUT
U2B
780-Hz CW BANDPASS FILTER
U2C
SIGNAL LIGHT DRIVER
1000 P
1.8M
U4
36k
PART OF LIMITER SWITCH
S1B
N.C.
OFF
CW
D5
D6
1N5235B
1N914
Q1
2N4401
51
DS1
MV5253
SIGNAL (GREEN LED)
EXCEPT AS INDICATED, DECIMAL VALUES OF CAPACITANCE ARE IN MICROFARADS (µF); OTHERS ARE IN PICOFARADS (pF OR µµF); RESISTANCES ARE IN OHMS; k=1000, M=1000 000.
T = TANTALUM
P = POLYSTYRENE
POWER SUPPLY
P1
0.01 3kV
S5
115 V
F1
1/4 A
T1
16 V 640 mA
D7
D8
D9
D10
D7-D10 50 PIV/3A DIODES
2200µF 35V
C1 1µF 35V T
U7 LM340T-12
IN
REG. OUT
GND
C2 1µF 35V T
680
DS2 ON (RED LED) MV5753

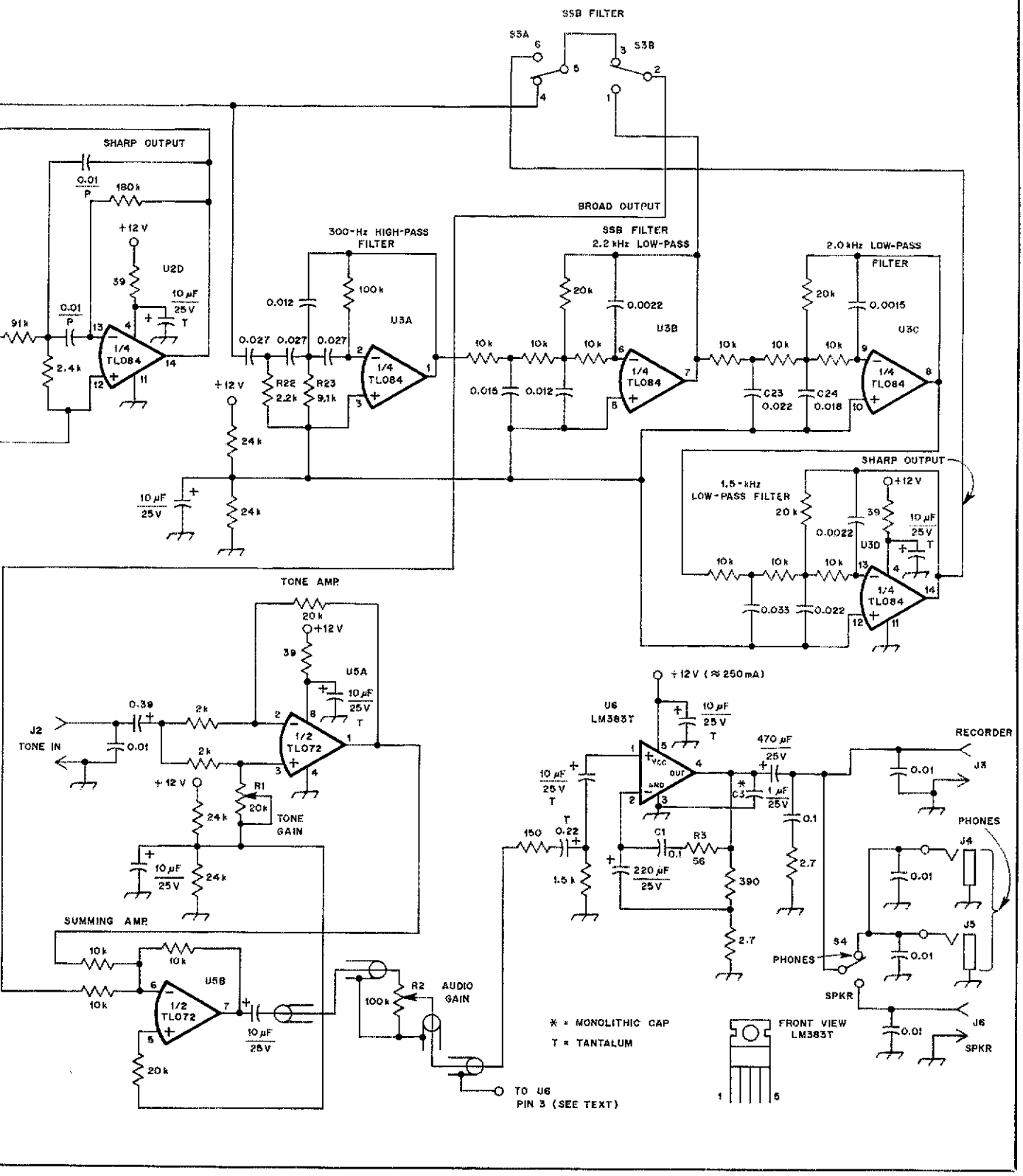


Fig. 2 — Schematic diagram of the unit. Information is given in the text that will allow the builder to alter the cw filter center frequency. All resistors are 1/4-watt carbon composition or film types. Note: Part numbers in parentheses are Radio Shack.

C3 — 1 μF Monolithic ceramic. Sprague 5CZ5U10SX-0050C5 or equiv.

D3, D4 — 1-A/20-V Shottky diodes, Vero VSK120, 1N5817 or equiv. (Available from Fuji-Svea, Inc., P. O. Box 40325, Cincinnati, OH 45240.)

J1-J3, J6 — Phono jack.

J4, J5 — Open-circuit phone jack.

R1 — 20-kΩ linear-taper potentiometer.

R2 — 100-kΩ audio-taper potentiometer.

S2, S3 — C & K 7211SYZQ 3-way toggle switch. (Available from Gerber Electronics, 128 Carnegie Row, Norwood, MA 02062.)

T1 — 16-V/640 mA secondary, 115-V primary, Signal DPC 16-640 with 10BR mounting bracket or equiv. (Available from Signal Transformer Co., Inc., 500 Bayview Ave., Inwood, NY 11696. Single-lot purchases require payment in advance.)

U1, U4 — 741 op amp (267-007).

U2, U3 — Quad bi-FET op amp, TL084CN or equiv. (276-1714).

U5 — Dual bi-FET op amp, TL072CP, LF353N (276-1715) or equiv.

U6 — LM383T audio amplifier (276-703).

Mallory SXK (or equivalent) polystyrene capacitors are recommended for use in the cw and signal-light driver filter sections. The other capacitors in the low-pass/high-pass filter sections can be Sprague type 225P or equivalent. Polarized capacitors can be electrolytic or tantalum types. Be sure to use tantalum capacitors at C1 and C2, and use a monolithic ceramic capacitor at C3. The remainder of the capacitors can be disc-ceramic types. Resistors used in the filter sections should have a 5% tolerance and be matched, using an ohmmeter. Other resistors can have a 10% tolerance.

Operation

This is the procedure I follow to set up my Drake C line for cw transceive operation. Turn on the CALIBRATOR and peak the PRESELECTOR on the calibrator signal. Connect the filter to the speaker jack on the rear of the receiver and connect the speaker to the jack on the rear of the filter unit. Place the receiver MODE switch in the maximum cw selectivity position and adjust the PASSBAND tuning control for lsb operation with a beat note of 750 Hz (the frequency offset used with the C line). Place the LIMITER switch in the CW position. The receiver RF GAIN should be set at maximum and the AUDIO GAIN at the 11 o'clock position. Adjust the filter unit AUDIO GAIN for the desired audio level. If the unit is operating properly, the SIGNAL LED should illuminate as you tune the receiver across the calibrator signal. Slow tuning is required because the bandpass of the SIGNAL LED filter circuit is narrow — approximately 40 Hz. The PASSBAND control is then adjusted for a maximum S-meter reading while the LED is lit. Do not readjust the PASSBAND control after it has been set up as described. The C line is now ready for proper cw transceive operation.

For separate receiver/transmitter cw operation, use the following procedure. Place the transmitter in the SPOT mode and adjust the tuning until the LED lights. Both the receiver and transmitter will then be on the same frequency.

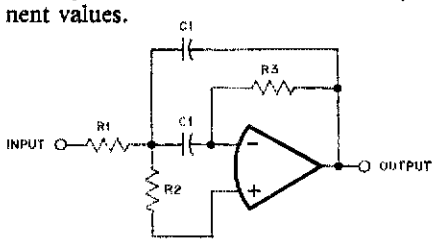
When sharp audio selectivity during cw operation is not required, I place the filter switch in the SSB NARROW position. Otherwise, the cw signal will sound distorted because of limiter action with no filter section in operation. When more audio selectivity is desired, the cw filter can be placed in the BROAD or SHARP position to give the required amount of *selectivity*. With the limiter circuit in operation, you can tune across the cw portion of the band and not have to adjust the AUDIO GAIN control to protect your ears from the effects of strong signals.

In the SSB mode, the LIMITER can be switched on to help reduce the effect of static crashes or other such annoyances. The required amount of audio selectivity is then chosen. Do not leave the LIMITER in the CW position when operating ssb: Severe distortion of the audio signal will result.

With the audio-filter unit, both cw and ssb operation become more relaxing. Hum, high-frequency noise, static crashes and key clicks are reduced or eliminated. I know you'll find the use of this filter a boon to cw and ssb operation. Should you desire more information, I'll be glad to answer questions, provided an s.a.s.e. is enclosed.

APPENDIX

Use these formulas to determine the cw and signal indicator filter circuit component values.



1) Select A_o — gain at filter center frequency.
   Select f_o — filter center frequency.
   Select Q.
2) Select R1 for desired input resistance.
3) Calculate R1:

$$R1 = \frac{Q}{(2Q^2 - A_o)\,2\pi f_o C1} \qquad \text{(Eq. 1)}$$

4) Calculate R3:

$$R3 = 2A_oR1 \qquad \text{(Eq. 2)}$$

5) Calculate C1:

$$C1 = \frac{Q}{2\pi f_o A_o R1} \qquad \text{(Eq. 3)}$$

6) Calculate R2:

$$R2 = \frac{A_oR1}{2Q^2 - A_o} \qquad \text{(Eq. 4)}$$

The following example will demonstrate how to determine the filter component values for a filter center frequency of 800 Hz. This particular frequency is used in many popular transceivers, such as the Kenwood TS-830S.

1) $A_o = 1$ (sets the gain at unity)
   $f_o = 800$ Hz
   $Q = 4$

2) Because it is easier to select resistor rather than capacitor values, C1 is chosen, and R1, R2 and R3 are then calculated. Thus, with a value of 0.01 μF for C1

$$C1 = \frac{Q}{2\pi\, f_o A_o R1} \qquad \text{(Eq. 5)}$$

becomes

$$R1 = \frac{Q}{2\pi\, f_o A_o C1} \qquad \text{(Eq. 6)}$$

and

$$R1 = \frac{4}{(2\pi)(800)(1)(1 \times 10^{-8})} = 79.6\ \text{k}\Omega \qquad \text{(Eq. 7)}$$

The nearest standard value of 82 kΩ is used.

3) $R3 = 2A_oR1$ (Eq. 8)

$R3 = (2)\,(1)\,(79.6\ \text{k}\Omega) = 159.2\ \text{k}\Omega$ (Eq. 9)

A 160-kΩ resistor is used for R3.

4) $$R2 = \frac{A_oR1}{2Q^2 - A_o}$$

$$= \frac{(1)\,(79.6\ \text{k}\Omega)}{(2)\,(4)^2 - 1} = 2.56\ \text{k}\Omega \qquad \text{(Eq. 10)}$$

Use a 2.4-kΩ resistor for R2.

Determination of the signal indicator filter circuit values uses the same procedure. A value of 1000 pF is used for C1 and an A_o of 10. This nets values of 82 kΩ for R1, 1.6 MΩ for R3 and 33 kΩ for R2.

The "Lowbander's" One-Antenna Farm

Not enough area for a full-size 160-meter antenna? You may have more room, electrically, than you realize — with plenty of space for 80- and 40-meter antennas, too.

By Lee Aurick,* W1SE, ex-K3AZ

An earlier article[1] described an antenna system for 80, 40, 20 and 15 meters that was simple and inexpensive, provided gain and was easy to construct. That antenna has been duplicated by hundreds of amateurs, with excellent results. A new transceiver that covered 160 meters provided the impetus to see if the principles could be applied to an antenna system for this band, as well as benefiting the 80- and 40-meter bands. Other antennas at my station presently provide coverage for 20, 15 and 10 meters, so this new approach had to deal only with our lower three bands.

This system offers a good antenna for each band without having a yard and house festooned with wire. Accomplishing this in suburbia without arousing the ire of the neighbors, not to mention that of your spouse, is an achievement. The antenna works well on three bands, so the design objectives were met.

The first effort was toward achieving the best 40-meter antenna design for property size, efficiency and economy. This was the band of greatest interest, even though it would place a performance limitation on the other two bands. The antenna would resonate close to desirable frequencies on these bands, but would not be "right on."

A system emerged that, according to the textbooks, offers some gain on each of the three bands. However, no claim about gain will be made here. The use of open-wire phasing sections brings the collinear elements too close together to provide much gain, and the phasing sections radiate on the two lower-frequency bands, thereby distorting the radiation pattern. In addition, the antenna is not mounted as high as it might be ideally. The complete antenna system is shown in Fig. 1, but it will perhaps be easier to understand how it functions if a band-by-band explanation is made.

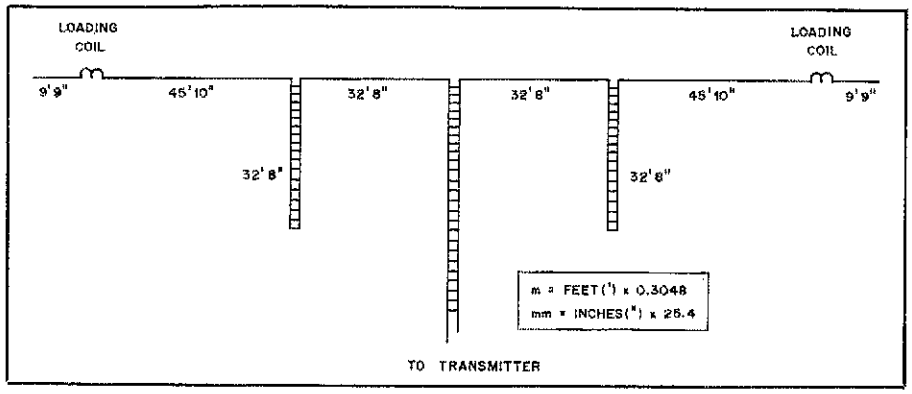


Fig. 1 — Diagram of the three-band antenna system. Forty-meter loading coils, used at W1SE to reduce the physical length of the antenna to 176.5 feet, are Van Gordon Engineering units. The phasing stubs and feeder are 450-ohm open-wire line.

40 Meters

The system functions at 7 MHz as three half waves in phase. Each horizontal section represents a half wavelength on 40 meters. Open-wire phasing sections reverse the phase of the voltage and current from what would be expected if they were not included. These phasing sections are 1/4 wavelength long on 40 meters (each section totals 1/2 wavelength of wire) so that each horizontal section has the same direction of current flow and voltage polarity as its neighbor (in-phase relationship). The phasing sections are constructed of 450-ohm open-wire line, as is the feeder.

80 Meters

On 80 meters the antenna *includes* the phasing sections. They add to the total length of wire, so you now have 5/8 wavelength each side of center. How many people do you know who have even *one* 5/8-wavelength antenna on 80 meters? This new antenna replaces a single 5/8 wavelength on 80 meters, and while it is impractical to compare antennas when used several weeks apart, the new antenna appears to work as well as the earlier one. Many 5-9 reports have been received from Eastern European stations while I was operating "barefoot," on sideband and cw.

160 Meters

Although this band doesn't offer the daily DX opportunities found on our other bands, it is difficult not to feel a little reverence when preparing to operate here. After all, "pioneers" operated on this band, and some of them are still around. It's a band that requires colossal antennas if they are to be full size. Even a quarter wavelength at 1.9 MHz is 123 feet (meters = feet × 0.3048). However, this antenna provides 307 feet of wire, center fed, just waiting to be loaded up! A 5/8-wavelength antenna won't beat four phased quarter-wavelength verticals, but if you can be satisfied with a respectable

[1]Notes appear on page 24.

*Advertising Manager, *QST*

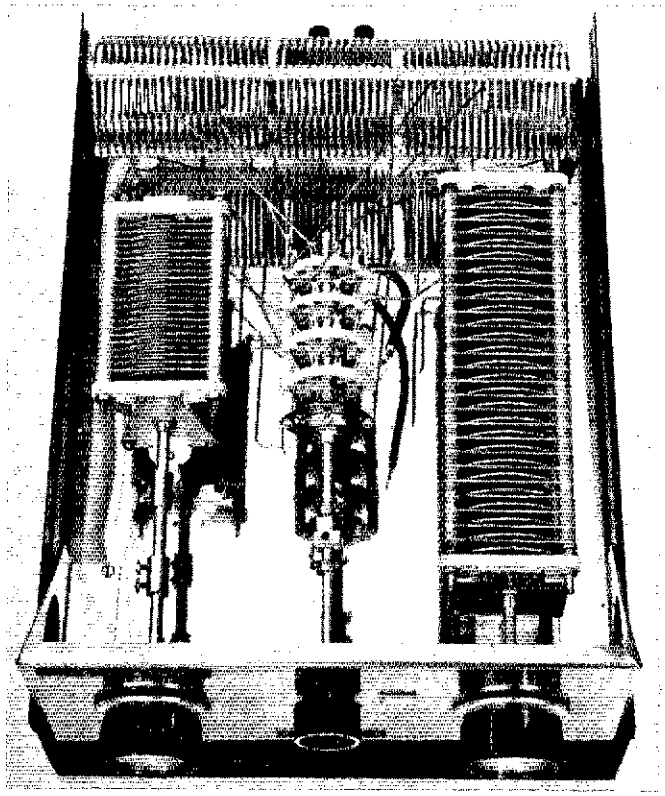


Fig. 2 — Photograph showing the interior construction of the link-coupled network used to match the antenna to 50-ohm coaxial cable.

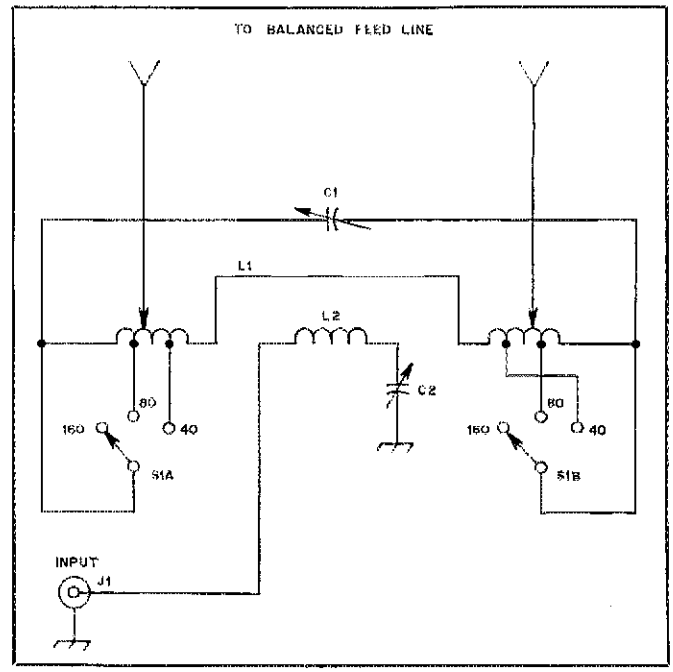


Fig. 3 — Schematic diagram of the link-coupled matcher. The arrows indicate taps that must be found experimentally, because each system will have different requirements.
C1 — 210 pF, with spacing greater than that of the final tank-circuit capacitor.
C2 — 350 pF, spacing not critical for low power.
L1, L2 — See text.
S1 — Two-pole, three-position ceramic rotary switch.

signal throughout the U.S., and occasional DX, this could be the system for you.

Feeding The Antenna

The use of open-wire line requires conversion from balanced line to unbalanced coaxial cable. Why not feed the antenna with coaxial cable? Well, coaxial cable is great — *if* the antenna you plan to feed *always* exhibits the same impedance at its feed point as the characteristic impedance of the line you are using — 50 ohms for example. If the antenna doesn't meet this criterion, you can expect something other than unity (1:1) SWR.

Coaxial cable doesn't handle high SWR very well; open-wire line does. Accept the fact that the SWR is going to be high with this antenna — perhaps 10:1 on 80 meters. No matter: The matching system described here will permit your rig to look at unity SWR, and everything will be fine. The feed-line radiation is cancelled as a result of the balanced feeders (equal but opposite voltages and currents), leaving you with just the normal I^2R (power) loss in the wire.

I decided to build a link-coupled matcher (1981 *Radio Amateur's Handbook*, p. 19-13), for the three bands covered by the antenna. Fig. 2 shows how I constructed the coupler. The layout is not critical. A large cabinet is required to house the big components needed to achieve resonance on 160 meters. Fig. 3 shows the schematic diagram of the circuit. L1 and L2 are made from one 10-inch (mm = inches × 25.4) length of B&W Air-Dux 2406T. Cut the coil wire 20 turns in from each end. Remove one turn from each side of the center portion. The two sections of L1 are then connected to form a single inductor of 40 turns, 3 inches in diameter. The center portion of the coil is used as L2. L1 is resonated by means of C1. Resonance on 160 meters occurs at nearly maximum capacitance, while resonance for the other bands occurs at approximately half capacitance. This can vary, depending on where the taps for each band are placed. In my unit the taps are at 14 and 18 turns from each end for 80 and 40 meters, respectively. The taps are selected by a ceramic-wafer switch that progressively shorts turns from the ends of the coils as you change to each higher-frequency band. Wafer-switch sections were originally provided for the 14-turn link, L2. However, it was unnecesary to tap this coil because a proper match was achieved on each band with the 500-pF capacitor I used for C2. Anything more than 350 pF is satisfactory. C2 may be of the broadcast-receiver type, unless high-power operation is contemplated. L1, L2 and C1 must be insulated from the chassis.

The antenna is tapped onto the coil at 10 turns from each end. This position of the taps permitted the antenna to be matched and loaded fully on each band. These points may be different in other installations and will depend largely upon the length of the feed line and, to some extent, on the antenna height.

Summary

At W1SE, there was insufficient room for the 196-foot length required for the three half waves in phase on 40 meters. Consequently, 40-meter loading coils were used in each of the outboard sections to reduce the size of the antenna to 176.5 feet. These loading coils have a small effect on 80/75 meters, and even less on 160 meters. The dimensions shown in Fig. 1 provide resonance at 7.15, 3.8 and 1.9 MHz. The coils used at W1SE are Van Gordon Engineering Coils, but any commercial 40-meter loading coils should work.[2]

The antenna system described provides good coverage of the top bands, and does it without making suburbia look like the Voice of America antenna site! Also, no balun is needed in this system. The link-coupled matcher permits conversion between the *bal*anced feeder and *un*balanced transceiver, and provides the impedance match that no practical balun could. QST

Notes

[1]L. Aurick, K3AZ, "The AZ Special," CQ, Sept. 1975, pp. 35-37.

[2][Editor's Note: These coils were measured in the ARRL lab and were found to have an inductance of 10.3 μH, and a Q of 170 at 7.1 MHz. One 10-inch piece of B&W Air Dux 1008T coil stock could be cut in half to make a pair of loading coils. Some method of strain relief would be required. A second alternative would be to "roll your own" using information found in *The Radio Amateur's Handbook*, page 2-11.]

New Books

☐ *An Amateur Radio Telescope,* by George W. Swenson, Jr., published by Pachart Publishing House, 1130 San Lucas Circle, P. O. Box 35549, Tucson, AZ 85740. Softbound, 6 × 9 inches, 58 pages, $6.95.

In the radio sky, stars and galaxies shine with an intensity that often differs surprisingly from the brightness of their visible counterparts. Cassiopeia and Cygnus are like beacons in the sky, and the Milky Way blazes through broad daylight to leave its imprint across the face of a chart recorder. Silent to our own ears, the unending procession of celestial objects that passes overhead appears as a howling rage of activity to radio ears. In his book, *An Amateur Radio Telescope*, G. W. Swenson, Jr. shows us that radio astronomy need not be the province of government researchers and large universities alone. The detection and study of extraterrestrial radio sources is within the grasp of the inquisitive radio amateur. A compilation of a series of articles originally published in *Sky and Telescope* magazine, Swenson's book is an excellent and practical introduction to a field that owes its birth to the pioneering work of an Amateur Radio operator over 40 years ago.

Underscoring the amusing fact that one man's noise is another man's signal, the book takes us out of the comfortable, conventional world where narrow-bandwidth circuits squeeze every last decibel of signal out of the surrounding noise in order to maximize the intelligibility of voice or code transmissions. We enter a strange world where the cosmic noise *is* the desired signal, and the radio astronomer's objective is to maximize his receiver bandwidth in order to capture as much noise power as possible from those distant sources. With the exception of that twist, however, Swenson leads us through the design and construction of preamplifiers, mixers, noise and signal generators, attenuators, and other devices and techniques that should be familiar territory to every radio amateur. The concept of interferometry is discussed in some detail. A technique all but unknown to many radio amateurs (yet an indispensable tool to the radio astronomer), interferometry has practical application to OSCAR satellite tracking. In a refreshing treatment of these topics, and with a minimal amount of math, the book details the assembly of a practical 73.8-MHz radio telescope from the antenna to the output recording device. The book includes a list of easily identifiable radio sources "visible" to the amateur observer in the northern hemisphere. Prominent on this list is our own sun. Directly monitoring solar radio emissions should appeal to the observant radio amateur with an interest in "homebrew" ionospheric propagation prediction.

If any criticism can be leveled at the author, it is that he has presented his material so skillfully that we want to see more — more detail on the design of the detector circuits that integrate over minutes instead of milliseconds, and more information about his experimental results and their interpretation. Swenson has told his story expertly and engagingly. His book will prompt many readers to explore a world where the signals that induce such feeble voltages in our antennas have been traveling for untold millenia. — *Ed Kalin, KIRT*

☐ *Designing with Field-Effect Transistors,* edited by Arthur D. Evans and written by Arthur Evans, Walt Heinzer, Ed Oxner and Lee Sheffer of the Siliconix Incorporated staff. Published by McGraw-Hill, New York, NY 10020. Hardcover edition, 6 × 9 inches, 293 pages including index, $24.50.

This informative textbook was written by the applications staff of Siliconix and includes coverage of FET theory, parameters and specifications, low-frequency circuits and high-frequency circuits. There are also sections on analog switches, voltage-controlled resistors and FET current sources. Chapter 7 treats power FETs. The subject of FETs in integrated circuits is illuminated in Chapter 8.

The text is not riddled with lofty terms and nebulous engineering jargon. Rather, the narrative is down-to-earth for all who understand the fundamentals of electronics. But the professional engineer or technician need not feel that the material is too fundamental. To the contrary, the theory and practical data are keyed specifically to the professional in electronics.

There is a substantial amount of valuable tabular data in the book, plus myriad practical circuit diagrams. It is encouraging to note that the writers made no effort to dazzle the readers with endless equations and hypothetical dissertations. This book has "meat," and should be very useful to amateurs who design their own equipment. Those who are interested purely in how FETs operate will also find this volume worthy of being added to the personal technical library. — *Doug DeMaw, W1FB*

☐ *World Press Services Frequencies,* by Thomas Harrington, W8OMV. Published by Universal Electronics, Inc., 1280 Aida Dr., Reynoldsburg, OH 43068. Second edition, 1981. Soft-bound volume, 8-1/2 × 11 inches, 72 pages, $5.95.

Most RTTY-equipped Amateur Radio stations don't limit themselves to copying RTTY signals solely within the amateur bands or on MARS frequencies. Eventually, the operator can't resist the urge to see what's happening on other frequencies and to do a bit of eavesdropping, copying some of the many RTTY signals that fill the airwaves. At first, this may be a "hit or miss" operation. Before long, it blossoms into something a bit more serious, and the need for more information concerning stations and frequencies becomes apparent. It is for these operators and SWLs that this book is intended.

The author begins by covering RTTY reception basics and by briefly describing a limited range of modern commercial RTTY gear. Harrington points out that most news services use a 425-Hz shift and a 50-baud (66-wpm) sending rate. While the present trend is toward video displays, many mechanical teleprinters are still in service. Some emphasis should have been placed on the mechanical speed restrictions of these machines, including some information regarding speed coverters. Similarly, while the commercially manufactured TUs shown are attractive, referencing more simple (and less expensive) homemade units would have been a beneficial addition.

An abbreviated list of equipment manufacturers and their addresses is presented in the third chapter. There are three lists in chapter 4 that provide times of transmission, operating frequencies and the ITU list of over 50 different news services in all parts of the world. This is the "meat" of the book. You'll also be able to tell who you're "printing" by referring to the listing, neatly arranged in chapter 5, of the abbreviations used to identify the various world press services. Additional information concerning RTTY reception, other sources of RTTY station lists, a description of "utility" stations and a listing of several interesting RTTY frequencies to monitor comprise the sixth chapter.

The last page of the book consists of two forms. One is a contributor's form, which you may use to submit candidates for inclusion in the next revision of the listings. The other form is a request for the planned updated frequency lists as they are published. If you're one of the "green keys" set who's enjoying the thrill of getting the news before it hits the TV screen, the data in this book might make your search for the right source a bit easier. — *Paul K. Pagel, N1FB*

Designing a Microprocessor-Based RTTY Speed and Code Converter

Part 2: Software design should be approached with as much care as hardware design. The procedures outlined here are important if programs are to be written efficiently.

By Greg McIntire,* AA5C

Designing a microprocessor-based project involves both hardware and software. The hardware portion of this project was described in Part 1. Transition to the software portion can best be made by describing how the software interacts with the hardware, specifically the I/O ports.[1] Fig. 5 details the input- and output-port bit assignments. Judicious choice of these assignments helps simplify the software. Notice that by making the bit positions for the data I/O the same as for the teleprinter, a software multiplexer has been created.

The programming language chosen for this design was PLM/80,[2] a high-level language used by Intel that is similar to PL1 or BASIC. Using a high-level language frees the programmer from worrying about the details of the processor being used, and provides a program listing that is easy to read and understand. The disadvantages are that a compiler is needed to generate the object code (the code loaded into the EPROM), and a high-level language is usually not as efficient at code generation as carefully written assembly language.

A "top-down" procedure was followed in the software design. The main modules necessary to solve the problem were identified, and the structure linking them was written first. Detailed tasks were filled in later. This procedure allows one to grasp the whole problem without getting bogged down in the details.

Program Subroutines

The calling structure for the routines used is shown in Fig. 6. The DRIVER routine is the taskmaster of the software system. It alternately calls the RCVLOOP and TXCNTRL routines and monitors the MODE, TXRX and SELCAL input lines. A change in these lines causes a call to the SETUP routine.

The SETUP routine is used to initialize the software parameters of the system. These parameters are:

1) Data bit positions in the I/O ports.
2) Timing counts for one-half and one received data bit interval.
3) Number of receive data bits.
4) Shift count used to correctly position the received character.
5) Timing counts for the transmit data and stop bit intervals.
6) Number of transmit bits.

This may seem like a lot of parameters to keep track of, but they are the key to the flexibility of the software system. There is only one receive routine and one transmit routine, regardless of the mode or direc-

[1]Notes appear on page 29.

*5232 Aztec Dr., Box 77512, Lewisville, TX 75056

Input Port Bit Definition

Address 0000_H

Bit	7	6	5	4	3	2	1	0
	MSB							LSB

Bit 0:	Demodulator Input	0 = Mark,	1 = Space
Bit 1:	Input From Current Loop	0 = Mark,	1 = Space
Bit 2:	Tx Key Line	0 = Transmit,	1 = Receive
Bits 3-4:	Mode		
Bits 5-6:	Unused		
Bit 7:	Selective Calling	0 = Activated,	1 = Deactivated

(A)

Output Port Bit Definition

Address 0040_H

Bit	7	6	5	4	3	2	1	0
								LSB

Bit 0:	Output to Current Loop	0 = Space,	1 = Mark
Bit 1:	AFSK Generator Output	0 = Space,	1 = Mark
Bit 2:	Buffer Overflow Output	0 = No Overflow,	1 = Overflow
Bit 3:	Buffer Empty Output	0 = Not Empty,	1 = Empty
Bit 4:	Motor Enable	0 = Motor Off,	1 = Motor On
Bits 5-7:	Unused		

(B)

Fig. 5 — The assignment of signal lines to the bits of the input port is shown at A, while the output port assignments are given at B.

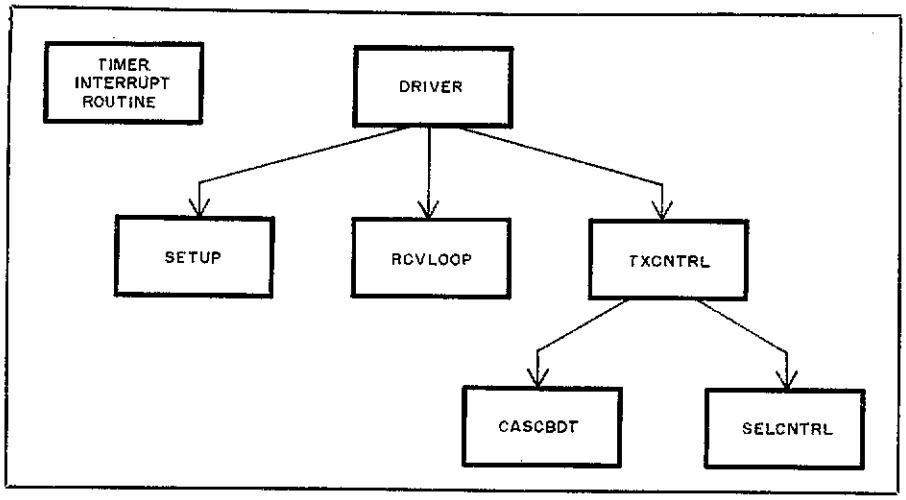


Fig. 6 — The software subroutine call structure. The timer subroutine is interrupt driven. It is called each time the processor is interrupted by the external 2.00-kHz clock.

tion of operation. The SETUP routine is called only if there is a change in the mode, transmitter status or selective-calling inputs.

Fig. 7A details the timing of a 60-wpm Baudot character as it would appear in the incoming data stream. A 100-wpm character is similar except that the data and stop bit intervals are 13.5 and 19 ms respectively, resulting in a total character length of 100 ms. The timing of a 110-baud ASCII character is shown in Fig. 7B.

The incoming data stream is sampled by the RCVLOOP routine. This is a state-driven routine; certain events cause it to go from one state to subsequent states. In state 0, the input is monitored until a space occurs, signaling the start of a new character. The transition to a space causes the routine to go into state 1, where it times to the center of the bit interval. If the space is still present at that time, the routine goes into state 2; otherwise it returns to state 0. State 2 is the main sampling loop: Here each data bit is sampled at the center of the bit interval to determine if it is a mark or a space. Once all of the data bits have been sampled, the routine goes into state 3. In this state, the input is monitored until a mark occurs. The transition to a mark causes the routine to enter state 4 where the presence of the mark is verified one-half bit interval later. Detection of a valid mark causes the routine to load the received character into the queue and then return to state 0 to await the next character.

The queue is a 900-byte block of RAM into which new characters are loaded. The queue location where the next character is to be loaded is maintained by a queue load pointer. A queue unload pointer maintains the location from which the TXCNTRL routine is to fetch the next character for output. The RCVLOOP routine examines these pointers and if a queue overrun is imminent, the buffer-

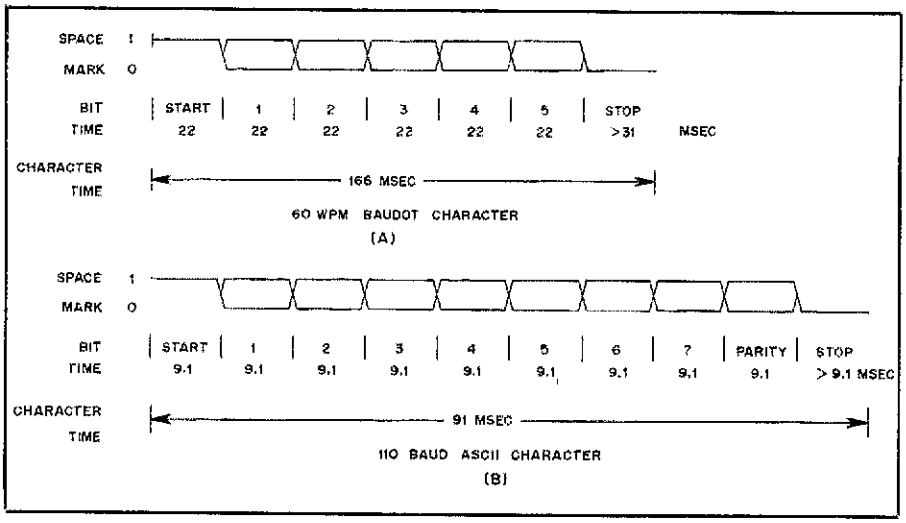


Fig. 7 — Shown at A is the timing of a 60-wpm Baudot character. The timing of a 110-baud ASCII character is shown at B.

overflow LED is illuminated. Data can be loaded into the queue at one speed and removed at another. This is the key to the speed conversion portion of the project.

The TXCNTRL routine, also state driven, is used to output characters from the queue. In state 0, the routine is looking for a difference between the queue load and unload pointers. No difference between the pointers means that no new characters have been added to the queue by the RCVLOOP routine, so the queue empty LED is illuminated. A difference causes the character pointed to by the unload pointer to be fetched. If the converter is in a code-conversion mode, the CASCBDT routine is called to convert the character from ASCII to Baudot, or vice versa. The SELCNTRL routine will also be called if the selective-calling feature is active. Once the character to be transmitted has been derived, a space is output, and if the pointers now match, the queue empty LED is extinguished. The routine then goes into state 1, where each data bit is output. When all the data bits have been transmitted, a mark is output, and the routine goes into state 2. State 2 terminates when the mark bit has been timed, and the routine then goes into state 0 to determine if there are more characters to be output.

The CASCBDT routine is used to convert ASCII characters to Baudot, and vice versa. The direction of transmission determines the direction of the conversion. The routine consists primarily of two look-up tables. The received character is used as an index into one of the tables, and the character pointed to is the converted value. The converted character replaces the character fetched from the queue, and the routine returns to the TXCNTRL routine.

The circular queue avoids one of the pitfalls of many code-conversion routines, the handling of the figures and letters characters. Converting from Baudot to ASCII is no problem as each Baudot character has a corresponding ASCII character (except letters and figures). Converting from ASCII to Baudot, however, requires the detection of a change of case and the insertion of the appropriate character (letters or figures), followed by the character that caused the change. The CASCBDT routine handles this by simply preventing the queue unload pointer from being incremented when the case character is output.

The SELCNTRL routine is called by the TXCNTRL routine if the selective calling feature is activated. This state-driven routine looks at the characters being transmitted, and a match to one of the characters that starts an activation sequence causes the queue pointer to be saved and the next character in the activation sequence to be looked for. This comparing continues until the value completion of an activation sequence. The motor is

then turned on, and the queue pointer is reset to the character position that started the sequence so that it can be printed. Transmission of the sequence NNNN causes the motor to be turned off.

The TIMER routine performs one operation — it increments a reference counter each time it is called by the RST7.5 interrupt. When the maximum count has been reached, the counter automatically resets itself to 0. Time in the system is referenced by adding offsets to the current count. When the counter reaches that value, a given length of time has elapsed.

Bringing Up the System

Testing a microprocessor-based project can be a problem for the amateur who does not have access to in-circuit-emulators or other sophisticated development equipment. Power is applied to the circuit, and it does not work — what then? This problem can be minimized by planning for the testing phase during the hardware and software design. A thorough understanding of what the outputs should be doing, based upon the given input conditions, proved to be enough in my case. An LED that is flashed at a 1-hertz rate, or some other indicator, should be included in any microprocessor project to give the builder some feel for whether or not the program is executing.

The bare minimum of test equipment for projects of this nature is a logic probe and frequency counter. The schematic diagram of a logic probe and "glitch-catcher" is shown in Fig. 8. A two-color LED in the logic probe section indicates the state signal. Red indicates a logic 0, and green indicates a logic 1. A yellow color is visible for transitory signals, the exact shade being determined by the duty cycle of the signal.

Signals with very low duty cycles are not indicated well by this type of logic probe, and that is where the glitch-catcher portion of the circuit comes in handy. A fast flip-flop forms a two-bit counter, the outputs of which are displayed by LEDs. The flip-flop trigger sense is switch selectable, and a reset button allows the counter to be cleared. Infrequently occurring signals can be verified by this portion of the circuit.

The first step in testing the converter circuit should be a thorough point-to-point wiring verification. Most hardware problems result from wiring errors, and the time needed to verify the wiring is well spent.

A reverse-biased power diode between the Vcc and gnd is a cheap safeguard to include before power is applied. With this in mind, apply power to the circuit and verify the CLOCK OUT signal from the processor (U1, pin 37) with a logic probe or oscilloscope. Next verify that grounding the RESETIN input (pin 36) causes the RESETOUT line (pin 3) to go low.

Execution of program memory instructions can be verified by first looking at the hold acknowledge line (HLDA, pin 38). The 8085A has the capability of allowing other devices to become the bus master. This is accomplished by raising the HOLD input (pin 39) to a logic one or by executing a software HALT instruction. The software for the converter does not contain a HALT instruction, and the HOLD input is wired disabled so the 8085A should never place the buses in the high-impedance state. The execution of a HALT instruction will be indicated by the S0 and S1 outputs (pins 29 and 33) being at logic 0. Next look at the ALE signal (pin 30) with the glitchcatcher. This line will be low most of the time, but it goes high to latch the LS byte of the address. The $\overline{WR}$ and $\overline{RD}$ lines (pins 31 and 32) should also be checked. Both lines are normally high, but go low to indicate those operations.

Communication of the 8085A with the devices on the bus can be verified by looking at the address decoder. Pins 15, 13, 11 and 9 on the 74LS138 (U6) should normally be high with low-going transitions. Pins 14, 12, 10 and 7 should always be high.

The 555 timer should be set to 2.00 kHz ±25 Hz. The duty cycle is immaterial as the edge-triggered RST7.5 interrupt of the 8085A is used. Normal quiescent inputs to the system are a low on the DEMODIN line and a low on the MARKIN line (a mark in the current loop).

These conditions should cause the BUFFER EMPTY LED to be on and the BUFFER OVERFLOW LED off. The MARKOUT and the AFSKOUT lines should be high for these input conditions. A valid input character should cause the BUFFER EMPTY LED to flash and the MARKOUT line to toggle if the TXRX line is high (teleprinter receiving). The AFSKOUT line should be unaffected. A valid character from the teleprinter should also cause the BUFFER EMPTY LED to flash if the TXRX line is low (teleprinter transmitting). This time the AFSKOUT line should toggle, and the MARKOUT line should be unaffected.

The selective calling feature, if used, can be tested by monitoring the MTRENB line on the output port. With the TXRX and SELCAL lines low, transmit a valid activation sequency from the teleprinter. This should cause the MTRENB line to go high. The transmission of the sequence NNNN should then cause the MTRENB line to go low.

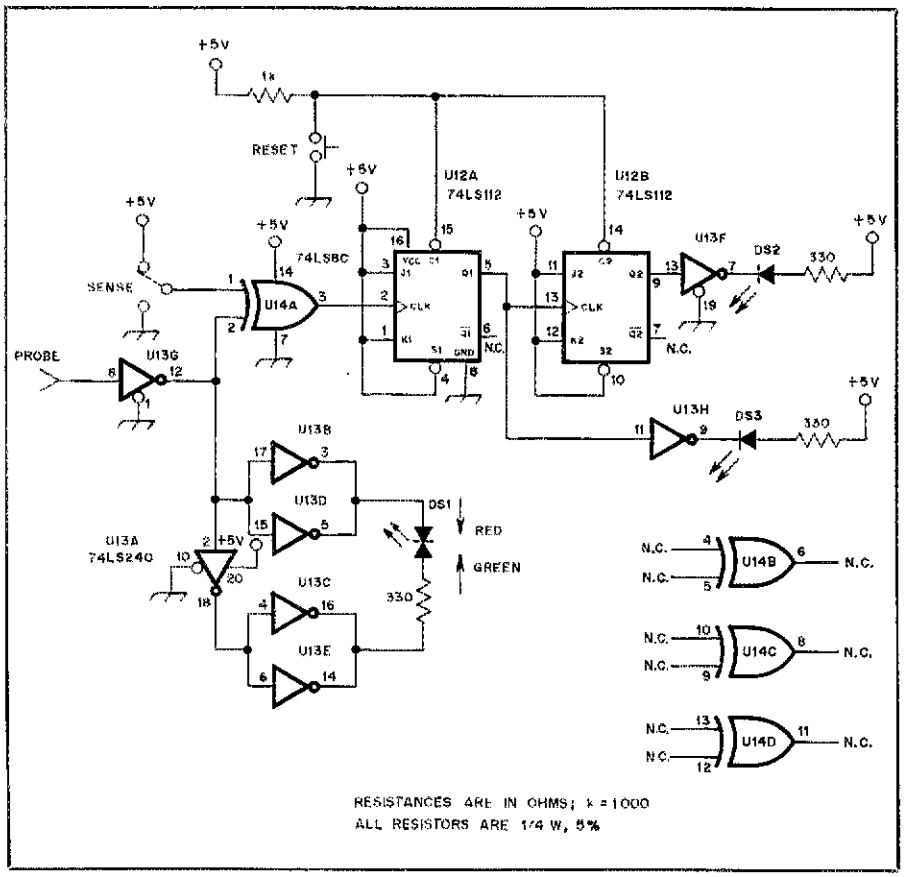


Fig. 8 — A logic probe and "glitch catcher" is useful when testing microprocessor and other digital circuits. The "glitch catcher" will indicate the occurrence of a single pulse. This circuit was designed by Tom Leete. DS1 is a two-color LED (red and green), and S2 is a normally open push-button switch.

Conclusion

The design of a microprocessor-based

project should not be viewed as a mysterious and complicated task. Rather, it should be thought of as a logical progression of steps followed to arrive at a solution. I have attempted to illuminate the following points relative to designing microprocessor systems:

1) Define the system requirements before designing the hardware or software. Get a good grasp of the whole problem before starting the detailed design. Describe in detail what you expect the system to do.

2) Choose the microprocessor. Available software support should be a major factor in this choice. Study the manufacturer's data sheets in detail. The program memory in most small projects is EPROM, so plan for some means of programming them.

3) Block out the hardware required and include the circuitry necessary to convert the I/O signal levels to those required for the microprocessor. Then proceed with the detailed design of the hardware. Try to consider how the software can be simplified by the choice of the bit assignments for the I/O ports. Plan on adding a little extra hardware and software for testing.

4) Design the software using a top-down approach no matter what language you choose to use. Concentrate on the high-level program structure first and simply include program stubs for the lower-level routines. These can be filled in once the high-level structure has been completed.

5) Thoroughly test the system. Some hardware and software testing should be done during construction, but once the system is all together, test all modes to verify that it fulfills the design requirements of step 1.

This project has provided me with a very flexible solution to the speed-conversion problem. It has the added features of multiple speeds, ASCII-to-Baudot conversion and selective calling, all for about the same cost as a new set of teleprinter gears. This flexibility is the main reason microprocessors are so useful in solving many problems. In the future, more and more products used by the amateur will contain microprocessors. Why not jump on the bandwagon and find out how exciting it can be to solve problems with microprocessors? ■

Notes

[1]Software is currently available for use with a 60-, 67- or 100-wpm Baudot or 110-baud ASCII teleprinter. A complete listing of the PLM/80 source and hex object code is available from ARRL for $3. The object code listing is available for 50 cents and an s.a.s.e. Be sure to specify the teleprinter type that is to be used with the converter. A programmed 2716 EPROM can be obtained from the author for $25. The ARRL in no way warrants this offer. Details regarding the EPROM can be obtained from the author (inquires must include an s.a.s.e.).

[2]*Intel PLM/80 Programming Manual*, available from Intel Corp., Literature Dept., 3065 Bowers Ave., Santa Clara, CA 95051.

New Books

☐ *Amateur Radio, Super Hobby!* by Vince Luciani, K2VJ, published by Cologne Press, Cologne, New Jersey. First printing, 1980; softcover, 8-1/2 × 11 inches, 144 pages.

Author Luciani set out to do with *Amateur Radio, Super Hobby!* what few before him have been able to do with much success: write an interesting and easy-to-understand book about Amateur Radio for the layperson. What emerged, however, is a book riddled with flaws that falls short of its mark.

Like a doctor about to stick a patient with a needle, Luciani uses a light and breezy narrative to set his readers' minds at ease, while he administers his own injection of Amateur Radio. His use of the first person singular, a personal touch to offset a subject often thought of as too technical, could have been a refreshing change from the drab, textbook approach used in most books on ham radio. But early on, Luciani lets this attempt at creativity get the better of him, and the book becomes more of a showcase for the author (and son Jim, who is often mentioned) and less of a lesson in Amateur Radio.

Too often the book becomes bogged down with the author's self-indulgences, and the reader must muddle through trite phrases like "cool the exam" and "take my word for it" to find something of substance. At one point the author pleads with the reader (who Luciani openly fears will be easily discouraged by any of several methods of learning Morse code): "Try another, please."

What information Luciani does give his readers is sufficient for a general, albeit surface, understanding of Amateur Radio, at an eighth-grade level. Most of the interesting facets of the hobby are introduced — from emergency preparedness to contests and QSLs — to inspire the reader to get a Novice license. Sometimes, though, Luciani's eagerness to swell the Novice ranks smacks of the "hard sell" and may seem offensive. In one instance, he tells parents to get their children involved in the hobby because "they wouldn't want to deprive them (children) of that pleasure."

One glaring deficiency in the book is its poor organization, which is surprising for an author with a technical-writing background. Some chapters begin with one subject and end with another. In others, the reader is introduced to a new idea, only to be told that it will be discussed in a later chapter. Still other chapters seem totally out of place. A chapter about women in Amateur Radio is mysteriously squeezed in between benefits of the hobby and repeaters, when 19 chapters later there is one called "YL Profiles."

Much of the book is loaded with extraneous material, which seems to have been included to stretch what would have been a short book into 144 pages. Sixteen chapters, covering nearly 40 pages, are devoted to profiles of hams, most of whom may be known to hams but not to nonhams. Fewer and better examples would have made the point, not belabored it. Add to that the pages given to lists of FCC field offices, manufacturers, publishers — all of which were mentioned in the body of the book — and the 8-page, 101 question-and-answer test at the back of the book (which, by the author's own admission, bears little resemblance to questions found on the Novice exam). The liberal use of white space and large type also helps extend the book past its otherwise short length.

One particularly irritating feature of the book is the cartoons that, aside from eating up lots of space, serve no constructive purpose. Most of them are corny, and do little to complement the text. In the beginning of the book, the author tells his readers that he "resisted the terrible temptation to fatten the book with photographs." Yet, he has absolutely no qualms about fattening the book with dozens of cartoons, some of which take up an entire page.

If the book has any redeeming features, they are a 5-page glossary, which gives concise, easy-to-understand meanings to frequently used Amateur Radio jargon, and the fact that the book can be easily read in one evening. — *Andrew Tripp*

☐ *Motorola Optoelectronics Device Data*, published by Motorola Semiconductor Products, Inc., P. O. Box 20912, Phoenix, AZ 85036. Softcover, 7 × 9-1/4 inches, 286 pages, $3.25.

This manual provides detailed device data sheets, selector guides, cross references and applications information for optoelectronics and fiber-optics devices. Concentration has been placed on infrared GaAs emitters, silicon detectors, high-technology opto-coupler/isolators, and an innovative approach to fiber-optic components, modules and links. Coverage includes the entire family of high-technology, opto-triac drivers and the new SCR couplers.

A fiber-optics section principally addresses the application of this system to the computer, industrial control and medical electronics fields, and discusses its consumer and automotive applications. While not geared specifically toward the Amateur Radio enthusiast, the related information certainly can be used in this area as well. The manual points out that analog and digital modulation schemes, at bandwidths through 50 MHz and system lengths through several miles, may be achieved using currently available Motorola fiber-optic devices. — *Paul K. Pagel, N1FB* ■

Practical 75- and 300-Ohm High-Pass Filters

Having TV-receiver overload problems? Build one of these simple, inexpensive modern-design filters for an up-to-date solution to an old problem.

By Edward E. Wetherhold,* W3NQN

According to a recent FCC report,[1] a significant part of the TVI problem is front-end overload caused by CB radio and (to a lesser extent) Amateur Radio. This particular problem is estimated to be the source of 25% of all interference complaints received by the FCC. Because of this, the radio amateur should have access to up-to-date design information on high-pass filters suitable for preventing TV receiver overload. Unfortunately, most present high-pass filter construction data is based on designs that are more than 25 years old.[2,3,4] For example, this data is practically indentical to that published in 1957 and 1951.[5,6]

During the past quarter century, there has been considerable change and progress in Amateur Radio design and construction techniques. The old image parameter filter-design procedure has been largely replaced by that of modern filter design (also known as *network synthesis)* in which computer-generated tables provide simpler designs with performance equivalent to that of the image parameter designs. In addition, modern components such as iron powder or ferrite toroidal cores and high-stability, low-loss monolithic ceramic capacitors permit the construction of compact, high-performance filters that were not possible 25 years ago. Modern test equipment such as spectrum and network analyzers with computer-controlled plotters now allow filter performance to be quickly and thoroughly documented.

The old image parameter filter designs using air-core coils served adequately in the past. But now it is time for modern filter-design procedures and components to be used to obtain filters that are easier to build and are less costly than filters of yesteryear. This article presents several types of inexpensive modern-design high-pass filters that are suitable to protect against TV receiver overload.

[1]Notes appear on page 34.

*Honeywell Inc., Signal Analysis Center, P.O. Box 391, Annapolis, MD 21404

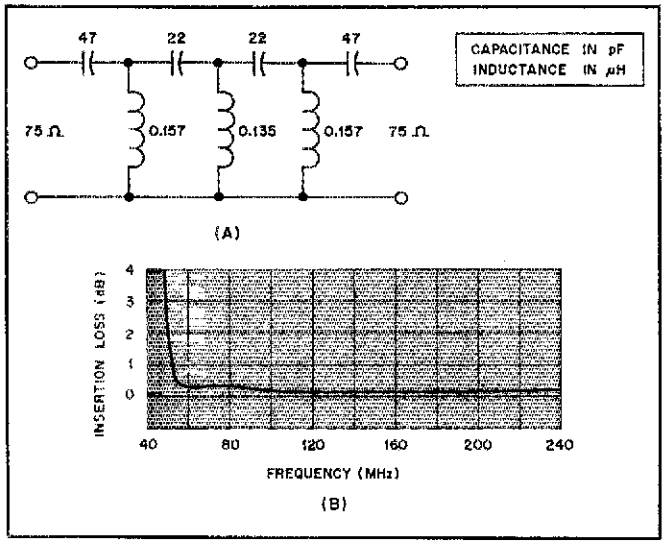


Fig. 1 — The schematic diagram of a 75-ohm Chebyshev filter assembled on pc board is shown at A. At B, the passband response of the 75-ohm filter. Chebyshev filter design parameters: reflection coefficient = 5.6%, F-A_D = 54.07 MHz, $F_{3\,dB}$ = 47.7 MHz, $F_{30\,dB}$ = 34.9 MHz. Design Inductances: 0.157 μH: 12 turns no. 24 wire on T44-0 Micrometals core. 0.135 μH: 11 turns no. 24 wire on T44-0 Micrometals core. Turns should be evenly spaced, with approximately 1/4 inch between the ends of the winding. If T37-0 cores are used, wind 14 and 12 turns, respectively.

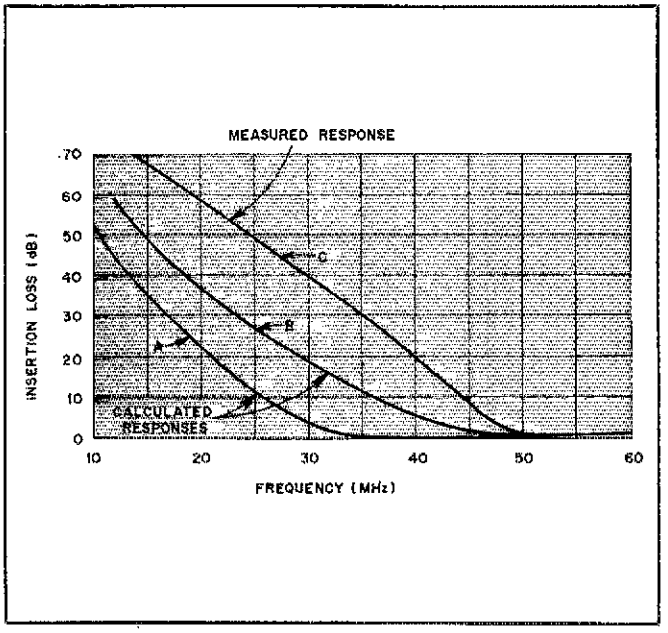


Fig. 2 — At A, computer-calculated insertion loss for a 5-element design from *The Radio Amateur's Handbook*, p. 15-12. B shows the computer-calculated insertion loss for a 5-element design from *The Radio Handbook*, 1978, p. 16.3. At C, measured insertion loss for the 7-element Chebyshev filter of Fig. 1.

The transmission line connecting the TV antenna to the receiver can be 75-ohm unbalanced-to-ground coaxial cable or 300-ohm twin-lead. The type of antenna lead-in will determine which of the following filter types to use.

75-Ohm High-pass Filter for Coaxial Cable

Fig. 1 shows the schematic diagram and the measured passband response of the filter design selected for installation in a 75-ohm coaxial cable antenna system. The measured stopband response of the new filter compared with the computer-calculated responses of two currently published designs is shown in Fig. 2. Fig. 3 is a photograph of the completed filter, with and without its tinned-steel container.

Filter Design

A 7-element Chebyshev design was used instead of a 5-element design because it provides over 12 dB per octave more attenuation than a 5-element filter. To simplify construction, a design using only standard-value capacitors was selected from a previously published table of precalculated designs.[7] Although the precalculated designs are based on an impedance of 50 ohms, a simple scaling procedure was used to get a 75-ohm design using standard-value capacitors.[8] A design having an F-A_p cutoff frequency of 54.07 MHz [F-A_p is the frequency at which the passband attenuation level first exceeds the peak amplitude of the passband attenuation ripple — Ed.], and a reflection coefficient of 5.6% was selected mainly because the 22- and 47-pF capacitor values are common and therefore easy to obtain. This value of reflection coefficient is low enough to provide a low maximum VSWR (1.12:1) while also providing a reasonable rate of increase in the stopband attenuation. Several other designs between 48 and 54 MHz having reflection coefficients between about 1 and 6% also could be used, but the capacitor values may not be as commonly available as the two values used in the design shown in Fig. 1. Table 1 shows four other designs that are suitable for this application.

Filter Construction

The capacitors used were ERIE "Red Caps," an ultrastable COGO (NPO) ceramic type for use in circuits requiring good capacitance stability and low loss over a broad temperature and frequency range. Other types of NPO ceramic capacitors having similar characteristics should be equally satisfactory. The inductors were wound on Micrometal, Inc. toroidal powdered-iron cores, which are available from Amidon or Palomar in small quantities.[9,10] This inductor type is inherently self-shielding, and a compact filter assembly is possible without undesired interstage coupling between inductors. The measured unloaded Q at 25 and 50 MHz was 66 and 80, respectively. Winding details are given in Fig. 1.

Double-sided 1/16-inch (mm = inches × 25.4) Teflon-fiberglass pc board [available in small quantities from Alaska Microwave Labs, 4335 E. 5th St., Anchorage, AK 99504 — Ed.] was used as a base for the filter components, but any other type of pc material should be equally satisfactory. The copper on the bottom of the board served as a ground plane. A section of copper on the top was stripped away on both sides of center to approximate a 75-ohm micro-strip line about 3/32 inch wide (see Fig. 3). Both sides of the top copper foil (at the edges) were connected to the ground plane underneath with eyelets or rivets inserted through the board. Two Radio Shack 75-ohm coaxial connectors (278-212) were modified by slicing off the extruded insulation around the solder pins to allow the connectors to butt directly against the pc board. Next, the shells of both connectors were soldered to the ground plane, and the center pins soldered to the micro-strip line. The micro-strip line was cut in four equally spaced places, and the capacitors were mounted across the spaces. The inductors were tack-soldered between the capacitor junctions and the ground plane on the top of the board. T44-size cores were used because they were on hand, but the smaller T37 cores should work equally well to give a more compact assembly. [A filter built in the ARRL Lab used a scrap of G10 epoxy-glass board and T37-0 cores. The performance of this filter was essentially the same as one submitted by the author — Ed.] To provide additional body and strength to the solder joints between the connector shells and the underside of the ground plane, a 1/2-inch length of Solder Wick was placed over the previously soldered junction. The braid was shaped to conform to the shape of the connector circumference, and then the wick was flooded with solder. This must be done quickly before the polyethylene insulation inside the connector gets too soft. The shielding provided by a metal case is probably unnecessary, and it may be omitted to minimize cost; however, it might be advisable to add something to protect the components from dust, dirt and physical abuse. The filter could be put in a plastic box, or it could be wrapped loosely with tape to give some protection to the components.

Filter Performance

Satisfactory filter performance for both low- and high-pass types is much more difficult to achieve in the frequency range above rather than below the cutoff frequency. This is because the stray inductance and capacitance associated with the filter components become progressively more significant and difficult to control as the frequency increases. Consequently, it is more difficult to get a satisfactory passband response than a stopband response in a high-pass filter. Fig. 1 shows that the measured passband insertion loss is less than 1 dB from 54 to 240 MHz, so the TV signal level should be relatively unaffected by the addition of the filter to the transmission line. When this response was measured, BNC coaxial connectors were used (because of their low loss) to indicate more clearly the effect of the

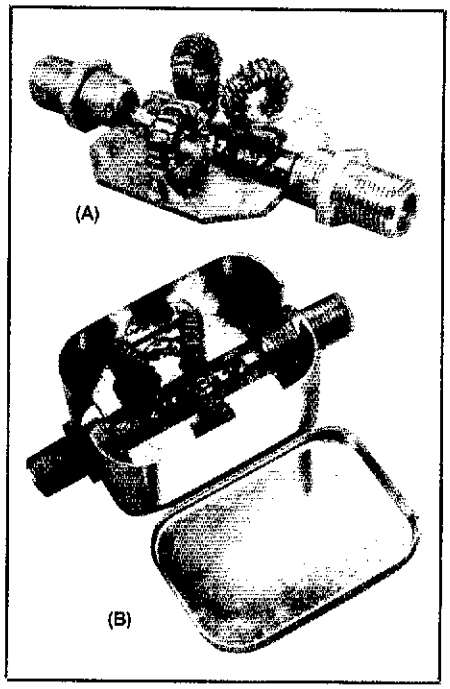


Fig. 3 — At A, photo showing construction of the 75-ohm unbalanced filter. At B, filter installed in a tin-dipped steel case for protection of the components.

Table 1
75-Ohm High-Pass Filters Using Standard-Value Capacitors

Filter Number	Frequency (MHz) A_p	3 dB	30 dB	50 dB	Reflection Coefficient (%)	C1,7 (pF)	C3,5 (pF)	L2,6 (μH)	L4 (μH)
1	48.3	37.2	25.6	19.1	1.00	82	30	0.209	0.165
2	49.4	43.7	32.0	24.5	5.78	51	24	0.171	0.148
3	50.0	40.7	28.6	21.5	1.93	68	27	0.187	0.152
4	53.0	45.0	32.2	24.4	3.27	56	24	0.167	0.140
5*	54.1	47.7	34.9	26.7	5.60	47	22	0.157	0.135

*This design was constructed and tested. See Figs. 1, 2 and 3. The frequencies listed above were computer calculated based on the given reflection coefficient. The plotted insertion-loss values in Fig. 2 may be different from the calculated values because of component tolerance and losses.

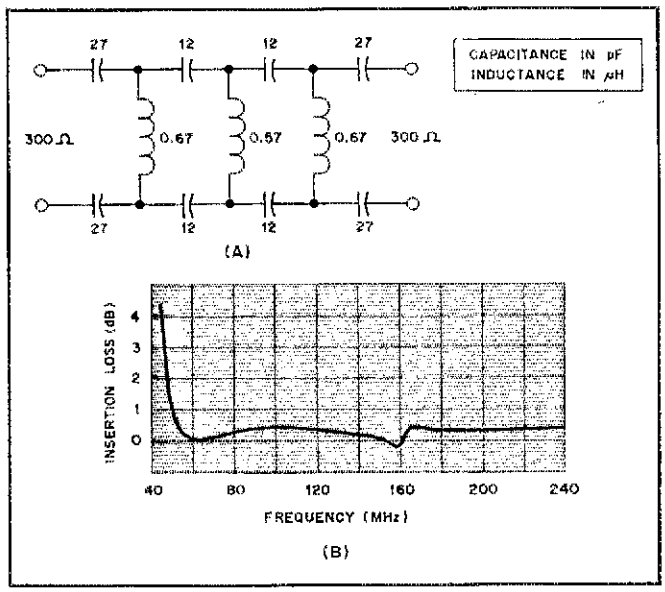


Fig. 4 — At A, schematic diagram of a 300-ohm balanced Chebyshev filter assembled on perf-board material. The passband response of the 300-ohm filter is shown at B. Design parameters: reflection coefficient = 4.111%, F-A_p = 51.6 MHz, F_{3dB} = 44.5 MHz, F_{30dB} = 36.0 MHz. Design inductances: 0.67 μH: 13 turns no. 24 wire on T44-10 Micrometals core. 0.57 μH: 12 turns no. 24 wire on T44-10 Micrometals core. Turns should be evenly spaced, with approximately 1/4 inch between the ends of the winding. If T37-10 cores are used, wind 15 and 14 turns, respectively.

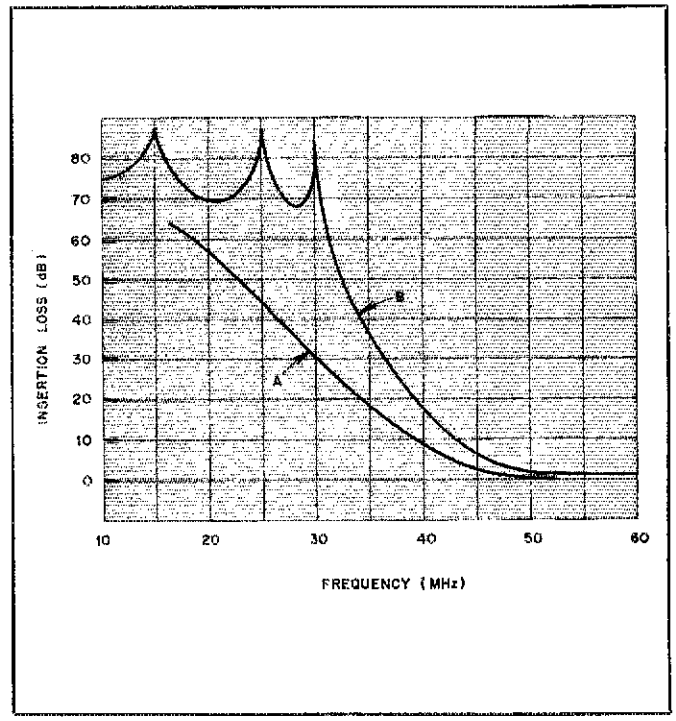


Fig. 5 — Stopband insertion loss of 300-ohm balanced high-pass filters. At A, Chebyshev design on perf-board using NPO ceramic capacitors. At B, elliptic design with pc-board capacitors.

capacitor and inductor losses. When the Radio Shack connectors were used, the insertion loss above 150 MHz gradually increased to 1 and 2 dB at 175 and 240 MHz, respectively.

The measured passband and stopband responses were obtained with the following Hewlett-Packard equipment: 8444A-H59 (0.5-1500 MHz) tracking generator, 8568A digital spectrum analyzer and 9825A desktop computer with a 9872A plotter. The digital spectrum analyzer has memory storage so that the filter response with connecting cables and 50/75-ohm matching pads could be measured and stored. After the filter was removed, the cable and pad losses were measured and then subtracted from the previously stored responses to give the exact response of the filter by itself. The calculated insertion loss graphs in Fig. 2 were obtained by using the component values with a BASIC network analysis computer program. Many years ago, it was not feasible to obtain this data, but now, with modern test equipment, the most complex filters can be tested quickly and conveniently.

High-Pass Filters for 300-Ohm Twin-Lead

Fig. 4 shows the schematic diagram and the measured passband response of the Chebyshev 300-ohm balanced filter. Fig. 6 shows the filter components assembled on a small piece of perfboard. The filter design is based on a 7-element Chebyshev design with an F-A_p cutoff frequency of 51.6 MHz, and a reflection coefficient of 4.111%. Because the 300-ohm impedance level is four times greater than that of the

Fig. 6 — Construction of the perf-board 300-ohm Chebyshev high-pass filter. Twin-lead connections are tack soldered to the two eyelets at each end of the board.

75-ohm filter, the inductance values of the 300-ohm filter are about four times greater than those of the 75-ohm design. Consequently, a different type of toroidal core is used for the 300-ohm filter to get optimum results. See Fig. 4 for capacitor and inductor values. As before, high-stability, low-loss NPO ceramic capacitors were used.

The passband response (Fig. 4) shows an insertion loss less than 1 dB over the 54- to 240-MHz range. However, there are discontinuities in the insertion loss slope and a slight insertion gain between 150 and 161 MHz. This anomaly may be associated somehow with an interaction between the filter and the 75/300-ohm baluns used in the measurement test setup. In any case, the filter passband attenuation is relatively low and flat, and extends beyond 240 MHz.

The stopband response of this filter is 10 dB poorer at 30 MHz than the 75-ohm filter (see Figs. 2C and 5A), but in most cases this attenuation level will still be adequate. If greater attenuation is needed, then the elliptic design (Fig. 5B) should be used. A suitable elliptic design will be discussed later.

Printed-Circuit Board Construction

While reviewing the various publications for background material on high-pass filter design, I came across an interesting reference in which a pc board was used to fabricate the capacitors in a high-pass filter.[1] I used this pc-board capacitor technique in an attempt to duplicate the previously discussed 300-ohm perf-board filter. Photographs of the top and bottom of the pc-board filter are given in Fig. 7. The construction details for this filter are given in Fig. 8. The passband and stopband responses of the filter with printed-circuit-board capacitors were virtually identical to that of the 300-ohm perf-board filter. Above 100 MHz, the passband loss gradually increased from 1 to 2 dB. This is attributed to the higher losses of the pc-board dielectric material compared with the lower loss dielectric of the ceramic capacitors used in the perf-board filter construction.

G10 epoxy-glass double-sided copper-clad board with a thickness of 1/32 inch was selected because its capacitance versus area gave a convenient overall size. The capacitance of this board may vary as much as 20% from batch to batch. If a capacitance meter is available, start with a piece of material 44-mm wide × 80-mm long and trim the length to obtain a capacitance of 180 pF ±10%. The individual capacitors should then be trimmed to the design values. The

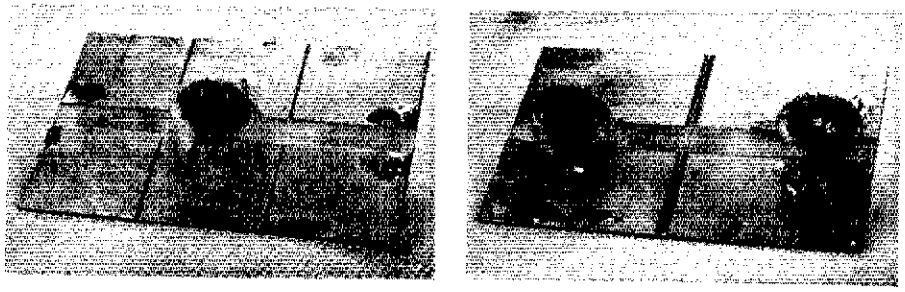


Fig. 7 — At left, top view of the 300-ohm filter using pc-board capacitors. The twin-lead is tack-soldered at the left and right ends of the board. The bottom view of the filter is shown at right.

capacitors are cut slightly undersize to compensate for fringing effects at the edges, which tend to increase the capacity. Thus, the capacitance calculated from the given pc-board dimensions is less than the specified value, although the actual capacitance (measured with a digital capacitance meter) is as given in Fig. 8. The two filter halves are separated by almost 1/4 inch to minimize capacitive coupling. A separation equal to approximately eight times the board thickness was believed to be adequate. These cuts are best made with an X-Acto knife, and the

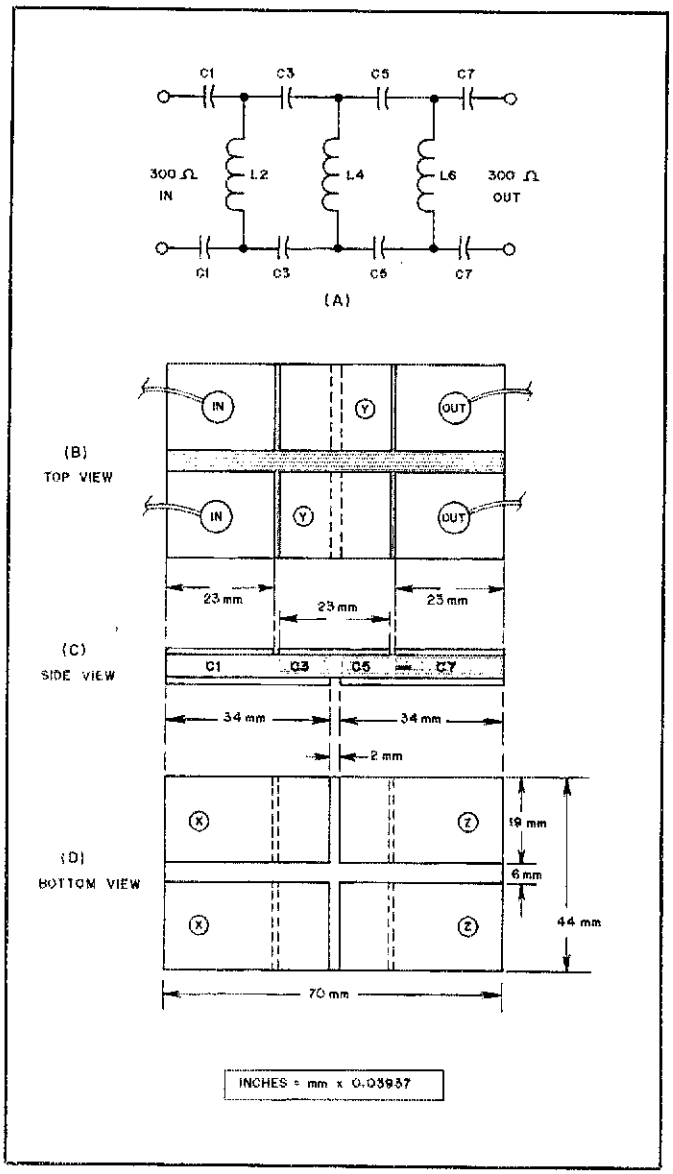


Fig. 8 — Schematic and pictorial diagrams of the 300-ohm balanced high-pass filter with pc-board capacitors. Shaded areas indicate where copper has been removed. Dimensions are given in millimeters for ease of measurement. This pc-board material has a capacitance per unit area of 0.057 pF/mm^2. L2 leads connect to the points marked Ⓧ L4 connects to the points marked Ⓨ and L6 connects to the points marked Ⓩ on the pictorial. Design parameters for a 7-element 300-ohm Chebyshev high-pass filter: reflection coefficient = 8.8%, F-A_p = 42.3 MHz, C1 = C7 = 26 pF, C3 = C5 = 13.2 pF. Design inductances: L2 = L6 = 0.788 μH: 14 turns no. 26 wire on a T44-10 core. L4 = 0.693 μH: 13 turns no. 26 wire on a T44-10 core. Turns should be evenly spaced, with approximately 1/4 inch between the ends of the winding. If T37-10 cores are used, wind 16 and 15 turns, respectively.

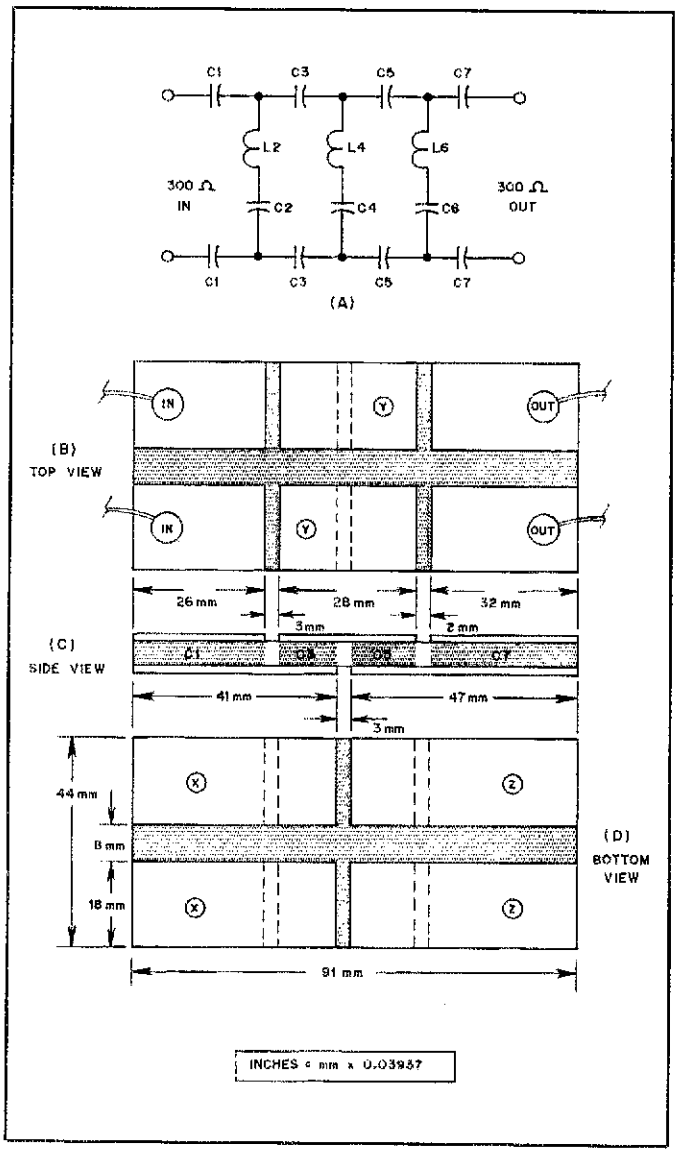


Fig. 9 — Schematic and pictorial diagrams of the 300-ohm balanced elliptical high-pass filter with pc-board capacitors. Shaded areas indicate where copper has been removed. Dimensions are given in millimeters for ease of measurement. L2-C2 connects between the points marked Ⓧ L4-C4 connects between the points marked Ⓨ and L6-C6 connects between the points marked Ⓩ on the pictorial. Design parameters for a 7-element, 300-ohm, elliptical high-pass filter: reflection coefficient = 5%, F-A_p = 50.2 MHz, A_s = 68.8 dB, C1 = 28.0 pF, C3 = 14.0 pF, C5 = 14.8 pF, C7 = 34.2 pF, C2 = 162 pF, C4 = 36.0 pF, and C6 = 46.5 pF. Design inductances: L2 = 0.721 μH: 14 turns no. 26 wire evenly wound on a T44-10 core. L4 = 0.766 μH: 14 turns no. 26 wire bunched as required on a T44-10 core. L6 = 0.855 μH: 15 turns evenly wound on a T44-10 core. These coils should be adjusted for resonance at 14.7, 30.3 and 25.2 MHz.

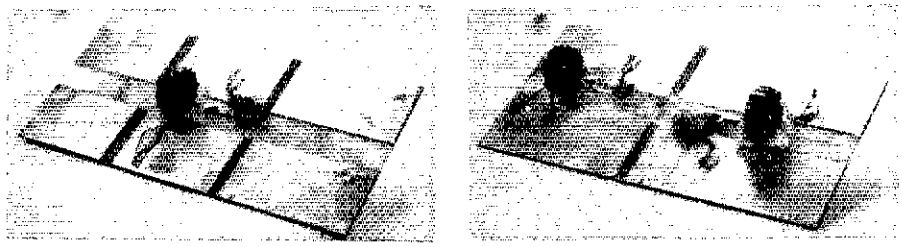


Fig. 10 — A top view of the 300-ohm elliptic filter using pc-board capacitors is shown at left. Twin-lead is tack soldered at the left and right ends of the board. At right, bottom view of the filter.

strips peeled off. Heating with a hot soldering iron will help the strip lift easier. Etching is not necessary for such a simple pattern. This pc-capacitor-forming technique makes it very easy to assemble an inexpensive but effective high-pass filter.[12]

300-Ohm Elliptic-Filter Design

Because the attenuation performance of the Chebyshev pc-capacitor filter was so satisfactory, the same technique was used to construct an elliptic filter for greater attenuation at 30 MHz and below. An elliptic design is distinguished from a Chebyshev design by its resonant sections that cause a more abrupt increase in stopband attenuation. Fig. 9 shows the schematic diagram and component values of this filter. Fig. 10 is a photograph of the top and bottom of the filter. The same type of pc-board material was used for this filter as for the 300-ohm Chebyshev filter.

Another important characteristic of the elliptic design compared with the Chebyshev is that C1, C3, C5 and C7 are all different values. Normally, this would cause a problem in matching the design values to standard capacitor values, but in this case, any capacitor value can be easily obtained by correctly partitioning the pc board to the required dimensions. Thus, the pc-board filter technique is ideally suited to provide the eight series capacitors in the balanced 300-ohm elliptic filter. The capacitors in the three shunt-tuned circuits are conveniently realized with NPO ceramic capacitors.

The passband response of the elliptic filter was virtually identical to that of the Chebyshev pc-board filter, and consequently, the related plot is omitted. The elliptic filter stopband response is shown in Fig. 5B, and the characteristic stopband attenuation peaks at 30, 25.5 and 15 MHz are apparent. These measured stopband attenuation peaks and the measured minimum stopband attenuation (A_s) of 68 dB agree very well with the calculated values given in Fig. 9. This design should suffice for those situations where greater attenuation is needed to prevent TV-receiver front-end overload.

Conclusion

These high-pass filter designs have significantly improved performance and ease of construction compared with designs originating more than 20 years ago. I expect these modern designs to be improved and simplified, but hopefully this will occur more promptly than in the past. Improvements to these high-pass modern designs can be expedited if those who build and install the filters will communicate their experiences and comments to the author and the ARRL. This will help make it possible for the corrections and improvements to be shared by all radio amateurs.

The author wishes to acknowledge the assistance of Joseph Gutowski of EWC, Inc., and Rex Cox of Honeywell, Inc., for the review of the manuscript. The author is also grateful to Honeywell, Inc., for making it possible to use the equipment needed for the filter evaluations.

Notes

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[2]J. Rusgrove and G. Woodward, *The Radio Amateur's Handbook*, 58th ed. (Newington, CT: ARRL, 1981), p. 15-12.
[3]W. I. Orr, *The Radio Handbook*, 21st ed. (Indianapolis: Editors and Engineers, 1978), p. 6.3.
[4]W. Lowry, D. DeMaw, et al., *Radio Frequency Interference* (Newington, CT: ARRL, 1978), p. 34.
[5]*The Radio Amateur's Handbook*, 34th ed. (West Hartford, CT: ARRL, 1957), p. 550.
[6]Orr, *The Radio Handbook*, 13th ed. (1951), pp. 386-387.
[7]E. Wetherhold, "7-element 50-ohm Chebyshev Filters Using Standard-Value Capacitors," *R. F. Design*, Feb. 1980, p. 26.
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[9]Amidon Associates, 12033 Otsego St., North Hollywood, CA 91607.
[10]Palomar Engineers, 1520-G Industrial Ave., Escondido, CA 92025, tel. 714-747-3343.
[11]P. Hawker, *Amateur Radio Techniques*, 6th ed. (London: RSGB, 1978), p. 199.
[12]Circuit boards and parts kits are available from Circuit Board Specialists, P. O. Box 969, Pueblo, CO 81002.

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Strays

TA PROFILE

☐ We certainly appreciate the many services rendered by ARRL Technical Advisor Robert V. C. Dickinson, W2CCE, of Berkeley Heights, New Jersey. A professional expert on CATV/CATV leakage problems, Bob has written the material for the CATV Interference chapter of our new (revised) edition of *Radio Frequency Interference*, available now from ARRL or your local dealer.

Bob was first licensed in 1947 and now holds an Extra Class license. Over the years he has worked the hf and vhf bands, with emphasis on antennas, RTTY and missionary traffic. He is a longtime member of the Amateur Radio Missionary Service. As a professional engineer, Bob has been involved in various areas of radio communications, radar, navigation systems, electronic countermeasures and international broadcasting. Much of his time during the last 10 years has been devoted to several areas of cable television.

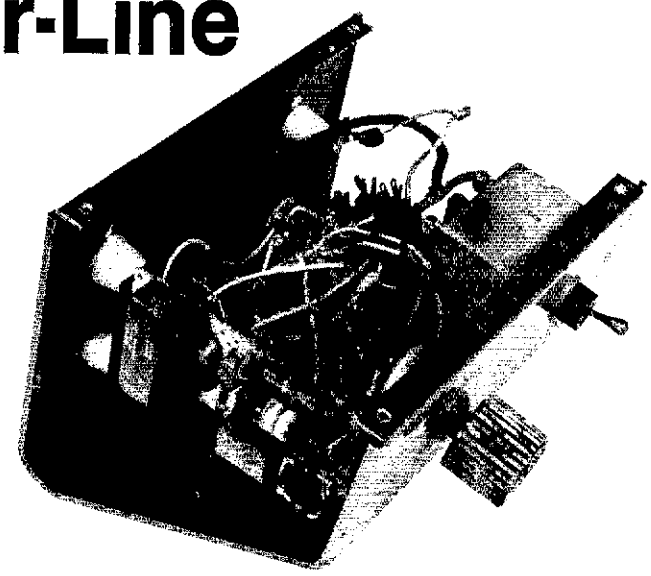
Bob is the recipient of a Mechanical Engineering degree and an MSEE degree in computer science from the Stevens Institute of Technology. He is the President of E-Com Corporation of Stirling, New Jersey, a firm that designs and manufactures equipment for data transmission and special services on CATV networks. — *Marian Anderson, WB1FSB*

TA Bob Dickinson, W2CCE

I would like to get in touch with . . .

☐ anyone with a circuit diagram for a XETEX (also identified as Advance Instrument) OS15 oscilloscope. Walt Jackson, KB3LH, 281 Irish Road., Berwyn, PA 19312.

Protect Your Equipment from Damaging Power-Line Transients



Your rig getting spiked? Probably 50 to 100 times a day! Get on the MOVs. Protect your sensitive radio today.

By Ken Stuart,* W3VVN and Gene Collick,** W8LEQ

Several years ago I designed and built an automatic dimmer for photoflood lamps. Even though the dimmer worked flawlessly, I would occasionally come into the room after a violent thunderstorm to discover an odor of charred components and would find the circuit breaker on the dimmer had tripped. Investigation always revealed that a bridge rectifier, which was connected directly across the 117-V line inside the dimmer and rated for at least 600 V, had shorted. After replacing the bridge four or five times in as many years, the dimmer was retired from service. Obviously, line-voltage transients of sufficient magnitude to exceed the 600-V PIV rating of the diodes were causing destruction of the diodes and surrounding parts (See photo).

Back in the "good ole days" of radio, semiconductor junctions were used only for detectors in radio receivers or for similar applications such as gate diodes in automatic noise limiters. All of the power-rectification functions were handled by vacuum or gas-filled tubes. These tubes were capable of withstanding short-duration overvoltages and internal arcs caused by power-line transients. In fact, most line transients, even those occurring during equipment operation, were not likely to cause equipment damage and probably went unnoticed. Only large transients, such as those caused by nearby lightning strikes, would cause notable damage, usually as a result of arcing to ground or across open switch contacts

When the semiconductor age arrived the bulky tube rectifier gave way to the tiny solid-state diode, which had the ability to handle much higher levels of forward current with almost no voltage drop.

This reduction in active-device size over the years has given rise to problems of transient protection. Semiconductor junctions are easily destroyed by voltage or current transients of less than a millionth of a second (microsecond) duration. In fact unprotected MOSFETs and integrated circuits containing unprotected MOS devices can be destroyed simply by picking them up. The small static-voltage difference between the human body and the device can arc across the gate-insulation layer. Since ICs and MOS transistors are standard equipment in Amateur Radio transceivers, we need to better understand the transient problems that can (and do) exist on our household and automotive power systems and the ways to protect against equipment damage.

Power-line transient voltages are generated in many ways including the natural phenomenon of lightning, switching inductive loads and ground-fault clearing. Depending on the conditions, the transient energy may vary from mild to severe, from microjoules to kilojoules.

Lightning

Of course all hams disconnect their antennas from their rigs at the end of each operating period to protect equipment from lightning strikes (don't they?). But how many disconnect the rig in the car from the mobile whip when it is not in use? My neighbor didn't. The largest pieces of his fiberglass whip antenna we were able to find were slivers less than three inches in length. I won't go into detail about the charred remains of his rig: He might read this article and the memory is still painful to him.

Exposure to lightning effects is always a matter of probability because of the very nature of this unpredictable phenomenon. A single stroke can have a length of over 4 kilometers (miles = km × 0.62) with peak currents of 400 kiloamperes. Typically, the highest peak currents occur for the tropical regions of the world because of the greater height of the bottom of the thundercloud. Peak currents in the temperate zones are in the range of 250 kiloamperes. Distribution of peak currents for lightning strokes occur over a broad current range as shown in Fig. 1.[1] From this graph, you can see that 50% of the strokes are less than 20 kiloamperes, 10% of the strokes are greater than 65 kiloamperes and only 2% of the strokes

*48 Johnson Rd., Riviera Beach, MD 21122
**7511 Brandywine, Richland, MI 49083

[1]Notes appear on page 38.

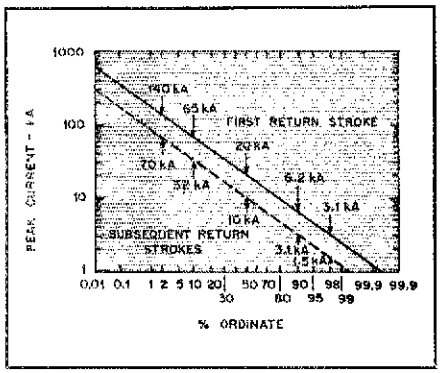


Fig. 1 — Distribution of peak currents for the first and subsequent return lightning strokes.

are greater than 140 kiloamperes.

Lightning can also cause problems even when the strike is nowhere near the antennas and equipment. Lightning produces both electric and magnetic fields that vary with distance, frequency and time. These fields are important since they can couple into power-transmission lines and destroy electronic circuits. Frequencies of radiated fields range from a few kilohertz up into the gigahertz region. The greatest magnitude is caused by the high-current return stroke, which radiates at a frequency of about 5 kHz. A strike at a distance of one kilometer can easily produce a field of 100 volts per meter (feet = m × 3.28). With fields of that magnitude, and long commercial power lines acting as antennas delivering that power into the house, very high transient voltages can appear at the power cord of your rig (remember my dimmer).

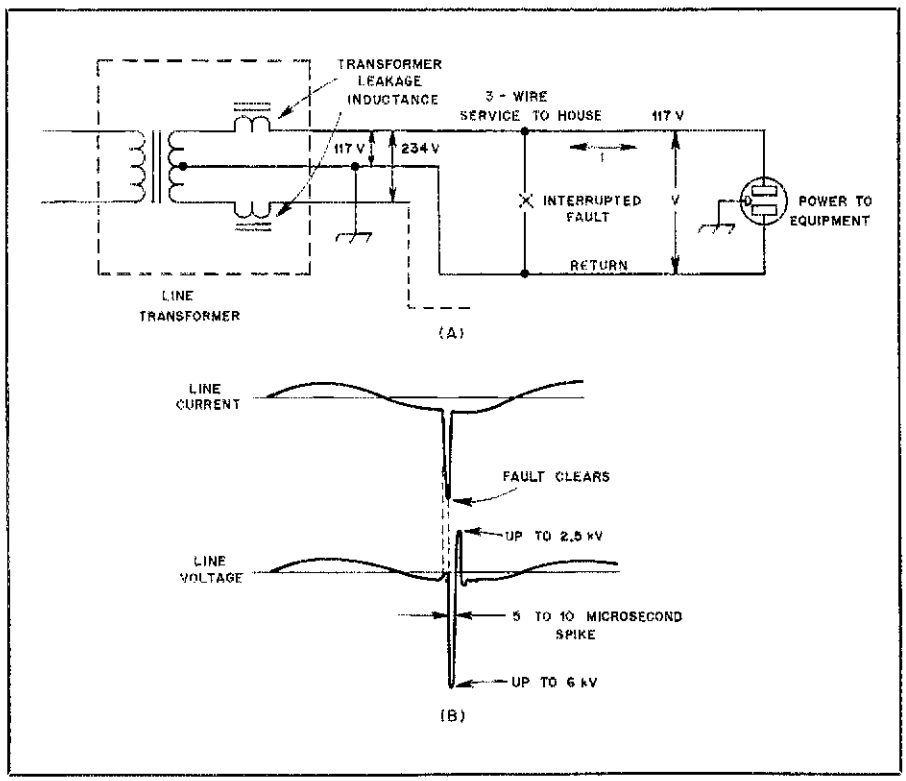


Fig. 2 — (A) A circuit showing the production of a transient spike when a short-circuit fault is cleared. (B) A drawing of the current and voltage waveform as the fault develops and is cleared.

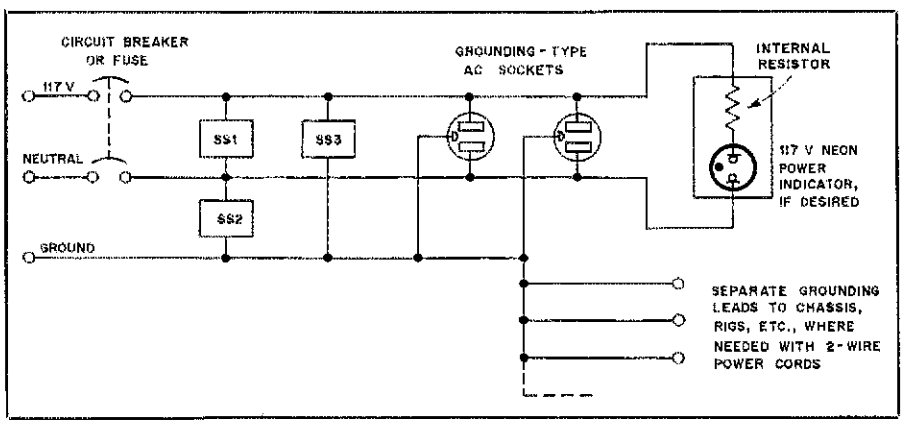


Fig. 3 — A suggested "shack" wiring diagram, including a main power-disconnect switch and transient-protective devices. SS1, SS2 and SS3 are bi-directional surge suppressors, with a minimum clamping voltage of 180-V peak and a maximum of 200-V peak.

Fault Clearing

When a very large current is drawn abruptly from an electrical system under conditions such as a short circuit, clearing of this fault by the blowing of a fuse or circuit breaker can result in an extremely high voltage spike. This spike results from the collapsing magnetic field in the power-distribution transformer (or "pole" transformer), which occurs when the high current fault condition is cleared. With 117-V ac power-line systems, a transient voltage of up to 6 kilovolts having a duration of approximately 5 to 10 microseconds can occur, as shown in Fig. 2.

Switching Inductive Loads

When the current is interrupted in an inductive load (such as an electric motor) a voltage is induced in the windings by the collapse of the magnetic fields. This voltage can be on the order of thousands of volts and can arc across the open contacts of the line switch, thereby generating a transient on the ac line.

The waveform of induced-voltage transients is usually oscillatory in nature and is caused by the gap between the contacts in the switch alternately sparking over and extinguishing. As the switch is opened the current in the inductor continues to flow, charging the distributed capacitance in the windings until the voltage is sufficient to spark across the switch gap. When the arc occurs, the induced voltage stored in the winding capacitance is discharged back onto the power line until the arc extinguishes, at which time the voltage build-up is repeated. This oscillation continues until there is insufficient energy available to restrike the arc.

One case history in a study performed on commercial and residential power-system transients involved a report of complaints of sparking in a light fixture. "With the (light) switch in the ground wire, and the frame attached to a grounded pipe, flashover at 1700 V was observed in correlation with the start of an oil burner in the house. This defective light fixture was acting as a voltage-limiting gap for the house."[2] This transient was apparently being produced by the automatic disconnection of the high-current starting windings of the burner motor when it approached operating speed.

Transients in the Home

Just as transients on the household power lines can be caused by various sources, the way in which the pulse is delivered to your gear can also vary. The pulse can exist from line-to-line (dif

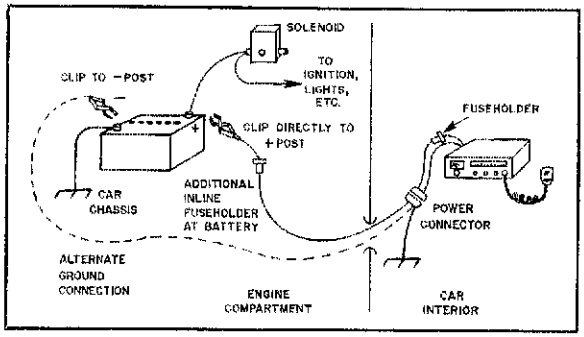
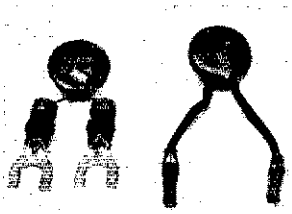


Fig. 4 — The suggested method of connecting a mobile rig to your car battery is shown.



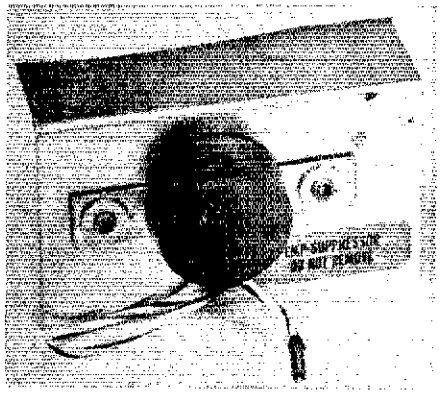


Fig. 5 — Left: Typical LA series MOV protectors, with various connectors on the leads. Right: A PA series MOV shown as it might be mounted in a service-entrance box.

ferential or transverse mode) or line(s)-to-ground (common or parallel mode). Therefore, even with a 2-wire, 117-V connection there are three possible paths for transients to follow. The problem is further complicated by capacitance in the household wiring, which can couple the transient from one wire to another thereby creating combinations of both modes at once.

To be completely effective then, transient protection must be applied at the station power receptacle and must be tied to the chassis of the rig as well (see Fig. 3). It is also desirable to include a local circuit breaker on the incoming power side of the protectors so the power line can be disconnected completely when the station is not in use.

Transient Protection in Mobile Installations

An automobile can be a very hostile environment for your rig. Currents as high as 300 A (starting motor) are switched regularly, and this can produce voltage spikes of up to −210 V on the electrical system.[3] However, the car does have two advantages normally lacking in the home: Lightning influence on the power system is almost never a problem, and the car battery is a natural surge suppressor. To take advantage of the protection afforded by the battery, however, the rig must be connected directly to the battery posts — not to intermediate junction points, under-the-dash or firewall fuse blocks, or auxiliary contacts on the ignition switch. (You may also want to try isolating the transceiver case from the car chassis and running a separate ground lead to the battery, especially if alternator whine is a problem.)

Protection of your mobile system can be summed up as follows:

1) Disconnect the antenna when the rig is not in use.

2) Provide power for the rig directly from the car battery. Use an in-line fuse holder at the battery-clip end of the positive lead to prevent damage or fire from accidental shorts, as shown in Fig. 4.

3) Turn off the rig and all other audio and radio equipment when starting the engine.

If you are concerned about accidentally trying to operate with the antenna disconnected, I would suggest that you mount a small aluminum bracket under the dash with a 2- or 3-pin female Cinch-Jones connector and a chassis-mount BNC connector spaced close together. Solder the power leads to the Cinch-Jones socket and the coaxial cable from the antenna to the BNC connector. Make short lengths of power and coaxial cables, using the appropriate mating connectors, to reach between the rig and the bracket. Since these wires will stay with the rig, you may wish to mechanically secure the cables to the case. Tying the free ends of these cables together will facilitate easy removal and reconnection of the antenna and power cables. A bracket and connector arrangement in the "shack" will make for fast and easy transfer of the rig from house to car and vice versa.

One final thought on mobile installations. The pointers for cars are equally applicable to boats and planes.

Transient Protection in the Home

The material in this section, written by Gene Collick, W8LEQ, provides specific information about transient-protective devices and their installation. By following his suggestions your equipment will have a high degree of protection against the transients described by Ken Stuart, W3VVN, in the first part of this article — Ed.

Protective Devices

The General Electric Home Lightning Protector® is designed to prevent lightning surges (entering through the wiring) from damaging electrical wiring and/or appliances. The protector is a two-pole, three-wire device designed primarily for single-phase 117/234-V grounded-neutral service. It mounts via a 1/2-inch pipe-thread connection through a knockout in the service-entrance box, or preferably, at the weatherhead or within the meter housing. The purpose of this device is to reduce the amplitude of large transients.

TransZorbs® are silicon devices manufactured by General Semiconductor Industries for transient suppression. They

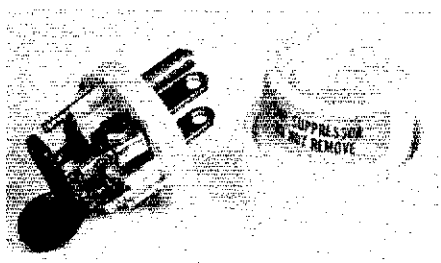


Fig. 6 — Construction of a plug-in protector. Install a V130LA10A MOV across the brass and silver terminals and another across the silver-to-green terminals.

contain a large-area PN junction having integral heat sinks and are capable of handling short-duration, high-power pulses (typically 1500 watts for 1 millisecond and 100,000 watts for 100 nanoseconds). The TransZorb® protects by clamping transient voltages to a safe level, with sub-nanosecond reaction time.

A metal-oxide varistor (MOV) is a bulk semiconductor device whose resistance varies with the magnitude (but not polarity) of the applied voltage. At extremely low currents, a varistor acts like a linear resistor with a resistance that can exceed hundreds of megohms. At higher currents, the voltage-current relation is nonlinear, and at extremely high currents the device acts like a constant resistor with a very small value (typically about one ohm). Varistors can respond in low-nanosecond times, with clamping-treshold voltages ranging from 10 to 1500 V, with continuous power from 0.5 to 5 watts and with peak energy of more than 600 joules. MOVs have a capacitance that is a device parameter, and this should be considered for high-frequency applications. GE manufactures devices with wire leads (LA series) and the heat sink type (PA series). I prefer the PA type for service-entrance box and fuse-box mounting and use the LA units for coils, solenoids and such within the equipment. See Fig. 5.

Installation

The first protective device you can install is a secondary low-voltage lightning

Fig. 7 — Ken Stuart's outlet strip with built-in transient protection. A 1N6072 TransZorb ® is shown connected between the hot and neutral sides of the strip. GE V130LA10A MOVs are connected from each side of the line to ground. The braid strap connects to the transceiver ground lug.

arrestor rated at 650 V (a typical device is a GE Thyrite type 9L15BC002). Power should be removed from the feed to the house, and the device should be installed ahead of the service-entrance box by a qualified electrician. The black leads (2) are connected to each hot leg, with the white lead terminated to the meter box (be sure the meter box is directly connected to the service-entrance box). The reason the white lead is terminated to the box rather than the electrical circuit neutral is that the device is being installed to protect against the common-mode (phase-to-case ground) transient.

The second device to be installed is a low-voltage surge arrestor such as a GE V130PA20A MOV. These should be connected from each hot leg to case ground. The arrestor should be located in a way that provides minimum lead length. These can be installed with an active power feed to the house, but with the main breaker turned off. Connect the MOVs on the load side of the main breaker.

The ac input to the transmitter can be protected by one of two methods. I didn't mind modifying the transmitter, so I installed a V130LA10A MOV across the ac input and another one from neutral to case ground. If you do not want to modify the transmitter, a plug-in protector can be purchased or constructed (see Fig. 6). This device is then plugged into the duplex receptacle feeding the transmitter. This method should be ideal for renters, for portable operation or to provide some protection for those who can't afford an electrician to install the other devices. Receivers, transceivers, TV sets and other electronic equipment should all be protected in a similar fashion. An alternative would be to wire an outlet box or strip as was done by Ken Stuart (Fig. 7).

Rotator protection consists of installing a plug-in MOV device in one side of the duplex receptacle that the rotator remote-control unit is plugged into. The rotator control cables should terminate in a grounded metal box. Each control cable conductor should have a GE V56ZA2 MOV connected across it to case ground. My control cable was not shielded, so the same type of protective devices were installed within the rotator. If shielded cable is used, the devices inside the rotator would not be needed. Check the voltage on the control cable and select a value of MOV rated for a safe operating voltage above the control voltage.

Table 1

Transient-Protective Device Cost and Selection Data

General Electric Co., Semiconductor Div., W. Genesee St., Auburn, NY 13021

"Home Lightning Protector"	
GE Thyrite 9L15BCB002	$15
"Metal Oxide Varistors"	
V130LA10A	$1.75
V130PA20A	$4.70
V39ZA6	$1.75
V56ZA2	$1.04

The numbers after the V indicate the normal operating voltage (rms) of the circuit. Voltages at a preset value greater than that will cause the device to conduct heavily, clamping the voltage.

General Semiconductor Industries, P.O. Box 3078, Tempe, AZ 85281

TransZorbs®

1.5KE6.8	$1.86
1.5KE7.5 to 47	$1.68
1.5KE51 to 110	$1.95
1.5KE120 to 150	$2.60
1.5KE160 to 200	$2.90
1N6072	$6.90

Bidirectional, for connection directly across 117-VAC line.
The numbers after KE are the approximate breakdown voltage of the device.

Table 1 provides information to help you select the proper transient-protective devices and to give you an idea of the cost of protecting your expensive equipment. Newark Electronics, 500 N. Pulaski Rd., Chicago, IL 60624, sells most of these units. TransZorbs are available by mail from Technico, Inc., 9051 Red Branch Rd., Columbia, MD 21045. You can also check with your electrical supplier or contact the manufacturer for the devices you need.

This concludes the transient protection of a basic amateur station. The intent of this article is to provide some basic concepts about transients and methods of protection from them. We hope you have found it both useful and interesting.

Notes

[1]Transient Suppression Seminar, Supplementary Notes, O. Melville Clark, General Semiconductor Industries, Inc.
[2]*Transient Voltage Suppression Manual* (General Electric, 1976), p. 68.
[3]*Transient Voltage Suppression Manual* (General Electric, 1978), p. 8.

Strays

TA PROFILE

☐ Many of you should recognize the amateur in the accompanying photograph because of his participation in seminars and forums during local, regional and national ham conventions at more than 90 locations. He is ARRL Technical Advisor Al Markwardt, W5PXH, whose field of expertise is antennas and RFI. Al's services as a TA (since 1978) are deeply appreciated.

Al has an Extra Class license (he was first licensed in 1932), and he also holds a Radiotelephone First Class license. His Amateur Radio interests include operating hf ssb/cw, 2-meter fm, electronics theory, and the design and construction of ham-band antennas (especially quads). Al spends a great deal of time assisting amateurs with RFI, TVI and other interference problems.

He is a member of ARRL, IEEE, QCWA, the Richardson Wireless Klub and the Toastmasters International. He earned the Distinguished Toastmaster degree (DTM) in 1970.

As a Communications Engineering graduate from Missouri Technical Institute, Al continued his education at the State University of New York and the University of Texas.

Residing in Richardson, Texas, he is employed by Northern Telecom and is a technical-training instructor on the subject of specialized common-carrier tandem switches. His other areas of professional specialty are sales, management, electronic technical instruction and public speaking. Al has patent-disclosure papers issued on Teletype message switching techniques. Despite his busy schedule, Al finds time to enjoy bicycling, gardening, house maintenance and listening to Nashville Brass musical recordings. — *Marian Anderson, WB1FSB*

TA W5PXH, relaxed, happy and ready for his next QSO.

New Products

MINIATURE TV SIGNAL TRANSMITTER

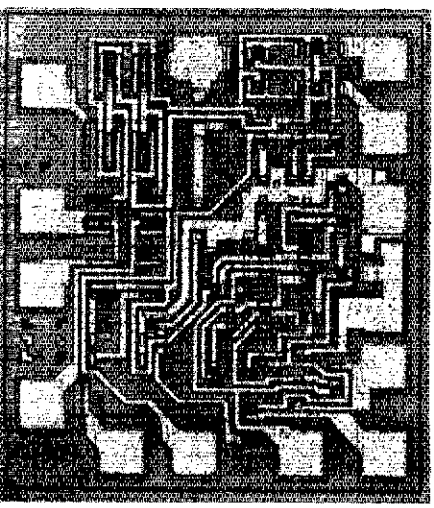
☐ A complete, miniature, precision transmitter capable of generating a high-quality television signal for transmission on a 75-Ω cable has been introduced by Motorola. The 14-pin plastic MC1374 is aimed at applications where a professional quality rf signal is required. With 30 mV rms output, the new device can easily handle a vestigial sideband filter and still deliver a "snow-free" signal to half a dozen TV receivers. While primarily characterized for the FCC-guarded channel 3 and channel 4 operation, the balanced design and high-frequency processing make special applications feasible. For example, the rf oscillator and modulator can be operated at over 100 MHz.

Each package contains the rf oscillator, balanced rf modulator, sound-carrier oscillator and fm modulator, arranged to permit "clean" pc-board layout and good isolation of sound and video circuits. The rf modulator resembles the earlier MC1496, complete with dual inputs and adjustable gain. The rf oscillator is internally connected to the modulator, and has only two external pins, which can be used for L-C tuning or crystal control. A standard signal from video of either polarity, and levels of 0.5 to 2.5 V pk-pk may be generated by the modulator. Dual inputs permit separate insertion of video and a modulated 4.5-MHz sound carrier, thereby reducing the possibility of cross talk and unwanted mixing products. According to the manufacturer, the performance of the rf modulator exceeds the accuracy of most available detectors with regard to variations in linearity (less than 2%), differential phase (less than 2°) and differential gain (less than 5%). Unwanted intermodulation is very low.

The sound oscillator and fm modulator are one inseparable circuit within the IC. Two pins are brought out for the tuning components that establish the nominal carrier frequency. A third pin is used for audio input and, if desired, dc frequency control (afc) of the sound oscillator. Also, the sound oscillator power-supply pin is brought out separately, permitting the sound section to be disabled.

The low distortion of this fm system is a significant improvement over the more common varactor system; it is also less expensive. Only one resistor and capacitor are needed to couple the sound subcarrier to the input of the rf modulator to complete the composition of a professional-quality TV signal.

The MC1374 is designed to operate over a power-supply range of 5 to 12 V at a current level of 15 mA. In 100-up quantities, the price is $2.88. For further information, contact Peter Whatley, Motorola Semiconductor Products Inc., P.O. Box 20912, Phoenix, AZ 85036, tel. 602-962-3103. — *Paul K. Pagel, N1FB*



ALPHA DELTA COMMUNICATIONS TRANSI-TRAP

☐ Any Amateur Radio station that is operated wisely includes provisions for protection from lightning discharges. While not much can be done about a *direct* lightning stroke, negating the effects of nearby discharges on radio equipment should be a concern of all station operators, amateur or professional. Solid-state receivers and transceivers are more prone to electrical-discharge damage from distant storms than are their vacuum-tube counterparts.

Don Tyrell, W8AD, of Alpha Delta Communications, investigated the performance of standard airgap lightning arrestors. He found them ineffective for use with solid-state equipment: They fire too slowly and at too high a pulse-voltage level. And, when the air-gap arrestor does fire, a 30- to 80-volt potential still exists across the firing arc. Because of the typically high (3-kV to 5-kV) firing level of the air-gap devices and the firing delay (1 ms), a sufficient amount of voltage exists that will damage semiconductor junctions.

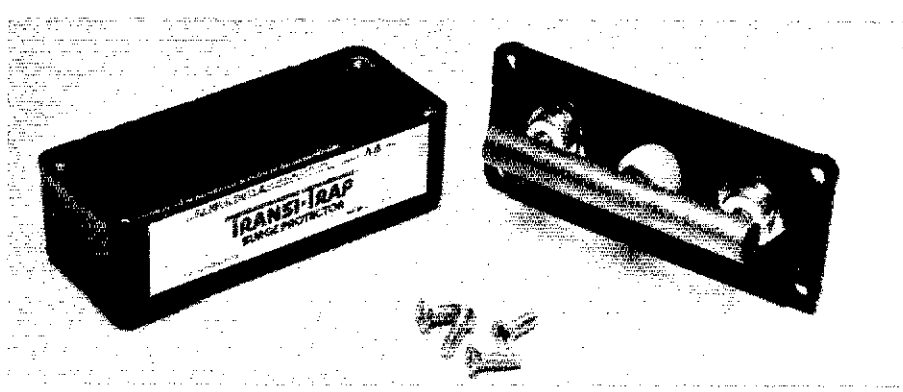
According to the manufacturer, the Transi-Trap employs a gas-filled ceramic tube that is constructed to provide a fast-firing (100-ns) characteristic. This is coupled with a low-level firing voltage that depends on the Transi-Trap model used. The model R-T fires at a 200-V dc/750-V pulse level, and the model HV operates at levels of 1 kV and 2.25 kV, respectively. R-Ts are designed for use with solid-state receivers and transceivers (or transmitters) operating at power input levels up to 200 watts. They are designed for use in 50-ohm systems at frequencies up to 500 MHz. Insertion loss at 500 MHz is 0.15 dB, with a corresponding VSWR of 1.22.[1] An HV unit is designed for use with equipment lineups that employ amplifiers operating at inputs up to 2 kW.

Transi-Trap Surge Protectors are encased in black die-cast aluminum boxes fitted with SO-239 connectors; either connector may be used for the input or output port. The field-replacable Arc-Plug cartridge is equipped with hardware to permit attachment to a ground wire. A ground wire is absolutely essential to the proper operation of the protectors and it should be kept from contacting other metallic objects.

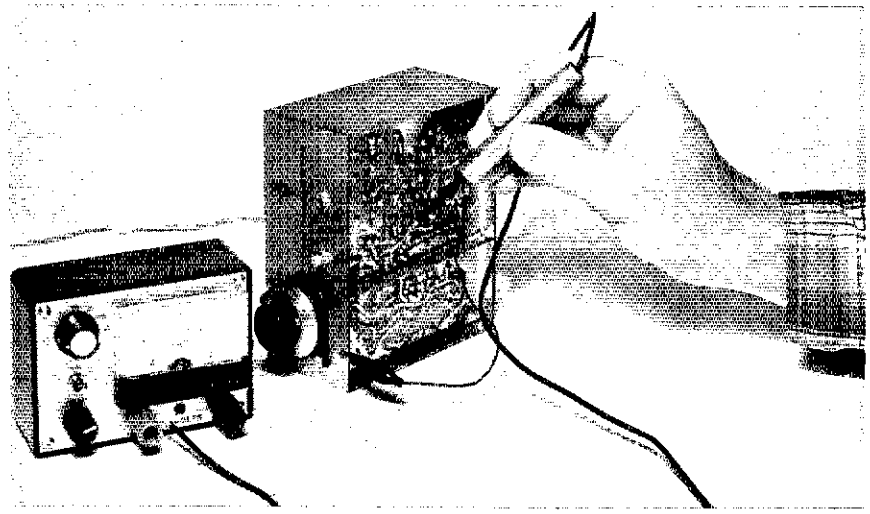
Early models of the Transi-Trap employed a brass wire connected between the two connectors. The manufacturer now uses a piece of brass tubing. This improved the vhf operating characteristics of the units.

While designed primarily for indoor use, the Transi-Trap may be used outdoors if proper weatherizing precautions are taken. Transi-Trap Surge Protectors are manufactured by Alpha Delta Communications, 116A North Main St., Centerville, OH 45459. Price class: model R-T, $30; model HV, $33. Add $4 for shipping and handling charges. — *Paul K. Pagel, N1FB*

[1]Verified in the ARRL lab.



BEGINNER'S BENCH



Some Basics for Equipment Servicing

Part 3: Using the proper techniques can speed equipment servicing. The methods are easy, and you can build the test gear!

By George Collins,* KC1V

In Parts 1 and 2 of this series, we presented the basic troubleshooting methods of dc voltage and resistance measurement, and semiconductor testing. These are very effective techniques for determining which component in a particular circuit has failed. If the symptoms of the problem provide us with enough information to locate the trouble area, a check of a few dc voltages may be all that is needed to pinpoint the problem. Unfortunately, we will often face situations in which the symptoms alone are not sufficient to locate the trouble area. This month we will look at some additional methods the amateur can use to make service work less difficult and not so time consuming.

Signal Tracing

Fig. 1 is the block diagram of a typical amateur receiver. If the receiver "dies," what do we do? First, see if the symptoms indicate where the problem is located: when the receiver is turned on, we hear the normal hiss from the speaker, but do not hear any signals as we tune across the band (the antenna is connected!) Applying a strong signal to the antenna input also results in nothing but hiss. So far, all we have learned is that it is likely that the audio stages and power supply are functioning. Noting that there is no S-meter indication when we tune across the frequency of the input signal, we can conclude that the signal is not reaching the agc or detector circuits. We have been able, tentatively, to eliminate four or five stages, leaving us with nine more possibilities!

At this time we could begin measuring the dc potentials at various points in each stage. While this approach should eventually lead us to the defective stage, it could be a time-consuming process. If we can reduce the number of possible stages to one or two, we should have the receiver back in working order much more rapidly. One way we can do this is by *tracing* a signal through the receiver. The general technique is to apply a signal to the input of the unit, and then check for the presence of the signal at the input and output of each stage. When we find a stage with input but no output, chances are we have found the problem area.

Equipment

Before we can begin signal tracing, we must have a signal source of appropriate strength and frequency. A tunable signal generator with adjustable output is ideal, but simple, low-cost substitutes will serve as well. A crystal oscillator, which we will look at later, makes a good signal source for this type of work.

A second requirement is that we have some means of detecting the signal. A high-frequency oscilloscope is an excellent instrument for this application and many others. The drawback is that a good oscilloscope is expensive. An alternative to the oscilloscope is a VTVM or FET voltmeter equipped with an rf probe. The FET voltmeter and probe shown in Part 2[1] (or any similar unit) will be more than adequate for basic signal tracing. With the necessary test equipment at hand, we can begin to track down the cause of the receiver problem.

The signal applied to the receiver input should be no greater than necessary to produce a reading on the voltmeter. Most meters will show a satisfactory reading with a 0.1-V rms signal. This is a strong signal (about 60 dB over S9), but it will not harm the receiver. Avoid input signal levels greater than 0.5 V rms, because

*Assistant Technical Editor

[1]Notes appear on page 44.

some receivers could be damaged at that level. The characteristics of the diode used in the rf probe limit the accuracy at these low (less than 0.5-V) signal levels. This need not concern us, since we are looking for relative signal levels and not specific voltages. The exact voltages will depend on the circuit impedance and the type of stage being tested.

With a 0.1-V signal applied to the receiver, we can begin tracing the signal by first checking the voltages at the preselector network input and output. These voltages may be the same, but in general the preselector output voltage will be higher than the input (the preselector may be providing an impedance step up).

Next, we move to the rf (radio frequency) amplifier output. Normally this stage will show some voltage gain (output voltage is greater than the input). If the signal is still present, we can assume that the amplifier is functioning and proceed to the next stage, the first mixer. This stage, as the name implies, mixes two input signals to produce the output signal. In this case the inputs are the signals from the rf amplifier and the heterodyne-frequency oscillator (HFO). If either is absent, the mixer will not operate correctly.

Our next step is to confirm that the rf amplifier and HFO output signals are reaching the mixer. If they are, and rf voltage is found at the mixer output, can we conclude that all is well up to the i-f (intermediate-frequency) amplifer? Probably, but one additional test should be made. In some mixer circuits the HFO signal may appear at the output. To ensure that the rf voltage we found at the mixer output is the i-f signal (and not the HFO) we should check to see if the mixer output drops when the signal generator is removed from the receiver. If the mixer stage is found to be functioning, we can proceed to test the following stages in the same manner.

As we move closer to the detector, the signal level will normally increase. The rf input to the receiver should be reduced to prevent overdriving one or more of the stages. A signal generator output level that yields a reading of about 0.5 V at the stage being tested is all that is needed.

Transmitter Circuits

The same basic method can also be applied to troubleshooting transmitter circuits. The primary difference is that we normally do not need to apply an input signal; the circuit generates the signal, and we simply follow it from one stage to the next. Because the oscillators in the transmitter will serve as our "signal sources" (a modern transmitter will have several) they are the logical places to begin signal tracing. A representative variable-frequency oscillator (VFO) and buffer amplifiers are shown in Fig. 2. The voltages shown are the rms values measured with the circuit operating normally. While the values will vary from one

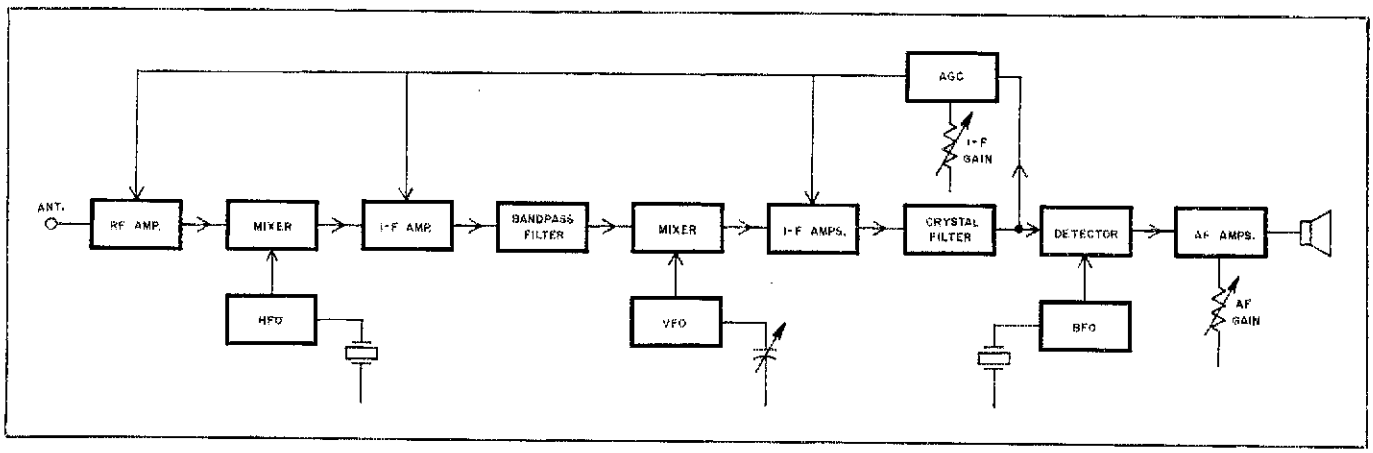


Fig. 1 — Block diagram of a typical amateur receiver.

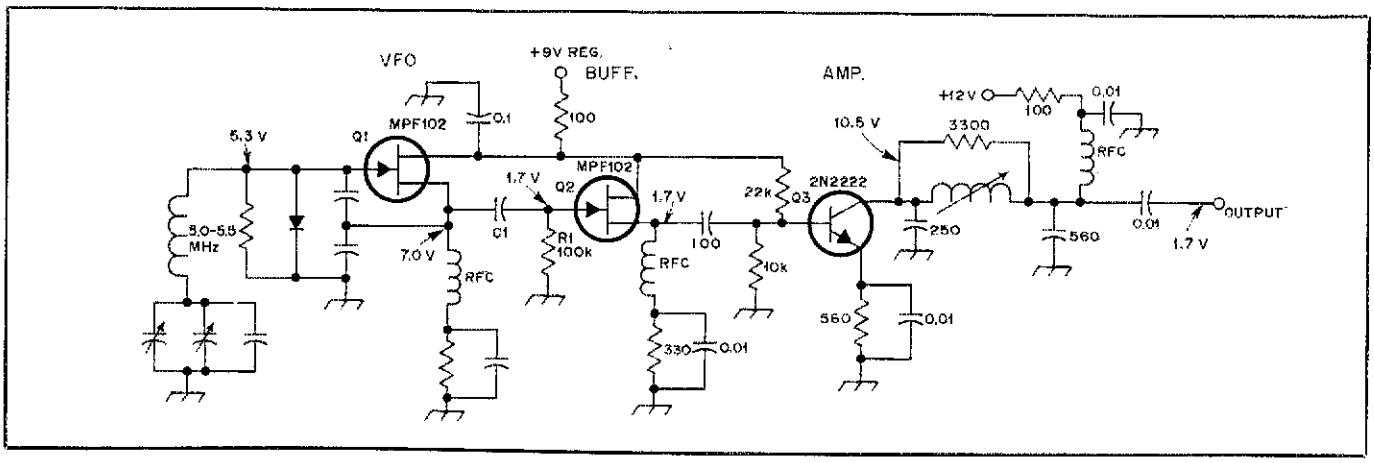


Fig. 2 — This VFO circuit is similar to that used in many transmitters and receivers. The voltages shown were measured with an rf probe and FET voltmeter.

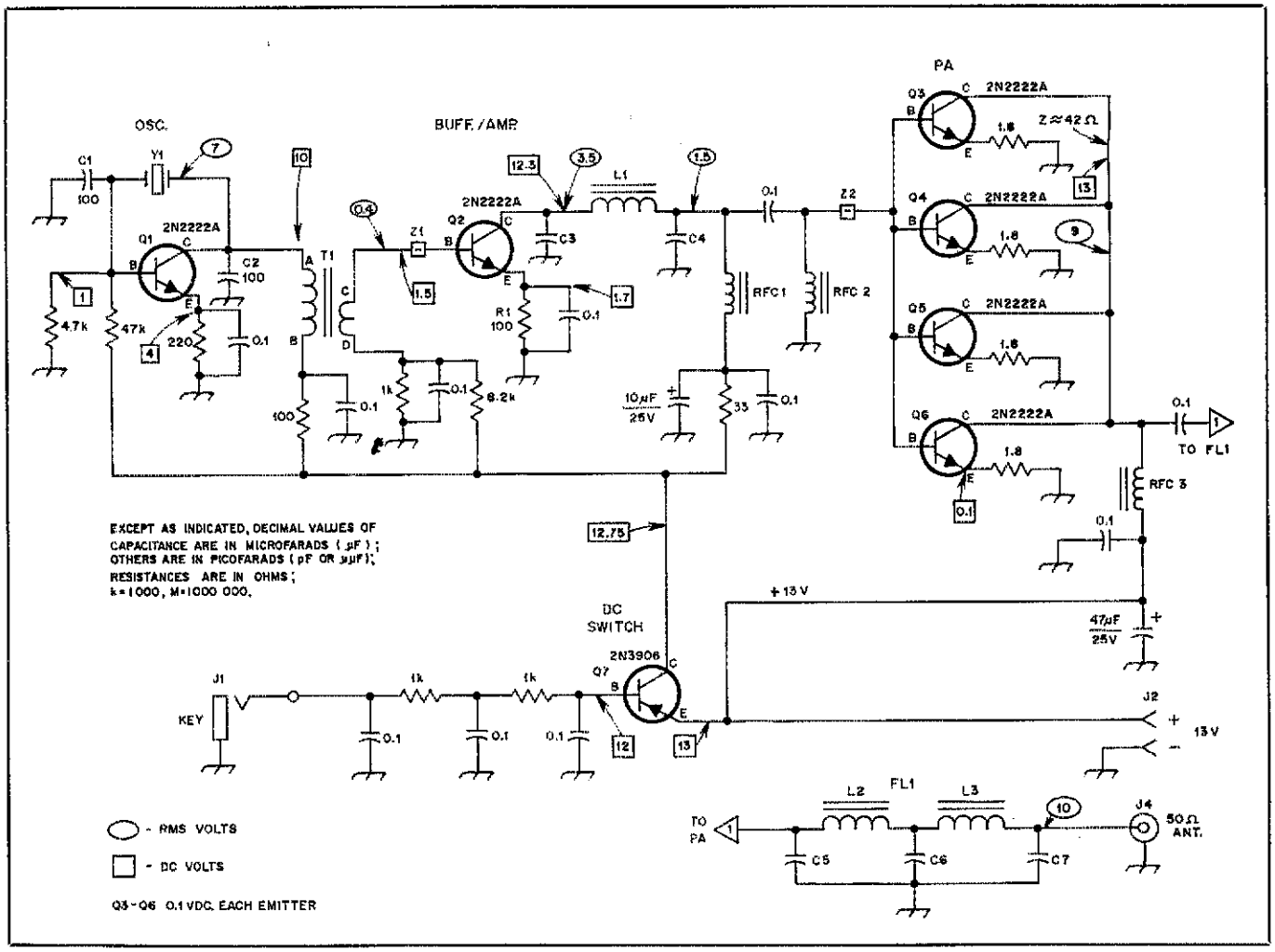


Fig. 3 — A simple low-power transmitter. The voltages were measured with an rf probe and FET voltmeter. The basic techniques used to troubleshoot a simple circuit like this can be applied to more complicated equipment.

circuit to another, the voltages shown point out some important circuit features. For example, the voltage across the tank circuit is fairly high (about one half the supply voltage), and the source voltage is also high. Capacitor C1 and the 100-kΩ resistor (R1) form a voltage divider between the source of Q1 and the gate of Q2. This results in the gate voltage being much lower than the source voltage at Q1. Buffer amplifier Q2 is operated in the source-follower configuration; thus the input and output voltages will be nearly the same. If we overlook the fact that the voltage gain of this stage *should* be only 1, we might think the stage was defective when it is actually operating correctly. The more we know about the circuits we are troubleshooting, the more likely we are to be successful in servicing our equipment.

The low-power transmitter shown in Fig. 3 provides an example of how we can apply our knowledge of circuit fundamentals to help us while signal tracing. We can

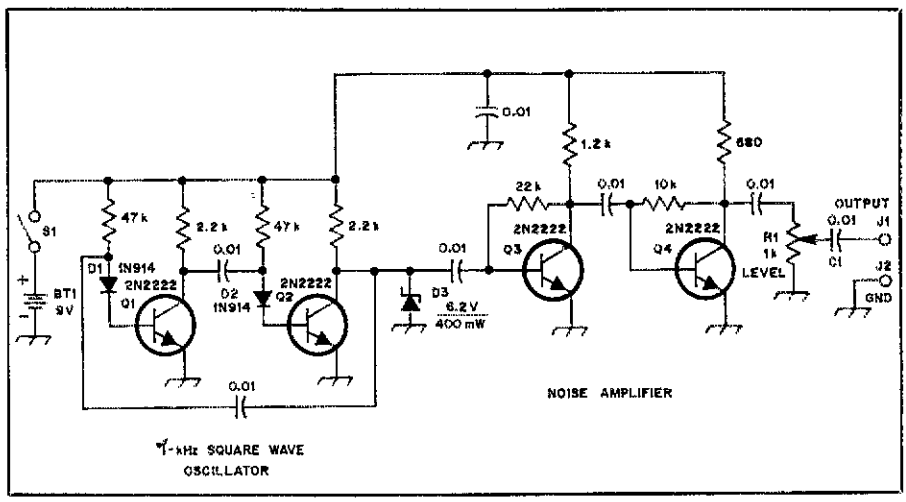
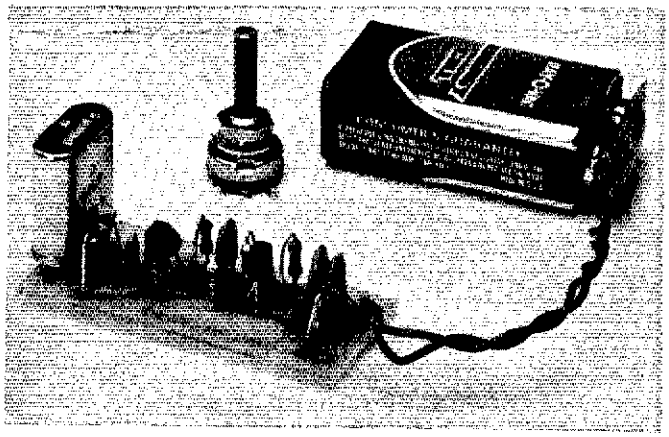
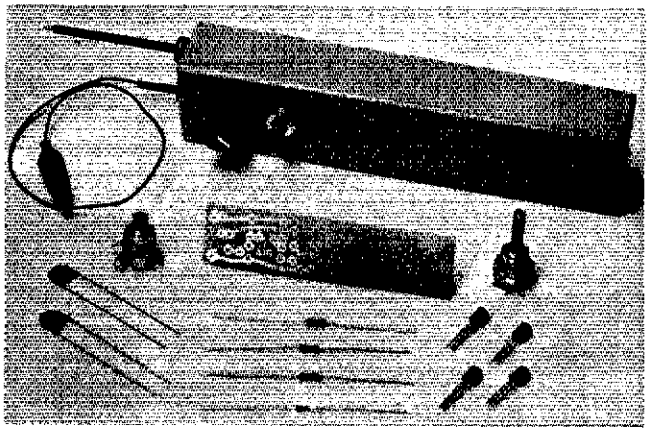


Fig. 4 — Schematic diagram of the af/rf signal injector. All resistors are 1/4 W, 5% carbon types, and all capacitors are disc ceramic.
BT1 — 9-V transistor radio battery.
D1, D2 — Silicon switching diode, 1N914 or equiv.
D3 — 6.2-V, 400-mW Zener diode.
J1, J2 — Banana jack.
Q1 - Q4 — General purpose silicon npn transistors, 2N2222 or equiv.
R1 — 1-kΩ panel-mount control.
S1 — Spst toggle switch.



Printed circuit board construction was used for this version of the crystal-controlled signal source.



The signal injector, housed in a homemade enclosure of circuit-board material, is a convenient, hand-held signal source.

expect the rf-voltage level at the oscillator (Q1) collector to be near that of the supply voltage; in this case we find 7 V at that point. T1 provides an impedance match between the relatively high value needed at Q1 and the lower impedance at the base of Q2. Because of this, we should expect the voltage at the base to be considerably lower than the Q1 collector voltage. Impedance matching between Q2 and the power amplifier (PA) is provided by an LC network made up of C3, C4 and L1. Again, the voltage at the low-impedance input to the PA is less than the voltage at the high-impedance side of the network.

Signal Injection

A troubleshooting technique related to signal tracing is signal injection. This method does not require a signal detector (such as the rf probe used in signal tracing) because the receiver being tested serves as the "detector" of the injected signal. Starting at the receiver output (the speaker) an audio signal is applied; if the signal is heard in the speaker, we move the injection signal to the input of the last audio amplifier stage. We continue this procedure until moving from the input of one stage to the preceding stage results in loss of audio output.

At that point we have found the defective stage. When the input to the detector is reached, we must use an injection signal at the receiver i-f rather than the audio signal used earlier. The injection-signal frequency used at the input to any rf stage must be the same as the normal signal frequency. If a wide-range tunable signal generator is available it can be used for this type of testing. If such an instrument is not part of your shop equipment, a simple "signal injector" can be used in place of the tunable generator. A signal injector generates an output signal that contains a broad spectrum of frequencies. Thus it can be used for testing audio, i-f or rf stages. The advantage in using a signal injector is the low cost of the device — it should not be considered as a replacement for a high-quality signal generator. Inexpensive signal injectors can be purchased for less than $6 or constructed at home. Fig. 4 shows the circuit of a low-cost, but effective, signal injector that can be constructed in a short time.[2] Many experimenters may have the necessary parts in their junk box.

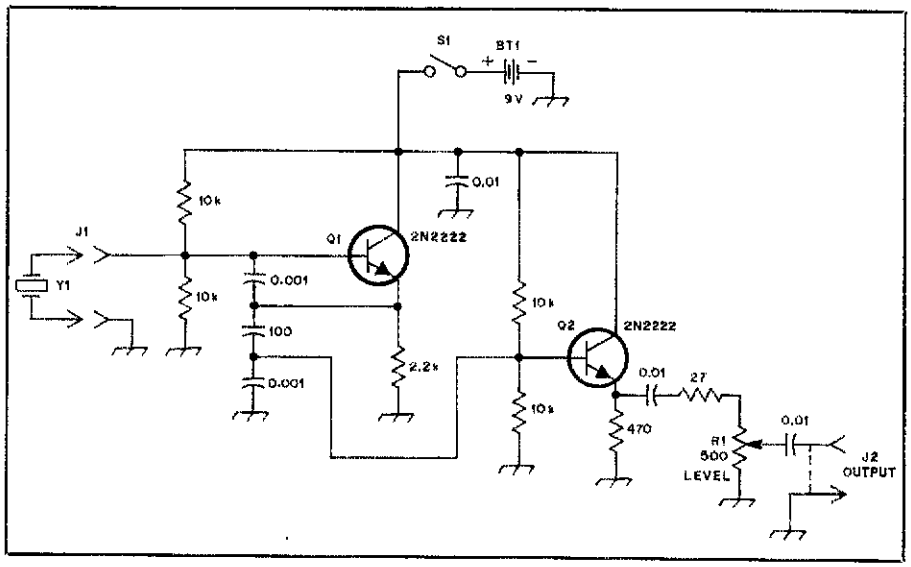


Fig. 5 — Schematic diagram of the crystal-controlled signal source. All resistors are 1/4 W, 5% carbon types, and all capacitors are disc ceramic.
BT1 — 9-V transistor radio battery.
J1 — Crystal socket to match crystal type to be used.
J2 — RCA phono jack or equiv.
Q1, Q2 — General purpose silicon npn transistor, 2N2222 or equiv.
R1 — 500-Ω panel-mount control.
S1 — Spst toggle switch.
Y1 — 1- to 15-MHz crystal.

A Crystal-Controlled Signal Source

The crystal oscillator and amplifier shown in Fig. 5 and the photograph was built as a general-purpose signal source and will serve very well for signal-tracing work. The output level is variable from 0 to more than 1 V rms into a 50-Ω load, and almost any crystal in the 1- to 15-MHz range can be used.

Q1 forms a Colpitts oscillator with the output being taken from the emitter. A capacitive voltage divider (across the 2.2-kΩ emitter resistor) reduces the voltage applied to the buffer amplifier, Q2. The buffer, an emitter follower, provides the low output impedance necessary to drive 50-Ω loads.

Construction is simplified by the use of a printed-circuit board, but any wiring method can be used. J1, the crystal socket, should be selected to match the crystals you intend to use. Multiple sockets can be wired in parallel so that any style of crystal (HC-6/U, FT-243, etc.) can be used (an HC-6/U style crystal can be soldered directly to the circuit board). The oscillator packaging is left to the discretion of the builder. A small box

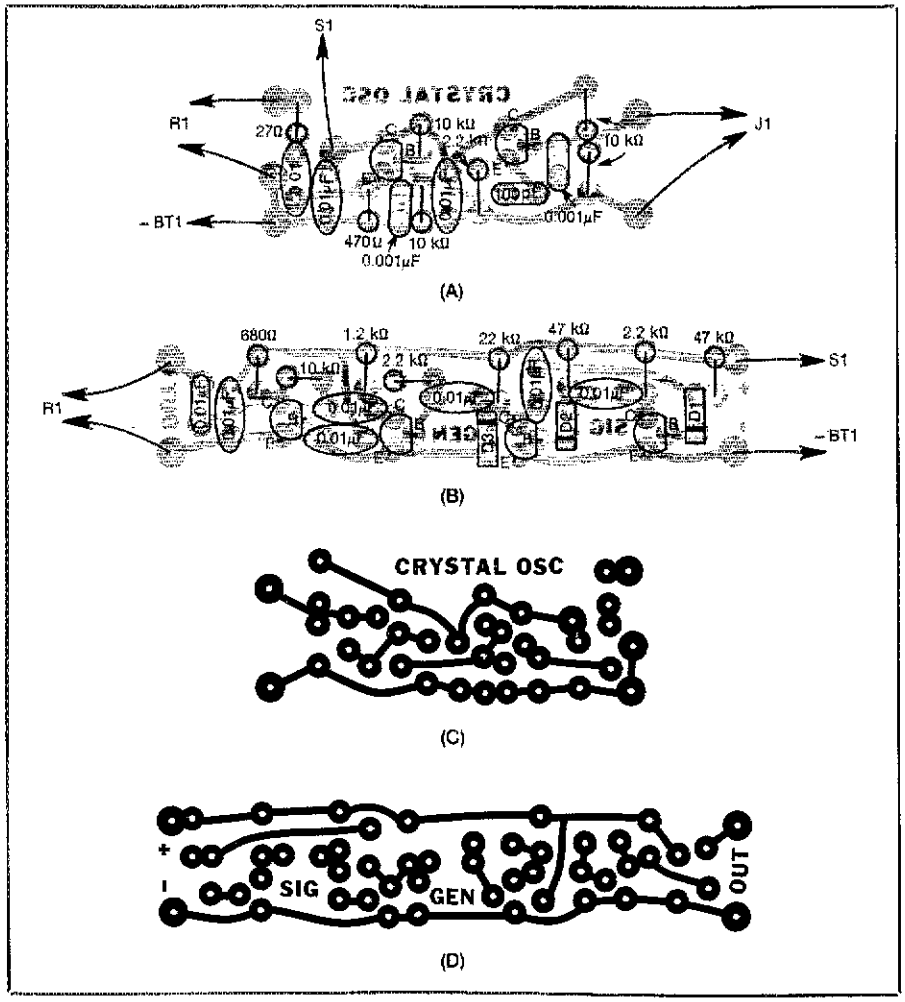


Fig. 6 — Parts placement diagram for the crystal-controlled signal source (A) and the signal injector (B). Gray areas are unetched copper, viewed from the component side of the board. Scale circuit-board etching patterns for the crystal-controlled signal source (C) and the af/rf signal injector (D).

(such as the Radio Shack no. 270-235), or an enclosure made of circuit-board material, will serve nicely.

AF/RF Signal Injector

Shown in Fig. 4 is the diagram of a simple signal injector. This device will generate detectable signals from the audio range to over 30 MHz. It consists of three basic stages: a square-wave oscillator (Q1 and Q2), a noise generator (D3) and a two-stage amplifier (Q3 and Q4). R1 is used to adjust the output level to that needed for the stage under test.

When the signal injector is applied to the antenna input of a receiver, a hissing noise should be heard. If the injector is used to test audio stages, a tone of approximately 1 kHz will produced.

The unit shown in the photograph was constructed on a printed circuit board and is housed in a homemade circuit-board box. A prototype was constructed "bread board" style on a scrap of unetched copper-clad board, and the results were the same as when the circuit board was used. The builder may select either method, and should obtain good results.

With these techniques and tools in your troubleshooting "bag of tricks" you will be able to track equipment problems easily and more rapidly. In Part 4 of this series, we will look at the use of the oscilloscope in troubleshooting and equipment servicing.

Notes

[1]G. Collins, "Some Basics for Equipment Servicing — Part 2," *QST*, Jan. 1982, pp. 38-41.

[2]Parts kits and printed circuit boards for the crystal-controlled signal source and the signal injector are available from Circuit Board Specialists, P.O. Box 969, Pueblo, CO 81002.

Strays

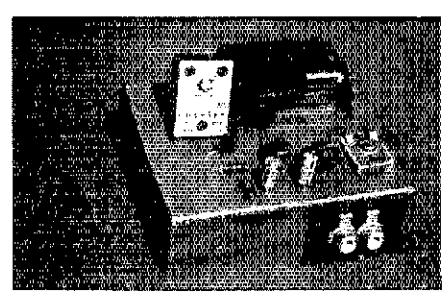
QRP TRUE GRIT!

☐ Basic Amateur Radio for September 1981 *QST*, entitled "Experimenting for the Beginner," dealt with simple cw transmitters and circuits. The "simplest transmitter," depicted schematically in Fig. 1, contained a single 2N2222 bipolar transistor, crystal controlled on 40 meters. Output power at 12 V is on the order of 50 mW. The article asked for details on on-the-air results from those who built the one-stage transmitter.

A letter from Mike Weber, WB9WFJ, of Costa Mesa, California, arrived at Hq. in December 1981. It was a study in tenacity and success. Mike built the 2N2222 rig of Fig. 1 in the *QST* article, plugged in a junkbox crystal for 7067 kHz, then connected a 9-volt battery to the transmitter. No doubt the power output was more like 25 to 30 mW with a 9-V power supply! To complicate matters even more, Mike used an indoor 40-meter antenna. His rig is shown in the accompanying photograph (nice work!).

He spent one hour per day (prime time for JA openings) for two weeks calling *CQ*. Finally, he worked JA2DYI. WA2NRC was his DX to the east. He sums up by saying, "The many hours of boredom and frustration paid off. It was worth it!"

It would be interesting to see what Mike could do with an outdoor antenna, high in the air! Hats off to this QRP enthusiast. Many of us would have given up the long vigil while running *100 watts*! — *Doug DeMaw, W1FB*

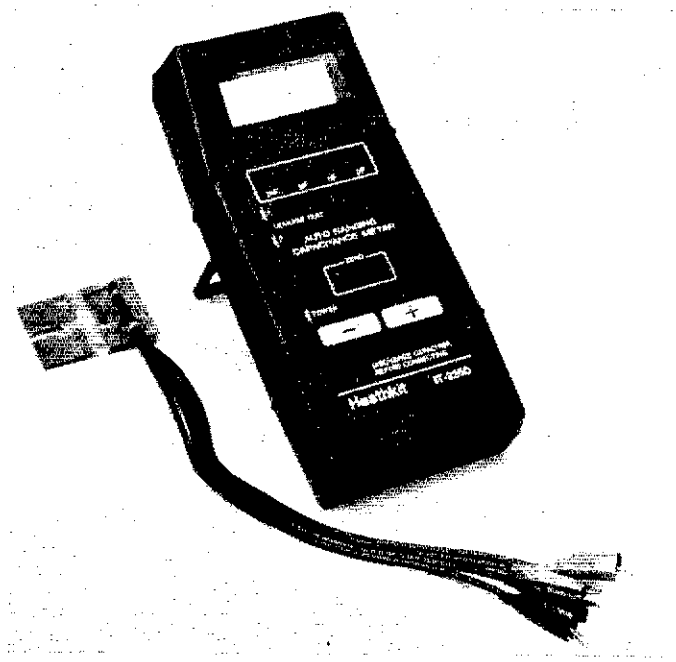


This neat one-transistor, crystal-controlled 40-meter cw rig netted WB9WFJ/6 a JA and a WA2 for his DX score. Power output to his indoor antenna was approximately 30 milliwatts!

Product Review

Conducted By Paul K. Pagel,* N1FB

Heath IT-2250 Auto-Ranging Capacitance Meter



How many times have you looked at the pile of assorted capacitors in your junk box and told yourself you'd get to checking them "some rainy day," but the required month of continuous rain never materialized? Are you tired of using a dip meter and a reference inductor for measuring capacitance? Ready to take a course in Egyptology in order to decipher the capacitor manufacturer's hieroglyphics? Whatever the reason, it's good enough to consider adding an honest-to-goodness capacitance-measuring instrument to the workbench.

The IT-2250 is a hand-held battery-operated, auto-ranging capacitance meter that will measure capacitance values from zero to almost 200 mF (that's 200 *millifarads* or 200,000 μF). The key word is "auto-ranging." When making simple capacitance measurements, there's no need to push a button to select a "guesstimated" range, just plug the capacitor into the meter terminal strips or connect it to the meter by means of the supplied cable assembly, and the '2250 does the rest.

Leakage measurements can also be made. The procedure is outlined in the accompanying manual and basically amounts to comparing the numerical readings obtained when using the LEAKAGE TEST switches. Both readings should agree in value within approximately 5% of each other. A greater percentage of difference indicates the capacitor under test exhibits excessive leakage. A nomogram is supplied that may be used to determine the approximate leakage value in ohms based on the test readings obtained.

The innocuous exterior of the '2250 is rather deceptive. Beneath its plastic "skin" lies a total of 31 ICs and 19 discrete transistors! Three circuit boards contain all the components. With the exception of two LSTTL devices, all ICs are CMOS types.

Heath IT-2250 Capacitance Meter

Manufacturer's Claimed Specifications	*Measured in ARRL Lab*
Range: 0 pF to 199.9 mF (0.1999 F).	Selected values to 125,000 μF measured (see text).
Accuracy (using Heath-supplied standards, within a temperature range of 67° to 77° F)[1]: 0 to 199.9 nF, ±0.5% of reading + 1 count + 0.5 pF; 0.1999 μF to 199.9 mF, ±5% of reading + 1 count.	As specified (see text).
Display rate: Values up to 1999 μF, less than 1.5 seconds; values up to 199.9 mF, less than 10 seconds.	
Display type: 3-1/2 digit LCD.	
Dimensions (HWL): 2 × 3-1/4 × 7-1/2 in.	
Weight: With battery, 16 oz.	
Price class: $158.	
Options: IMA-2215-1 leather carrying case, $15; PS-2350 120-V ac battery eliminator, $8; PS-2450 240-V ac battery eliminator, $15.	As specified.
Manufacturer: Heath Company, Benton Harbor, MI 49022.	

[1]mm = in. × 25.4; g = oz × 28.35.

Construction

A total of nine corrections had to be made to the instruction manual before proceeding with the unit assembly. If you're baffled by what appear to be "extra holes" in the pc boards, don't be: These are plated-through holes that act as jumper wires between the foils on the opposite sides of the pc board. With that in mind, be sure you place the component leads in the proper holes and not into a nearby plated-through hole.

Heath has thoughtfully supplied a small magnifying glass for use during kit assembly, but I opted to use a pair of magnifying binoculars secured by a head strap. They're relatively inexpensive, eliminate eye strain and are a boon to the assembly of heavily populated pc boards.

It took me a total of nine hours to complete the construction of the '2250. And, much to my pleasure, it worked the first time (that's always such a relief!). Calibration was completed in a matter of minutes using the Heath-supplied capacitance standards. These capacitance standards have been measured accurately, and their values marked on the envelope. When you're finished using them, store them in the envelope in a secure place so they'll be available for periodic calibration checks.

Circuit Description

A complete description of the circuit operation occupies approximately three instruction manual pages. Basically, the meter measures the unknown capacitance by measuring the time required to charge the capacitor from a fixed reference voltage to another fixed reference voltage and then discharge the capacitor to the original reference voltage. The time count is obtained from a crystal-controlled time base generator having a base frequency of 3.58 MHz. A selection of five clock frequencies is made by a range counter. The time required for the capacitor charge/discharge cycle is directly and linearly proportional to the capacitance value.

In Use

The IT-2250 may be powered by an internal, user-supplied, 9-V battery (alkaline types are recommended) or by one of two optional Heath battery eliminators (120- or 240-V models). The external supplies connect to the meter by means of a subminiature phone plug that is inserted into a jack mounted on the side of the meter case. If the internal battery is used, a LO BAT indication appears when the battery potential has dropped to approximately 5 volts.

Meter protection is provided by an internal resistor placed across the input jacks when the instrument is switched off. With power applied, clamping diodes and a 1/4-A fuse offer

*Assistant Technical Editor

assurance against damage. The fuse is mounted on fuse clips secured to the input circuit board, and case disassembly (removal of three screws) is required to replace either the fuse or internal battery.

There are four LED annunciators that inform the operator which one of the ranges is being used during display of the capacitance value measurement. A thumbwheel at the center of the instrument allows meter zeroing. The capacitor to be measured (or the remote cable assembly) plugs into the terminals at the bottom front of the unit. These terminals are strips of copper that permit ease of insertion and retraction — no need to find a little hole for the capacitor lead.

The remote cable consists of a pc card with four lengths of small-diameter coaxial cable attached to it. It is used for connecting the meter to capacitors that cannot be plugged directly into the meter terminals. (When making measurements in the picofarad range, it is important to take into consideration the stray capacitance offered by the cable, approximately 30 pF.) I found the remote cable assembly to be both esthetically unappealing and awkward to use. The pc board can be easily pulled from the socket during use, and handling four leads is uncomfortable. Banana jacks and plugs would offer a more solid mechanical approach in my opinion, but two dual units would be required to be compatible with the existing circuit arrangement. Nevertheless, the cable assembly does perform the designed task.

The action of the ZERO control is adequate, but not quite as smooth a vernier type as that of the Data Precision 938[1] used in the ARRL lab. Comparison capacitance measurements were made using the IT-2250 and the '938. Measurements agreed with the specifications given by Heath up to the maximum capacitance range of the '938 (2000 μF). At that point, the '2250 kept on measuring capacitance as I tacked a total of 125,000 μF to the leads, still short of the top end of the range.

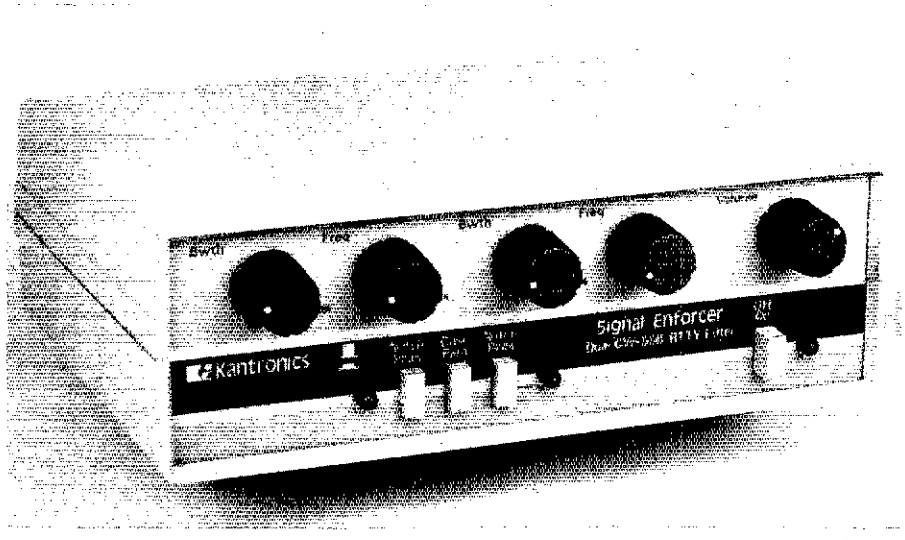
The accompanying construction/instruction manual is complete in every detail. A large, fold-out schematic diagram is included, as are a flow chart and a table of waveforms that appear at various points in the circuit.

With the IT-2250 in hand, you can make short work of that pile of capacitors you've been meaning to sort. Now let's see. . . where's that variable I wanted for the VFO? — *Paul K. Pagel, N1FB*

KANTRONICS SIGNAL ENFORCER

☐ Today, active audio filters range from simple, fixed-tuned types to elaborate, multisection filters with adjustable bandwidth and frequency. The Kantronics Signal Enforcer falls into the latter category.

The most prominent feature of the Signal Enforcer is that it has two independent filter sections. Either section can function as a peak or a notch filter, and both are adjustable in bandwidth and frequency. In the peak mode, a band-pass response is produced. No provisions are made for low-pass or high-pass responses. A front-panel switch is used to place the filter sections in series or parallel with each other. Combined with the peak/notch option, this allows the user to select a wide variety of filter configurations. For example, by placing the filters in series and selecting the notch mode for one and the peak mode for the other, a cw signal can be peaked while an interfering heterodyne is notched. If the sections are placed in parallel, both in the peak mode, signals of two different frequencies can be peaked simultaneously. The cw operator is likely to find that the most useful configuration results when both sections are in the peak mode and are placed in series; this produces maximum selectivity.



Other features include a self-contained power supply (117/234 V ac) and audio amplifier. Jacks are provided for headphones and an external speaker. When using narrow bandwidth settings, tuning of the filter center frequency becomes critical. To make the adjustment easier, each filter section contains an LED tuning indicator. To center a signal in the filter passband, you simply adjust the frequency control until the LED lights when the desired signal is present. The power switch and indicator and the volume control complete the complement of front-panel controls. The power switch, in the OFF position, feeds the incoming signal directly to the output jacks so that the unit need not be removed from the audio line when not in use.

A unique feature of the Signal Enforcer is the demodulator output (DEMOD OUT). The instruction manual supplied with the filter states that the demodulator output is "basically a filtered square wave that can be used to interface with other equipment." From on-the-air use, it appears that there is more to the operation of the DEMOD OUT signal than the manual indicates. If you wish to demodulate a cw signal you can use only one filter section. The other must be adjusted so that the tuning indicator remains off. The signal from the DEMOD OUT jack will then be a square wave that follows the input cw signal. With an RTTY signal, proper adjustment will result in mark demodulation with anti-space. If the mark and space tones are both absent, the demodulator output will be in the mark condition. This prevents the teleprinter from "running open" when no RTTY signal is present. It would be unfair to compare the demodulator output feature of the Signal Enforcer to more elaborate RTTY terminal units (TUs), as it does not provide the degree of filtering, limiters or automatic threshold circuits found in TUs designed for optimum hf RTTY operation. The demodulator output does provide an easy way to interface your rig to a personal computer or teleprinter for vhf and casual hf operation. A transistor switch to ground, with an internal pull-up resistor to 5 V, is used to generate the demodulator output, making it TTL compatible. A loop supply and additional interface circuit is required if the demodulator output is to drive a standard teleprinter.

Performance

The Signal Enforcer was used at my home station during cw, ssb and RTTY operation, the most-used mode being cw. When the transceiver ssb filter was used for cw operation, the Signal Enforcer provided a significant improvement in reception. There is a major drawback to using the Signal Enforcer (or any audio filter of this type) as a replacement for an

Kantronics Signal Enforcer

Manufacturer's Claimed Specifications	*Measured in ARRL Lab*
Bandwidth: Variable from less than 30 Hz to greater than 1000 Hz.	As specified.
Frequency range: Variable from less than 150 Hz to greater than 3000 Hz.	340 Hz to 3500 Hz.
Audio power output: Variable, 2 W maximum.	As specified.
Power requirement: 115 V at 60 Hz; 230 V at 50 Hz; or 12 to 18 V dc at 200 mA.	As specified.
Size: 2-1/2 × 8 × 6 in.	As specified.

[1]"Data Precision Model 938 Digital Capacitance Meter," *Product Review, QST*, Nov. 1979, p. 51.

i-f cw filter: The wide ssb passband will allow strong nearby signals to control the receiver agc. Even though the audio amplitude of these nearby signals is decreased to a low level by the af filter, the reduction in gain makes it impossible to copy weak signals. Turning off the agc will improve copy under some conditions, but I find that to be an uncomfortable way to operate.

When a 500-Hz i-f bandwidth is used, an audio filter can improve the overall signal-to-noise ratio by reducing the wide-band noise generated in the i-f and af stages of the receiver. When used at medium bandwidth settings, the Signal Enforcer performs this function well. By using the minimum bandwidth settings, a very narrow (less than 50-Hz) bandwidth is produced. In normal operation, these narrow settings are difficult to use. Anything less than about 150-Hz bandwidth (at the 6-dB points) severely taxes the stability of most rigs. I found that using the filter sections in series, with the bandwidth controls at about the 10 o'clock position, produced the most usable cw response. By slightly offsetting the center frequencies of the sections, a wider passband is obtained (this does reduce the skirt selectivity). Later laboratory tests showed that this configuration yields a 6-dB bandwidth of 200 to 400 Hz, depending on the exact settings of the filter controls. This is adequate to reduce wide-band noise and does improve the system selectivity.

A possible problem for the cw operator should be noted: If the cw note you like to copy differs from the sidetone frequency of your rig, the filter will attenuate sidetone as well as received signals of that frequency. Solving this problem may require sidetone oscillator modification. I found the notch filter handy when operating ssb; the good null depth allows broadcast-station carriers to be eliminated.

The Signal Enforcer is housed in a two-piece, plastic cabinet (the front and rear panels are aluminum). All circuitry is contained on two double-sided printed circuit boards. Construction and component quality appear to be high. This should lead to long, reliable service. Manufactured by Kantronics, Lawrence, Kansas, the price class of the Signal Enforcer is $170. — *George Collins, KC1V*

MAGGIORE ELECTRONIC LABORATORY HI PRO MK I 220-MHz REPEATER

☐ Quality! Often mechanical construction foretells the electrical performance of a piece of equipment. That is definitely the case with the Hi Pro Mk I. Both receiver and transmitter strips are mounted in heavy-duty cast aluminum boxes that provide excellent shielding. The remainder of the circuit is arranged neatly on a heavy-duty chassis. Throughout, the construction techniques and choice of materials speak of craftmanship and attention to detail.

Maggiore Hi Pro Mk I Repeater

Manufacturer's Claimed Specifications	*Measured in the ARRL Lab*
Transmitter output power: 15-W minimum.	18 W.
Duty cycle: 100% at 90° F.	Same, room temperature.
Receiver sensitivity: 0.3 μV for 20 dB of quieting.	0.3 μV for 20 dB of quieting.
Squelch sensitivity: 0.2 μV.	Less than 0.1 μV.
Size: 5-1/4 × 19 × 13 in.	
Weight: 6 lb.	
Color: Gray.	

The repeater has been in service for some months now at W1AW/R near ARRL Hq. It has performed flawlessly. Unfortunately, a repeater system requires more than a repeater to function smoothly. On several occasions I made a trip to the repeater site after performance degraded. Each time I found the Hi Pro Mk I operating into an infinite VSWR. Each time I worked with hardline connectors and jumper cables, and apparently "fixed" the problem.

After several of these trips, I removed the antenna from the tower and brought it back to the lab. Once the loading coil housing was removed, Chuck Hutchinson, K8CH, and I found the trouble. A wire from the center pin of the coaxial connector to the antenna loading coil had not been soldered to the connector. The manufacturer had packed enough RTV compound around it to hold it in place. Acid, formed as the RTV cured, had caused corrosion of the wire and the connector pin. Sometimes the two surfaces made good electrical contact; sometimes they did not. The repeater had operated for several months with a load that changed from moment to moment, and survived this "trial by fire" unscathed! It is hard to imagine a more torturous test of durability.

Power and control connections are made at the terminal strip at the chassis rear. Metal boxes on the chassis house the receiver and transmitter strips; the control circuit is located on the underside of the chassis. The front panel is designed for standard 19-inch rack mounting.

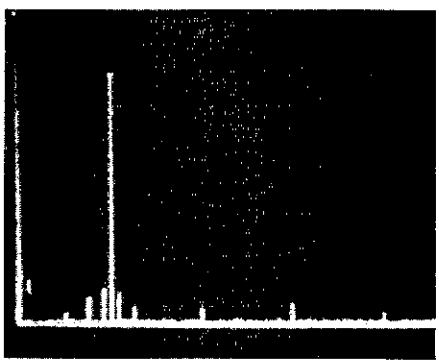


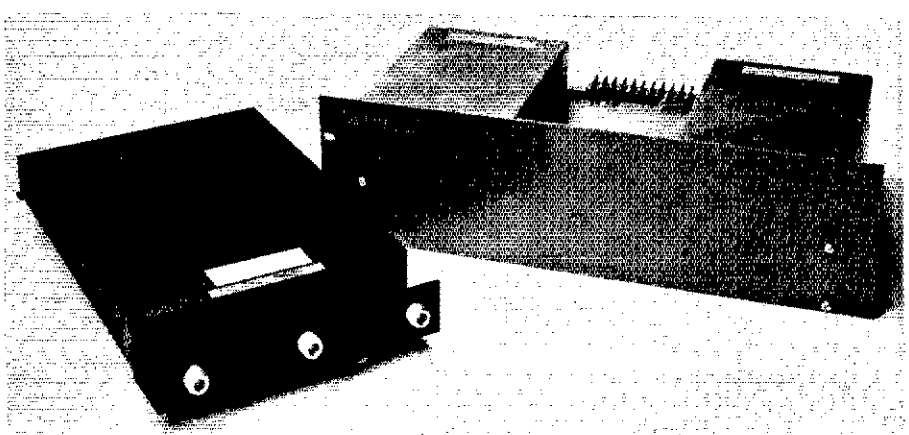
Fig. 1 — Spectral display of the HI Pro Mk I 220-MHz transmitter output. Vertical divisions are each 10 dB; horizontal divisions are each 100 MHz. The fundamental has been reduced in amplitude approximately 15 dB by means of notch cavities; this prevents analyzer overload. Power output is 18 watts at a frequency of 224.84 MHz.

Repeated audio is excellent. Controls are available for adjusting the volume, speed and tone of the built-in identifier, the time-out timer and the "hang" time. The repeater and matching duplexer are completely assembled and ready for installation. All that is needed is a power supply (12 V dc at 3.5 A) and an antenna. (Actually, as we unintentionally found out, the repeater performed reasonably well without an antenna!) We have observed no indication of intermod or desense during the six months that it has been in service.

At one point during a testing in the ARRL lab, we kept the transmitter keyed for over 30 minutes (into a dummy load, of course!). We observed no change in power output level during the test. There was a barely detectable increase in the chassis temperature near the PA stage — the Hi Pro Mk I seems to have a more than adequate heat sink.

If your repeater group is in the market for a moderately priced repeater, I suggest you give serious consideration to the Hi Pro Mk I. A deluxe version with built-in power supply, front panel controls, metering and accessories is also available at a higher price.

Price class of the basic repeater with crystals, flat-pack duplexer, cables and helical resonator is $1000. More information can be obtained from Maggiore Electronic Laboratory, 845 Westtown Rd., West Chester, PA 19380 — *Peter O'Dell, KB1N*



THE CENTURION TUF DUCK "MINI" 2-METER ANTENNA

☐ Miniaturization of electronic components has enabled the production of smaller and smaller transceivers. This has been particularly noticeable in the 2-meter fm market. The one thing that hasn't gotten smaller — until now — is the antenna. Centurion has introduced a short version of the "rubber duck" antenna.

Comparison

Excluding the BNC connector and ignoring any tapering, the typical "rubber duck" is roughly 6-1/4 inches long. The TUF DUCK is about 3-1/2 inches long. A typical "rubber duck" is approximately 3/8 inch in diameter, while the TUF DUCK measures 5/8 inch in diameter. This difference in proportion makes the TUF DUCK appear squat.

Physically short antennas operating over imperfect ground systems are often inefficient. I was curious about a comparison between the TUF DUCK and a stock "rubber duck" antenna, so I did an informal, unscientific survey of existing "rubber duck" antennas at Hq. Two tests were conducted comparing the TUF DUCK to a regular "rubber duck" antenna. With a receiver tuned to a moderately strong signal from a repeater, I compared the apparent received signal strength using the two antennas. A step attenuator with 1-dB resolution was connected between the antennas and the receiver. Results indicated that the regular "rubber duck" delivered about 3 dB more signal to the receiver than did the TUF DUCK.

Mike Kaczynski (W1OD) and I conducted similar tests using the two antennas for transmitting. Again, we connected the step attenuator to the receiving station and adjusted it to produce equal S-meter readings for both antennas. The results corresponded with those of the receiving tests: An ordinary "rubber duck" appeared to be about 3 dB better on transmit than the TUF DUCK.

I also checked the SWR of the antennas and found that it is over 2:1 for both at the center of the 2-meter band. The TUF DUCK did become warm to the touch at a power level of about 20 watts. This heating effect was not observed at more "reasonable" power levels.

Conclusions

A 3-dB difference is barely discernible to the casual observer. Also, the testing standards are far below laboratory specifications (ARRL does not have an antenna testing range). I conclude that the TUF DUCK could be used in place of "rubber ducks" by most amateurs with almost no one noticing the difference. Probably the only one who would notice a difference is someone whose signal is marginal to begin with. If you want to make your small rig "smaller," then consider the TUF DUCK. The TUF DUCK is available with all standard connectors. Additional information can be obtained from Centurion, Box 82846, Lincoln, NE 68501. Price class: $11. — *Peter O'Dell, KB1N*

BENCHER INC. XZ-2 ACTIVE FILTER

☐ How many gee-gaws are needed to make an RC active audio filter worth the price? Is a band-pass response adequate, or should we be able to select high-pass low-pass responses? The need for additional features will depend upon the kind of operating that is contemplated. The Bencher XZ-2 filter has only a band-pass response, which for me is entirely adequate for cw operation. An ssb selectivity position can be set from the front panel, along with three degrees of cw selectivity. The BANDWIDTH switch selects passbands of 90, 115, 150 and 250 Hz on the response curve 6-dB points. A frequency (TUNE) control located on the front panel adjusts the filter center frequency. In conjunction with the receiver tuning, it can be set to provide the desired cw pitch. Ideally, it would be adjusted to the receiver cw-offset frequency, which is typically between 600 and 800 Hz.

The advantage of a filter with so few controls is adjustment ease. The user simply tunes in the desired signal (filter turned off), turns the filter on and adjusts the TUNE control for maximum signal in the speaker or phones. The degree of selectivity used will depend on band conditions (QRM) and personal preference. I use maximum selectivity (90 Hz) at all times, even when copying loud signals. No annoying "ringing" has been noted when utilizing maximum selectivity, except during severe storms: The QRN peaks will tend to yield a ringing effect.

Those who use audio filters extensively are apt to become addicted to them, for the quality of the receiver output is enhanced by the filtering action — assuming the filter is designed well and functioning correctly. Some filters are very noisy and may introduce audio distortion when driven to a comfortable listening level. The Bencher filter is capable of providing extremely clean audio output, more than is needed for a normal operating environment. The user can attach headphones or an external speaker to the XZ-2.

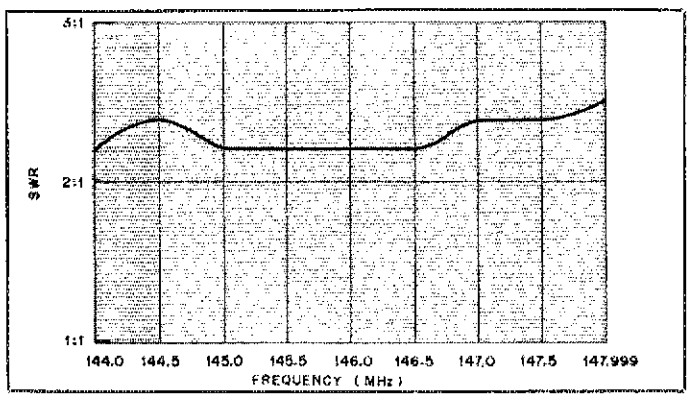
The circuit has some interesting innovations that set it apart from other commercial audio filters. The manufacturer has asked that the circuit details be kept confidential. It can be said, however, that the engineering was done well.

Filter bypassing is achieved by turning the BANDWIDTH switch to the OUT position. There is no need to patch around the unit, as had been the case with some other filter brands. There has been no indication that the circuit is susceptible to rf energy. It has operated properly from 160 through 10 meters while using 1 kW of dc input power at W1FB (100 W on 160 meters).

The manufacturer states that a potential grounding problem may exist with the first few hundred units that were sold. A common ground does not exist between the AUDIO INPUT and SPEAKER phono jacks on the rear panel although the jacks are part of a single assembly. One of the jacks has a wire connected to the pc-board ground foil. A jumper wire connected between the two jack ground terminals will avert any possible grounding problems.

An RC active audio filter is a valuable station accessory because it reduces wide-band noise from the receiver. This provides an effective improvement in the signal-to-noise ratio. It also enables the operator to lift otherwise unreadable weak signals above the noise for Q5 copy. This type of filter is especially useful for weak-signal cw work. Few DX chasers on 160 meters would consider operating cw without a good audio filter. I'm convinced that the Bencher XZ-2 is indeed a "good audio filter."

An external 12-V dc power supply is required to operate the filter. It is available as an accessory for $9.95. The XZ-2 sells for $69.95. The box dimensions are 2-1/2 × 5-1/4 × 6-1/2 inches. The manufacturer is Bencher, Inc., 333 West Lake St., Chicago, IL 60606, tel. 312-263-1808. — *Doug DeMaw, W1FB*



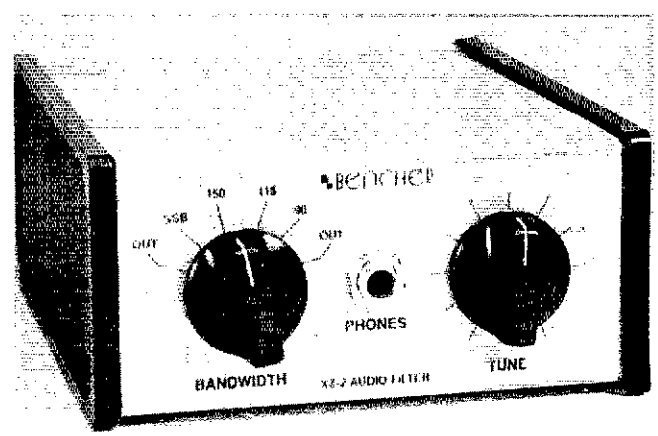


Fig. 2 — SWR curve for the TUF DUCK miniature 2-meter antenna. This curve is similar to those obtained with the conventional type "rubber duck" antennas.

Hints and Kinks

Conducted By Larry D. Wolfgang, * WA3VIL

HF ADAPTER FOR NARROW-BANDWIDTH OSCILLOSCOPES

☐ Here is a simple piece of test equipment that will allow you to display signals that are beyond the normal bandwidth of your oscilloscope. I wanted to monitor my modulated 10-meter signal on a scope that had a 5-MHz upper-frequency limit. I began by using a Mini-Circuits Laboratory SRA-1 Mixer. Any stable oscillator or VFO with an output of 10 dBm can be used for the local oscillator (LO), which mixes with the hf signal to produce an i-f in the range of the oscilloscope. The complete schematic diagram is shown in Fig. 1.

The mixer can handle rf signal levels up to −3 dBm without clipping, so this was set as an upper limit for the rf input. I constructed a toroidal-transformer coupler by winding a 31-turn secondary of no. 28-AWG wire on a 3E2A core, which has a 0.380-inch[1] diameter. The Amidon FT-37-75 is an equivalent core. The primary is a piece of coaxial cable through the core center. This coupler is described in *The Radio Amateur's Handbook*, 1981 edition, p. 16-31. The coupler gives 30-dB attenuation and was found to have a flat response from 0.5 to 100 MHz. My calculations indicated that an additional 20-dB attenuation was needed, for a total of 50 dB before the mixer. One-watt resistors will do fine for the attenuator. The completed adapter should be built into a shielded box.

This circuit, with the 25-MHz LO frequency, is useful on frequencies in the 20- to 30-MHz range with transmitters of up to 50-W power output. By changing the frequency of the LO, any frequency in the range of the coupler can be displayed on a 5-MHz bandwidth oscilloscope. More attenuation will be required for higher-power transmitters. — *Kenneth Stringham, Jr., AE1X, Attleboro, Massachusetts*

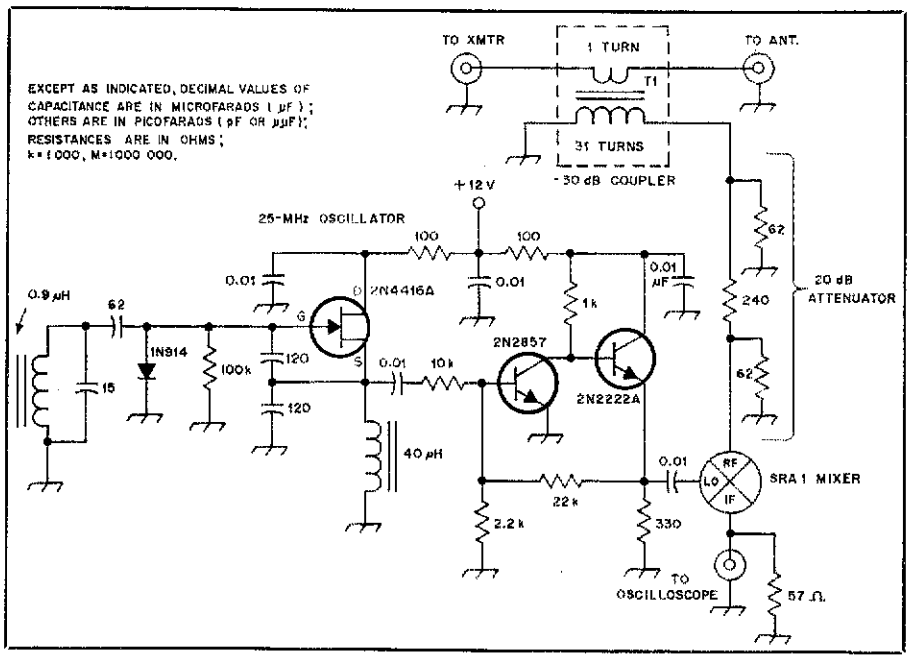


Fig. 1 — Schematic diagram of an adapter to display rf signals on a narrow-bandwidth oscilloscope, including a 10-dBm 25-MHz LO, −30-dB coupler, 20-dB attenuator and a diode-ring mixer.

ALTERNATOR-WHINE FILTER

☐ The standard solution for alternator whine is a choke-and-capacitor filter. Unfortunately, when the rig is shuttled between different vehicles, a separate filter is needed for each one. With this in mind, I put the filter inside my rig (a Kenwood TR-2200A).

The modification was easy and took only a few minutes. Finding space for the components may be the most difficult part of the task. Fig. 2 is the schematic diagram of the filter I added to my TR-2200A. A small iron-core choke was "liberated" from an old CB unit and placed under the spacer in the battery compartment. The tight fit holds it in place. The capacitor was mounted behind the speaker, with the ground lead on the capacitor soldered directly to the pc board.

Space is at a premium, but with attention to the physical size of the choke and capacitor this filter should be adaptable to most mobile rigs. One precaution: be sure the choke is capable of handling the current drawn by the rig. — *Dallas Williams, WAØMRG, Sedgwick, Colorado*

[1]mm = in. × 25.4; m = ft × 0.3048.

*Assistant Technical Editor

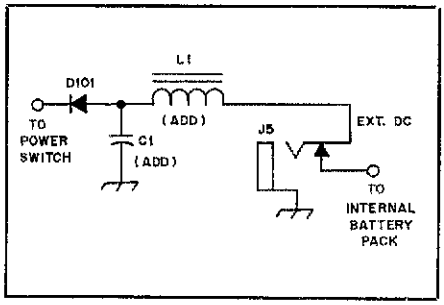


Fig. 2 — This simple alternator-whine filter was added to a Kenwood TR-2200A by WAØMRG. This circuit should be applicable to other rigs. C1 is a 470-μF, 25-V electrolytic capacitor. L1 is a dc power-supply choke.

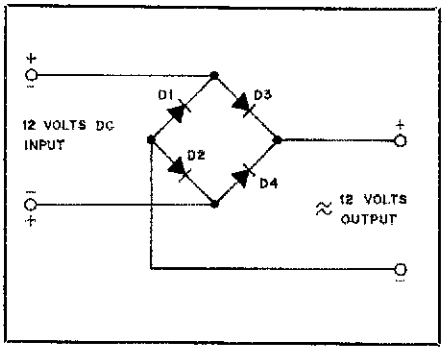


Fig. 3 — A bridge rectifier can provide positive protection against reverse-voltage connections to your rigs.

REVERSE-POLARITY PROTECTION

☐ Stop worrying about reverse-polarity voltage on your mobile rigs. This circuit will make reverse polarity an impossibility. I use a 25-A bridge rectifier. The output of the bridge rectifier is connected to the rig permanently, observing the correct polarity. A 12-V supply is connected to the ac input of the bridge, and polarity is not important. The voltage to the rig will be slightly less than the input voltage, depending on the voltage drop of the diodes. See Fig. 3. — *Henry Leggette, WB4MNW, Memphis, Tennessee*

RECTIFIER HASH FROM THE POWER SUPPLY

☐ I decided to try an old trick and use just the center of the coaxial feed line on my 80- and 40-meter dipole to load up on 160 meters. I slid the coaxial-connector sleeve off the back of my KWM 380 and found that the antenna loaded very nicely (low VSWR). However, I noticed a loud buzz in the receiver! I grabbed a portable a-m radio and started searching for the noise source, since it sounded close. It was obviously on the ac mains somewhere, so I started turning off everything in sight. I noticed that unplugging the dc supply to the 2-meter rig reduced the noise. But the switch was off! That didn't make any sense at all. I turned on another receiver and tuned to 160 meters. There it was, from bc on up to about 2 MHz. Anything that I unplugged or plugged into the ac line had an effect. Then I turned the KWM 380 off ... and so went the noise!

I remembered having the same trouble with a TR7 once — the power supply! The problem was caused by hash from the low-voltage rectifiers. Placing a 0.05-μF capacitor across the secondary of the power transformer eliminated the hash. Apparently this is a common problem

with low-voltage, high-current dc supplies. The hash is transmitted into the ac mains.

The noise had been there all the time, but using a shielded feed line prevented me from hearing it. When the shield was lifted, the antenna lead was exposed to the radiation from the ac line. Simple problem, simple cure; but sometimes those "simple" problems can make you feel "simple minded"! — *James Beckett, WA2KTJ, Horseheads, New York*

MOBILE POWER SUPPLY FOR YOUR 2-METER HT

☐ Tired of recharging those NiCad batteries after using your HT for mobile operation? Try this circuit that I have used with my Yaesu FT-207R for about a year. Only a single coaxial cable is needed to supply dc power to the rig and carry the rf signal to my mobile amplifier. The modification cost about $5 for all new parts. See Fig. 4 for circuit details.

To modify an FT-207R, remove the rear cover and connect the battery pack. Be sure the radio is turned off. Connect voltmeter leads between the ground side of the BNC jack and the terminals on the back of the VOLUME/ON-OFF switch to determine which terminal receives the positive voltage from the battery. The cathode of D1 will connect to this terminal (remove the battery pack first).

Disconnect the wires that are soldered to the center feed of the BNC connector. Insert C1 between the BNC center terminal and the wires just removed. Connect choke L1, C2 and the anode of D1, as shown. The other end of C2 connects to ground at the BNC jack.

Follow the schematic diagram for modification of the amplifier. Capacitors C1 and C4 are used to couple the rf signals to and from the coaxial cable. If your amplifier has an ac coupling capacitor you may omit C4. The rf chokes L1 and L2 couple the dc power source to the rig, and at the same time offer almost no rf load to the coaxial line. Capacitors C2 and C3 provide additional rf filtering.

Diode D1 serves two purposes. It drops the line voltage approximately 0.6 V when the rig is powered externally. It also prevents current drain on the NiCad battery when a grounded external antenna is connected. Diodes D2, D3, D4 along with D1 drop the 13.8 V auto-battery voltage to be approximately 11.4 V at the transceiver ON/OFF switch. As with any rf circuit, all leads should be kept as short as possible. — *Glen Day, AB8W, Gambier, Ohio*

SPEAKER "THUMP" IN THE HW-101

☐ After constructing my HW-101 I noticed an intense "thump" in the speaker when going from receive to transmit. This was quite annoying, so I contacted the Heath Co. people for help. They suggested soldering a 0.1-μF capacitor from lug 2 of R12 to ground, but this didn't help.

I quieted my T-R problem by increasing the value of bypass capacitor C322 to 0.1 μF and changing R337 to 470 kΩ. This will give the same time constant as the original values. I also changed R338 to 680 kΩ to provide about the same blocking voltage to V14A so the audio amplifier will remain cut off during transmit (Fig. 5). If anyone has any "mods" to the HW-101 that they would like to share, please write to me. — *Jim Flanagan, WB5KYE, 1032 Southcliff, Portland, TX 78374*

FREQUENCY JUMPS IN THE TS-820S

☐ I was experiencing a frequency jump of up to 500 Hz with my TS-820S VFO. An on-the-air discussion with Al Fischer, W7OA, revealed that he had solved the same problem with his TS-820S. Kenwood had advised him to clean all of the pins on the plugs above and below the chassis with rubbing alcohol and a brush. This must be done gently, and the plugs must be reinserted carefully. The VOX relay must also be removed, the protective cover taken off and the contacts cleaned carefully with a brush and alcohol. This cleaning operation eliminated the frequency jump of the VFO, and my receiver is stable again. — *Jerry Dolezal, W9NSC, Franklin, Wisconsin*

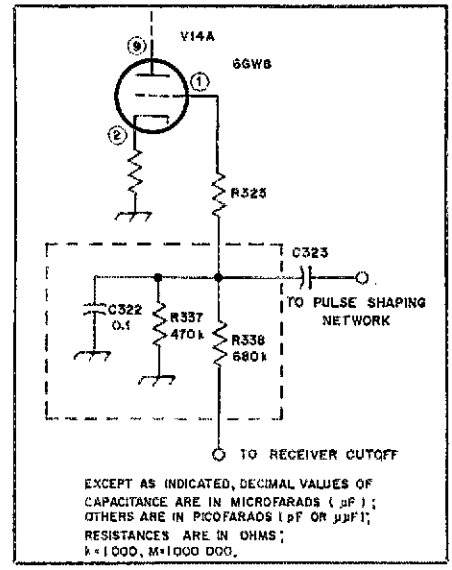


Fig. 5 — Components shown inside the dotted lines were changed to the values indicated to eliminate a loud thump in the HW-101 speaker when going from receive to transmit.

HW-101 LOADING CAPACITOR PROTECTION

☐ Recently the loading capacitor in my aging HW-101 failed. This failure was the result of constant upward pressure placed on the capacitor rotor shaft by the rubber belt-drive mechanism. Eventually this caused the bearings to wear down, allowing the rotor shaft to tilt and short the plates.

After replacing this capacitor at a cost of $12.15, plus the shipping and handling (the part used to cost $2.85), I decided to protect my investment by making a thrust bearing, which mounts on the front of the rf-cage assembly. This bearing will absorb the pressure placed on the rotor shaft, protecting the capacitor bearings. It is made from 3- × 3/4- × 1/16-inch aluminum bar and a nylon bushing (Heathkit part no. 455-44). Fig. 6 shows the mounting details. — *John E. Brush, WA3CAS, Coraopolis, Pennsylvania* QST

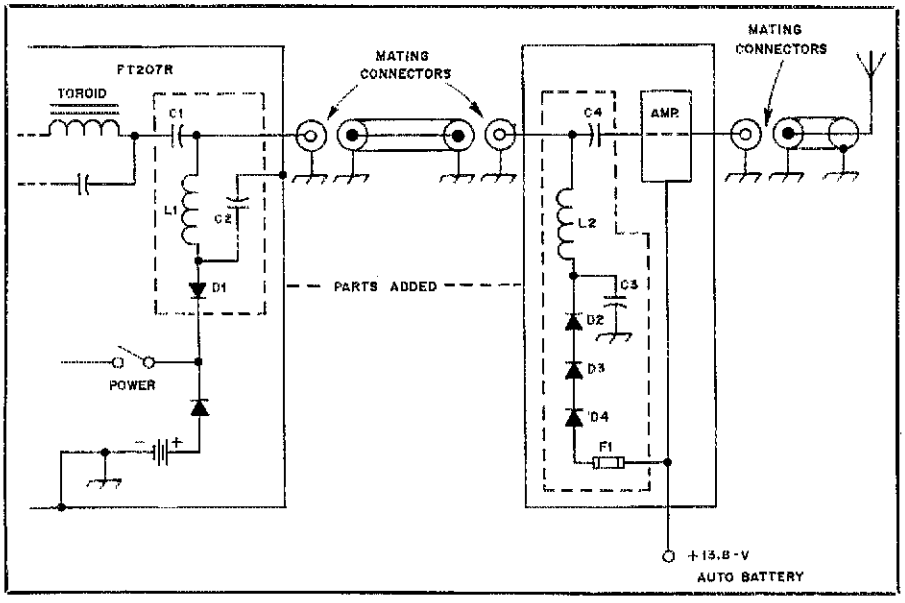


Fig. 4 — Supply the operating voltage to your HT through the coaxial cable from your mobile amplifier using this circuit. L1, L2 — a single-layer coil of no. 30 to 34 magnet wire covering the entire body length of a 5- to 20-megohm, 1/4-watt resistor.
C1, C4 — 0.01 μF, 50 V miniature disc.
C2, C3 — 0.1 μF, 50 V miniature disc.
D1 through D4 — 1N4001 or 1N4007 rectifier diode (any 1 A silicon diode).
F1 — 1/4 A fast-blow fuse.

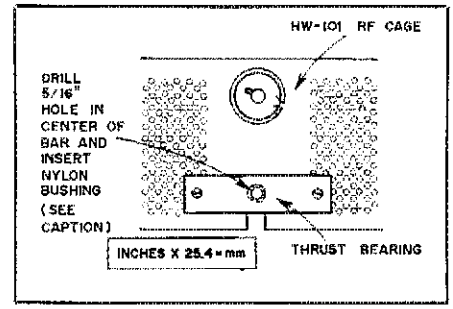


Fig. 6 — This thrust-bearing assembly reduces excessive wear on the loading-capacitor bearing in an HW-101. After placing the thrust-bearing assembly over the rotor shaft, mark mounting holes A and B to align with holes in the rear of the rf cage. Drill A and B with a 1/8-inch bit. Mount the assembly on the rf cage with no. 6 hardware.

Technical Correspondence

Conducted By
Doug DeMaw,* W1FB

ADVICE ON TRANSMISSION-LINE INDUCTORS

☐ Two otherwise excellent articles in *QST* have incorrectly shown the electrical schematic for the coaxial transmission-line inductor.[1,2] As shown, the two terminals of the inductor are at the opposite ends of the shorted transmission line. In this case, the fact that a coaxial line is used is immaterial, since the inductance is determined by the physical length and configuration of the line as a single conductor between the two terminals.

Both terminals of the inductor should be at the input, or unshorted, end of the line. In this case, the inductance is determined by the electrical length of the line, and is independent of the physical configuration or grounds to the pc board, in addition to the ground at the input end.

The inductance of a short-circuited 50-ohm cable with TFE dielectric material ($\epsilon = 2.1$) can be calculated with the equation

$$L_{\mu H} = \frac{7.96 \tan (1.74\ f\ell)}{f} \dagger$$

When the VCOs described in the two articles are built, the input end of each line should be soldered to the pc board and not left floating, as shown on the electrical schematics — *Jack Priedigkeit, W6ZGN, Menlo Park, California*

"APPARENT VSWR" — WHAT IS IT?

☐ The VSWR measured at the station end of a transmission line is indicative of the VSWR at the antenna feed point only if the transmission line is lossless. When there is a loss in the line (and all lines have some loss) the true VSWR is disguised at the transmitter end of the cable in accordance with the line loss in decibels.

I have visited amateur stations at which substantial power loss occurred in the transmission line. The operators were happy with the VSWR readings they obtained in the shack, even though a significant mismatch existed at the antenna. For example, assume that a particular station operated at 146 MHz and was equipped with 100 feet (30.4 m) of RG-58/U line for feeding a 2-meter antenna. A 6-dB feeder loss would result under the specified conditions. If the VSWR measured at the transmitter was, say, 1.25:1, the actual VSWR at the antenna would be 3:1. This is illustrated by the curves in Fig. 1, which show clearly that the lower the line loss the more closely matched are the VSWR numbers. One might conclude correctly that a highly lossy coaxial cable serves

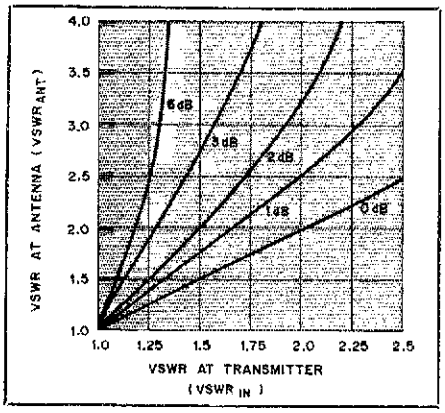


Fig. 1 — Curves that illustrate the effect of the line loss on the accuracy of VSWR readings taken at the station end of a feed line. The resolution is not perfect for these curves. The equation given in the text will provide more accurate comparisons.

admirably as an "air-cooled dummy load." Now, if the feed line of this station had a 1-dB loss per 100 feet, and if the VSWR in the shack read 1.25:1, the actual VSWR would drop to 1.5:1. When the line loss[3] and the input VSWR are known, the VSWR at the antenna can be obtained from

$$VSWR_{ant} = \frac{A + B}{A - B} \text{ derived from}$$

$$A = \frac{VSWR_{in} + 1}{VSWR_{in} - 1} \text{ and } B = 10^{\frac{dB}{10}}$$

where dB is the line loss under a matched-load condition.

Some amateurs have reported that the VSWR of their antennas has actually "improved with time," for unknown reasons. This phenomenon suggests strongly that the line is old and has become contaminated, and hence is very lossy. It is wise to replace cables that exhibit this characteristic. Remember that even a 3-dB line loss equates to wasting one half of the transmitter power, while at the same time confusing VSWR accuracy when it is read at the transmitter end of the line. — *Doug DeMaw, W1FB*

ANTENNA FEED LINES FOR PORTABLE USE

☐ The 1981 *Handbook* recommends the use of twin-lead-fed folded dipoles for portable operation, noting that RG-58 and -59 are "quite heavy and bulky for backpacking," and RG-174 is "too lossy."[4] Always eager to improve my portable station, but leery of the ability of twin-lead to perform under typical backpacking-type portable conditions, I purchased 100 feet (m = feet × 0.3048) of Belden 8230 300-ohm TV lead for test material. The feed line was strung around my wooden deck (several feet above the ground) and supported by TV standoff insulators, so that the line didn't contact the deck. Far from being typical backpacking conditions, this would simulate near-ideal circumstances.

Next I built two 4:1 baluns on large ferrite cores, putting one at each end of the twin-lead. My 50-ohm dummy load was used to terminate the system, so the cable was running with a 1.5:1 SWR. Cable loss was determined by measuring the power delivered to the load and comparing that to the *net* forward power (i.e., "forward" minus "reflected" power) measured at the input end with a Bird model 43 wattmeter. The balun losses (0.4 dB total) were measured separately at the same power level and subtracted from the result. The frequency for all tests was 21 MHz.

Dry twin-lead measured 0.8 dB loss, about the value given in the *Handbook* for RG-8 foam-insulated line. After about two weeks of dry weather (during which Mount St. Helens did *not* erupt!), a light rain fell, increasing the line loss to 3.7 dB, about twice that of RG-58! Later, when hard rain fell, loss was measured at 2.4 dB, slowly decreasing to 1.5 dB as the cable got "washed." Laying it on the wet deck increased loss to 2.6 dB, and coiling the cable resulted in 4.4 dB loss.

I can only conclude that 300-ohm flat twin-lead is a viable choice for feed line only if it can be kept clean, dry and uncoiled, and out of contact with trees, brush and the ground. These conditions could seldom have been met on trips *I've* taken in the past!

I would expect that tubular twin-lead would be less susceptible to dirt and water, but it would still have to be kept uncoiled and in the clear (what does one do with excess feed line?), and the potential advantages of bulk and weight would be largely lost.

Since coax isn't sensitive to being coiled (unless coil diameter is very small), wet or dirty, let's take a careful look as some possible candidates. First, I weighed some cables, with the following results (coax types include two BNC connectors):

Cable	*Weight (lb) per 100 feet*
Surplus RG-174/U-type	0.9
Columbia 1188 RG-58/U-type foam	2.4
Essex 21-024 RG-58/U	2.4
Belden 8230 300-ohm twin-lead	1.5

The *Handbook* shows a loss of about 2 dB per 100 feet for RG-58/U at 21 MHz,[5] so it would seem to be a good choice for the higher amateur hf bands, or when the feed line must be long. The 60% increase in weight over twin-

[1] A. Helfrick, "A High-Performance Synthesized 2-Meter Transmitter," *QST*, Sept. 1980, pp. 17-21.
[2] A. Helfrick, "The Universal Synthesizer," *QST*, Sept. 1981, pp. 18-23.
† Where f is the frequency in MHz, and ℓ is the line length in meters.
*Senior Technical Editor

[3] See the ARRL *Handbook* and ARRL *Antenna Book* for charts and tables that provide line-loss information in decibels for various types of coaxial cable.

[4] *The Radio Amateur's Handbook*, Fifty-eighth ed. (1981), ARRL, p. 10-14.
[5] *Handbook*, Fig. 31, p. 19-15.

lead may be a good trade for the predictability of the loss under backpacking portable conditions.

RG-174/U is attractive from a weight standpoint, and it can be packed into a much smaller volume than even TV twin-lead. The *Handbook* shows about 5.3 dB loss per 100 ft at 21 MHz. This may be on the high side; Belden 8216 RG-174/U cable is specified at 8.8 dB loss at 100 MHz[4] (the *Handbook* shows about 11 dB at this frequency). Using the approximation that loss in decibels is about proportional to the square root of frequency, we could expect the Belden cable to have a loss of about 4.0 dB per 100 feet at 21 MHz. Some time ago I obtained a quantity of surplus RG-174/U style cable which has a silver-plated solid center conductor and a silver-plated shield. It measured 3.3 dB/100 ft at 21 MHz. Naturally, the loss of all lines decreases at lower frequencies, making RG-174/U more attractive for such use.

So what do I recommend for backpacking-type portable feed line? I recommend that you weigh the advantages and disadvantages of each kind, and determine which is best for *your* particular application. I hope that this brief analysis provides information to aid your choice. — *Roy W. Lewallen, W7EL, Beaverton, Oregon*

THE MERITS OF FM VS. SSB

☐ On several occasions I have heard discussions about the relative merits of fm and ssb for vhf communications. Most experiments contrived to settle the issue show that fm is "better."

A good theoretical analysis can be found in ref. 1, chapters 9 and 10. Eq. 9.2-22 is of special interest:

$$\gamma_{fm} = \frac{S_o/N_o}{S_i/N_m} = \frac{3\beta^2}{2}$$

where

γ_{fm} is the communication efficiency referenced to a baseband system.
S_o/N_o is output signal to noise.
S_i is signal power at the limiter input.
N_m is noise power in the information bandwidth at the limiter input.
β is the modulation index.

Note that $\gamma_{ssb} = 1$ (ssb is frequency translated baseband); therefore, γ_{fm} is the improvement factor for fm over ssb. Applying this to a 5-kHz deviation, 3-kHz bandwidth system:

$\beta = 1.67$ and

$\gamma_{fm} = 4.17$ or 6.2 dB

In practice fm is about 3 dB better because of the 75 μs deemphasis, lowering the effective audio bandwidth for noise (see ref. 2, page 21-12, for math). This gives an fm-system advantage of about 9 dB over an ssb system for strong signals.

An fm system shows a threshold effect that causes the performance to degrade rapidly below 7 dB input signal-to-noise ratio. The fm i-f filter is about four times as wide, or 6 dB wider, so the ssb system has 13 dB signal-to-noise ratio at the fm threshold. Ref. 1 covers threshold effects in chapter 10. The following experiment verifies the behavior predicted by the theoretical analysis.

Fig. 2 shows the setup for the experiment. The agc in the Drake 1A receiver was disabled to allow reliable signal-to-noise measurements. The i-f strip from a Motorola H23 was retuned to 28.120 MHz and used as the fm i-f in the experiment. The H23 strip had a 5-kHz deviation i-f filter.

Fig. 3 is a graph of the measured S + N/N vs. input level for both systems. The theoretical graphs are S/N and the measured graphs are S + N/N. This causes a slight difference at low levels. Note that above the 20 dB quieting point fm provides significantly better system performance, and below that becomes noisy very quickly. The ssb system remains usable about 8 dB below the level at which the fm system becomes unusable. This means about six times the power level needed for marginal ssb communications is needed for fm. The minimum level that can be detected is about 12 dB lower for ssb. This is important because it can be a clue to rotate your antenna toward the other station. On long paths, multipath distortion can render fm unintelligible, while ssb would be almost unaffected.

Besides offering better signal-to-noise ratio, an fm signal also lends itself nicely to reliable squelch circuits because of its constant total power. A Touch-Tone pad signal would not survive the small frequency errors typical of ssb systems. One should note that both systems have their unique advantages and disadvantages, and both systems play important parts in today's vhf bands. — *Bruce Randall, WD4JQV, Alpharetta, Georgia*

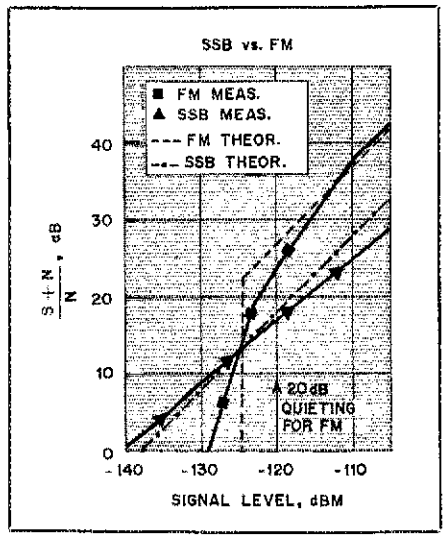


Fig. 3 — Curves for the measured signal-to-noise ratio versus the signal input level for both systems discussed in the text.

References

[1]Taud, H. and D. L. Schilling, *Principles of Communications Systems.* (New York: McGraw Hill Book Company, 1971).
[2]*Reference Data for Radio Engineers, Fifth Ed.* Indianapolis: Howard W. Sams & Co., Inc., 1969).

[4]Belden Electronic Wire and Cable Catalog No. 878, 1978.

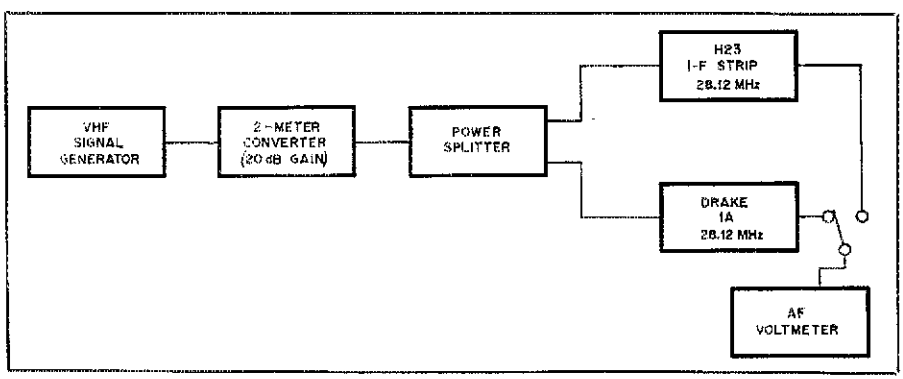


Fig. 2 — Block diagram of the test setup used for the experiment described in the text.

Feedback

☐ Two diagrams are reversed in the Technical Correspondence item, "Wave Reflections in Attenuators, Filters and Matching Networks," by Walt Maxwell, in November 1981 *QST*. The diagram and graph shown as Fig. 4 should be Fig. 5, and vice versa. Tables 1 and 2 will correlate correctly with the attenuation curves when this correction is made.

☐ Bill Fisher, W2OC, points out an error in the schematic diagram of his "Digital Frequency Filter for Repeater Inputs" (December 1981, p. 42). C1 has been shown incorrectly with a polarity marking. As is mentioned in the text, C1 must be a nonpolarized type.

☐ The December 1981 Product Review of the Cubic Astro 102 BXA transceiver incorrectly showed the 80-meter third-order intercept to be − 10 dBm. The figure should have been + 10 dBm.

☐ Fred Brown advises that as the result of an oversight in the original text for his Dec. 1981 *QST* article, "An Introduction to the Bilateral Transverter," the last two sentences of the first paragraph under "Tuning" (p. 38) should read: "L8 should be adjusted to maximize this current. L9 is adjusted for maximum collector current of Q7, and C9 for maximum Q8 collector current."

Also, the resonating technique for C16 and L14 is similar to that for C4 and L5 (p. 35). L14 is a hairpin loop of no. 18 wire. The position of C16 on L14 determines resonance. Lead length of C16 is virtually zero.

☐ In November 1981 Correspondence, Dick Schellenbach's call sign should have been printed as W1JF.

The 1981 Radio Amateur's Yearbook

Planning, public service and participation — cornerstones of a year that will be remembered as a gateway to the future.

By Richard Palm,* K1CE

With the spoils of WARC-79 clutched firmly in hand, the amateur community turned to the task of fine-tuning its machinery, readying itself for the shift to high gear on the road to the future. The word *planning* took on new meaning for Amateur Radio and the League, perhaps the very theme of the year 1981.

The year saw ARRL map its course by adopting the recommendations of its Long Range Planning Committee, recommendations that were based on a comprehensive study of the factors most likely to exert the greatest influence on Amateur Radio. Organizational dynamics, development of technical advances and continued support of the IARU in the international arena are all keynotes toward a new era in technology and public service.

Public service also took on new meaning for amateurs volunteering their time and labor in the public interest, convenience and necessity. The League placed expansion of public service activities high on its list of priorities, calling for new programs and formal recognition of amateur achievements in emergency communications.

Participation continued as a pervasive element at all levels of activity in 1981. Amateurs' involvement in local clubs and communications teams in both domestic and international civil and government affairs, remains a critical building block for the future.

New Faces of an Old Nemesis

The battle of RFI raged on in 1981, spurred by the FCC's lethargic attitude in Docket 78-369, and by the appearance of a new strain of RFI virus: CATVI, cable television interference. Amateurs became alarmed with the rising incidence of harmful interference from cable television operation, and began mounting an offensive. The League fired another salvo with its comments in the Commission's further RFI inquiry — the right of radio amateurs to operate their stations shall not be infringed because of the interception of amateur signals by home-entertainment equipment.

The enemy from within, malicious interference, was dealt blows from both the amateur community (through local efforts) and the FCC, which lent a helping hand with swift enforcement actions in hard-core cases. The ARRL Interference Task Force assisted local committees and individuals with direction-finding techniques and procedures for dealing with purveyors of MI.

Capitol Hill

The 97th Congress saw the introduction of two pieces of legislation of interest to amateurs. In the House, HR-2203, introduced by Rep. William E. Dannemeyer (R-CA), would allow FCC to use volunteers in the administration of exams and the monitoring of rule violations. On the Senate side, S-929 hits hard for minimum RFI standards for electronic equipment. Introduced by Senator Goldwater (R-AZ), the measure would also exempt Amateur Radio transmissions from the secrecy provisions of the Communications Act and would change the amateur license term from five to 10 years.

ARRL's presence continued to be felt not only on the Hill, but in other influential circles as well. The League's "Man in Washington,"[1] Perry Williams, W1UED, conducts the orchestra of volunteers in and around the nation's capital.

Legal Matters

With a 1981 federal rulemaking proceeding as a forum, the League said, "The most serious problem confronting Amateur Radio in the United States is the proliferation of highly restrictive zoning ordinances, building codes and restrictive covenants in deeds which so severely restrict amateur antennas that effective operations are all but impossible." ARRL called for a *Bill of Rights* — "a concise statement to assist local governments in recognizing the importance of Amateur Radio, the importance of the transmitting antenna, and the necessity that any zoning ordinances and building codes which may be adopted be realistic and not unreasonably restrictive."

Amateur Radio enjoyed victories and suffered setbacks in its continuing fight against the infringement of amateurs' rights by municipal governments. Amateurs celebrated their federal court victory in the *Oelkers* case, which held that a city's zoning ordinance was so restrictive as to be an infringement of the amateur's civil rights. In 1981, the precedent in the case was cited by attorneys representing radio amateurs in other cases and was used to persuade numerous local officials to be reasonable in enacting ordinances affecting the height of amateur antennas.

In another matter, the Massachusetts attorney general agreed with a League statement that the Town of Andover did not have the legal authority to regulate matters of radio frequency interference. (The town had submitted for approval an ordinance effectively prohibiting interference to neighbors' televison and radio reception.) Attorney General Belloti ruled that a "local community may not legislate in this area," and struck the proposed restriction from the ordinance.

In Canada, a successful appeal in an RFI case brought good news for amateurs. Bob Forbes, VE3QI, was convicted of interfering with a neighbor's stereo under a local antinoise by-law. The conviction was overturned on June 8. In his summary, the judge stated that regulation of amateur transmitters was a federal matter that could not be made subject to municipal control.

An adverse decision was handed down by the New Jersey Appellate Court in the case involving a Winslow Township ordinance adopted to make it unlawful to transmit radio signals that interfere with

*Assistant Manager, Membership Services, ARRL

[1]C. Colvin, "Our Man in Washington," November 1981 *QST*, page 58.

the well-being of others within the limits of the Township. The Court upheld the ordinance and affirmed a lower court decision that found Randy Bynum, WB2SZK, to be in violation of the ordinance. The fight may continue this year with an appeal to a higher court.

ARRL Hq. received an average of 15 requests per week for assistance with local restrictive ordinances in 1981. Amateurs can expect the fight for their rights to continue in 1982 and in years to come.

Public Service and Communications

Representatives from over a dozen European and African nations, Japan and the United States, assembled in Sicily last fall to attend the International Conference for Emergency Communications. The concept was born from the ashes of the disaster that was the Italian earthquake of 1980. Discussions focused on administrative and operational facets of emergency communications with the overall theme of improvement of the amateurs' ability to serve humanity in its time of need on an international scale.

U.S. and Canadian amateurs held several emergency-preparedness exercises including two Simulated Emergency Tests (SET) and, of course, Field Day, during which operators and equipment were liberated from the security of ham shacks and turned out into the wild to test their emergency communicating prowess. Another highly successful national display was the result.

To celebrate the centennial of the American Red Cross, amateurs participated in Operation Red Cross Message Relay. The National Traffic System relayed congratulatory messages at all levels. Red Cross and Amateur Radio have worked side by side formally since 1940, and in 1981 the ARRL Field Organization continued to offer emergency communication planning (in the pre-disaster phase) and emergency communications facilities (in the emergency phase) to Red Cross and civil preparedness organizations.

The National Traffic System continued on its four-cycle trial awaiting formal area staff recommendations. 1981 also saw the reinstitution of the Official Relay Station (ORS) appointment in keeping with the vaunted traditions of amateur message-handling.

As part of its efforts to coordinate more closely with other public and volunteer agencies, the League became a voting member of the National Volunteer Organizations Active in Disaster (NVOAD, pronounced no-vad). The ARRL communications manager traveled to Washington, DC, to accept the membership and participate in its meeting.

With power restrictions removed from 1800 to 1900 kHz as a result of a League request and Commission action, amateurs looked toward the establishment of a band plan to promote efficiency and order in the use of the new privileges.

Coming off the peak of the sunspot cyle, propagation was excellent in 1981. The favorable conditions were put to good use by both the DX and contest communities.

There Were Losses, Too

The year 1981 will be remembered as a positive one for Amateur Radio, but it was not without its darker days. Among the roster of silent keys are five men whose contributions to Amateur Radio will be long remembered.

David Hazelton Houghton served the League and Amateur Radio for 54 years as ARRL circulation manager, treasurer and honorary vice president.

Francis Edward Handy, W1BDI, a household/hamshack word to countless amateurs worldwide, was the first author of the *The Radio Amateur's Handbook*, known affectionately as "Handy's Handy Handbook." Ed served the amateur fraternity as ARRL communications manager and vice president for 42-plus years. He was the father of such institutions as Field Day, Sweepstakes and what is now the Amateur Radio Emergency Service.

Donald B. Morris, W8JM, served Amateur Radio well as vice director of ARRL's Roanoke Division (1974 through 1976) and as the guiding spirit of West Virginia State Conventions in an unbroken string back to 1959. He served also as SCM and held numerous posts in West Virginia radio organizations.

Harry A. McConaghy, W3SW, known to his many friends as "Connie Mac," will be missed both as a dedicated ham and volunteer of the League, and a gentleman. He served as a director of the League from 1970 to 1979, and was a life member of QCWA, the Society of Wireless Pioneers, Antique Wireless Association and ARRL.

Hiram Percy Maxim and F. E. Handy, 1935.

Robert M. Booth, Jr., W3PS, general counsel of ARRL for 20 years, was a close friend to many on the staff and in Washington, DC, where he practiced communications law on behalf of the League and Amateur Radio. He worked closely with associate Chris Imlay, N3AKD, in maintaining effective liaison with the FCC and other government agencies. This writer fondly recalls the tour of the city beloved by the tour guide on a warm summer's day last year.

State of the Art

Spread-spectrum, packet radio, computers and Coherent CW were headlines in 1981. ASCII came of age.

In October, the League sponsored a conference hosted by the Amateur Radio Research and Development Corporation (AMRAD) and the Radio Amateur Satellite Corporation (AMSAT) on Amateur Radio networking and packet radio techniques. On June 17 in Denver, the IEEE International Conference on Communications held a special Amateur Radio session.

QEX: The ARRL Experimenters Exchange was inaugurated as a forum for amateurs wishing to exchange ideas on highly esoteric tech topics. The new League publication is edited by AMRAD President Paul Rinaldo, W4RI.

The year also witnessed the migration of many hams to the world above 450 MHz — a wilderness that is only starting to be charted. The 10- and 24-GHz bands enjoyed vitalization, with amateurs

One of the year's worst U.S. disasters in terms of property damage occurred last fall, when a tremendous fire burned out the central area of Lynn, Massachusetts. Nearly 100 amateurs, including K2AJY, shown operating the North Shore Repeater Association control station across the street from the gutted area, assisted civil defense, Salvation Army, National Guard and Red Cross personnel during and after the blaze. (*photo courtesy WA1MCN*)

seeking to extend communications distance records and develop new techniques. Increased activity in the ARRL UHF Contest confirmed amateurs' migratory patterns.

The first U.S. packet radio repeater became operational during 1981. KA6M/RPT is a fine example of the new emphasis on digital communications, and an impetus in discussions of its application to public service activities such as the National Traffic System.

Plans and construction continued toward this year's planned launch of the Phase III-B satellite. The University of Surrey (England) celebrated the successful launch of its first satellite, UoSAT OSCAR 9. 1981 also saw the quiet death of AMSAT-OSCAR 7, which had long outlived its life expectancy. AMSAT-OSCAR 8, however, enjoyed a year of vitality.

Domestic Regulatory Matters

A flurry of FCC actions marked the regulatory scene in 1981. One of the highlights was the termination of the "plain language" proceeding, the Commission's proposal to rewrite Part 97 into simpler, easier-to-understand language, without action. Amateurs helped bury it with a paper blizzard of opposing comments from individuals and groups across the U.S. ARRL also filed in opposition.

Another action of significance occurred in Docket 80-136. In response to requests from amateurs, the FCC relaxed station i-d requirements — hams no longer must identify the station with which they are in contact (except when international third-party traffic is involved). Strike another win for deregulation, a recurring Commission philosophy in 1981.

The FCC continued its preparations for upcoming specialty WARCs in dockets 80-184 and 80-741. The U.S. also began the long process of implementing the Final Acts of WARC-79, which have yet to be ratified by Congress. The Commission released several inquiries during the year to study and solicit comment concerning various segments of the spectrum. ARRL commented in each in Docket 80-739.

AMRAD won a special waiver for spread-spectrum experiments. Later in the year, FCC proposed to allow the use of spread-spectrum techniques on vhf bands. The search for means of increasing spectrum efficiency continues as a major focal point for both the Commission and spectrum occupants.

The ARRL, FCC and the International Telecommunication Union (ITU) protested a U.S. attorney's decision to drop charges against a pirate radio station operating in Florida that allegedly transmitted anti-Castro propaganda to Cuba in the amateur 7-MHz band. The dismissal of the case (*United States v. Jose M. Gonzalez*) generated bitter disappointment within the Commission, which had invested more than 1000 hours of staff time to developing the charges.

The FCC released a working paper on deregulating Personal and Amateur Radio to stimulate discussion and critical comment on issues involving FCC policy. The paper generally called for greater flexibility in regulation.

A beacon experiment was authorized by FCC to operate in the new WARC 10-, 18- and 24-MHz bands to allow study of weak-signal propagation, typical of those conditions found in natural disaster situations.

FCC proposed to allow the use of additional digital codes on frequencies above 50 MHz for domestic communications, in response to an ARRL petition filed earlier in the year.

The amateur community in 1981 generally enjoyed good relations with the FCC which, to a great extent, responded with appropriate actions to the ever-changing needs of a dynamic Amateur Radio Service.

International Affairs

A possible fourth ITU Region was discussed at a meeting in Geneva of an International Working Party (IWP 5/4) formed for the purpose by the International Radio Consultative Committee (CCIR). Participants, including the International Amateur Radio Union (IARU), arrived at the consensus that there was no technical or operational justification for the formation of a fourth region.

Consistent with the theme of planning for the future, IARU President Noel Eaton, VE3CJ, appointed a committee to study how IARU might be restructured for even more productive operation. Sometime this year, IARU regional representatives will meet to consolidate many recommendations and suggestions into one cohesive proposal to be submitted for approval to the IARU membership.

The international amateur community suffered a great loss with the passing of Roy Stevens, G2BVN. A member of the IARU WARC team at Geneva, Mr. Stevens played a key role in the strength of Amateur Radio in Region 1. He was secretary of IARU Region 1 as well as a dedicated member and past president of the Radio Society of Great Britain.

Region 1 held the only Regional IARU Conference of the year in Brighton, England. Its Executive Committee also met in October, and chose Eric Godsmark, G5CO, to succeed Roy Stevens as secretary.

International Amateur Radio entered 1982 in a strong and healthy state, the result of the interest and participation in the activities of each IARU society. The International Amateur Radio Union will remain a vital force in post-WARC planning.

Canadian Affairs

The Canadian Radio Relay League continued the traditions which were established with the Canadian Division of the League in 1920. With CRRL membership climbing in 1981, amateurs are looking forward to increases in services, activities and representation — challenges that will not go unmet.

CRRL and CARF officials met with DOC staff members to assist with the preparation of a new, expanded syllabus for the amateur, advanced amateur and digital amateur class license exams.

The Anik-B Project was highly successful. With the joint sponsorship of CRRL and CARF, two teams of five amateurs were permitted use of an Anik-B commercial-experimental satellite voice channel to conduct packet radio experiments.

CRRL is paying all legal fees in the successful appeal of a significant RFI case in Mississauga, Ontario. Bob Forbes, VE3QI, was convicted of interfering with a neighbor's stereo under a local antinoise by-law.

Canadian amateurs won 10-meter repeater privileges, the result of a proposal submitted to DOC by CRRL.

Expansion of the CRRL Board from three to five regional directors was discussed at the CRRL Board meeting June 6 in Montreal. Election procedures, a study of the CRRL constitution, and the Intruder Watch were other topics of discussion.

Planning was a priority for CRRL. Items of discussion included a possible part-time salaried professional to administer many CRRL membership services. Visions of a CRRL Hq. building developed to serve the burgeoning needs of Canadian Amateur Radio.

"Of, By and For The Amateur . . . "

Long range planning occupied a major portion of the League's attention in 1981. The Board adopted the recommendations of its Long Range Planning Committee at its second meeting of the year, held in Hartford.

At its first meeting, in Orlando, the Board dealt with several housekeeping chores. Committees were proposed to study and make recommendations concerning the 900-MHz band, digital communications and vhf/uhf contesting.

Director elections were held to ensure that the membership has its say in policy matters. Election procedures were a topic of discussion as problems cropped up in a few divisions. Some fine-tuning was performed to preclude similar problems in the future.

Some tough decisions were made in 1981, decisions that were necessary in difficult times. The League enjoyed a year of organizational health as it lifted its eyes to the future, with the membership serving, as it should, as its life blood.

Soviet Amateur Satellites Launched

By Bernie Glassmeyer,* W9KDR

Amateur Radio enthusiasts worldwide are amazed at the spectacular launch of six Amateur Radio spacecraft put into orbit on December 17, 1981. These six satellites, RS 3 through RS 8, are orbiting the earth approximately once every two hours, similar to RS 1 and RS 2 launched in 1978. This latest launch is unique because the satellites will sometimes be spaced approximately 20 minutes apart, completely encircling the earth; this would provide continuous communications through each satellite one at a time and then repeating every 120 minutes.

Each of the RS satellites has its own telemetry beacon. Uplink to the RS satellites is from 145.910 MHz to 146.00 MHz. Beacon frequencies and orbital parameters for December 24, 1981 are listed in Table 1.

The passband of the transponders that have been heard so far is approximately 40 kHz. The first transponders heard in the USA were RS 5 and RS 8 on December 23, at approximately 0230 and 0430 UTC. The first QSOs reported to ARRL Hq. were between W3HV, W2RS and ON1BE.

Amateurs who wish to operate the RS satellites should use operating procedures as outlined in the *ARRL Operating Manual* and OSCARlocator Package. One point to remember is *do not use more than 10 watts of uplink power.* The Soviet RS uplinks are very sensitive and you should *only use uplink power necessary to maintain communications.* An aid to communicating through the 145/29 MHz RS and OSCAR transponders is to announce your uplink frequency when you are receiving your own downlink frequency. This will help minimize QRM generated from those trying to find their own signals.

Since the Soviet RS satellites are orbiting at an average apogee (height) of 1600 km, the communications range of these satellites will be in excess of 8000 km. Inclination is 82.9°.

Additional operating excitement has been from the ROBOT QSO AUTO-RESPONDERS. These ROBOTs have been found on RS 5 and RS 7. The ROBOTs have definite input and output frequencies. RS 5 input 145.826 MHz, output 29.331 MHz. RS 7 input 145.835 MHz, output 29.341 MHz. To QSO the ROBOTs, the procedure is: RS__ DE (YOUR CALL) AR. Send this after the ROBOT calls CQ and pauses for a call. If you were successful, the ROBOT will reply with: (your call) DE RS__ QSO NR__ OP ROBOT TU FR QSO 73 SK.

The RS telemetry formats were printed in June/July 1980 *Orbit* magazine. All telemetry data and QSLs should be sent to Box 88, Moscow, USSR. One means to tell if the transponders are on is to monitor the K channel of telemetry. If the channel reads 00, the transponder is off. A reading above 00 indicates the output power of the transponder.

*OSCAR Program Manager, ARRL

PLOTTING THE RS SATELLITES

If you have the "all-new OSCARlocator Package" (available from ARRL for $7 U.S., $8 elsewhere postpaid), you can use either the OSCAR 7 or OSCAR 8 plastic overlay to make an RS plotter. To modify your new OSCARlocator, remove the large plastic overlay from the snap fastener and place it over Fig. 1. Position the tracking curve 90 degrees to the existing track to cause least interference. Align the cross at the north pole and fasten it with a paper clip. To trace the curve, we use a Pilot SC-UF ultra-fine-point black permanent marker. This pen sells for less than a dollar and can also be used to mark high-gloss QSL cards. You may divide the minute marks even further if you wish, but the two-minute intervals were found to be adequate. To find successive orbits, place the plastic overlay back on the snap fastener. Align the 0-minute mark of the RS tracking curve with 0 degrees longitude. Progress around the circle and make a mark every 30 degrees. You will find this divides 12 times, telling you that RS makes 12 orbits in 24 hours. Starting at 0, number each successive mark 1, 2, 3, etc., until you reach 11. The 12th successive orbit will be the 0 mark. This completes the large tracking circle modification.

To modify the range circle (the one centered over your QTH), use Fig. 2 to increase the size. You will find the RS range circle is only slightly larger in overall diameter than the OSCAR 7 range circle.

The Amateur Radio operators of the Soviet Union and the DOSAAF have made a major contribution to Amateur Radio with this latest launch. We wish the Radio Sputniks long life and hope for continued success in future endeavors. We thank the Soviet Union for a very nice Merry Christmas to Amateur Radio.

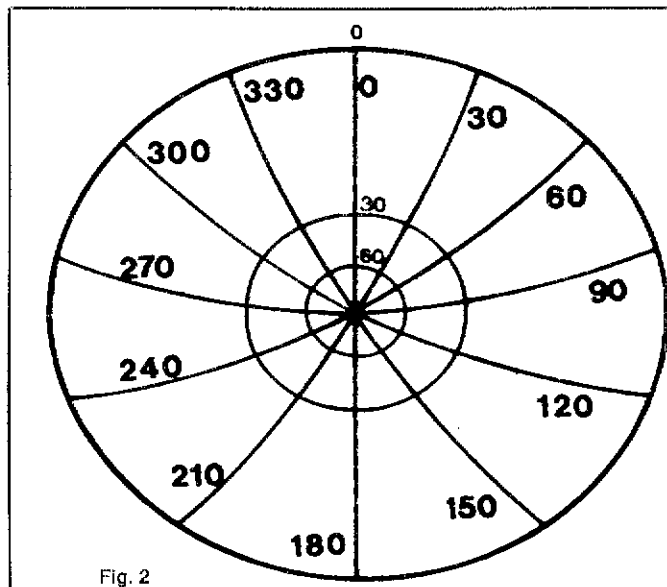


Fig. 2

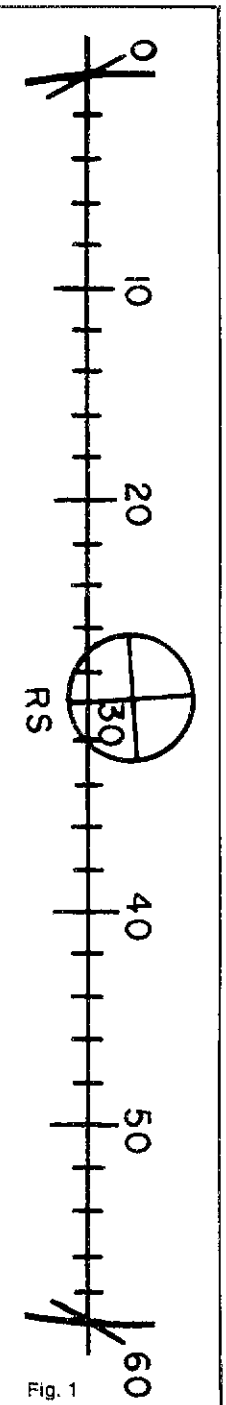
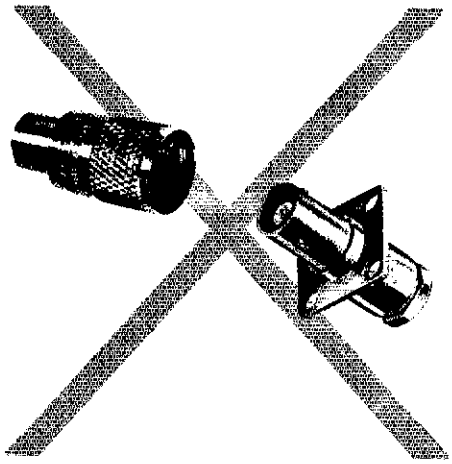


Fig. 1

Table 1
December 24 Orbits

Satellite	*Beacon Frequency (kHz)*	*Orbit No.*	*Time (UTC) Hr Mn*	*EQX W. Long. (Deg.)*	*Period*	*Increment*
RS 3	29,320	80	0036:01	185.9	118.5205	29.7567
RS 6	29,410 - 29,450	80	0051:45	189.9	118.7189	29.8065
RS 7	29,340 - 29,500	80	0121:31	199.3	119.1957	29.9261
RS 4	29,360	80	0145:20	203.3	119.3967	29.9760
RS 5	29,330 - 29,450	80	0157:53	206.4	119.5557	30.0158
RS 8	29,460 - 29,500	79	0014:46	180.5	119.7662	30.0685

The Amateur Radio Mating Game



By Edward L. Koller,* W6UDY

This article is written in utter frustration and is intended to alert the amateur fraternity to a dire threat that could eradicate, once and for all, our wonderful hobby. I refer to the profusion of cables, plugs and connectors to which the manufacturers of ham radio equipment are subjecting us.

I am an amateur who likes to operate a number of modes and who has the usual overabundance of gear in the hamshack, accumulated miscellaneous parts, connectors, cables and plugs — enough to cause a considerable storage problem in a two-car garage. Nevertheless, when I decide to hook up two pieces of equipment, any two pieces, I come flat up against one inalterable circumstance — invariably, I don't have the right connector. If I have the right type of plug, it isn't the right sex! If it is the right sex, it isn't the right type! If it is the right sex and right type, then the cable won't be wired to it using the compatible connections.

For a while, this was only a minor annoyance, but as the commutations and permutations have proliferated, I am about to be driven crazy. There are coax connectors called uhf, BNC, type N, Motorola, etc. Each of these types have interconnectors that are T, double-male, double-female, right angle, etc. Then there are the various adaptors to convert one type to another. The radio stores are full of them. Time after time, in frustration I have gone down to the local "candy store" and spent a fortune on these "goodies," only to come home to find that I bought too many of one type or too few of another. As a result, the whole project is usually stalled because of lack of the right connector or adaptor. (Unless you want to resort to, ugh, clip leads.)

Microphone connectors have taxed the imagination of designers for years. I swear, the manufacturers must offer prizes to the most ingenious designers of microphone connectors. When two manufacturers do manage to use the same type, they choose to be original in how they wire up the connector.

Over the years, I have seen the type where the connector was a metal sleeve with a threaded ring, some phenolic and a spot in the middle of the latter where a drop of solder represented the hot lead connection. Then there was the same arrangement, but with two places for a drop of solder. Then there was the good old phone plug with the tip and sleeve. Then someone got the bright idea to use two sleeves and a tip. These were pretty useful because mikes could be changed in a jiffy (hey, Joe, which mike sounds better, mike A or B?). Now the latest is the four-pin type with the threaded exterior sleeve that opens up all kinds of original wiring concepts to the equipment designer. Believe me, I have three different pieces of Japanese equipment, all of which came complete with push-to-talk microphones, all with identical connectors, but none of which can be used with any other rig!

If rf and mike connectors were the only ones to worry about, the situation would still be tolerable. But to continue with my sad tale of woe, there are many others. Have you contemplated the infinite variety of printed-circuit board connectors, both for single- and double-sided boards, and the great variety of numbers of terminals per board? Then there are the varieties of extender boards and adaptive extender boards, both rigid and flexible. How about the proliferation of computer interface plugs, ports and receptacles? I won't even start into that except to yearn for the good old AN-connector types in use during and following WW II. The military wasn't so dumb — at least they knew that the war could be won or lost because of such mundane matters.

One might expect some sanity in the realm of audio interconnectors. In this country we had that situation pretty well under control with the RCA phono connector and the two different types of sleeve-and-tip plugs and jacks. Then the Japanese invasion began. (The Europeans contributed their own brand of confusion with their DIN series.) To make matters worse, the various miniature plugs look alike until you try to mate them. Then you find that a microscopic difference in plug shaft diameter or length frustrates the interconnection of the moment. Soldering these requires access to a high-power microscope!

One would think that we as amateurs, who have been looked to for years as being in the forefront of innovation, would have better things to be preoccupied with in trying to improve the state of the art than to be constantly harasssed by the most mundane of problems, simply hooking one piece of wire or cable or equipment to another. It is almost as though the manufacturers are jealous of the inventiveness of the amateur fraternity and have vowed to keep us so preoccupied with the mundane that we will never be able to challenge them on their own ground.

Maybe it is time we all rise up and demand return to the marvelous Fahnestock clip of yesteryear, where to make the connection one simply stripped the wire and slid it under the spring clip. That was an invention of sheer genius! It hasn't been improved upon in 50 years of connector engineering. With it you could connect antennas, audio, microphones, key, B+, C−, you name it. To hold it in place you could nail it, screw it, staple it or none of the above. In those days, our inventive genius was unfettered with connection problems. If the Fahnestock clip had been in use ever since, maybe we would have had humans walking on the moon during the Truman administration!

Licensed since 1941, the author is active on ssb, cw and RTTY, on all bands. He has operated from the Philippines (1945-46) and Australia (1964-67). These days, he specializes in ragchewing and building gear.

*225 Purrington Rd., Petaluma, CA 94952

Happenings

Conducted By W. Dale Clift,* WA3NLO

The Moonlight Metamorphosis of N6RJ

If you listen long enough, you'll notice the strangest thing about Jim Rafferty's signal on 20 meters. N6RJ may be weak all day long, but suddenly at sunset Jim's signal comes roaring up out of the QRM to become one of the strongest on the band. Even more amazing, it drops just as abruptly back toward oblivion at sunrise.

Ionospheric absorption? Not exactly. Jim faces one of the most bizarre local antenna regulations you'll find anywhere: He's required by law to keep his tower nested at rooftop level in the daytime. He's allowed to crank it up to its full 70-foot height only at night. Quite literally, Jim has a night-blooming antenna farm. But he isn't complaining all that much, because things could have been worse.

A well-known DXer and member of the ARRL's DX Advisory Committee, Jim lives in an officially designated "scenic corridor," an area with laws forbidding utility poles and ordinary television antennas — let alone 20-meter beams!

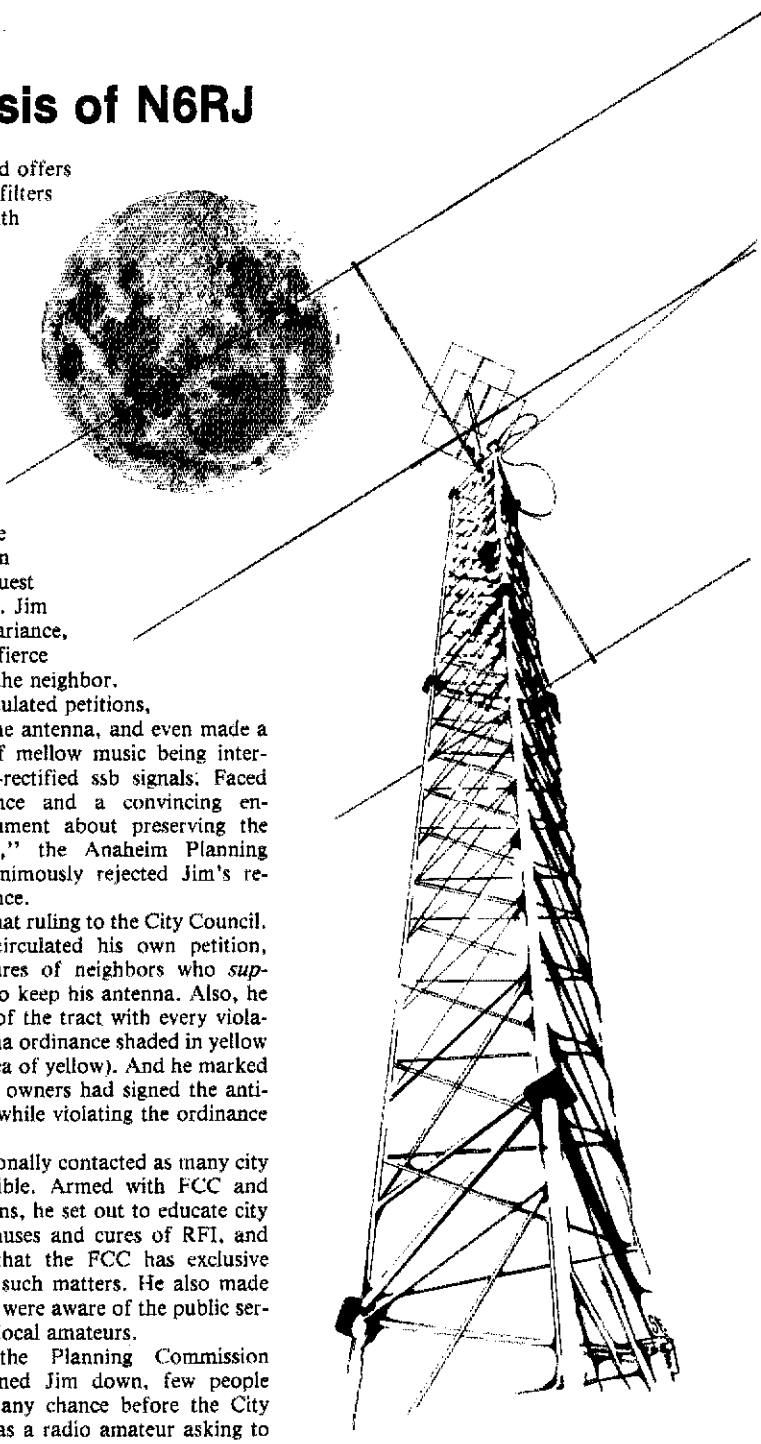
Jim's home is in Anaheim, California, which is also the home of Disneyland, the Los Angeles Rams and the California Angels. For the most part, this suburban city of 200,000 is wide open to radio amateurs. Hams planning to put up antennas are routinely told by city officials that they don't even need a building permit. However, the city limits extend eastward from the flatlands of the Los Angeles Basin into the Santa Ana River Canyon, and the rules are a lot different there.

Jim lives in the canyon, but before he moved there in 1974, he carefully checked the local zoning rules and deed restrictions to make sure antennas were permitted. He was told — correctly — that there were no restrictions. However, a year later the city declared the canyon and surrounding hills to be a "scenic corridor" and imposed tough new zoning restrictions, including a total ban on all types of outdoors antennas. The new rules were not retroactive, so Jim's existing antenna (a 3-element, 20-meter Yagi on a 40-foot telescoping mast) appeared safe.

By 1980, at least 150 of the 260 homeowners in Jim's tract had installed illegal TV or CB antennas, ignoring the "scenic corridor" zoning restrictions. In fact, the term "scenic corridor" conjures up a misleading image of the area. Jim lives on flat land some distance from the nearest hills. It's a neighborhood of quality homes, but it's *not* view property.

Furthermore, city officials were making no effort to enforce the restrictions, in spite of wholesale violations. Some building department employees privately assured residents the ordinance would not be enforced. Encouraged by all of this, Jim put up a 70-foot motorized self-supporting crankup tower and a 5-element, 20-meter beam in 1980. But then the trouble began.

A neighbor who had been grumbling about television interference for years — and had repeatedly rejected offers of free high-pass filters and other help with the problem — complained to the city. Jim was cited for violating the zoning ordinance, but nothing else happened until mid-1981.



Then city officials ordered Jim to remove the big antenna within 15 days — or request a zoning variance. Jim chose to seek a variance, and encountered fierce opposition from the neighbor. The neighbor circulated petitions, took photos of the antenna, and even made a tape recording of mellow music being interrupted by audio-rectified ssb signals. Faced with this evidence and a convincing environmental argument about preserving the "scenic corridor," the Anaheim Planning Commission unanimously rejected Jim's request for a variance.

Jim appealed that ruling to the City Council. Meanwhile, he circulated his own petition, gathering signatures of neighbors who *supported* his right to keep his antenna. Also, he prepared a map of the tract with every violation of the antenna ordinance shaded in yellow (the map was a sea of yellow). And he marked all parcels whose owners had signed the anti-antenna petition while violating the ordinance themselves.

Next, Jim personally contacted as many city officials as possible. Armed with FCC and ARRL publications, he set out to educate city hall about the causes and cures of RFI, and about the fact that the FCC has exclusive jurisdiction over such matters. He also made sure city officials were aware of the public service activities of local amateurs.

Back when the Planning Commission unanimously turned Jim down, few people thought he had any chance before the City Council. Here was a radio amateur asking to keep a large antenna system in a special scenic zone where even dipoles are forbidden, and facing determined opposition. But when the public hearing was held in November of 1981, it was obvious Jim's homework had paid off. The council members sharply questioned the leading opponents about their refusal to install high-pass filters and told them pointedly that RFI was none of the city's business.

It was clear the council members were not prepared to abandon their "scenic corridor" zoning. But it was also clear they realized they would have to order the zoning rules enforced against hundreds of other residents if they refused to grant Jim's variance. Mayor John Seymour conceded that he was unprepared for the political heat that might result if the city tried to force all the affluent and influential canyon area residents to give up their television antennas.

To solve the dilemma, the mayor offered a compromise. Yes, the antenna was big, he said, and yes, it was a conspicuous violation of the "scenic corridor" zoning. But the city's only legitimate concern was its *appearance*, not the RFI issue. Thus, Jim's antenna was a problem to the city only when it could be seen, the mayor suggested. Would Jim agree to keep the tower cranked all the way down in the *daytime*, only raising it between sundown and sunrise?

*Deputy Manager, Membership Service, ARRL

Jim weighed the pros and cons. Without the variance, he would have to fight a costly legal battle in court — with no guarantee of success — or make an even more costly move to another community. Accepting the conditions would mean saying goodbye to his big signal during some prime DXing hours. Still, going along would be a painless way to keep his antenna while he weighed his other options.

Jim accepted the mayor's compromise, and thus accomplished something that once seemed impossible: He won the right to keep a 5-element, 20-meter beam right in the middle of a "scenic corridor." His big array is perfectly legal now, but his neighbors' little TV antennas are still illegal!

From a ham's viewpoint, Jim Rafferty gave up a lot, but in the real world of political give and take, he won a major victory. As a last resort, other amateurs may want to suggest a similar compromise to their local authorities. Perhaps city officials elsewhere can be persuaded that a ham antenna can't possibly be an eyesore when it's too dark to see it.

Next time you beat N6RJ in a pileup at high noon, don't be too smug. As night falls, his antenna rises, and so does his signal strength. It's a moonlight metamorphosis brought to you by the Anaheim City Council. — *Wayne Overbeck, N6NB, Fullerton, California*

BEACON OPERATION RULES PROPOSED

Last month "League Lines" announced that the FCC has proposed to authorize the unattended automatic control of beacons in PR Docket 81-823 and limit all beacon operation to designated sub-bands. This month, "Happenings" carries the details of the proposal.

Under the present Amateur Rules, most Amateur Radio stations, including those operating as beacons, must have a control operator on duty at an authorized control point during all periods of operation.[1] This requirement, however, presents a practical difficulty in operating a beacon station. A function of a beacon station is to aid other stations in determining propagation conditions which are unpredictable, particularly in the vhf and uhf bands. Uninterrupted operation of a beacon transmitter is desirable, but around-the-clock monitoring duty by a control operator is not. The Commission has granted Special Temporary Authorizations (STAs) to amateur licensees to allow operation under automatic control, of some beacons in the amateur bands, thereby dispensing with the need for constant control-operator monitoring in special cases. These stations have demonstrated to the Commission that automatic control is adequate for most beacon operation.

The Commission has heard, however, that some operators allegedly operate "beacons" to harass legitimate operations (e.g. networks and repeaters), intentionally. This seems to be one instance of increased amateur-to-amateur malicious interference and is a situation the Commission will not tolerate. Therefore, the Commission is proposing to limit all beacon operation to certain frequencies, whether the beacon be under the presently allowed manual control or remote control rules, or under the proposed automatic control rules. FCC is also proposing this limitation to avoid interference because of increased beacon activity which may result from the authorization of automatically controlled beacons. Another benefit of the frequency limitations is that operators will be better able to locate beacon transmissions within each of the amateur bands. The proposed frequencies are a compromise between those proposed in a petition for rulemaking and the commonly accepted American Radio Relay League band plans.[2] Table 1 lists the proposed frequencies.

[1]See §§97.3(m) and 97.79(b). Under the present rules only stations in repeater operation may be operated under automatic control. Stations in space operation, however, are exempted from control operator requirements by §97.417.

Table 1

Amateur Frequency Bands Proposed for Beacon Operation

28.08- 28.10 MHz
50.06- 50.08 MHz
144.05-144.06 MHz
220.05-220.06 MHz and 222.05-222.06 MHz
432.07-432.08 MHz
all amateur frequency bands above 450 MHz

Power and Emission Limits

The proposal would also limit the emissions of stations in beacon operation below 450 MHz to A$\emptyset$, A1, F$\emptyset$ or F1. Furthermore, when type F1 emission is employed in these bands, the frequency shift would be less than 900 Hz. If beacon operation is conducted on an amateur band above 450 MHz, the beacon could use any emission type authorized for that band.

The Commission is also proposing a power input limitation of 100 watts on all beacon operation. It believes that the power of a station engaged in beacon operation should be limited to avoid interference. The FCC considered applying an effective radiated power (erp) limitation to beacon operation. However, if a beacon station operator wishes to employ directional antennas a regulation based on erp may be complex or ambiguous. Consequently, it is proposing a *power input* limitation. Also, this proposal is consistent with other current regulations regarding power measurements. The Commission says it selected 100 watts as a reasonable compromise between the needs of beacon operators and the needs of hams involved in other operations on the same frequency bands near beacons.

The Notice of Proposed Rulemaking (NPRM) in PR Docket 81-823 would also revise the definitions in §97.3 of the rules to include a definition of beacon operation. §97.84 of the rules would be changed to require a "beacon" designation to be transmitted at the end of the station call sign. Such station identification would be required at intervals not to exceed *one minute* during any period of operation.

The NPRM also proposed a new §97.87, entitled *Beacon operation*. This new rule will, if adopted, prohibit a station in beacon operation from operating concurrently on more than one frequency in the same band from the same location, provide for automatic control of beacons, and provide that operation shall cease upon notification by the Commission or any engineer-in-charge that the station is operating improperly or causing undue interference to other stations. The Commission also proposes additional minor changes to other sections of the rules to clarify the status of beacon operation and maintain consistency with the rest of the regulations.

[2]See the *ARRL Repeater Directory*, 1981-1982 edition, pages 16-20.

Members wishing to receive a copy of this NPRM are invited to submit to Hq. a self-addressed stamped envelope with 20¢ postage. Address your request to ARRL, NPRM 81-823, 225 Main St., Newington, CT 06111. Also, the full text of this proposal can be found in the *Federal Register* published on December 14, 1981, Vol. 46, No. 239, page 60859. Persons wishing to comment on the proposal should send one original and five copies to FCC Secretary, Washington, DC 20554 on or before March 15, 1982. Replies to comments are due April 15.

ROBERT M. BOOTH, JR., W3PS

On Thursday, December 3, 1981, Bob Booth, W3PS, general counsel of the ARRL, became a Silent Key. His accomplishments in the radio field were almost innumerable. His love for Amateur Radio and the ARRL were the root of most of these accomplishments. Most of all, however, Bob's kind manner and optimistic outlook toward his work and the tasks he faced left a positive, lasting impression on all who knew him.

The details of Bob's life were well described in a *QST* article about him in November 1980, page 63. Only some things will be repeated here. Bob was more interested in his dealings with people than statistics or lists of his accomplishments.

Bob held a variety of call signs. First licensed in 1927 as 8DDF in Cincinnati, and later 8PV, he later held W9DDB, W9DY and K4PS. The technical side of radio more interested Bob than did operating initially. His first job, which he began at age 16, was as a troubleshooter for Crosley Radio. He graduated from Purdue with an engineering degree in 1933. Bob returned to Crosley, worked as an engineer at WSAI, W8XAL (international broadcast station) and W8XO, a 500-kW experimental broadcast station which later became WLW in 1934. Attending law school at night, Bob brought to the Communications Bar a unique blend of understanding of the radio and television business. He became W3PS after World War II and has since then held that call.

Bob succeeded Paul Segal as general counsel of the ARRL, beginning in 1961. Bob attracted the League's attention initially because he represented a group of maritime mobile amateur enthusiasts, opposing the League in

connection with a proceeding before the FCC. He agreed to represent the League on the condition that he be permitted to comment to the Board of Directors on matters of substance — to have a voice in policy decisions that affected Amateur Radio. His understanding of radio and of the forces in Washington that regulated it would not permit him to remain silent on certain issues — he loved Amateur Radio too much for that.

Bob could be forceful, but never, ever unkind. "I'm not criticizing, I'm only trying to be helpful" are words he used often. Bob analyzed a problem by first asking innumerable questions, and only then would he give an opinion or suggestion for a solution to it. His solutions to problems helped many amateurs nationwide in handling restrictive antenna zoning or covenant cases. He was probably the most knowledgeable person in the U.S. on the subject of amateur antenna and RFI regulations. His expert testimony turned the tide in more than one Amateur Radio zoning case.

In 1979, Bob received the first distinguished amateur award from the National Association of Broadcasters. He did much over the years to encourage and effectuate FCC rule changes and legislation favorable to amateurs and to broadcasters.

The undersigned was uniquely privileged to be a member of Bob's law firm, Booth & Freret, for almost three years before Bob's death. In that time, it became clear why Bob Booth was a friend of all those he met. He loved people. One could tell by the sparkle in his eye when he shook hands with someone for the first time. Bob Booth was a good lawyer, a good amateur and a good friend. — *Christopher D. Imlay, N3AKD*

ARRL OPPOSES REMOTE CONTROL AND SECURITY DEVICES IN AMATEUR BANDS

Concerned with the potential for interference to devices such as burglar alarms and garage-door openers, the League has petitioned the Federal Communications Commission for reconsideration of its decision to allow such devices to operate in the amateur bands. ARRL also requested a stay of the effective date of the Commission's *Report and Order* (Docket 20990), December 10, 1981. "The League cannot and will not tolerate the creation of rules which will unquestionably lead to an increase in serious interference," ARRL said in response to the Commission decision to permit the operation of new unlicensed radio-control devices in the bands 144-148, 220-225 and 420-450 MHz.

The League requested that these devices not be permitted to operate on amateur frequencies because safeguards to resolve the incompatability of unlicensed devices with Amateur Radio operation do not exist. Pointing out the seriousness of the problem, ARRL said "every day public service-oriented radio amateurs receive undeserved complaints, lawsuits and abuse resulting from interference caused by the inability of consumer electronic devices to reject amateur signals." With security and convenience device operation, and amateur activity, being residential in nature, colocation and interference is unavoidable. A serious consequence is that "legitimate amateur transmissions on the same frequencies as security alarm devices which trigger false alarms would increase a presently existing burden on the public safety services, fire and police," the League said. Problems would be exacerbated by consumers' ignorance in interference matters. The League said that interference problems will exist even if the amateur bands are declared off limits for such devices, but "for the Commission to compound this problem by authorizing operation *within* the amateur bands is dangerous and not in the public interest."

The League was surprised that the Commission acted on its initial proposals made more than five years ago with no opportunity provided for further public comment to bring the record up to date. In its concluding remarks, the League said that the Commission's order should be followed by a reopening of the proceeding to allow further public comment, or in any event by an amendment of the rules to prohibit the operation of unlicensed remote control devices in the 144-148, 220-225 and 420-450 MHz bands. — *Richard Palm, K1CE*

PETITION FOR SUB-BAND ON 160-METERS DENIED

The FCC has denied a petition for rulemaking, RM-3761, that sought to establish exclusive sub-bands in the 160-meter amateur band for type A1 emission. The petition, filed by Charles T. Rauch, W8JI, proposed that ". . . the lower 50 percent of each current 25-kilohertz segment (of the 160-meter amateur band) as a maximum and the lower 20 percent as a minimum be exclusive type A1 emission with the remainder of the band (segment) mixed." The petition also went on to propose that, "If the band is restored to full amateur instead of shared then the lower half should be exclusive type A1 emission. . . ."

In denying the petition the FCC noted that the ARRL has undertaken voluntary partitioning of the band and expressed its belief that this approach to segregating inharmonious operating modes is more flexible and responsive to the amateur community. (See August 1981 *QST*, page 56 and January 1982 *QST*, p. 51.) In the Commission's view, a voluntary band plan is more appropriate for 160 meters than the imposition of new regulatory burdens.

TWENTIETH-ANNIVERSARY AMATEUR SATELLITE FUND DRIVE

Contributions to the ARRL Foundation's drive for funds supporting the amateur satellite program continue to roll in from amateurs wanting a piece of the action at the frontier of space. With a Phase III-B satellite in the works at AMSAT, 1982 holds much promise for "Hams In Space." To date, the ARRL Foundation has received a total of $82,535. It's not too late to make your contribution to the space program. Why not become a part of tomorrow's telecommunications world today? Mail your donation to the Amateur Satellite Program, ARRL Foundation, 225 Main St., Newington, CT 06111. Do your part to keep Amateur Radio at the forefront of technology! Recent contributors of $100 or more include: Tillo Deforce, ON5KD; and Robert E. Anderson, K1TVF (in memory of F. E. Handy, W1BDI).

160-METER POWER LIMITS ERRATA

The FCC's Order that restored to U.S. radio amateurs some of the power privileges on the 160-meter band contained an error. The appendix to the Commission's Order inadvertently left out the District of Columbia in the chart of restrictions for the frequencies 1900-2000 kHz. The District of Columbia should be included in the group, which includes Connecticut, Delaware, Maryland, New Jersey, New York, Pennsylvania and Vermont. (See "League Lines," July 1981 *QST*.) The power restrictions for this group are as follows:

Maximum DC plate input power in watts

1900-1925 kHz	1925-1950 kHz	1950-1975 kHz	1975-2000 kHz
day/night	day/night	day/night	day/night
200/50	0	0	200/50

AMATEUR'S RADIO STATION LICENSE REVOKED, OPERATOR'S LICENSE SUSPENDED

FCC Administrative Law Judge Thomas B. Fitzpatrick has revoked the license of Armando M. Rodriguez, Hialeah, Florida, for radio station WD4FPY in the Amateur Radio Service and suspended his Advanced class operator license for a term for willful and malicious interference with a repeater station's communications.

He also determined that Elio Mencia, Rodriguez's cousin and the licensee of amateur station KA4DWA, was not guilty of similar interference and vacated an order to show cause why his license should not be revoked.

In early October 1979, Rafael M. Estevez, president of a Miami-based amateur group called the Sociedad Internacional De Radio Aficionados, Inc. (SIRA), asked Southern Bell Telephone & Telegraph Company security to monitor SIRA's repeater station, because of interference that had been going on since May of that year.

Southern Bell determined that on October 4, 16 and 19 telephone calls were made from Rodriguez's residence to the SIRA repeater, and on October 27 calls were made from Mencia's home. Moreover, Estevez and two other SIRA control operators identified Rodriguez as the caller on several occasions.

(The SIRA repeater has two telephone lines. The first is an unlisted number used in conjunction with a walkie-talkie to activate an autopatch. The second line also has an unlisted number that can be used to control the repeater. For example, if the control operator dials a seven-digit unlisted number at the repeater, the control system automatically answers and waits for a command. If the control operator pushes number nine on a push-button telephone, the control system automatically shuts off the autopatch. If no command is given, the repeater's automatic timer will disconnect the call after 1 minute and 45 seconds has elapsed, during which time the control operator would be unable to access the repeater.)

As for Mencia's part, Judge Fitzpatrick pointed out that Rodriguez had been visiting his cousin on October 27 and had ready access to Mencia's telephone. Apparently, the comment heard by Estevez and attributed to Mencia, he said, was in the background and Mencia had not known about Rodriguez's call to SIRA. The judge added that since Mencia has been an employee of Southern Bell for over nine years, it was unlikely he would jeopardize his position by providing his cousin with an unlisted telephone number, even had he been able to obtain it.

The initial decision becomes effective in 50 days unless there is an appeal by one of the parties within 30 days or the Commission moves for review within that period. — *FCC news release dated October 9, 1981*

Correspondence

Conducted By Bruce R. Kampe,* WA1POI

POLITICAL INTERFACING

☐ Your article on the ARRL lobbying efforts ("Our Man in Washington," November 1981 *QST*) brings to light the need for a strong organization to represent Amateur Radio operators. Reviewing the pending dockets and petitions for rulemaking in the Amateur Radio Service, it is quickly noticed that there are many groups that wish to obtain the use of various ham bands or in some manner restrict our operations. These threats will not be deterred by individuals grumbling about them on the air. Even letters to one's congressman are not as effective as a strong lobbying effort. Certainly anyone cognizant of the ways of Washington realizes that lobbying is a very effective way of getting things accomplished.

In light of the growing importance of lobbying it seems that the ARRL should intensify its efforts to get *all* amateurs involved in the League. One way to increase membership greatly is to offer a membership in the ARRL (at a reduced rate) without the subscription to *QST*. Granted, a medium for communicating amongst members is important, but a newsletter would suffice. Offer the option of joining the ARRL and not receiving *QST*. Let the magazine stand on its own merits and *not* be forced onto people who only want to be represented by the League and to utilize its services. — *Thomas E. Ask, AC9L, Champaign, Illinois*

☐ This letter is in reference to the article "Our Man in Washington" on page 58, and item #71 on page 55 in the November issue of *QST*.

We can no longer afford to continue to have ARRL headquarters remain in Newington, Connecticut. Forget nostalgic sentimentality. The power is seated in Washington, DC, not Newington, Connecticut.

As an organization of amateurs we need every available resource channeled into lobbying. We need to camp out on the doorsteps of the FCC and our representatives in Congress. It is appalling to think of the number of well educated people who do not understand the many facets of Amateur Radio.

Imagine, if you will, an ARRL with an effective lobby equivalent to the National Rifle Association. The cost alone would be prohibitive you say? Nonsense! With ARRL headquarters located in the Washington, DC area, we could train and support an active corps of volunteers to lobby our representatives, similar to the way we train people to handle traffic and emergencies, etc.

The directors of the ARRL would do well to consider the exposure we would give Amateur Radio. Honestly, consider how many tourists flock into Newington, Connecticut, every year as compared with to our nation's capital. The possibilities for growth and advancement are staggering.

It is agreed by everyone, I am certain, that we need to win friends and influence people. We need to get our points across with an effective lobby. We need to have ARRL headquarters located where it will be more cost effective.

It is my opinion that the ARRL membership would support and even welcome such a plan. We all recognize the need to spread the word about how beneficial Amateur Radio can be to such a complex society as ours, in the most expeditious manner possible.

I challenge our elected representatives of the ARRL to poll the membership, and to hold a special election on this matter. — *Edward T. Mitchell, NØAKT, Monument, Colorado*

[Editor's Note: Mr. Mitchell's mention of item 71 on page 55 of November *QST* refers to minute 71 of the September 10-11 Board meeting, where it was adopted that the ARRL explore and develop practical options for establishing a more continuous presence in Washington, DC.]

☐ This is in reference to the item in December 1981 Happenings: "New Jersey Appellate Court Rules Against Amateur Radio." It prodded me to get off a letter to my congressman. As a bit of an amateur political scientist (as well as an amateur operator) I observe this as possibly a continuation of a threatening trend. This trend does not only affect individuals such as Randy, WB2SZK, it affects anyone who may be involved in "making waves" against certain interests. Often these interests control our legislative bodies, even though we elected these bodies.

There is hope, but only if all of us join in the struggle. We must not get bogged down at local levels. We must become politically active. Each of us *must* write, call and visit our United States Representative *today*, again next week and again next month. The corporations and special interests do this *all* the time. If you don't know who your congressman is, contact the League of Women Voters in your area, and they'll inform you. Let the folks in Washington hear from us regularly and often. Remember the old saying, "The wheel that squeaks gets the grease."

You could send your congressman a copy of the above mentioned "Happenings" item regarding the New Jersey Appellate ruling. Tell him you don't like it, and that you want some action at the federal level. Suggest that legislation be enacted or the following changes be made:

1) Require electronic manufacturers to incorporate adequate filtering.

2) In reference to regulation 47 C.F.R.,§97.116 (this appears in the third paragraph of the article) delete the word "local," which appears before the words "law is prohibited."

Politics is not an exact science, as is communications technology. In politics one can always make mistakes and cover up with sweet talk. If people in communications technology make mistakes, the equipment won't work! I wonder what would happen to the world if more of us in the exact science fields (who know how to make things work, or fix up what doesn't work) entered the political spectrum. Think it would work any better? — *Frank J. McDonough, W3PMV, Pittsburgh, Pennsylvania*

WELFARE ROLLS

☐ I disagree with Homer Fort, WB5IKX (Correspondence, December 1981 *QST*) in that DX lists are great. I feel that lists *are* the welfare rolls of Amateur Radio. In addition, I was shocked at Homer's lack of respect for good operating practices! Nothing can subordinate the savvy demonstrated by the op who makes a quick and snappy contact with that rare one, and in much less time than any list could ever hope to equal.

How much fun can exist in screaming at the 59 + 20 dB listmaker so that he can feed your call to the DX station? This type of activity breeds less than honest practices and lowers values regarding DXing; that is to say, it is too easy to listen for friends or to accept telephone calls, both of which discolor the DX game.

Mr. Fort indicates that it is a rare occasion when a 200-watt-3-elements-at-50-feet signal gets through the pileup. Not so, Homer. There are many operators who have the skill and patience, and with less than even 20 watts, have an impressive list of DX to their credit.

I don't have the extensive line of equipment or the impressive location to net any great advantage in breaking the pileups — only a 200-watt signal and a 3-element tribander at 50 feet. Yet I only occasionally fail to achieve contact with the desired station during a pileup. I am not saddened by this . . . for the essence of competition in the pileup is 50% of the thrill!

I respect and admire the DX station operator and his/her desire to avoid being the focus of a list operation. I will go on record supporting any attempt to implement guidelines into DX awards rules discouraging the use of list operations. It is my philosophy:

If the prize
loom greater
than the quest,
then
get on the list. — *David A. Grubbs, N4EF, Orlando Florida*

☐ It has been my observation that welfare recipients are usually the first ones to squeal when anyone points out they are receiving something for nothing.

Many true DXers (not welfare hams) have made up for lack of the location, tower, antenna or linear, which would have made DXing much easier, with hard work, diligence and patience.

If some want to participate in a sport with handicaps I suggest they try bowling. We must not let them turn the yacht race into one comprised of dinghies. Please keep in mind I am referring to operators, not equipment. — *Carl D. Henson, WB4ZNH, Jonesboro, Georgia*

*Membership Services Assistant, ARRL

Canadian NewsFronts

Conducted By Harry MacLean,* VE3GRO

More Answers to Your Questions About CRRL

We continue from last month.

Q. How is CRRL governed?

A. CRRL has a five-person board, consisting of a vice president who is also ARRL Canadian director, a secretary who is also ARRL Canadian vice director, and three regional directors: one for the West, one for Ontario and one for the East. The CRRL Board chooses the CRRL president, who could be any amateur who meets the requirements of the CRRL Constitution. In May 1979, to make it easier for members to identify "Who's in charge? Whom do I contact?", the CRRL Board appointed the CRRL vice president *president*! So far, this arrangement has worked well.

The CRRL Board sets policy and initiates the actions that become the responsibility of the CRRL vice president, who is, in effect, the organization's general manager. At present, Mitch Powell, VE3OT, is both CRRL vice president and president. Needless to say, he keeps busy with CRRL work.

Q. Why are there only three regional directors?

A. Canada is a big country. It costs a fair bit of money to bring even five board members together. This is why full CRRL Board meetings are just annual events. Board members do work together between meetings, relying on telephone contacts and correspondence.

It has now become clear that three regional directors are not enough. It is very difficult for a Western director to relate to amateurs on both sides of the Rockies. It is equally difficult for an Eastern director to relate to amateurs in both the Atlantic Region and Quebec. Last June, despite the costs that would be involved, the CRRL Board recommended that two new directors be added. This change will likely be incorporated into the CRRL Constitution before elections in 1983.

Q. How does CRRL get input for submissions to DOC, other government agencies, ARRL and IARU?

A. Informally, but effectively. First, CRRL reps and workers get a lot of mail. Then, they make a point of visiting clubs, hamfests and conventions. They ask a lot of questions and gain a pretty good idea of how amateurs feel about various issues. Finally, CRRL has attracted top amateurs in every part of Canada. Many are experts in particular technical fields, or in certain modes of operating. All are active people, well known and well respected by their peers. They have become CRRL directors, assistant directors and public information assistants. They are resource persons and are always consulted on matters in which they have experience or expertise.

Q. When will CRRL and CARF stop fighting?

A. We thought you'd never ask. There's been no "fighting" for over two years. Instead, there's been competition. Both CRRL and CARF have been trying to offer the best representation, the best bulletin systems and the best licencing materials. Result? Canadian amateurs have never had better service. Competition can be a wonderful thing.

Q. Will CRRL and CARF ever get together?

A. Not in the forseeable future. As a result of what has happened in the past, there's still a lot of distrust. Philosophically, CARF and CRRL are miles apart. CRRL people value the "ARRL Connection." It's a continuation of a 60-year tradition, it makes possible a level of service that would be impossible with a smaller, "all-in-Canada" organization, and it does not compromise the ability of CRRL to represent Canadian amateurs to DOC and others. But CARF people believe that the "ARRL Connection" makes CRRL "U.S. dominated," and that CRRL people do not take sufficient pride in Canada. We are proud of being Canadians. We are offering more and more League services from Canada through CRRL. We even produce and promote our own Canadian materials. But nothing we say or do seems to convince CARF people that we're on the right track.

Anyway, we're all still friends on the air!

DOC NEWS

National Policy Branch of DOC has issued a new table of frequency allocations for Canada. These will not take effect until Telecommunications Regulatory Branch of DOC changes its regulations. Here are some highlights of interest to amateurs:

1) The new 10.1- to 10.15-MHz band will be exclusive AMATEUR in Canada.

2) The new 18- and 24.5-MHz bands, when they become available later in the decade, will be primary AMATEUR in Canada.

3) 1800 to 1850 kHz will be exclusive AMATEUR. 1850 to 2000 kHz will continue to be shared with RADIOLOCATION and RADIONAVIGATION. This will likely be revised in a few years, when Canada's last Loran-A chain is phased out.

4) 3950 to 4000 kHz will continue to be exclusive AMATEUR. At WARC '79, Canada had added a footnote that would permit CBC to use this subband for international broadcasting. Apparently, this will not be happening.

Early in December, unofficial but reliable sources in Ottawa indicated that DOC was planning to release the new 10.1- to 10.15-MHz band to Canadian amateurs in January 1982. In Canada, amateurs would be the primary users, though DOC planned to treat amateurs as secondary users from an international viewpoint. Thus, if a Canadian amateur interfered with any Canadian user of the band, the amateur would have priority. However, if the amateur interfered with a foreign user of the band, and that user complained, the foreign user would have priority.

CRRL Ottawa Liaison Ray Perrin, VE3FN, felt that this could happen, in January, but was probably "jumping the gun." More likely, items, 1, 3 and 4 above would be part of a comprehensive set of regulations changes which Telecommunications Regulatory Branch of DOC would release in February or even March.

In other news, DOC has prepared another proposal for a new TRC-24, the Syllabus for Canadian amateur examinations. Early indications are that it is little changed from the proposal DOC made last year.

CRRL NEWS

The 37th annual meeting of the General Council of CRTPB, the Canadian Radio Technical Planning Board, was held in Ottawa on December 10. Amateurs were represented by CRRL Ottawa Liaison Ray Perrin, VE3FN, and Noel Eaton, VE3CJ. Among the items on the agenda: implementation of new frequency allocations, technical specs for communications equipment used in Canada, and the future organization of CRTPB and its various subcommittees.

MARCONI'S 80TH ANNIVERSARY

On December 12, 1901, Guglielmo Marconi received the first transatlantic wireless signal on Signal Hill, St. John's, Newfoundland. On October 29, 1981, Mrs. Gioia Marconi Braga, Marconi's daughter, visited St. John's to speak at the annual conference of the Association of Professional Engineers of Newfoundland. After her keynote address, SONRA, the Society of Newfoundland Radio Amateurs, and the Cornish Radio Amateur Society, staged a reenactment of this historic event in communication. GB4MEA, in Land's End, England, transmitted the letter "S" which was received by VO3MEA in St. John's and relayed to Mrs. Braga and the gathering of 200 engineers and their wives. Reception of the signal in St. John's was coordinated by VO1AW, VO1FG, VO1FN and VO1HP.

SONRA operated VO3MEA on December 11, 12 and 13 from Cabot Tower on Signal Hill, in commemoration of the 80th anniversary of the first transatlantic signal. — *VO1AW*

When Marconi's daughter, Mrs. Gioia Marconi Braga, visited St. John's, SONRA hosted a luncheon at which she was presented with publications on Marconi and with a hand-embroidered Newfoundland tablecloth. Shown seated (l-r) are VO1HP, Mrs. Braga and VO1FX. Standing (l-r) are VO1BL, VO1IM, VO1NP, VP1CR, VO1AW and VO1FN.

*163 Meridene Crescent West, London, ON N5X 1G3

International News

Conducted By Richard L. Baldwin,* W1RU

The Intruder Watch

The Intruder Watch program is aimed at preventing intrusions into the amateur bands of stations of other services not so authorized. Although the procedure may vary slightly from country to country, the general method of operation of an Intruder Watch is that its members monitor the bands in accordance with instructions promulgated by the national society, filing their reports either with the national IARU society or with the national telecommunications authorities. Then, through established channels, the necessary complaint is filed with the administration of the intruding station. Success in removing an intruder is not guaranteed, but persistence raises the odds for success.

Essential to the whole process is the existence of an Intruder Watch and someone to coordinate its activities. This month's sermon is aimed at those of our readers who live in IARU Region 2 (North and South America). The Intruder Watch Coordinator for the whole of Region 2 is W7JIE, who reports having remarkably little response to his request for IW coordinators in the various countries of Region 2. Those readers of this column who are officials of an IARU society in Region 2 and who do not yet have an Intruder Watch or a coordinator named, please contact W7JIE, either direct or via IARU Hq. Box AAA, Newington, CT 06111.

1983 — WORLD COMMUNICATIONS YEAR

On November 19, 1981, the UN General Assembly proclaimed 1983 as World Communications Year (WCY). The UN stated that the purpose of WCY is the development of Communications Infrastructures. Or, to put it another way, WCY will be a specific set of activities to increase the scope and effectiveness of communications as a force for economic cultural and social development, with special attention being given to the communications needs of developing countries. IARU Hq. is receptive to imaginative ideas of how Amateur Radio might play a role in WCY.

CCIR PLENARY ASSEMBLY

The CCIR (International Consultative Committee on Radio) will hold its 15th Plenary Assembly in Geneva during the period February 15-26, 1982. The purpose of this meeting will be to give an overall review of the many papers that have been given individual review by the various CCIR study groups during the past year or so, in preparation for the Mobile WARC, which is to be held in the early part of 1983. Because a number of amateur papers have been included in the work of the CCIR, IARU Hq. will be represented at the Plenary by Merle Glunt, W3OKN, who has been active in the work of Study Group 8 and who has attended a number of other CCIR meetings in Geneva.

SOME AMATEURS HAVE 10 MHz

British amateurs were to have use of the new 10-MHz band as of January 1, 1982. Power was to be limited to 150 watts dc input, with operation cw only on 10.1 to 10.14 MHz and both cw and RTTY on 10.14 to 10.15 MHz, in accordance with the IARU band plan.

Likewise, amateurs in the Solomon Islands were to be permitted use of the band 10.1 to 10.15 MHz on a noninterference basis as of January 1. The Solomon Islands Radio Society is a relatively new member of IARU Region 3 Association, and seems to be providing excellent leadership.

We also have a brief announcement from the Philippines that their amateurs were to be permitted use of the band 10.1-10.15 MHz band as of January 1, 1982. Although we have no further details, it seems that the Philippines were the first country to make known the availability of the new band, back in June of 1980.

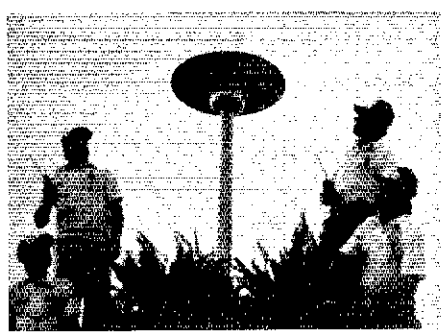
AMATEUR RADIO IN CHINA

There continues to be a great deal of excitement about the possibility of Amateur Radio being once again permitted in the People's Republic of China. A number of groups from Japan, the United States, Canada and other countries have visited China for one reason or another and have taken advantage of the opportunity to discuss Amateur Radio and its place in the world scheme of things.

IARU Hq. is in touch, both directly and through intermediaries, with those officials in China who do now and who will in the future have responsibility for administering any Chinese Amateur Radio service. We are assured that when any authorized Amateur Radio operation in China takes place, it will first be from station BY1PK and that IARU Hq. will have adequate advance notice of the operation. The Chinese are, understandably, proceeding very cautiously and, because of the many sociological and ideological differences, it is not likely that we will soon see an Amateur Radio Service in China that resembles that with which we are familiar in most of the rest of the world. To those who thirst for a contact with China, we can only urge over and over and over — patience, patience, patience!

*Secretary, IARU

Strays



The Amateur Radio control center had a press-box view of opening ceremonies of the National Sports Festival III, held last July in Syracuse, New York. The event, which takes place in non-Olympic years to help U.S. athletes prepare for future competition, provided the opportunity for more than 175 amateurs to render needed communications between headquarters and all sports venues, and also for the "Torch Runs," twin runs carrying Olympic flame torches from Buffalo and Albany to Syracuse. Amateurs covering the full five-day runs were (right photo, l-r) WB2FXG, WB2LQX, WA2URK and KA2KLM. *(photos courtesy Vivian Douglas, WA2PUU)*

BASEBALL, APPLE PIE AND AMATEUR RADIO

☐ When the World Friendship Baseball Series was held in Newark, Ohio, last summer, Amateur Radio was there along with some of the best ballplayers from Australia, Canada, El Salvador, Guatemala, Holland, Italy, Korea, Republic of China, Sweden, Venezuela and the United States. Designed to promote friendly international competition, the week-long event was beamed live via satellite to several nations. The games were also "covered" by the Newark ARA, which has been involved since the inception of the series. They put Amateur Radio in the foreground, providing needed communications at the site and passing many messages through the Ohio SSB Net for players and families. (Players from these countries with which the U.S. has no third-party agreement had to be disappointed, of course.) The team from Korea won the series, but the members of the Newark ARA agreed that Amateur Radio had been a winner, too. — *Fritz Tender, WB8HII, Newark, Ohio*

Hamfest Calendar

Conducted By Marjorie G. Tenney,* WB1FSN

[Note: Sponsors of large gatherings should check with League Headquarters for an advisory on possible date conflicts before contracting for meeting space. Dates may be recorded at ARRL Hq. for up to two years in advance.]

Florida: The Treasure Coast Hamfest is Feb. 20, at the Vero Beach Community Center. Prizes, drawings, tailgating, QCWA luncheon. Admission $2 in advance, $2.50 at the door. Talk-in on 13/73, 04/64, 52, and 222.34/223.94. For information write P.O. Box 3088, Beach Station, Vero Beach, FL 32960.

Indiana: The LaPorte ARC Winter Hamfest will be Sunday, Feb. 28, at the Civic Auditorium, beginning at 8 A.M. Chicago time. Donation is $2.50 at the door. Reserved tables $2 each. For further information write to P.O. Box 30, LaPorte, IN 46350.

†Iowa: The Davenport RAC 11th annual hamfest is set for Sunday, Feb. 28, in the Davenport Masonic Temple at 7th and Brady (Hwy. 61). Talk-in on the WØBXR/R at 146.28/88. Tickets are $2 in advance, $3 at the door. Tables are $5 each, with a $2 charge for electrical hook-up (limited number). Hours are 8 A.M. to 4 P.M. Hotel discounts, food and drink available. For advance tickets/table reservations, write to Dave Johannsen, WBØFBP, 2131 Myrtle, Davenport, IA 52804.

†Kentucky: Glasgow is the site of the annual Glasgow Swapfest. The date is Saturday, Feb. 27. Time is from 8 A.M. *Central* time 'til everyone goes home. This popular event takes place at the Glasgow Flea Market Building, located 2 miles south of Glasgow just off Hwy. 31E. Large, heated building and free parking. No meetings or forums; just prizes, free coffee, large flea market and friendly hams. Admission $2 — no extra charge for exhibitors. One free table per exhibitor, with extra tables available at $3 each. Talk-in on 34/94 (primary) or 63/03 (alternate). Additional information from WA4JZO, 121 Adairland Ct., Glasgow, KY 42141.

Massachusetts: The Algonquin ARC will be having an electronics flea market on Feb. 14 at Marlboro Junior High School Cafeteria. Doors open for sellers' set-up from 9 to 10 A.M. Doors open from 10 A.M. to 2 P.M. Talk-in on 01/61 and 52. Tables reserved in writing before Feb. 7 will be $5, $7.50 after, if available. Admission $1. Refreshments available. For reservations contact Mac, W1BK, 128 Forest Ave., Hudson, MA 01749.

Michigan: The Cherryland ARC announces its Ninth Annual Swap-N-Shop to be held, Saturday, Feb. 13, at the Immaculate Conception Middle School gymnasium, 218 Vine St., Traverse City. Doors open from 8 A.M. to 2:30 P.M. General admission is $2.50; single tables at $3. Talk-in on 146.85 or 52 simplex. For further information, contact Jerry Cermak, K8YVU, Chairman, 3905 Slusher Rd., Traverse City, MI 49684; s.a.s.e. will be appreciated.

†Michigan: The Livonia ARC presents its 12th Annual Swap-n-Shop on Sunday, Feb. 28, from 8 A.M. to 4 P.M., at Churchill High School, Livonia. Plenty of tables, prizes, refreshments and free parking. Talk-in on 52 simplex. Reserved table space of 12-foot minimum available. For further information, send s.a.s.e. (4 × 9) to Neil Coffin, WA8GWL, c/o Livonia Amateur Radio Club, P.O. Box 2111, Livonia, MI 48151.

†Minnesota: "Mid-Winter Madness" Amateur Radio and Computerfest, sponsored by the Robbinsdale ARC will be held Saturday, Feb. 27, at the Sacred Heart Auditorium, 4087 W. Broadway, Robbinsdale. Set-up time is 6 to 8:30 A.M. (CST); show time is 8:30 to 4:30 P.M. Advance admission is $2, at the door $3. Computer and Amateur Radio seminars, ARRL and FCC forums, literature table, rig test area, flea market/auction (for those unsold boat-anchors); prizes, food service, parking. Talk-in on 147.00/147.60 and 52 simplex. Further information from Robert M. Trover, KBØPM, 8200 67th Ave. North, Brooklyn Park, MN 55428, tel. 612-535-2144 (home).

†ARRL Hamfest
*Hamfest/Travel Coordinator, ARRL

New Jersey: The Split Rock Amateur Radio Association annual equipment auction is Thursday, Feb. 25, at the Morris Plains VFW Post #3401, Rte. 53, Morris Plains. Doors open at 7 P.M. to unload and inspect equipment; auction gets underway at 8 P.M. sharp. Admission is free. Items must be working electronic equipment; loose parts are to be bagged or boxed. Club will take flat 10% commission on all sales of individual items up to $50; above $50, club will take a $5 commission on each individual sale. All commissions are payable in cash only. Refreshments available. In case of inclement weather, auction will be held on Thursday, March 4, at same location and times. For more information, write P.O. Box 3, Whippany, NJ 07981.

New Jersey: On Feb. 28, the Old Bridge RA will hold its second annual auction of Amateur Radio, computer and electronic equipment at the Cheesequake Firehouse, Rte. 34 (Perrine Rd.) at Rte. 9, Old Bridge, in Central New Jersey. Doors open for registration and inspection at 11 A.M. Sale begins at 11:30. Admission $1. Many prizes. Club commission on successful sales only: 10% on the first $100 of the sale price, 5% on the remainder. Refreshments available. Talk-in on 72/12, 34/94 and 52. For more information call Fred, WA2BJZ, at 201-257-8753.

†North Carolina: The fifth annual Elkin Winter Hamfest will be held on Sunday, Feb. 21, at the Elkin National Guard Armory from 8 A.M. to 5:30 P.M. Site is 1 mile off I-77 at exit 85, easily accessible from the five surrounding states. Breakfast and lunch served by the sponsoring clubs, the Briarpatch ARC of Galax, Virginia, and Foothills ARC of Wilkesboro, North Carolina. Talk-in frequencies are 144.77/145.37, 22/82 and 52 simplex. Tickets are $2.50 in advance, $3 at the door. For tickets, table reservations or other information, contact Earl Day, WB4GQP, 131 Harris Ave., Elkin, NC 28621, tel. 919-835-3509.

†Ohio: The Northern Ohio ARS (NOARS) "Winterfest," its first indoor flea market/swap shop will be held on Sunday, Feb. 7, at Gargus Hall, near exit 8 of the Ohio Tpke., Lorain, from 8 to 6. Dealers welcome; dealer table space available in advance. Admission $2. Tables (6 ft and 8 ft) available at 50¢ per

Coming Conventions

February 6-7
Florida State, Miami

February 27-28
Ohio State, Cincinnati

March 20-21
Roanoke Division, Charlotte, North Carolina

March 27-28
Nebraska State, Kearney

April 3-4
Missouri State, Kansas City

April 17-18
Mississippi State, Jackson

May 14-15
Atlantic Division/New York State
Rochester

May 15-16
Alabama State, Birmingham

May 22-23
Delta Division, Knoxville, Tennessee

June 4-6
Southwestern Division, San Diego, California

June 5-6
Oregon State, Seaside

June 12-13
Southeastern Division, Atlanta, Georgia

June 19-20
Kansas State, Salina

ARRL NATIONAL CONVENTIONS

July 23-25, 1982
Cedar Rapids, Iowa

October 7-9, 1983
Houston, Texas

OHIO STATE CONVENTION
February 27-28, Cincinnati

Hamilton County ARPSC is again organizing the Ohio State Convention at the Great Oaks Career Center, just off I-275 near I-75 north of Cincinnati. This all-indoor activity starts with registration, hospitality suite and Wouff Hong ceremony on Friday night at the Holiday Inn Sharonville, 2235 E. Sharon Road, Cincinnati, OH 45241 (513-771-0700). Mention the convention for special rates (indoor recreational facility and pool).

Convention opens at 9 A.M.; excellent prices, so come early. Saturday banquet will feature ARRL representative Sally O'Dell, KB1O, club program manager and recognition of the Ohio Amateur of the Year. Forums on Dxing, NTS, computers, RTTY, OSCAR, ARPSC, ARRL, FCC as well as commercial vendors, exhibitors and displays.

Registration is just $4, flea market space $3 and the banquet $12.75. For information and tickets, write to: CINCINNATI ARRL '82, P.O. Box 46311, Cincinnati, OH 45246, or call Bill McMannis at 513-671-7066.

foot. Prizes and refreshments. Talk-in on 10/70, 144.55/145.15 and 52 simplex. For further information contact Doug Krucinski, WD8BJY, winterfest chairman, tel. 216-282-5945.

†Ohio: The Mid-Winter Hamfest/Auction will be held on Sunday, Feb. 14, at the Richland County Fairgrounds in Mansfield, cosponsored by MASER, Inc. and Inter City ARC. Doors open 8 A.M. to 5 P.M. Advance tickets $2, $3 at the door. Tables (advance reservations required) are $5 in advance, $6 at the door. Half tables available. Prizes, auction and flea market in large heated building. Meeting rooms available. Talk-in on 34/94. For info, advance tickets or tables, send s.a.s.e. to Harry Freitchen, K8HF, 120 Homewood Rd., Mansfield, OH 44906, tel. 419-529-2801.

†Ohio: The Cuyahoga Falls ARC 28th Annual Electronic Equipment Auction and Flea Market will be Sunday, Feb. 28, at North High School, Akron, from 8:30 A.M. to 4 P.M. Tickets are $2 advance; $2.50 at the door. Sellers bring your own tables or rent a table for $2. Plenty of space and parking. Many prizes. Easy access from Tallmadge Ave. off ramp of North Expy. (Rte. 8) connected to major interstates and Ohio Tpke. Talk-in on 04/64. Details from CFARC, P.O. Box 6, Cuyahoga Falls, OH 44222 or from K8JSL, tel. 216-923-3830.

Ontario: The NPARC will hold their 4th annual minihamfest Feb. 6, at the Holiday Inn, St. Catharines, from 8 A.M. to 3 P.M., with a dinner dance in the evening. Admission to the flea market is $2 per person. Prizes. Write Don Arseneau, VE3LVH, 52 Bula Dr., St. Catharines, ON.

Pennsylvania: Penn Wireless Assn. Inc. will hold its Tradefest '82 on Sunday, Mar. 7 at the National Guard Armory, Southampton Rd. and Roosevelt Blvd. (Rte. 1), 2 miles south of Pennsylvania Tpke. exit 28. Sellers space 6 ft × 8 ft is $5. General admission $3. Prizes, refreshments, rest areas, displays, and surprises. Talk-in on 146.115/715 and 52. Contact Mark J. Pierson, KB3NE, P.O. Box 734, Langhorne, PA 19047.

†Virginia: The 9th annual winter season hamfest, WINTERFEST '82, sponsored by the Vienna Wireless Society, will be held at the Community Center, 120 Cherry St., Vienna, on Feb. 28, beginning at 8 A.M. Displays by major electronic manufacturers and dealers, indoor flea market and outdoor "Frostbite" tailgating will be featured. Tables are $5 and $10. Many prizes. Tickets are $3. Food service available. Talk-in on 31/91 and 52 simplex. For full information send s.a.s.e. to WINTERFEST '82, Vienna Wireless Society, P.O. Box 418, Vienna, VA 22180, or call Ray Johnson, tel. 703-938-8313.

†West Virginia: The Plateau ARA 4th annual hamfest will be held in the Memorial Bldg., Fayetteville, on Sunday, Feb. 21, starting at 9 A.M. Admission is $2.50, children free. All indoors — exhibits, forums, prizes, food and refreshments, parking and ladies' activities. Talk-in on 19/79 and 52 simplex. Flea market tables are $2. For further information, contact Bill Wilson, WA8YTM, tel. 304-469-9910 or 304-469-9313.

Wisconsin: The Wild Rivers ARC will hold its third midwinter swapfest on Saturday, Feb. 20, from 10 A.M. to 3 P.M. at the Minong Village Hall. Admission is $2, tables are free. Talk-in on 147.81/21 and 52 simplex. For information, contact Adrian DeVriend, WB9BNK, Rte. 1, Box 102, Hayward, WI 54843.

Club Corner

Conducted By Sally O'Dell,* KB1O

THE ELECTRONIC SOLUTION?

Ever wonder how your club stacks up against the other 2200-plus affiliated with the ARRL? How many other groups are affiliated as local clubs, wide area clubs or school and youth group clubs? Of those, what is the average number of members? How many hams belong to ARRL affiliated clubs? How do we get in touch with other similar clubs? What is the mean, standard deviation and total of this parameter, or that? Too many of these questions have gone unanswered for too long.

"Wouldn't it be great if we could get a list of other _____ (contest, QRP, school, repeater...) clubs so that we could share ideas!

"Wouldn't it be great if we could get breakdowns of clubs in our area to coordinate activities, identify common interests, pool valuable resources, form regional councils and otherwise improve our effectiveness!

"Wouldn't it be great if new licensees in our area could be referred to us early in their ham radio careers?

"Wouldn't it be great if ARRL Headquarters could help us use our potentially most valuable resource — our own club and others like us locally — more effectively!"

We couldn't agree more. And we're on our way to serving you better by helping you in the ways mentioned above. No, we certainly aren't there yet; it will be some time before we can answer all such questions. But with your help, the journey from here to that "ideal" point in the future will be a quick one.

What's the answer? Better management of information about you and your fellow affiliates — more efficient, more timely, more effective assimilation and distribution of who we all are and what we have to offer.

If you're beginning to pick up the scent of bytes, bits and chips, you're right on target. We're rapidly bringing an in-house computer on line to replace the minimal service bureau data management facility we've relied on for years. No, we aren't so naive as to believe that the mere existence of a computer will solve all of our problems. Answers lie in the way we use the potential that the hardware represents.

Some improvements will be obvious. The speed with which we will be able to handle your routine club- and instruction-related requests will certainly improve as we eliminate the time-consuming step of shipping our requests to the bureau in Massachusetts and awaiting their response. To date we have maintained only a straightforward mailing list on computer; the rest of the information you have sent in annually has been maintained manually in a redundant card and folder file in the Club and Training Department.

How did we filter our answers to your questions and requests? We undertook a very tedious file-by-file search. Needless to say, we've been reluctant to assemble statistics on our 2200 affiliates beyond the bare minimum. By categories we've known our total numbers and by geographical and organizational regions we've generated mailing lists (only for valid purposes). For detailed information we've been able to operate only on a club-by-club, file-by-file basis.

Now, however, the days of our card file are numbered! Hallelujah! Some time will pass before we're able to assemble and pull out the information we both need to operate effectively. What will cause the delay? We can enter only that information that you send us. We're ready and eager to speed the process along and await only your cooperation.

With the January issue of *Radio Club News* that was sent to your "current" contact officer (*you* are responsible for keeping our information on your club current) was included the 1982 Club Annual Report form. One condition of maintaining Active Affiliation Status and thereby receiving the latest information that is important to you as a club is to send us your club's report, on the appropriate forms supplied by headquarters, *each year*. The time to do that for 1982 is *now*. We're ready to do whatever has to be done to serve you and your fellow clubs better with the computer. But we have to feed the machine before it can do us, any of us, much good.

If you have misplaced the new annual report forms or did not receive them, please contact Maureen Thompson, club program assistant at headquarters immediately. Early in the year, make sure your club officers spend the 20 minutes it takes to fill out the forms and return them to us. And if you have any problems whatsoever, please give us a call.

We know that many of you belong to clubs that are not affiliated with the ARRL. Effective clubs are the most valuable asset Amateur Radio has. Together they represent a very powerful force. A few clubs, banded together locally for a common purpose, can move mountains. This year we will be working toward greater *regional organization* of our clubs. Whether that takes the form of Club Councils or some other structure depends in large part on the locale and what your wishes are. We will, however, primarily be working through our network of affiliates. If you want to play a part and influence the direction this takes, we encourage you to explore affiliation for your club. Contact the Club and Training Department for all the facts.

The electronic solution? Well, a significant part of a solution. But the effectiveness of our service to you depends on your cooperation. Tell us what we all need to know about you soon, and we'll be able to tell you about each other even sooner. — *Steve Place, WB1EYI*

*Club Program Manager, ARRL

Moved and Seconded...

MINUTES OF EXECUTIVE COMMITTEE MEETING NO. 396 December 8, 1981

Pursuant to due notice, the Executive Committee of the American Radio Relay League, Inc., met by telephone conference call at 11:00 A.M. EST on Tuesday, December 8, 1981. Present on the line were President Harry J. Dannals, W2HD, in the Chair; Vice President Carl L. Smith, WØBWJ; Directors Gar Anderson, KØGA, Mitch Powell, VE3OT, William J. Stevens, W6ZM, and Stan Zak, K2SJO; and General Manager Richard L. Baldwin, W1RU. Also present on the line were Chris Imlay, N3AKD, of the General Counsel's office, and W. Dale Clift, WA3NLO, Deputy Manager, Membership Services, ARRL.

President Dannals called for a moment of silence in respect for the memory of General Counsel Robert M. Booth, Jr., W3PS, who had died on Thursday, December 3rd.

Mr. Clift read to the Committee a prepared paper that summarized developments in the Karagozian case, involving an antenna ordinance in Newport Beach, California. In essence, although there are indications that the city wishes to settle the case out of court, attorney Fred Lawson believes that the most benefit could accrue to radio amateurs if the case went to trial. To pursue the case in court, however, would require additional funding by the League of at least $5000.

After extended discussion, the Executive Committee voted unanimously to approve additional funding to attorney Lawson for the Karagozian case in the amount of $5000, on condition that the case be brought to trial and a decision reached.

Mr. Imlay reported that contributions in the memory of General Counsel Booth could be made to the American Cancer Society or to the Booth Memorial Fund at St. Mark's Presbyterian Church, 10701 Old Georgetown Rd., Rockville, MD. Expressions of sympathy may be sent to Bob's children Pamela and Peter, addressed to Peter Booth, 9509 East Vexhill Dr., Kensington, MD 20895.

The date of the next in-person meeting of the Executive Committee was set for February 6, 1982, in Miami. It is expected that there will also be meetings of the Long-Range Planning Committee and the Membership Affairs Committee at that time.

The Committee also discussed, without formal action, the Cron covenant case, the Boudreau case in Minnesota and election matters.

Respectfully submitted,
Richard L. Baldwin, W1RU
Secretary

YL News and Views

Conducted By Jean Peacor,* K1IJV

Sister Alverna O'Laughlin, WAØSGJ

In 1958, the idea to form an organization devoted to providing the encouragement and assistance for the handicapped to become radio amateurs was just a dream. Ned Carman, WØZSW (now deceased), pursued this dream and later became founder of the Handi-Ham System. Today their summer radio camps, equipment loan research, newsletter "Handi-Ham World" (also available on standard C-60 tape cassettes) and very popular Codeline Service are providing inspiration for handi-ham members worldwide.

Sister Alverna O'Laughlin, WAØSGJ, joined the Courage Handi-Ham System last year as educational services coordinator. She is in the process of writing a most interesting series of articles on the history of this organization, along with her other duties.

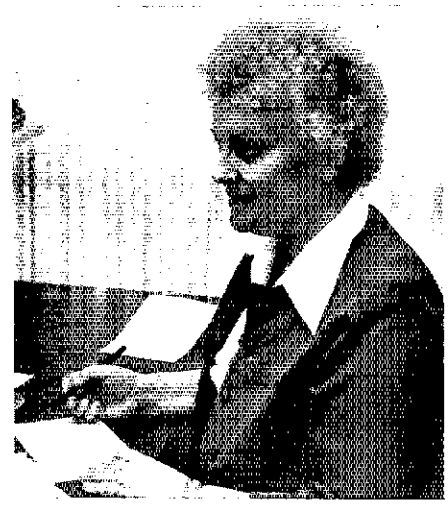
Sister Alverna's first exposure to Amateur Radio came from Sister Judith Simon, ex-WAØQVN. "Fascinated by the key and oscillator she stored in the closet in my department, I decided to surprise her by learning the Morse code," says Sister Alverna. It wasn't long before she was ready to send her first cw message to Sister Judith. At this point, Sister Alverna learned that sending Morse code was one thing; receiving it was quite another.

She started studying for her Novice license, although she was not exactly certain why until she met Ned Carman, WØZSW, an instructor at the Rochester (Minnesota) Amateur Radio Club. Ned spoke of his dream to help handicapped become radio amateurs. Productive activities for the physically disabled had long interested Sister Alverna, and for her, this idea suddenly added a new dimension to Amateur Radio. She passed her Novice exam.

It is difficult for Sister Alverna to think of Amateur Radio activities without the Handi-Ham System; most often she views them as one and the same. In the System's early years, she spent long hours working with others on the affairs of the infant organization. It was trial and error, and as though blessed, it grew and flourished.

Sister Alverna is a member of the Franciscan Sisters of Rochester, Minnesota, Assisi Heights. While in Rochester, she was active with the International Missionary Radio Association and served as net control on Thursdays. She checked into the Intercontinental Net regularly where she often made phone patches to sisters located in South America. She kept weekly schedules for phone patches into Honduras for a young native who was hospitalized in Rochester for almost a year. Since moving to Minneapolis, her biggest interest is county hunting. She has 82 counties left to work.

Sister Alverna joined the staff at Courage Handi-Ham System in January 1981. She finds her work challenging and interesting. In her words, "I receive much more than I give. If you too wish to receive by giving, join the Handi-Ham System." Membership information may be obtained by writing Courage Center, 3915 Golden Valley Rd., Minneapolis, MN 55422.



Sister Alverna O'Laughlin, WAØSGJ

Nets of Interest

In addition to the many regular traffic nets, there are several nets of special interest to the physically disabled. Those known by Handi-Ham System are listed below; they'd like to hear about any others.

Hadley School QSO, Wed., 1600-1700 UTC, 21.390 MHz
Piconet All-Day Watch, Mon.-Fri., 1500-1800 UTC, 1900-2300 UTC; Sat. 1500-1800 UTC, 3.925 MHz
International Handicappers Net, Mon.-Fri., 1500-1800 UTC, 14.287 MHz
Handicappers Informational Net, Mon.-Fri., 2000 UTC, 7.270 MHz
Craig Rehab Hospital Net, Thurs., 0230 UTC, 3.940 MHz
American Council for the Blind Net, Mon.-Sun., 1800-1900 UTC, 14.305 MHz
Handi-Ham Roundup, 1930-2100 UTC, Sat., 7.250 MHz
The Courage Handi-Ham System Hq. station, WØZSW, monitors the Piconet All-Day Watch (see above) daily, 8 A.M. to 4:30 P.M. (CST) and welcomes schedules with any amateur.

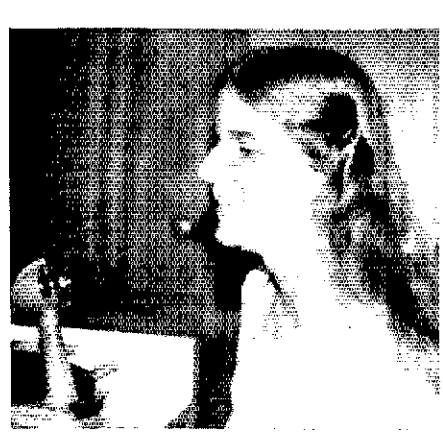
THE BEST THING THAT EVER HAPPENED

Diane Vorwald, WD9DNQ, graduated from high school this year. She lives with her family on a farm near River Falls, Wisconsin. Two years ago she became acquainted with the Handi-Ham System, has since passed FCC's Advanced class license exam, and, to quote Bruce Humphrys, KØHR, director of the Courage Center Handi-Hams, "Diane is a cw whiz kid! Last year we clocked her at 35 wpm — 100% comprehension."

Diane's is an interesting story. She attended the Wisconsin School for the Visually Handicapped from 1st through 7th grade. During her last year there, the school radio club became very active. Curiosity sparked Diane's interest in Morse code. Two of her school friends were Novices and had taken to conversing in Morse code. To get in on the conversation, Diane joined the radio club. Morse code she loved; theory was a different story. At the end of the year, she missed on the exam.

In 8th grade, she went to public school. To be accepted was her uppermost goal — Diane went roller skating, took piano lessons and learned to ski — but she still wanted something more — to develop more friendships. Remembering her interest in radio, her dad introduced her to a ham friend, Al, who worked at the River Falls radio station at the university. With Al's help, it wasn't long before she was a Novice. "Scared stiff to get on the air at first, I'd call CQ and pray that no one would answer." Sound familiar? That feeling soon passed.

At about the time when upgrading to General looked far too difficult, a ham friend introduced Diane to Bruce, KØHR, from the Courage Center, who encouraged her to attend the Center's radio camp. During the fall of her junior year, Diane went to Courage North radio camp for a week of lots of studying and lots of fun. To be able to study with others having the same goal made all the difference. The camp is located at Bemidji, Minnesota, near Itaska State Park, where the Mississippi River begins. She got to walk across the Mississippi River. She also passed her General. In her senior year, Diane returned to radio camp; this time she earned the Advanced class license.



Diane Vorwald, WD9DNQ

Diane found the "something more" she'd been looking for in Amateur Radio. She's involved with nets for the handicapped and has met many Courage Handi-Ham members as a result. She feels that without KØHR's help she would never be where she is today. The Courage Handi-Ham System provided the help she needed, as they have done for thousands of other hams.

"It's a neat feeling to know that all you have to do is turn on the rig, press down on the mike and have a meaningful QSO with anyone, anywhere. I can honestly say it's one of the best things that's ever happened to me."

YLRL'S RECEIVING TREASURER

The Young Ladies Radio League (YLRL) announces that Barbara Robinson, WB1ACA, 28 Upland Rd., Marlboro, MA 01752, has been appointed receiving treasurer following the resignation of K6INK. For dues information, see November 1981 "YL News."

YLRL'S HOWDY DAYS

YLRL Winner — Martha King, WD4NKP
Nonmember — No entries

*Country Club Dr., Monson, MA 01057

How's DX?

Conducted By Ellen White,* W1YL/4

The Wandering Years — G2RO

G2RO/EP VP1RO VP2AO VP2DRO VP2GRO VP3RO VP4RO VP5RO VP6RO VP7RO VQ1RO VQ2RO VQ3RO VQ4RO VQ5RO VQ6RO VQ8AY VR1RO VR2RO VR4RO VS1RO VS2RO VS4RO VS5RO VS6RO VS9RO ZC4RO ZC5RO ZD6RO

The historical theme of recent months touched briefly on the 1950 DXploits of G2RO. Recent correspondence with Bob Roberts yielded a more in depth view of the way it was . . . his own account of an expedition that is now part of our own Amateur Radio DX history. — W1YL/4.

"In 1952 I accepted an advisory job with the British Government broadcasting service which required me to travel continuously around the world, to some 60 countries. The radio and TV broadcasting services were to be upgraded, but many of the territories required technical advice. That job fell to me. My own feelings about the assignment were never in doubt, having been addicted to world travel since age 18.

"I traveled with a transmitter only (being able to borrow a receiver from the host country). It had to be small, lightweight and simple — capable of being operated from multiple supply voltages. I settled for cw only, 15 watts from an 807 driven by a 6L6 crystal oscillator/doubler, bandswitched to 40 and 20 by plug-in coils. I chose a crystal frequency of 7030/14,060, which quickly became identified with the RO calls.

"The antenna was an end-fed hank of wire. That, with transmitter, coils, key, logbook and some simple tools, fitted into a ladies hatbox, which traveled inconspicuously and constantly with me as part of my baggage for many years.

"On arrival at any new base (hotel, Governor's residence, private house or otherwise), one of my earliest interests was to prospect about for an antenna support. I became familiar with the miscellaneous services, including washing, always to be found on the flat roof of a tropical hotel. My antenna would often snake up the wall from my window, then mingle with the washing.

"Sometimes I was loaned a professional mast or antenna. In Guyana, I used two 300-foot masts, which helps 15 watts quite a bit! In many settings, such as the islands of the Indian Ocean and the South Pacific, it was simply a matter of getting someone to climb a high palm tree with the end of the antenna wire. Some antennas were more bizarre. In Zanzibar I was staying at a rather dignified British club and could operate only after midnight when I would creep with the unrolling wire along the corridor from my room, across a large deserted ballroom, and then hoist the wire between the flagstaffs on the balcony before working the clamoring Ws and others — then several hours of operating before I could reverse the process and get to bed.

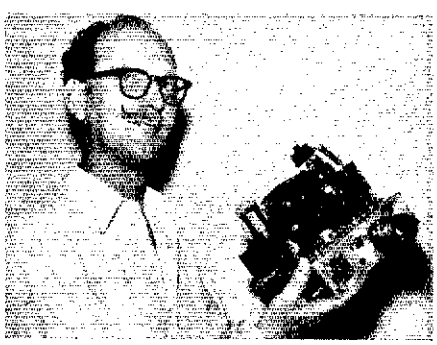
"One of the pleasantest experiences was in Brunei where one of my hosts, the boss of the Public Works Department (Pengiran Mahomed) whistled up a gang of men with trucks, masts and rigging, getting me on the air in a couple of hours. Pengiran later became VS5PM.

"*QST* and others kept the world ham fraternity well informed about my movements and lots of people were ready to greet me over the air at each new location. I remember that in Sarawak I found U.S. hams calling me when I switched on the receiver for the first time.

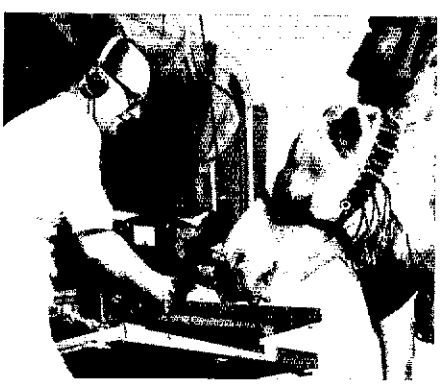
"Grace, courtesy and friendliness were always present. Selfishness was rare. Of course, there were occasional uncouth slobs, just as there are now. After three warnings, I short-listed them and never worked them again. I think that a DX operator at a wanted location has got to show that kind of firmness out of respect for the other hams who are behaving decently. In the same way, like most operators, I listened *off* my transmitting frequency and tried to make it clear what I was doing.

"On the other side of that coin, hams sitting at home should always recognize that the DX man may be operating under difficulties. I remember, for example, a receiver dial so stiff that it would only go around in unpredictable jerks. It was very difficult to choose a good listening frequency, and impossibly dangerous to respond to requests to move.

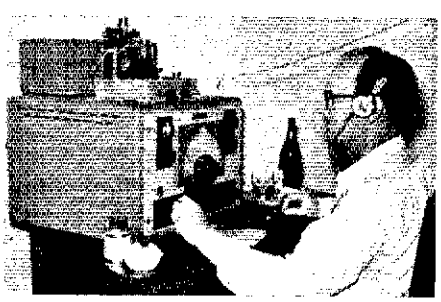
"Happily, from the Amateur Radio point of view, the 60 countries which formed the core of my responsibilities were mostly small and remote, with desirable DX prefixes. Job development, ingenuity and an itchy foot carried me to many other countries. For example, one route to Fiji from Europe is via the Far East. But, the next time I could go via the States and that is how I came to enjoy a visit to W1AW. There, and everywhere in the world, I kept finding the warm friendliness of ham spirit which cuts across race, class, country and climate. I do hope we can keep this ham spirit, which made my world travels so happy to remember."



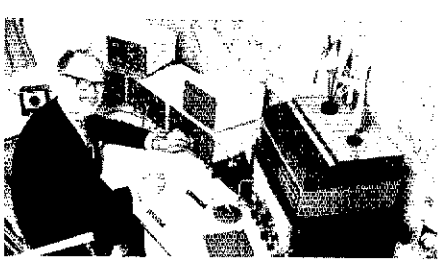
The transmitter that went round and round the world. Left to right: crystal, rectifier, oscillator, final, plug-in coils (photo taken in ZC4).



Mobile tests in Somalia, camel-aided.



In operation at VS9RO.



G2RO in the '60s — the operator looks pretty much the same today but the gear is now all Yaesu; the world a familiar backdrop.

*19620 SW 234 St., Homestead, FL 33031

THOSE DOUBLE-NUMBERED PREFIXES

That December item about A71AD got typoed to A71AD and caused the whole point to be missed. Thanks to ARRL Assistant General Manager K1ZZ for interesting information on the subject of prefixes, à lá the WARC-79 final acts.

As far as the ITU is concerned, a call sign is divided into two parts: the part denoting the country having jurisdiction over the station, and the part identifying the particular station. (The latter is constructed in a prescribed manner so as to also identify the *service* in which the station is licensed. The term "prefix" has no meaning as such to ITU.

The first part of the call is the first two characters, except that for calls beginning with B F G I K M N R U and W, only one character is required because the entire block is assigned to a single country. Another exception is half-series, only one of which exists at the present time: half the "3D" block belongs to Swaziland, while the other half belongs to Fiji. There just isn't any distinction between *letters* and *digits*; the term used is "characters." Letter-digit combinations begining with B, F, etc., are not allocated in the International Call Sign Series, thus eliminating any possible duplication.

Hams calls are constructed by adding to the country designator a single digit (regardless of whether or not the country designator contains a digit), plus not more than three letters. Thus, calls like 3?3A, A71AD, Y22TO, etc., are indeed in accordance with current regulations. (Some countries are not in compliance, apparently, but little confusion has resulted.)

Additional interesting points by Dave note that the People's Republic of Yemen (7O) has *no* call sign series from which an amateur call sign could be made in accordance with the rule that states, "Combinations commencing with a digit when the second character is the letter O or the letter I" shall not be used for amateur calls. What if you hear a "Seven-Oscar" station? Work him and don't argue. The same holds for the Somali Democratic Republic, where the "T5" block should be used in preference to the "6O" block. Whew!

PAØGMM SOUTH PACIFIC DXPEDITION

Guido's second Pacific swing should have netted you KX6ZX Jan. 14-18, Eastern Carolines KC6 Jan. 19-25. Upcoming: Tuvalu T2 Jan. 27-Feb. 3, West Kiribati T30 Feb. 4-10, East Kiribati T32 Feb. 11-16. Instead of KC6 he could possibly be operating from Vannatu YJ8 Jan. 20-23, and Nauru Jan. 25-26 (operating the club station C21NI). Most calls not known at the time of this writing (mid-December), as they're to be issued upon arrival. Usual frequencies around 14,200, 21,300 and 28,600. QSL plus s.a.e. plus IRCs or equivalent for postage for direct to his home QTH: Guido M. M. van den Berg, Tweeboomlan 117, 1624 EC Hoorn, The Netherlands.

RTTY DXERS

An opportunity to add Anguilla (VP2E) to your DXCC total will take place February 23-March 3. A group of contesters will participate in the ARRL contests during this period to put Anguilla on Teletype for the first time ever. Calls to look for are: VP2EV (via K8ND), VP2EJ (via WA8CZS) and VP2ED (via WB8VPA). Other calls may appear. QSL as directed by the operator. While on Anguilla the group may make a one day mini-expedition to French St. Martin (FS7) and Dutch St. Maarten (PJ7). This would likely take place Feb. 27 or 28, half of the day being spent as FGØAMR/FS7 and the other portion of the day as K8ND/PJ7. QSL both to K8ND. This plan will only take place if there appears to be significant interest. Voice your approval by dropping a note to K8ND a.s.a.p. Thanks to HAL for making this operation possible.

AFRICA

Ciskei reportedly became independent in early December with operation by S42A. ZS2RM still has logs and QSLs from the Gough Island expedition of several years ago (ZD9BR and ZD9GA). ZS2RM, via W1BFT, also notes that a German group had planned to activate Bouvet during January just past.

KOREA

HL9DX who has been superactive from Tongduchon (Camp Casey) is back in the states. . . . HL9EZ now has his tribander and should be plenty QRV. . . . HL9s DC TN and RM are also getting on from Tongduchon; look for a local club starting up there soon. . . . Hams coming to the Second Infantry Division or Camp Casey should contact Bob Patterson, HL9EZ/K5DZE, at the Signal Office for information on acquiring an HL9 call. . . . QSL HL9DX via W3HNK or A15P, HL9EZ via HL9 Bureau or to K5DZE.

END OF AN ERA

After managing the W2 QSL Bureau for some 16 years, Vic Ulrich, WA2DIG, is stepping down. New to the helm will be Joe Painter, W2BHM. Kudos to "The Digger" for his contributions to our DXing, his perseverance, his good nature and his lovely Anne.

TUNING THE BANDS

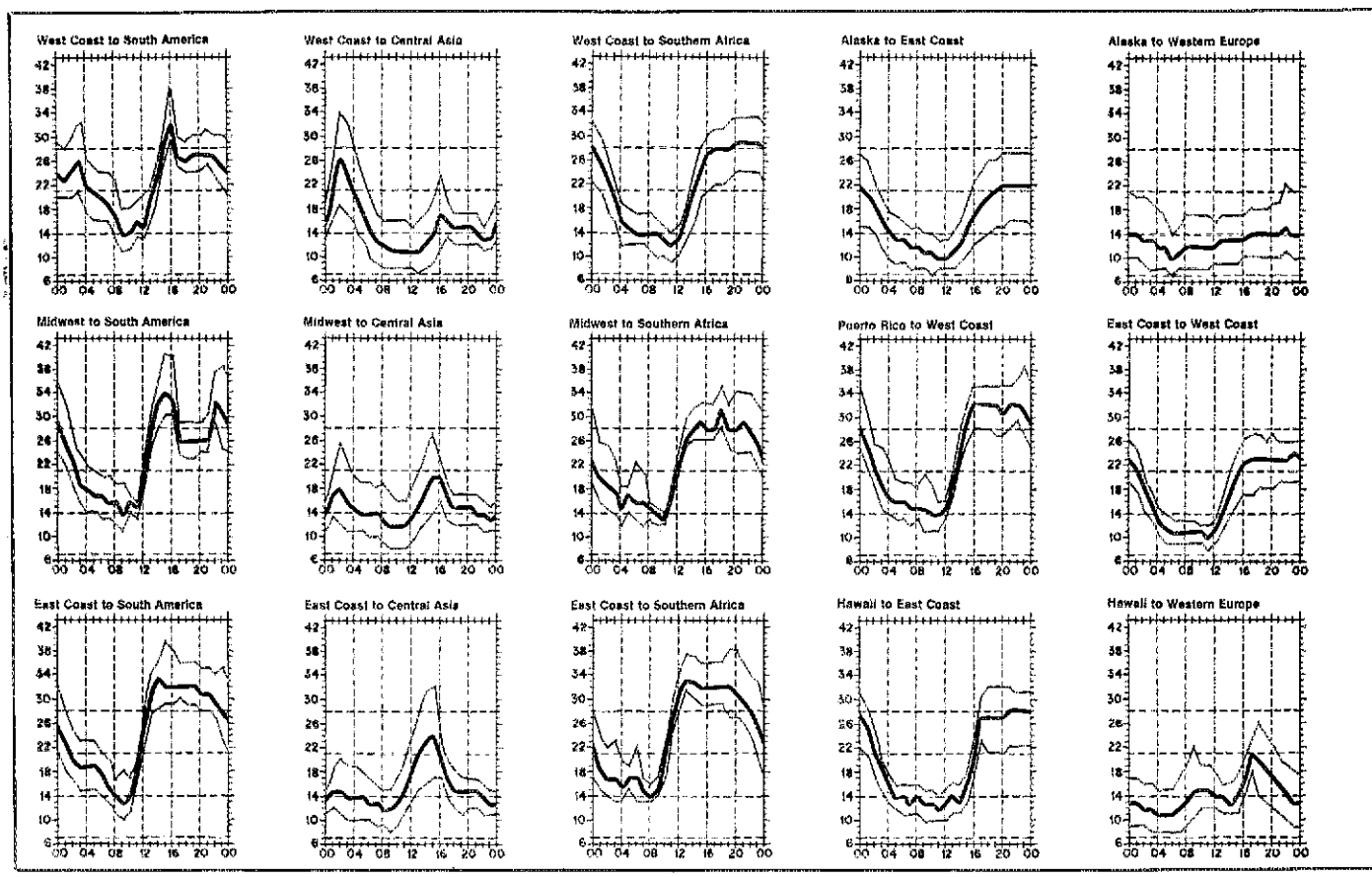
☐ QSL FPØGNS (Radiosport 1981) via John Gilbert, VE3CXL, 714 Highland Ave., Ottawa, ON K2A 2K7, Canada.

☐ K3SA/PJ3 goes via K3SA, 3305 Llewellyn Field Rd., Olney, MD 20832.

☐ 5H3AP continues to be bootlegged. Ian left Tanzania in retirement in August 1977, and has made note of this fact to all interested parties.

☐ Following a successful jaunt at 8P6QL, the globetrotting Colvins activated 9Y4KG at the start of winter.

☐ The November CQWW cw Netherlands Antilles stir created by P41E gets confirmed via K4BAI, while the P41C phone event cards go to either WB3JRU or N4RV.



When are the bands open? These charts predict this month's average propagation conditions for high-frequency circuits between the U.S. and various overseas points. One chart for East Coast to West Coast is also included. On 10 percent of the days of the month, the highest frequency propagated will be at least as high as the uppermost curve (highest possible frequency, or hpf). On 50 percent of the days of the month, it will be at least as high as the middle curve (maximum usable frequency, or muf). On 90 percent of the days of the month, it will be at least as high as the

☐ YBØBR says the new address for his bureau is Box 59, Jakarta, Indonesia.

☐ QSLs for Oct. 24-25, 1981 (only) go to Mark Forbes, KC9C, 1000 Shenandoah, Lafayette, IN 47905. Mark operated 4U1ITU for 19-1/2 hours for the CQWW phone event. Best "run" occurred on 10 meters on Saturday of the event, during which he worked 353 QSOs in 2 hours. The weekend following saw him on the air as KC9C/LX.

☐ VE1ZL now manages cards for C6ANU.

☐ QSLs for VP2EM should preferably go to John Conner, P.O. Box 583, Fredericton, NB Canada. Please bear in mind that American postage is worse than useless in Canada and will incur a delay awaiting John's next visit to the U.S. for mailing.

☐ In February every good DXer has the ARRL Test on his mind. A new to the market aid to countries/prefixes/headings, etc. is being produced by WDØEAO. The 12-pager, on high-quality bond paper, is custom printed with 367 places, based on your latitude and longitude. It includes 10 unique columns of information; the list is arranged alphanumerically, with name of country, continent, CQ zone, ITU zone, short-path distance in statute miles, long-path distance to that location, short-path bearing and long-path bearing, in addition to checklists for cw and ssb worked/confirmed. The DX-1 sells for $6.95 each plus $1.50 shipping. Order from Jon Presley, WDØEAO, Rte. 3, Box 117, Lebanon, MO 65536.

☐ The mid to end of December Grand Cayman operation of ZF2FK gets confirmed with a QSL to WD9IIC. Dick had planned spending time on the Novice bands to aid the new DXers.

☐ VP8AEN, Brian, will be on South Georgia until March (0945Z/14,253 kHz). Catch him pronto; the next group will not include a ham and the station will be dismantled. QSL via GM3ITN.

☐ 17-year-young WB3LUI has 123 countries worked on 10 meters. His devotion to DXing included hosting DL9XG for a week this past summer, and YS1ECB and family for two weeks! Ulis handles confirmations for YS3RZ.

☐ W5IB's DX tips include using a master prefix list (reducing the DXCC list to a single sheet). All prefixes are shown on the front of one sheet. He uses an "x" when he works them. If it is a new band for the country he fills in the top of the "x" with a red pencil. When the prefix/country is confirmed the bottom is filled in. If he works a new one, the prefix is shaded lightly in red pencil. His columns are headed country, 10, 15, 20, 40, 80. He suggests when doing a batch to leave the country prefix blank on the "master" to make future changes/additions easier. Helps too to allow a couple of "blank" lines following each group of letter/number prefixes. Thanks, Sarge (for your past efforts, too, as D4ARJ, SVØWZ-Crete, and 5A4TQ).

☐ Top-band DXers have already received W1BB's kickoff bulletin, which always has timely tips for 160-meter buffs. This issue included Oceania DXing procedures suggested for W/VE, the new JA frequencies, how to use the DX window, etc. Write "Mr. 160" with an s.a.s.e. for your copy of the 160 Meter DX Bulletin.

☐ WD6EWG reports that Hamid, C5ACA, is moving to AP2-land and hopefully will be QRV by the time you receive this issue.

☐ VS5RP has closed down his Brunei operation and will be fulfilling QSL obligations from his home QTH, G3REP. WB6GZK also reports that Bob probably will go to HZ-land to work, but that ham radio doesn't look like a promising bet. QST

QSL Corner

Administered by Joan Becker

Here is some QSL information for those of you who would like to QSL direct to the station location. It is passed along as we receive it and, therefore, may not be accurate. The call sign in parentheses is the QSL manager.

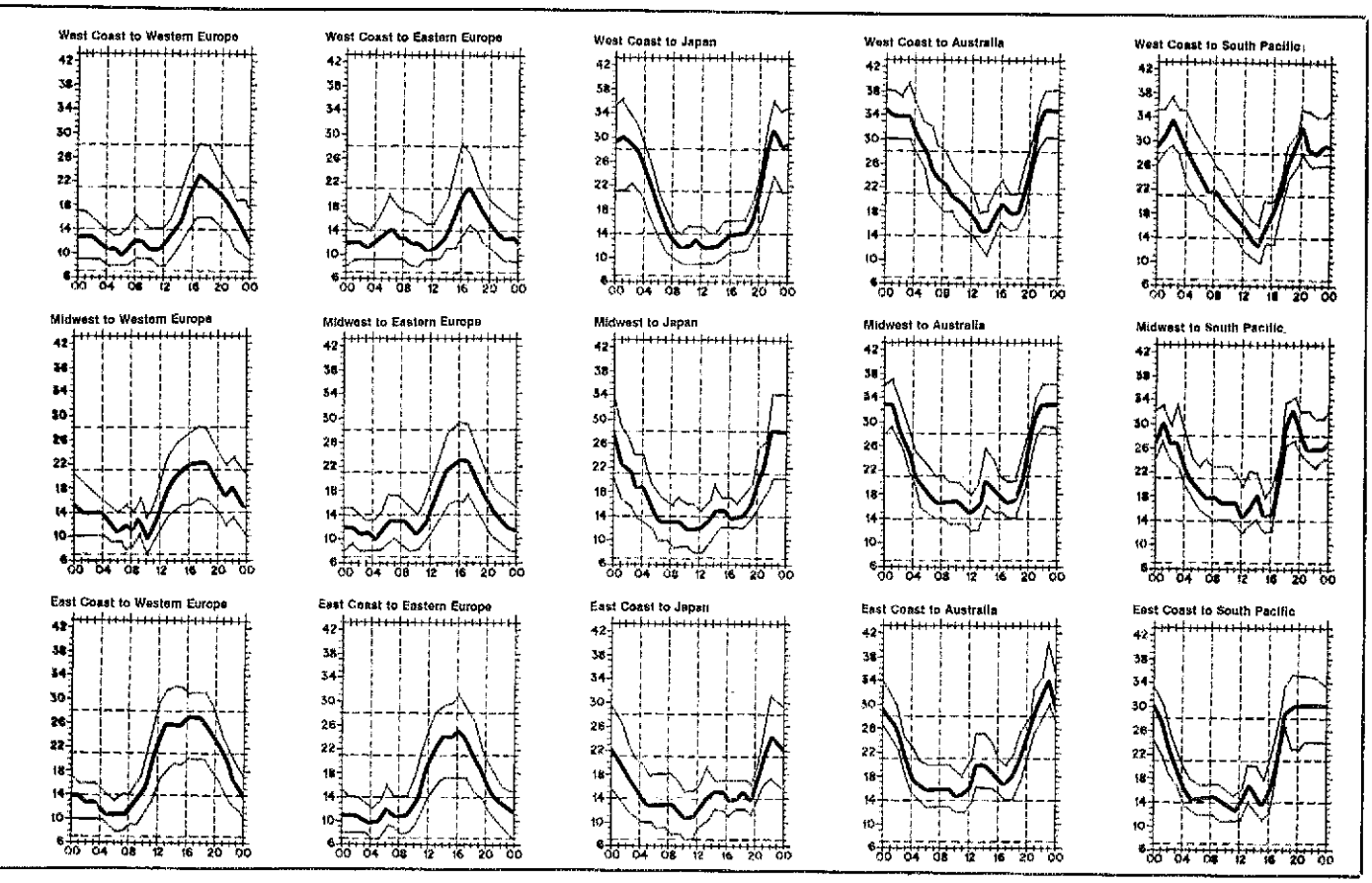
A22ZM (ZS5CU)
CR9UT P.O. 798, Macao
C5AEG (N6BFM)
C6AES (K4XG)
C6ANI P.O. 106, Nassau
EA6IT (WB1DQC)
FK8DD (KA3A)
FPØGAQ (K8JQ)
FWØBE (DJ9ZB)
J6LB (KB2HZ)
KC4BH/KHØ (JA2VUP)
OE5JTL (OE5UYL)
P29CF P.O. 369, Okakumpa, Lae Papau
P29DP (K7TRG)
SPØKAD (SP9ERV)
TA1AB c/o P.O. Box 10, Orestias, Greece
TJ1GH (DJ6SI)
TU2IN (K3HBP)
TU2JJ (KNØKCW)
T5TI (IØSSW)
VP2MFW (KP4BZ)
VP5JCR (N4CTC)
VP5JNX (W9CN)
VP8AIC (WA4TWS)
V3AW P.O. 306, Belize City
V3MS (WØCP)
YJ8RW (ZL1AMO)
ZD8HR (W6HR)
ZF2FN (W5RU)
3X1Z (W4FRU)
9G1DJ (WD5GXB)
9H1GC (VE3FKH)
9M2HB (N4FFN)
9U5WR (SP6FER)

QSL MANAGER VOLUNTEERS

KA8BXA WD9IGM

NOTE

In September 1981 "QSL Corner," page 53, appears an explanation of the ARRL-Outgoing QSL Bureau. December 1981 "QSL Corner" contains information and addresses for the Incoming Bureaus. For information on the bureau operation (Incoming and Outgoing) send a self-addressed, stamped envelope to ARRL QSL Bureau, 225 Main St., Newington, CT 06111. QST



lowest curve (optimum traffic frequency, or fot). See January 1977 *QST*, page 58, September 1977 *QST*, page 35 and January 1979 *QST*, page 11, for a complete explanation. The horizontal axis shows Coordinated Universal Time (UTC); the vertical axis, frequency in MHz. Data are provided by the Institute for Telecommunicaton Sciences, Boulder, Colorado. These predictions, for February 15 to March 15, 1982, assume a sunspot number of 116, which corresponds to a 2800-MHz solar flux of 162.

DX Century Club Awards

Administered by Don Search, W3AZD

The ARRL DXCC is awarded to amateurs who submit written confirmations for contacts with 100 or more countries on the official ARRL DXCC List. You may also submit cards to endorse your award in 25-country increments through 250, 10-country increments through 300, and in 5-country increments above 300. The totals shown below are exact credits given to DXCC members from October 1 through October 31, 1981. An s.a.s.e. will bring you the full rules for participation in the DXCC, the DXCC list and application forms.

New Members

Mixed

DF5DO/103 HK3DBQ/109 SVØBV/113 ZS6NH/102 KB2RA/105 W4DEU/105 K6KUQ/145 W7AGQ/147 WD9HMQ/104
DJ6ZY/103 HM1PW/148 VE1AST/297 9V1TK/110 WA2IYA/103 WA4SFF/102 KA6HNY/121 W7IHC/107 AIØZ/108
DK4DC/114 I4UFH/106 VE3EXF/109 K1VSJ/106 WA2YSJ/106 WA4RUW/101 KE6BN/104 W7MCG/113 KBØBO/115
DF7VO/115 JJ1LYS/111 VE3JPP/104 KA1BIJ/101 WB2HYO/102 WD4JDJ/200 WA6EZV/188 KI8C/105 KBØCN/101
DKØAA/106 JH2AMH/107 VE3LAJ/108 KA1KQ/126 KA3DEH/105 N5ALS/100 WB6WSD/272 WA8CZS/110 KBØG/102
DL2FAG/107 JA7FEX/127 VE3KPZ/108 KC1H/100 W3ANV/116 W5NF/141 K7BBO/160 WA8JDW/100 KCØAM/102
DL7SI/238 KH6GS/225 VE3KYP/108 WA1VEC/104 WB3IFE/199 W6QNG/119 KA7ESS/163 KG9Z/100 KEØC/108
G3AAE/VP9/104 LA7SP/151 VE5BBQ/105 AJ2H/134 AC4B/300 WB5UIH/277 KA7HAI/103 N9CHN/105 NØFJ/109
G4IXX/107 OH2SX/116 XE1GBM/296 K2AYQ/104 K4PTB/107 WD5HDD/110 KB7UY/102 W9YCV/107 WØYBV/127
G3MHK/103 PT7TZ/110 ZB2GR/123 KA2CYN/118 N4CCA/101 WD5JMB/103 KD7H/110 WD9DVA/104 WDØBDA/105
HBØNL/135 SV1NN/119 ZL4AW/310

Radiotelephone

CE3NR/100 G4DNR/106 JA8UJY/124 W1IAN/101 WA2YXS/125 WB4ZWS/101 WA6EZV/188 K8NIW/106 W9NJW/151
DF2KD/110 GM4KHE/110 OZ1BUR/141 AJ2H/133 W3ARK/118 KM5A/100 WB6FDQ/109 KB8VW/107 WD9AEU/138
DF3EB/108 HH5CB/214 SVØBV/110 K2YEX/129 WB3IFE/195 W5UFA/132 WB6KBM/103 WA8CZS/105 WD9HMQ/104
DF7HY/105 HI3LRB/106 VE1CAQ/109 KA2CYN/107 K4BMT/102 WD5HDD/104 WB6WSD/269 WA8VJB/115 KCØAM/100
DJ1HN/107 HM1PW/146 VE2WA/308 KB2RA/104 KB4PL/128 K6KUQ/137 K7SE/PJ5/111 WB8TRW/166 NØZA/214
DJ8CG/155 I2PKF/279 YBØZM/105 N2ATT/104 KC4YY/102 KA6HNY/120 K7SE/VP2A/100 K9PBV/102 WØARY/113
DL2FAG/100 I2TZK/167 ZB2GR/117 WA2IYA/102 KD4MO/107 N6AJF/203 KB7M/113 KD9M/102 WØBX/103
EA7AZH/123 I2YKV/125 K1JRE/115 WA2LYF/101 KD4TS/109 N6AXO/118 KM7U/109 N9CHN/101 WØMWN/104
EA8VV/136 I3VRV/303 KA1KQ/124 WA2PFC/100 N4BJM/102 N6DJW/104 W7DAF/112 W9BVE/100 WBØJOS/108
G3AAE/VP9/102 I4UFH/106 W1CKA/341 WA2TYQ/109 WA4SFF/101 W6SJC/201 W7RXO/118 W9KXF/108 WBØYTI/103
G4AQD/105

CW

A7XE/126 JA1OP/104 OZ1BUR/122 VE3KPZ/108 WB1GXO/110 AA4CQ/107 K6PWR/102 AE8W/100 W9ZR/276
DF4NW/111 JF1SEK/195 SM6KQK/106 VE7APE/158 K2DSV/265 K4CEB/269 W6BJH/202 KB8MF/100 KØRWL/155
DL7SI/136 LA7SP/132 SV1JG/134 YS9RVE/225 N2MF/220 KB4JS/131 W6TVP/102 W8TIV/103 WØJSN/104
GM4FVQ ON5GK/157 SV1NN/103 YV5DFI/111 W3FG/110 WA4ZBK/111 KF7T/102 K9HA/114 WBØWLX/105
HK2DP/106 ON7GO/132 VE3GAN/105 W1IAN/108 AA4AR/124 WB5UIH/176 W7MCG/100 K9YBC/114

5BDXCC

AJ2E JA2YKA W3PC N5UD WAØIDK W9HK DJ4XA I2MQP TF3YH
WA2CBB YU3GI K4MEZ N6JV N5GM W7CB G4DDS K8JK DL7UX
LZ1KDP I2UBT N3II PY1ZAE K2LX OE3VEL

Endorsements

Mixed

DF6JC/154 JA8CDT/310 YO3AC/325 K2AM/179 W3BTX/320 N4BCN/175 W5UXE/160 KB7W/294 N9AF/330
DJ2AA/343 JA9NLE/263 YU3LF/200 K2DSV/311 W3GL/302 N4HU/273 WA5TOS/260 W7EDA/289 W9AND/310
DJ5EJ/152 KH6CD/360 YU3SE/204 K2MFY/306 W3PN/339 NI4Y/180 WB5CRG/258 W7HRD/206 W9KPC/157
DJ6RX/331 KH6IJ/352 YU7NWO/162 KB2HZ/249 W3SQ/281 W4BD/303 WB5ZGP/270 W7LHO/200 W9KRI/201
DK2PS/167 LA7QI/269 4X4FQ/341 KB2SG/205 W3TEF/225 W4DJJ/301 WD5IAF/208 W7LZF/325 W9TNZ/148
DL1DA/295 OE1HGW/314 4Z4DX/303 KB2TY/201 W3VQ/315 W4NTO/207 WN5MBS/175 W7NA/296 W9UO/266
DL1DC/348 OH2BC/338 K1AR/286 N2DT/300 WA3YVN/128 W4WFB/175 AA6AA/303 W7RVM/283 WA9TAH/201
DL1EV/233 OH6RA/313 K1GSK/294 W2AZX/339 WB3AVN/261 W4WXZ/270 K6AAW/311 WA7GVM/280 WA9USE/270
F5TI/258 ON7EJ/282 K1NJE/325 W2DUN/156 WB3CQN/271 W4YV/323 KB6Q/243 WA7MOK/225 WB9RGA/290
F6DYG/260 ON7WW/279 K1RB/224 W2HG/259 WB3CZK/215 WA4QBX/310 KC6X/227 WB7BQA/204 WB9ZBE/291
F8CW/300 OZ2RC/202 KA1A/203 W2IQB/297 WB3IXF/217 WA4ZBK/191 KV6O/203 K8IAI/151 WD9AEU/140
G3DOG/310 PAØRRS/249 KA1GR/148 W2KE/300 AA4KA/287 WB4YFF/200 N6BK/270 K8JH/205 WD9ASU/233
G3KMO/310 PP5UG/328 KA1DOS/182 W2PK/281 AA4KT/293 WD4FZO/159 N6COG/122 K8JRM/269 WD9CJG/176
HB9BCI/200 PY1HX/353 KE1K/200 WA2FUE/262 K4AIM/345 WD4NBX/253 N6UC/330 KA8JZR/127 WD9CPX/255
HB9RX/320 PY5EG/266 N1AKX/251 WA2OVG/148 K4ELK/260 WD4NKP/282 N6VI/270 KN8R/270 AKØA/282
HK2DP/141 SM6AYM/251 W1DQH/310 WB2ULI/219 K4ITV/223 AD5F/128 N6YI/274 N8AA/329 KØEOU/276
HKØEHM/233 SM6CST/315 W1GME/335 WB2ZEL/208 K4PRT/257 AE5H/275 W6BJI/316 WA8EQP/198 KØJGH/270
I2SM/337 SM6KQK/143 W1IAN/159 AF3T/284 K4QMU/202 AK5B/262 W6KH/350 WA8EUK/260 KØKTP/294
I4EAT/282 SM7FDO/283 W1IUU/307 AI3N/277 K4RZ/312 K5ENA/198 W6KPC/325 WD8DXN/182 KØQQ/284
IT9AZS/274 SM7HCW/268 W1MEW/214 AJ3H/258 K4XQ/271 KA5FUI/179 W6MND/254 WD8EIO/243 KØRWL/274
IT9MTH/150 SM7HTH/135 W1RQ/301 K3HPG/326 KA4JMZ/153 KC5CZ/205 W6NPY/304 K9HA/293 KØTLM/187
JA1JWP/304 SMØBZH/273 W1UQ/243 K3LWM/290 KB4SA/265 KE5JI/204 W6OJW/183 K9LHA/272 KD0Q/258
JF1SEK/258 VE3CVZ/316 W1UU/342 K3RT/298 KD4BO/157 N5CT/225 WB6DMB/211 K9TI/269 WØEJ/239
JR1FYS/300 VE3IR/306 W1ZT/235 N3AKD/186 KE4E/284 N5IH/278 WB6FDQ/173 K9TUS/280 WØIUB/285
JA2LMY/154 VE3LDT/223 WA1FCN/231 N3AUE/229 KJ4S/210 W5HFN/152 WB6RIU/306 KB9QX/156 WØVIP/250
JA5ELM/250 VO1CA/248 AA2F/202 W3ARK/271 KT4M/226 W5MJQ/325 K7RLS/305 KC9AT/198 WAØQID/125
JH7BDS/233 Y45RA/261

Radiotelephone

CT1NQ/175 JA9NLE/254 VO1CA/204 W2IFK/200 WB3EFC/260 AE5H/264 N6BAK/199 WA7GVM/278 W9TC/271
DA1MV/203 KV4FZ/327 XE1GBM/296 W2IQB/276 AA4KA/242 KC5CZ/185 N6HC/158 WB7BQA/204 W9TNZ/135
DJ2AA/327 LA7QI/240 YC1GJ/151 W2QWS/336 AA4KT/286 KC5UO/250 N6UC/329 WB7QEQ/159 WA9TAH/194
DJ5EJ/136 LA7ZO/293 ZL1SZ/203 WB2CVL/280 AA4M/269 KE5J/180 W6BJI/310 K8JRM/269 WB9JBH/251
EA3BDE/177 OE2GKL/302 6W8AR/227 WB2JEZ/205 AC4B/298 N5IH/277 W6BWG/285 KA8CFW/195 WB9JXT/265
EA7BFW/153 ON6NY/269 K1GSK/294 WB2TOJ/125 K4AIM/345 W5RRK/310 W6KPC/324 KC8BU/277 WD9CPX/254
EA7BLU/233 OZ5EV/312 K1MM/299 WB2ULI/217 K4XQ/268 W5VUZ/129 W6OJW/160 KN8R/270 AKØA/261
EI8AR/129 PAØHBK/251 K1NJE/323 WB2VPV/251 KB4IY/125 WB5CRG/256 WA6CTX/224 N8BIB/204 KØKTP/293
F6DLM/301 PAØRRS/228 K1QMV/319 WB2ZEL/190 KD4BY/282 WB5OFN/253 WB6DMB/211 W8TIV/121 KØQQ/279
G3DOG/290 PP5UG/326 K1RB/224 AF3T/283 KD4HO/226 WB5UIH/270 WB6RIU/306 WD8IFX/136 KBØHJ/225
G3YJI/281 PY5EG/282 KE1K/190 AJ3H/160 KD4NI/133 WN5MBS/175 WB8TRP/235 K9HA/292 KD0Q/209
G4GED/126 PY5EX/192 W1BH/199 K3CBW/220 KE4E/277 AA6AA/303 AI7M/128 K9LHA/272 WØEJ/193
HKØEHM/233 SM7HCW/253 W1LTC/282 K3KA/300 KT4M/226 K6EID/270 K7GEX/290 K9TI/251 WØIZ/278
I1UW/322 SMØBZH/176 W1MZB/237 N3AKD/165 W4DJJ/297 K6ZM/311 K7RLS/289 KB9DU/250 WØKXZ/134
I2SM/337 VE3CKP/280 W1PCD/301 N3AZU/175 W4WFB/175 KD6BE/130 K7SE/225 KE9U/260 WAØABT/218
IØCEP/291 VE3IR/229 W1ZT/128 W3EVW/342 WA4OPW/315 KV6O/167 W7LZF/297 N9AF/326 WAØLHK/200
JA1JWP/297 VE3TD/167 K2DSV/294 W3GL/281 WA4ZBK/125 N6AFD/250 W7TE/295 W9DNE/314 WBØCIW/187
JA7EPO/220 VK6HD/317 W2FCR/275 W3PN/283 WD4NKP/227

CW

DL1EV/206 ON5KD/259 SM7HCW/170 K1MM/275 W3GG/175 AA4KT/262 W4NTO/139 KB7W/165 W8RT/280
DL1QT/150 ON7EJ/256 TF3YH/174 KA1DOS/135 W3ODJ/241 K4ITV/220 W4UG/178 W7EDA/204 WD8IFX/178
F6CRT/250 ON7WW/216 VE2EAR/168 W2IFK/125 W3PN/195 KV4F/124 AE5H/188 W7LZF/227 WB8TRW/193
JA1JWP/273 PAØRRS/150 VE2WA/206 W2IQB/160 W3TVB/232 N4HU/126 W5TVX/150 W7TE/232 KØJCF/201
JA2IDN/200 PAØTA/184 VE3CVZ/230 WA2RLQ/295 WB3JRU/178 N4SV/249 W5UR/261 K8WW/286 KØQQ/133
JA5PUL/206 SM6AYM/251 VE3IR/165 AJ3H/217 AA4AK/225 W4DJJ/237 AA6AA/296 K8ZH/277 KD0Q/163
JH7BDS/229 SM7FDO/260 VO1CA/143 W3ARK/207 AA4KA/212 W4MLA/181 WA6IGU/175 W8ELE/174 WØEJ/156

On Line

Conducted By Stan Horzepa,* WA1LOU

Automated QSLing

Exchanging QSL cards is an integral part of our hobby. Most hams enjoy opening their mailbox to find a handful of cards or a bulging envelope from the QSL bureau. But as some old sage once opined, it is better to give than to receive. The problem is that giving can be a chore.

QSLing takes time and can be expensive. How many cards have you discarded because you made an error filling in the QSO information? (You say that instead of discarding a card, you correct your errors on the card? Well, I hope that card doesn't end up in the hand of W3AZD at the ARRL DXCC desk, because more likely than not that corrected card will be rejected as a possible counterfeit. So, if there's any chance of your card being used for a DXCC submission, rather than trying to fix a mistake, use a new card.)

What's the solution to the chore of QSLing? I looked over at my Radio Shack TRS-80 computer and saw the answer. After a few hours at the keyboard, I wrote a program to automate QSLing.† The program is designed to accept basic QSO information and format it for printing on a 3-1/2- × 1-inch self-adhesive label that is affixed to the front or back of a QSL card, as illustrated in the sample. (Radio Shack sells these labels one up on pin-feed backing paper in quantities of 5000, catalog number 26-1404. The labels are also available from most computer-form suppliers at various prices.)

The program is easy to use. First, it assists you in aligning the labels in the printer. This routine may be repeated as many times as necessary to achieve proper alignment. Next, you enter the QSO date, frequency and mode. Then you are ready to enter individual QSO information: call sign, time, signal report and whether you seek or acknowledge receipt of the other ham's QSL card. If you make a mistake, you are given a second chance so you won't have to discard a label, much less a card.

The program will accept 50 QSOs and then print out 50 labels. Thereafter, you may continue entering more QSO information. If you have fewer than 50 QSOs to enter, you may stop input at any time by entering an "S" when the program requests a call sign. The program will jump to the print routine and print out all of the QSOs that were entered. When you want to change the date, frequency or mode, enter "D", "F" or "M," respectively, when the call sign is requested.

By the way, in order to fit all the necessary information on the label, the format for the date, frequency and mode is limited. The date must be entered in the day-month-year format that is preferred nearly everywhere outside the United States, with the month and year abbreviated (for example, 3 MAR 82 for March 3, 1982). The frequency format is in megahertz and no fractions thereof; 28 MHz is acceptable, whereas 28.615 MHz is not. The mode format is a two-, three- or four-letter abbreviation such as CW, SSB or RTTY. These formats may be changed to meet your own requirements, but this will require reworking the program to assure that all of the information fits on the label.

Program Notes

My printer is an Integral Data Systems 440 Paper Tiger. This printer has an "enhanced" print mode that permits the printing of double-width characters. This feature has been implemented in the program with enhanced printing of the station's call sign. If you don't have a Paper Tiger, delete "CHR$(1);" and ";CHR$(2)" from line 540, and the program will run successfully on printers without an enhanced print mode.

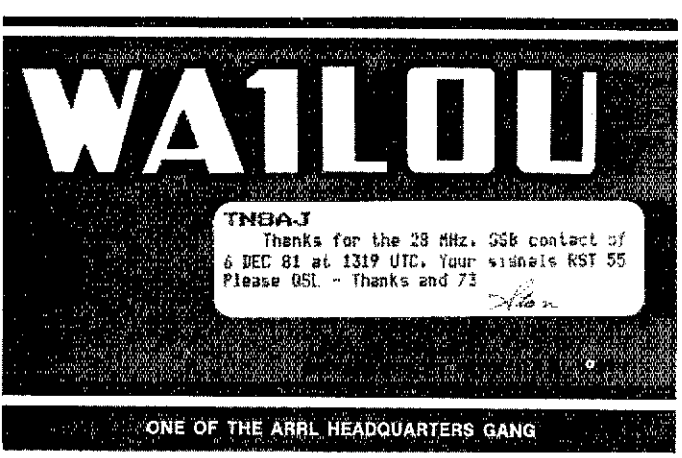
Lines 110, 270 and 660 contain the statement "PRINT CHR$(23)". In Radio Shack BASIC, this causes characters to appear double sized on the video display. Also, throughout the program are "PRINT" statements followed by numbers. The numbers are the locations on the TRS-80 video display where program text will appear. Those lines must be changed or deleted to be compatible with other versions of BASIC.

Notice that lines 60, 70, 550 and 560 contain text in upper and lower case. Despite the fact that your TRS-80 may not have the lowercase modification, lowercase printing is possible as long as your printer has that capability. When entering the text, simply SHIFT those characters that are to be in lower case. By SHIFTing, you generate the code for lowercase that is ignored by the TRS-80 video display circuitry (without lowercase modification), but is recognized by a printer with lowercase capability.

Next time you have a stack of QSL cards to answer, let your computer do the hard work, and you will have more time to get on the air. QST

†For a program listing, send a business-size s.a.s.e. to me at the address listed below.

*72 Stiles St., Waterbury, CT 06706



An automated QSL card: The self-adhesive label affixed to the standard QSL card was generated by a program run on a TRS-80 microcomputer.

On line at WA1LOU . . . the walls of aluminum and steel cylinders help contain the computer rf.

The World Above 50 MHz

Conducted By William A. Tynan,* W3XO

VHF Primer — EME Operating Procedures

This, the final installment in this primer series on EME, will deal with procedures for establishing and completing contacts via the earth-moon-earth path. As in past columns in this series, 2-meter moonbounce will be stressed, and there will be comments on how things differ for the higher bands.

By now the reader knows from earlier columns that moonbounce signals are usually quite weak, especially for "minimum" stations, which describes what the majority of EMErs have. There is fading, both of the fast fluttery kind caused by libration, and the slow variety arising from Faraday rotation. In order to optimize the probability of completing contacts under such marginal conditions, a specialized operating procedure and a unique signal reporting system were worked out by the pioneers of amateur moonbounce some 10 to 15 years ago. Because those doing the early moonbounce work on 2 meters were largely a different group than those involved in 70 cm, the procedures and reporting systems for the two bands are not identical.

Since EME is a very weak signal mode, it is not for the casual operator or the ragchewer. Most "QSOs," especially those for new moonbouncers, are accomplished by prearranged schedules employing the specific pattern of transmitting and receiving as well as the unique signal reporting system already mentioned. Actually, the transmit/receive sequence used for EME are very much akin to those employed for meteor scatter work. Because of the differing propagation characteristics, however, i.e., slow fading caused by Faraday rotation as opposed to the relatively short bursts of signal encountered in m.s. operating, the time slots allocated to receiving and transmitting in the two propagation modes are quite different. For meteor-scatter skeds, a transmit/receive sequence of 15 seconds is used most commonly. For 2-meter moonbounce, transmit/receive periods of two minutes is the norm, while on 70 and 23 cm, sequences of 2-1/2 minutes are almost universal. The 1-1/4 meter EMErs seem to use a mixture of the two. It's always a good rule to make certain that both parties to a sked are clear on all details including the type of sequencing to be used. This, of course, includes who goes first. On 2 meters, it is customary for the more easterly station to transmit in the first 2-minute period and each odd-numbered 2-minute period thereafter throughout the schedule, which usually lasts for an hour. On 70 cm, the opposite is true with the more westerly station normally transmitting first and in the succeeding odd-numbered 2-1/2 minute periods.

In addition to this prescribed sequencing, the special EME signal reporting system know as TMO5 is used. Once again, however, there are some slight differences between the specific systems used on the two most popular moonbounce bands. In all EME work, T denotes that signals have been detected but that they are too weak, or broken up, to copy any more than random letters. On 2 meters M indicates that signals are still too weak for full calls to be received, but that portions of calls (possibly enough, with prior knowledge, to identify your call or that of the other station but not both) are being heard.

On 70 cm, the definition of M is somewhat different. There, it indicates that, although signals are too weak to be classified as "solid copy," they are nevertheless sufficiently readable so that full calls can be discerned over the transmission period. Under this definition, it is thus possible to complete a contact successfully with M reports; whereas, with the 2-meter definition, that is not the case. In both systems, O indicates that full calls can be detected, although signals are what would be considered very weak in other modes. If signals are above that level, the standard RST reporting system is used; thus the report, unless QRM is a factor, would begin with 5. Hence the name "TMO5."

It is one thing to say that transmission and reception periods are 2 or 2-1/2 minutes long but there is more to it than that. How each of these periods is used should also be described.

On 2 meters it is customary to send calls during the entire 2-minute transmission period if nothing has been heard. Once any signals have been heard, calls are sent only for the first 1-1/2 minutes and reports for the final 30 seconds. Once calls and reports have been heard, R and a report of O or better is sent for the entire 2-minute period. Once R has been heard, and assuming that complete calls and a report of O or better have been received, R73 is sent for all but about 10 seconds of the transmit period, followed by SK for the last 10 seconds.

On 70 cm, only in the case of the first transmission sequence are calls sent during the entire 2-1/2-minute period. For all succeeding periods, if nothing is heard from the other station, calls are sent only for the first 2 minutes and nothing for the final 30 seconds. If only "wispy" (too weak to identify calls) signals are heard, calls should be sent for the first 2 minutes and TS for the final 30 seconds. If, on the other hand, full calls are heard but no reports, or T reports, calls should be sent for the first 2 minutes and appropriate T, M, O or RST reports for the final 30 seconds. If reports of M or better are heard but not full calls, T reports are sent for the entire 2-1/2 minutes. If MS or better are heard along with complete calls, appropriate reports and RS are sent for the entire 2-1/2 minutes. When RS are heard, after previously receiving complete calls and reports, RS are sent for the entire 2-1/2 minutes. Although the foregoing procedure specifies not sending calls for what may be a considerble period, don't forget government identification requirements.

The frequencies used for EME on 2 meters are generally 144.000 to 144.050 MHz and, similarly, the first 50 or 60 kHz above 432 on 70 cm. As well as times and sequences to be used, the exact sked frequency is, naturally, another important item to be agreed upon in advance. Skeds can be arranged by mail or telephone, or on the hf bands. By all means, however, if the telephone or hf is used, don't keep the circuit open during the schedule. This way there will be no doubt in your mind, or anyone else's, as to the validity of the contact.

It is hoped that this series on moonbounce will be helpful in increasing the ranks of EMErs, and has provided some of the information necessary for the beginner to get started. Once again, I recommend that those seriously interested in delving further into this fascinating and challenging aspect of vhf take advantage of the EME notes produced by W6PO. For those interested in moonbounce on 70 cm or higher frequency bands, the newsletter put out by K2UYH is also highly recommended. Information on receiving these publications was given in the December column. For details on a new EME news sheet devoted to 2-meter moonbounce, see the 2-meter section.

ON THE BANDS

6 Meters — The DX fireworks continued crackling up to the time this is being written 10 days before Christmas. In fact, some of the events transpiring during this period can probably be classified as bombshells. One example of such extreme pyrotechnics are the November 17 contacts by VE1YX and VE1ASJ with VU1AID in Bombay. This shocker took place about 1450Z with Bob's and Andy's antennas aimed a few degrees east of north, which should be about the normal path to India. Three days later G5KW completed a crossband QSO with VS6BE over the long path. Ken first heard the Hong Kong station's signal at 1050Z and it remained audible for about an hour. On Monday, November 16, beginning about 1730Z, a number of the East Coast gang, not at work, were treated to an opening to American Samoa with AH8A holding down the fort on that end. K1HTV/3 near Washington was one of the fortunate ones on that occasion. All of this took place as the 10.3-cm solar flux was declining from 196 on the 15th to a low of 154 on the 24th.

Despite the declining numbers, the period between November 8 and 20 will long be remembered by 6-meter DXers. It was during that time that C5AEH was activated by W6JKV and N6BFM. Using an IC-551D into an SB-200 modified for 6 meters and a 32-foot boom KLM, Jim and Bob completed some 1500 QSOs with approximately 900 different stations in 29 countries during their stay in The Gambia, West Africa. This includes a number of crossband contacts with a baker's dozen European countries not having the blessing of 6-meter operation. One of the high spots for them was November 15, when they completed WAC in a little over six hours. A contact with KG6DJX took care of Oceania. VS6BE represented Asia and one of the few Europeans authorized 50-MHz operation SZ2DH, the special 6-meter call for SV1DH, provided that continent. With FY7AZ for South America, EL2AV for Africa and, of course,

*Send reports to Bill Tynan, W3XO, P.O. Box 117, Burtonsville, MD 20866, or call 301-384-6736 and record your message.

numerous Ws and VEs to fill in the blank for North America, the sweep was complete. Speaking of Ws, C5AEH made contacts with all states except KL7 and worked around a hundred 6s, some as early as 5:30 A.M. California time. As an illustration of the consistency of 50-MHz propagation to a number of parts of the world, at least during the time of their stay, many stations and areas were contacted every day while the operation was in progress. Prime examples of this are G5KW (crossband), the Caribbean with 9Y4LL, 8P6KX, DL3ZM/YV5 and the FY7THF beacon all prominent and the New England/eastern Canada area with VE1YX worked every day. Daily contacts with Equadorian stations were completed and HC8VHF was worked many times. KG6s DX and JDX were worked on three successive days. Who would have thought that 6 meters could display such results over these long-haul paths? Let's hope that this behavior is taken into account when the powers that be in various countries consider using this part of the spectrum for government or commercial communication or broadcast applications. The 6-meter gang owes a debt of gratitude to Jim and Bob for a fine job of organizing and operating. One aspect of their operation that was especially helpful was their near continuous use of 28.885. Jim is considering the Pacific for his next jaunt. I will keep you posted when definite information is available.

EL2s AV and FY also continued to provide African contacts. One big day for this was November 22, when EL2FY worked Ws from 1 through Ø call areas. Incidentally, QSLs for Saitoh now go to JA1BGS. Another station putting that continent on the 6-meter map is ZS3AK, who has been there many times to hand out Southwest Africa QSOs, and thus somewhat relieving the load on ZS3E.

November 29 brought a welcome sound for many of us who have been trying to work ZD8TC for over a year. Early that evening, about 2200, probably because of a link-up of Es and TE, Ted's weak and fluttery but readable signal poked its way through to the East Coast. As a result, a number of us have a new country that many had given up expecting to get. Cards for ZD8TC go to N2CW.

The first weekend in December brought much higher flux numbers, with the 10.3-cm reading reaching 270 by the 6th, and the pickup in conditions was quite noticeable. The mornings saw much 6/10-meter activity to Europe with the appearance of HA6NN, CT2EE and HBØQQ/P in Liechtenstein livening up the action. HB9QQ had made a special trip to a snowy mountaintop in that tiny principality just to provide North American 6-meter operators with a rare new crossband country. The afternoons brought transcontinental openings with many signals well over S9. VE8BY was also doing a landoffice business. On the 8th, one of those bombshells referred to earlier burst with a bang. VE1ASJ, who holds the title of North American 4-meter champion, did it again. This time Andy contacted five stations via the 6-to-4 crossband route, beginning around 1340Z. He worked EI6AS, EI6DT, G3APY, GW3MHW and G2AOK. All 70-MHz signals were quite weak, around 329 to 339. Congratulations are certainly in order to all who took part in these historic vhf contacts. As of this writing, we are still waiting for a U.S. station to succeed in making a 6-to-4 contact. The afternoon of the same day brought KG6DX and JDX into the East Coast with a number of stations making the grade. The following afternoon KH6IAA was in, providing the last state for a few more 6-meter operators.

The final weekend in this reporting period, December 12 and 13, also produced super conditions with many notable contacts being made. Saturday evening brought a strong JA opening to the west, with stations as far east as Albuquerque taking part. In addition to the many JAs available, W6UXN reports nabbing VS6BE, HL2JD and Okinawa stations JR6RPW and KA6OR. The following day TF3T, the new call for TF3SG, experienced a many-hour opening to the U.S. working stations from coast to coast. When last heard from Sveinn was attempting to work into KL7. ZB2BL was also making it all the way to the West Coast.

As if to add an additional dash of spice to the feast provided by the F2 layer, Es made its usual winter return. For some of the newer 6-meter operators, accustomed to the longer skip, it made for some unusual distances and provided a few new "hard to get" states. As in the case of the contacts with ZD8TC, mentioned above, it also helped make available some real DX as well.

Another country should be on 6 meters by the time this appears. J88AR St. Vincent in the Caribbean is to get the Swan 250 and associated gear originally intended for HC8VHF. When it wasn't needed for Rick's trip to The Galapagos, the group (which includes K3NZZ, KA3ECK, K8EFS, WB8BKC, W3IWU, K1ZFE, K1BXC, K3QMX, K1HTV/3 and VE1YX) decided to send it to Robert. From that location it provides the opportunity of a new country for most of the 6-meter gain via both F2 and E_s.

With all of this activity and cooperating propagation, the next appearance of the 6-meter DX box should show some impressive numbers. A reminder: To get your total listed correctly, please send me an s.a.s.e., and I will send you special forms for reporting your countries worked. Simply providing your totals in a letter does not really do the job, as sometimes people either assume certain areas are countries that aren't or do not count countries that are. There are also some obviously non-legitimate calls which must be discounted. So please, send for the forms, fill them out and return them to me as soon as possible.

KA1BRD passed along a letter from PAØRYS requesting the help of the rest of the world's amateurs. As has been mentioned in this column several times,

23-Cm Standings

Figures are states, U.S. call areas (plus VE and XE call areas, plus other DXCC countries not located within the borders of the above) and best DX in miles. Distances are in statute miles for farthest terrestrial contact. (*indicates EME capability.)

K1PXE	13	5	448	K5PUF	1	1	290
K1FO	11	4	405	WA5HNK	1	1	250
W1JR	10	4	475				
W1XP	7	5	300	K6ZMW	4	3	402
KA1GT	7	4	360	N6CA	3	2	338
W1QXX	6	3	260	W6XJ	2	3	250
				W6OQQ	2	2	200
WA2LTM*	17	6	770	N6NB/6	1	2	360
K2UYH*	17	6	770	WB6NMT	1	1	296
W2VC	13	5	537	KC6A/6	1	1	295
W2DWJ	12	4	200	N6TX	1	1	112
K2YCO	11	6	570	N6VI/6	1	1	94
K2JNG	10	4	305				
K2EVJ	7	5	335	K7GNV/7	5	3	402
WA2VTR	6	4	320	N6NB/7	4	2	295
W2PGC	5	5	473	KB2M/7	4	2	295
WA2FUZ	5	3	125	N6CA/7	3	2	345
WA2EUS	4	5	320	WA7JUO	2	1	—
K2OVS	3	2	135	N6CA/7	1	1	215
				W7LUX	1	1	130
W3HMU	11	5	300				
K3IUV	9	4	290	WA8TXT	10	7	—
WA3JUF	7	4	300	W8YIO	9	7	551
				K8WW	6	4	448
K4QIF	15	6	790	WB8BKC	6	3	500
K4NTD	3	2	847	WB8PAT	3	3	405
W4VHH	2	1	350				
W3IY/4	7	5	274	W9ZIH	10	5	790
				WB9SNR	8	5	760
WB5LUA*	11	12	839	W9UD	5	4	760
W5HN	4	2	485	W9JIY	5	3	300
K5LLL	2	2	847	W9WCD	3	3	770
W5LDV	2	2	847	W9AAG	2	2	350
WB5TCO/5	2	2	218				
W5UKQ	2	1	365	WØPW	3	2	97
W5HPT	1	1	571	WØZJY	3	1	170
WA5TBE	1	1	372	WØMDL	2	2	340
W5GVE	1	1	366	WØVB	2	2	290
				XE2BC	1	1	370

Anyone who has done any crossbanding has worked this gentleman. From this well-equipped shack on the Isles of Scilly, G5KW has WAC and 35 countries to his credit — all by listening on 6 meters and responding on 10 meters. Ken has also worked 47 U.S. states via the same route, lacking only Hawaii, Alaska and Wyoming.

the Dutch have been authorized three spot frequencies at 53.875, 53.925 and 53.975 MHz. In addition, even this meager assignment expires January 31, 1982. Gur asks that letters be written to The Netherlands PTT requesting an extension, as well as for more suitable frequencies in the vicinity of 50.1.

2 Meters — Now there is a newsletter for 2-meter EMErs. Called "The Lunar Letter," it is published by KI7D and N7CSF. The first issue is packed with information ranging from statistics on active 2-meter EME stations to details on matching 75-ohm CATV coax to one of the popular 144-MHz Yagis as well as constructing of power splitters for this readily available transmission line. Those wishing to receive this informative publication should send a stack of legal size s.a.s.e.'s to Rick Beatty, WB7DTI, 426 NE 156th, Seattle, WA 98155.

From that quite rare state of Kentucky, KC4EG pleads for a Delaware station to give him the last state he needs east of the Mississippi and bring his total to 40. Ralph can be contacted at P.O. Box 412, Pewee Valley, KY 40056. Another midwesterner who is actively pursuing states is K9EFX Valparaiso, Indiana. John reports a November 16 QSO with WA4MVI, now installed in his new QTH in South Carolina. Nothing much came of their m.s. sked until the 38-minute point, when out of nowhere signals appeared. It was noted that WA4MVI had his antenna elevated about 20 degrees, and they speculated that the 520-mile contact may have been via aircraft reflection rather than by meteor trails. John was completing an EME installation at the time of writing in mid-November, so anyone wishing to run with him may call 219-462-4358. States he needs are Vermont and Rhode Island as well as all 7s W6, KH6 and KL7.

In the "how time passes department," K4CAW notes the fifth anniversary of the North Carolina Single Sideband SWOT Net. To celebrate the event last November 3rd, the net held a special birthday meeting with a total of 68 stations checking in to offer congratulations. Over its five years of existence, 760 stations in 19 states plus Ontario have checked in at one time or other. Of the 261 scheduled net nights since the group began in 1976, there were only four occasions on which the net failed to meet. The North Carolina SWOT Net is held at 2100 local time on Tuesday evenings on 144.250 MHz.

70 CM and Down — Another hard-working vhfer has joined the still exclusive ranks of those who have worked all 50 U.S. states on 70 cm. Al Ward, WB5LUA, joins WØYZS, K2UYH and K5JL in the honor by virtue of a contact with WA7JUO in Nevada. WB6ESQ was on hand at Sam's QTH in Las Vegas to provide assistance. This gives Al WAS and WAC on 6 and 2 meters as well as 70 cm. Next stop 23 cm!

WAC was also achieved by JA9BOH, after completing with YV5ZZ earlier in 1981. Kimio also has 19 U.S. states to his credit plus a like number of countries.

"Have you called CQ on 432.1 this week?" That's the question posed in the December 1981 issue of "432 News," the FB info sheet put out by WØOHU. The issue contains a schedule list, a rundown of band conditions during October and November as well as some helpful, and hopeful, comments on wintertime propagation. To begin receiving a copy, send some s.a.s.e.'s to Edward W. Fitch, WØOHU, 1628 Northern Heights Dr., Rochester, MN 55901.

K1FO reports that his prinicipal activity, in addition to working 1-1/4 meters, has been on 23 cm, mostly the construction end of things. Steve now has 150 watts of ssb and cw output from a pair of 7211s driven by a 7289. Speaking of equipment for this band, WB2WIK calls attention to the AM-3204A, which has been offered by Fair Radio Sales in Lima, Ohio for about $75. This little gem includes three cavities, two of which can be made to work at 1296 MHz. It is understood that the units come with three 7289s installed.

WA5VJB recounts the tale of his Halloween DXpedition to Oklahoma to provide some of the gang back in "Big D" with a new state on 23 cm. Kent says that the area received eight inches of rain that day and was declared a federal disaster area. The result was that the rig got water in it and the fog made it difficult to see to aim the antenna. Nevertheless, he succeeded in working W5HN, W5HPT and WB5LUA over the 95-mile path. Of course, WB5LUA has most of the states on the band already, but it was a new one for the others. I am sure that Kent's efforts were very much appreciated.

In addition to his 23-cm activity, which is notable with nine states and 551 miles to his credit, W8YIO Manchester, Michigan, is also active on the next higher band as well. Lew now has 4 watts output of ssb and cw on 2304 MHz feeding an 8-foot dish. Plans call for an increase in power to 20 watts by spring.

The New Frontier

The World Above 1 Gig

Conducted By Bob Atkins,* KA1GT

Microwave Horn Antennas

Horn antennas, such as are commonly used in conjunction with Gunnplexers, are useful and convenient when large amounts of gain are not required (e.g., over short line-of-sight paths). I recently received a request for design information on a high-gain (40 dB) horn for intended use at 10 GHz. At first glance this may not seem unreasonable, but closer investigation reveals a problem — size!

Approximate design equations for a practical horn of a given gain are:

$A/\lambda = 0.443\sqrt{G}$

$B = 0.81 \times A$

$L/\lambda = 0.065 \times G$

Where L = horn length, open face aperture A × B, and G = absolute power gain.

As can be seen, for a 40 dB horn (G = 10,000) at 10 GHz (30 mm)

$A = 44.3\ \lambda = 1.32$ m

$B = 35.9\ \lambda = 1.08$ m

$L = 650\ \lambda = 19.5$ m

This is a large antenna by any standard.

An important factor to note is that the gain of a horn antenna is proportional to the face area of its open end. In fact it will have approximately the same gain as a dish of equivalent area to its face area. In the example above, the open end face area of the horn is approximately 1.43 m^2. A 1.35 m diameter dish has the same area and also has around 40 dB of gain. The big size difference is in the length. The horn is 19.5 m (64 ft) long, whereas the dish would be about 1 ft deep!

This shows why horn antennas with a gain of over about 20 dB are rarely used. Much more gain per unit volume can be achieved using a parabolic dish.

Incidentally, when you are building small horn antennas it is often useful to make a cardboard model first to be sure that all the parts will fit together properly. The horn must taper from its face aperture at one end to the internal dimensions of the waveguide at the other (0.9 × 0.4 in. for the usual 10 GHz waveguide) in a length L. The four sides required may be drawn out on cardboard first and cut out. If these pieces fit together properly they can then be used as templates to cut out equivalent shapes from thin sheet brass or copper.

NEW DX RECORDS ON 10 GHz

July 1981 seems to have been a very busy month on 10 GHz in Italy. On the 11th, I4QIG (locator GE22F) worked I6CHY/SV8 and I6ZAU/SV8 (JZ2OF) in Corfu at a distance of 830 km for a new world record. (For a locator map see Sept. 1979 *QST*, pp. 79-80). 10 mW Gunnplexers and 1-meter dishes were used at both ends of the path.

On the next day, July 12, IØSNY(JA63H) worked I3SOY and IW3EHQ (FG5OJ) at a distance of 860 km. This is the same group that previously held the world record with 757 km (see "The New Frontier," November 1980). One-meter dishes were used at both ends of the path, and transmitter powers (*Radio Rivista*, October 1981) were stated to be 25 and 100 microwatts. (The Yugoslavian vhf magazine reports these powers to be *25* and *100 mW*, which seems more reasonable.) I have no information on the type of transmitter used.

It seems that the 10-GHz DX record is slowly creeping toward the 1000-km mark. Remember that Microwave Associates will present an award to the first stations to work over 1000 km on 10 GHz (see "The New Frontier," November 1980, p. 69). Is anyone trying for this award on this side of the Atlantic?

2304-MHz SATELLITE

A number of reports have been received from stations in Western Europe of a signal on 2304.000 MHz that seems to be coming from a satellite. The azimuth bearing of the signal tracks the sun and its elevation is 20 to 30 degrees higher than the sun. This would be consistent with a sun-synchronous-orbit satellite. It has been heard between 0900 and 1400 UTC and transmits either a steady carrier or fm telemetry. The signal is quite strong, being copyable on a dish feed horn at 6 to 10 dB above the noise using a 3 dB NF preamp and a 2.5 kHz bandwidth. I would be interested to learn of any reception reports of this signal in the USA, or any information on its origin.

TRANSISTOR NEWS

TRW Semiconductor (14520 Aviation Blvd., Lawndale, CA 90260) is now marketing two new microwave transistors, the BFR90 (1.5 dB NF at 500 MHz, 5 GHz cutoff) and the BFR96 (+20 dBm output at 1 dB compression at 1 GHz). Prices (in 1000 lots!) are $1.55 and $1.75, respectively. Small-quantity prices will probably be in the $2 to $3 range. These devices might be suitable for microwave LO chains, or low-power stages of solid-state transmitters on 1296 MHz.

WARC MOVES ON

The FCC has started an inquiry to put into effect the acts of the 1979 WARC conference concerning the 40.5- to 400-GHz region of the spectrum. The WARC proposals for amateur allocations were generally in line with the U.S. viewpoint and it seems unlikely that significant changes will be made to them.

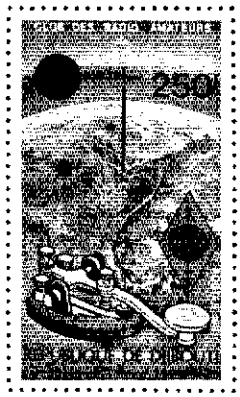
2300 MHz (ALMOST) BEACON

Microwave experimenters might like to listen to a beacon that was left on the moon by the last Apollo mission. It transmits on 2276.0 MHz using right-hand circular polarization. The signal is fm telemetry with 1.06 kb/s data.

G4KGC and G3WDG report copying this beacon using a 4-ft dish and a 1.5 dB NF preamp. Signals were about +5 dB S+N/N using a receiver with a 500-Hz bandwidth. The beacon can be a useful test aid when developing 2304-MHz antennas and preamps.

*c/o ARRL Hq., 225 Main St., Newington, CT 06111

Strays



Two new Amateur Radio stamps, which now bring the number of such stamps to 21, were issued in 1981. The first (left) was issued in March by the USSR on the occasion of the Thirtieth All-Union Amateur Radio Exhibition. It shows the Russian Amateur Radio Satellite and mentions the Amateur Radiosport Overseeing Committee. The government of Djibouti issued a multicolored 250-franc stamp (right) in June. It carries the logo of the Radio Club of Djibouti and of the International Amateur Radio Union. *(courtesy of Vic Clark, W4KFC)*

OUCH!

☐ J. F. Moomaw, Jr., W4XD, of Staunton, Virginia, saw a notice in his local paper recently with the words "frequency of 99.7 megahurts..." Joe quips, "Many of us OTs have thought megahurts, not megahertz, is correct ever since it replaced 'cycles.'"

I would like to get in touch with . . .

☐ foreign amateurs who are also members of the Experimental Aircraft Association and/or the International Aerobatic Club. Edwin Hartz, K8VIR, 108 Hartz Dr., Holly, MI 48442.

☐ amateurs interested in starting a net that would provide addresses of stations worked. Kenneth Hand, WB2EUF, P.O. 708, East Hampton, NY 11937.

☐ anyone interested in setting up a sked for teaching a foreign language. Ben Adler, WD2AIW, 112-39 68th Ave., Forest Hills, NY 11375.

In Training

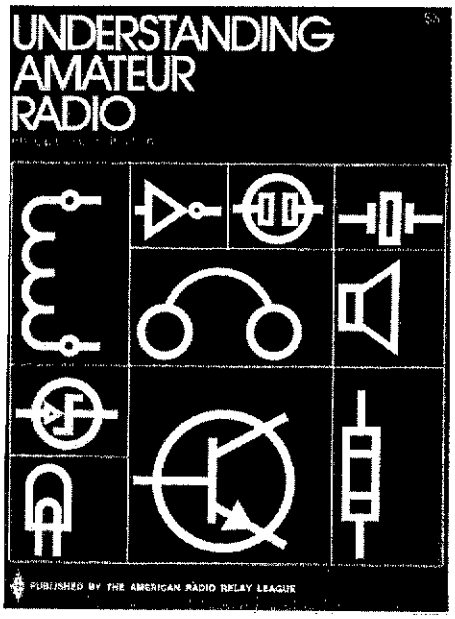
Conducted By Steve Pink,* KF1Y

A HANDS-ON APPROACH TO AMATEUR-RADIO TEACHING

☐ Many longtime hams bemoan the fact that the new generation of Amateur Radio operators is less likely to build its own equipment than earlier generations. "Appliance operating," as it's come to be known, takes no more than plugging in an ac cord and connecting an antenna. Yet hams have a long tradition of self-building and electronic ingenuity. Many reasons can be given for this "new style" of operating, and some people would even dispute the claim that hams don't build anymore. State-of-the art technology is so advanced over 20 years ago that from an economic point of view it is simply cheaper (in time and money) to buy new hf transceivers than to build them. On the other hand, some argue that although very few new hf transceivers are homebuilt, the number of homemade keyers, audio filters, SWR bridges, antenna tuners and other station accessories has kept quite high.

But most would agree that the "spirit of homebrew" needs to be sustained in our hobby. "Homebrew" is a habit that is acquired early: Here is where instructors and training courses become important. Do you remember your feeling of satisfaction from seeing the first simple project you built work? Perhaps it was a crystal radio or a code oscillator. That satisfaction served as the motivation for the next, more difficult project, which in turn led to another and may ultimately have led you to a career in radio electronics or communications. This story is the genesis of the homebrew spirit. By introducing "hands-on" projects in your ARRL licensing courses, you will be sustaining a spirit that has always been a part of the ham radio tradition. Worth a try?

It's easy to start. The Novice Instructor Guide, available from ARRL Headquarters for $1.50, contains on page 37 two code practice oscillator projects for class construction. Building these oscillators will enhance your Novice class in two ways: It will introduce your students to the art of "rolling your own" and, when they are finished, will provide a way for each student to practice sending the Morse code. Other points in the Novice Instructor Guide supply opportunities for a hands-on approach. Lessons three and four include demonstrations of "Ohm's Law in action" and the measurement of alternating current and radio frequency. In smaller classes it may be possible to allow each student a chance to measure a circuit with meter or scope. This one small experience could lay the foundation for a career of designing and building.



Understanding Amateur Radio can enhance your licensing course with interesting and practical construction projects. It's available from ARRL or your local dealer for $5.

Perhaps the best all-around beginning tinkerer's text is in the League's *Understanding Amateur Radio*. Not only does this "junior Handbook" cover the theory necessary for designing and building, but also the principles and practice of construction are detailed in a way that makes integrating this text with an ARRL licensing course quite easy. Chapters on building receivers, transmitters, power supplies and antennas can supplement any license class, Novice through Extra, and "Chapter 7: Workshop and Test Bench" should be considered required reading at all levels. This should go some way toward eliminating the "tool crude" radio amateur.

A new feature in the pages of *QST* can also be coordinated to fit into an ARRL training program course. "Beginner's Bench," now edited by George Collins, KC1V, is designed to train newcomers in the fundamentals of homebrew. From setting up a new station to learning to troubleshoot equipment, this monthly feature can be used by the creative instructor as the focal point for a construction project or a hands-on demonstration. Many new hams have absolutely no idea what to do when their commercial equipment malfunctions — it may be as simple as a line fuse, but the techniques for determining the trouble can be found in "Beginner's Bench" in December 1981 and in January, February and March 1982 *QST*.

"In Training" itself has run some simple construction projects. The September 1979 column (p. 108) presents an 80-meter VFO project that could also be used as a QRP transmitter. Reprints of this column were sent out to a number of League instructors. We have plans, at the Training Branch, for more "In Training" construction projects. If you have any projects that you think will serve in a licensing class or if you care to suggest any, drop us a line. We are always interested in finding out what you, the ARRL instructor, are doing to keep the homebrew spirit alive in Amateur Radio.

*Training Program Manager, ARRL

Special Events

Conducted By Mark Wilson,* AA2Z

Punxsutaweny, Pennsylvania: Woodchuck Net will commemorate Groundhog Day 1982 starting at 1700Z *Jan. 31*. Frequencies: 3.980 7.240 14.290. Certificate for large s.a.s.e. to: P.O. Box 345, Punxsutaweny, PA 15767.

Monterey, California: Naval Postgraduate School ARC will operate K6LY during the 41st Bing Crosby National Pro-Am Golf Championship from 1800-2400Z daily *Feb. 4-7*. Frequencies: lower part of 40- and 15-meter General class phone bands. Commemorative QSL available from: N6CLR, 902 Maple St., Pacific Grove, CA 93950.

Rainy Lake, Minnesota: Robbinsdale ARC will operate KØLTC from the frozen surface of the lake near International Falls during its second "Operation Icebox" from 0000Z *Feb. 5* until 0000Z *Feb. 6*. Frequencies: 10 kHz up from bottom of the General class phone bands; some Novice operation also planned. Certificate for large s.a.s.e to KBØPM.

Kennedy Space Center, Florida: Cape Kennedy Area ARC will sponsor its first annual field day on *Feb. 5-7*. Listen for KC4CK at the following times and frequencies: 14.290 from 1300Z each day; 21.380 and 28.660 from 1300Z Feb. 6 and 7; 3.995 after 2200Z each day. Certificate available (for SWLs, too) from: P.O. Box 21065, Kennedy Space Center, FL 32815.

Veron, British Columbia: North Okanagan ARC is sponsoring an award to celebrate the 22nd Annual Veron Winter Carnival, western Canada's largest. Work three Veron-area amateurs to qualify. Activity on 14.295 21.375 28.575 from 2100-2400Z daily *Feb. 5-14* and *Feb. 7* from 2000-0200Z. Certificate for large s.a.s.e. and IRC to: P.O. Box 1706, Veron, BC V1T 8C3 Canada.

Hodgenville, Kentucky: Lincoln Trail ARC will operate NN4H from the birthplace of Abraham Lincoln from 0000Z *Feb. 13* until 0000Z *Feb. 14*. Frequencies: phone — 15 kHz up from lower General class band edge; cw — 40 kHz up from lower band edge; Novice — 15 kHz down from upper band edge. Certificate for large s.a.s.e. to: Charlie Myers, Box 723, Elizabethtown, KY 42701.

Portland, Oregon: Oregon Tualatin Valley ARC will operate KA7CTP from 1700Z *Feb. 14* until 0200Z *Feb. 15* to celebrate the state of Oregon's 123rd birthday. Frequencies: 14.280 21.360 28.510. Certificate for large s.a.s.e. to: Marshall McKillip, 1175 NW 128th St., Portland, OR 97229.

George, Washington: Central Washington ARC will operate W7WMO/7 to celebrate George Washington's birthday from 1700-2400Z *Feb. 15*. Frequencies: 3.950 14.295 21.425 28.610. QSL for s.a.s.e to: Eugene Bye, W7WMO, 18 J St. NE, Ephrata, WA 98823.

Mt. Vernon, Virginia: Mt. Vernon ARC will operate WB4IGW from 1400-2100Z *Feb. 22* from the estate to celebrate the 250th anniversary of Washington's birth. Frequencies: phone — 7.260 14.285 21.415 28.745 146.055/.655; cw — 21.120. Special QSL card for s.a.s.e. to: Elmer Zborofsky, 5912 Brookview Dr., Alexandria, VA 22310.

Brenham, Texas: Brenham ARC will operate WB5STR from 0200Z *Feb. 27* until 2200Z *Feb. 28* to commemorate the anniversary of the signing of the treaty which freed Texas from Mexico. Frequencies: phone — 80-10 meter General class portions; Novice cw portions. Special QSL for s.a.s.e to: BARC, Box 44, Brenham, TX 77833.

Note: The deadline for receipt of items for this column is the 15th of the second month preceding publication. For example, your information would have to reach Hq. by February 15 to make the April issue.

*Assistant Communications Manager, ARRL

Silent Keys

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

WA1ACP, John Perry, Middletown, RI
W1ACW, Lester E. "Red" Hughes, Presque Isle, ME
W1AQL, Grover C. Brown, Brewer, ME
W1ATJ, Verden W. Hodge, Claremont, NH
N1AYX, Kenneth W. Keane, West Warwick, RI
W1FRT, William E. Medler, Montpelier, VT
W1HOY, Helen A. Harris, Arecibo, PR
W1IXL, James W. Hawkes, Goffstown, NH
W1NBQ, James J. Craven, Jr., Chebeague, ME
W2AZT, Joseph M. Keller, Aiken, SC
W2CEH, James A. Sinclair, Trenton, NJ
WA2DFW, Rollin P. Brown, Edwards, NY
WA2FZH, William A. McGough, Woodbridge, NJ
*N2KR/ex-W2MZB, Karl Rosenbaum, Moriches, NY
KA2LCV, Alice G. Mitchell, Linwood, NJ
WA2PJS, Abner A. Karny, Buffalo, NY
WA2RBP, Wilmarth E. Wilber, Binghamton, NY
WB2VXT, James W. Tonkin, Alloway, NJ
WA2YMI, Charles T. Schwartz, Mastic, NY
KB3BQ, Sam S. Rolison, Morton, PA
W3EBX, Frank E. Colonna, Jessup, MD
W3IEC, Sigmund R. Pituch, Marion Station, MD
**W3PS, Robert M. Booth, Jr., Kensington, MD
W4CI, John J. Fogarty, Tampa, FL
K4DSH, Clarence L. Dickinson, Jacksonville, FL
K4FPR, Chester C. Angstadt, Bradenton, FL
K4IHD, William S. Dycus, Paducah, KY
K4LGG, Marion G. McWhorter, Union Springs, AL
WA4LYJ, Lacy T. Yarbro, Davenport, FL
W4MYG, Raymond M. Dagley, N. Naples, FL
W4MYM, John A. Thompson, Cheraw, SC
W4WN, Jack F. Wynne, Cape Coral, FL
W4ZQT, Edwin H. Koeper, N. Palm Beach, FL
WA5EJH, Terrence W. Beverly, Springdale, AR
W5GMV, John H. McClain, Houston, TX
W5JCQ, Ralph L. Wood, Jr., Del City, OK
K5JIT, Stancil M. Bagwell, Tulsa, OK
WA5JUI, Malcolm J. Brenneman, Midland, TX
W5SUW, Herbert L. Scales, Kingsland, TX
WA5YRQ, Elmer F. Hard, Houston, TX
W6AGG, Wendell M. Fales, Los Angeles, CA
KA6AWV, Joseph D. Lorenzen, Tracy, CA
W6BJD, Lester H. Cushman, Riverside, CA
W6BZ, Melvin D. Whiteman, Alameda, CA
WD6CAK, John A. Simpson, Bloomington, CA
*W6DGL, E. Stewart Naschke, Sacramento, CA
WB6DWX, Roland E. Snyder, San Jose, CA
W6EGC, Clair M. McLaughlin, Paso Robles, CA
WA6HIN, Robert B. Wolfe, Stockton, CA
K6HSZ, Leland J. Gillette, Woodland Hills, CA
WB6IXQ, Clement O. Futterer, Lake San Marcos, CA
W6KSJ, Robert J. Bucaro, Santee, CA
WB6MUN, Robert F. Biloon, Santa Cruz, CA
W6MXQ, Oliver A. Nelson, Jr., El Cerrito, CA
WA6OCA, Richard C. Thomas, San Francisco, CA
W6PVI, J. S. Fennell, Oakland, CA
N6RD, Burl L. Bailey, San Diego, CA
K6RHW, Joe R. Blake, Grass Valley, CA
WA6YXX, Robert L. King, Sr., Ojai, CA
WA6YZJ, Juanita R. Dane, Napa, CA
W7APA, Dale R. McCulloch, Redmond, WA
W7AV, Verne K. St. Louis, Port Angeles, WA
KA7EUN, David M. Smith, Redmond, WA
K7GYD, Frank I. Roddan, Tigard, OR
W7JOP, David L. Mickel, Bend, OR
W7KWB, Joseph D. "Don" Conner, Phoenix, AZ
W7MKN, Curtis E. Taylor, Spokane, WA
K7NDF, George T. Squires, Vernonia, OR
W7ODZ, Bernard L. Klapperich, Tillamook, OR
WB7ONK, David L. Jeaudoin, Ridgefield, WA
WA7PSK, Donald R. Cratty, Ajo, AZ
WA8DHG, Lewis G. Best, Zanesville, OH
W8HIC, Otis Ferguson, Huntington, WV
K8JZP, Ronald P. Titus, Portage, MI
AB8L/ex-W8DEZ, Robert H. Finegold, Kettering, OH
W8LG, Harry B. Colley, Caldwell, OH
K8OZR, Carl A. DeSantis, Weirton, WV
WA8WAX, Eleanor J. Paxton, Akron, OH
W9AJK, Harold B. Rothrock, Richland, IN
KA9FFG, Donald F. Blahunka, Elgin, IL
W9GTJ, John J. Janczak, Beaverdam, WI
W9VCO, Clarence D. Billburg, Park Ridge, IL
NØBFH, Knox D. Kuppinger, Lafayette, CO
KAØCDV, Donald E. Wacaser, Independence, MO
WDØDVQ, Paul G. Wyckoff, El Dorado, KS
WØELR, Harry C. Drake, Kirkwood, MO
WØHOK, Asa L. Blasche, Kansas City, KS
WØKFF, Arthur L. Vandersluis, Bemidji, MN
WØMAN, Roy W. Johnston, Sioux City, IA
WØYQB, Wallace L. Koppmann, Rapid City, SD
KBØZT/ex-WBØLKS, L. Wallace Cornell, Mound, MN
VE3BOX, John J. McCarron, Stouffville, ON
VE3IFZ, Carl G. Everett, Weston, ON
VE3MKL, William K. Lane, Toronto, ON
VE3PY, Vernon A. McCourt, Ottawa, ON
VE6FM, Richard K. Massett, Cochrane, AB
VE7NP, Charles O. Smythies, Nanaimo, BC
DJØND/W8RLT, Lawrence R. Mueller, Holxen, West Germany
OK1JMW, Josef Marik, Liberec, Czechoslovakia
*YBØAR, John H. Kertayasa, Jakarta Pusat, Indonesia

*Life Member, ARRL
**Charter Life Member, ARRL

In order to avoid unfortunate errors in the Silent Keys column, reports of Silent Keys will henceforth be confirmed through acknowledgment only to the family of the deceased. Thus, those who report a Silent Key will not necessarily receive an acknowledgment from Hq.

Note: All Silent Key reports sent to Hq. must include the name, address and call sign of the *reporter* as well as the name, address and call of the Silent Key in order to be listed in the column. Please allow several months for the listing to appear in *QST*.

50 Years Ago

February 1932

☐ As of June 30, 1931, there were 22,739 licensed amateurs in the U.S., an increase of almost 20% over the previous year. And, effective April 1, 80-meter phone will be moved from 3500-3550 to 3900-4000 kc. A special *operator* license endorsement will be required for 75- and 20-meter (14.15-14.25 Mc.) voice operation. The full 160- and 5-meter bands remain open for phone without special licensing.

☐ The lead article and cover photo feature "An Unorthodox Receiver" by Ross Hull. This gem of a gang-tuned r.f./detector receiver has the tuning knob on the *side* of the receiver (the design permits *either* side, depending on the builder's preference), and the dial is in the center of the panel.

☐ "The Important First Choke in High-Voltage Rectifier Circuits," by Dr. Dellenbaugh Jr. and Bob Quimby, president and engineer of Delta Mfg. Co. (forerunner of Raytheon) is the first of three articles about rectifiers and filters. This classic treats the need for limiting the peak/average current ratio through mercury-vapor rectifier tubes (often ignored by radio amateurs).

☐ George Grammer asks "Which Tube for the Crystal Oscillator?" Based on tests of available triodes and pentodes, he concludes that the audio-frequency pentode, the '47, is the answer, giving ample output with minimum crystal heating.

☐ Readers are treated to one of the rare essays by "The Old Man" (revealed after his death to be ARRL founder Hiram Percy Maxim). TOM treats "Rotten Young Squirts" with all the disdain he can muster (which is considerable). The title refers to years in ham radio and not chronological age — the tirade was triggered by someone who bootlegged with a Radio Supervisor's call!

25 Years Ago

February 1957

☐ The "Monimatch, Mark II" of Lew McCoy, W1ICP, graces the cover. It is an improved version of the popular s.w.r. indicator design.

☐ Director Claude Maer Jr., WØIC, describes "The Snoop-Loop," a transistorized 28-Mc. d.f. loop for hidden transmitter hunts and other fun and games.

☐ Technical Assistant Laird Campbell, W1CUT, writes of "A 7- to 30-Mc. Preselector," a regenerative amplifier to give improved image rejection and better sensitivity to older receivers. A pentode-triode 6AN8 serves as amplifier and cathode follower.

☐ Under "Recent Equipment" the Regency ATC-1 is hailed as the first solid-state receiving device offered to amateurs. The converter covers 3.5 to 30 Mc., uses two transistors and a diode, and is powered by three penlite cells. The mixer/oscillator is an SB-100 surface-barrier transistor. The second transistor doubles as a Q multiplier and b.f.o., and the diode serves as a signal limiter at the antenna. Also of note in the section is the RME 4301 Side-Band Selector, a companion unit for the 4300 receiver. Using vacuum tubes and the phasing method of sideband selection, it is believed to be the first example in the amateur field of etched-circuit technique.

☐ Paul Whitlock, K4ANU, describes his "Ten Watts Mobile for Twenty Bucks," a compact 3-tube a.m. rig using a 6C4 oscillator and 6AQ5 output and modulator stages.

☐ H. F. Friebe Jr., W2TGP, tells about "Transistor Operating Characteristics" and gives equivalent circuit diagrams and operating equations. Mention is made of the temperature sensitivity of the available (germanium) transistors.

☐ "Using the 4X250B on 144, 220 and 432 Mc." by Mason Southworth, W1VLH, involves plug-in plate tank circuitry, a two-band grid circuit and forced-air cooling. The tube is used as an amplifier (AB1 or Class C) and as a tripler. When used AB1 following a QRP transmitter, it of course requires essentially no driving power, and a "power absorber" of pilot-lamp bulbs is shown.

☐ "An 'All-Band' BC-458-A Heterodyne V.F.O. for S.S.B.," by sideband old-timer Ben Russ, W2QZ, describes simple modifications to the WW II surplus unit to work with a 9-Mc. sideband generator.

☐ S. B. Leslie, W5DQV, is justifiably proud of his "Combined Keyer and Control Circuit." The compact unit includes an electronic bug key and paddle, receiver break-in and sidetone. Two relays and two twin triodes are used. — *Byron Goodman, W1DX*

ARRL International DX Contest Awards Program

The list below shows all of the plaques that will be awarded in the 1982 ARRL International DX Contest (see December 1981 *QST*, page 94 for rules). The sponsors as of Jan. 1 are shown next to the plaque name. Several plaques still need sponsors, so if you or your club is interested in sponsoring one of these awards (pictured on this month's cover), contact the Contest Branch at ARRL Hq. to see what is available. Thanks to the efforts of many individuals and clubs, this awards program is continuing into its third year.

W/VE Phone

Single Operator

All Bands	Frankford Radio Club
1.8 MHz	
3.5 MHz	Lance Johnson Engineering
7 MHz	David Thompson, K4JRB/K5MDX
14 MHz	Mark Michel, W9OP and Richard Loehning, N9ACP
21 MHz	
28 MHz	
QRP	Rockford Amateur Radio Assn. — W9AXD

Multiop-Single Transmitter

The VP2E Contest Operators

Multiop-Multi Transmitter

Buffalo Area DX Club — W2RR

W/VE CW

Single Operator

All Bands	Frankford Radio Club
1.8 MHz	W1TX Roy Fosberg Memorial
3.5 MHz	Northern Illinois DX Association
7 MHz	Chuck Cullian, KØRF and George Schultz, WØUA
14 MHz	Neenah-Menasha Amateur Radio Club
21 MHz	
28 MHz	Mike Badolato, W5MYA
QRP	Hollywood Amateur Radio Club

Multiop-Single Transmitter

The VP2E Contest Operators

Multiop-Multi Transmitter

Colorado Contest Conspiracy

DX Phone

Single Operator

World	North Jersey DX Association
Africa	
Asia	Acadiana Amateur Radio Assn.
Europe	Murphy's Marauders
North America	Chod Harris, VP2ML
Oceania	Ray Stone, W5RBO
South America	Carl Smith, WØBWJ
1.8 MHz	
3.5 MHz	Robert Peterson, W3YY
7 MHz	
14 MHz	Don C. Wallace, W6AM
21 MHz	
28 MHz	Mike Badolato, W5MYA
QRP	

Multiop-Single Transmitter

World	Delta DX Association
Africa	
Asia	
Europe	Metro DX Club
North America	
Oceania	Carl Smith, WØBWJ
South America	

Multiop-Multi Transmitter

World	Gloucester County Amateur Radio Club
Africa	
Asia	Mike Badolato, W5MYA
Europe	Tom and Joy Middleton, WB4CKY
North America	
Oceania	
South America	

DX CW

Single Operator

World	North Jersey DX Association
Africa	San Diego DX Club
Asia	Alamo DX Amigos
Europe	Clarke Greene, K1JX
North America	Peter Grillo, KNØE (ex N6CJ, W6RTT, W9LVT, W5LZG)
Oceania	Ray Stone, W5RBO
South America	W6CUU Charles Cheatham Memorial
1.8 MHz	Jim Dionne, K1MEM and Bill Poellmitz, K1MM
3.5 MHz	
7 MHz	Art Boyars, K3KU
14 MHz	Bencher, Inc.
21 MHz	Southern New England DX Associaton
28 MHz	W2BN — West Jersey Communications Products
QRP	AJ7S — Nashua Amateur Radio Club

Multiop-Single Transmitter

World	George Schultz, WØUA and John Brosnahan, WØUN
Africa	Red Stick DX Association
Asia	Red Stick DX Association
Europe	
North America	Tom Taormina, K5RC
Oceania	
South America	

Multiop-Multi Transmitter

World	*QRZ DX*, Weekly DX Bulletin
Africa	
Asia	
Europe	
North America	
Oceania	
South America	

Special

Single Operator

World Combined Score	Yankee Clipper Contest Club
Highest Combined Total Multiplier (both modes)	*The DX Bulletin*
Japan Combined Score	Northern California Contest Club
W/VE Operator (Combined Score)	*National Contest Journal*
Low Power (top both modes)	Ken Bolin, W1NG
W/VE Low Power (cw)	Wireless Institute of the Northeast
W8 (phone)	Livonia Amateur Club
California (phone)	Dave Bell, W6AQ
California (cw)	Southern California Contest Club
Texas (cw)	Dennis Motschenbacher, N5DKG
Caribbean Resident (phone)	Arturo Gigante, HI8GB
Israel (phone)	Martin Hartstein, N6WW
Israel (cw)	Martin Hartstein, N6WW
Japan (phone)	Western Washington DX Club
Japan (cw)	Tom Morrison, K5TM and Randy Thompson, K5ZD
Sicily (top score, either mode)	John Lindholm, W1XX

Multioperator

Caribbean (phone)	W5QBM Joe Johnston Memorial
Caribbean (cw)	The YASME Foundation

W/VE Club

Unlimited (50+ entries)	ARRL
Medium (less than 50 entries)	ARRL
Local (3-10 entries, live within 20 miles)	ARRL
Most Improved Club (points per entry)	Steve Place, WB1EYI

Results, 1981 IARU Radiosport Championship

By Mark J. Wilson,* AA2Z

While most people were outside last July enjoying the beach, cookouts, nice weather and all the other pleasures of summer, thousands of dedicated contesters throughout the world were actively engaged in the 1981 IARU Radiosport Championship. Hams in the United States and Canada, in the Soviet Union, in Bahrain and Liberia, in Japan and Thailand, were all making contacts with other hams throughout the world. In all, 1483 participants submitted entries (down slightly from 1501 last year), signaling that the Radiosport Championship is indeed a very popular contest.

The International Amateur Radio Union added two new members to the union, San Marino and Andorra, since the 1980 contest, bringing the total number of member societies to 113. Welcome aboard!

As usual, summer propagation conditions from the United States left something to be desired. Most of the action was on 15 meters this time around, with 20 running a close second. However, there were plenty of good multipliers to be found on 80, 40 and 10 meters for those operators willing to patiently listen for weak signals. Knowledge of sunset/sunrise times is essential during this contest to catch those rare zones at the peak times.

A look at the top scores table shows many, many high scores from the Soviet Union and Eastern Europe. The Radiosport Championship is probably more popular among hams in those countries than any other contest. We received more than 300 Soviet logs this year listing contacts with thousands of different "U" call signs.

The 1981 contest saw several new records. N2ALK at K2TR just narrowly beat the old K5TM/K5ZD W/VE mixed record, while K5GN operating K5GA squeaked by K1KI's cw-only record from 1980. On the W/VE multioperator front, a seasoned crew at AI6V smashed the record set at W6RDF last year. Only one new world record to report, with LU8DQ using some outstanding transequatorial propagation to set a new cw-only record as he has done every year since the first Radiosport.

The next running of the IARU Radiosport Championship is July 10-11, 1982. See you then?

From left to right then going up are: KM8Y, W8YZ then KA8EEA, WD8QKK, KK8K, WB8SEZ, and AK8H of W8YZ multioperator station fame.

WB9JKI — top code operator from Illinois in the 1981 contest.

SMØCCM (background) checks the logs as KR6Q fills 'em using the call sign K6TMB/OHØ from Aland Island.

Top Scores — W/VE

Mixed		*Phone*	
K2TR (N2ALK)	1,383,642	K6HNZ	930,832
WA6DBC	905,590	VE7CC	923,731
K5KG	622,089	AA8U	735,065
N7DF	521,835	AG7M	597,811
N8II	494,856	AI8D	579,200
KU6J	443,646	K8MJZ	576,576
WB8JBM (AA8S)	388,056	WB5DDI	523,925
AA4NC	385,000	N4UH	495,410
KB8EC	377,880	K1WW	429,613
N6VI (N6MI)	323,733	K7NW	394,725
CW		*Multioperator*	
K5GA (K5GN)	1,076,400	AI6V	2,064,650
K7NHV (N6TR)	815,606	N2RM	1,549,560
K6LL	791,910	W6YX	1,394,787
K1KI	767,100	N4WW	1,371,843
K7GM	695,808	K1ZZ	1,364,856
KN5G	679,768	W5WMU	1,317,200
K1XA	644,292	KN8R	1,224,308
N4DW	644,266	KØCL	1,213,520
K5NW	643,600	AD8I	1,172,309
KM5R	640,224	W5XZ	1,130,005

Top Scores — World

Mixed		*Phone*	
UA1DZ	1,466,450	HA5NP	1,185,480
**K2TR (N2ALK)	1,383,642	OK6DX	1,050,060
UB5LAW	1,306,742	K6HNZ	930,832
UM8MAO	1,259,544	VE7CC	923,731
UC2AGA	1,233,869	HA5EIV	900,500
UI8LAG	1,150,373	OH1IJ	857,490
YU1DW	1,071,918	4X6DX	840,942
UQ2GDQ	1,071,480	UAØWAY	744,744
Y22OM	982,800	AA8U	735,065
UB5AAF	908,747	UA6ALL	680,734
CW		*Multioperator*	
*LU8DQ	1,797,400	XE2QQ	2,652,364
UP2NK	1,250,865	UK2BBB	2,526,520
UP2NV	1,249,740	UK2PCR	2,419,375
**K5GA (K5GN)	1,076,400	UK6LAZ	2,414,340
AH6BK (K7TI)	1,015,854	**AI6V	2,064,650
N5RM/NHØ	939,205	UK5MAF	1,940,888
UB5ZAT	857,790	HG6V	1,888,125
K7NHV (N6TR)	815,606	OK1KSO	1,811,160
EA2IA	806,505	UKØAMM	1,564,862
UW3HV	801,486	N2RM	1,549,560

*New world record
**New W/VE record

*Assistant Communications Manager, ARRL

Multiplier Leaders (Total, 1.8 MHz, 3.5 MHz, 7 MHz, 14 MHz, 21 MHz, 28 MHz, VHF)

Phone + CW								
K2TR	162	2	16	23	40	49	30	2
UC2ACA	149	11	15	25	39	39	20	-
UA6LFX	143	7	12	25	34	41	24	-
UA1DZ	139	9	13	26	40	37	14	-
OK2BLG	133	2	15	17	41	38	20	-
UB5AAF	131	5	12	20	39	34	20	1
CW								
K5GA	156	5	18	28	40	39	25	-
LU8DQ	152	5	20	32	36	33	26	-
K1KI	150	5	13	24	45	40	23	-
UB5ZAT	135	11	13	21	33	34	23	-
UP2NK	133	6	9	28	37	33	19	1
Phone								
OK6DX	132	-	9	16	40	38	29	-
DL8PC	117	1	12	10	37	37	18	2
AA8U	113	2	4	11	35	49	11	1
K6HNZ	112	-	3	12	37	40	20	-
HA5NP	111	-	9	16	34	34	18	-
Multioperator								
AI6V	175	7	13	31	52	44	24	4
UK2PCR	175	8	18	31	48	45	24	1
UK6LAZ	170	8	15	32	42	44	28	1
UK2BBB	166	5	14	32	48	46	21	-
HG6V	159	-	14	21	45	56	22	1

SOAPBOX

The Radiosport is the perfect combination of the November SS and the CQ WW DX Contest. No matter what time of day it is, there are stations that the "little pistols" can work (KB9AW). Why not make this a two weekend contest? One weekend for phone and another for cw (12UIY). I found the conditions to be very poor during the period of the contest. You will notice that there are very few Japanese stations worked from here — a very unusual situation for a contest weekend (ZL2RY). I like the Radiosport scoring system, which makes it worthwhile to hunt the stations outside your zone and continent rather than sitting in one spot calling "CQ." It gives us little guys a shot at using strategy to make up for a lack of high power amplifiers and monster antennas (WA2SEL). Conditions on the high bands were down from last year, but the low bands were improved. Please don't change the scoring system. This contest has something for everyone the way it is set up now. We stand a chance to win here in W5, but note that the chief competition came from W1 and W7. Both ends and the middle of the country can do well in this contest. The strategy is the only difference. My best moment was actually hearing LU8DQ on 160 meters. Wow! (K5GN). I'm glad that I could get in this contest just to have a good time and not threaten those who were risking exhaustion and hyper-tension trying to win (AF3Z). Thank goodness for cw. Without it I could not have operated in the contest at all. I developed a severe case of laryngitis before the contest. Used cw exclusively in the contest to save my voice for my job — radio announcer. Had to go through life as Freddy the Frog for awhile. Maybe I should have gone on ssb "ribbit ribbit" — might have been effective against the Woodpecker. Hi! (W7JYW). My special moment was working two "new ones" (JT0WA and 4X4VL) within 15 minutes, using just my barefoot TR-3 and a 40-meter dipole on 15 meters (K6ZH). I'm really glad that there's at least one good contest that I can operate while I'm out of school. I can never forget that it's summer what with the desert temperatures passing the century mark and the L-4B a-frying' beside me. Whew! (KB7PJ). This is a grueling contest for us "old timers." In the ARRL DX Contest, at least, one has the opportunity to choose single-band entry and thus get some decent sleep. One small rule change which would help this situation would be to make the minimum "off" time 4 hours instead of half-hour increments. This rule change would also minimize the temptation to cheat by listening for multipliers during a series of 30-minute quasi "off times." "Rubber-clocking" would also be reduced. As you know, multipliers are extremely important in this contest. Also, the paperwork associated with this contest is a nightmare. I guess that there's not much that can be done about that, but on the summary sheet do you really need QSO points broken down by band? (K6LL). My intense concentration in the dwindling hours of the Radiosport was interrupted by the unexpected appearance of gentle giant WB8PBC, who easily goes about 6'8". His entrance into the shack startled me a bit — with a gasping moan, I flipped over backwards in the operating chair. Fortunately, George lifted me back into place instantly, and I was able to resume the run without missing a beat. Thank goodness for memory keyers (K1XA).

Scores

Scores are listed by ITU zone, then by country within that zone. The line score (example — KL7Y 264, 496-1023-61-A) indicates the call sign used, the total score, the number of valid contacts, the number of ITU zone multipliers, and the entry class. The entry class letters indicate: A — single operator, mixed mode; B — single operator, cw only; C — single operator, phone only; D — multioperator, single transmitter.

Zone 1

Alaska

KL7Y 264,496-1023-61-A
KL7AF 360,302-1021-94-B
WB7SVT/KL7 (WA4CPR, opr.) 3724-78-14-B
NL7L 156,060-772-54-C

Zone 2

British Columbia

VE7FFI 119,556-569-64-B
VE7ZK 85,680-360-60-B
VE7IQ 52,933-357-43-B
VE7CC 923,731-2450-107-C
VE7TAR (VE7DQS, + 2 oprs.) 127,673-567-61-D

Zone 3

Saskatchewan

VE5AAD 49,134-415-38-B

Zone 4

Quebec

VE2JR 30,970-173-38-A
VE2WA 65,018-- 58-B

Ontario

VE3FEA 19,720-142-34-A
VE3GCE 164,920-606-70-A
VE3MFT 28,608-274-24-B

Zone 6

W6

East Bay

K56Q 7600-121-20-A
KS6H 127,024-591-68-B
K6CSL 19,430-230-29-B
W6DNY 4752-99-16-B
N6IP (+AG1E) 391,460-1050-92-D

Los Angeles

N6VI (N6MI, opr.) 323,733-1016-93-A
AI6Z 98,280-440-65-A
WA6OEZ 79,590-325-70-A
WD6DMV 4300-71-20-B
W6NNV 4108-36-26-B
W6CN 55,385-296-53-C
K6ASK 10,848-147-32-C
WB2KXC/6 3120-78-13-C

Orange

W6TSE 193,759-890-71-A
WB6JMS 191,520-567-96-A
N6MU 446,380-1134-110-B
WA6JAH 367,840-1175-88-B
N6PE 338,628-1002-102-B
AC6H 104,920-546-61-B
WD6EWG 92,140-422-68-B
AA6DP 82,044-515-53-B
NC6T (+N6DFY) 652,369-1768-105-D
K6AA (KE6B, KN6C, N6HE, WB6KWU, oprs.) 237,204-1194-66-D

Sacramento Valley

KI6O 272,612-1001-76-A
N6JM 17,802-100-43-B
AF6D 16,775-65-61-B
N6WR 12,200-156-25-C
WD6EFU 741-17-13-C
AI6V (+N6s KT, TU, WA6VEF) 2,064,650-3113-179-D

San Diego

WA6DBC 905,590-2057-119-A
N6ND 576,202-1305-121-B
K6ZH 41,052-259-44-B
N6KW 23,066-169-38-B

San Francisco

KU6J 443,646-1224-98-A
WB6SRM 123,130-614-70-A
AA6DX 20,112-220-24-B
KB6ZA 215,974-902-62-C
N6QC 55,290-292-57-C
W6BIP (+WA6DJI) 234,234-578-99-D

San Joaquin Valley

W6MYP 44,226-257-54-B
W6KRO 6916-110-19-C

Santa Barbara

N6HK 40,936-236-43-A
KA6V 54,850-341-50-C
KD6LB 28,160-254-32-C
WD5JMC 9106-86-29-C
N6MB (+W2KVA, WA6IET) 378,360-1031-90-D

Santa Clara Valley

WD6ERA 56,672-427-44-A
N6NF 52,312-318-52-A
N6UW 34,220-170-58-A
KD6PY 24,678-260-27-A
N6QW 233,091-767-89-B
KA6FRY 9369-140-27-B
K6HNZ 930,832-1991-112-C
W6YX (AA6s G, UO, K6XO, N6s IG, NE, W1ARP, WD6AAJ, oprs.) 1,394,787-2328-151-D
W6OWQ (+KD6ZY, WB6FCR) 184,184-807-56-D

W7

Arizona

WB7EZO 100,386-603-54-A
KE7W 1780-58-10-A
K6LL 791,910-2108-105-B
K7GM 695,808-1466-128-B
KB7PJ 41,306-345-38-C
WA7YUL 18,734-210-29-C
K7KH (+WB7PST) 460,320-1306-105-D

Idaho

K7NHV (N6TR, opr.) 815,606-1594-131-B

Montana

K7PGL 38,016-294-36-A
W7JYW 86,064-545-48-B

Nevada

WA7UEC 141,624-757-56-B
WB7VVH 11,977-135-29-C

Oregon

KA7BYL 5505-147-15-A
W7TC 146,034-763-63-B
W7YAQ 133,475-415-95-B
K7KJM 88,556-467-52-B
WB7EEI 44,443-220-49-C
WA7VYJ (+WB7s NNA, RPJ) 129,828-557-62-D

Utah

N7DF 521,835-1483-95-A
N7CJO 5911-93-23-A
K7CU 4400-52-22-A
W7TE 26,271-95-63-B

Washington

W7PQE 108,744-456-69-A
K7WA 65,127-349-51-A
KG5W/7 19,504-86-53-A
W7LUR 11,448-170-24-A
KI7I 80,520-464-55-B
W7BYK 6048-60-27-B
WB7RMQ 2880-60-16-B
AG7M 597,811-1769-97-C
K7NW 394,725-1141-98-C
WA7PVE 117,218-647-58-C
WB7WQE 108,324-575-54-C
WA6NHB 37,556-341-41-C
K7RS 2052-50-18-C

Wyoming

WA5YTX 41,642-272-47-B

Zone 7

W5

Arkansas

K@VGB 64,844-304-58-A
KE5B 161,352-667-7? B
W5EIJ 15,776-134-34-B

Louisiana

K5KLA 425,184-1024-103-B
W5QB 59,200-203-64-B
N5RMD 24,960-180-39-C
W5WMU (+N5AN, WA5OIH) 1,317,200-2432-148-D
W5XZ (+K3JT) 1,130,006-2258-131-D
W5EA (AE5V, KA3BER, KC5CZ, N4XC, WD5EAE, oprs.) 556,500-1520-105-D

Mississippi

N5XA 182,160-694-69-B
W5VSZ 33,696-224-39-B
KS5M 310,590-1146-87-C
KC5IG 8560-157-16-C

Northern Texas

KA5W 284,958-871-81-A
W9PL/5 116,928-503-64-A
K5NW 643,600-1560-111-B
KM5R 640,224-1602-114-B
K5HM 167,325-693-75-B
WB5PKH 122,368-596-64-B
WB5VZL (WD5BIK, opr.) 78,228-450-53-B
K5SOR 70,752-338-66-B
W5PLN 283,860-1005-87-C
WB5KTD 179,080-697-74-C
K2SCU/5 76,734-380-63-C
K5FUV (+AF5K, K5MM, KM5s, K, X, WD5JBA) 896,793-2010-123-D

Oklahoma

W5AS 41,538-308-43-B
KK5I 22,048-116-52-B
N@IN/5 10,426-123-26-B
W5TZN 21,816-254-27-C

Southern Texas

K5KG 622,089-1531-117-A
N5BA 233,734-904-79-A
WB5YXK 52,417-293-53-A
K5GA (K5GN, opr.) 1,076,400-1840-156-B
KN5G 679,768-1358-124-B
AD5Q 558,125-1605-95-B
W5VX 532,795-1302-113-B
KN5F 150,064-495-83-B
W5NR 4160-44-20-B
K5ZD 336-14-7-B
WB5DDI 523,925-1541-95-C
K5DX 336,088-1071-86-C
WA5AFG 324,075-1049-87-C
N5DDO 104,105-635-47-C
WA5IYX 82,882-447-58-C
K5TM (+WB5VZL, WD5EHB, WN4KKN) 989,856-2230-126-D
KA5BTH (+K5TSQ, WD5CLD) 496,152-1263-108-D
KB5FU (+AA5E, KC5BX, WB5MYR) 441,988-1374-94-D
N5CKW (+KC5RL, N5CKX) 167,374-1124-53-D

W@

Colorado

AD@O 116,480-652-65-A

N0ZA 41,360- 211- 55-A
AC0S 175,240- 750- 65-B
KA0FPJ 4560- 96- 19-C
K0CL (+AE1V, HH2TD, K9MWM, K0UK, N0AFD, W0KEA, WB0ITG) 1,213,520-2328-140-D

Iowa

N0AN 70,167- 350- 57-A
WD0FLO 25,590- 251- 30-A
KJ0D 210,342- 863- 66-B
AK0P 181,843- 687- 73-B
WB0NSF 34,566- 251- 42-B
WB0UCP 6804- 116- 21-B
WD0EIF 79,915- 369- 55-C
W0PPF 59,640- 308- 56-C
WD0BNP 46,184- 276- 46-C
K0CCU 18,180- 96-C
KF0H (+WD0EWD) 687,744-1891- 96-D
KI0Q (+KC0DM, WA0YGJ) 322,156-1106- 86-D

Kansas

W0RT 13,260- 111- 34-A
K0VBU 33,845- 205- 36-B
N0BLD 2639- 77- 13-C

Minnesota

K0IHG 139,880- 636- 65-A
W0BF 28,434- 163- 42-A
N0BSH 4400- 68- 22-A
W0MN 100,296- 527- 56-B
KA9COE 49,024- 434- 59-B
K0JFV 43,302- 306- 42-B
KA0M 25,308- 164- 37-B
W0UFO 9152- 113- 26-B
KB0C 111,296- 592- 47-C
KB0AI 16,036- 131- 38-C
WD0ENG 12,132- 90- 36-C
W0PXI 8064- 70- 28-C
N0BSG 7564- 100- 23-C

Missouri

AK0B 52,785- 307- 51-A
K0SI 36,464- 220- 53-B
AC0N 136,710- 578- 65-C
KG0L 10,287- 119- 27-C
WA0ITU 6822- 119- 18-C
K0VUW (+K0FU, KB0RC) 834,309-1830-133-D
WB0UXI (+K0CS, KB0S U, X) 181,027- 633- 77-D

Nebraska

AK0G 58,124- 453- 44-A
K0DI 126,498- 638- 58-B
WB0GOB 45,240- 235- 52-B
KB0AG 29,636- 285- 31-B

North Dakota

KF0A 50,988- 378- 42-A

Zone 8

W1

Connecticut

KD1Z 298,634- 983- 83-A
WA1VJA (WA1ZVL, opr.) 710,674- 965- 74-A
WA1FCN 190,729- 759- 77-A
WA1YEC 120,384- 498- 64-A
K1NYK 70,384- 455- 53-A
AA2Z 33,321- 263- 29-A
WB1CRI 18,528- 145- 32-A
KA1EUQ 11,898- 265- 18-A
K1KI 767,430-1250-150-B
K1XA 644,292-1779- 99-B
K1EBY 148,419- 605- 69-B
AK1B 85,277- 457- 53-B
W1VH 50,448- 309- 48-B
K1CC 43,142- 268- 37-B
W1CNU 33,478- 209- 38-B
WB9IHH 24,430- 258- 35-B
K1EFI 20,152- 206- 22-B
W1HUE 5568- 64- 24-B
AB1U 29,120- 224- 35-C
WB1CAV 22,230- 277- 26-C
N1BMU 4240- 102- 16-C
K1NGD 2392- 66- 13-C
K1ZZ (+K1TO, K8CH, KA1EKY) 1,364,856-2392-148-D

Eastern Massachusetts

W1WLW 295,526-1064- 77-A
KC1X 190,328- 715- 74-A
W1XH 20,664- 264- 28-A
W1IHN 311,922-1002- 78-B
W1OPJ 2490- 38- 15-B
W1BET 657- 19- 9-B
AA1Q 88,877- 620- 47-C
K3ZJ 36,294- 215- 46-C
KA1FEG 15,496- 192- 26-C
KA1KF 3948- 76- 14-C

Maine

KB1U 43,302- 265- 42-A
KF0Z/1 27,522- 268- 33-A
KA1EVM 10,304- 172- 22-C
N1AFC 36,738- 376- 39-C
K1SA (+N1BEY) 62,475- 335- 49-D
WB1GLJ (+WB1GLH) 23,816- 302- 26-D

New Hampshire

AK1A 594,035-1607- 95-B
K1WW 429,613-1525- 97-C
W1LQG 46,596- 253- 44-C

Rhode Island

WI1GL 384,846-1041- 98-B
WA1KIP 16,762- 175- 29-C

Western Massachusetts

KA2KGH/1 5453- 107- 19-A
AI1S 147,926- 491- 74-B
K1BE 3515- 43- 19-C
K1FFK/1 (AK1V K1s BHY, CE, DH, FXY, IO, SGK, K2GBH, KA1s BDB, BIY, CDC, CFE, CIN, FAA, FMG, HFT, HIE, NE, RE, KA2JZL, KB1W, KB3MB, KJ2R, N1s AAR, AOC, AOZ, APA, N2CRY, W1s BKG, HER, HHR, TM, UD, WYN, ZPB, W2s FVC, HRL, LVZ, WA1s HSO, MJE, YQF, YQG, YWH, WA2s GUK, KCL, WB1s EKC, ETI, GEX, HGR, HIH, HRN, WB2PEE, WD2AER, oprs.) 56,056- 398- 52-D

W2

Eastern New York

K2TR (N2ALK, opr.) 1,383,642-2171-162-A
WB2THN 104,188- 550- 61-A
K2POF 32,170- 307- 42-A
K2QF 106,920- 508- 55-B
N2CAP 46,332- 295- 52-B
N2AZS 36,610- 371- 39-B
WB2RHQ 20,774- 252- 26-B
AA2Y 17,640- 184- 36-B
W2GUP 14,020- 166- 20-B
KA2SKG 11,520- 171- 32-B
KB2MG 221,044- 738- 73-C
N2BIN 30,081- 261- 37-C

New York City - L.I.

KA2AEV 146,404- 711- 68-A
W2GKZ 79,296- 312- 64-A
N1EE 383,708-1091- 94-B
WB2QEU 102,258- 500- 57-B
KA2ETG 83,160- 432- 63-B
K2QD 37,345- 313- 35-B
KA2HDG 8169- 124- 21-B
W2AFM 1586- 26- 13-B
WA2SEL 18,381- 153- 33-C
WB2PXA 5282- 72- 19-C
AC2P 3744- 72- 12-C
N2KW (+N2KA, WA2BOT, WB3LHK) 607,950-1305-126-D
WB2TCQ (+KA2AMN, WB2RNT) 503,514-1403- 99-D

Northern New Jersey

KC2X 114,026- 582- 73-A
WA2PID 40,388- 288- 46-A
K3OX 33,746- 200- 47-A
WB2FUE 125,558- 552- 67-B
W2HL 5452- 43- 29-B
KD2G 227,780-1026- 70-C
W1GD 46,767- 279- 51-C
N2CDX 41,715- 255- 45-C
N2BNC 40,334- 260- 43-C
K4BNC 10,653- 53- 53-C
N2GT 5446- 119- 14-C

Southern New Jersey

WB2YOF 55,430- 308- 46-B
W2GTN 8505- 111- 21-B
K2HPV 4256- 50- 19-B
W2FGY 19,866- 102- 43-C
WA2JSG 18,560- 188- 29-C
N2RM (+N2ME) 1,549,560-2840-148-D

Western New York

W2STM 46,046- 275- 46-A
WA2LOG 118,800- 471- 66-B
W2TZ 108,000- 412- 74-B
W2FTY 86,030- 319- 70-B
W2FUI 77,409- 377- 61-B
W2AW 73,775- 277- 65-B
KG2CK 31,080- 219- 50-B
KA2CGV 29,700- 207- 44-B
KB2DE 81,900- 512- 52-C
WA2PHA 60,000- 286- 60-C
WB2TKD 6912- 88- 18-C
N2HR (+KA2s CUE, KJQ, KG2Y, N6IN) 299,552-1092- 74-D

W3

Delaware

N8NA/3 4104- 70- 19-A
WB3GKD 483- 17- 7-C
N3CGH 475- 29- 5-C

Eastern Pennsylvania

W3ARK 185,484- 528- 82-A
KA3BLP 134,946- 714- 51-A
K3FN 80,150- 353- 50-A
WB3DNA 44,400- 294- 40-A
K3ND 40,645- 157- 55-A
WB3KXP 17,061- 185- 33-A
WB3DCT 161,733- 87-B
KC3N 132,825- 647- 69-B
KA3AKY 24,679- 151- 37-B
N3KR 18,876- 116- 39-B
AF3Z 280- 16- 7-B
KB3BW 50,688- 332- 48-C
WA3DMH 29,160- 171- 40-C
K3RH 28,496- 134- 52-C
K3ZPG 5376- 104- 14-C
W3EAN 2244- 43- 11-C
N3AMY (K3EUH, KA3EARQ, DSW, WA3s VUE, ZGL, WB3S, FPA, FYL, HYX, oprs.) 185,097- 728- 79-D
N3AIU (+WB3s JYZ, KWE) 136,275- 625- 75-D

Maryland - D.C.

W3ICM 222,732- 645- 92-A
WA3VPL 82,745- 395- 65-A
KE3A 35,604- 289- 43-A
W3EE 13,233- 91- 33-A
WA3EEE 10,992- 135- 24-A
N3AVA 36,960- 285- 44-B
N3CB 26,732- 167- 41-B
N3AXA 7656- 80- 29-B
K3VY 25,959- 155- 51-C
KD3G 3743- 71- 19-C
K3HPG (+WB3FOG) 807,960-1916-120-D

Western Pennsylvania

AD8J 167,428- 710- 76-A
KA3P 40,170- 285- 39-B
KB3RH 6820- 84- 22-C
W3YEY (+KA3s BMU, EDP, GPY, WB3KNS) 128,384- 567- 64-D

W4

Alabama

NE4L 201,524- 735- 83-A
WA4QHI 29,250- 250- 39-B
WA4QIN 4500- 75- 15-B
WD4JXF 50,853- 589- 33-C

Georgia

AA4GA 41,501- 259- 47-A
NB4X 8398- 107- 26-A
K4BAI 414,638-1281- 98-B
W4GLS 61,132- 298- 58-B
W6OKX 37,464- 156- 56-B
KX4R 153,432- 625- 72-C
KD4W 140,294- 538- 77-C
N4BFA 139,503- 536- 73-C
WD4LRB 127,080- 538- 72-C
WB4BDP 46,305- 371- 45-C
KA4SFE 6183- 85- 27-C
AK4T 994- 16- 14-C

Kentucky

WA4QMQ 285,520-1006- 83-A
KA4JMZ 17,404- 136- 38-B
W4YDL 13,076- 107- 28-B
WA4RUW 30,081- 279- 37-C

North Carolina

AA4NC 385,000-1299- 88-A
KB4RV 67,767- 436- 49-A
WA4BCN 47,376- 305- 48-A
K3NS/M 33,176- 230- 44-B
WB5YMS 20,868- 106- 47-B
N4UH 495,410-1293-107-C
WD4AAM 180,880- 647- 70-C
WD4AVY 128,765- 553- 65-C
NG4E 23,760- 160- 36-C
WB4JFX 12,144- 100- 33-C
N4AYJ 26,928- 258- 36-C

Northern Florida

AJ2E 25,284- 150- 43-A
NE4F 234,560-1005- 64-B
W4VQ 137,428- 592- 68-B
N4FY 39,010- 271- 47-B
KC4ZT 10,396- 132- 23-B
WB4GHU 2520- 40- 18-B
W8RAO/4 186,956- 720- 77-C
W4WIJ 86,616- 454- 54-C
W5IJU 10,488- 120- 24-C
KA4MCM 3262- 86- 14-C
N4WW (+AA4NA, KB4BU, KZ4M, N4s EF, SA, WB4YFF, WD4DTC) 1,371,843-2544-149-D
KW4T (+WB2CPV, WA3UBA, KA4MFU, KC4QO, WD4SQB) 452,180-1456- 92-D
KD4KU (+AA4EB, N4EWH) 57,960- 428- 45-D
N4ID (WA4s QFJ, QGW, oprs.) 41,307- 287- 49-D

South Carolina

AE4Y 56,160- 250- 54-A
WA4TNI 36,498- 291- 42-A
K4CNW 215,200- 819- 80-B
N4ZG 23,885- 85- 85-B
K8UM 35,120- 298- 40-C

Southern Florida

N4BP 51,597- 367- 49-A
WB4TDH 481,072-1074-107-B
K1ZX 468,672-1353- 96-B
WA4YZF 159,149- 764- 61-B
WB3HVS 148,176- 706- 63-B
WD4AHZ 140,964- 651- 68-B
W4NN 2532- 37- 12-B
K9ARY 155,532- 672- 78-C
N4CXK 34,965- 509- 37-C
N4TL 29,222- 216- 38-C
W4PCO (109- 16- 16-C

Tennessee

KR4D 56,234- 326- 62-A
W4QSG 5376- 125- 21-A
AA4AK 318,648-1077- 88-B
NF4F 9072- 160- 21-B
KA4LLN 1935- 27- 15-B
KC4UH 46,827- 350- 43-C
NE4G (+ KQ4C, KD4MO) 373,152-1182- 96-D

Virginia

W4VY 288,144- 966- 87-A
NI4Y 96,228- 594- 44-A
K4FPF 61,828- 357- 52-A
K5OGU/4 33,120- 268- 36-A
WB4PIQ 1764- 26- 18-A
N4OW 644,266-1452-119-B
AA4M 337,548- 907- 92-B
WB4DNL 10,802- 177- 22-B
LU3YL/W4 30,784- 178- 37-C
W4KMS 28,971- 187- 37-C
N4MM 17,976- 101- 42-C
WB4UBD 6909- 71- 21-C
K4PQL (+K7SV, KB3RMI) 933,385-1712-139-D

W8

Michigan

KB8EC 377,880-1339- 94-A
K8PUJ 99,936- 356- 72-A
AC8W 78,926- 319- 62-A
K8NWD 47,670- 287- 42-A
KM8I 2684- 74- 14-A
W8UA (K8CC, opr.) 579,152-1411-112-B
WA8RRR 192,548- 667- 74-B
K8SIA 81,785- 435- 55-B
K8DD 63,492- 295- 52-B
K8LF 29,997- 266- 37-B
WA8WMC 7048- 119- 19-B
N8RW 5516- 47- 28-B
N8CQA 657- 19- 9-B
AA8U 735,065-1703-113-C
AI8D 579,200-1491-100-C
K8MJZ 676,576-1650- 99-C
N8BKF 117,000- 515- 72-C
KB8LM 87,482- 431- 62-C
N8CNT 73,203- 548- 39-C
WB8VPQ 27,552- 208- 41-C
KB8RT 27,354- 148- 47-C
KM8V 8602- 121- 27-C
KO8M 1600- 71- 16-C
KN8R (+KN8P, N8JWI) 1,224,308-2130-151-D
W8YZ (+AK8H, KA8EEA, KK8K, KM8Y, WB8SEZ, WD8QKK) 238,342- 847- 59-D

Ohio

WB8JBM (AA8S, opr.) 388,056-1068- 92-A
N8BJQ 200,148- 802- 78-A
N8TN 187,920- 755- 72-A
WB8PH 62,460- 413- 45-A
K5BK 26,720- 178- 40-A
K8HF 9918- 85- 29-A
K8MR 984- 48- 7-A
WD8AUB 503,520-1333- 96-B
WB8KKI 251,722- 905- 86-B
K8DL 81,322- 318- 73-B
WB8N 73,408- 365- 74-B
KJ8I 31,962- 262- 42-B
KA8HXX 4065- 115- 15-B
W8KKF 293,244- 981- 84-C
KC8JH 251,615-1035- 79-C
WB8DOD 201,579- 830- 87-C
WB8VPA 162,976- 523- 88-C
K8LF 105,400- 420- 68-C
KB8AC 82,228- 404- 61-C
WB8JSQ 77,174- 368- 47-C
N8ATR 36,261- 201- 51-C
W8IMZ 34,736- 268- 52-C
KB8WB 31,284- 236- 44-C
KK8S 24,057- 280- 27-C
W8DXT 13,195- 157- 29-C
KA8FAN 4686- 70- 22-C
KI8O 1230- 24- 15-C
N8AXA 168- 16- 4-C
AD8I (+K8ND, WD8ALQ) 1,172,309-2203-137-D

West Virginia

N8II 494,856-1251-108-A
KB8FJ 44,498- 309- 38-B
WB8BMX 37,479- 236- 39-B

W9

Illinois

K9UQN 155,794- 831- 61-A
N9RR 126,170- 632- 55-A
WB9TBU 22,610- 261- 34-A
WH9JKI 303,336-1073- 88-B
W9QA 158,272- 698- 64-B
WD9DBC 137,595- 686- 63-B
WD9IIC 62,160- 419- 40-B
K9SA 53,280- 296- 60-B
WA9MRU 23,310- 159- 45-B
KA9AKD 16,975- 185- 35-B
KB9PY 14,678- 112- 41-B
W9REC 7047- 63- 29-B
WD9GGY 5500- 54- 22-B
WD9HMQ 113,640- 674- 60-C
KB9AW 86,471- 509- 59-C
KB9PB 24,955- 197- 35-C
W9BAH 5412- 66- 22-C
KB9TI 1197- 49- 9-C
K9SD (+K9s BGL, IZY, HWU, KC9ALJ) 828,675-1796-127-D
AI9D (+N9AEJ, W9AYH, WD9FEN) 644,270-1615-110-D
W9RW (+K8KIX, K9HDE, WB9s (WN, VJE) 589,149-1526-121-D
K9QVB (+AI9R, KB9OF, WD9s AHJ, DBA, EJE) 567,528-1607-104-D
KB9BR (+N9LE) 274,832-1001- 89-D
WD9DCL (2 oprs.) 22,192- 250- 38-D

LA9FY gave it a go on phone in the 1981 Radiosport Championship.

The man and his machines — K8CC at the controls of station W8UA in Michigan.

Indiana

KC9C 21,041- 105- 53-A
WD8BOP 40,950- 293- 45-B
W9XD 4520- - 20-B
KB9XQ 3850- 79- 14-B
WD9EME 3840- 66- 20-C
WD9DGA (+KA9FUL, KB9MO KC9CC) 201,190- 954- 62-D
KA9L (+N9BNB) 120,384- 686- 64-D
KA9CGA (+KA9FSC) 23,766- 203- 34-D

Wisconsin

N9AW 56,644- 380- 49-A
W9YCN 360- 11- 8-A
K9GDF 24,208- 288- 34-B
KB9RK 23,200- 130- 50-C
WB9NKC 2240- 42- 20-C
K9SFI 75- 15- 3-C

Zone 9

St. Pierre & Miquelon

FP9GNS (VE3CXL, opr.) 42,975- 273- 45-B

Maritimes - Newfoundland

VE1ASJ 450,840-1181-102-B
VE1AXT 180,225- 561- 81-B
VO1AW 67,412- 396- 38-B
VE1ANU 43,350- 124- 85-B
VO1QU 39,336- 335- 33-B
VE1AJJ 5564- 124- 13-B

Zone 10

Mexico

XE1VV 221,722-1080- 59-A
XE1OX 180,695- 779- 71-C
XE1ZZA 81,651- 493- 51-C
XE1LLS 36,890- 311- 34-C
XE2GQ (K5s WA, ZD, KN5H, N5s CDO, JJ, oprs.) 2,652,364-5212-143-D

Zone 11

Dominican Republic

HI8GBG 36,324- 608- 18-C

Panama

HP1XAT 52,572- 399- 39-B
HP1AC 10,956- 120- 22-B

Puerto Rico

KP4V 598,665-1460-107-B
KP4BO 120,934- 769- 46-C

Neth. Antilles

K8UNP/PJ2 336,875- 893- 77-A

Costa Rica

TI2LO 11,400- 116- 25-C

Belize

VP1BCX 43,160- 315- 40-C

Bermuda

W4KFC/VP9 4500- 124- 15-B

Zone 12

Colombia

HK3BON 102,025- 551- 53-C
HK3LT 75,096- 360- 42-C
HK1ENH 23,494- 227- 23-C

Peru

OA8V 77,486- 364- 43-C

Zone 13

Brazil

PY8ZLC 42,874- 333- 26-B
PT7ZMG 129,267- 493- 53-C
PS7KM 8664- 73- 24-C
PY1EAH 104- 6- 4-C

Zone 14

Argentina

LU9EIE 405,614- 798-103-A
LU8DQ 1,797,400-2436-152-B
LU1EWL 83,325- 311- 55-B
LU1VZ (LU1VK, opr.) 47,840- 210- 46-C

Zone 15

Brazil

PY2ZEZ 73,560- 349- 40-A
PY1ZFO (W9VA, opr.) 510,660-1144- 90-B
PY1DFJ 36,064- 323- 23-B
ZZ5XFR 3630- 66- 15-B
PP5JD 285,856-1795- 32-C
PP2ZDD 67,734- 260- 53-C
PT2LS 39,135- 203- 39-C
PY1BPE 6593- 99- 19-C

Zone 18

Svalbard

JW5NM 2952- 57- 18-A

Norway

LA9HW 228,956- 860- 74-A
LA4YW 86,602- 520- 53-B
LA7SI 3900- 40- 25-B
LA3JAA 40,986- - 46-C
LA2TO 36,736- 230- 41-C
LA9FY 36,072- 253- 36-C
LA3HL 12,857- 187- 23-C

Finland

OH7NW 39,150- 218- 45-A
OH2BUT 1050- 17- 14-A
OH3WS/4 260,463- 943- 79-B
OH6MM 169,592- 652- 68-B
OH5UO 85,158- 393- 54-B
OH3XS 63,936- 400- 48-B
OH8LB 58,545- 361- 45-B
OH2BSA 32,809- 227- 43-B
OH2BBT 6210- 155- 15-B
OH2BUU 3025- 295- 25-B
OH2DN 2907- 47- 17-B
OH1CI 2178- 33- 18-B
OH1IJ 857,490-1964-101-C
OH7AA (OH7XE, opr.) 1592- 41- 8-C
OH6EF 1071- 35- 9-C
OH5OQ 20- 4- 1-C
OH1AF (OH1s BC, EH, HS, KC, OH7TC, oprs.) 922,576-1985-109-D
OH3AA (OH3s IQ, KS, oprs.) 148,464- 759- 48-D

Aland Islands

OH2VZ/OHØ 7200- 77- 25-B
K6TMB/OHØ (+KR6Q, KS6O, SMØCCM) 1,402,596-3030-111-D

Denmark

OZ7JZ 417,954-1133- 82-A
OZ1EE 109,926- 417- 62-B
OZ7BW 98,568- 307- 72-B
OZ1CTK 93,635- 265- 61-B
OZ5KU 68,940- 254- 60-B
OZ1FGS 63,675- 201- 75-B
OZ1AXG 9075- 100- 25-B
OZ8E 2400- 36- 16-B
OZ6KS 660- 36- 6-B
OZ6SF 301- 9- 7-B
OZ5EV 560,064-1290- 96-C
OZ1CAH 32,000- 292- 25-C
OZ1BLO 14,140- 159- 28-C
OZ7AMG 9548- 89- 28-C
OZ2BM 6528- 68- 24-C
OZ6EI 6320- 105- 16-C
OZ3ZK 2670- 49- 15-C
OZ1DAF 2528- 46- 16-C
OZ9ZS 963- 23- 9-C
OZ3CE 426- 17- 6-C

Sweden

SM6EWB 304,941- 866- 91-B
SM5BAX 97,698- 370- 57-B
SLØFRO (SM5AHK, opr.) 86,400- - 54-B
SM2CEW 81,000- 376- 54-B
SM7KIL 58,406- 335- 38-B
SM2DIR 40,410- 264- 45-B
SMØBDS 29,930- 178- 41-B
SM4BTF 23,780- 158- 41-B
SM1BVQ 20,216- 130- 38-B
SM6LGW 13,870- 187- 19-B
SM2DQS 2255- 65- 11-B
SM7CZC 920- 23- 8-B
SM7AIO 121,440- 431- 66-C
SM7HSP 35,156- 308- 34-C
SM5ARG 17,728- 160- 32-C
SM5AAY 2431- 51- 13-C
SM6JY 448- 18- 7-C
SMØFM/5 48- 8- 2-C

Zone 19

European R.S F.S.R.

UA1DZ 1,466,450-2530-139-A
UA1ZWW 371,184- 900- 88-A
UW1YY 200,464- 582- 88-B
UA1ZCZ 28,971- 272- 29-B
UA1ZCX 6048- 164- 12-B
UA1CAX 258,930- 943- 70-C
UW1BM 43,840- 334- 40-C
UK1ZAS (5 oprs.) 139,842- 830- 51-D
UK1ZBB (3 oprs.) 28,913- 283- 29-D

Zone 20

Asiatic R.S.F.S.R.

UA9XWT 64,942- 382- 38-A
UA9KAJ 366,928-1068- 76-B
UA9XWU 39,882- 251- 34-C
UK9CDG (UA9s COC, CPL, & 1 opr.) 400,900-1138- 76-D

Zone 21

Asiatic R.S.F.S.R.

UAØBBT 93,054- 530- 39-B

Zone 23

Asiatic R.S F.S.R.

UKØQAA (UAØs QBB, QDL, oprs.) 1,511,640-3077-117-D
UKØQAM (UAØs QU, QDS, QEP, QEZ, oprs.) 158,766- 732- 47-D

Zone 26

Asiatic R S.F.S.R.

UAØKBC 197,640- 706- 61-B
UAØKCL 45,674- 279- 41-B
UAØKBW 38,304- 271- 42-B

Zone 27

Republic of Ireland

EI5DP 57,456- 408- 38-C

France

F6FBQ 215,930- 786- 65-A
F6DKV 140,504- 637- 52-B
F6EQV 102,624- 509- 48-B
F8TM 51,984- 212- 57-B
F3AT 21,320- 123- 40-B
F6DMQ 464,202-1459- 74-C
F9BB 32,691- 143- 51-C
F6FHA 30,217- 195- 41-C
F6DRP 16,152- 169- 24-C
F6KAW (F6s BBO, DZS, EBN, GDK, GWV, oprs.) 906,816-2138- 96-D
F6BVB (+F5WB) 226,704-1023- 48-D

England

G3XTT 85,629- 283- 69-A
G3ESF 263,386- 849- 79-B
G4JBH 28,766- 211- 38-C
G4JJE (+G4CVZ) 91,902- 510- 51-D

Scotland

GM4FDM 310,800-1049- 74-A

Luxembourg

LX1RK 8188- 100- 23-C

Belgium

ON6NL 128,089- 491- 59-A
ON4FD 664,860-1545-105-B
ON4XG 49,632- 291- 44-B

Netherlands

PAØDIN 112,833- 373- 81-B
PA3ASC 103,014- 460- 59-B
PAØTA 71,221- 261- 67-B
PI1PT 40,140- 216- 45-B
PAØDUO 151,309- 443- 83-C
PA3AIK 34,891- 217- 41-C
PAØFEI 8400- 101- 25-C

Zone 28

Federal Republic of Germany

DF2RG 6244- 63- 28-A
DF8AN 1458- - 9-A
DL1TH 79,992- 350- 66-B
DF3QN 62,645- 336- 55-B
DL1RB 52,626- 285- 49-B
DJ3XD 28,245- - 35-B
DK8KC 11,280- 93- 30-B
DK4HD 3840- 52- 20-B
DL8PC 666,198-1264-117-C
DF9YY 404,913-1305- 71-C
DL5EAM 48,816- 280- 48-C
DL3WB 9152- - 26-C
DL3YAS 8809- - 23-C
DL8SAP 5032- - 17-C
DH6LAD 3010- 85- 14-C
DL7YS 1870- 29- 17-C

Hungary

HA4XH 650,196-1287-116-A
HAØLM 404,404-1177- 77-B
HA8UB 323,248-1030- 89-B
HA3PT 6890- 213- 13-B
HA5NP 1,185,480-2603-111-C
HA5EIV 900,500-1975-100-C
HG6V (6 oprs.) 1,888,125-3016-159-D
HG1W (6 oprs.) 1,499,284-3015-124-D
HG5A (HA5s CA, HO, HA7RY, HA8BI, oprs.) 1,356,723-3067-109-D
HA5KKG (5 oprs.) 1,011,809-1832-127-D
HA5KDB (6 oprs.) 186,558- 809- 62-D
HA5KFN (6 oprs.) 168,480- 814- 54-D

Switzerland

HB9AON/P 3439- - 19-A
HB9AW 104,958- 422- 63-B
HB9DX 32,750- 185- 50-B
HB9AGH 22,044- 113- 44-B
HB9BRQ (W4KM, opr.) 6748- 89- 28-B
HB9QA 1236- 29- 12-B
HB9BYN 1080- 34- 12-B
HB9ASJ 19,040- 170- 35-C

Italy

I2UIY 45,045- 493- 33-A
I7PXV 284,760- 997- 84-B
I1ZVF 6708- 145- 12-B
IØRIZ 284,525- 820- 95-C
IX1BGJ 219,456- 940- 72-C
I4CSP 29,435- 841- 35-C

Bulgaria

LZ2AF 12,716- 111- 34-A
LZ1RN 7400- 102- 20-A
LZ13CWT 42,517- 347- 71-B
LZ2SD 17,180- 263- 20-B
LZ1ZQ 6137- 124- 17-B
LZ2KK 53,064- 327- 44-C
LZ1QR 738- 33- 9-C
LZ2KKZ (3 oprs.) 19,035- 215- 27-D

Austria

OE7SHI 30,008- 364- 22-B
OE9SLH 32,291- - 49-C

Czechoslovakia

OK2BLG 823,935-1491-133-A
OK2QX 284,784- 706-102-A
OK3CFP 182,778-2229- 82-A
OK1KZ 132,480- 553- 72-A
OK2BJU 97,328- 388- 56-A
OK1FAR 96,240- 696- 30-A
OK3YK 28,238- 252- 38-A
OK2KVI 3629- - 19-A
OK2BHV 688,842-1328-126-B
OK3CEM 339,540- - 92-B
OK2UAS (OK2WHT, opr.) 231,544- 624-103-B
OK2BUJ 146,395- 525- 67-B
OK1AVD 101,304- 422- 63-B
OK1AOR 81,852- 368- 57-B
OK2SGW 70,821- 286- 61-B
OK1MKU 66,969- 247- 63-B
OK1DRY 58,450- 355- 50-B
OK1AES 53,580- - 30-B
OK1MZO 44,968- 270- 44-B
OK1AXB 36,120- 206- 43-B
OK2PBG 30,451- 183- 37-B
OK3TAY 25,690- 268- 35-B
OK3TRI 21,360- 224- 30-B
OK1AXA 20,725- 829- 25-B
OK1AJY 18,524- 199- 22-B
OK1MHA 16,092- 145- 27-B
OK1MAA 15,158- 145- 26-B
OK1KZQ 13,542- 116- 37-B
OK1ARD 12,989- 145- 31-B
OK3YDP 11,132- 131- 22-B
OK1HCH 7140- - 21-B
OK1JDJ 6876- 96- 18-B
OK1AOU 5964- 64- 21-B
OK3CDN 4650- 101- 15-B
OK3RMW (OK3CMK, opr.) 3432- - 13-B
OK1AEH 3332- 52- 14-B
OK3CEL 3141- 131- 9-B
OK3CAU 1900- 40- 10-B
OK1AIA 1834- 31- 14-B
OK1MSO 1562- 30- 11-B
OK1TW 1443- 25- 13-B
OK3BRK 1332- 98- 6-B
OK1DLD 1064- 51- 8-B
OK3COK 945- 29- 9-B
OK1AHQ 360- 24- 5-B
OK2BWM 54- 6- 3-B
OK6DX 1,050,060-1850-132-C
OK1MSN 423,864-1099- 87-C
OK3CFA 329,312- - 82-C
OK2BTI 34,476- 318- 39-C
OK3CRH 4005- 71- 15-C
OK1KSO (OK1s AII, JCW, JJB, WT, oprs.) 1,811,160-2985-130-D
OK3KFF (OK3s CPN, CQW, YCQ, oprs.) 1,079,520-2032-130-D
OK1KCU (Multiop) 997,044-2099-114-D
OK3KFO (OK3s CQH, CUM, CXF, CXW, TFH, OL8CLL, oprs.) 804,529-2061-109-D
OK3KEE (OK3s CGG, CTL, TKA, oprs.) 343,742-1094- 86-D
OK3RXA (+OK3s VO, ZMD) 196,245- 915- 63-D
OK3KEX (OK3ZAZ & 2 oprs.) 116,982- 482- 67-D
OK2KQX (Multiop) 101,517- 494- 57-D
OK3KXC (OK3s CKQ, COV, ZLL, oprs.) 91,215- 597- 45-D
OK3KXR (Multiop) 73,580- 367- 52-D
OK1KOK (Multiop) 17,094- 110- 33-D
OK1KTW (Multiop) 15,048- 164- 19-D
OK2KPS (Multiop) 13,286- 129- 26-D
OK2KYC (Multiop) 8100- 92- 25-D

Poland

SP7KTF (SP7LIH, opr.) 131,275- 628- 59-A
SP7AWA 84,348- 352- 66-A
SP9CTW 41,364- 198- 54-A
SP5ES 9804- 64- 38-A
SP3IOE 1452- 21- 12-A
SP5GIQ 188,020- 630- 79-B
SP5JTR 130,680- 475- 66-B
SP2JGK 38,185- 367- 35-B
SP9CVY 37,440- 204- 48-B
SP6FER 33,726- 177- 42-B
SP9EMI 26,130- 202- 39-B
SP8BVO 19,360- 214- 22-B
SP5AWV 16,160- 129- 32-B
SP7ENU 10,925- 155- 19-B
SP2GOW 9060- 75- 30-B
SP5BR 7965- 79- 27-B
SP8BAB 8850- 127- 25-B
SP9AXY 4144- 76- 14-B
SP9AKD 3728- 52- 16-B
SP4GFG 905- 77- 5-B
SP8UFO 525- 44- 5-B
SP9EPF 410- 13- 10-B
SP9PRO/9 124,020- 591- 65-C
SP9PEZ 122,248- 507- 74-C
SP6DVP 67,320- 253- 72-C
SP1GHW 58,522- 325- 58-C
SP6HTQ 19,600- 182- 25-C
SP6JIR 10,580- 189- 20-C
SP3HFX 9891- 145- 21-C
SP2LLU/8 4992- 106- 16-C
SP9HZF 4650- 98- 15-C
SP6LB 3000- 48- 20-C
SP3CDR 2730- 61- 14-C
SP1PBW 2680- 35- 20-C
SP7DZA 1520- 48- 8-C
SP6GEQ 525- 49- 5-C
SP9LLE 168- 20- 4-C
SP8KEA/8 120- 32- 2-C
SP5ENA 30- 3- 2-C
SP7KTE (Multiop) 541,404-1362-108-D
SP2KFV (SP2s CMD, JYR, oprs.) 37,023- 251- 41-D
SP9KKM/9 (Multiop)

Greece

SVØAU 523,944-1838- 76-C
SVØAN 58,960- - 40-C

Dodecanese

SVØAA/5 4832- 102- 16-B

Crete

SVØBE/9 13,728- 66- 14-B

German Democratic Republic

Y22OM/A 982,800-2189-108-A
Y35LM 711,348-1583-102-A
Y37UF 88,312- 576- 56-A
Y53YN 85,727- 421- 59-A
Y21JH 59,850- 282- 63-A
Y23RJ 40,598- 239- 53-A
Y31SK 35,496- 211- 51-A
Y33UO 33,150- 171- 50-A
Y34UF 21,320- 167- 40-A
Y41YN 17,646- 162- 34-A
Y31ZE 2227- 35- 17-A
Y31XA 319,590- 974- 90-B
Y51ZE 221,550- 801- 75-B
Y25TG 79,776- 617- 36-B
Y33YA 76,024- 302- 68-B
Y21XC 53,694- 240- 57-B
Y24IF 48,384- 318- 36-B
Y51XE 16,776- 146- 36-B
Y23CM 16,065- 106- 35-B
Y24EA 10,564- 58- 38-B
Y24ZH 10,270- 131- 26-B
Y22UB 8925- 104- 21-B
Y23TL 8184- 114- 22-B
Y34SE 7780- 36- 10-B
Y23HN 3420- 65- 15-B
Y82ZL 2767- 43- 11-B
Y55XL 2688- 50- 16-B
Y26RM 1064- 61- 7-B
Y27HN 385- 36- 5-B
Y23JA 294- 14- 7-B
Y22DK 245- 31- 5-B
Y49ZL 84- 7- 4-B
Y38YK 93,092- 409- 68-C
Y47ON 61,617- 335- 47-C
Y44XF 53,703- 334- 51-C
Y47XF 45,156- 223- 53-C
Y38YE 28,310- 250- 38-C
Y47VN 26,352- 278- 36-C
Y55UG 5032- 94- 17-C
Y36YC 4598- 63- 22-C
Y26LN 2896- 47- 16-C
Y33TA 2190- 38- 15-C
Y42TC 1630- 73- 10-C
Y53WL 420- 26- 5-C
Y55TG 356- 26- 4-C
Y31QJ/P 255- 19- 5-C
Y54ZA (Y54s TA, UA, XA, oprs.) 222,360- 756- 85-D

Romania

YO6WUG 48,714- 357- 46-A
YO3CR 130,985- 502- 67-B
YO4KCA 33,540- 409- 26-B
YO6EZ 22,794- 211- 29-B
YO3BYF 15,084- 153- 36-B
YO3CDN 9366- 285- 14-B
YO8DD 7406- 95- 23-B
YO6AW 5236- 83- 17-B
YO6UO 4913- 101- 17-B
YO6BMC 2090- 100- 10-B
YO6ADW 1944- 66- 12-B
YO6HQ 1171- 67- 7-B
YO6KEI 130,624- 615- 52-C
YO9HT 46,800- 286- 50-C
YO3KWJ 5415- 121- 45-C
YO8BDA 3920- 105- 16-C
YO4BXX 2576- 67- 16-C
YO2BZV 344- 40- 4-C
YO6BTY 42- 17- 2-C
YOØWUG (YO3s AC, CRJ, oprs.) 3267- 141- 11-D

Yugoslavia

YU1DW 1,071,918-2115-113-A
YU1OWW 14,040- - 20-A
YU7NZR 1008- 34- 9-A
YU4PH 192,444- 706- 79-B
YU7SF 94,107- 443- 57-B
YU4AW 91,316- 603- 37-B
YU3TCM 90,072- 388- 54-B
YU4VWQ 41,216- 182- 56-B
YU1NZW 37,827- 325- 27-B
YU1EA 37,638- 408- 27-B
YU7PFT 11,214- 134- 21-B
YU7ORQ 11,178- 119- 27-B
YU1OVU 9918- 65- 38-B
YU3NP 1827- 41- 9-B

Cyprus

5B4JP (SM2HZQ, opr.) 204,081- 699- 59-B

Zone 29

European R.S.F.S.R.

UA6LFX 801,086-1434-143-A
UA3DKF 457,744-1263-112-A
UA3SBW 330,500-1055-100-A
UA6AKK 230,845- 464-137-A
UA3AAH 92,344- 387- 68-A
UA6AJG 63,988- 249- 68-A
UA3DKO 54,756- 346- 54-A
UA4LAW 31,324- 269- 41-A
UA3EAT 17,274- 214- 23-A
UW3HV 801,486-1768-126-B
UA3DQZ 319,584-1051- 96-B
UA3QGO 249,808- 723-104-B
UA3DLN 239,075-1034- 73-B
UA3AGL 226,100- 962- 76-B
UA4FAZ 187,229-1061- 49-B
UA1QAU 124,538- 476- 73-B
UA3VDS 109,070- 519- 65-B
UA3RDH 104,878- 339- 82-B
UA3DIW 88,536- 420- 62-B
UA3ECA 78,440- 457- 53-B
UA3TOK 76,167- 376- 63-B
UA1CJM 66,787- 496- 49-B
UA3VIT 64,942- - 38-B
UA3LCC 64,377- 273- 69-B
UA3DQS 60,588- 390- 44-B
UA3LAR 58,800- 297- 56-B
UA6AJO 53,150- 318- 50-B
UA3GO 49,150- 278- 50-B
UV3FL 48,450- 250- 57-B
UA3EAL 44,730- 166- 71-B
UA3YAO 44,208- 340- 48-B
UA3AEX 43,050- 332- 41-B
UA3EAH 38,370- 355- 30-B
UA4LX 33,957- 342- 33-B
UA3DNV 33,684- 277- 42-B
UA3ESN 32,528- 299- 38-B
UA3RO 32,320- 258- 32-B
UA4YAB 28,992- 296- 32-B
UA3XBB 27,600- 195- 46-B
UA3DRT 24,352- 321- 32-B
UA6LLI 21,645- 187- 39-B
UA6LDF 17,434- 270- 23-B
UA3LBE 13,850- 198- 25-B
UA3AAJ 12,120- 94- 30-B
UA6ECH 10,608- 235- 16-B
UA3QLC 9450- 153- 21-B
UA3VAS 9246- 120- 23-B
UA3RCT 9000- 166- 18-B

UA4NBD 7520- 181- 16-B
UA3ZP 5184- 90- 18-B
UA3QBC 420- 10- 10-B
UA6ALL 680,734-1560-107-C
UA6AZA 512,988-1479- 84-C
UA3RKK 163,170- 685- 70-C
UV3TE 126,822- 686- 46-C
UA6AKB 99,176- 547- 56-C
UA3TN 93,375- 409- 75-C
UW3ZU 45,492- 298- 51-C
UA6WS 44,550- 251- 54-C
UA6UDB 38,514- 264- 49-C
UA4NAA 37,300- 263- 50-C
UA4ACP 31,785- 299- 39-C
UA4PBX 27,436- 269- 38-C
UV3CS 23,364- 265- 33-C
UK6LAZ (UA6s LHK, LIG, UB5ITW, oprs.) 2,414,340-3364-170-D
UK4PNZ (UA4s PNP, PNW, + 2 oprs.) 1,034,334-2092-126-D
UK3QAE (UA3s QJW, QLL, QLM, oprs.) 695,835-1860-105-D
UK4UAC (3 oprs.) 579,500-1520-100-D
UK3GAZ (UA3GGQ + 3 oprs.) 284,992-1126- 73-D
UK1AFA (UA1AAF + 2 oprs.) 216,792- 945- 72-D
UK6ACR (UA6s AAM, AHF, AXC, oprs.) 186,704-1037- 56-D
UK6HCZ (UA6s HJU, HKP, UW6FC, oprs.) 107,372- 524- 68-D
UK3QAX (UA3s QBC, QLJ, oprs.) 99,322- 612- 53-D
UK6WAW (3 oprs.) 78,255- 712- 45-D
UK6ACQ (3 oprs.) 54,188- 541- 31-D
UK6LDN (3 oprs.) 53,802- 326- 49-D
UK3DBV (3 oprs.) 41,292- 479- 31-D
UK6APP (EZ6ACB, UA6ARX, oprs.) 13,950- 199- 30-D
UK3TAN (2 oprs.) 2436- 61- 12-D

Kaliningradsk

UA2FCW 340,388-1120- 86-B
UA2EC 167,200- 632- 76-C

Ukraine

UB5LAW 1,306,742-2418-122-A
UB5AAF 908,747-1828-131-A
UB5ECH 234,657- 873- 81-A
UB5HEK 96,102- 497- 57-A
UB5ICS 41,664- 177- 56-A
UB5EAX 38,420- 372- 34-A
UB5QCK 37,744- 200- 56-A
UB5WCW 25,400- 318- 25-A
UB5MDD 22,025- 273- 25-A
UB5ZAT 857,790-1812-135-B
UB5XBU 385,090-1026- 97-B
UB5UKW 275,560-1007- 83-B
UB5FDG 172,898- 891- 58-B
UB5IJZ 113,595- 666- 55-B
UB5IF 106,506- 608- 61-B
UB5LIC 106,419- 629- 57-B
UB5MLP 67,473- 350- 63-B
UB5CAT 64,948- 317- 52-B
UY5ZI 62,460- 341- 60-B
UB5QIA 62,376- 402- 46-B
UT5HP 60,121- 307- 59-B
UT5AB 57,920- 273- 64-B
UB5LJD 55,890- 434- 46-B
UB5ZFB 53,866- 439- 46-B
UB5ZBF 53,405- 267- 55-B
UB5MEH 50,732- 369- 44-B
UB5HN 47,150- 303- 50-B
UB5RAF 44,528- 284- 46-B
UB5VK 36,099- 437- 27-B
UB5QAU 34,920- 204- 40-B
UB5FKO 32,288- 315- 32-B
UB5UGO 26,622- 279- 34-B
UB5UKO 22,954- 137- 46-B
UB5EEP 22,428- 264- 28-B
UB5MMF 21,775- 273- 25-B
UB5WBS 20,126- - 29-B
UB5UWM 6660- 79- 20-B
UB5QHF 882- 58- 7-B
UB5AAL 200- 24- 5-B
UB5GBD 278,308- 762- 82-C
UB5LAN 205,296- 751- 78-C
UB5VAZ 31,586- 301- 34-C
UY5XE 95,232- 465- 64-C
UB5MNR 26,680- 358- 29-C
UB5VCD 17,480- 310- 20-C
RB5IOV 880- 33- 10-C
UK5MAF (RB5MUV, UB5s CE, MDC, MMM, MNM, MNX, MDA, UY5LK, oprs.) 1,940,888-3166-152-D
UK5MAG (UB5s ICI, IET, INR, MDL, MDP, oprs.) 1,480,011-2676-137-D
UK5UDX (UB5s RCA, UCE, UCF, UWG, XCM, oprs.) 1,304,515-2576-139-D
UK5IAZ (3 oprs.) 585,089-1173-127-D
UK5XBA (5 oprs.) 502,475-1313-101-D
UK5NAJ (3 oprs.) 210,624-1101- 64-D
UK5MCP (EZ5MBZ, UB5s MDJ, MPD, oprs.) 134,536- 642- 67-D
UK5MCO (UB5s MRO, MRX, oprs.) 125,571- 699- 57-D
UK5WBG (2 oprs.) 119,597- 798- 41-D
UK5QAC (UB5s QA, QDU, QIS, oprs.) 111,864- 609- 59-D
UK5UBE (UB5UBE + 2 oprs.) 89,232- 754- 39-D
UK5HAB (UB5HEW + 1 opr.) 47,164- 283- 52-D
UK5ZAC (3 oprs.) 41,688- 326- 36-D
UK5LAZ (3 oprs.) 38,182- 392- 34-D
UK5MBF (3 oprs.) 33,915- 291- 35-D
UK5ICX (3 oprs.) 27,192- 331- 33-D
UK5INW (UB5IOK + 1 opr.) 23,016- 294- 24-D
UK5EDI (2 oprs.) 7872- 164- 16-D

White R.S.S.R.

UC2ACA 1,233,869-2054-149-A
UC2BA 56,120- 290- 61-A
UC2AFI 50,064- 361- 48-A
UC2WAZ 397,606-1093-106-B
UC2ACZ 121,330- 768- 55-B
UC2SE 91,195- 491- 61-B
UC2DQ 75,915- 327- 63-B
UC2AW 54,594- 283- 54-B
UK2AAF (3 oprs.) 34,122- 352- 33-D
UK2AAP (3oprs.) 25,284- 298- 28-D

Azerbaijan

UD6DLJ 207,740- 902- 65-A
UD6CN 19,404- 146- 33-B
UD6BW 1504- 44- 8-B
UD6DER 7410- 51- 38-C

Georgia

UA3TDX/U6F 18,800- 128- 35-A
UF6CX 8048- 141- 16-B
UF6FAL 1207- 27- 6-B
UF6FFF 2639- 77- 13-C

Armenia

UG6LT 100,548- 504- 57-C

Moldavia

UO5OEK 19,656- 280- 28-A
UO5OWC 119,840- 680- 56-B
UO5ODB 65,164- 532- 44-B
UO5OFL 41,403- 340- 37-B
UO5OBD 17,252- 272- 19-B
UO5OCL 58,550- 357- 50-C
UO5OGE 37,556- 304- 41-C
UK5OAA (5 oprs.) 210,728-1047- 56-D

Lithuania

UP2BAO 273,600-1036- 75-A
UP2PAQ 83,549- 429- 67-A
UP2BDX 48,800- 362- 50-A
UP2BBF 12,198- 255- 19-A
UP2NK 1,250,865-2235-133-B
UP2NV 1,249,740-2357-131-B
UP2BCW 91,245- 537- 55-B
UP2BB 50,115- 365- 39-B
UP2DT 38,147- 287- 37-B
UP2BFB 25,080- 102- 60-B
UP2BEW 20,748- 280- 28-B
UP2BDW 16,000- 307- 20-B
UP2PBM 5536- 128- 16-B
UP2AV 34,452- 301- 44-C
UP2PBW 32,103- 292- 41-C
UK2BBB (UP2s BAO, BAS, BAW, BBB, BIL, PAX, PX, oprs.) 2,526,520-3692-166-D
UK2PCR (UP2s BBT, BCR, BCT, BFL, BFN, BGW, BIO, PAV, oprs.) 2,419,375-3169-175-D
UK2BCO (2 oprs.) 209,853-1094- 63-D
UK2BCR (3 oprs.) 106,350- 723- 50-D

Latvia

UQ2GDQ 1,071,480-2280-120-A
UQ2GCP 42,922- 374- 41-A
UQ2PQ 387,450-1122-105-B
UQ2GEI 223,360- 903- 80-B
UQ2DZ 54,180- 384- 43-B
UQ2PP 38,123- 153- 67-B
UQ2GFN 111,390- 595- 47-C

Estonia

UR2OI 15,876- 211- 28-A
UR2QI 709,100-1821-100-B
UR2RKS 123,414- 594- 67-B
UR2RSA 8019- 85- 27-B
UK2RAC (3 oprs.) 296,962-1207- 74-D
UK2RBT (3 oprs.) 64,350- 346- 55-D

Zone 30

European R.S.F.S.R.

UA4WBC 76,208- 486- 44-A
UA4HBJ 29,261- 352- 29-A
UA4WAE 117,738- 520- 62-B
UA4HLX 55,726- 456- 34-B
UK4WAP (UA4s WAW, WBG, oprs.) 198,968- 811- 64-D

Asiatic R.S.F.S.R.

UA9ACZ 193,710- 668- 66-A
UA9AFG 77,784- 306- 56-A
UA9MR 45,630- 290- 39-A
UA9WS 41,094- 179- 54-A
UV9AX 665,174-1406-103-B
UV9AH 664,510-1290-110-B
UA9NN 467,976-1013-102-B
UA9TS 334,848- 777- 96-B
UA9CBM 55,744- 204- 64-B
UA9LBM 54,810- 224- 58-B
UA9SGK 33,450- 271- 30-B
UA9FGJ 32,084- 260- 26-B
UA9ACU 16,514- 164- 23-B
UA9SHU 2184- 80- 7-B
UA9WDM 5616- 65- 18-B
UW9FD 62,304- 352- 44-C
UW9CL 49,182- 271- 42-C
UK9AEC (UA9ABQ + 2 oprs.) 196,480- 691- 64-D

Uzbek

UI8LAG 1,150,373-2058-119-A
UI8ADQ 48,204- 271- 39-B
UI8TAV 32,984- 256- 28-B

Tadzhik

UJ8JAS 295,582- 750- 86-B

Kazakh

UL7CBM 84,280- 324- 56-B
UL7PBI 66,976- 352- 46-C
UK7PAL (UL7s PAE, PBY, PCZ, oprs.) 1,517,544-2875-126-D

Zone 31

Asiatic R.S.F.S.R.

UA9PP 320,178- 712-102-B
UA9YBR 50,490- 328- 34-B
UA9UGA 27,750- 208- 30-B
UA9YCO 168,805- 845- 53-C
UA9OIE 7467- 88- 19-C
UK9OAC (UA9s OBG, OFE, OFH, oprs.) 1,269,520-2167-140-D
UK9UBL (UA9s UAR, UCU, UGI, oprs.) 417,312-1260- 84-D
UK9UAA (UA9UFR + 3 oprs.) 211,038- 885- 51-D

Kazakh

UK7GAL (UL7GBP + 3 oprs.) 829,192-1823-104-D

Kirghiz

UM8MAO 1,259,544-1683-143-A
UM8MAZ 79,718- 378- 46-B
UK8MAA (3 oprs.) 887,936-1582-128-D

Zone 32

Mongolia

JTØWA (OK1DWA, opr.) 532,544-1287-106-A
JT1BG 8480- 113- 20-C

Asiatic R.S.F.S.R.

UAØSAU 727,947-1777- 99-A
UAØAG 39,707- 153- 59-B
UAØWAY 744,744-1991- 91-C
UKØAMM (UAØs AAK, ACQ, AGI, oprs.) 1,564,862-2509-139-D
UKØSAB (UAØSLU + 3 oprs.) 108,426- 520- 51-D

Zone 33

Asiatic R.S.F.S.R.

UAØOAA 307,956-1006- 66-B
UAØJDH 539- 17- 7-C

Zone 34

Asiatic R.S.F.S.R.

UAØNH 86,551- 611- 41-A
UAØLAF 115,575- 421- 67-B
UKØFAD (4 oprs.) 696,366-1862- 99-D
UKØFAL (3 oprs.) 52,932- 311- 44-D

Zone 35

Asiatic R.S.F.S.R.

UAØZBW 143,898- 555- 58-B
UAØZCQ 10,128- 100- 24-B
UKØZAH (UAØs ZBP, ZDD, oprs.) 254,772- 885- 63-D

Zone 37

Portugal

K9VV/CT1 785,840-1793- 95-A

Spain

EA5TX 6107- 49- 31-A
EA2IA 806,505-1828-105-B
EA2AEJ 101,232- 500- 57-B
EA2CR 41,642- 215- 47-B
EA3CRU 37,488- 294- 33-B
EA3PE 21,126- 286- 21-B
EA3BOW 14,650- 152- 25-B
EA3GF 324- 18- 6-B
EA3AQS 112- 6- 4-B
EA7BDL 105,560- 416- 65-C
EA2QU 77,265- 421- 45-C
EA4HO 66,900- 338- 50-C
EA3AYK 24,174- 201- 34-C
EA5OK 16,380- 148- 26-C
EA7BGL 7450- - 25-C
EA2ABJ 7130- 75- 23-C
EA5ANR 1638- 38- 13-C
EA3CRX (+EA3s AVV, BXE, CVD, EC3AT) 915,900-2213-100-D

Balearic Islands

EA6GP 7062- 95- 22-C

Canary Islands

EA8ABS 45,362- 246- 37-C

Gibraltar

ZB2EO 114,352- 506- 56-B

Zone 39

Bahrain

A9XDO 29,760- 280- 24-C

Israel

4X4VL 394,056-1117- 72-B
4X6DX 840,942-2188- 81-C

Zone 44

Korea

HMØT 58,986- 650- 29-A

Zone 45

Japan

JH2FFR 329,268- 781- 92-A
JA6CNL 171,258- 523- 69-A
JA6BIF 163,560- 408- 94-A
JA1KF 73,736- 298- 52-A
JA1EF 71,148- 282- 77-A
JH7GFO 45,820- 252- 58-A
JAØBMS/1 37,370- 262- 37-A
JA7JRP 1479- 87- 17-A
JA1BNW 1222- - 13-A
JAØGTM 666- 25- 6-A
JAØGZ 539- 19- 7-A
JA9CWJ 382,382- 882- 91-B
JE1CKA 257,175- 682- 81-B
JH7UJN 248,492- 758- 73-B
JH3LPT 243,390-1221- 42-B
JA2UA 147,291- 367- 87-B
JH2QAY 112,176- 318- 76-B
JH1MTR 86,904- 279- 72-B
JH9DCJ 83,780- 258- 71-B
JA3JF 47,775- 165- 65-B
JA2MYA 42,500- 184- 50-B
JA1PS 40,494- 247- 34-B
JA1OP 35,564- 123- 68-B
JH7BRG 20,512- 133- 32-B
JR4ISK 19,425- 157- 35-B
JA4CES 18,798- 153- 26-B
JM1LCF 15,097- 120- 31-B
JK1LUY 15,002- 123- 26-B
JA8AQ 11,397- 85- 29-B
JH6SWF 7867- 75- 27-B
JH2ANI 7452- 60- 27-B
JA9JKL 5928- 73- 19-B
JH4DRB 5896- 51- 22-B
JA7ECT 4488- 56- 17-B
JR1MSR 4112- 55- 16-B
JA2KPV 3401- 39- 19-B
JH7RDS 2737- 37- 17-B
JA5UXR 1989- 35- 17-B
JF1LKM 1808- 27- 16-B
JR1CER 1534- 26- 13-B
JE6LFQ 1000- 24- 10-B
JR6OJD 75,939- 517- 51-C
JA9DDM 54,341- 249- 49-C
JA6YDH (JR6GHN, opr.) 45,954- 350- 47-C
JF1JLW 31,349- 289- 29-C
JA6CM 22,554- 127- 42-C
JH1UUT 17,925- 193- 25-C
JA7KM 16,224- 109- 32-C
JA2HPO 13,680- 150- 24-C
JA1RGR 13,167- 129- 21-C
JHØPZD 11,396- 123- 22-C
JR7SUJ 10,626- 94- 23-C
JAØAD 7718- 94- 17-C
JA6QDU 5625- 83- 15-C
JA3FZI 5436- 68- 18-C
JAØBQB 4800- 54- 20-C
JH4XAE 3706- 62- 17-C
JH2YMI (JG2NXV, opr.) 3344- 53- 16-C
JA1JGP 3128- 32- 23-C
JA4YFJ 2912- 53- 16-C
JA1AAT 2693- 35- 13-C
JN1DTR 2520- 38- 15-C
JI3IDG 2338- 47- 14-C
JA3BBG 1364- 26- 11-C
JR4IEW 1309- 33- 11-C
JA4PA 1243- 25- 11-C
JR2VLS/1 1089- 25- 9-C
JI3IJT 904- 37- 8-C
JH7JHY 756- 104- 7-C
JH1FJK 520- 15- 8-C
JF2RQT 378- 12- 7-C
JH8TXK 330- 11- 6-C
JAØPIF 294- 17- 5-C
JH7BMC 200- 10- 5-C
JF2PZW 7- 7- 1-C
JA9YBA (JA9s LJI, LNJ, LWB, OTX, THK, UAD, JHØCAZ, oprs.) 939,907-1829-109-D
JA1ZLO (JG1ILF, JH6LQL, JH7PKU, JHØQGG, JI1s NCA, QQI, JR2UNY, oprs.) 799,397-1649-107-D
JA3YKC (JF3PMM, JG3LLB, JI3DNR, JR4BSM, oprs.) 781,040-1591-104-D
JA1YAD (JA7RHJ, JE2QIZ, JH7SJH, JHØs DRT, EHI, JK1AES, JR6JOE, oprs.) 681,156-1466-102-D
JA2YEF (JF2GNY, JR2s TWA, UWZ, oprs.) 628,197-1396-103-D
JA7YCQ (JH7s FZI, UGG, XUZ, JHØs CZQ, PJZ, JI1FLB, JM1RFU, JR7s MZC, NTP, oprs.) 608,304-1458- 92-D
JA2YKA (JA4UDP, JA9NFO, JE2SRB, JG1GIF, JH2QXG, oprs.) 344,892- 899- 82-D
JA4YFH (JF3GPS, JH4s FMI, MVB, JR4TKR, JH6PHS, oprs.) 311,364- 881- 81-D
JA7YAA (JH7s CUO, WTC, JR2NKG, JR7s OMD, SEI, oprs.) 60,330- 423- 30-D

Zone 46

Liberia

EL2AV 263,325- 707- 75-C

Zone 49

Thailand

HS1ALP 29,480- 154- 44-C

Zone 50

Philippines

DU1CPL 290,844- 36-C

Zone 52

Burundi

9U5WR 34,700- 247- 20-B

Zone 54

Indonesia

YB2SV 471,500-1164- 82-C
YB2CR 130,896- 551- 48-C

Singapore

9V1TL 128,037- 469- 67-B

Zone 58

Australia

[illegible]6JS 5775- - 15-C

Zone 59

Australia

VK2BQQ 305,003- - 89-B
VK2AYD 279,758- 863- 86-B
VK3AEW 145,676- 383- 79-B
VK5RK 1242- 28- 9-C

Zone 60

New Zealand

ZL2RY 69,882- 258- 57-B
ZL2AH 83,457- 510- 33-C

Zone 61

Hawaii

KH6CP 74,328- 282- 57-A
AH6BK (K7TI, opr.) 1,015,854-1801-114-B
KAØCDP/KH6 (+KH6HI, WØVS) 185,421- 858- 57-D

Zone 63

Easter Island

CEØAE 149,520- 714- 42-B

French Polynesia

FOØFB 196,581-1084- 37-A

Zone 64

Guam

AH2K 5670- 128- 9-C
WB7EHU/KH2 (+KA7JGP) 79,989- 415- 39-D

Mariana Islands

N5RM/NHØ 939,205-1661-115-B

Zone 69

Antarctica

4K1A (UA3XBP + 2 oprs.) 12,285- 91- 27-D

Check Logs

AL7Z, K6XO, KA1FEX, KB8K, N1NN, N2BSD, N6TR, G2AJB, G6NK, HA1KZZ, HA2NI, LA4CBA, LA5BS, LA5QK, LA6XO, LA7XB, LA9OI, LZ1KVF, LZ2AG, LZ2KRR, OH1KC, OH1PY, OH6MM, OK1AII, OK1IAR, OK1MWN, OK1US, OK2BM OK2SAT, OK2SWD, OK3KJF, ON5F OZ1BII, OZ1DYC, OZ4RT, PAØPLM, PA3AIR, PAØINE, PAØLRK, PAØPHK PY2ERA, SM5AHK, SM5BDV, SM2L SM5BDV, SM6AYM, SM7KNW, SMØI SP1LOP, SP1KIZ, SP2AJO, SP2NA, SP3DWN, SP3GVX, SP3HLH, SP3HL SP3XR, SP3ZAM/3, SP4EAK, SP4EL SP5GTC, SP6DMI, SP7AW, SP7HT, SP8BVN, SP8GSC, SP9DH, UA1AWO UA1OBQ, UA1OBR, UA1POL, UA1W UA1ZBQ, UA3DBB, UA3DHH, UA3D UA3DJN, UA3LDZ, UA3PCT, UA3QB UA3TAM, UA3VFI, UA4CO, UA4FD UA4FDE, UA4FDJ, UA4HAU, UA4H UA4NCB, UA4NDJ, UA4PAB, UA4Y UA6ALV, UA6ARP, UA6ARX, UA6H UA9KAN, UF6RB, UA9ADT, UA9CE UA9CFC, UA9FFC, UA9SBM, UA9SI UA9UBT, UA9UTF, UA9XS, UAØAC UAØBBR, UAØCCW, UAØJEH, UAØK UAØLDI, UB5ABY, UB5EF, UB5HEX UB5IPN, UB5JAR, UB5JBW, UB5JCI UB5JGM, UB5JIR, UB5JNW, UB5LIE UB5MET, UB5SG, UB5TAM, UB5UC UB5VBN, UB5ZA, UB5ZBL, UK2BA UK2BBF, UK2RBN, UK3APV, UK3X UK5CAP, UK5FAA, UK9CCR, UK9H UKØKAB, UM8MBA, UM8PAC, UL7E UC2ACT, UC2LBE, UC2ODA, UO5F UO5GR, RA9OHV, UP2BV, UQ2MU, UQ2GBZ, UV3MM, UW3RR, UY5YB VK3CD, Y21DC, Y22WK, Y23BF, Y23LM, Y23VB, Y23ZF, Y24BH, Y24HF, Y24WL, Y25KH, Y26EI, Y2 Y26SO, Y29812/H, Y41VG, Y41ZM, Y42VE, Y45VJ, Y47YL, Y47YM, Y4 Y67XL, YO4PX/QRP, YO6KEW/P WP4BDS QST

Public Service

Conducted By Robert J. Halprin,* K1XA

Amateurs Alert in Lynn

Although the Lynn, Massachusetts, fire was covered in these pages last month, the importance of the Eastern Massachusetts Alert Frequency to the emergency effort was not addressed directly. In a guest editorial, John Carroll, AB1Z, describes the operation of the Alert Frequency and the philosophy behind it, and suggests possible national adoption. Preceeding that, by way of introduction, is a summary of the Lynn disaster, contributed by Donald MacComisky, KE1V, and Joseph Galipeau, WA1LRL.

A Lynn firefighter walks through the remains of what was downtown Lynn, Massachusetts. *(photo courtesy of Jim Wilson, WA1MCN)*

How it All Started

On Saturday, November 28, 1981, at 7 A.M., the disaster coordinator of the Greater Boston Chapter of the American Red Cross requested communications assistance from WA1IDA. The reason — a fire raging out of control in Lynn, Massachusetts. WA1IDA sent an alert over the Eastern Massachusetts Emergency Alert Frequency (145.695) to all Amateur Radio operators in the Greater Boston area. This priority message instructed hams to tune to the Waltham repeater (04/64) for Amateur Radio coordination.

The Red Cross repeater (63/23) located in Boston was activated, linking Greater Boston and the Lynn Red Cross to facilitate communications. WA3VUX served as net control for the directed emergency net. Through him, Amateur Radio operators were dispatched to Red Cross Headquarters and emergency shelters located in Lynn. While at the shelters, the Amateur Radio operators provided communications for the Red Cross regarding Welfare traffic, and services and supplies to be issued during the disaster.

Meanwhile, the ravaging fire spread disaster through a four-block section of Lynn, causing an estimated $70 million worth of damage. Buildings collapsed like matchsticks. Fire departments from 54 cities and towns reponded to the 10-alarm blaze, with some coming from as far away as New Hampshire.

Massachusetts Governor Edward King declared a state of emergency in Lynn and activated the civil defense and National Guard. The North Shore Repeater Association relinquished the use of their repeater (28/88) for RACES operations. WA1LRL set up the directed net to provide communications for the National Guard. Both the Amateur Radio command post and the National Guard command post were established at the Edison Hotel in Lynn and were linked by adjoining suites. AB1Z was assigned as our command post coordinator. The directed net on the Salem repeater linked the command post with perimeter stations, Lynn Armory, Lynn police and civil defense agencies.

As the fire progressed, the National Guard division provost marshal requested three shifts of Amateur Radio operators to be stationed at six strategic locations to provide radio communications for National Guard personnel.

More than 80 Amateur Radio operators from eastern Massachusetts answered the call for assistance during the 36-hour operation. Amateur Radio operators from as far away as the Hope Valley Repeater Association, located in Rhode Island, arrived in the Lynn area to assist.

By the end of the blaze, many years of shoe-industry history were lost. Seventeen big buildings were destroyed and six damaged on four city blocks. It looked like the blitz. However, no deaths were announced and a minimum amount of minor injuries occurred. President Reagan declared Lynn a federal disaster, and aid is being provided to reconstruct the city. The American Red Cross, Salvation Army, National Guard and North Shore Repeater Association wish to thank all those who participated in the fire disaster for their efforts in providing effective communications. — *KE1V and WA1LRL*

Why An Alert Frequency

For many years, the one weak link in ham emergency communications has been the lack of a fast method for getting the word out, if there's a need at an hour when people don't ordinarily want to listen to 2 meters. For actual emergency operating, we're fine. We've got swarms of repeaters that can cover just about any conveivable operation zone — not to mention simplex channels for short-haul stuff. For emergency reporting, we've got the autopatches. But when the public safety agencies want to get hold of us, it's a different story.

There are other ways besides the Alert Frequency of putting out alerts, of course — telephone trees, tone decoder boxes, and so on.

Only a few emergency organizations have access to telephone trees, though. That leaves most of the hams inaccessible to most of the agencies until the word spreads by osmosis.

Then there are the tone signals and decoder boxes. These things work fine. Several local systems exist and have been written up in *QST* and *73*. There's one big problem with them, though. To leave the receiver on silently and still hear the alert when it comes, a piece of hardware has to be added. That means either getting a lot of hams to build and install the things or organizing a group project to turn them out. Unfortunately, it's unrealistic to expect more than a small minority of hams to be induced to carry that job through. So the need for a special gadget automatically reduces the potential population who can be reached.

The Alert Frequency does the same job as a decoder-based system. It's a selective alert system; the receiver is left on and stays silent in the absence of an alert. But the frequency is the selective alert system. (Any selective alert system must require that the receiver be left powered-up and that it be left tuned to the frequency on which alerts will be heard. This is the only possible system that requires nothing beyond that.) With nothing to build or buy, only a procedure is needed: get in the habit of switching the rig off by switching it to 145.695 instead of cutting the power. This system simply uses the equipment that the majority of hams already have. Installation? What installation?

Transmitting an alert is similarly simple. No special stations or repeater-based features. Any 2-meter rig on a hilltop can do the job and get out like a repeater. We signed up about 40 hams who live high up, sent them some information, held regular practice at relaying a formal message, and distributed a roster — just to enhance the speed and accuracy of alert distribution. But for a strictly local alert, a simple announcement from a mobile on a hilltop does the job.

The Alert Frequency has been operational in eastern Massachusetts for a year. We kept it relatively local for a while, to build up some experience with it and find out what changes should be made to the procedures and writeups

*Assistant Communications Manager, ARRL

before giving it wider publicity. Last month, a dozen public-service-minded hams who have been involved with it from the beginning met to talk over the results of various tests and drills, as well as one actual use on the second day of a lost-child search.

Various things came out at the meeting. ARRL officials such as the section communications manager, the section emergency coordinator and the section traffic manager, announced League support for the Alert Frequency on a local basis. (The Central Massachusetts ARA, the Minuteman Repeater Association, Bedford and Weymouth Civil Defense, the North Shore Repeater Association, the Waltham ARA and the Sharon ARA have also announced support.) The test schedules were rearranged for greater convenience and interest, and we have decided to rewrite the procedures in the form of step-by-step checklists for the various things that happen during alerts and test. That will make them easier to refer to and put less burden on memory. That writing is underway now.

The Alert Frequency has proven itself in eastern Massachusetts. Not only have we used it successfully three times, getting hams when we needed them the most, but we've had a wide variety of large and small exercises that gave us all practice at starting up an emergency job. The test alerts and SETs have also showed that there's a small but growing number of hams who think OFF = 145.695.

The Alert Frequency is an addition to all other methods of alerting and not a replacement for them. During many times of the day, the fastest way of getting a lot of hams is to make announcements on the more popular commuter repeaters or check into local nets. But there are always those wee hours when nobody wants to hear a conversation between a couple of passing mobiles. The Alert Frequency fills the gap. Similarly, tone-signal alerts are a good thing, for those equipped with them. But that's likely to remain a minority, while the Alert Frequency is accessible to anyone with a 2-meter rig. Also, anything that depends on a special piece of hardware, either to receive or to transmit the alert (especially if it involves something at a repeater site) is liable to be down for maintenance. The Alert Frequency can be a backup, either for an individual or for a whole local organization. So the Alert Frequency should coexist with all the other alert methods, but not seek to replace them.

The actual choice of 145.695 was done rather carefully. It had to be totally free of other uses to be a truly selective alerting frequency. That eliminated all repeater frequencies, all recognized fm simplex frequencies, the satellite subband, the cw and ssb segments at the bottom of the band, and all RACES frequencies. At the same time, it was desirable to have it inside a RACES sub-band, so it could legally be used after a presidential declaration of emergency.

Only one frequency met all the criteria. We tried it out, and it worked. Notice that this choice is valid everywhere in the U.S., not just locally. A letter is now on its way to the Eastern New England Repeater Advisory Committee, requesting that 145.695 MHz be recognized as a published frequency with a specific purpose, not assigned to any particular organization.

I'm asking now that all hams in North America informally recognize 145.695 MHz as the standard Alert Frequency. It would be desirable, of course, to get in the habit of shutting off the rig when it's not in use by switching to the Alert Frequency. But even more important, the channel shouldn't be used for anything else. In particular, 145.695 is not a ham distress frequency; that's what autopatches are for. (Since an fm channel is 15 kHz wide, the neighboring frequencies would be 145.68 and 145.71; in-between frequencies shouldn't be used.)

This can become an accepted custom all over, just as it has in this area, precisely because the frequency isn't already in use. Nobody is being asked to give anything up. But we all gain something very valuable: the answer to a missing link in our emergency communications capability. Nothing else can fill the gap instantly, for all of us. — *AB1Z*

ARRL SECTION EMERGENCY COORDINATOR REPORTS

☐ For November, 31 SEC reports were received denoting a total ARES membership of 18,675. Sections reporting were: AL, AB, AZ, CO, ENY, IL, IN, KS, LA, ME, MI, NH, NLI, NNJ, NTX, OH, OK, ON, ORG, RI, SV, SJV, SCV, SDGO, SK, SC, SFL, WMA, WNY, WPA, WV.

Members of the Santa Clara Valley Repeater Society combined with members from the Lockheed ARC to provide communications for the Sunnyvale Department of Public Safety on Halloween. Shown here are (l-r) DPS Lt. Ray De Rossi checking the status of mobile units with net control WA6REH of SCVRA. *(photo courtesy of KB6RJ)*

REPEATER LOG

According to reports received between November 21 and December 21, the following repeaters were involved in the delineated public service events.

	Weather Emergency	Criminal Activity	Medical Emergency	Vehicular Emergency	Fire	Search and Rescue	Public Safety Events	Drills/Alerts	Power Failures	Total
K1FFK							1			1
K1HF							1			1
K1LT							1			1
W1PFA							3		1	4
W1PW	1									1
WC1RAC								4		4
W1XJ								4		4
WR2AGH							1			1
KC2CY					6	1		2		9
W2VL			1	1	17		32			51
N3AIA				3	1			1		5
N3BFL					1					1
WA3JDX							2	1		3
K3JSZ					1			13		14
WA3PBD							1			1
W3UER			1		3	1	2			7
WR4AMJ								2	3		5
WD4CJJ								2			2
KA4CLL								1			1
W4CUJ								1			1
K4GSO								1			1
K4IGB									1		1
K4ILW	1								1		2
WA4KMG									1		1
WB4LET					3				4		7
NN4N					1						1
WB4QES	1		1	2	22	3				1	30
W4SZP									1		1
VE4WPG									1		1
N5CQE				1							1
W5GIX					9						9
W5RVT	1		2	1	4						8
N6AHW									1		1
W6ASH								1			1
WR6AZO	1								1		2
WB6CAN								1			1
WA6EUZ					8	2					10
W6IYY	1			1	6	2		1	4	1	16
W6KPS								1			1
W6LIO									1		1
WB6OQS										1	1
W6RHC	1				3			2	5	1	12
WA6WTT	4		1		8	1	1			3	18
WC7AAT					1					1	2
WR7AGX					1						1
K7CC				1	8						9
KC7FA	2								5	2	9
W7IXF							2				2
W7WGW					3						3
WR8ADL								1			1
WR8ADO	1								4	1	6
WR8AES								3	3		6
WR8ARB					1		1				2
KA8BZM									1		1
W8NXD	1						1			1	3
WA8ULB					1						1
WRØAEV								1	1		2
WØAFG	49										49
WBØBUZ									1		1
WØMME					1				1		2
WBØCMC			1	3	2			1	1		8
Total	64		7	13	111	10	5	63	66	13	352

NATIONAL TRAFFIC SYSTEM

N5AMK has been named alternate net manager, CAN/c2. The following have received RN5/c2 certificates: W4WJF WA4JDH W4CKS WB5GQH W9YCE WD4HIF N5AMK KT5Z W5HKW WB5EAY WB5ELG WA5RKU W4OGG K5BNH KB5UL KA5AZK W5KLV W5SHN WA5RVT. The following have received 8RN/c2 certificates: N8BQK KC8DC WD8DHC KA8HCT K8JDI W8MOK WD8PEI WD8RHU W8VPW KB8YS. WD5DEA/2 has received a 2RN/c4 certificate. KE6JV and WDØDEX have received RN6/c4 certificates. EAN/c4 has implemented liaison with IATN (see "Transcontinental Corps"). W1QYY has been elected a member-at-large of the Eastern Area Staff, replacing W1KX. Thanks, Bill, for your labors in the NTS vineyard, and welcome back, Tom.

November Reports

1	2	3	4	5	6	7
Cycle Two						
Area Nets						
EAN	30	1323	44.1	.896	94.4	
CAN	30	1112	37.1	.676	100.0	
PAN	60	828	13.8	.451	97.8	
Region Nets						
1RN	59	398	6.7	.371	90.0	100.0
2RN	60	360	6.0	.326	91.0	100.0
3RN	30	197	6.6	.383	97.5	96.7
4RN	57	525	9.2	.548	76.0	96.7
RN5	30	368	12.3	.355	97.1	100.0
RN6	88	518	5.9	.273	62.0	96.7
RN7	60	565	9.4	.644	99.0	100.0
8RN	60	327	5.5	.387	80.5	96.7
9RN	60	415	6.9	.415	100.0	100.0
TEN	30	238	8.0	.224	68.9	100.0
ECN						76.7
TWN	54	239	4.4	.390	50.6	96.7
TCC						
TCC Eastern	110[1]	684				
TCC Central	87[1]	608				
TCC Pacific	94	454				
Cycle Four						
Area Nets						
EAN	30	2134	71.1	1.780	96.1	
CAN	30	1241	41.4	1.085	100.0	
PAN	30	1316	43.9	1.323	99.4	

Region Nets

1RN	59	830	14.1	.603	89.4	93.3
2RN	90	737	8.2	.521	93.8	90.0
3RN	64	327	5.1	.492	97.9	100.0
4RN	60	820	13.7	.566	95.0	100.0
RN5	58	926	15.9	.604	90.4	100.0
RN6	60	869	14.4	.447	98.8	100.0
RN7	60	656	10.9	.837	96.9	100.0
8RN	59	559	9.5	.485	93.0	93.3
9RN	60	673	11.2	.458	95.0	100.0
TEN	60	390	6.5	.375	91.3	100.0
ECN	60	341	5.7	.464	90.6	96.7
TWN	60	511	8.5	.453	97.6	98.3
TCC						
TCC Eastern	106[1]	876				
TCC Central	80[1]	522				
TCC Pacific	113[1]	939				
Sections[2]	6754	30,971	4.6			
Summary	8321	54,706	6.6			
Record	8258	66,257	18.4			

[1]TCC functions not counted as net sessions.
[2]Section and local nets reporting (215): APSN ATN (AB), ABN ASN SSN (AK), NCN NCTN SCN (CA), CN CPN CR NVTN WCN (CT), FAST FMSN FMTN FPON FPTN GN MEN PEN QFN QFNS SPARC SWFTN TPTN (FL), CGVHFN CVEN GCN BSN GSSBN GTN (GA), I75MN ICN INPMN ITEN TLCN (IA), A2MN BSN IMN MTN (ID/MT), ILN (IL), ICN IPN ITN QIN (IN), KPN KSBN QKS (KS), 3ARES 4ARES 5ARES 6ARES 11ARES 13ARES BARES CARN CCEN KEN KNTN KPON KRN KSN KTN KYN MEN MKPN MRN PAEWTN PAWN SEKEN TSTMN (KY), LAN (LA), EM2MN EMRI EMRIPN HHTN NEEPN WMFN WMN (MA/RI), MEPN MMN WRIN (MB), MACS MITN MNN QMN UPN (MI), APN NFN (MR/NF), MTN (MS), CMN CN CNCTN CNN JFK M2MEN PCTN RARS TEN 4ARES (NC), MNARES NCHN NE40 NE75 NE160 NMPN NSN PARC2MTN PVTN WNN (NE), GSFM GSPN NHN (NH), NJN NJPN NJVN NWNJVN OBTTN UCETN (NJ), NSN (NV), CDN EPN HVN NLI NLIPN NYPON NYS SDN STAR SVHFTN WDN (NY), ALERT BN BRTN COARES FRCN HCARES CLNWOAN O6MN OSN OSSBN OSSN (OH), OFON OLZ OPEN OTWN (OK), LBLARES MPARES ORARES OSN PTTN SOARES SOFM WGN (OR), D3ARES D10ARES EPA EPAEPTN LCARES MCESN PFN PTTN WARCVTN (PA), WQUVARES (PQ), BR2MN GPD2MN S2MN SCNTN SCSSBN (SC), PWN RARA S2MN SATN SPN (SK), TNCW TNPN TNVN (TN), DFW TEX TSN TTN (TX), BUN UCN (UT), VLN VN VNTN VSBN VSN (VA), EWTN NTN NWSSB PSTS SCARES WARTS WSN (WA), BEN BWN NWTN WEXPO WIN WNN WSBN WSSN (WI), WVA/R WVFN WVHN WVMDN WVN WVNN (WV).

1 — NET
2 — SESSIONS
3 — TRAFFIC
4 — AVERAGE
5 — RATE
6 — % REP.
7 — % REP. TO AREA NET

Transcontinental Corps

NTS's continuing efforts to handle international traffic in a more organized manner have been further enhanced by the special liaison thta has been established with the IATN (International Assistance and Traffic Net) on 20 meters. There is a station on each session of EAN/c4 who is assigned to bring any international traffic to IATN. All international traffic (provided a third-party agreement exists) can be routed to the IATN rep. For November, this special liaison setup (which is being spearheaded by WA4CCK) handled 13 messages that were destined for foreign countries.

1	2	3	4	5
Cycle Two				
TCC Eastern	120	91.6	1356	684
TCC Central	90	96.7	996	608
TCC Pacific	120	78.0	902	454
Summary	330	88.8	3254	1746
Cycle Four				
TCC Eastern	121	87.6	1743	876
TCC Central	90	88.9	1041	522
TCC Pacific	120	94.2	1843	939
Summary	331	90.2	3827	2337

1 — AREA
2 — FUNCTIONS
3 — % SUCCESSFUL
4 — TRAFFIC
5 — OUT-OF-NET TRAFFIC

TCC Roster

The TCC Roster (November) *Cycle Two* — Eastern Area (N2YL, Director) — K1s CE EIC, N1BHH, W1s QYY XX, N2YL, K2PL, KO2H, W2XD, WA2SPL, K3JSZ, WB3GZU, WA4CCK, WB4PNY, AF8V, W8PMJ, WB8YDZ, VE3s GOL HTL QI. Central Area (W9JUJ, Director) — WD4HIF, K4VM, W4s OGG ZJY, KA4MZY, W5s CTZ KLV, KB5TC, N5AMK, WA5EQO, WB5s NKC OXE YDD, K5s BNH KJN, W9s HOT JUJ NXG, WB9WGD. Pacific Area (WØHXB, Director) — W5JOV, KA5DDW, WB8EIG, KM6I, KT6A, W7s DZX GHT TGU VSE, WA7GYQ, WØs EJD HXB, WDØAIT, KØDJ. *Cycle Four* — Eastern Area (W2CS, Director) — K1EIR, N1BHH, W1s EFW NJM TM, WB1CPF, K2PL, KB2KW, N2YL, W2s C6 FR GKZ XD, WA2SPL, W3s FAF PQ, WB3GZU, W4UQ, K4s KNP ZK, KB4N, WB4PNY, AF8V, W8PMJ, WB8s ITT WTS YDZ, N8XX, VE3s ATU CWA GOL. Central Area (W5GHP, Director) — W4s WXH ZJY, W5s LQ RB SBE, N5s BB BT RB TC, K5s GM TL, KB5W, KC5SF, W9s CXY DND, WB9UYU, AEØR, WØs AM HI, KØEZ. Pacific Area (KØDJ, Director) — K5MAT, W5KH, N6s GW PZ, W6s EOT OA VZT, KN6C, KT6A, K7s HLR KSA, KN7B, KD7I, W7s AK DZX EP GHT LYA VSE, WB7NHR, KØs BN DJ, KCØD, NØIA,WØs HXB LQ OGH, WDØAIT, VE7ZK.

Independent Nets (November 1981)

1	2	3	4
Amateur Radio Teletype Society	30	1190	313
Central Gulf Coast Hurricane	30	255	2432
Clearing House	30	229	
Early Bird	30	926	397
Empire Slow Speed	29	57	355
Hit and Bounce Slow	30	119	359
Hit and Bounce Traffic	29	618	384
Midwest RTTY	31	216	406
Mission Trail	30	387	1233
North American SSB	25	156	188
Southwest Traffic	30	218	1317
20-Meter ISSB	25	1027	643
75-Meter ISSB	30	514	1141
7290 Traffic	44	997	3889

1 — NET
2 — SESSIONS
3 — TRAFFIC
4 — CHECK-INS

Public Service Honor Roll November 1981

This listing is available to amateurs whose public service performance during the month indicated qualifies for 60 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. 30; (2) Checking into phone/RTTY nets, 1 point each, max. 30; (3) NCS cw nets, 3 points each, max. 12; (4) NCS phone/RTTY nets, 3 points each, max. 12; (5) Performing assigned NTS liaison, 3 points each, max. 12; (6) Delivering a formal message to a third party, 1 point each, no max.; (7) Handling an emergency message, 5 points each, no max.; (8) Serving as emergency coordinator or net manager for the entire month, 5 points, max. 5; (9) Participating in a public service event, 5 points, max. 5. This listing is available to Novices and Technicians who achieve a total of 40 or more points.

686
KA9CPA
178
WD8LRT
172
KA1ON
170
WB3GZU
156
K5CXP
149
N1BHH
147
WA1TBY
146
WB4FVV
145
WD4COL
144
KA3CDQ
136
W9JUJ
132
WD4HIF
129
AA4FG
127
WB5YDD
WA4PFK
126
W2GLH
125
AF8V
124
W2XD
119
N1NH
117
W1EOF
116
VE3FGU
115
AD7G
K4SCL
KA5CUW
114
N4EDH
113
WD4AWN
WA7LGN
112
WB2MCO
111
WA4JDH
W9YCV
WB2EAG
NG4J
110
N1ARI
WB4WYG
KB2H
109
N7AKX
WA6DNT
WD8IBY
WD4CNQ
W5DTR
108
WB1GXZ
WD4ALY
WA4SRD
107
AA2H
KA1FE
KA8CPS
WB1HIH
106
WA3WIY
WØOYH
K6YD
105
AK1E
KA1CXP
W8VPW
WB7DZX
104
KA1BBI
VE1WF
WD5JYI
K3JSZ
WB8SYA
W4NWM
AG2R
103
KB3DT
K8OZ
W2MTA
AK1W
K2VX
N9AUG
102
WB8MTD
W4GPL
101
K4JST
KB5NX
KY4U
100
WB8JGW
K3JL
WB5MMI
99
W7LNE
WA5RKU
WA4PIZ
WB5CRC
98
WB8OEX
WB4TZR
KB4OZ
W7FJZ
97
KF8J
KA4GFU
W4ANK
WA4CCK
96
K7GXZ
W2ZOJ
WØOTF
W6NTN
W2YJR
95
KA7HHJ
K1OSM
KA4AUR
94
W7VSE
K4EV
WDØAIT
93
WA4QXT
W1TN
KA4MZY
KT6A
N2WX
92
WB2PKG
W4OGG
N5TC
91
N4PL
W4WXH
90
N8BQK
K5TF
VE3WM
W5CTZ
AG9G
89
W8GGX
N4BZH
VE3DPO
NT4S
WA4STO
W4CKS
W2BIW
88
WB8YDZ
WD8RHU
KAØAID
N9BYK
87
WA4EYU
KA1BJY
WA4UTC
KY4K
N6AWH
KO7H
86
K3CR
N1BFD
KB3UD
WB4NVO
KØEZ
WA4EIC
KA9HPQ
85
W7GHT
WB2VVS
84
AC3N
KC5NN
KAØCUF
WB7TQF
N2APB
WØKJZ
83
N2CER
VE3GT
82
N5RB
VE2PJ
KA2KVZ
81
KA2GSL
WB7WOW
KB5UL
WB3HTW
WB3FKP
KP4DJ
VE2GAG
80
K2HD
K4IWW
N5BT
NØBDG
WD5AAH
79
K1BSO
KC5SF
W5KLV
KA4ASZ
N2XJ
N5DXW
KA9IKR
78
WA2KOJ
WA3EHD
KZ4K
WA4LXP
77
N7BGY
W5VMP
NN4D
KB2KW
76
W4ZJY
KB8MX
75
WB2IDS
W6RNL
KA3GJT
W9NXG
WB4FDT
74
KI4W
WB1CGK
73
WB2OWO
VE3KK
VE3GOL
KA5GYJ
KB5EK
N9ATP
72
W6IPL
KD4TY
K5TL
K3RZR
KG9B
71
WA7IHS
N7CSP
WB4AID
70
WØOGH
KAØJQG
WA6QCA
KS8D
WA7DPK
69
WB8YTD
KA2CTU
KD4PJ
N6GW
NT4U
68
KB6FC
WA1YNZ
KØSI
KC5FX
K1JHC
W9IEM
67
WD8KBW
AA3B
W1RWG
W9JIJ
KB5TC
K2RN
W6HUJ
WB1CGK
VE3HTL
K2ZVI
66
WA6LVO
K4ZN
WA8PIM
W5VMY
W6CPB
KA4PNF
N2BNB
WB9YPY
VE2EDO
65
WBØGOB
WB6QBZ
KA7ELI
N4UF
WB4NTW
K7NTG
W3DP
WB9WGD
N2BDW
64
W8EK
W3VA
KA8LHJ
K4VWK
KA4BBT
63
N3ADU
WB8RSM
W4HON
WBØQAM
WB2TXK
WØRJW
WØOUD
W1TM
62
KA3CWA
N2ARD
KC4LA
K4ZB
WA8DHB
KA3DTE
KA1T
WP4AOH
WA7MEL
K2ZM
61
WA8GMT
KA2GOH
KA4ERP
WD5GKH
WD9FRI
60
W7EP
WA1VRL
WDØDEX
WB4WII
58
KA8IWW/N
52
WB2TWQ/T
51
KA5IWF/T
49
KA8DEZ/N
N8DAD/T
42
KA4SAA/N
41
N8BZG/T
40
KA2BDH/T
N2CPX/T

Brass Pounders League November 1981

BPL Medallions (see April 1979 *QST*, page 77) have been awarded to the following amateurs since last month's listing: W1UD, KAØAID, KCØAS, KBØMB.

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.

1	2	3	4	5	6
W3CUL	656	1161	1536	62	3415
NØBQP	51	1511	190	834	2586
KA9CPA	40	1021	212	632	1905
W5SHN	293	287	666	31	1277
W9JUJ	4	604	566	35	1209
WAØHJZ	28	696	10	460	1194
WB3GZU	58	379	404	69	910
W7DZX	11	434	427	7	879
AA4FG	287	65	362	33	747
WA4JDH	2	386	344	5	737
W3VR	273	169	181	12	735
KB5W	29	329	351	7	716
N4PL	115	222	344	34	715
KT6A	4	349	345	16	714
W5DAD	22	333	333	22	710
N1NH	79	272	337	18	706
W7TGU	108	239	347	5	699
WB6EIG	17	339	335	4	695
WB4FVV	4	334	286	48	672
K4TH	15	302	202	150	669
W4SIZ	12	327	322	17	666
WB8MTD	5	341	286	6	638
W3ATQ	2	318	303	10	633
AF8V	5	296	309	19	629
WB5YDD	29	280	251	68	628
WD4HIF	4	295	293	31	623
W7VSE	1	298	292	5	596
N7AKX	50	234	284	14	582
WB7TQF	35	251	271	15	572
W1EOF	3	203	341	21	568
N1BHH	1	264	259	38	562
K8NCV	5	273	269	7	554
NG4J	26	261	240	21	548
K4SCL	3	283	250	9	545
K4EVY	120	108	275	50	543
W4WXH	81	242	261	7	542
WA1TBY	8	241	248	41	538
WD9ESZ	40	196	288	4	528
WDØDEX	17	249	252	3	521
WA2SPL	13	220	246	38	517
W2MTA	0	287	213	2	502
N3ADU	1	261	236	4	502

BPL for 100 or more originations plus deliveries:

KA4SAA	203
W8UPD	195
W1YI	191
WØBMA	168
N4EDH	151
WP4BDS	131
KA8CPS	103
WD8LRT	101
VE4IX	101
W1JP (Sept.)	107

Multioperator station:

WD4IIO	210

1 — CALL
2 — ORIG.
3 — RCVD.
4 — SENT
5 — DEL.
6 — TOTAL

Operating News

Conducted By John F. Lindholm,* W1XX

VHF/UHF Ad Hoc Committee — A Progress Report

"Operating News" in August *QST* made some rather caustic remarks about the League's vhf/uhf contest program. Some of the membership response indicated that we had been a bit harsh on ourselves. And perhaps the critisism was a bit exagerated to call greater attention to the plight of contesters in the upper portions of the spectrum. The consensus is, however, that the ad hoc committee formed to address this concern is certainly a good idea.

Following a general call for volunteers to serve on this important committee, the following highly knowledgeable amateurs, representing a broad spectrum of vhf/uhf interest, were selected to serve: KA1GT/2, WA5VJB, N3AHI, K1KA, WD4MBK, N6NB, KCØW, WA8ONQ, W3XO, Contest Advisory Committee Liaison WØSD and VHF/UHF Advisory Committee Liaison W1JR. Serving as chairman, I have been privileged to witness the high-powered objectivity of this erudite group of radio amateurs. Any selfish interests have been shunted aside in favor of in-depth study for meaningful resolution of difficult questions.

Progress has not been rapid, nor was it expected to be. A Committee which must by necessity communicate by mail cannot move swiftly. Recognition that quick answers to complex problems further precludes immediate solution of problems too long unattended.

The first task of the Committee was to ascertain the objectives of vhf/uhf contesting. After all, on what basis could the present and any proposed rules be judged without knowing the objectives? For example, if it were proposed that all contacts be made with a milliwatt on solar power to a rubber duck antenna, that should meet some agreed-upon objectives. Stating such objectives in behavioral terms will help insure that a particular course of action is being pursued for sound reasons. And or course, there may be instances when objectives conflict, in which case all the alternatives must be weighed carefully.

Objectives of ARRL VHF/UHF Contest Program

1) PROMOTE ACTIVITY, including —
   a) use of the higher frequencies
   b) operation from "rare" geographical locations
2) DEVELOP OPERATING SKILLS
3) ENHANCE STATION CAPABILITY by means of —
   a) development of technical improvements
   b) knowledge gained through propagation studies
   c) experimentation with newer modes and techniques
4) PROMOTE COMPETITION
5) TO HAVE FUN including the achievement of operating awards

Although some of the objectives are shared with contests conducted of hf, some are unique vhf/uhf, and therefore deserve special attention.

The Committee has further identified what it perceives as obstacles to meeting the stated objectives. Not surprisingly, the most burning question is the use of fm. Blind banishment of the mode, or any mode, is not viewed favorably. Two views on fm have support on the Committee. One, that the continued use of fm in the present contest format is counterproductive to meeting the first objective (promotion of the use of higher frequencies); that is, its continued recognition attemps to promote activity where no promotion is needed. On the other hand, the use of fm is seen as legitimate response to promotion of spectrum use, and any restrictions are thus inappropriate. The bottom line on this difficult, potentially emotional question is that its use can be discouraged by methods far better than an outright ban (such as the scoring scheme). Also the present rules pertaining to use of 146.52 appear totally unacceptable. Admittedly short on immediate solutions, the Committee is not finished with this sticky wicket!

Not isolated from the fm question is the perceived inequities in the scoring system because of geographical location. The voice of the amateur in Ottawa who made a 2-meter contact with Thunder Bay (a distance of 934 miles), only to receive "Ontario" as the "multiplier," has been heard. It is further recognized, however, that equating scores nationally cannot be achieved. The contest efforts in the northeast corridor cannot be artificially equated to those in Spearfish, South Dakota.

Modification of the standard ARRL section multiplier to a grid system could be a boon to activity. For years, Europeans have made great sport of collecting grid squares. Activity from a rare square can generate a DX pile-up. When it comes to pinpointing exact locations, however, there is no better substitute for the universally accepted longitude and latitude. A grid system, on the other hand, is an alphanumeric coding of longitude-latitude to increase information density, a contest exchange requirement. Its purpose is to produce essentially equal-sized multiplier blocks or *areas* for contest and/or award purposes. In recent months there has been a multi-nation stir to adopt a worldwide grid system. Such a universal concept has great appeal, but will meet with little success in North America unless accompanied by readily available, simple formulas to help people easily calculate their own grid squares. Although the concept has been successfully used in the present ARRL UHF Contest, any grid system adopted must be easily understood by even the casual operator. Otherwise, widespread acceptance will not be achieved.

Correspondence from the members has been most helpful to the Committee in its deliberations. Besides the previously mentioned areas of interest, the Committee is addressing a host of other concerns expressed in the correspondence. Among these, there appears to be much agreement that single-band categories will not negatively affect participation on the more "exotic" frequencies. Rather, recognizing single band efforts on, say, 6 and 2 meters, will enhance activity. It appears that action on this will be forthcoming in time for the June VHF QSO Party.

Further "experimentation" appears in the offing for the UHF Contest in August and the September QSO Party — all this to measure the acceptability of the participants. After all, that's who the program is for!

Although it's a bit early at this writing (before Christmas) for detail, the Committee appears to stand on the brink of offering many concrete proposals on interrelated issues. The goal is to offer a better contest program. As the ultimate consumer of the efforts of this blue ribbon panel, you have a large stake in its efforts. We thus continue to solicit your input. Copies of all correspondence (addressed to ARRL Hq.) go to each member of the Committee. We also ask you to maintain "open receivers" for what may be somewhat innovative direction taken by the Committee.

*Communications Manager, ARRL

5-Band WAS

Awards issued September 1, to December 15, 1981

949 KAØFNY
950
950 K3VY
951 OK3TCA
952 W5AS
953 W7KT
954 W5JM
955 KA9DWD
956 W4GOQ
957 WA4CYR
958 XE1AE
959 N9AXV
960
960 AB7Z
961 N6AXV
962 KD7P
963 WA8CZS
964 WØJF
965 NØZA
966 N6APW
967 W6OUL
968 W2IQB
969 KB5FU
970
970 WDØHXQ
971 WB7TLO
972 K3CNH
973 KE3A
974 AG2K
975 WB6TVX
976 PT7WA
977 WD8RZG
978 W4YZX
979 WB2ZEL
980
980 AI1Q
981 XE1OX
982 KB4LX
983 WDØFOY
984 KØSI
985 N6PE
986 K8MW
987 N5BA
988 W4NWM
989 K4UTE

W1AW NOTE

The complete W1AW winter operating schedule appears in October *QST*, page 98. A W1AW schedule also is available on request from ARRL Headquarters. Please enclose an s.a.s.e. See the "Contest Corral" section of *QST* for times and dates of W1AW Code Proficiency Runs.

SCM ELECTION NOTICE

To all ARRL members in the Wisconsin, Illinois, Northern Florida, Manitoba, Santa Clara Valley, Indiana, Vermont, Maine, and Oregon sections: You are hereby solicitated for nominating petitions pursuant to an election for Section Communications Manager.

OSCAR Operating Schedule

OSCAR 9				OSCAR 8			
Date (UTC)	*Orbit No.*	*Time (UTC) Hr Mn*	*EQX W. Long. (Degrees)*	*Orbit No.*	*Mode*	*Time (UTC) Hr Mn*	*EQX W. Long. (Degrees)*
1 Feb.	1777	0035	142.4	19,928	A	0046	79.3
2 Feb.	1792	0023	139.3	19,942	A + J	0051	80.4
3 Feb.	1807	0010	136.3	19,956	X	0055	81.6
4 Feb.	1823	0133	157.0	19,970	A	0060	82.7
5 Feb.	1838	0121	153.9	19,984	A + J	0104	83.9
6 Feb.	1853	0109	150.9	19,998	J	0109	85.0
7 Feb.	1868	0057	147.8	20,012	J	0113	86.2
8 Feb.	1883	0044	144.7	20,026	A	0118	87.3
9 Feb.	1898	0032	141.7	20,040	A + J	0123	88.5
10 Feb.	1913	0020	138.6	20,054	X	0127	89.6
11 Feb.	1928	0007	135.5	20,068	A	0132	90.7
12 Feb.	1944	0130	156.2	20,082	A + J	0136	91.9
13 Feb.	1959	0118	153.2	20,096	J	0141	93.0
14 Feb.	1974	0106	150.1	20,109	J	0002	68.4
15 Feb.	1989	0054	147.0	20,123	A	0007	69.5
16 Feb.	2004	0041	144.0	20,137	A + J	0012	70.7
17 Feb.	2019	0029	140.9	20,151	X	0016	71.8
18 Feb.	2034	0017	137.8	20,165	A	0021	73.0
19 Feb.	2049	0004	134.8	20,179	A + J	0025	74.1
20 Feb.	2065	0127	155.5	20,193	J	0030	75.2
21 Feb.	2080	0115	152.4	20,207	J	0034	76.4
22 Feb.	2095	0103	149.4	20,221	A	0039	77.5
23 Feb.	2110	0051	146.3	20,235	A + J	0044	78.7
24 Feb.	2125	0038	143.2	20,249	X	0048	79.8
25 Feb.	2140	0026	140.2	20,263	A	0053	81.0
26 Feb.	2155	0014	137.1	20,277	A + J	0057	82.1
27 Feb.	2170	0001	134.0	20,291	J	0102	83.2
28 Feb.	2186	0124	154.7	20,305	J	0106	84.4
1 March	2201	0112	151.7	20,319	A	0111	85.5
2 March	2216	0060	148.6	20,333	A + J	0116	86.7
3 March	2231	0048	145.5	20,347	X	0120	87.8
4 March	2246	0035	142.5	20,361	A	0125	89.0
5 March	2261	0023	139.4	20,375	A + J	0129	90.1
6 March	2276	0011	136.3	20,389	J	0134	91.3
7 March	2292	0134	157.1	20,403	J	0139	92.4

Orbit predictions for OSCAR 8 by Project OSCAR, P.O. Box 1136, Los Altos, CA 94022. To keep abreast of the latest developments, tune in the regular phone and cw bulletins over W1AW, or to the AMSAT nets (East Coast and Mid States at 9 P.M. and West coast at 8 P.M. local time, on 3850 kHz — international at 2200 UTC Saturday on 28,878, at 1800 UTC Sunday on 14,282 and 1900 UTC Sunday on 21,280 kHz. OSCAR 9 *predictions are for reference only. Because of its low altitude, long-range predictions are not always accurate.* Use W1AW and AMSAT Bulletins for weekly updates. For printout of each orbit send an s.a.s.e. to Project OSCAR for a three-month calendar. Donations for this service are accepted by Project OSCAR at the above address.

O 9 progresses an average of 23.8129° W. per orbit in a period of 95.2516 minutes.
O 8 progresses an average of 25.7962° W. in a period of 103.1851 minutes.

O 8 modes of operation are Mondays and Thursdays — Mode A. Tuesdays and Fridays — Mode A + J. Saturdays and Sundays — Mode J. Wednesdays are for experimental use on Mode A or J or recharge Mode D. Mode A + J is simultaneous operation of both transponders.

Mode J Club: Become a member of the Mode J Club. Complete eight Mode-J contacts. QSL cards are not required. Just list the call sign of each station worked, date, orbit number and station equipment used. Send this information along with $3 in U.S. funds, a one-time charge to cover the certificate and newsletter costs, to Mode J Club, c/o Larry Roberts, W9MXC, 3300 Fernwood, Alton, IL 62002.

OSCAR 8 QSL: To receive an OSCAR 8 QSL card, send a copy of the telemetry from the 29.402- or 435.095-MHz beacons. Please send your report, along with an s.a.s.e., to ARRL Hq.

Spacecraft Frequencies

Spacecraft	*Uplink*	*Downlink*	*Beacon*
OSCAR 8			
Mode A	145.850-145.950 MHz	29.400-29.500 MHz	29.402 MHz
Mode J	145.900-146.000 MHz	435.200-435.100 MHz	435.095 MHz

Mode A x = uplink frequency − 116.458 MHz ± Doppler shift
Mode J x = uplink frequency − 581.106 MHz ± Doppler shift

Note: A minus sign in front of the downlink frequency indicates that the passband of the satellite is inverted in that mode. This means that signals transmitted up to the satellite at the low end of the uplink passband will appear at the high end of the downlink passband. Additionally, upper-sideband signals transmitted on the uplink will appear as lower-sideband signals on the downlink.

OSCAR 9
Hf Beacons — 7,050, 14,002, 21,002 and 29,510 kHz. On-off keying with Morse telemetry, interspersed with a carrier or continuous carrier.
Vhf Beacon — 145.825 MHz nbfm ±5 kHz. ASCII, Baudot, voice, afsk and Morse.
Uhf Beacon — 435.025 MHz nbfm ±5 kHz. ASCII, Baudot, voice, afsk and Morse.
S-Band Beacon — 2401.0-MHz nbfm ±10 kHz. ASCII, Baudot, voice, afsk and Morse.
X-Band Beacon — 10.470-GHz steady carrier. S- and X-band beacons use lhcp.

Further information on the radio amateur satellite program can be obtained free of charge from ARRL Hq. The all-new OSCARLOCATOR package is now available: $7 U.S., $8 elsewhere.

A petition, to be valid, must contain the signatures of five or more full ARRL members residing in the section concerned. Photocopied signatures are not acceptable. No petition is valid without at least five signatures *on that petition*. No member may sign more than one petition. It is advisable to have a few more than five signatures on each petition.

Petition forms (CD-129) are available on request from ARRL Headquarters but are not required. The following form is suggested:

(Place and date)

Communications Manager, ARRL
225 Main Street, Newington, CT 06111

We, the undersigned full members of the . . . ARRL Section of the . . . Division, hereby nominate . . . as candidate for Section Communications Manager for this Section for the next two-year term of office.

(Signature . . . Call . . . City . . . Zip . . .).

An SCM candidate must have been a member of the League for a continuous term of at least two years and a licensed amateur of General class or higher (Canadian Advanced Amateur Certificate) immediately prior to receipt of petition at Headquarters.

Petitions must be received at Headquarters on or before 5:30 P.M. Eastern Local Time, March 5, 1982.

Whenever more than one member is nominated in a single section, ballots will be mailed from Headquarters on April 1, 1982, returns counted May 18, 1982, and SCMs elected as a result of the above procedures will take office July 1 1982.

If only one valid petition is received for a section, that nominee shall be declared elected without opposition for a two-year term beginning July 1, 1982.

If no petitions are received for a section by the specified closing date, such section will be resolicited July *QST*, and an SCM elected through the resolicitation process will serve a term of 18 months.

Vacancies in any SCM office between elections are filled by appointment by the communications manager.

You are urged to take the initiative and file a nominating petition immediately.

John F. Lindholm, W1XX
Communications Manager

REPEAT SCM NOMINATING SOLICITATIONS

Since no petitions were received for the Santa Barbara and East Bay sections as a result of notices in the July and August *QST*, nominating petitions for these sections are herewith resolicited. See the above notice for details on how to nominate.

SCM ELECTION RESULTS

The following were elected for a two-year term of office beginning April 1, 1982:

Uncontested
E. Pennsylvania Karl W. Pfeil, W3VA
Louisiana John J. Meyer, N5JM
Pacific R. A. "Army" Curtis, AH6P

Strays

NEITHER RAIN NOR SLEET . . .

☐ What does the National Weather Service do when vital weather observations are needed, but no official weather station exists in the affected area? In Seattle, Amateur Radio was the answer, and Pacific Northwest hams (some veterans of Mount St. Helens) have formed the Amateur Radio weather reporting network. Held daily at 10 A.M. Pacific Local Time on 3.910 MHz, the net is the center of activity for approximately 68 amateurs reporting their local weather observations. The information is then sent to the Seattle NWS. Special observations and reports can also be requested to supplement regular reports, and since some Weather Service instruments at high elevations tend to freeze during winter months, the amateurs' information can be invaluable. This cooperation between Amateur Radio and the National Weather Service again provides dramatic proof of the worth of our hobby. — *John H. Brown, W7CKZ, Olympia, Washington*

I would like to get in touch with . . .

☐ anyone having one of my *HS1LN QSLs that I sent* out from Bangkok in 1947. Unfortunately, I didn't save one for myself. Ben Lane, W7FNE, 3764 S. Hemlock, Tolovana Park, OR 97145.

Contest Corral

A Roundup of Upcoming Operating Events

Conducted By Mark Wilson,* AA2Z

FEBRUARY

Jan. 30-Feb. 7

ARRL Novice Roundup, Jan. *QST*, page 90.

2

West Coast Qualifying Run (W6OWP prime, W6ZRJ alternate), 10-35 wpm at 0500Z Feb. 3 (9 P.M. PST Feb. 2). Frequencies are approximately 3590/7090 kHz. Underline one minute of the highest speed you copied, certify your copy was made without aid and send to ARRL for grading. Please enclose your full name, call (if any) and complete mailing address. A large s.a.s.e. will help expedite your award/endorsement.

6-7

Arizona QSO Party, Jan. *QST*, page 98.

North American Sprint, Jan. *QST*, page 98.

South Carolina QSO Party, Jan. *QST*, page 98.

QRP-SSB Contest, sponsored by QRP Club ARI (Italy), from 1500Z Feb. 6 until 1700Z Feb. 7. Categories: single operator single or multiband QRP; single operator multiband QRO. QRP is defined as 15 watts PEP output or less. Operate 80-10 meters, ssb only. Exchange signal report and "L" for low power or "H" for high power. Count one point for QSOs with same country, 2 points for same continent and 5 points for different continent. Multiply by number of DXCC countries worked per band. Contacts made with nondirective antennas count double points. Multiply final score by power bonus (power out: 15 to 4 watts, bonus = 1; 3.9 to 1 watt, bonus = 2; 0.99 to 0 watts, bonus = 4). Mail logs within 30 days to: QRP Club ARI, Via Boccanegra 8, 00162 Rome, Italy.

7 MHz Contest, phone, sponsored by the RSGB, from 1200Z Feb. 6 until 0900Z Feb. 7. Phone only (cw Feb. 27-28). Single operator only. Exchange signal report and serial number. Non-European stations count 15 points per QSO with G, GD, GI, GJ, GM, GU, GW stations (not GB). Multiplier is G prefixes. Mail entry to arrive by April 3 (April 24 for phone) to: RSGB HF Contests Committee, P.O. Box 73, Lichfield, Staffs WS13 6UJ, England.

New Hampshire-Vermont QSO Party, sponsored by K1HI, from 2100Z Feb. 6 to 0500Z Feb. 7 and 1100-0100Z Feb. 7. Work stations once per band and mode. Exchange serial number, signal report and QTH (county and state for NH/VT stations; state, country or province for others). Suggested frequencies: phone — 3.930 3.960 7.230 7.260 14.280 14.320 21.360 28.570 50.110 144.200; cw — 3.530 7.030 14.080 21.060 28.070 144.100; Novice — 3.760 7.130 21.150. Count one point per QSO. NH/VT stations multiply by number of states, provinces and countries worked; others multiply by number of NH/VT counties worked. Awards. Mail logs by March 15 (include large s.a.s.e. for results) to: Rex Lint, K1HI, 10 Hartwood Dr., Merrimack, NH 03054.

9

W1AW Qualifying Run, 10-40 wpm at 0300Z Feb. 10 (10 P.M. EST Feb. 9). Transmitted simultaneously on 1.835 3.58 7.08 14.08 21.08 28.08 50.08 147.555 MHz. See Feb. 2 listing for more details.

13-14

PACC Contest, sponsored by VERON, from 1400Z Feb. 13 until 1700Z Feb. 14, cw and phone, 160-10 meters. Work PA-PE-PI stations. Single and multioperator categories. Exchange signal report and serial number. Dutch stations will send report and province (GR FR DR GD UT OV YP NH ZH ZL NB LB). Work stations once per band regardless of mode. Count one point per QSO and multiply by number of provinces worked per band for final score. Mail entry by March 30 to: PACC-Contest, F. T. Oosthoek, PAØINA, Box 521, 4330 AM Middelburg, The Netherlands.

QCWA QSO Party, cw (phone March 13-14). For QCWA members only. For details, contact: Glen Baxter, K1MAN, Long Pond Lodge, Belgrade Lakes, ME 04918.

Oregon QSO Party, sponsored by the Brand-X ARA, from 1700Z Feb. 13 until 0800Z Feb. 14 and 1500 to 2400Z Feb. 15. Work stations once per band and mode. Exchange signal report and QTH (county for OR stations; state, province or country for others). Suggested frequencies: phone — 3.920 7.260 14.300 21.370 28.600; cw — 60 kHz up from lower band edge; Novice — 10 kHz up from lower band edge. Count one point per QSO (Novices/Techs count 3 points per QSO). OR stations multiply by number of OR counties, states, provinces and countries worked; others multiply by number of OR counties worked (max. 36). Awards. Official forms available from WA7NVT; all entries must have summary sheet. All entrants are encouraged to follow standard contest guidelines (see Nov. 1981 *QST*, page 106). Mail entries by March 8 (send large s.a.s.e. for results) to: Tim Burdick, WA7NVT, 138 N. 20th St., Philomath, OR 97370.

Two-Land QSO Party, sponsored by the South Jersey Contest Coalition, from 2100Z Feb. 13 until 0300Z Feb. 15. Single ops operate a maximum of 24 hours; no time limit for multioperator stations. Work stations once per band and mode. Work mobiles and portable again as they change counties. Exchange signal report and QTH (county and state for 2-land stations; state, province or country for others). Suggested frequencies: phone — 3.900 7.230 14.280 21.355 28.600; cw — 1805 and 60 kHz up from lower band edge; Novice — 25 kHz up from lower band edge. Count two points per QSO. All 2-land stations multiply by total states, countries, provinces and 2-land counties worked; others multiply by number of 2-land counties (max. 83) worked *per band*. Awards. Number each new multiplier as worked, include summary sheet with usual signed declaration. Mail logs by March 20 (include large s.a.s.e. for results) to: Ken Newman, N2CQ, 81 Holly Dr., Woodbury, NJ 08096.

YU-WW Contest, sponsored by Savez Radio-Amatera Jugoslavije, from 2100Z Feb. 13 until 2100Z Feb. 14. Cw only, 3.5 and 7 MHz. Suggested frequencies 3520-3590 and 7010-7040 kHz. Exchange signal report and serial number. Count 5 points per YU QSO (10 points on 3.5 MHz), 2 points for other DX QSOs (5 points on 3.5 MHz) and 1 point for QSOs on your own continent (2 points on 3.5 MHz). Multiply by the number of DXCC countries plus YU prefixes worked per band. Single operators must remain on a band at least 30 minutes, multiops at least 10 minutes (except for a new multiplier which may be worked anytime). Mail logs by March 15 to: Savez Radio-Amatera Jugoslavije, YUDXC, Box 48, 11001 Beograd, Yugoslavia.

YL-OM Contest, phone, sponsored by the YL Radio League, from 1800Z Feb. 13 until 1800Z Feb. 14. YLs work OMs and vice versa. No crossband, net or repeater QSOs. Work stations once only. Exchange signal report, serial number and ARRL section or country. Count one point per QSO. Multiply by total of ARRL sections and countries worked. Stations running less than 150 W on cw (300 W P.E.P. on ssb) multiply total by 1.25. Mail entries by March 15 (must be received by April 5) to: Sandra Heyn, WA6WZN, 962 Cheyenne St., Costa Mesa, CA 92626.

WAS SSTV Contest, sponsored by A5 Magazine, from 1400Z Feb. 13 until 0200Z Feb. 15. 80-10 meters. Object is to work as many other SSTV ops as possible. Count 100 points for each new state listed; 25 points for each contact plus 10 bonus points for live exchanges of "mugshots," color two-way contacts, or 256 or 128 (half-speed) mode transmissions. Station calls and signal reports must be exchanged in video format. Count 500 points for contacts with Alaska or Hawaii. Mail logs by March 1 to: A5 Magazine, P.O. Box H, Lowden, IA 52255.

20-21

ARRL International DX Contest, cw, Dec. *QST*, page 94.

24

W1AW Qualifying Run, 10-35 wpm at 2100Z (4 P.M. EST Feb. 24). See Feb. 9 listing for more details.

27-28

CQ WW 160-Meter Contest, phone, Jan. *QST*, page 98.

French Contest, phone, Jan. *QST*, page 98.

7-MHz Contest, cw, see Feb. 6-7 listing.

YL-OM Contest, cw, see Feb. 13-14 listing.

QRP Winter Sports Contest, sponsored by the G-QRP-CLUB, from 0900-2300Z Feb. 27 and 28. Check the following times and frequencies (time in Z/frequency in MHz): 0900-1000/14.060; 1000-1100/21.060, 28.060; 1100-1200/7.030; 1200-1300/3.560; 1300-1400/7.030; 1400-1500/3.560; 1500-1730/21.060, 28.060; 1730-2000/14.060; 2000-2100/7.030; 2100-2200/3.560; 2200-2300/14.060. For more information and logs, contact: Christopher Page, G4BUE, "Alamosa," The Paddocks, Upper Beeding, Steyning, West Sussex BN4 3JW, England.

MARCH

3

West Coast Qualifying Run, 10-35 wpm at 0500Z March 4 (9 P.M. PDT, March 3). See Feb. 2 listing for more details.

6-7

ARRL International DX Contest, phone, Dec. *QST*, page 94.

10

W1AW Qualifying Run, 10-35 wpm at 0300Z March 11 (10 P.M. EST March 10). See Feb. 9 listing for more details.

13-14

Nebraska QSO Party, sponsored by the Amateur Operators of Nebraska, from 0000Z March 13 until 2400Z March 14. Enter phone-only, cw-only or mixed mode categories. Exchange signal report and QTH (county for NE stations; state, province or country for others). Count one point per QSO. NE stations multiply by total states, provinces and countries worked; others multiply by total NE counties worked. Suggested frequencies — phone 20 kHz up from low end of General band; cw — 50 kHz up from lower band edge; Novice — 25 kHz up from lower band edge. Mail entries within 30 days to: Tom Brackett, KØJFN, 1820 East 3rd St., Fremont, NE 68025.

Virginia QSO Party, sponsored by the Sterling Park ARC, from 1800Z March 13 until 0200Z March 15. Three entry categories: fixed/portable single transmitter and multi transmitter and mobile. Work stations once per band and mode. Exchange serial number and QTH (county for VA stations; state, province or country for others). Suggested frequencies: phone — 3.930 7.230 21.375 28.575; cw — 60 kHz from lower band edge; Novice — 25 kHz up from lower band edge. Count one point per QSO. Mobiles may rework stations each time they change county and count all QSOs for points. VA stations multiply by total states, provinces, countries and VA counties worked; others multiply by number of VA counties worked. Awards. Mail logs by April 15 (include large s.a.s.e. for results) to: A. Ray Masie, K3RZR, Rte. 1, Box 115E, Dunnsville, VA 22454.

RSGB Commonwealth Contest, open to amateurs in the UK and other Commonwealth countries. For more information, contact: D. S. Booty, 139 Petersfield Ave., Staines, Middlesex TW18 1DH, England.

20-21

BARTG Spring RTTY Contest
Bermuda Contest
Tennessee QSO Party
YL-ISSB QSO Party

25

W1AW Qualifying Run

27-28

CQ WPX Contest, phone
Spring VHF/UHF QSO Party

*Assistant Communications Manager, ARRL

Section Activities

A-1 OPR ✗ EC ✗ DXCC ✗ RCC ✗ WAS ✗ STM ✗ OES ✗ ORS ✗ NM

SCM ✗ ARES ✗ OVS ✗ SEC ✗ OBS ✗ TCC ✗ OO ✗ NTS ✗ WAC ✗ CP ✗

CANADIAN DIVISION

ALBERTA: SCM, E. Roy Ellis, VE6XC — SCM/SEC: VE6XC. ASCM: VE6AMM. STM: VE6ABC. NM: (APSN) VE6ABC. Yours truly received a fone call from DOC on 27 Nov to the effect that the microwave cct was out between Edmonton and the Yukon and could I round up a couple hams with fone patches to handle emergency traffic. We came up with VE6WX VE6DD and VE6AAG. Not too much in the way of excitement occurred and the cct was back in operation within two hours. The Hinton repeater is off the air because of a severe wind storm. Traffic: VE6CHK 130, VE6ABC 21, VE6QN 10, VE6XC 6, VE6YW 4. (Oct.) VE6HO 75.

BRITISH COLUMBIA: SCM, H. E. Savage, VE7FB — NM VE7QC reports that the B.C. Phone Net broke the magic number of over two hundred check-ins one night. November's total was 4576 checkins. BCEN CW, we are still looking for the members to send in their traffic reports first week of the new month please. SNC were awarded BCEN members for year checkins, VE7OM 303, 7CSI — 287, and VE7s BZI EDN BNI BLO COA ZK CCJ AAG FJR BNH CDF. Dogwood Chapter QCWA Christmas party forty nine enjoy standing rib roast and talking about yesterdays. Traffic: VE7ZK 133, VE7FAZ 78, VE7HQ 70, VE7FB 57, VE7COA 21, VE7BZI 7.

MANITOBA: SCM, Peter Guenther, VE4PG — ASCM: VE4JP. STM: VE4RO. SEC: VE4HK. NMs: VJ TE ACX NM. Our thanks to VE4AFO for supplying all the NCSs with an always changing roster. We understand that VE4IF and VE4JF are again back in the hospital. We wish them a speedy recovery. Lots of traffic has been originated this month, and its nice to hear some of the older group getting involved. MEPN QNI 1151, QTC 86, sess 30. MMN QNI 480, QTC 31, sess 30. WRIN QNI 132, QTC 122, sess 8. MTN QNI 261, QTC 200, sess 30. Traffic: VE4PG 386, VE4IX 110, VE4RO 86, VE4ACX 75, VE4AIE 62, VE4JA 57, VE4AJE 53, VE4TE 30, VE4AEJ 28, VE4CR 25, VE4NM 16, VE4AAD 15, VE4ID 14, VE4AAU 11, VE4FK 11, VE4LB 8, VE4NE 6, VE4QI 6, VE4AAT 5, VE4EN 5, VE4TL 5, VE4ADS 4, VE4DS 4, VE4XN 3, VE4AAF 2, VE4HH 2, VE4AGS 1, VE4GW 1, VE4IW 1

MARITIME — NEWFOUNDLAND: SCM, D. R. Welling, VE1WF — ASCM: VO1FG. SEC: VE1EI. NMs: VO1JN VE1WF. STM: Open. EXEC HARC: VE1BNK, pres.; VE1BSM, 1st v.p.; VE1BNL, 2nd v.p.; VE1AVP, sec.; VE1BMF, treas. Congrats. Hosp. VE1AO. VE1 Callbooks still avail; cct VE1FQ. Nets: APN 3654 kHz 8 P.M. daily; Maritime Net 3750 kHz 7 P.M. daily; Nfld Net 3785 kHz 6:30 AST daily; Weather Net 3770 kHz 7 A.M. daily; White Cane Net 3770 kHz daily; Old Timers 3750 kHz 8 A.M. Sunday; NBARA 3745 kHz 6 P.M. Sunday; NSARA 3767 kHz 6 P.M. Monday. VO3MEA and GB4MEA recreating Marconi's orig msg "S" on Dec 12th on 3792 kHz. APN sessions 30, QNI 218, tfc 82, time 374; NFN sessions 30, QNI 219, tfc 0, time 138. Traffic: VE1QF 391, VE1LCR/RO 84, VE1BXA 29, VE1XF 27, VE1ALU 22, VE1CEN 6, VE1BPM 2.

ONTARIO: SCM, Larry Thivierge, VE3GT — ASCM: VE3GOL, SEC: VE3GV. STM: VE3QI. The number beside your call sign in the Radio Amateur Callbook magazine indicating the class of certificate of proficiency that you may hold may not be up to date. This is because DOC now only releases current call sign information which does not make reference to the class of certificate you may hold. OVMRC recently held a successful club banquet with 30 people in attendance. VE3FGU has completed WAS on 6 meters. VE3CVX has returned from a few weeks in YV-Land where he visited with DL3ZM/YV5 who is active on six. Attendance at the EC "on the air" meetings the first Sunday of each month has improved. VE3IDH is the new EC for the city of Guelph and Wellington Co. Advanced classes are being held at the QTH of VE3ASH. VE3MWV is attempting to organize an Advanced class in the Oakville area. New Burlington ARC members are VE3s MWV MCO MWR LWO BVN MMZ MVI NAV. Traffic reports are due on the 5th of each month and traffic handlers should be using the two letter abbreviation for Ontario (ON) in their traffic. VE3MFP is the new club call custodian and QSL manager of VE3VM, club station of the Niagara Peninsula ARC. Regretfully well known DXer VE3AAZ has become a Silent Key. VE3AAZ, from the Toronto area, was a long term Ryerson instructor. Congrats to VE3FN on his new *QST* column "Ottawa Mailbox". VE3s MFA and MMK have their Advanced, while VE3LFV is a new call on the air. Traffic: VE3KK 301, VE3CYR 223, VE3FGU 177, VE3HGJ 168, VE3DPO 135, VE3GNW 123, VE3GT 117, VE3GOL 115, VE3AYZ 64, VE3AWE 59, VE3WM 56, VE3KCZ 54, VE3BZB 49, VE3DUK 47, VE3BVG 42, VE3WG 39, VE3ANJ 29, VE3AJN 23, VE3DVE 22, VE3LSJ 20, VE3KXB 12, VE3DZH 10, VE3KLX 9, VE3FGV 6, VE3WV 4. (Oct.) VE3KXB 59, VE3HOI 44, VE3FGV 30, VE3KLX 22, VE3EWD 8.

QUEBEC: SCM, Harold Moreau, VE2BP — SEC: VE2DEA. STM: VE2PJ. NMs: VE2PJ VE2FSA. New appointee: VE2GAT, OO. Congrats to VE2FMH for his DX-CC endorsements (133 mixed, 131 SSB). VE2ADA has moved to Valcourt, and is active on all bands and all modes. VE2CBS (Sorel-Tracy ARC) classed first in our division in last Field Day, class 1A battery. Congrats to all. VE2RTR a maintenant un auto patch. Prompt retablissement a VE2FK, qui est a l'hospital. VE2FJU, un nouvel amateur de Grand-Mere. Traffic: VE2PJ 130, VE2FKI 91, VE2EDO 74, VE2BP 45, VE2FFE 32, VE2EKC 28, VE2GAG 20, VE2EC 15. (Oct.) VE2FFE 39, VE2FSA 17.

ATLANTIC DIVISION

DELAWARE: SCM, Roger E. Cole, W3DKX — STM: WA3WIY. SEC: W3PQ. PSHR: WA3WIY K3JL. Thanks to K3AWJ WB3DPJ and helpers for the most successful AWARE meeting honoring Pres Dannals. Attendance was 110 for the dinner and 170 for the meeting. 1982 officers for DARC: W3QLS, pres.; KA3BXC, v.p.; WB3GXD, treas.; N3CGH, sec. New 1st State officers: WA3HDS, pres.; K3BYW, sec.; WB3HEL, treas.; KA3CCZ, act. dir.; K3DX, trustee. New hams: KA3IFM KA3IIT. Upgrades to Advanced: KA3BXC and KB3PD (ex-KA3BSM). Congrats to all! DTN QNI 324, QTC 59, DEPN: QNI 57, QTC 6, SEN QNI 28, QTC 14. Traffic: W3PQ 136, W3QQ 60, WA3WIY 55, W3DKX 48, K3JL 38, WB3DUG 18, W3FEG 17, K3ZXP 15, WA3PWT 8, W3WD 5, WA3ZBI 5, N3AXH 4.

EASTERN PENNSYLVANIA: SCM, Karl W. Pfeil, W3VA — SEC: WA3PZO. STM: WB3JYZ. DECs: N3CJP W3EEK W3YZW.

Net	Freq.	Time	QNI	QTC	Sess	Mgr
EPAEPTN	3917	6:30 P.M. Dy	538	189	30	WA3EHD
EPA	3610	7/10 P.M. Dy	491	212	57	AA3B
PFN	3958	5 P.M. Dy	345	341	30	WA3WQP
PTTN	3610	6:30 P.M. Dy	275	120	30	K3JSZ

Vhf and local nets reporting: D3ARES D10ARES LCARES MCESN and WARCVTN with a total QNI 443 QTC 63 in 27 sessions. New appointments: KB3UD to ORS and N3BHS to OVS. Congrats. OO reports: KC3B N3BFL W3FAF W3GVR W3KEK. OBS reports: K3EBZ KB3VL N3CJP W3CL W3VA WB3CAI WB3FVJ. OVS report from N3BFL. PSHR reports: AA3B K3JSZ K3RHI KA3GJT KB3UD N3AJQ N3BFL N3CJP W3DP W3VA WA3EHD WA3WQP WB3FKP WB3FYT WB3HTW. New gear: AF3Z, a IC2AT; KA3A, a IC-720A; KA3AJC a TS830; KA3FJJ an 11-ele 2mtr beam. Upgrades: KB3RW and KB3UD to Extra: N3AVZ WB3HTW WB3LUJ to Advanced; KA3EEZ to Tech; KA3IFG, new Novice in Williamsport area. Call changes: KA3CRP to KB3WW; KB3VM to N3CJP; N3AZT now KE3U. EPAEPTN welcomes WA2WXM/3. EPA welcomes KA3BOS KA3DLY and KF3J. PFN welcomes WA2WXM/3 KB3BG KB3N and KB3UD. W3KT was guest speaker at Carbon ARC banquet and new officers for the CARC are: WB3JYY, pres.; WB3JZE, v.p.; WB3FVJ, sec/treas. KA3DLY KA3ECC and WB3KUZ report for first time. Welcome aboard. K3JSZ sez SS was lots of fun but had to share rig with KA3CAT, his XYL. Hi. New officers for the DL-ARC: N3BIB, pres.; N3BHF, v.p.; K3NWM, sec.; K3RI, treas.; AC3M W3GMN W3PYF WB3EVL, directors. Nice to hear OTs K3KW and K3NGN in the cw nets again. WB3FKQ/rpt now on 29.51/29.61 MHz linked with 2 mtrs. WB3FKP installing new station console. N3AJQ back home after a stay in the VA hospital. WB3DJF reports antennas installed and operating at Falls Twp CD building and he had lots of fun at PA Party. WB3FYT working DX on 6 mtrs. AA3B reports PWA had excellent turnout for both the PA QSO Party and the SS in Nov. WB3HTW back to the salt mine after illness and misses those afternoon nets. N3CAY now Gen class. Traffic: WA3WQP 295, K3JSZ 276, W3DP 208, KB3UD 203, WB3HTW 149, W3IPX 124, W3FAF 90, WA3EHD 87, W3VA 87, KA3GJT 81, AA3B 71, N3CD 64, KB3LF 58, WA3OGM 57, W3TWV 44, WB3FKP 41, N3BFL 38, WB3KUZ 38, N3CJP 30, W3CL 19, WB3FVJ 18, WA3OFD 18, WB3CAI 17, W3ID 16, K3QXC 14, W3ADE 13, K3RHI 12, N3AJQ 11, WB3DJF 11, W3EEK 10, KA3DLY 8, AF3Z 7, K3EBZ 4, WB3FYT 4, KA3FJJ 3, N3AKQ 2, KA3ECC 2, KB3CC 2, W3HK 1.

MARYLAND — DISTRICT OF COLUMBIA: SCM, Karl R. Medrow, W3FA — SEC: WA3TAI. WB3LTA and RACES/ARES are still working over the results of their best ever SET. W3ZNW along with W3IRE WB3JKV KB3FS WA5UNR KA3COO and others provided a good demo of Amateur Radio during the Calvert Cliffs nuclear exercise when commercial communication circuits failed from overload! Congrats to you all for very realistic drills. WB3BFK is handling the PON workload for W3DFW while Gay is working out of town. W3LDD is very happy with his new transceiver. KA3CDQ won both the local and international prize as sales manager of the year. Congrats! Besides he has MDSN going great on 3735 kHz at 1930 local, Mon thru Fri. Join 'em! W3CDG reports an active new ham, N3CDA — his son. W3FZV has a new all-band dipole. It's good and he likes it. WA3VPL and son, N3CJQ are into DX. KA3CWA got lots of NCS practice this month. Laurel ARC officers: W3DQI, pres.; KD3S, v.p.; N3CKD, treas., K3LDE, secy.; WA2PIV, member-at-large. Congrats. N4DR is very pleased with the new beam and the new ground system for the low bands. Works great. WB3GZU mows 'em down with skeds everywhere. AK3X says his new keyboard stutters! W3UT is volunteer of the month. N5EAZ/3, formerly KA3HIY, went from ORS-II to ORS and his upgrade. KA3GWH to General. Congrats. W3VBM is an antique car buff. KC3D got himself a Model 33 for RTTY. W3CDQ entertained ZS2AA, the first YL in ZS-Land, if all goes as planned the AARC will have N3FN, pres.; WB3KIW, v.p.; N3BDW, secy.; KA3ERP, treas. WA3FYZ/m is exclusively mobile and well heard. KA3HKB is getting into many activities as a new appointee. K3CXB is a new OO. WB3KJT finds work interferes with his fun. KB3NL was so busy helping others he almost forgot himself. W C 2 mtr/W3GEJ 4/2/18.5. WRPON/W3DFW 22/29/22.5. MDSN/KA3CDQ 13/9/4.4. MDD/W3PQ 60/241/8.8. Brass W3FA WB3GZU K3JL. MEPN/WB3GZU 31/152/27.6. 100% WB3BFK WB3GZU K3ONU KB3VP. Others N3AGM W3DKX W3DLA WA3IHW. Traffic: WB3GZU 910, KA3CDQ 173, W3FA 150, W3UT 146, W3ZNW 64, KA3CWA 60, N4DR/3 40, W3DQI 39, W3FZV 37, WB3BFK 34, W3LDD 22, N5EAZ/3 13, WA3VPL 12, AK3X 5, KC3D 4, WB3KJT 2, KB3NL 2. (Oct.) W3CVE 256.

SOUTHERN NEW JERSEY: SCM, Bill Luebkemann, WB2LCC — STM: WB2LCC. SEC: W2HOB. November is a month when clubs plan lots of Christmas activities. Among the most popular is the annual dinner meeting that all clubs (well, almost all clubs!) hold. Almost all are held in December and this year was no exception in SNJ. Almost every club newsletter I get (and I do read them all!) is encouraging the members to come to the annual dinner meeting, eat, drink and be merry; and most of all to VOTE. New officers will be taking over most club helms on January 1, with lots of campaigning going on in December (Campaigning, verb, 1. The art of trying to convince the membership of your club NOT to vote for you!) Best of luck from the section staff to all the lucky winners (free for another year) and the unlucky losers who will have to work for another 12 months! On another front, the ARRL is considering a change to make the SCM job a more wide ranging position entitled section manager. More responsibility will be assigned, with more authority to delegate tasks to willing volunteers. If details of this haven't been printed in QST by the time you read this, contact me for details. It is important you let our director, W3KT, know of your opinions on these wide ranging proposals ASAP. I'll try to have more details next month as space permits. Traffic: N2CER 334, WB2PKG 112, KA2GSL 101, W2ZQ 79, AA2H 71, KM2E 28, WB2GFM 27, WB2JCE 27, WA2HEB 25, WA4JRP 23, WA2PTQ 23, WB2LCC 20, K2UL 11, KD2Q 10, WA2GTJ 5.

WESTERN NEW YORK: SCM, William W. Thompson, W2MTA — SEC: W2BCH. STM: N2APB. ASCM: W2GLH. DECs: WA2AIV KA2BHR WA2DHZ WB2NAO WB3CUF. Appts: N2BLX-STAR NM; WA2PJC OO; KE2K ORS; KA2BHR DEC Central; K2DHR EC Orleans. THANKS: N2ALI and KI2D for leadership during '81; Western District ARES during Nov 6 Akron alert. Silent Keys: REYCO Trap developer W2VS; Mr. Amateur Radio, W1BDI. PSHR: N2APB N2ARD KA2CTU KA2DBD/T W2GLH KA2GOH WB2IDS WA2KOJ W2MTA WB2OWO WB2TXK W2ZOJ. BPL: W2MTA. Other reports: OO-WB2MMB 22, N2NW 8; OBS-W2GLH K2KWK; OVS-K2OR. Two meters hot/432 perking. W2SEU 6M FY7-HC-HK-KL7-LU-PJ-TI-VY 8P DX in Oneonta. CVARA looking for 07/67 reactivation soon near Norwich. RAWNY '82 classes WA2FKV KA2IWJ W2PNV WB2RNR will instruct. Second harmonic heard in shack of AE2T and WD2AIM. Club officers: GRAM — WB2ODH KD2Y WA2ODD WA2HED; LARA — WB2BGA N2BIC WD2AIM KA2EGC; RAGS — WA2VSU WA2URK K2SDD WA2PUU WB2NCK; Mohawk Valley QCWA — K2IXN W2ICS. NYSPTEN '82: KA2Q WB2HKU K2VTT KD2V AA2Y. W2TZ high QRP score ARRL DX Test. PS events: SVARA BC Criterium, Rome Crop Walk. Mark calendar: Owego May 1, Rochester May 14/15, Batavia July 11, Traffickers Picnic Aug 14.

Net	Freq.	Time/Day	QNI	QSP	QND
NYS/*	7077	1000/M-S	83	40	16
NYSCN	3677	1000/Sn	53	15	5
THIN	3913	1600/Sn	47	—	4
NYPON*	3913	1700/Dy	638	395	30
NYSPTEN	3925	1800/Dy	765	98	30
ESS	3590	1800/Dy	368	57	30
OCTEN*	34/94	1830/Dy			
Q NET	31/91	1830/Dy	438	19	30
STAR/E*	99/39	1830/Dy	73	53	19
WDN/E*	04/64	1830/Dy	487	90	30
NYS/2*	3677	1900/Dy	355	220	30
JCARCN	10/70	2000/Dy	253	1	26
WNYECN	3955	2000/3rd Sn	(ARES Coord)		
OARCN	25/85	2000/W	68	0	4
WIN	04/64	2000/M	(SKYWARN)		
SLVARES	31/91	2100/Sn	41	1	5
CNYTN*	40/00	2115/Dy			
NARASEN	22/82	2130/Sn	73	2	5
STAR/L*	325/925	2130/Dy	54	20	16
WDN/L*	04/64	2130/Dy	810	137	30
NYS/3*	3677	2200/Dy	325	187	29

*NTS nets. Oct. NYPON 545-257-31. ARES needs Emergency Coordinators in Cattaraugus, Cayuga, Chautauqua, Chenango, Essex, Fulton, Hamilton, Herkimer, Madison, Schoharie, Schuyler, Seneca, Yates Counties. Traffic: W2MTA 502, WA2HSB 291, KA2CTU 257, W2ZOJ 222, WB2OWO 218, WB2IDS 192, K2GWN 181, KA2CLT 124, N2APB 112, W2GLH 109, KG2D 71, WB2QIX 71, KA2GOH 68, W2FR 63, WA2KOJ 56, WB2LJK 53, W2PZL 47, AF2K 43, WB2TXK 42, KA2BHB 36, W2RQF 33, N2ARD 32, KA2BHR 22, K2RN 22, WB2SGI 22, N2ABA 18, WA2RXO 18, KA2DBD 16, K2AFE 14, WA2AIV 14, WA2MFU 14, AF2A 12, WB2NAO 9, N2CSB 6. (Oct.) AF2A 51.

WESTERN PENNSYLVANIA: SCM, Otto L. Schuler, K3SMB —

Net	QNI	QTC	Sess.	kHz	T/D
WPACW	420	161	30	3585	7:00 P/D
WPAPTN	668	162	30	3983	6:15 P/D
WPA2MTN	490	66	30	146.28/88	8:00 P/D
NWPA2MTN				146.04/64	9:00 P/D
PFN	345	341	30	3958	5:00 P/D M-S

W3ELP and N3AKS are Silent Keys. Our sympathy is extended to their families. Upgraded: Tech — KA3GWA; General — KA3CDV WB3FNT; Advanced — N3AQZ KB3WF. New calls: KB3WG (KA3GPY), KF3V (WB3JGD), KB3WC (KA3EBF), KF3X (KA3BRO), KB3WD (KA3EUO), N3CMV (KA3GWA). Steel City ARC 1982 officers: WA3BKD, pres.; WA3TSI v.p.; WA3FWA, treas.; KA3AIN rec. sec.; W3UUH, corr. sec. Our thanks to K3HWL for all his efforts in getting the amateur PA license plate mess finally settled. It was a tough job, and consumed much of his time. Remember that the NMs, DECs, SEC and STM are all volunteers and if you do not like what they do don't critisize. Pitch in and give them your help. Those who complain the loudest do the least. Amateur Radio is a public service and all should help. The Breezeshooters Ground Wave Contest 11-28 was really a success. The ten meter band was jumping for five hours. It seemed that all the tri-state hams joined in. Please notify me of your new and old call so the records are complete. N3ADU has made BPL again. Traffic: N3ADU 502, KB3DT 209, AC3N 168, N3FM 156, W3IA 123, K3CR 115, W3EGJ 76, KA3CDV 51, W3SMV 51, KB3BG 45, N3KB 42, K3SMB 40, WA3UNX 38, WB3WX 36, WA3QNT 34, W3RUL 32, W3MML 27, W3KUN 20, KB3NV 20, K3VQV 20, N3BKU 19, KF3V 15, W3EXC 13, N3BKV 15, K3LTV 12, W3SN 12, W3VX 11, WB3GUK 10, W3NGO 10, W3AHH 9, W3YO 8, K3HCT 6, W3KMZ 6, KA3BGC 5, W3TTN 5, W3LOD 1. (Oct.) KA3DEH 29, N3KB 27, WB3KJH 5.

CENTRAL DIVISION

ILLINOIS: SCM, Larry M. Keeran, K0ORP — SEC: W9QBH. STM: WB9JSR. ASCM: WD9EBQ.

Net	Freq.	Times/Days	QTC	Sess.
ILN	3690	2300/0300 Dy		
Il Phone	3915	2130 Dy	162	
NCPN	3915	1200/1700 Dy	169	49
IEN	3940	1400 Sn	7	5
ITN	3705	1900 local Dy		

D9RN 100% stations: W9HOT W9NXG K9EHP WB9ODN WB9QGD K9UZA K9BVE. DRN9 100% stations: W9NXG WB9WGD W9HOT. W9VEY memorial station had 12 QTC in 5 sessions. Each month some dedicated stations check into traffic nets as regular as clockwork, taking

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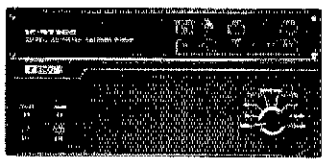

COVERS 160-80-40-20-15-10 meters plus new WARC-79 bands.
CONTROLLED by band switch in IC-720A or IC-730.
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MATCHES output impedances 16.7 to 150 ohms (VSWR 3:1).
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VOLTAGE, 12VDC @ 0.5A or 115/220VAC @ 13 watts.

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Brand new transceiver covers entire 220MHz band, provides simplex and duplex operation. Identical in size, appearance to popular IC-2A series and fully compatible; can use same accessories. Power output, nominal 1.5W w/standard IC-BP3. Comes complete with NiCd battery pack, wall charger, belt clip, "rubber duckie" and wrist strap.

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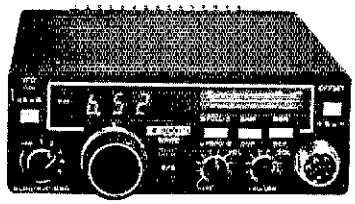

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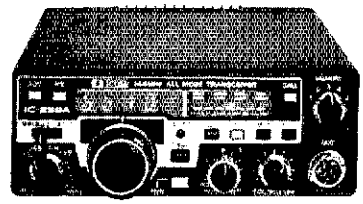

IC-290A 2 METER FM/SSB/CW TRANS-CEIVER

5 memories/Priority/Scan/Squelch on SSB. 10 watts p.e.p. SSB, 10 watts output FM and CW. Operating voltage 13.8VDC.

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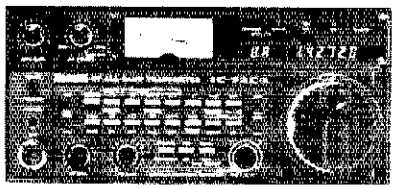
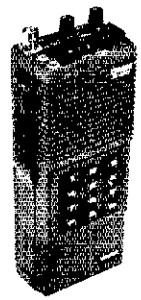
IC-720A ALL-BAND TRANSCEIVER



All nine HF bands • All solid state • Broadband tuned • Digitally synthesized w/10Hz resolution • Two VFO's • General coverage receiver, 0.1MHz to 30MHz (no transmit, general coverage) • Simplex, duplex • RIT • 100W p.e.p. output on SSB, 100 W CW and RTTY, 40W AM • Digital readout • Passband tuning • Operating voltage, 13.8VDC @ 20A • • Dozens of other desirable features.



IC-2AT
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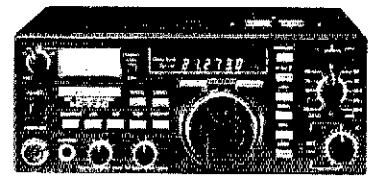
(Regular)

IC-730 MOBILE TRANSCEIVER



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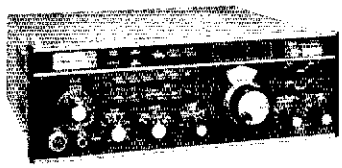

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- CONTINUOUS FREQUENCY COVERAGE: Continuous receiver coverage, 1.5-30MHz. Transmit coverage, 160 through 10 meters.
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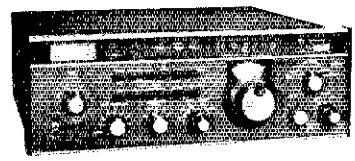

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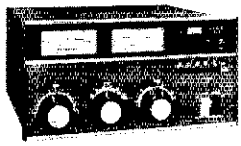
L-7, 2KW LINEAR AMPLIFIER.

Continuous duty cycle, 160-10M.*

Temperature controlled design for "key-down" operation over wide freq. range. Features wide coverage for new HF amateur bands, MARS, other services authorized by FCC amplifier rules.



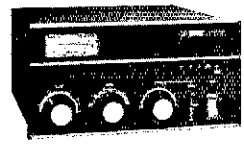
2KW pep, 1KW CW, RTTY, SSTV. Uses two 3-500Z triodes. Has accurate built-in wattmeter. Separate power supply operates on 120/240VAC, 50/60Hz.

*10 meter coverage available only on export models.

L-75, 1.2 KW LINEAR AMPLIFIER.

1.2KW pep SSB continuous, 1 KW CW, 50% duty cycle

160-10 meters* plus expanded ranges, future HF band expansion or additions within FCC rules, also MARS, other services.



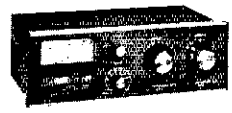
Uses single 3-500Z triode. Built-in power supply operates on 120/240VAC, 50/60Hz.

*10 meter coverage available only on export models.

MN-2700 MATCHING NETWORK.

160 thru 10M coverage plus MARS, future band expansions. Matches antennas fed with coax, random wires, balanced lines (with optional B-1000 balun). Built-in RF wattmeter/VSWR bridge. Handles 2000 watts pep, 1000 watts continuous.

MN-75 MATCHING NETWORK.

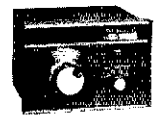


Covers 1.8 to 30MHz. Matches antennas fed with coax, random wires, balanced lines (with optional B-1000 balun). Built-in RF wattmeter/VSWR metering. Handles 200W average, continuous duty.

WH-7 RF WATTMETER.

Covers frequency range of 1.8 to 30MHz. Has three scales: 0-20, 0-200, 0-2000 watts, also VSWR scale.

RV-7, VFO FOR TR-7.



Connects with TR-7. Can be used for transmit, receive or transceive frequency control. Has spotting switch.

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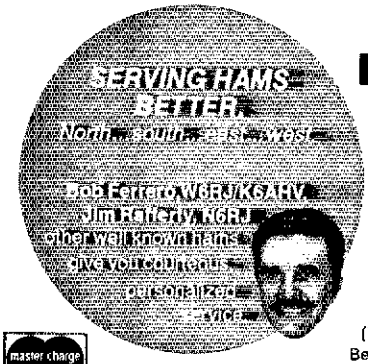

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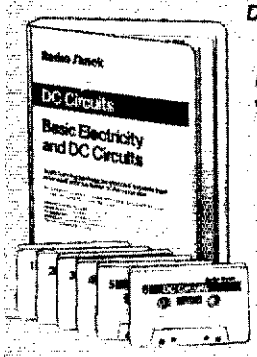

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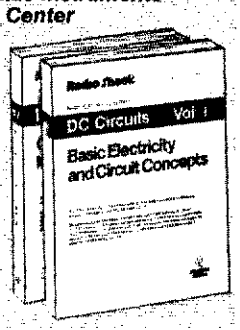

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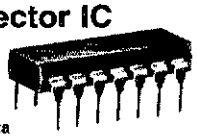

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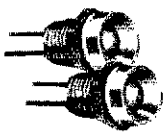

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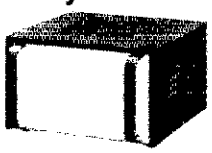

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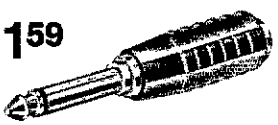

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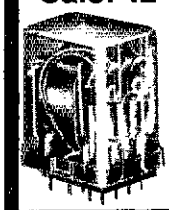

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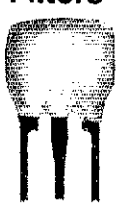

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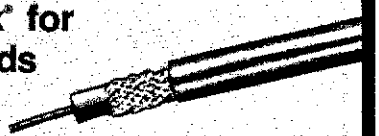

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messages from the NTS. The reward is knowing that a job was done well, by them. I recognize the stations each month by listing them at the top of this column. Those stations have represented Illinois in Section Nets, and account for any traffic for this state to have an outlet and a means to be delivered. Hats off to them. Hams in southern Illinois working under the auspices of ARES have begun a close association with the local ESDA offices and the St. Louis NWS Forecast office. Many of the area hams have participated in severe weather spotter classes taught by NWS personnel. During storms info is passed from the ARES members back to the NWSFO and the ESDAs via ht and 2 meters. In order to keep the hams posted of weather developments on a day-to-day basis as well as during storms, WD9EBQ has installed an Amateur Radio teletype system which passes information from the Illinois weather wire to RTTY equipped hams on 147.39 MHz. The system is patterned after the Brookfield WB9AGH operation which is run by the SEC. A request-reply computer system is also in the making which will have data from the IWW and also from aviation service "A". The computer system is the brain child of about-to-be Novice Chuck Williams with assistance from W9LFF. Illinois NVOAD meeting December 5th was attended by SEC W9QBH and newly appointed ASEC K9ZDN. WD9EBQ continues as ASEC for southern Illinois. Plans underway for seminar for ECs and ARES in Champaign in October. N9AOP, EC, Will County, is new chairman of Chicago Area SKYWARN Council. W9QBH is collecting the call signs of those interested in growing with packet radio. Chicago area meeting will be called in the near future. WA9CFM presented a paper, co-authored by W9SKD at the Washington, DC Amateur Radio Computer Networking Conference, on Illinois and packet switching. The Central Illinois Chapter of the Quarter Century Wireless Association had the Central Division Director, W9PRN as a guest speaker on October 31st. He gave a presentation of what "ham radio" will be like in future years. The new QCWA officers are W9MRT, pres.; W9ROK, v.p.; W9CFV, sec. The St. Clair ARC at Belleville had a 100% pass rate for exams taken in St. Louis during November. Seven Novices upgraded: five to General & two to Technician. Congrats to training manager, WA9SQE. The IEN, which has been in existance since November 1940, has a new net manager, W9TLU. He will make the net more effective by participating in the overall Section plan for emergency communication. Bulletins: WD9EBQ 234. Traffic: W9HOT 349, W9NXG 335, WB9WGD 204, KB9X 161, W9JIJ 140, W9TLU 95, KN9BAM 94, W9RJW 84, K9EHP 67, W9LNQ 45, W9OK 39, WD9HZF 36, W9QBH 26, W9KR 10, W9KSU 6, KA9BYB 4, W9SSP 3, WB9EDP 2.

INDIANA: SCM, Bruce Woodward, W9UMH — SEC: W9UMH. STM: W9JUJ. NMs: ITN W9QYY; QIN WD9GXW; ICN N9AEI; VHF W9PMT; IWN K9DCX; IPN W9DLF.

Net	Freq.	Time UTC (Daily)	QNI	QTC	QTR	Sess.
QIN	3656	1430/0100/0400	877	494	2333	89
ITN	3910	1330/2300	2317	353	2433	60
ICN	3708	0015	152	41	79	30
IPN	3910	2130	1023	108	689	30
IWN	3910	1310	1638		423	30

Hoosier VHF Nets: QNI 4852, QTC 145, QTR 7268, bulletins 58 for 233 nets. D9RN QTC 415 in 60 sessions. IN 100% QNI: W9JUJ K9CGS W9URQ WB9MIK W9DLF K9KTB. CAND: QTC 1112 in 30 sess. D9RN 100% IN QNI: W9JUJ AB9A. 9HN QTC 643 in 1455 minutes. IN QNI: W9QLW W9JUJ W9EI W9XD N9AEI N9HZ WD9GXW KI9R KJ9J KK9K K9WWJ WB9UYU WA9OCF. Appts: KA9DHL ORS; KA9IYJ EC; K9PQP DEC for Henry, Rush, Decatur, Franklin, Fayette, Union, Wayne. K9KTH DEC for Monroe, Owen, Brown, Green, Lawrence. WB9ZQE DEC for Marion, Boone, Hamilton, Madison, Hancock, Hendricks, Morgan, Johnson, Putman, Shelby. Silent key W9LDT. Thanks to the ACARTS for a fine Fort Wayne Hamfest and to W9JUJ for a very well attended ARPSC Forum. WB9ZQE reports several Indiana stations have established liaison with the Midwest RTTY Net on 3630 kHz at 0230Z dy. This net has late session outlets to 9RN, CAN and EAN. The net could use more Indiana RTTY stations. I would like to see an Indiana RTTY Net. Please contact WB9ZQE if you are interested. We are pleased to hear that W9NGS is home from the hospital. The Tri-State ARC is planning a 2M fm with Santa. Clark Co ARC is to operate from Bethlehem, IN. Pike and Dubois ARCs will work all from Santa Claus, IN. Bartholomew ARC will have Christmas from the Mail. Congrats to EC N9CQD for his Golden Mike Award from Porter Co ARC. It was good to meet K9LSB at Fort Wayne. HAMS, Inc. puts out an excellent newsletter. Everyone is pleased with the BEACON, a new publication of the Indy Repeater Assn, WB9ZQE editor. Congrats to the Clark Co ARC for their help with the Turkey Trot. For all the races those guys help with they should be in great shape. Traffic: W9JUJ 1209, W9FC 362, WB9UYU 191, W9EI 148, KJ9J 144, N9AEI 142, W9QYY 118, W9UMH 105, W9URQ 92, W9WKM 82, K9FZX 58, K9DCX 54, W9PMT 52, W9IOH 50, K9WWJ 47, WB9MIK 39, WB9ZQE 36, WD9ART 28, WB9DIX 27, WB9AWI 26, KG9K 22, W9XD 20, KB9HH 19, W9QLW 18, WB9YAY 18, WA9OHK 16, K9TKE 16, K9DIY 13, WD9DWD 12, W9RTH 12, W9WEI 12, W9DLF 12, WA9OKK 11, N9PS 10, K9FHQ 9, W9UPI 9, K9CGS 8, WD9CIV 7, WA9JNC 7, N9AST 6, WD9EXI 6, WA9KWH 6, N9CQD 5, N9CBC 4, N9BLK 3, W9DKP 2, KB9WI 2, W9YEW 2, W8LKU 1, W9BDP 1.

WISCONSIN: SCM, Roy A. Pedersen, K9FHI — SEC: W9OAK. STM: K9UTQ. BWN 3984 1215Z QNI 1090, QTC 1251 WB9YPY. BEN 3985 1800Z QNI 650, QTC 187, WB9ESM. WSBN 3985 2300Z QNI 1103, QTC 362 WD9ESZ. WNN 3723 0000Z QNI 231, QTC 74, KA9HPO. WSSN 3645 0030Z QNI 202, QTC 59, N9BYK. WIN-E 3662 0100Z QNI 391, QTC 200, W9YCV. WIN-L 3662 0400Z QNI 333, QTC 176, K9LGU. XPO 3925 1900Z QNI 349, QTC 43, W9AKY. NWTN .34/.94 0030Z QNI 526, QTC 45, WB9YPY. Gr Bay .72/.12 W 0030Z QNI 13, QTC 1, WB9NRK. WCWTN .31/.91 0030Z QNI 291, QTC 43, N9AUG. K9GDF is a member of the QCWA. KA9KAG has General. March 21 Tri-County Swaptest Jefferson County Fairgrounds, April-MARA Swaptest Dane Co Forum building Madison; details later. Please note new time for XPO net, 1830Z to 1900Z. Regret to report K9TAJ and W9KXK as Silent Keys. WSSN, WIN-E, WIN-L BWN, BEN, WSBN, certificates to KA9IKR. YTARC celebrated its 2th birthday in October. W9IHB received his DXCC. KA9KKJ received her Tech. W9NA made DXCC Honor Roll with 312 countries. KA9CPA and WD9ESZ made BPL. New Novice in Clintonville area is KA9DMS. WIN-E certificates to WD9DHF and KA9GYD. BEN certificate to KA9AIV. Traffic: KA9CPA 1905, WD9ESZ 528, WB9YPY 352, W9YCV 234, W9CXY 209, K9GDF 201, K9FHI 193, W9DND 185, N9AUG 166, N9BYK 135, W9UCL 121, KA9HPO 107, K9AKG 104, W9IEM 103, WA9WYS 84, AG9G 82.

64, WB9ESM 62, W9LDO 62, KG9B 58, N9BCX 49, W9IHW 47, W9SO 47, W9KTG 46, KA9IKR 45, WB9JSW 44, WB9ICH 42, WA9ZTY 40, WB9NRK 39, K9AQ 38, K9JPS 38, K9VSY 38, KA1EBA/9 37, N9ATP 37, KC9GW 37, K9UTQ 37, K9UU 36, WB9WNA 35, N9BDL 31, KB9NG 30, K9ANV 28, WB9YPZ 26, WD9BKT 24, K9HDF 23, WA9DXW 21, K9EC 18, W9UW 15, KE9C 14, WD9IMZ 13, KA9EMF 12, WA9GGH 11, KB9FM 8, KA9IHR 7, KB9W 7, W9NA 2.

DAKOTA DIVISION

NORTH DAKOTA: SCM, Lois Jorgensen, WAØRWM — Congrats to new Novices KAØMOI KAØLPX KAØMMC KAØKRY. Tech to Gen — NØCMC KAØBKO. Nov to Gen — KAØGVH. Nov to Adv — KAØLPX. Will have more upgrades from Dec. 2 tests. The BARK and Teddy Roosevelt clubs each had an Amateur Radio display in the malls and reported good attendance, interest and activities. FORX club had their annual hamfest with good attendance from other area clubs as far as Minot and several from VE4-Land. At the banquet the MC was non-ham Lyn Klug, XYL of KAØA who did a tremendous job with jokes and all. KØGA, ARRL Division Director was the guest speaker. The SCM also attended. The club did very well as more attended the banquet than expected but got all in one room, so now we know how sardines feel in a can. Traffic: WAØRWM 146, KAØFSM 12.

SOUTH DAKOTA: SCM, Erv Heimbuck, KØOTZ — Belated seasons greetings to all. Hope Santa was good to you. I imagine that new rigs will be on the air by now. Special thanks to Frankie for all her help. I hope that by now someone has sent in the nomination form for the SCM position. This is a challenging job requiring a lot of time and effort, but it is rewarding. I just do not have the time required. WØKJZ has been very active as a new OBS. She has been exceeding 15 OB transmissions per month since her appointment. She should be commended also for making PSHR every month since I can remember. Congrats. Net activity has been very high also with the net reports and station activity reports coming in. The antennas are up and working well for the new Green Mtn repeater. Many upgrades this time in Rapid City. Traffic: WØKJZ 44, WAØNZA 1.

DELTA DIVISION

ARKANSAS: SCM, Dale E. Temple, W5RXU — SEC: WB5IGF. APN mgr effective Dec 1 W5QFU, Malvern. Appreciate W5UAU serving these past months. APN report 592 QNI, 33 tfc, 1053 min. OZK NM W5MYZ, 189 QNI, 28 tfc, 432 min. Mockingbird NM WA5ZWZ 616 QNI, 50 tfc, 9 hours. Razorback NM KC5CE, 1324 QNI, 75 tfc, 679 min. ADXA held quarterly meeting in LR Dec 5 with 100 plus in attendance. N5CMA rptr, LR on Shinall Mtn provided emergency communications for Childrens Hospital Nov. 6. NWAARC held club auction Oct 16 & annual banquet Nov 14. K5GO presented W4RHD HAM OF THE YEAR AWARD & WB5SFN RAZORBACK AWARD. Traffic: AE5L 76, W4AZJ 65, W5QFU 35, W5UAU 32, W5KL 22, W9YCE 19, WB5GQH 13, W5TUM 6.

LOUISIANA: SCM, Jim Glammanco, N5IB — N5IB and WD5CMA have just welcomed a new baby girl to the family. So now you know why it's been so hard to find your SCM. LA was 100 percent on DRN5, thanks to KA5HDT WB5LBR KC5SF and W5LQ with KA5DHT and W5LQ also on CAND. The Delta DX Assn placed second nationwide in this year's Field Day. Congrats to all the DDXA members. State Communications Officer Al Bennet addressed the most recent meeting of the MTARC. Welcome to newly ARRL affiliated clubs, the Bastrop ARC and the Louisiana Tech ARC. Interference on two meters from cable TV systems has cropped up in the Lafayette area. Be sure to investigate any unusual vhf interference before you dismiss it as unavoidable. This cable RFI is beginning to show up as a real threat to amateur operations. The New Orleans VHF Club will be providing communications again at this year's Mardis Gras Marathon. Don't forget that the Lafayette Hamfest is coming up in March.

Net	Freq.	Time	QNI	QTC	Mgr
LAN	3615 kHz	7 & 10 P.M., Dy	388	170	K5TL
LTN	3910 kHz	6:30 P.M., Dy	84	12	
LSN	3703 kHz	7:30 P.M., M-F	—	—	WB5IYH
LRN	3587.5 kHz	6:30 P.M., Su & P.M. W	1	1	N5RB

Traffic: K5TL 238, N5RB 130, NC5SF 89, AC5R 44, W5VMY 43, WB5LBR 33, WD5CWK 10.

MISSISSIPPI: SCM, Paul Kemp, WB5SNB — SEC: WB5FXA. STM: KB5W. Freq Coord: WD5DCI. Congrats to W5CH as Delta Division Director. Good things are in the future with the new program from the LRPC. If you want to become involved and make things happen, contact myself or W5CH. Still need help as NCS on MTN. KA5FDD now KD5DG. New officers for Vicksburg club are: WB5YKR AK5K K5IMT WB5OWY. Reports are down; remember to send in your reports. CAND (W5KLV) sess 30, QTC 1112, MS rep 100%. DRN5 (WB5YDD) sess 30, QTC 368, MS rep 97%. MTN (K5OAF) sess 30, QNI 174, QTC 77. MSBN (WD5EYM) sess 30, QNI 2247, QTC 60. MN (WB5RMW) sess 29, QNI 496, QTC 9. MSN (KA5GGG) sess 20, QNI 161, QTC 8. CAEN (KA5AGD) sess 5, QNI 123, QTC 3. CSEN (KB5W) sess 21, QNI 526, QTC 93. Traffic: KB5W 716, K5OAF 130, KT5Z 66, W5HKW 57, N5DDV 17, WD5EYM 11.

TENNESSEE: SCM, John C. Brown, NO4Q — STM: K4YOL. SEC: K4TKQ. K4TKQ of Rockwood has been appointed the new SEC for the Section. All communications previously submitted to W4NZW should now be forwarded to K4TKQ. Should also say that many of the counties of TN do not have ECs. Contact SEC about a possible appointment. He will start soon to contact as many as possible to bring his records up to date, and your help is needed in this task. Previous work indicates he will be very active as the SEC. Let's make a very active Section in emergency coverage. Just a reminder, if you plan to be in the Knoxville area for hamfest next season, better be thinking about overnight stay accommodations. They are still available, but get your bid in the pot. Honor roll is as follows: TSN — KA4AUR KA4JEC W4MRD W4UOI W4DDK WD4KCW WD4SIG K4VM WB4HSG KY4L WA4UCE NG4J KA4BSG N4DZW WA4CMS N4EAM NN4D N4EFB N4FTC KA4HPW KA4OVE KA4RJC W4ZJY KA4OXO KC4UH WA4LXP KA4PWU WB4YSN. That is some kind of record (28). TNCWN — W4DDK W4ZJY W4WXH KA4BSG N4EAM NO4Q K4WOP K4VM. TN CW Net "NCS Century Club" membership certificates awarded to W4WXH KA4BSG W4ZJY. Still being advised of many on the upgrade trail. Hope all are aware that FCC exams will only be given on a one-time per year schedule at four major cities. Net traffic: LF — QNI 4859, QTC 343, sessions 84; VHF —

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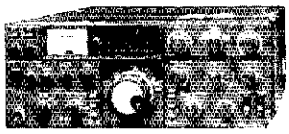

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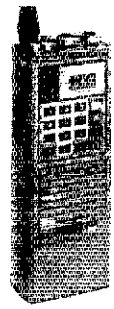

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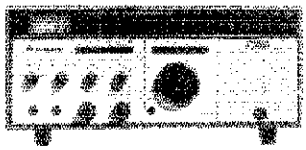

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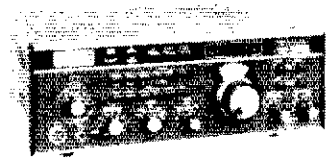
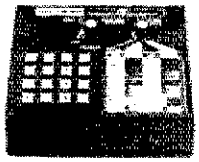
DRAKE TR7/DR7



Full Stock of Accessories Available

Limited Stock Available at Pre-October-Pricing.

AEA MORSEMATIC



- Dual Microcomputers provide many features.
- Approximately 500 character memory with unique "soft-partitioning."
- Morse trainer mode with programmable speed-up.
- Beacon mode for VHF DX scheduling.
- Automatic serial number sequencing.

SALE PRICE $165.95

Amateur Net $199.95

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Finally — a properly decoupled antenna with superior performance at a reasonable cost. Raise more repeaters or increase your simplex distance!

- Achieve maximum attainable gain for a twin 5/8 wavelength antenna.
- Patterns independent of mounting or feedline length.
- Greater than 9 MHz band width.
- Completely weather protected matching network and RF connections.
- Easiest to assemble. Mounts on standard TV master (NOT SUPPLIED).

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Other models also available

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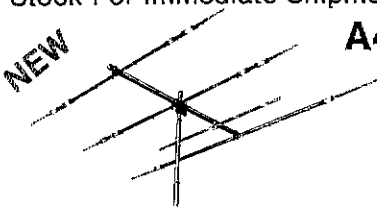
NEW

A4



maximum performance
20-15-10 meter beam

SALE $219.95 SAVE $80.00

40 meter adapter also available

AV-5

10 thru 80M vertical

SALE $99.95

SAVE $30.00

2M FM/SSB TWIST

A147-20T

2-10 element Yagis on 1 boom

SALE $59.00 SAVE $20.95

2M Boomers at big savings:

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32-19	3.2	λ	82.00	SAVE $27.95
214B	2.2	λ	67.00	SAVE $22.95
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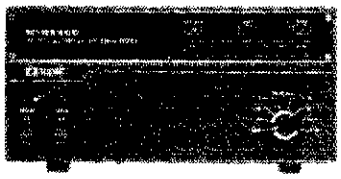
Amateur Net $829.00

*WITH FACTORY REBATE

Truly an exceptional buy. Measures only 3.7"(H) x 9.5"(W) x 10.8"(D). Dual VFO's with 1 frequency memory per band. Covers 10-80M including the new WARC bands. 200W PEP input.

NEW! AT-500 AUTOMATIC ANTENNA TUNER



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No adjustments necessary when changing frequency or bands. Fully automatic. Compatible with IC-730 and IC-720A.

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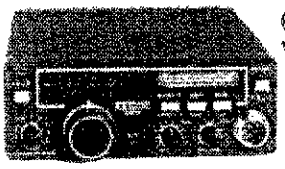
Full featured 2m FM transceiver in a very compact package. 25W too!



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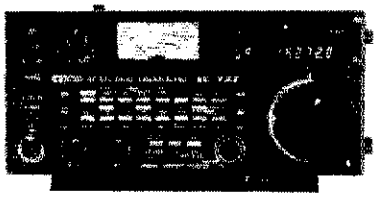
Amateur Net $349.00

Measures 2"(H)x5½"(W)x7"(D). Dual VFO's with band scan and memory scan with automatic resume after preset delay or carrier drop. Encoding microphone also included. 5 memories with priority channel. Tuning rates 5KHz (A VFO) or 15KHz (B VFO).

IC-720A HF TRANSCEIVER



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Available with all accessories

IC-2KL SOLID STATE LINEAR AMPLIFIER SPECIAL FACTORY OFFER

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Compatible with IC-701, IC-720A and IC-730. 500W output power on 160 thru 15M including 10MHz and 15MHz WARC bands.

NEW! IC-3AT

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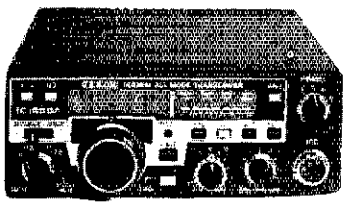
IC-290 2M ALL MODE TRANSCEIVER



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Covers 143.8 to 148.1999MHz FM,SSB (USB/LSB) and CW. Output 10W/1W. 5 memories with 2 VFO's and priority channel. Tuning rate 5 KHz or 1 KHz on FM. 1 KHz or 100Hz on SSB and CW. Squelch with scan operational on SSB.

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(Shown)

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QNI 3228, QTC 809, sessions 146; CW — QNI 1251, QTC 1285, sessions 113. Traffic: NG4J 548, W4WXH 542, W4OGG 398, W4ZJY 280, N4EAM 165, K4VM 118, N4EFB 116, N4DZW 100, W4MRD 98, W4DDK 71, KY4L 49, KA4RJC 48, KB4G 37, KA4OXO 35, KA4BSG 33, KA4IKT 29, K4DEC 22, W4PFP 21, NM4W 20, WD4SIG 20, WA4UCE 16, NN4D 16, W4TYV 20, W4PSN 8, K4WOP 7, WB4TDB 6, W4EWR 5, W4NZW 4, WA4GLS 3, WB4YPO 3, W4DPO 1.

GREAT LAKES DIVISION

KENTUCKY: SCM, Dave Vest, KZ4G — STM: KA4GFU. SEC: N4EEL. Nets reporting KRN MKPN KTN KYN KSN KNTN KEN BARES CARN 3ARES 4ARES 5ARES 6ARES 11ARES 13ARES KYPON PAEWTN SEKEN TSTMN CCEN MEN MRN PAWN. Total sessions 345, total QNI 6194, total QTC 1061. DCAN/D9RN 100%. New appointment: KA4BCM, ORS. New club in Winchester is Pioneer ARC. WA4YNV new president Bluegrass ARC. KC4MK new pres ARTS. AB4Y has Novice class on TV in Bowling Green. KA4WPC and KA4WPD new Novices in BG. RCARA has Novice class at community college through the Continuing Education Dept. Traffic: K4YZU 375, KA4MZY 286, KA4SAA 229, KA4GFU 157, KC4VB 154, WA4JTE 149, KC4AV 136, KB4QZ 86, KZ4G 77, WD4BSC 74, K4JLX 73, K4MHL 65, KS4V 58, WD4IYI 51, KD4TY 51, KC4WN 40, WA4SWF 34, K4HOE 29, WD4EKZ 27, KA4BCM 26, WD4CJO 25, WA4YPO 25, KD4SN 24, KA4MBF 20, KA4GBZ 17, W4PKX 16, WD4COF 15, WA4GAL 15, N4EEL 12, WA4AVV 12, WD4IYH 12, WA4JAV 12, WA4UQA 12, WB4NHO 11, NN4H 10, KD4IF 10, K4AVX 7, K4AXE 6, KA4SKV 4, KA4ADF 3.

MICHIGAN: SCM, James R. Seeley, WB8MTD — ASCM: WA8DHB. SEC: WA8EFK. STM: AF8V. DECs: KC8DN WD8MBB K8RCT W8VWY. NMs: KA8DEZ WA8DHB K8LNE K8KMQ WD8LRT WD8NKT WA8PIM W8SCW WD8RNQ WB8YDZ W8YIQ K8ZJU.

Net	Freq.	Time/Day	QNI	Tfc	Sess	Mgr
QMN*	3663	1800 Dy**	1271	468	90	WA8PIM
MITN*	3953	1900 Dy	740	392	30	WD8LRT
GLETN	3932	2100 Dy	1149	185	30	WD8LSV
UPN*	3922	1700 Dy	710	183	30	WA8DHB
MACS*	3953	1100 Dy**	623	136	30	K8LNE
MNN*	3722	1730 Dy**	373	133	60	KA8DEZ
WSSBN	3935	1900 Dy	597	44	30	WB8SUR
BR	3930	1730 M/S	361	21	25	WB8ZGP
MEN	3930	0900 Sn	179	7	5	WB8ZGP
TASYL	3922	1900 M	38	6	5	KM8E

*NTS Nets. Times local. **QMN late net, 2200; MNN late net, 2000; MACS Sn 1300. VHF nets 9 reports, QNI 508, Tfc 17, Sess 40, Mgr WD8NKT. 3932 kHz is MI emer. freq. Traffic workshop Sn 3935 kHz, 1600. ARES net Sn 3932 kHz, 1730. UP ARES Thur 3922 kHz, 1800. OO reports: W8QG AC8Y. Silent Keys, with deep regret: W8CJW W8CON W8YCN. New appointments: WD8MBB as DEC for South Central Lower MI, for weather operation coordination and NWS liaison; KF8M as ORS. New officers for Mich-a-Con RC: W8HFS, pres.; WB8SYA, v.p.; WD8BQT, sec; WB8EBS, treas. For Garden City ARC: KB8YG, pres.; KA8HZO, v.p.; KF8Z, sec.; KC8HR, treas. The Garden City group is starting a local net on 147.45 MHz, monthly, 1st Tuesday, 8:00 P.M. local time. WD8OEP announces the Ham Radio Rag Chewers Net, 7250 kHz, 0030Z, M/T/Th, newly formed last fall, is doing well. Stats for Nov.: QNI 43, traffic 3. Everyone welcome. New calls: WD8RWR now KS8P; N8BJD now KS8D. Put those two together on a net! (Yep, they do it!) Welcome to the monthly net listings to the TASYL net (The Auto State Young Ladies), a long-established organization deserving of a lot more recognition than they're used to. Lanse Creuse RC clearly is the winner of MCRC's annual Olinghouse FD award. Tops in class 7A (98th percentile) is hard to beat. The award will be presented at the State Convention in Muskegon in March. I hope to see a whole bunch of you there. A reminder: Your section leadership wants to get to know you; your SCM, SEC and STM are available for presentations at club meetings and ARRL hamfests. BPL: KA8CPS WD8LRT WB8MTD AF8V. Traffic: WB8MTD 638, AF8V 629, KA8CPS 336, WD8LRT 318, WB8ITT 302, KB8MX 236, WD8IBY 230, KA8AID 176, WB8YDZ 164, K8GXV 144, N8BNC 117, WA8PIM 112, W8VPW 112, WD8MJB 104, WD8OSE 99, WA8DHB 98, W8YY 97, KA8DEZ 94, WD8OEP 89, W8IHX 85, WA8TAQ 83, W8VIZ 83, WD8RHU 79, WD8EIB 71, KC8DC 66, W8JXJ 64, WD8NKT 64, KA8IWW 60, KS8P 58, W8SCW 57, K8RV 53, KA8LHJ 52, WD8RNQ 50, K8UPE 39, KS8D 38, W8YIQ 37, K8LNE 35, W8ECK 30, K8OCP 28, WB8YWA 28, WB8YRY 24, N8BBY 23, WB8DJS 23, WB8ZGP 23, K8ZJU 22, K8DD 21, WB8HPZ 20, KI8Q 17, K8CIP 14, W8CUP 14, W8TBP 11, W8BEZ 9, N8DGN 9, W8LDS 9, KC8EO 8, WD8JOH 6, K8KQJ 6, KF8M 6, W8MOF 6, W8RNQ 6, W8LOU 5, KB8Q 5, WD8BEN 4, KI8Z 4, N8CQA 3, WB8HSN 3, KE8X 2.

OHIO: SCM, Allan L. Severson, AB8P — ASCM: W8MOK. SEC: K8AN. STM: K8OZ. NMs: WA8RUW W8EK KF8J WB8JGW WD8KFN WB8YGW WB8YTD.

Net	QNI	QTC	Sess.	Time (local)	Freq.
BN	375	280	61	5:45/10 P.M.	3.577
BNR	262	93	30	6 P.M.	3.605
ONN	204	53	26	6:30 P.M.	3.708
OSN	206	160	30	6:10 P.M.	3.577
OSSBN	2826	961	90	10:30 A.M. 4:15 & 6:45 P.M.	3.9725
OSSN	150	44	29	6:45 A.M.	3.577
O6MN	681	32	30	9:00 P.M.	50.160

A typo in December's edition moved Cincinnati to another area of our state. Sorry. WA8SSI and the other officers mentioned in December represent the Cincinnati ARA. Congratulations to KN8W, 1981 TSRAC Special Recognition Award winner. I had the privilege of meeting KA8NXV, the eight-year-old (oops, nine now, I was informed) Novice I mentioned last month. She won a memory keyer in one of the TSRAC drawings, and filed her traffic report this month, so we older folks (10 and up) had better look to our laurels. Amateurs (and spouses and sibs) are certainly good company! This is the last opportunity I'll have to mention the Ohio State ARRL Convention in Cincinnati of Feb. 27 & 28. (Actually the 26th should also be noted as that evening will include a hospitality room sponsored by the Cincinnati FM Club, followed by the awesome rites of the Royal Order of the Wouff Houng.) All forums, exhibits and the flea market will be indoors, and the banquet will have a speaker of note. KB1O will represent Hq and the headquarters' hotel features a tremendous indoor recreation center. Hope your convention plans are already made. Club elections Greater Toledo ARA: KA8DLF, pres.; W8BHL, v.p.; W8CBA, secy.; KA8FKB, treas. Westpart Radiops: AC8X, pres.; KA8DGO, v.p.; KC8F, secy.; WD8BJL, treas. Upgrades: Extra — W8NLQ KA8DXW.

Local Nets	QNI	QTC	Sess.
ALERT	31	1	4
BRTN	360	221	30

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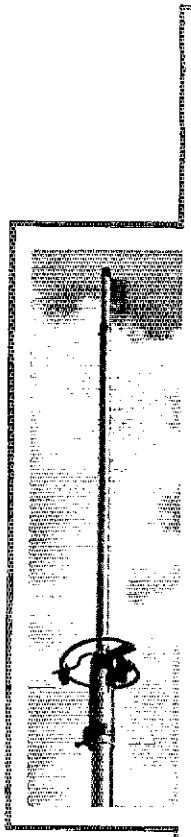

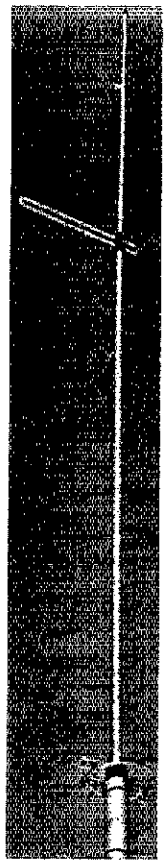

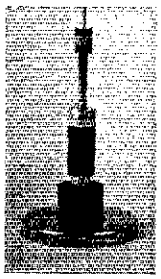

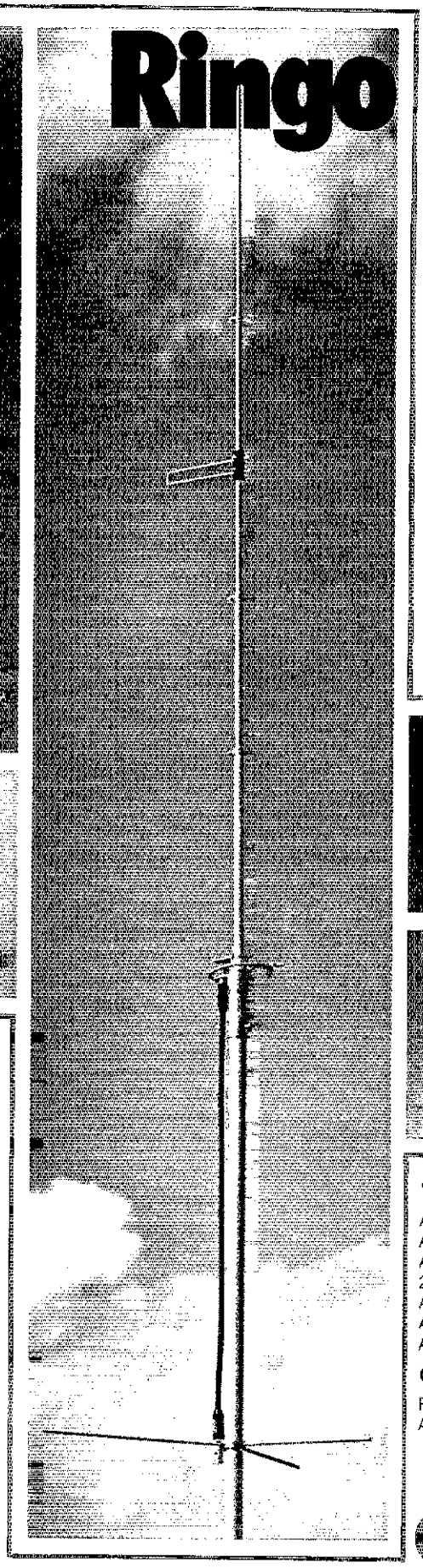

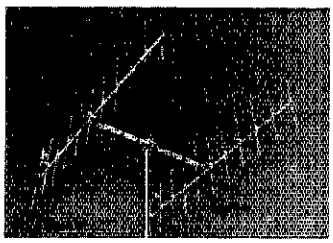

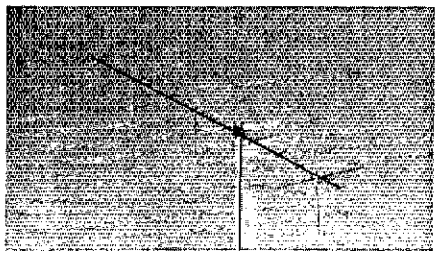

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RINGO RANGER

ARX-2	134-164 MHz

RINGO

AR-6	50-54 MHz
AR-2	135-175 MHz
AR-10	28-29.7 MHz
AR-220	220-225 MHz
AR-450	440-460 MHz

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S-147	144-148 MHz	Trunk Lip Mount
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S-220	220-225 MHz	Trunk Lip Mount

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A147-11	145.5-148 MHz	11 Element
A147-22	145.5-148 MHz	22 Element
214-FB	145.5-148 MHz	14 Element
A220-7	220-225 MHz	7 Element
A449-6	440-450 MHz	6 Element
A449-11	440-450 MHz	11 Element

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FP-107 Internal power supply ... 139.00
FP-107E External power supply ... 145.00
FV-107 Remote VFO ... 150.00
FC-107 9-band ant. tuner, 250w ... 150.00
FTV-107R Transverter w/no module ... 284.00
2m module only ... 154.00
6 meter module only ... 110.00
440 module only ... 255.00
SP-107 Speaker ... 29.00
SP-107P Speaker/patch ... 65.00
XF8.9B/XF8.9GA AM filter ... 45.00
Service manual ... 25.00

FT-707 8-band, 3.5-30 Mhz digital Xcvr ... 810.00
FP-707 Power supply ... 162.00
FV-707DM Dig VFO w/12 memories ... 279.00
FC-707 8-band antenna tuner, 150w ... 129.00
FTV-707 Transverter w/no module ... 129.00
2m module only ... 154.00
6m module only ... 110.00
440 module only ... 255.00
FRB-707 Relay box ... 39.00
MMB-2 Mobile mounting bracket ... 20.00
MR-7 Mounting rack ... 20.00

Other accessories for FT-107M/707:

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XF8.9HCM 450 Hz CW filter ... 50.00
XF8.9HCN 350 Hz CW filter ... 50.00
YM-34 Desk microphone ... 31.00
YM-35 Scan noise canx mic ... 20.00
YM-36 Noise canx mobile mic ... 20.00
YM-37 Mobile microphone ... 10.00
YM-38 Scan desk microphone ... 39.00

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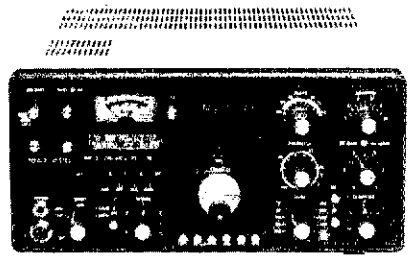

FT-101ZD MK-III 9-band dig. Xcvr ... 925.00
FV-101DM synth., scanning VFO ... 359.00
AM-101Z AM board ... 27.00
FM-101Z FM board ... 56.00
DC-101ZD DC converter ... 60.00
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FT-901 Series service manual ... 25.00

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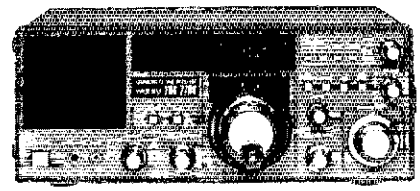
SP-901P Speaker/patch ... 76.00
YO-901P Monitor scope w/panadaptor ... 515.00
FV-901DM Remote VFO w/memory ... 415.00
FC-902 9-band ant. tuner, 500w PEP ... 199.00
FTV-901R Transverter w/2m module ... 389.00
6 meter module only ... 110.00
440 module only ... 255.00
YR-901 CW/RTTY decoder ... 730.00
CL-901 60 ma. Loop ... 30.00
YK-901 ASCII Keyboard ... 175.00
XF8.9HC 600 Hz CW filter ... 45.00
XF8.9HCM 450 Hz CW filter ... 50.00
XF8.9HCN 350 Hz CW filter ... 50.00
XF8.9B/XF8.9GA AM filter ... 45.00

Misc. Accessories:

YS-200 1.8-150 MHz wattmeter/SWR ... 79.00
YS-2000 1.8-60 MHz PEP watt/SWR ... 95.00
YP-150Z Dummy load/wattmeter ... 135.00
YH-55 Lo-Z headphones ... 15.00
YH-77 headphones ... 15.00
YD-148 Lo-Z goose-neck microphone ... 32.00
YD-844A Hi/lo-Z desk microphone ... 32.00
YD-846 Hi-Z hand microphone ... 17.00
YE-11 600 ohm hand microphone ... 17.00
YM-21 Noise cancelling microphone ... 20.00
YM-22 TTP mic for 127RA ... 69.00
FF501dx Low pass filter ... 34.00
QTR-24D Deluxe 24 hour world clock ... 49.00



Shortwave Receivers:

FRG-7700 150 KHz-29.99 MHz dig. Rcvr ... 549.00
MU-7700 Memory unit ... 149.00
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FRV-7700 118-150 MHz VHF converter ... 149.00
FRT-7700F 118-130, 150-170 MHz ... 149.00
FF-5 500 KHz VLF low pass filter ... 20.00
DC kit for FRG-7700 ... 6.00
FRG-7 0.5-29.9 MHz Shortwave receiver ... 319.00

VHF/UHF Transceivers:

FT-680R 6m SSB/FM/CW/AM Xcvr ... 520.00
FT-480R 2m SSB/FM/CW Xcvr ... 529.00
FT-780R 70 cm synth. All-Mode ... 785.00
FP-80A Power supply for FT-680R/480R ... 95.00
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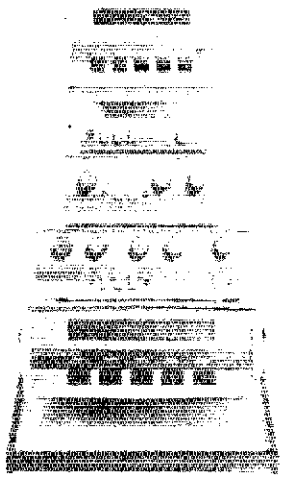

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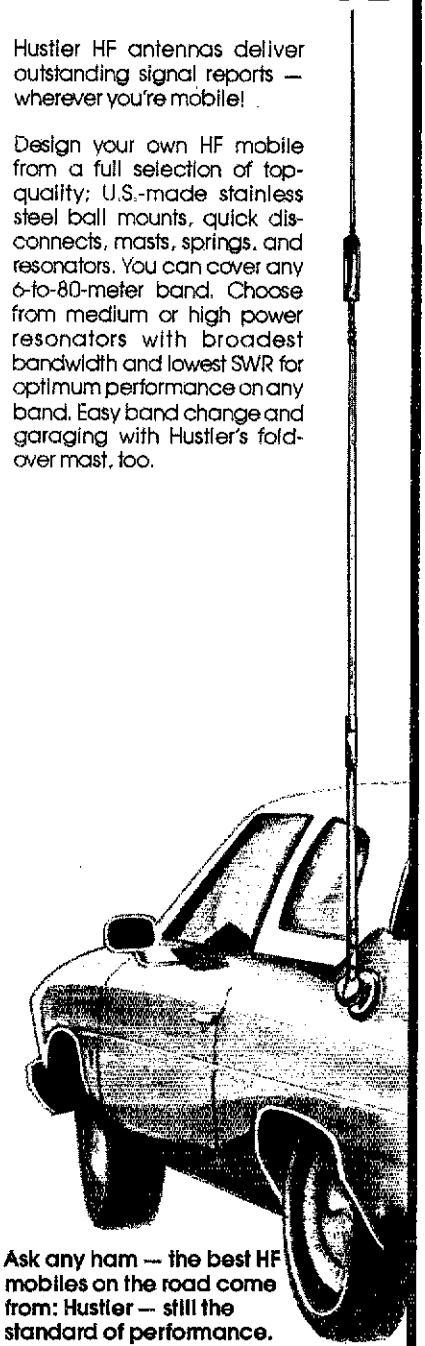

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HUDSON DIVISION

EASTERN NEW YORK: SCM, Paul S. Vydareny, WB2VUK — SEC: KB2KW. STM: WA2SPL. ASCM: W2IT KB2TM. Net listings, etc., will appear in next month's column again. Just a reminder. If you are around in the morning at 10 A.M. join the NYS CW net at 7.077 MHz Monday thru Saturday. Contact WB2EAG for further info! WA2SPL reports TA-36 tri-bander up and working. WA2RUW reports OMARC new officers for 1982 are N2AVN, pres.; K5NA, v.p.; K2HA, tres.; KA2AHW, dir.; WA2RUW, sec. Rip Val Winkle ARC had their holiday dinner on 20 Dec. WECA reports good dinner and magic on 19 Dec. Albany ARA reports KA2MBB upgraded to Adv, KA2MLX and KA2MLW upgraded to Gen. AARA also reports WA2QMF as Silent Key. Note: If you don't feel your speed is high enough for NYS CW, why don't you try ESS daily at 8 P.M. on 3590 kHz. Thanks to all those who attended ENY Staff meeting on 17 Jan. Let us look forward to the spring weather and public service activities for the coming year. Don't forget, these are golden opportunities for publicity for Amateur Radio! PSHR: N2BDW W2BIW N2CPX WB2EAG KA2KVZ KB2KW WB2MCO WB2TWQ WB2VVS W2YJR K2ZM K2ZVI. BPL: WA2SPL. Traffic: WA2SPL 517, WB2EAG 342, WB2MCO 164, W2BIW 141, KB2KW 102, K2EFU 97, KA2KVZ 68, K2MI 60, WB2VVS 54, W2YJR 53, N2BDW 50, K2ZVI 38, WA2CJY 36, AA2Y 34, N2AWI 25, K2ZM 22, N2CPX 19, WB2TWQ 14, W2IQK 12, WB2SON 12, K2HNW 9, N2CSX 7, WB2ELA 4.

NEW YORK CITY — LONG ISLAND: SCM, John Smale, K2IZ — SEC: WA2KKJ. STM: WB2BNY.

NLI CW	3630 kHz	1900/2200	K2GCE
NLIPN	3928 kHz	1515	WA2SEL
NLS	3720 kHz	1930	WB2EUF
NCVHF	146.04/64	2100 MWSn	WA2SOE
BAVHF	147.915/315	2030 M-F	N2BMF
SCVHF	144.77/5.37	2030 M-F	WA2ARC
LIMARC	146.25/85	2045 F	WA2SOE
ESS	3590 kHz	1800	W2WSS

All times are local. Please try and help out by checking in whenever you can. Plan now to attended the Hudson Div convention being held Oct 29-31 at the Playboy Club at Great Gorge, New Jersey. Many thanks to Columbia Univ club stn W2AEE KH6IQD WA2LVY N2CGH WA2QVG K2JOU and Metroplex who helped, along with K2IZ K2KLN and a lot of other stations, to rebroadcast from England to ceremonies at Columbia Univ the first signal that Marconi heard eighty years ago. One of the high points of the evening was being introduced to his daughter, Mrs. Gioia Marconi Braga. Welcome to new ORS N2AKZ. Metroplex had their Operation Santa on Dec 20. K2GCE is a proud grandpa, now with two grandchildren. WA2ZHA and WB2MGB are both recovering after a stay in the hospital. WA2VQE upgraded to Advanced, KA2KQR to Tech. WA2MHQ to Extra. It is with deep regret that we list WA2RPN as a Silent Key. Congrats to WA2UWF who handled her first marathon in great shape. The marathon was the 1st annual Suffolk County marathon. WA2KEC is back on two with a new Kenwood. K2DOD and KA2JXF were hosts to 16 cubscouts who visited the Grumman ARC shack, WA2LQO. KA2CIW WB2COO and KA2EPY are recuperating from hospital stays. Officers for Grumman are: W2INJ, pres.; W2CJN, v.p.; WB2ODT, sec.; K2OB, treas. WA2LQO is now running 100W into the duplexers, doubling their previous power. Welcome to new Novices KA2NWN KA2NWO. Officers for 1982 for Tu Boro are W2YGM, pres.; WA2APT, v.p.; WB2UKO, treas.; WA2PMW, sec. W2GKZ built the Heath keyer and says is doing FB. KA2KGH is now KR2B, and NL1PN welcomes N2DAL who provides a link with BAVTN. WA2SEL is now KS2G and worked Vermont during phone SS to complete 15M WAS. He now has 10 and 15 done, and has 48 worked on 80 in pursuit of 5BWAS. WB2IDP now on the air from new QTH in Sag Harbor. Traffic: W2GKZ 142, K2HD 133, N2AKZ 117, K2GCE 53, N2BSS 31, K2IZ 24, K2YQK 20, WB2VEX 14, KS2G 12, KR2B 8, WB2JAY 6, N2BQD 4, KE2N 2. (Oct.) N2BQD 17.

NORTHERN NEW JERSEY: SCM, Robert Neukomm, KB2WI — ASCM: W5DTR/2. SEC: WB2VUF. STM: W2XD. NMs: W2CC N2BOP W2PSU KA2GQQ KA2HNQ N2XJ WB2IQJ N2BNB.

Net	Freq	Time	Sess	QNI	QSP
NJPN	3950	6 P.M. Dy 9 A.M. Su	35	559	227
NJN/E	3695	7 P.M. Dy	30	380	158
NJN/L	3695	10 P.M. Dy	30	290	140
NJSN	3735	6:30 P.M. Dy	30	190	105
OBTTN	72/12	8 P.M. Dy	30	583	101
UCETN	085/685	7:30 P.M. Dy	30	320	59
NJVN	49/49	10:30 P.M. Dy			
NWNJVN	90/30	8:30 P.M. Dy	4	32	7
NJRTTY	147.51	Autostart			

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and to K2APG on upgrading to Advanced. KA2EIA upgraded to General. The Ramapo ARC participated in the Boy Scouts JOTA at Camp Tamarack under the excellent leadership of W2RJW. WA2HLE organized communications for the March of Dimes Bike-A-Thon in Ringwood State Park. W2HWW KC2FR WB2RMH W2DQA were elected president, v.p., sec. and treas. respectively of Tri-County Radio Assoc. W2FPY would like to hear from anyone in NNJ interested in packet radio. KA2ILD is now KC2FU. The Cherryville Repeater Association has scheduled the next Flemington Hamfest for April 3. Official station appointments are available. Appointees should check your certificate to see if it needs endorsement. Remember to send reports and other information for this column to W5DTR/2, RD 3, Box 175, Califon NJ 07830 (201-832-2821) until KB2WI returns. PSHR: W2XD KB2H W5DTR AG2R K2VX N2XJ WA7DPK N2BNB. Traffic: W2XD 195, AG2R 186, KB2H 177, K2VX 157, N2XJ 143, W2RQ 102, WB2KLF 59, W5DTR 55, WA7DPK 53, N2BOP 46, N2BNB 44, N2BC 25, W2CC 23, KA2IRQ 23, KA2GSX 20, KA2JMH 20, KK2R 20, W2UH 11, KC2AK 8, KO2A 7, WA8ZNH 4, W2IU 2, KA5DLV 2. (Oct.) KB2WI 184, KK2R 146. (Sept.) KA2GSX 24.

MIDWEST DIVISION

IOWA: SCM, Bob McCaffrey, K∅CY — SEC: W∅RPK. STM: KA∅X. NMs: WB∅AVW WA∅AUX WD∅HND W∅YLS: I will be accepting nominations for the "Iowa ARRL Amateur of the Year" this month. The award was presented to K∅GP last year. Selection will be made on the basis of the content of the nominations. Send your nominations to me as soon as possible. Support the National ARRL Convention sponsored by the CVARC July 23, 24 and 25th at Cedar Rapids. Let's put out the Iowa Red Carpet for all. A new RTTY net Sundays, 2300, 147.24 in central Iowa. W∅DQ has new SSTV gear. New calls heard are N∅DAC and KO∅O. W∅WL presented antenna talks at DSM and Newton. WB∅ZKG & WA∅ROI running hot on 6 meters. Still need OBS in major areas. Good "HR" article by N∅AN. I need your club's newsletter. ICN doing remarkably well after one year of activity. Encourage novices in your area to participate. The 3900 Novice Net needs your support Sundays 8 A.M. on 3725. First multi-op tfc station combines AE∅R/KA∅X. A good time for ECs to do planning for activities and stormwarn, and do not forget ITEN on Sundays.

Net	Freq.	UTC	Days	QNI	QTC	Sess.
75M Phone	3970	1830-2330	M-S	2097	97	50
TLCN	3560	0030-0400	Dy	400	180	60
ICN	3713	0100	TThs	108	39	13

Traffic: WA∅AUX 557, AE∅R/KA∅X 152, W∅SS 143, W∅YLS 140, WB∅QAM 111, K∅CY 105, KA∅JQG 81, K∅GP 80, WD∅HND 63, WB∅UPF 58, WB∅AVW 37, W∅BW 12, KO∅O 15, KB∅OZ 11, KA9GBG 18, WA∅NMA 15, W∅LFF 10, KF∅D 10, N∅CKD 6.

KANSAS: SCM, Robert B. Summers, K∅BXF — SEC: W∅KL. NMs: W∅FT KA∅UCF WA∅LBB. Finally got to squeeze in a few days vacation this past month, and did not hear of any Silent Keys or bad illness. Tnx again to WB∅ZEN for assisting W∅FT with QKS for a while. As all have noticed KA∅CUF has both feet firmly planted into the duties as NM for KPN and KSBN. As always new stations are encouraged to try your hand at NCS spots and to also provide the much needed liaison. Net QNI/QTC: QKS 55 51/2; CSTN 1408/125; KSBN 1444/138; KPN 476/25; KWN 1089/604; QKS 383/114. PSHR: N∅BDG KA∅CUF W∅OYH. I received a copy of a letter from the Governor to N∅BLD, confirming receipt of a radiogram sent to him during the past SET. The Governor stated, "I want to take this opportunity to let you and the other ham operators, throughout Kansas, know that I do appreciate your willingness to be of assistance to our state and to the nation." Note we have had several chances this past year to keep the governor abreast of HAM RADIO. Welcome to KA∅E from MO to KS. He is an active traffic handler. Traffic: W∅QMT 166, W∅AM 163, W∅OYH 113, W∅HI 109, WB∅ZEN 104, W∅FIR 95, K∅BXF 89, WA∅LBB 88, KA∅CUF 67, AC∅E 40, W∅PB 35, WB∅YLP 31, W∅CHJ 28, W∅FT 18, W∅FDJ 15, N∅BDG 11, W∅RBO 11, W∅KL 9, KA∅E 7, W∅RT 7, W∅NYG 6, K∅FPC 4.

MISSOURI: SCM, L. G. Wilson, K∅RWL — ASCM: W∅OTF. SEC: N∅AJI. STM: KM∅L. The Heart of America Radio Club is presently holding Novice classes. The Eastern Ozark ARC has just completed Novice classes. Congrats to recent upgrades to Tech, KA∅GLU and KA∅MHB. Several fine scores were received from those who participated in the CQ WW DX CW and SSB, the ARRL 160- and 10-meter contests. Should be interesting to see where some of those folks place. Our sympathy goes to the families and friends of W∅HH and W∅ZSU who have joined the ranks of the Silent Keys.

Nets	QNI	QTC
CMEN	100	2
MOSSBN	732	53
HBN	414	48

With the coming of the new year, many clubs are holding elections. The Kansas City DX Club has the same line-up as last year—KB∅U, pres.; KB∅X, v.p.; AB∅X sec.; AK∅A, treas. The Heart of America RC WA∅NXD, pres.; N∅CLO, v.p.; KM∅E, sec.; WB∅YBC, treas. New officers for the Missouri Valley ARC: WB∅VRA, pres.; KA∅DAY, v.p.; KA∅IKS, sec.; WB∅HNO, treas. Traffic: W∅BMA 364, KI∅K 139, K∅SI 101, K∅BM 83, W∅OTF 82, W∅OUD 58, K∅PCK 39, KG∅L 32, K∅RWL 8, WB∅NIE 6.

NEBRASKA: SCM, Shirley M. Rice, KA∅BCB — SEC: N∅AIH. STM: WD∅BQG. W∅EUT reported 46 attended QCWA meeting in G.I. Nov 7. Elected W∅RN, pres.; W∅AP, v.p.; W∅UQJ, secy.; W∅WVE, treas.; W∅BTM W∅WKP W∅CSW W∅EUT W∅LJO, directors. Special guests were Leo Myerson, National Board Member & W∅FIR, ARRL Director. WA∅PCC phone patched W∅FQB into a QCWA net to make many happy. Tnx Harold. Congrats to: KA∅IOM, Adv; KA∅JTH KA∅IZO, Gen; KA∅LUG KA∅JGF KA∅MCQ KA∅LRF KA∅LRH KA∅MJZ WB∅WSL to Tech. N∅CWH & WB∅GOB had 87% representation on TEN CW Net. FB guys! N∅AIH recommended & I appointed K∅GND new DEC for 41 eastern NE counties. N∅AJU, active OVS, reported a fantastic Nov. Don't forget ur valentine this month & 88s from ur SCM! Traffic: WB∅GOB 52, W∅HOP 50, W∅ZNI 21, KA∅BCB 17, W∅NIK 10, WB∅SGB 10, WA∅PCC 9, WB∅GWR 8, WB∅GMQ 7, K∅SFA 7.

NEW ENGLAND DIVISION

CONNECTICUT: SCM, Pete Kemp, KA1KD — SEC: K1WGO. STM: K1EIC.

Net	Freq.	EST	Sess.	QTC	QNI
CN	3640	1900 2200	60	313	371
CPN	915/315	1800	30	90	220

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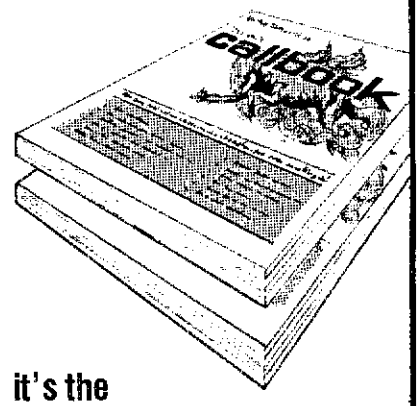

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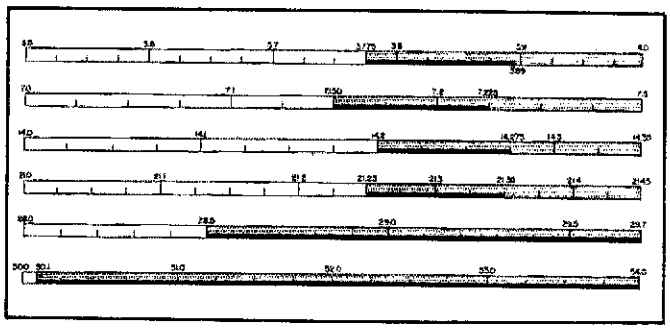
Generals Get HF SSTV

The FCC has amended its rules to allow general class amateurs to operate SSTV on any frequency where they are authorized voice transmission. The action by the Commission occurred on 24 November, and while no effective date was given, it is expected to become effective in January or February of 1982.

FCC Opens General Class Phone Bands to SSTV

The FCC last month approved a proposal (Docket #80-252) to allow the transmission of television (SSTV) on all amateur radio frequencies above 3.775 MHz where voice transmissions are currently allowed. This resulted in opening up the general class portions of all phone bands to SSTV without impairing the special bands set aside for Advanced and Extra Class licenses. The frequencies now available for SSTV are shown in the accompanying band allocation chart.



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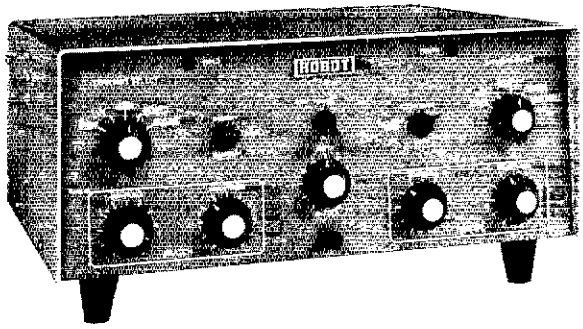

only can you transmit and receive high quality pictures of your station, and yourself, but pictures of your new car, your family, and even pictures of minute items like coins or stamps.

We estimate a 25% to 50% increase in the number of SSTV stations within the next 12 months, and the majority of hams having SSTV by the late 1980s.

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NVTN	28/88	2130	30	94	314	

High QNI: CN — K1UQE WB1EKV W1QJM. NVTN — K1EUW WB1CPF. CPN — K1EUW KA1KD K1AQE. Welcome on board to K1WGO as SEC and WB1AIU as CPN NM. It is with regret that I report that W1BDI has become a Silent Key. Ed worked at Hq for many years in a number of capacities and was responsible for many of the operating practices that we follow today. Murphy's Marauders held their Xmas party on Jan 9. New officers of SMAG: WB1AIH, pres.; KA1BIJ, v.p.; WB1FYN treas.; KA1DE, sec.; W1THZ, act. coord. Obtain your FREE CT Repeater Directory for a #10 sase to WA1LOU. FARA club station hours: Tue 7:30-9:30 P.M.; Sat 9:30 A.M.-3:30 P.M. SARC antenna party for K1KK produced a 55-footer & TET. WA1PRJ now on SSATV. KA1ESH is getting up for EME operations. CARA is now holding their meetings in Brookfield. Appointments: OO KE1H, ORS WB2PJU K1AQE, OVS KE1H KE1K, OES K1AQF, OBS WB1CRH N1BFD. WA1ZMK now KA1VI. KA1EJF now KA1XG. K1WGO is now sporting an Extra. KA1GXS recently upgraded to Advanced. ARES group within the state need your help. Contact your local EC DEC or SEC for details. Northwest CARES meets on Wed evenings at 8:30 on 146.25/85 and 28.750. Welcome N1BBE KA1GII & K1NCD to NTS. K1XA is keeping active contesting. Bethel Middle School ARC now has an additional 40 Novice operators. Traffic: W1EFW 275, K1GF 201, WB2PJU 200, WB1GXZ 190, KA1BHT 148, WB1EKV 128, N1BFD 106, WB1CRH 94, K1EUW 92, K1AQE 87, K1UQE 82, KA1KD 68, W1BDN 52, KA1GII 28, W1CUH 15, K1XA 8, W1FAI 5.

EASTERN MASSACHUSETTS: SCM, Rick Beebe, K1PAD — STM: WA1TBY. SEC: WA1BLG. ASCM: K9HI

Net	Mgr	Freq	Time (loc) Dy	QNI	QTC
EMRI	N1GQ	3.658	1900/2200/Dy	433	303
EMRIPN	KA1BJY	3.898	1730/Dy	382	261
EM2MN	KA1CGP	90/30	2000/MWF	210	112
NEEPN	K1BZD	3.945	0830/Sn	89	28
HHTN	K1BSO	04/64	2230/Dy	473	175

The big fire in Lynn the weekend after Thanksgiving brought out a big Amateur Radio effort. Because of a lot of preplanning by amateurs the Red Cross had some phone numbers to use to request amateur's assistance. WA1IDA got the call at about 7 A.M. and immediately put out an alert on the alert frequency which is monitored 24 hours per day by emergency-minded hams. The Northshore Repeater Association sprang into action with the aid of WA1LRL and others using their 28/88 repeater. Amateurs were active providing communications between Red Cross shelters and Boston Red Cross as well as assisting the National Guard in patrolling the affected area. The Red Cross discontinued its operation late Saturday evening but the Guard and the 28/88 group continued up thru Sunday evening. Information I have is that over 90 amateurs participated and, thanks to KE1V and AB1Z, some good publicity was obtained as well. There were too many major helpers to list here but one thing is sure: Amateur Radio came through again when it was needed. Those of you who helped know who you are and a lot of people are thankful for your presence. Well done. Quannapowitt member W1BHD got his homebrew disc recording machine working. Acton/Boxboro club provided communications for a roadrace in Acton. Past Capeway club member W1AN showed up at a meeting recently to everyone's pleasant surprise. WA1WIS gave a talk on CPR to the Middlesex ARC. Greater Lawrence club had N1AWA give a talk on TV DXing with slides. Algonquin ARC reports that some concerted effort by WB1DQC KB1Q WB1CTO K1MEM WA1VHJ and others resulted in the sorting of over 40,000 QSL cards for the incoming bureau. A survey by your SCM indicates that most hams in EMass are getting good service from the all volunteer bureau. Massasoit club had KA1GYS give an interesting talk on his job. He's a narcotics agent. Wellesley club preparing for their big Natick Mall Christmas message center. Traffic: N1BHH 562, WA1TBY 538, KA1ON 191, KA1BJY 188, WB1DXR 130, K1BSO 103, WB1GQO 90, WA1LPM 87, W1CE 71, KA1MI 43, N8TM 40, W1ATX 35, N1AJJ 32, KA1KU 27, K1BZD 27, KA1EMQ 29, WA1DXT 21, WB7TPY 17, WA1FNM 16, KA1R 10. (Oct.) WB1EZT 160.

MAINE: SCM, Cliff Laverty, W1RWG — SEC: KL7IJG. STM: AK1W.

Net	Freq.	UTC	Sess	QTC	QNI	NM
PTN	3596	0000 Dy	30	178	331	W1KX
SGN	3940	2100 M-S	24	174	984	K1GUP
SPSN			13	9	119	KA1AVU
MSN	3596	2339 MWF	13	17	114	N1BJW
AEN			4	2	58	WA1YNZ
CMEN	10/70	0100	8	101	16	W1WCI
HCEPN	385/985		2	0	2	KA1GGE
MSPN	3940	1300 Sn	7	11	70	N1BCE
RACES	3990	1230 Sn	5	9	65	W1RWG
SGN (Oct)	3940	2100 M-S	27	257	1172	K1GUP

It is my pleasure to appoint AK1W as STM. Traffic: AK1W 248, W1RWG 104, W1KX 102, WB1BYR 88, AC1G 86, N1BUN 75, W1AHM 60, W1HDC 43, W1JYH 40, K1NAN 36, K1TVT 31, KA1ENL 26, KA1AVU 25, WA1YNZ 18, WB1EIL 18, KA1GGE 18, W1WCI 16, W1GCB 16, N1BJW 15, W1GKJ 14, KL7IJG 12, KA1TJ 11, KA1GNO 10, KA1ENM 6, KA1EIW 5, KA1AIF 5, KA1CNG 5, K1BUC 4, WA1ZJL 4.

NEW HAMPSHIRE: SCM, Robert C. Mitchell, W1NH/W1SWX — SEC: AK1E. STM: W1TN. NMs: N1NH K1OSM W1VTP. KA1HLF now KA1XM. WB1HJF now KF1V. First place in RI QSO Party was KA1BBI. New Hampshire had highest checkins for Daytime First Region Net. The Port City Club had its Ladies Night at the Hampton Ashworth. The GSFMN had 335 QTC and 733 QNI. K1BH attended Antique Wireless Assn national convention. KA1CXO is resident magician at Benson's Animal Park. NHN had 246 QNI and 243 QTC. K1NOR now has a motocycle. Just had the first snow storm and tree wiped out the nine coax feeds at W1NH. Plan ahead — ARRL conventions at Boxboro Oct 2 & 3. K1OSM and KA1BBI now Extra. N1NH made BPL. By the time you read this spring will be just around the corner. Traffic: N1NH 706, W1QYY 346, KA1CXP 303, W1TN 239, KA1BBI 231, AK1E 196, K1OSM 181, KA1BJ 163, W1MHX 137, W1VTP 126, KB1A 89, KA1FWQ 71, W1ALE 54, N1ALM 40, KA1CJI 33, N1AKS 19, K1NH 13, N1BOF 12, KA1FKM 10, W1NH 10, WA1PEL 8, WA1HOB 3, KA1VHM 1.

RHODE ISLAND: Gordon Fox, W2YNE — SEC: KA1EHR. STM: KA1FE. WA1OSL, NM RIEM2MTN, reports 21 sessions, 164 QNI, 47 QTC. Endorsements: KA1FE ORS. Appointment: N1RI ORS. New calls: KA1DZT now KF1T; N1BHT now KA1VZ. W1AQ club reports three new members: KA1TR KA1SO KA1FWF. SEC KA1EHR received reports from all ECs. All county ARES nets are now in

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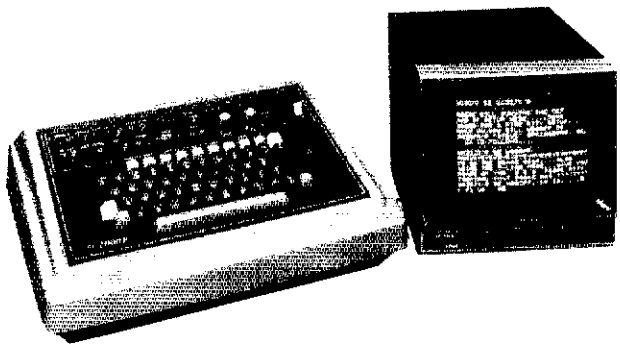

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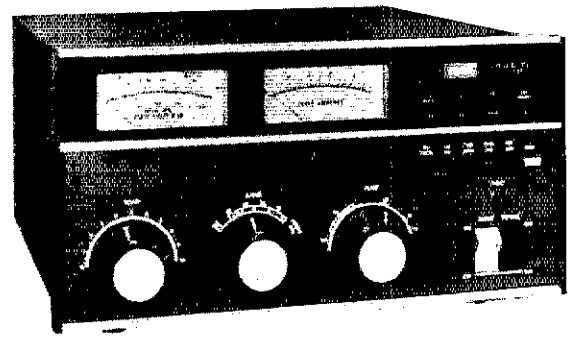
Suggested Retail Price ..... $1095 Monitor $185



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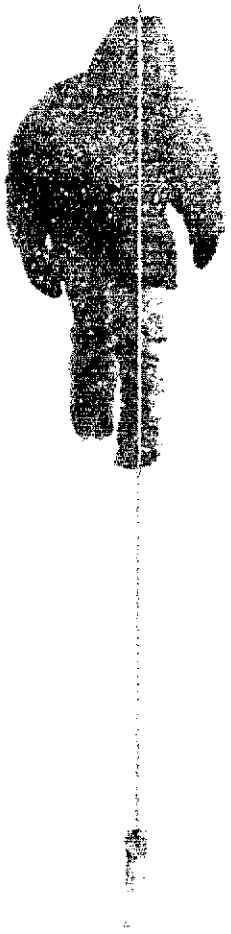

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operation. Next month's column will have a complete listing. Traffic: W1EOF 568, KA1FE 144, KA1BTU 42, WA1CSO 41, KA1EHR 25, N1RI 12.

VERMONT: SCM, Bob Scott, W1RNA — SEC: WB1ABQ. STM: N1ARL. K1LPS has been reported to have WAS on six. He beats out W1AIM who just worked his fifth state, Hawaii, on 6 meters. Congrats to you both. No one else in VT has reported accomplishing this on six. W1AIM now on 220 with 100 watts. Grn Mt Wireless Society will be providing comms for kids in the Rutland Hospital during Xmas so they may talk with Santa at "North Pole". W1RCZ XYL passed away early Dec. News of VT hams activities are as hard to come by as ever! By the way, why so few reporting traffic? There are more than the usual half dozen or so who report regularly. GMN 25/509/40; VSB 30/531/95; Carrier 25/322/27; VPN 5/83/6; RFD 5/80/16; VTN 26/73/38. Oct VTN 29/92/43. Traffic: K1BQB 138, N1ARI 128, WB1ABQ 87, AE1T 15, W1RNA 33.

WESTERN MASSACHUSETTS: SCM, Art Zavarella, W1KK — ASCM: K1BE. STM: W1TM. SEC: W1JP. NMs: W1UD W1UPH WA1ITL. Kudos to W1YI for his continuing BPL achievement, and to W1JP his belated Sept BPL. Certificates of Merit awarded to W1UD re his yoeman NTS work with SET and "Big E" traffic, and to WB1HIH for his ARES accomplishments. KA1CHI now KG1S. K1PUG has better signal from new 80/40 ant. W1ZPB has QRO gear. K1SF keeping 6M open to HK4, 8P6, HP1, HKØ, PAØ, ZB2. Hampden Co 2M ssb net perking up Mon 8 P.M. 144.155. SCM-elect W1JP sez W1UD/STM, WB1HIH/SEC, KA1T/NM WMN effective beginning his two year term 1 Jan. At this point your exiting SCM expresses sincere thanks for himself and those LOs listed above as well as all the other LOs in our Section for the excellent cooperation of the membership. PSHR: WB1HIH WB1CGK K1JHC W1TM KA1T. Traffic: W1YI 315, WB1HIH 202, W1TM 166, W1UD 147, KA1T 142, WA1ITL 128, K1JHC 76, WB1CGK 67, W1KK 42, K1IJV 36, WA1OPN 34, W1BVR 21, K1PUG 18, WIJP 13, W1ZPB 10, WB1HKN 9, WA1MJE 7, WB1DBN 5, W1UPH 5.

NORTHWESTERN DIVISION

IDAHO: SCM, Lem Allen, Jr. W7JMH — Voice of Idaho club has bought additional solar panels to beef up the Cinnabar repeater and they hope to install the panels soon. This will make the repeater even more versatile and reliable. Boise club winding up Amateur Radio classes. Good luck everyone! W7HZL ant mast came down in windstorm. He has new Welsh Corgi pup. WA7TXB spent Thanksgiving with family in Oregon. K7RX happy over 160-meter contacts. KB7ZD/R on 146.14/74 being tested in Boise area. Works fine. KI7D is active in EME.

Net	Freq.	Time/Days	Sess.	QNI	QTC
FARM	3935	7 P.M. Dy	33	1428	27
CD	3990	8:10 A.M. M-F	21	691	19
IMN	3635	8 P.M. M-F	22	172	79

Can you build a simple "storm antenna" that won't blow down? You might need to use it someday. Traffic: W7GHT 268, AC7P 103, W7JMH 32.

MONTANA: SCM, Les Belyea, N7AIK — New officers for the Yellowstone ARC: WB7TWG, pres.; WB7TYN, v.p., WA7RMR, secy., WB7VDM, treas. Gallatin HRC: KB7O, pres.; KE7X v.p.; W7OZH, secy/treas. WA7VRU now LC7LM. Upgrades: Tech — KA7KXK KA7KKG; Gen — WB7WAD (a blind operator), KA7IOQ N7CTU KA7HPD KA7CIW; Adv — WA7UWC KA7DPA KA7IOS. Congrats to all. WB7BWZ, EC Billings area, received the Ham of the Year Award from the Yellowstone club. FB. KF7T worked C5 (Gambia) and HKØ (San Andres) on six meters. W7HAH worked KH6JEB for his final for 5BWAS. Red Lodge repeater is trying 16/76 on a temporary basis, replacing 34/94. W7JMX is planning a sailplane expedition over the Bridger Mountains. Join the growing list of hams that participate in the Montana Section Net each Sunday morning at 9:30 A.M. on 7240 kHz. This net provides a good way to exchange information among Montana hams on a regular basis. MTN-QNI 952, QTC 60. IMN-QNI 171, QTC 89. BSN-QNI 189, QTC 10. PSHR: WB7DZX. BPL: W7TGU. Traffic: W7TGU 699, WB7DZX 150, N7AIK 26.

OREGON: SCM, William R. Shrader, W7QMU — STM: W7VSE. SEC: K7WWG.

Net	Time/Days	Freq.	QNI	QTC
OSN	0230/0600Z Dy	3587	469	387
BSN	0145Z Dy	3908	960	32
OARES	0115Z Dy	3993.5	612	175
OARES	0230Z Dy	3993.5	91	13
PTTN	0300Z Dy	146.76	346	68
LBLARES	0330Z Dy	146.79	972	16
SOARES	0300Z MThFS	146.94	375	265
MPARES	0300Z TTH	147.02	201	2
SOFM	0330Z T	146.64	147	5

WB7UGU passed her Advanced at 73 years young. Congrats! Upgrades: Novice — KA7LRS; Tech — KA7JJU KA7ILE KA7JFQ. K7ZQU is new Linc/Benton/Linn ARES NM. Thanks to retiring WB7QQH. Crater Lake Chapter 10-10 Int'l meets on Saturday at 1830Z on 28.930 MHz. K. Falls "Fox Hunt" (no bunnies in KBARA) in Nov won by WB7CXW. New autopatch in Roseburg on 146.40/147.00, and in Medford on 147.90/30. Oregon clubs made a good showing in FD results. Sunset Empire RC set up an operating station aboard the former USCG lightship Columbia, and is considering sponsoring a permanent station. If you did not lose your antenna on the coast during the big storm advise those not so lucky how to put 'em back. Traffic: W7VSE 596, WA7LGN 298, WB7OEX 212, W7LNE 155, WA7IHS 138, KA7ELI 120, W7ZB 106, N7BGY 103, KA7DBS 72, KI7Y 54, W7QMU 37, W7TC 27, W7LT 11, W7DAN 9.

WASHINGTON: SCM, Joe Winter, WA7RWK — ASCM: KD7G. SEC: K7SH. STM: W7GB.

Net	Time(Z)	Freq	QNI	QTC	Mgr
NTN	1930	3970	1001	51	W7VL
WARTS	0200	3970	3241	168	W7SFT
NWSSBN	0230	3945	704	45	W7ZPK
WSN	0245/0545	3590	581	219	W7GB
EWTN	0130/0530	146.64	61	77	WA7CBN
PSTS	0130/0630	145.33	110	62	W7IEU
SCARES	0330/(Wed)	147.18	100	3	W7ERH

Congrats to 1982 Yakima ARC W7AQ officers KA7CNN, pres.; WB7QBK, v.p.; WB7VKY, sec/treas.; W7AQ is celebrating its 50th year with ARRL. Clark Co ARC W7AIA, relayed Christmas messages from Barnes VA Hospital. CCARC tops 200 mbrs. KA7LEQ is #201. Who'll make it 250? W7BG and WA7VBK heading up Vancouver HF. The club will also celebrate its 50th year with the League. Spokane Dial Twisters SWAP FEST '82 planned for April 24 at Interstate Fair Grds. The AR Weather Spotter System is in operation in NE Wash and No. Idaho on WG7AAT, 147.30/rpt, 146.61, 146.98, 147.12 rptrs. Many spotters are needed. Contact KA7CSP or

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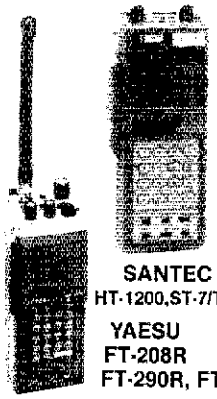
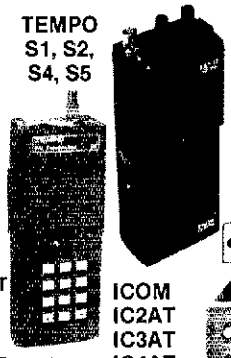


SANTEC HT-1200,ST-7/T
YAESU FT-208R FT-290R, FT-708R

TEMPO S1, S2, S4, S5

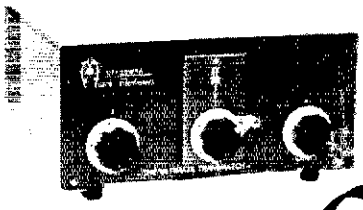


ICOM IC2AT IC3AT IC4AT

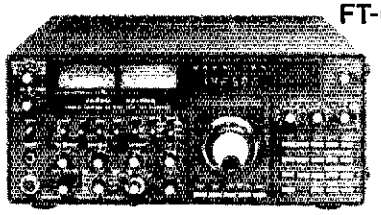
DRAKE TR-5, TR-7, R-7, L-7, L-15, & Theta-7000E

TEN-TEC Omni "C"

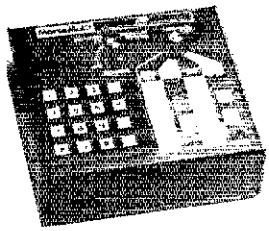
YAESU FT-ONE



MURCH Model UT2000B



FT-101ZD MARK III, FT-480R, FT-707, FT-720RU, FT-720RVH, FT-902DM, YR-901-CW/RTTY



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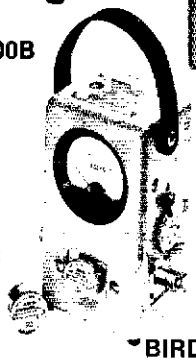

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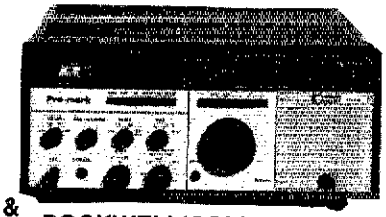
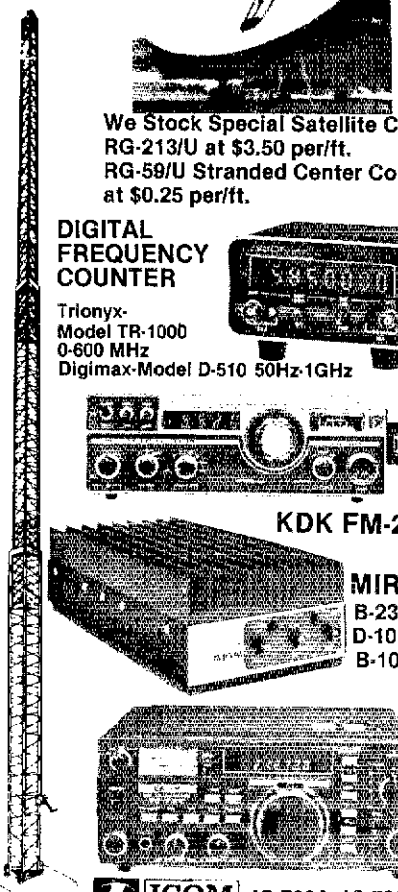


ROCKWELL/COLLINS KWM-380



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IC-25A, IC-251A, IC-2KL, IC-451A

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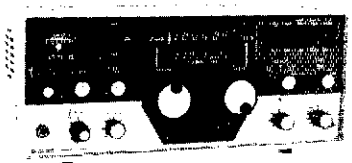
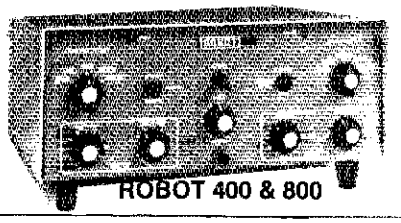
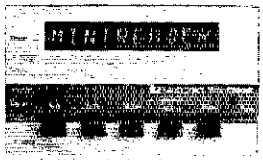


ASTRO 103 150A & 100 MXA
DIPLOMAT 150



ROBOT 400 & 800



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WA7LNC. Treat your heart. Join the fun. Send messages for the kids in Shriners Hospitals every Sun. 9 A.M. — 3925 kHz all welcome. No. Whidbey Is. has new rptr KE7C 146.86. Lots of info, activities RTTY 2 Mtr/10Mtr. link Cont. KE7C or WA7NQW. Tacoma's K7SSC and 14 local hams assisted 45 Reno, NV, area hams with Reno Internat'l Auto Rally Dec 11-14 (one of the largest). Congrats! Boeing Emp. ARS and RC of Tacoma challenged each other for SS contest (5 yr) in cw and phone with trophys for each mode. Challenge a club and have more fun with lots of activity. WW DX Club 1982 officers are K7LAY, pres.; K7RS, v.p.; KC7DU, sec.; W7BQG, treas. Much success! WA2JQW and XYL KA7GZG and W7FAB in Tacoma now on RTTY and cw with new computers. Join K7LYM's code course on 21.180 M-F at 6 P.M. for 1 hr., 5 to 13 wpm. JA3VII visited RC of Tacoma. ARES/NWS Net needs more Ea. Wash reporters and alternates from all over, daily at 3910 kHz at 10 A.M. Please help. Contact WA7RWK No. Seattle RC officers 1982 are W7GR, pres.; K7KPC, v.p.; W7GPS, treas.; KA7APK, sec. Good Luck. Thirty seven members and XYLs attended NSARC annual dinner. Fifty attended RC of Tacoma. Christmas Dinner and Dance. W7PK broke ankle on hike near home and called for help on 2M HH. WB7QNS ansered and got help started. W7ZTG heard call and responded until emer team came. Traffic: W7DZX 879, WB7TOF 572, W7FJZ 250, W7CSP 186, K7GXZ 153, N7AFZ 132, K7CTP 128, W7GB 116, AD7G 94, N7ANE 94, W7IEU 91, WA7BDD 76, N7AFY 59, WA7RCR 50, WB7WOW 47, W7BUN 40, W7APS 23, WA7JEB 18, KA7ILW 11, W7ERH 10. (Oct.) N7CSP 218, N7ANE 164, AD7G 75.

PACIFIC DIVISION

EAST BAY: SCM, Bob Vallio, W6RGG — ASCM: W6ZF N6DHN VE2AQV/W6. SEC: WB6KQU. KE6JV (ex-K9OZM & N6FEO) back on the air with a bang after 15 years inactivity. He handled 324 messages in two months, and joined both MDARC and EBARC. Welcome to the Section! SBARA member N6BDE enjoyed his recent tour of ARRL Hq. Their "Groundplane" features an FB article on ant tuners by N8BFO. EBARC welcomed new members Tom Thompson, Melissa Sheppard, David Sheppard and Bill Jones, (all new graduates of WA6VBV's classes), and N6FEO WA1JSD KA6ICJ and KA6ICK. LARK recent visitors include JG1NYS JN1PLQ W9NYK and Sue Klenko, Their "Klutz-of-the-Month" award went to KD6SS for an antenna "problem." MDARC mourns the loss of member, Lee E. Herrenkohl. Their "The Carrier" featured a three-page photo spread of their license classes and auction. I was pleased to receive the fall issue of "The Relay," the bulletin of NCN, after a long hiatus. Congrats to editor W6ZRJ and to manager N6AWH. Traffic: KE6JV 145, WB6UZX 31, K6APW 12. (Oct.) KE6JV 79.

NEVADA: SCM, Ralph E. Covington, W7SK — SEC: WA7KCD. Las Vegas club had good program on DXing given by W7KDH at their Nov meeting. Upgrade congrats to KB9DT (ex-WA7GSG). W7BS attended 40th anniversary of Pearl Harbor Assn in Honolulu. Congrats to N7AKX on the attainment of his third BPL certificate. This qualifies him for the award of a hard earned BPL Medallion. Nevada Sagebrush Net weeknights 7 P.M. on 3906 kHz. Traffic: N7AKX 582, W7BS 102, W7BKQ 58, W7CX 5, W7SK 2.

PACIFIC: SCM, Pat Corrigan, KH6DD — KH6B is broadcasting bulletins daily on 7290 at 1800 local and on 1810 kHz. Big Island hams can copy these sessions and some parts of the state can also. Kauai has the Garden Island Rptr Assn VHF Net on 147.93/33. There is another active net, KARC VHF Net on 146.31. KH6S can provide details. He is also EC for Kauai Co. Hoping to have KH6PU active on PTN in '82. Thanks to W6IPL and KE6JV for doing great backup job on PTN for west coast end for KH6HIJ. By the time you read this the new SCM will be elected. I urge you all to consider seriously what support you can provide the SCM, especially active participation in Section activities. ARRL is a membership organization and must have the input, participation and support of its members to function properly. Let's all help. Traffic: KH6HIJ 155, KH6H 6.

SACRAMENTO VALLEY: SCM, Norman Wilson, N6JV — SEC: N6AUB. ASCM: KI6T. New officers for the Nevada Co ARC are: K6GTU, pres.; WA6SOH, v.p.; WB6GMU, sec; KG7IW/6, treas.; KD6GY, dir. The River City Contesters, a new ARRL affiliated club, have elected K6SG as pres. and KV6H as sec/treas. Welcome to N6EPG the new Emergency Coordinator for Yolo County. N6AUB made PSHR. Congrats to KA6HLZ on making General class. K6SG's new tower and Christmas tree got bent in the last big wild storm. KE6EP, EC for Butte/Sutter Cos, reports that with the help of his AECs K6DYT WA6GUO and WA6ZGM they have vhf ants. going up at two Chico hospitals, the Salvation Army bldg. and CDF Headquarters in Oroville. Traffic: N6AUB 35, W6RSP 4.

SAN FRANCISCO: SCM, Bob Smith, NA6T — SEC: KE6CD. STM: K6TP. SCM attended MARC Xmas dinner in San Rafael. Ol' Timers and charter members of MARC were honored. Open house was at KA6ERE's for FWHA-HARC Xmas party. Del Norte Co has new club meetings first Wednesday. KA6KXZ is pres. Congrats to KA6s KCF NBC RLU RQI RQK RQL SBD IXK KJI and WB6UAZ on upgrades. Sonoma Co. RA supplied comms for Jr. Olympics, Whale Run, and Crop Walk and Run. N6BLN has to take reservations for rig operations — now all the family are hams. KD6HQ has new harmonic, 9 1/2 pound boy. Ask KS6W about Charmin and showers. K6ANP is now pres of REDXA and Sonoma Co. RA, Inc, KE6CD is pres of SFRC for another year. WA6ODB donated Ham-M rotor to get Med Center beam rotating again. Tnx. Traffic: W6IPL 167, K6TWJ 141, K6TP 134, W6RNL 90, WB6RTE 20, WA6QXV 10, W6GGR 2.

SAN JOAQUIN VALLEY: SCM, Charles McConnell, W6DPD — SEC: WA6YAB. W6DDC is a Silent Key. Turlock ARC offers a certificate for 20 cw contacts with 20 members. Fresno ARC offers a certificate for contacts with 20 members in the calendar year. Congrats to new licensees and upgrades: Novice — KA6SDH; Tech — KA6ITL KA6HME; General — N6FIO; Advanced — WB6WVE N6DNE KA6ITM; Extra — KD6OM. KA6KWO now KE6JZ. NF6K has FT 208R and a Santec ST7/T. WB6HQU has an IC551D. W6DTL has a TS830S. WB6IVZ has a Santec HT-1200. W6KPC has a KWM380. N6DTB won a TR 2500. K6KDM and WA6TJW have IC3ATs. WA6OIB has a TR 2500. N6DBH has a Tempo S-1. KB6DI burned a gamma. The NCDXC has 30 members living in the SJV. Temporary officers of the Central Cal DXC are N6AWD, pres.; W6GR, v.p.; W6BYH, sec/treas. Don't forget the Fresno Hamfest May 21-23 in Fresno. Traffic: N6AWH 161, KV6W 70, KB6CC 22, WA6YAB 19, W6DPD 11, KY6BM 9, W6SX 9, WD6FRS 4, WA6JDB 4.

SANTA CLARA VALLEY: SCM, Jettie Hill, W6RFF — SEC: WB6IZF. STM: W6ZRJ. NPS ARC has new members

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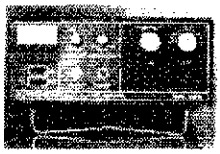

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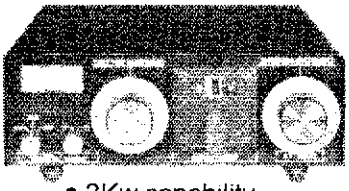

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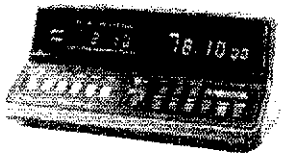

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WB1AUB, N4BFK, KB7CK, KA6DGV, KH6JJD, KA6MNL, WB8WGE. Santa Cruz and San Lorenzo Valley clubs had a joint breakfast meeting. New Novice in SLV is KA6RFZ. SBARA Ground Plane had several good articles on homebrew. SLAC ARC busy getting QSLs printed and setting up code practice at noon. They also are sponsoring a "Quark Lark QSO Party" Mar 20-21. Contact SLAC ARC, Bin 20, Box 4345, Stanford, CA 94305 for info. New members of NCCC are K2PV N6DOK KS6Q K6TMB, KA6LAF. New members of SMRC are WD6EPR W6ZO W6TVS KD6ID. W6ZRJ and W6VZT spoke to PAARA on "Do Hams Really Communicate?" Explorer Post 599 in Palo Alto is looking for young people interested in ham radio. For info contact KA6NAN. New DEC is W6ASH. Congrats for fine job as EC for many years. W6ZRJ and W6VZT also gave their talk to SCVRS, and the club welcomed KA6PXI KA6PXH KA6PXK and W6REW as new members. A talk on "power charger" for batteries was presented to PARS by AA6PZ. WB6AAJ of PARS and EMARC is finalizing a General license class and needs instructors. Interested? Call 415-961-2259. WB6LVD has resigned as DEC because of health and increased work load. Thanks for all your help! SCCARC busy preparing for Santa Cruz convention in October. Pac Div Directors meeting end of Jan in Dublin. OO report from K6AYB. GI3OEN takes over as editor of PAARAgraphs. WA6NDN has new HT 2 mtr rig. W6PRI working NCN and RN6-D. WB6HBL is now N6FMF, and has a new keyer. Traffic: W6YBV 274, W6KZJ 217, W6OII 36, W6RFF 31, W6ZRJ 26, WB6OTS 21, W6PRI 17, WA6HAD 3. (Oct.) W6ZRJ 40.

ROANOKE DIVISION

NORTH CAROLINA: SCM, Ian C. Black, WD4CNR — STM: W4EAT. SEC: NB4L.

Net	Time	Freq	Sess	QTC	QNI	NM
CMN	1345Z	3927	30	289	588	W4EAT
CNN	2300Z	3715	29	69	200	KA4AUR
JFK	2330Z	3923	30	208	1117	WB4WII
THEN	0030Z	3923	30	228	1360	WA0BR
CN	0000Z	3574	49	373	622	AB4S

Congratulations to W4EAT, our new STM. Please give him your support. NJ4L taking a brief rest before surgery in January. Best wishes to him from the section. Section ttc count was great and Dec looks like maybe another record for NC. Wonder if mail rates have anything to do with it? Anyone not subscribing to the RARS newsletter is really missing a good thing. With more complete section news than this, there are articles of general interest, technical, towers, antennas, satellite info, humor, (WA4AOO and his OMG-size antennas had us chuckling), interesting and readable notes by W4FMN (how can he write that well so far off frequency), and much much more. Forsyth ARC busy with plans for holiday season. Congrats on idea for Ham of the Year award. Wondering if criteria for award appeared on page 7. Info from N4CRH and the Rockingham Co ARS indicates high level of activity there. Keep up the fine work. Needed: more club news, i.e. upgrades, activities planned or accomplished, etc. Remember this is your column. I just do the reporting. Questions in the mind of a two month old SCM: How can various Section clubs, organizations and individuals be made into a more cohesive group? How can a group of hams engaged in one facet of our hobby become more cognicent of the problems of a group engaged in another? Is the League as responsive to our needs as it should be? What can be done to make it more so? With your help, maybe we can come up with some of the answers. Traffic: K4EVY 543, WD4CNQ 421, WD4CNR 271, NJ4L 248, AB4S 227, WB4WII 214, W4PCN 207, NB4L 187, KD4PJ 160, KU4W 151, KD4WP 149, W4EAT 123, KF4R 119, WA4SRD 119, WA4UTC 102, K4MC 90, W8PJS 84, N4CJJ 68, W4WXZ 62, WD4DCY 53, K4FTB 45, WB4CYN 44, KZ4A 43, K4IWW 41, KA4KJI 36, WB4HRR 33, WA4OBR 31, WD4LRG 30, W4PRO 30, WD4LOO 27, W4ACY 22, N4CCK 21, NE4J 21, WB4SLF 21, KA4ATK 19, WD4EIQ 18, WD4HTE 18, W4EHF 14, WA4CUD 13, KZ4J 13, NT4K 13, KC4AM 10, KA4KDD 10, WA4OJU 10, W2JDB 8, N4CYG 6, N4UE 6, N4ARY 5, N4AET 4.

SOUTH CAROLINA: SCM, Richard McAbee, W4MTK — ASCM: WB4UDK. SEC: WD4HLZ. STM: W4ANK. NMs: K4PFC KC4LA KA4AUR. Sorry to hear that W4CE became a Silent Key. He was a great asset to the hams of SC. He will be missed. A new net in SC, the Carolinas Net RTTY. Won't you join them? Freq 3643 Tues only, 0100. The SCNTN doing fine. Join them at noon daily. QNI/QTC SC SSBN 1417/135, Blue Ridge 2 Meter Net 2018/79, SCNTN 327/80, Lancaster County 2M Net 196/15, Western SC Emergency Net 515/34, Newberry Co ARES Net 73/4, Carolina State Line Net 69/4, Greater Pee Dee 2 Meter Net 1018/104, CNN 200/69, Trident ARC ARES NET 158/4, Spartanburg ARC 2M Net 322/16, Carolina Net RTTY 12/1. Traffic: K4ZN 311, W4ANK 144, K4ZB 139, W4NTO 102, KC4LA 67, W4FMZ 55, KA4AUR 48, W4MTK 45, WD4EDM 43, K4KEP 43, K4FRX 35, AF4E 20, KA4LHM 16, K4LYU 11, NQ4N 8, WD4DOL 5, W4DRF 4, WA4JWS 1, WB4NBK 1.

VIRGINIA: SCM, Luck Hurder, WA4STO — ASCM: K3RZR. Chief OO: W4HU. STM: KY4K. SEC: KZ4K. Chief OBS: K3RZR. Chief OVS: N4CD.

Net	QTC	QNI	NM
VNTN	160	307	WD4FTK
VSBN	380	684	W4NWM
VSN	154	313	WB4KSG
VN(E)	263	446	K4JST
VN(L)	109	238	W3ATQ
VLN	202	484	WD4ALY
SVEN	58	378	NT4S
WARC	10	42	K4RC

Congrats to W3ATQ for highest traffic total. It takes a lot of effort, much of it on weekends when the rest of us have other things in mind. Also, guess who has a brand new A-1 certificate? No hints or anything but his name is Gil! And kudos to JST for his fine training efforts just before the busy season. We all appreciate it. Thanks to VTARA, WARC, VARA and others for their informative club bulletins. N4CD is anxiously searching out an Asian station on vhf. WD4CXU has snagged Hawaii but needs KL7 on 6M. WB4IUS in opposite boat, needing only KH6 on vhf. Shucks, it took ME years just to do it on hf! Hey, you appointees out there! Got a new call and want new certificates for the shack? Just ask. Chief OO W4HU reports 44 OO reports sent in by VA OOs with particularly strong showing by KB4WT. Thanks! WA3UDB in Front Royal has new Icom and is awaiting mail box system for his TRS80. Hey Novices and Techs! Want to get in on an easy going Sunday morning cw net to bring up your speed? Try 3748, at 8:30. No pressure, just fun. And for those of you more experienced, we ALWAYS need more in the way of liaisons at all levels of NTS. Don't be bashful! Jump in and volunteer. By the time you read this, the outcome of the SCM election will probably be known. I'm sure that the best man for the job will

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SC-1 Station Console

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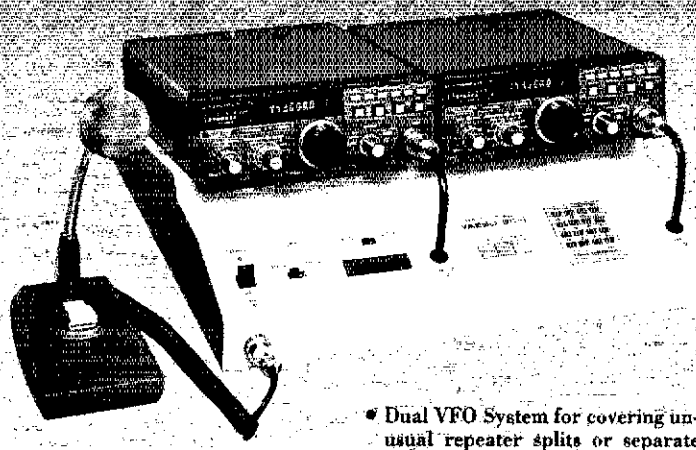

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- Completely self-contained, battery powered 2 meter multimode Transceiver with Telescoping Antenna.
- Microprocessor control for operating convenience usually found only in base station equipment.
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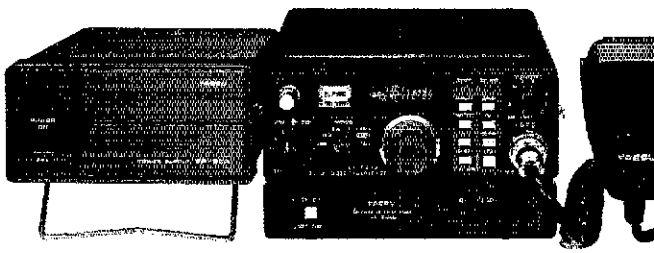
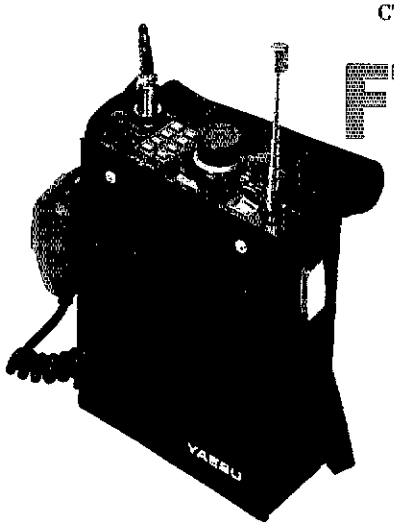
Don't miss those great DX openings this year! T FT-290R and FT-690R are ready whenever (a wherever) you are!!!





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6 METER MULTIMODE PORTABLE

- Repeater splits of ±1 MHz built in for FM work.
- Use with FT-290R accessories, including YM-50 16 Button Tone Encoder Microphone and NC-11B Battery Charger. Use FP-80A AC Power Supply for base station work. FL-6010 Amplifier available outside USA.
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- 2.5 watts RF Output on SSB/CW, 800 MW Output on AM.
- Synthesizer steps optimized for mode in use.

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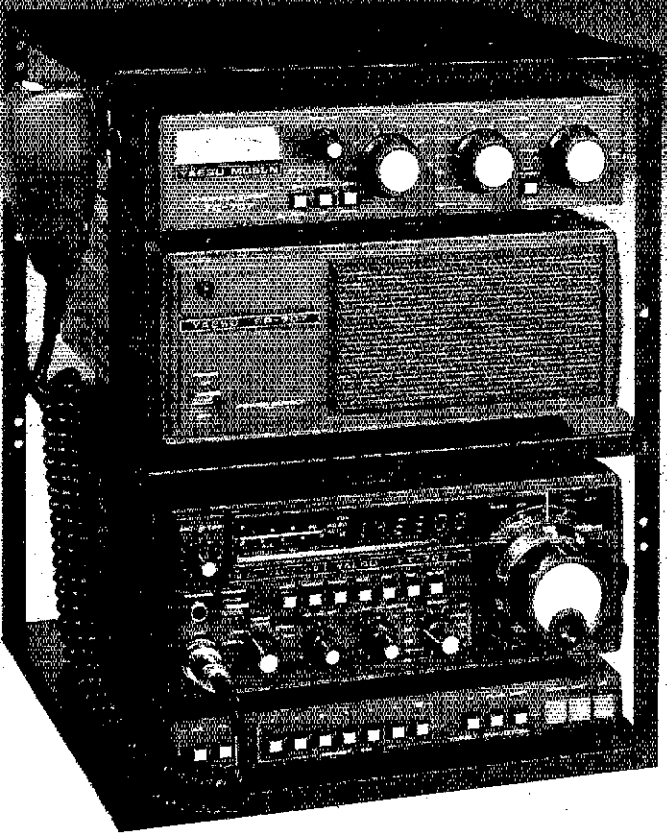

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TOP OF THE LINE PERFORMANCE
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- All Solid State, with individual Low Pass Filters for each band providing excellent Harmonic Attenuation.
- 80 through 10 Meter operation, including the new 10, 18 and 24 MHz bands.
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- Wide Receiver Dynamic Range provided by doubly-balance Diode Ring Mixer.
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The FV-707DM is the ideal traveling companion, yet you need not sacrifice performance away from home. Ask your Authorized Yaesu Dealer for a demonstration today!

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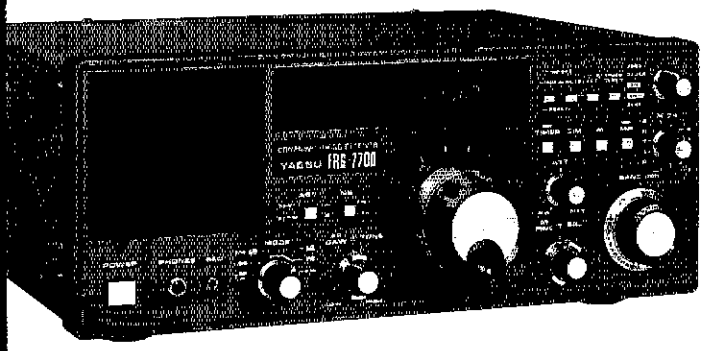
FRG-7700

DELUXE HF COMMUNICATIONS RECEIVER



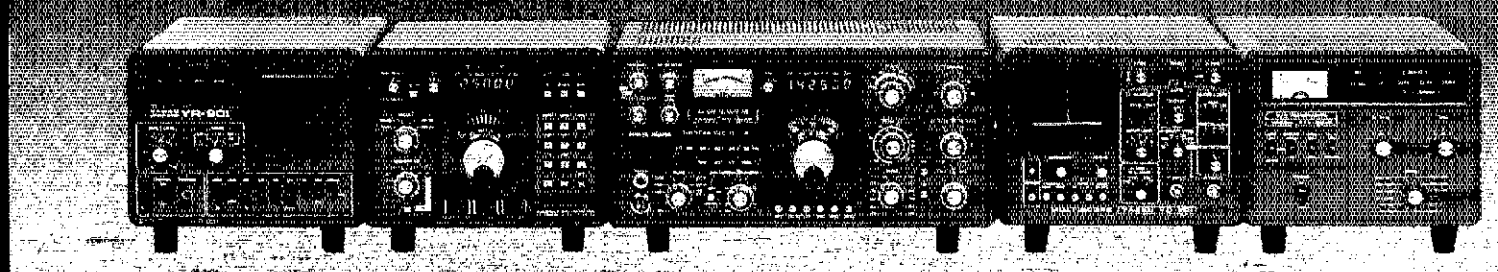
- 150 KHz through 29.99 MHz coverage on AM, SSB, CW and FM
- Three AM bandwidths for changing interference conditions on crowded shortwave broadcast bands.
- Built-in Quartz Digital Clock with timer for control of station accessories.
- Tape Recorder Output Jack on front panel.
- Noise Blanker and AGC Selection controlled from front panel.
- Optional memory unit allows storage and recall of up to 12 frequencies — no more frantic dial twisting at I.D. time!
- Optional Accessories: FRV-7700 VHF Converter, FRT-7700 Antenna Tuner, FF-5 500 KHz Low-Pass Filter, DC-7700 DC Kit, YH-77 Headphones and QTR-24D Deluxe World Clock.

FRG-7 HF COMMUNICATIONS RECEIVE

- Top-selling Shortwave Receiver provides high performance at a reasonable price.
- 500 KHz - 29.99 MHz using Wadley Loop Synthesizer for excellent stability.
- Audio Filter for enhanced reception under difficult conditions.
- Built-in Tunable Preselector for excellent out-of-band interference rejection.
- Front panel Tape Recorder Jack plus Headphone Jack.
- Dial Lamps may be switched off for reduced power consumption.

FT-101ZD MK III

COST-EFFECTIVE DX PERFORMANCE!



- 160-10 Meter coverage on SSB and CW. AM or FM Unit may be added as optional accessory.
- Variable IF bandwidth, using cascaded crystal filters for excellent interference rejection.
- Audio Peak/Notch Filter for razor-sharp selectivity.
- CW Wide-Narrow Selection using optional 350, 450, or 600 Hz CW Filter.
- RF Speech Processor and Adjustable-Threshold Noise Blanker are built in.
- Worldwide Power Capability provided by Multi-Tap Power Transformer, covering 100/110/117/200/220/234 VAC.
- Rugged 6146B Finals with RF negative feedback.
- Optional Accessories: FV-101DM Scanning VFO with 10 Hz Synthesizer and Memory, FTV-901R VHF/UHF Transverter, FC-902 Antenna Coupler, SP-901P Speaker/Patch, DC-101Z DC-DC Converter, FA-9 Cooling Fan, complete line of Microphones.

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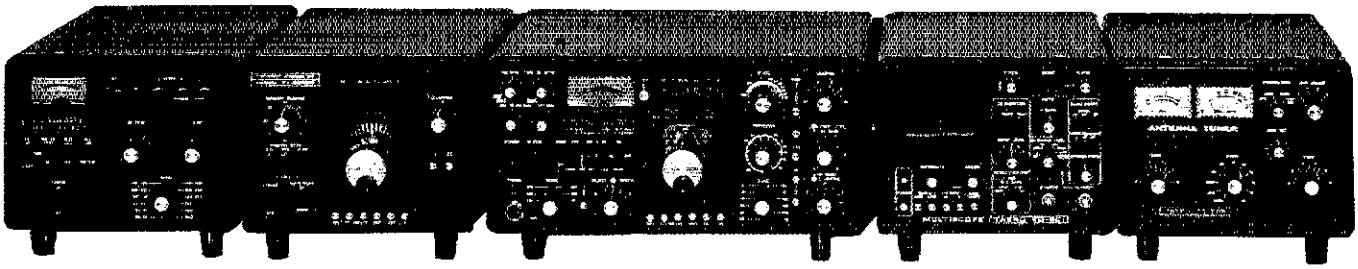
FT-902DM

THE CHOICE OF CHAMPIONS FOR DX AND CONTEST OPERATION AROUND THE WORLD



- SSB, CW, AM, FM and FSK operation built in for All-Mode Versatility.
- 160-10 Meters, including the new bands recently assigned at WARC.
- Variable IF Bandwidth and IF Rejection Tuning for outstanding Selectivity. Cascaded Filters standard, not optional accessories.
- Audio Peak CW Filter provides single signal reception.
- Built-in Curtis 8044 IC Keyer.
- Built-in Memory System for control of Transmit, Receive, or Transceive Frequency.
- Rugged 6146B final tubes with RF negative feedback for excellent spectral purity.
- Built in RF Speech Processor and IF Noise Blanker.

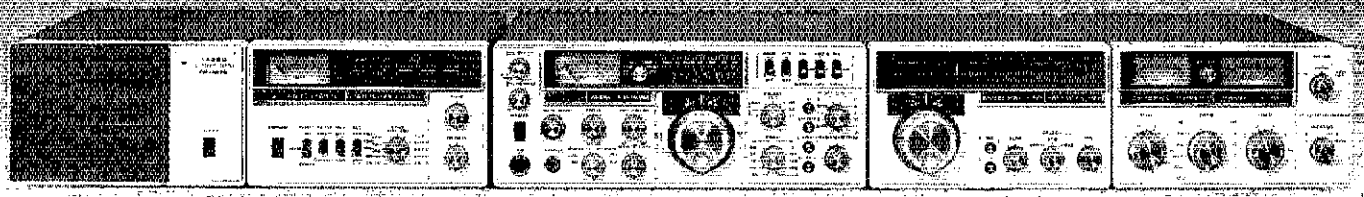
FT-902DM Accessories

- FTV-901R extends coverage to 50, 144, and 430 MHz on full duplex (External Receiver required for duplex operation) for satellite work. 6M/70CM Units optional.
- FV-901DM Synthesized VFO scans in 100 Hz steps and sports 40 Frequency Memory Bank for DX or contest work.
- YO-901P Multiscope includes IF Monitor, Panadapter, and Two-tone Generator for quick station testing.
- FC-902 Antenna Coupler provides for matching 3 Coax-fed Antennas plus one random wire.
- YR-901 CW/RTTY Reader provides versatile Teletype or CW Monitoring using external video monitor.
- SP-901P Speaker/Patch and SP-901 External Speaker round out your FT-902DM Total Communications System.

FT-107M

SOLID-STATE HF TRANSCEIVER

BROADBAND PERFORMANCE FOR EASE OF OPERATION



- All Solid State, 160-10 Meter Transceiver equipped for SSB, CW, FSK and AM operations.
- 12 Frequency Memory System with Digital Memory Shift providing scanning capability (Scanning Microphone optional).
- Excellent VSWR Turndown Characteristics: 75% Power Output at 3:1 SWR.
- Variable IF bandwidth using Cascaded Crystal Filters, Audio Peak/Notch Filter built in.
- Diode Ring Mixer for strong IMD performance. Low-Noise Premix Crystal Local Oscillator.
- Digital plus Analog Frequency Counter Readout. Digital Display utilizes true frequency.
- Built-in RF Speech Processor and IF Noise Blanker.
- Choice of optional internal or external AC Power Supply.
- Optional 350, 450, and 600 Hz CW Filters.
- Optional Accessories: FV-107 External VFO, FTV-107R VHF/UHF Transverter, FC-107 Antenna Coupler, SP-107P Speaker/Patch, SP-107 Speaker.

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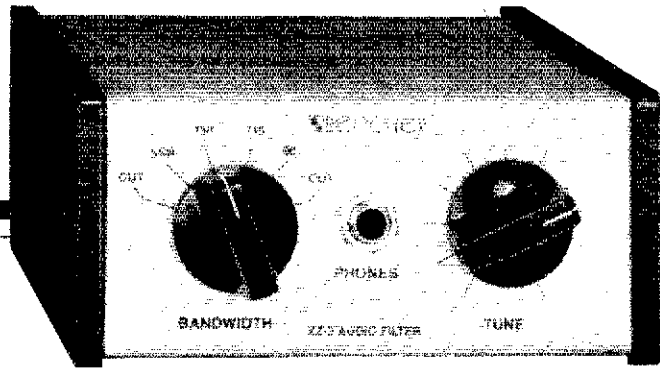

have it and we all look forward to a rewarding relationship. Traffic: W3ATQ 633, WB4PNY 471, WA4STO 386, WD4FTK 321, W4NWM 203, WA4CCK 198, K4JST 191, WD4ALY 160, KY4K 152, K4KDJ 143, WB4FLT 120, WB4FDT 114, WB4KSG 110, NT4S 109, KA3DTE 107, W3BBN 104, KZ4K 103, K4JM 102, KA4IUM 96, K3RZR 80, N4RF 61, NT4U 54, KI4W 54, KB4WT 50, W3BBQ 48, K4LMB 46, W4NFA 45, KA4PNF 38, KA4ERP 35, WB4UHC 32, WB4ODZ 28, K4VWK 27, N4YQ 25, K4DHB 25, W4YVG 25, KB4PW 24, NN4I 20, WB4ZTJ 20, N4LE 19, N4BJX 18, WB4KIT 17, KE4FM 17, W4CFV 16, WB4MAE 16, WB4RWY 15, WA1VRL 12, N4YE 12, NC4B 11, W4OKN 10, WB4DQZ 9, N4FNT 8, W4KFC 8, N4NK 7, W4KXE 7, KC4HN 6, N4DW 6, WA4TVB 5, W4PVA 4, WD4DUU 4, WA4EQW 4, W4KX 4, W4TZC 3, WB2OMZ 2, WD4EUV 2, W4DM 2, WD4KOJ 1 (Oct.) WB4KSG 131, N4RF 78, N4NK 56, KC4HN 5.

WEST VIRGINIA: SCM, Karl S. Thompson, K8KT — Repeater Coordinator: K8LG. SEC: K8QEW. STM: KD8G. NMs: K8MHR KD8X W8FZP WD8LDY. Fayetteville H.F. will be Feb 21 in Mem Bldg. WA8YTM W8AHL & WD8RNB are now Adv ops. PARA active during 2nd annual Bridge Day. WD8QDA is new OVS. KA8IBO is new EC for Fayette Co. Tnx to K8CFT for fine job. Nice attendance at MARA Xmas dinner on 12/8. Two-mtr nets: KFC 47/87-5 sess, 74 sta, 1 msg. Para, 19/79-4 sess, 46 sta, 0 msg. KARC 28/88-4 sess, 53 sta, 2 msg.

Net	Time	Freq	Sess	QTC	QNI	NM
WVN	7:00	3567	25	57	137	KD8X
WVFN	6:00	3990	30	104	719	K8MHR
WVMD	Noon	7235	30	41	471	W8FZP
WVNN	6:15	3730	28	31	123	WD8LDY
WN 6Mtr	9:00	50.150	25	0	142	KA8CGU
Hillbilly	11:00	14290	5	52	187	W8YP

Traffic: KD8X 81, KD8G 64, K8QEW 57, KC8CR 45, WD8DHC 44, K8MHR 43, N8AJC 29, K8KT 29, WD8DIN 29, W8FZP 18, WD8KOI 17, W8HZA 15, W8CAL 10, KC8CS 10, W8CKX 7, WB8WEZ 4.

ROCKY MOUNTAIN DIVISION

COLORADO: SCM, Lawrence E. Steimel, WØACD — SEC: K3PUR. STM: WBØMCL. NMs: WØHXB NØAXQ WDØAIT WØEJD WØRYL KBØZ. With the close of the year I want to thank the SEC, ECs and all traffic people for a fine job done in 1981. I wish all the best for the New Year. There were a lot of activities in the Colorado section this past year that ARES and other interested amateurs have taken part in, as the Health Fair that involved amateurs throughout the Section, and other benefit functions. There were other real emergency activities, such as tornado emergency communications, severe weather watches, domestic fire emergencies, industrial fires involving hazardous materials, along with a great amount of other emergency communications, resulting from traffic accidents, lost persons and various other emergency situations. Not to forget the vast amount of traffic handled by our traffic people. HNN sess 30, QNI 1682, QTC 101, Inf 262, QNF 1182. CWN sess 25, QNI 187, QTC 165, QNF 606. Colombine sess 25, QNI 1199, QTC 80, Inf 261, QNF 1085. Traffic: NØBQP 2586, WAØHJZ 1194, WØACH 460, WØEJD 348, WØFPT 296, WDØAIT 274, WØACD 172, KBØZ 108, WØNFW 82, NØFB 33, WØGW 8.

NEW MEXICO: SCM, Joe T. Knight, W5PDY — SEC: W5ALR. NMs: WA5UNO KB5LI W5VFQ. Southwest Net (SWN) meets daily on 3.583 at 1930 local and handled 156 msgs with 183 QNI. New Mexico Roadrunner Net (NMRRN) meets daily on 3.939 kHz at 0100Z and handled 128 msgs with 996 QNI. New Mexico Breakfast Club meets daily on 3940 kHz at 0700 local and handled 73 msgs with 777 QNI. Yucca 2 Mtr Net, 146.01/61 handled very little tfc because of rptr being down. Caravan Club reports 177 checkins with 4 msgs. KB5LI improving after a back operation. W5JOV is QRT for abt six wks. Miss you! Queen Res-Q completed 18 yrs of emergency service in the Guadalupe Mts hunting season. Six SAR missions were completed in the state this month with all saved except one aircraft and pilot. Tnx to all who helped. Traffic: W5DAD 710, KA5DDW 214, W5ENI 135, K5DUV 106, KB5LI 50, WA5MIY 22.

UTAH: SCM, Leonard M. Norman, W7PBV — WB7UGR sending cw practice on 146.49 in the Grantsville area. K7JH hosted K7KM WB7TUR KA7GRW and N7AVJ at his station for the Sweepstakes contest. W7CAV KA7DRA and WA7ARK operated special events station WA7MTF, equipped for ssb, sstv, fm and speedometer modes, worldland speed record station on the Great Salt Flats. Contributors to the project were N7CLG K7MQ KB7FZ K7RJ KA7CNM and WA7MTF. KA7EGC has new repeater in SE UT. WB7BIJ has new repeater on Kessler Peak, SLC area. W7PBV WA7GTU WA7HHE WB7DGJ WB7EJP KA7BHM KA7DUS KA7GRW KA7IMV KA7KJT N7AVJ and N7CWO assisted in search and finding crashed aircraft. UARC HB contest winners: W7ETR WA7ARK N7SM W7JPG KA8GIF/7 KA7IRB KE7G KM7A. Judges were N7DF KB7XO and WB7RLW. Ogden ARC has a new autopatch repeater serving Ogden and SLC. WB7SSS now KO7H. Traffic: WA7MEL 79, WB4NVO/7 55, KO7H 44, WA7JRC 43, W7PBV 18, W7OCX 13.

WYOMING: SCM, Dick Wunder, WA7WFC — SEC: WB7EIN. STM: WØOGH. The Wyoming Traffic Net has a new manager. Congrats to WØOGH. Congrats to KA7LTD, new Novice. Great Plains ARA held its annual meeting Nov 15 in Wheatland, and attendance was good as well as fellowship. Their repeater 146.28/88 is working well again after last minute repairs before winter hit. WB7NHR reports the Wyoming Cowboy Net held 20 sessions with 649 QNI and 16 QTC. WAØPFJ reports the Wyoming Jackalope Net help 24 sessions with 615 QNI and 0 QTC. Traffic: WØOGH 239, WB7NHR 160, K7TFW 79, W7SQT 47.

SOUTHEASTERN DIVISION

ALABAMA: SCM, James M. Bonner, K4UMD — SEC: W4IBU. Many clubs had their Xmas parties in Dec. Good time for eye ball QSO. BARC participated in the annual Valcon Run held in B'ham on Nov 22 and the Veterans Day parade on Nov 11. Hams that helped with communications were N4BEN K4IR W4UCT WB4TOU KA4TGW WD4BXE KC4LV WB4TLW KD4DO WA8PWF WB4ZAG NM4C N4DLF KA4SWV WA4RNP. BARC thinking of starting a chapter of QCWA. Do you have 25 yrs as a ham? Check with BARC and give your opinion. Enterprise ARC new officers: KD4RT, pres.; K4HKR, v.p.; KA4AFI, sec/treas.; WA4YQT, activities manager. WB4YSJ should be on the air soon with HL9RS. The HAYLARC have been very busy talking about Amateur Radio to grade school children in the Huntsville area. HAYLARC will provide communications for the annual Xmas parade on Dec 5. These YLs are doing FB. WD4DAT reports WAARS is a year old, and have agreed on a patch for their club emblem. Mobile ARC will hold nominations for 1982 club officers. DRN5 was 100% from Ala. by N4BEN W4CKS N4DRZ W4IBU WD4ERU

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- 2 VFOs with data transfer standard.
- 2 tuning rates, 5KHz (A VFO) or 5 KHz (B VFO).
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- Compact size...only 3.7 in(H) x 9.5 in(W) x 10.8 in(D).

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TR7A Transceiver

• **CONTINUOUS FREQUENCY COVERAGE** — 1.5 to 30 MHz full receive coverage. The optional AUX7 provides 0 to 1.5 MHz receive plus transmit coverage of 1.8 to 30 MHz, for future Amateur bands, MARS, Embassy, Government or Commercial frequencies (proper authorization required).

• **Full Passband Tuning (PBT)** enhances use of high rejection 8-pole crystal filters.

New! Both 2.3 kHz ssb and 500 Hz cw crystal filters, and 9 kHz a-m selectivity are standard, plus provisions for two additional filters. These 8-pole crystal filters in conjunction with careful mechanical/electrical design result in realizable ultimate rejection in excess of 100 dB.

New! The very effective NB7 Noise Blanker is now standard.

New! Built in lightning protection avoids damage to solid-state components from lightning induced transients.

New! Mic audio available on rear panel to facilitate phone patch connection.

• **State-of-the-art design** combining solid-state PA, up-conversion, high-level double balanced 1st mixer and frequency synthesis provided a no tune-up, broadband, high dynamic range transceiver.

R7A Receiver

• **CONTINUOUS NO COMPROMISE 0 to 30 MHz frequency coverage.**

• **Full passband tuning (PBT).**

New! NB7A Noise Blanker supplied as standard.

• **State-of-the-Art features** of the TR7A, plus added flexibility with a low noise 10 dB rf amplifier.

New! Standard ultimate selectivity choices include the supplied 2.3 kHz ssb and 500 Hz cw crystal filters, and 9 kHz a-m selectivity. Capability for three accessory crystal filters plus the two supplied, including 300 Hz, 1.8 kHz, 4 kHz, and 6 kHz. The 4 kHz filter, when used with the R7A's Synchro-Phase a-m detector, provides a-m reception with greater frequency response within a narrower bandwidth than conventional a-m detection, and sideband selection to minimize interference potential.

• **Front panel pushbutton control** of rf preamp, a-m/ssb detector, speaker ON/OFF switch, i-f notch filter, reference-derived calibrator signal, three agc release times (plus AGC OFF), integral 150 MHz frequency counter/digital readout for external use, and Receiver Incremental Tuning (RIT).

The "Twins" System

• **FREQUENCY FLEXIBILITY.** The TR7A/R7A combination offers the operator, particularly the DX'er or Contester, frequency control agility not available in any other system. The "Twins" offer the only system capable of no-compromise DSR (Dual Simultaneous Receive). Most transceivers allow some external receiver control, but the "Twins" provide instant transfer of transmit frequency control to the R7A VFO. The operator can listen to either or both receiver's audio, and instantly determine his transmitting frequency by appropriate use of the TR7A's RCT control (Receiver Controlled Transmit). DSR is implemented by mixing the two audio signals in the R7A

• **ALTERNATE ANTENNA CAPABILITY.** The R7A's Antenna Power Splitter enhances the DSR feature by allowing the use of an additional antenna (ALTERNATE) besides the MAIN antenna connected to the TR7A (the transmitting antenna). All possible splits between the two antennas and the two system receivers are possible.

Specifications, availability and prices subject to change without notice or obligation.

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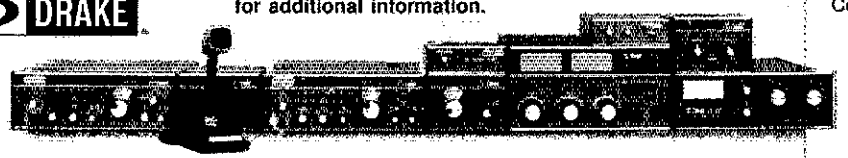

COMING SOON: New RV75 Synthesized VFO Compatible with TR5 and 7-Line Xcvrs/Rcvrs

• **Frequency Synthesized** for crystal-controlled stability • **VRTO (Variable Rate Tuning Oscillator*)** adjusts tuning rate as function of tuning speed. • **Resolution to 10 Hz** • **Three programmable fixed frequencies** for MARS, etc. • **Split or Transceive operation** with main transceiver PTO or RV75

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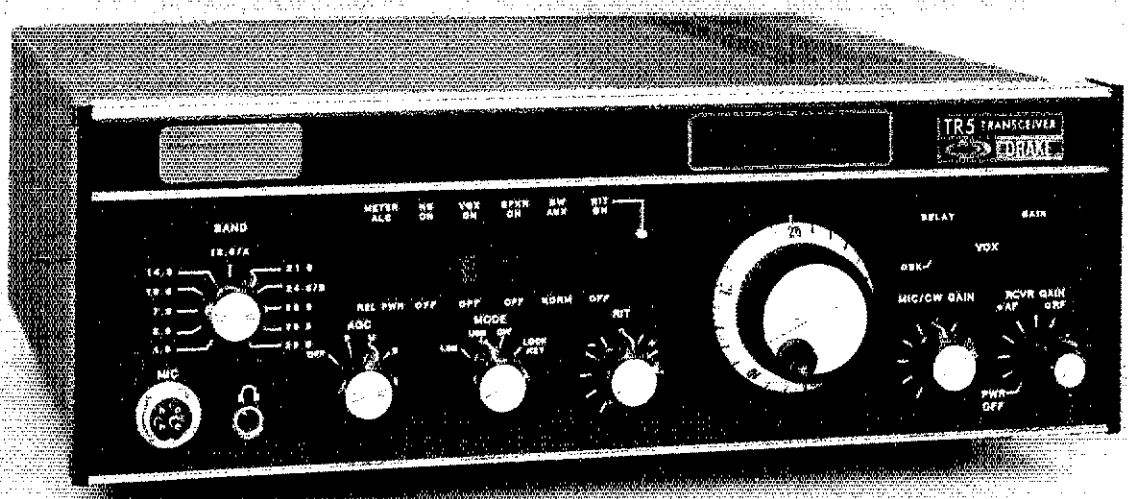
* Patent pending

New Drake TR5 Transceiver



far above average!

COMING SOON:
RV75 Synthesized VFO
featuring the Drake "VRTO"

• Frequency Synthesized for crystal-controlled stability • VRTO (Variable Rate Tuning Oscillator*) adjusts tuning rate as function of tuning speed. • Resolution to 10 Hz • Three programmable fixed frequencies for MARS, etc. • Split or Transceive operation with main transceiver PTO or RV75

* Patent pending

With the new TR5 versatility and value are spelled D-R-A-K-E...

DYNAMIC RANGE

The dynamic range of the TR5 is unexcelled by any transceiver in its class. The TR5's greater than 0 dBm third order intercept point (85 dB two-tone dynamic range) at 20 kHz spacing can be achieved only by the use of a passive diode-ring double balanced mixer. Drake was the first to bring this technology to the Amateur market with a high-level mixer in the TR7.

RELIABLE SERVICE

When you purchase a TR5, or any Drake product, you acquire a product of the latest production techniques, which provide reliable performance.

Yet with a product as sophisticated as one of today's transceivers, after-sales service is a must. Ask any Drake owner. Our Customer Service Department has a reputation second to none.

ACCESSORIES

Drake is the only Amateur Radio manufacturer who offers a full complement of accessories to satisfy almost every desire the HF Amateur may have. This wide selection allows any operator to assemble a station which meets his needs, and assures compatible interfacing and styling instead of a desk full of equipment with a variety of styling and poor operation as a system.

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Everyone wants to be heard! The accessory L75 and its 3-500Z (1200 watts PEP input) and a decent antenna will do the trick. This rugged self-contained amplifier / power supply will put the TR5 on an even footing with the best of them.

ENGINEERING

The TR5 and all Drake Transceivers, are backed by the best in engineering. The TR5 is the result of an extensive engineering effort, combining proven past techniques and ideas with new state of the art concepts.

As a result, the TR5 will not be superceded by a new model every six months. It represents a true radio communications value that will provide many years of operating enjoyment.

See your Drake dealer or write for additional information.

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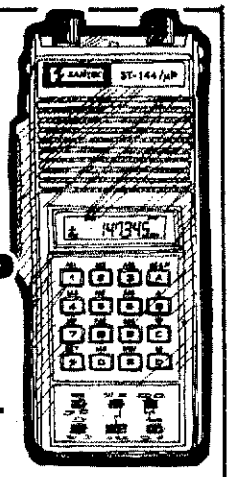

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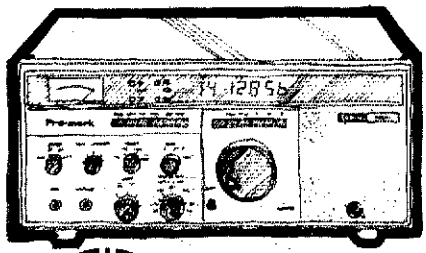

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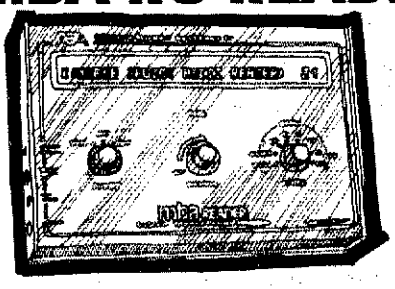

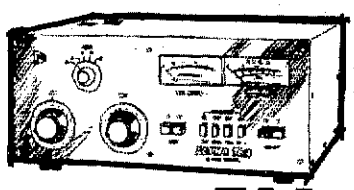

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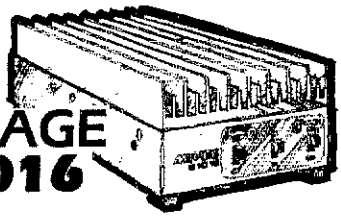

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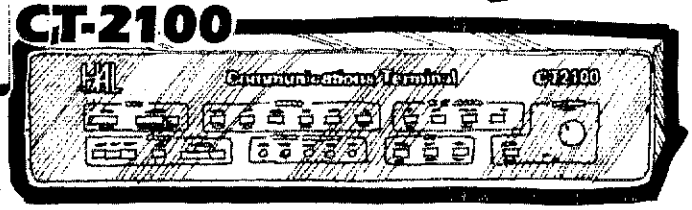

Coming:
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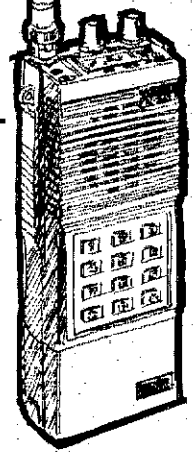
TR-5



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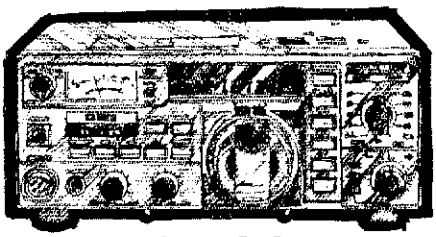
IC-720A

IC-25A



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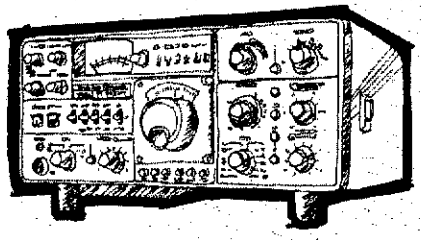

FT-902DM

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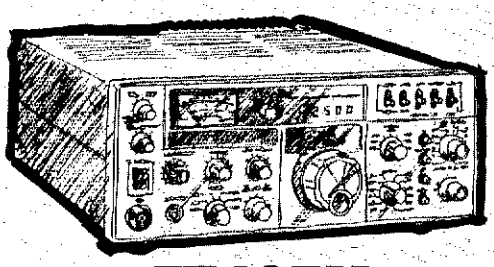
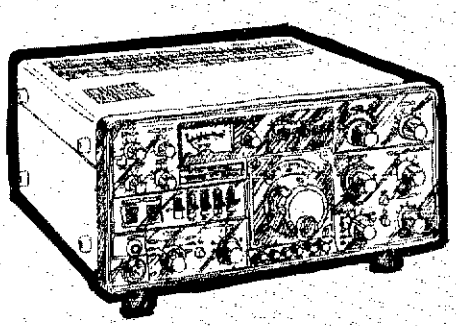
FT-707



FT-107M



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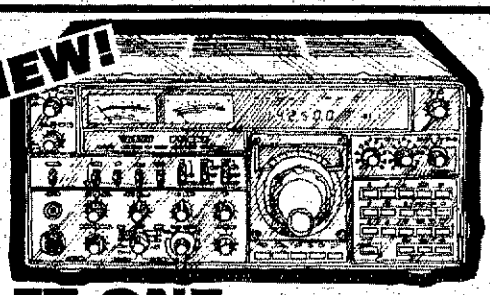

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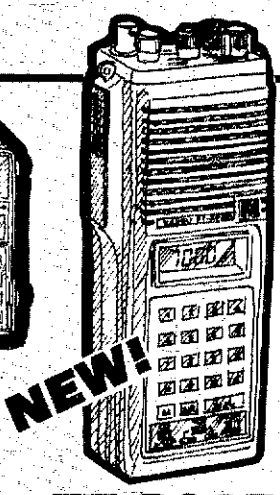

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Dual VFOs Give You Two Radios for the Price of One!

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Features:

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DUAL VFO's each provide complete band coverage. (You are not limited to a single memorized frequency)

235 Watts input, SSB and CW on all frequencies

IF Passband Tuning not to be confused with ineffective "IF shift"

Utilizes an 8 pole filter which is continuously variable for either high pass or low pass.

CW Crystal Filter (optional), 400Hz 6-pole

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External Receive Antenna Jack allows separate transmit and receive antennas

Tunable Notch Filter when combined with passband tuning, provides the ultimate in removing interference

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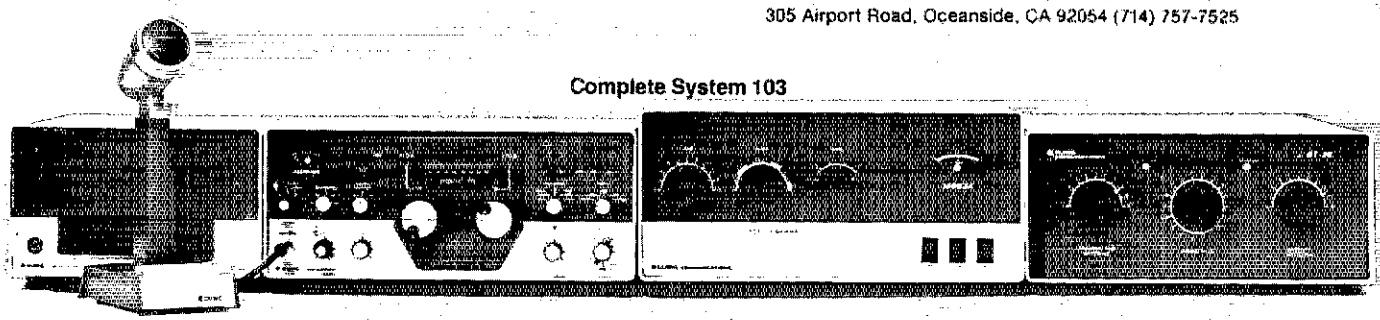
Complete System 103



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Power Supply/Speaker

ASTRO 103
Transceiver

1500Z-A
1500 Watt Linear
Amplifier

ST-2B
2kW Antenna Tuner

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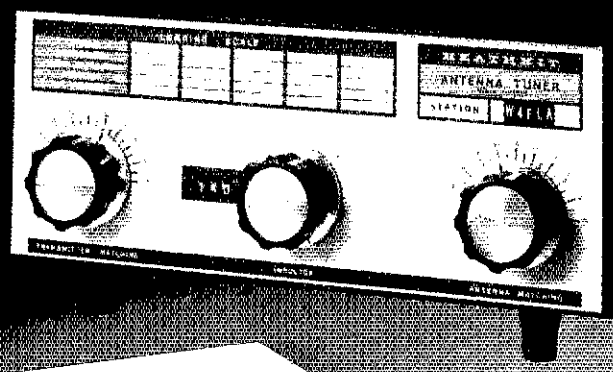
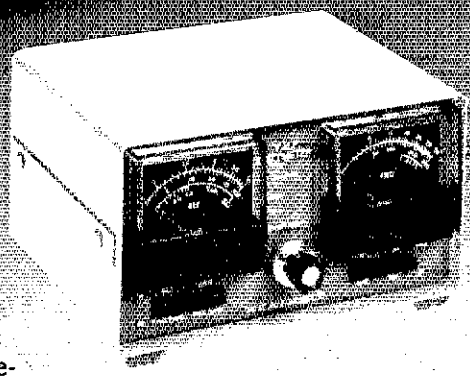


Low SWR and maximum radiation are yours with the SA-2040 2 kW Antenna Tuner.



Measure power and SWR with the HM-2141 Dual Meter VHF Wattmeter you build yourself.

No matter what you are doing to your signal, Heath has the amateur gear to help you do it better...and to save you money, too. Heath is your one-stop headquarters for accessories, antennas and complete, build-it-yourself rigs. And they're all backed by the more than 200 hams at Heath.

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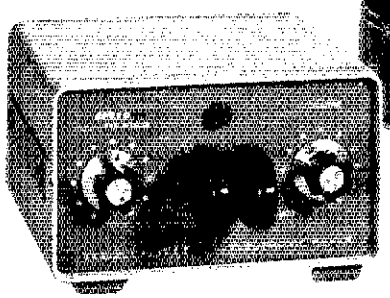
The easy-to-build Cantenna™ Dummy Load reduces QRM during tune-up.



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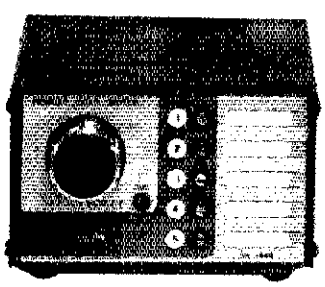

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Rate selectable tuning to 10 Hz with frequency memory and split VFO provide excellent operational flexibility.

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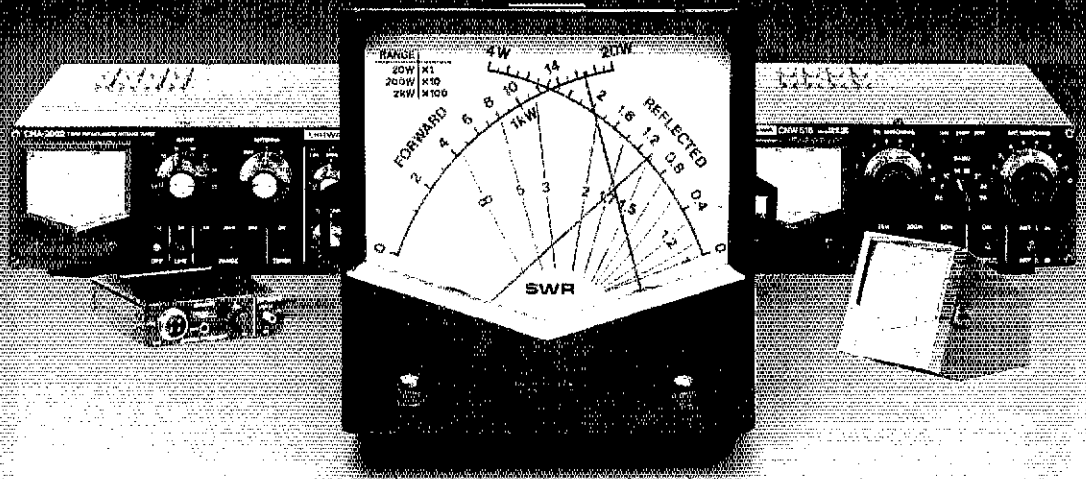


A REVOLUTION IN CONVENIENCE

DAIWA announces an *all-new lineup* of high-quality amateur radio innovations.

Cross-Needle Meters CN-520 / CN-540 / CN-550

DAIWA cross-needle precision is now available in a compact case. Get forward power, reflected power and SWR readings at a single glance—from a meter that fits anywhere!

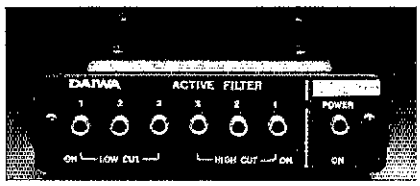
CN520 - Frequency: 1.8-60MHz • **Power range:** Forward 200/2kw, Reflect 40/400 watts • **Detection Sensitivity:** 40 watts minimum • **Accuracy:** ±10% at full scale • **Dimensions:** 72W x 72H x 95D m/m

CN540 - Frequency Range: 50-150MHz • **Power Range:** Forward 20/200 watts, Reflected 4/40 watts • **Detection Sensitivity:** 4 watts minimum • **Accuracy:** ±10% at full scale • **Dimensions:** same as CN-520

CN550 - Frequency Range: 144-250MHz • **Power Range:** Forward 20/200 watts, Reflected 4/40 watts • **Detection Sensitivity:** 4 watts minimum • **Accuracy:** ±10% at full scale • **Dimensions:** same as CN-520

Active Audio Filter AF-306

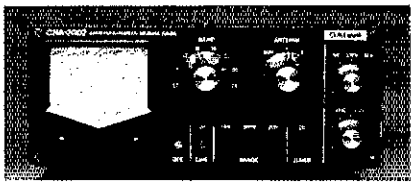
By electronically filtering unwanted signals, the AF-306 gives you clean, distinguishable copy. Featuring its own internal speaker, the AF-306 Active Audio Filter is easy to install, easy to operate.



Input: 2.8v (4v max.) • **Output power:** 1 watt @ 8 ohms • **Distortion:** less than .2% • **S/N ratio:** better than 50dB • **Low Cut Filters:** 400Hz, 800Hz, 1100Hz • **High Cut Filters:** 1100Hz, 1600Hz, 2500Hz

Automatic Antenna Tuner CNA-2002

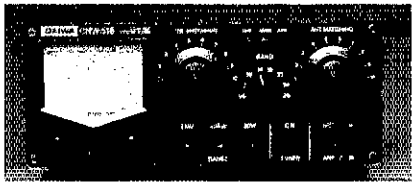
Leading the way in convenience is the Daiwa CNA-2002 2.5 kW (PEP) Automatic Antenna Tuner. Cross-Needle Metering and optimum matching in under 45 seconds make it the perfect compliment to any state-of-the-art amateur station.



Frequency Range: 3.5-30 MHz including WARC bands • **Tuning Time:** less than 45 seconds • **Power Rating:** SSB-2.5kw PEP, CW-1kw (50% duty), AM-500 watts, RTTY, SSTV 500 watts (10 minutes) • **Output Impedance:** 16-250 ohms (unbalanced) Dummy Load 100 watts 1 minute (installed) • **Metering Ranges:** Forward power - 20/200/2000 watts, Reflected power - 4/40/200 watts, SWR-1.1-infinity • **Power Requirements:** 11-16 vdc @ 200 ma.

Manual Antenna Tuners CNW-518 / CNW-418

The serious amateur wants to achieve the best antenna match possible. That's why DAIWA offers two manual antenna tuners that maximize power transfer—and offer cross-needle metering as well.

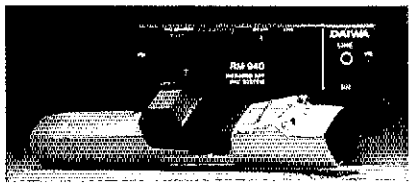


CNW-518 - Frequency Range: 3.5-30MHz including WARC bands • Power rating: 1kw CW (50% duty) • **Output Impedance:** 10-250 ohms (40-10 meters) 25-100 ohms (80 meters) • **Insertion loss:** less than .5 dB

CNW-418 Same as above except—**Power rating:** 200 watts CW

Infrared Cordless Microphone RM-940

DAIWA ingenuity is also evident in the RM-940, an infrared cordless mobile microphone system. Audio and transmit/receive switching are carried on a safe infrared beam. Experience the freedom of cordless mobile operation. Ask your Daiwa dealer for a demo today!

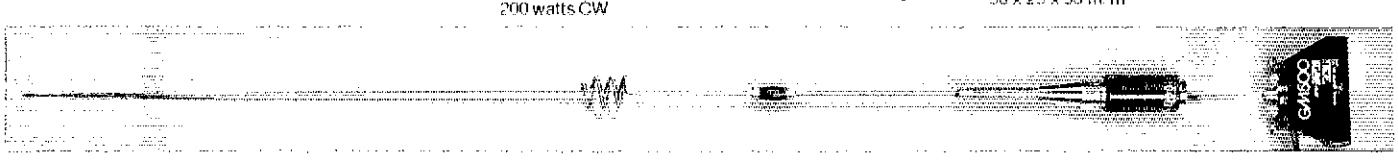


Microphone: Electret Condenser type • **Continuous Operating Time:** 5 hours minimum • **Charging Time:** 8 hours max • **Usable Distance:** 3.5 feet—microphone to sensor • **Power Requirements:** Controller—13.8 vdc @ 80 ma. Microphone—2.5 vdc @ 30 ma.

Speech Processor RF-670

DAIWA innovative thinking led to the development of the RF-670 Photocoupler Speech Processor. Its unique design gives your signal the boost it needs to cut through bothersome QRM. Get RF-type processing performance with the RF-670's economic photocoupler design.

Clipping Level: 20dB max • **Frequency response:** 300-3000Hz (-10dB) • **Clipping Threshold:** less than 2mV at 1kHz • **Bandwidth:** 2400Hz at 6dB down • **Distortion:** less than 3% at 1kHz, 20dB clip • **Output level:** 40mV max • **Mike imp.:** 600-50k ohms • **Power requirement:** 13.5v @ 60ma • **Dimensions:** 90 x 25 x 93 m.m.



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DA100 - 5/8 wave • Length, 1.360 m/m • 146 MHz
DA200 - 7/8 wave • Length: 1.870 m/m • 146 MHz

Gutter Mount

GM500 - Frequency Range: 1.8MHz-500MHz • **Power Rating:** 1kw • **Dimensions:** 86W x 54H x 37D m/m

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DAIWA
Amateur Radio Innovations

WA4JDH WB4TVY W4WJF. AENB reports QNI 202, QTC 80, sess 30. AEND reports QNI 206, QTC 99, sess 30. AENM reports QNI 2807, QTC 134, sess 35. AENR reports QNI 48, QTC 1, sess 8. K4EVY requests that all RTTY stations participate in Eastern RTTY Traffic Net daily on 3643 kHz at 2200Z. W4IBU is the new SCM for 1982-83. Give him your full support. Traffic: WA4JDH 737, W4CKS 197, WA4LXP 80, W4IBU 64, K4AOZ 64, WA4PIZ 52, WD4DHI 37, KA4VFC 24, K4UMD 20, WB4EKJ 10, K4HJX 10, WB4TVY 6, W8IM 3.

GEORGIA: SCM, Eddy Kosobucki, K4JNL — ASCM/SEC: K4VHC. STM: W4WXA. NVOAD: WA4PUP. Chief OBS: W4BIA. Beautiful wx & huge attendance made the annual Famvention a real success. W4TJS & W4YEK honored with ARRL Certificates of Merit for their many devoted years to the hobby in the section. Colquitt Co HRS 1981-82 officers are: W4NWB, pres.; K4UPP, v.p.; AA4P, sec/treas.; WB4MYJ, trustee. Macon ARC now an ARRL affiliated club. Congrats. We still need OBSs for the section. If you feel you can qualify please let me know so I can get you the proper form. Savannah area hams continue doing many public service events. This is the kind of PR the hobby needs. Please report these directly to K1XA at League Hq. At this writing I received work from K4VHC, the SEC, that he must resign effective Dec 31st because of continued work out of the state. I'm sure that all agree with me that he helped promote the ARES program in the section. Bob, tnx for the FB job. Gwinnett ARC elected as follows: WB4GKI, pres.; KM4Z, KA4BNG, sec; N4CUJ, treas., KA4HEN, act mgr; WA4BXA, editor. Central Ga. ARC's new officers are: W4HON, pres.; N4BHB, v.p.; KC4WU sec/treas.; WD4ENO, prog dir. Atlanta Chapter QCWA net meets each Sat on 3832 at 0900 local time. K4VN invites all QCWA members to join the ragchews. In regard to Hamfests, if you desire to hold an ARRL hamfest contact the SE Director at least four months in advance for the necessary paperwork. Also keep W4RH and myself informed of any other that you plan in the section. The Georgia section probably now holds more than any other in the SE Division. Starting out the season will be the annual Columbus Hamfest on March 28th & 29th. It won't be long until these cold days are gone again & the next thing it will be spring. 73. Traffic: K5TF 258, WB4NTW 138, K4EV 105, W4WXA 105, W4PIM 57, K4JNL 49, WB4LBM 34, N4UZ 28, W4BIA 20, W4HON 16, W4ELO 15, K4NM 11, W4FIZ 10, WB4APG 8, KA4ATM 5, K4PIK 5.

NORTHERN FLORIDA: SCM, Billy Williams, N4UF — SEC: WA2GIN. STM: WD4HIF. W4BSP became a Silent Key. He served as ASCM and as Sec. of FMTN. 1982 NOFARS officers: WD4NYT, pres.; NO4J v.p.; WD4RPB sec.; KA4CIZ, treas.; WB8KTH act. mgr; WD4ETG N4BZH, dirs. Youngest LMARS ham is KA4WRJ, 8 years old! NS4K very active promoting Amateur Radio to the scouting program in Seminole/Orange Co. Contact him if you can assist. LMARS comms for the Golden Age Games very successful. N4EDQ has new simplex autopatch in Orlando area. OARS had a message booth at Martin-Marietta Family Day & generated considerable traffic. TARS had booth at North Fla. Fair likewise. Plans for Orlando Hamcation shaping up with new site at fairgrounds. HCARA heard program on Handi-Ham system by W4RAJ. Panama City ARC chose N4DXC, pres.; KA4VMZ, v.p.; KB4LU sec/treas. Gainesville ARS elected W4TKE, pres.; W4OQX, v.p.; KA4WNU sec.; K4FSX, treas.; N4AUY, rptr chmn; KA4TSB, PR chmn. BARS officers: W4BSO, pres.; WD4MSR v.p.; KD4OV, sec.; WD4SGB, treas. NE4Z is editor of Random Wire, BARS newsletter. N4ADI & XYL had their car break down. W4CCQ & K4DEE heard the call and came to their aid. N4KE finished 5BWAZ. He should be first in FL to earn it. DBARA has full size slate of PS events for 1982. Daytona Speed Week activities in Feb are next. WD4JDU has new 2M ssb rig & WB4ORK getting equipment together for 3300-3500 MHz. KA4EPQ has new 13/73 rptr in FWB. Those having interference from CATV ch E (18) should forward details to me at Box 9673; Jax 32208. More info on this potential problem is available. Let your elected representatives know your feelings about this intrusion into our freq. assignments. Traffic: AA4FG 747, N4PL 715, W4SIZ 666, WD4HIF 623, WD4IIO 424, N4EDH 380, W4JL 304, WA4EYU 273, WA4QXT 253, WB4TZR 196, W4DTV 119, WD4MLQ 117, W4KIX 113, KF4U 100, W4MGO 88, N4BZH 64, WB4GHU 52, W4GUJ 27, W3IDO 26, KA4MGQ 22, WA4STZ 21, N4UF 21, WB4DTS 14.

SOUTHERN FLORIDA: SCM, Woodrow Huddleston, K4SCL — ASCM: W4KGJ. SEC: AA4WJ. STM: WA4PFK. We had 40 stations reporting to the SCM this month: 39 traffic reports and 1 other. That is 0.3% of the hams in this section; 0.1% of the ARRL members. That is disappointingly low. Are you doing your part and reporting each month? Our apology to W4JM, a faithful reporter and Asst. Director. We listed his call as K4JM the last two months. Sorry! We are so used to handling traffic with K4JM in Virginia that the typewriter just naturally typed it that way! W4JM reports keeping weekly skeds, Thursday, 9 A.M., on 21.380, with the German QCWA Chapter 106. He invites other QCWA members to join in. W4SMK reports he will be off the air a few weeks moving to a new QTH. We hear, through WA4PRK, that we have a new 11-year-old Novice, KA4WST, son of NC4H. Congrats! And also congrats NC4H! Wish I could have gotten my kids interested enough to study and get a license. K5IHH has a new IC3AT 220 MHz handheld. St. Pete ARC has elected new officers: WA4IIT, pres.; WD4KGY, v.p.; WA4WOU, secy.; W4VIP, treas.; W4CF WA4WKO K4RBJ, executive committee. WA4IBM and Florida Power Club acquiring GE MASTR repeater to replace their GE Prog. Line on 147.00 Pinellas ARES hopes to have a GE MASTR repeater on 146.25/85 soon. Traffic: W3CUL 3415, W3VR 735, WB4FVV 672, K4TH 669, K4SCL 545, KY4U 444, WA4PFK 390, WD4AWN 372, WD4COL 335, W4NFK 314, K4ZK 286, KE4O 218, KA4FZI 216, WA4HXU 214, N2WX 183, K4EUK 169, WA4EIC 162, WB4WYG 162, WB4AID 155, W4GPL 118, W3TLV 118, KA4ASZ 114, WB4PIB 112, N4KB 61, WD4CHO 53, KA4LNA 50, VE3BSY 46, WB4GCK 42, W4IRA 38, W4ESH 33, K5IHH 31, W8PDP 31, W4WYR 24, KA4BBA 19, W4UIO 17, AA4WJ 12, WB4FVN 11, W4SMK 8, WB4SNX 7.

WEST INDIES: SCM, Julio Negroni, KP4CV — JOTA was well attended at PRARC headquarters and at Manati. Section participants are enthused over QSL published reports of FD activities. KP4ID NP4D and KP4VA rated highest regional scores in their category, and ranked very well with national participants. NP4D is planning a new repeater at Cerro Tres Dias to provide ARES and NTS with a more reliable repeater than ailing El Gato. The new repeater will operate on 146.31/91 MHz. New appointment: KP4ZC OO. WP4BDS/KP4 was active in Sweepstakes with NP4D and WP4BDS as operators. PSHR: WP4AOH KP4DJ. BPL: WP4BDS. Traffic:

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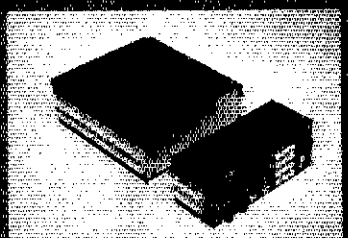

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- INSTANT MEMORY 1 RECALL: By pressing a button on the microphone or front panel, memory channel 1 may be accessed immediately.
- MEMORY SCAN: Memory channels may be continuously scanned for quick location of a busy or vacant frequency.
- PROGRAMMABLE BAND SCAN: Any section of the band may be scanned in steps of 5 or 10 kHz. Scan limits are easily reprogrammed.
- DISCRIMINATOR SCAN CONTROL (AZDEN EXCLUSIVE PATENT): The scanner stops by sensing the channel center, so the unit always lands on the correct frequency. COMPARE this with other units that claim to scan in 5-kHz steps!
- THREE SCAN MODES WITH AUTO RESUME: "Sampling" mode pauses at busy channels, then resumes. "Busy mode stops at a busy channel, then resumes shortly after frequency clears. "Vacant" mode stops at a vacant channel and resumes when signal appears. If desired, auto resume may be prevented by pressing one button. COMPARE!
- REMOTABLE HEAD: The control head may be located as much as 15 feet away from the main unit using the optional connecting cable. COMPARE!
- PL TONE OSCILLATOR BUILT IN: Frequency is adjustable to access PL repeaters.
- MICROPHONE VOLUME/FREQ. CONTROL: Both functions may be adjusted from either the microphone or front panel.
- NON-STANDARD OFFSETS: Three accessory offsets can be obtained for CAP/MARS or unusual repeater splits. CAP and Air Force MARS splits are BUILT IN! COMPARE!
- 25 WATTS OUTPUT: Also 5 watts low power to conserve batteries in portable use.
- GREEN FREQUENCY DISPLAY: Frequency numerals are green LEDs for superior visibility.
- RECEIVER OFFSET: A channel lock switch allows monitoring of the repeater input frequency. COMPARE!
- SUPERIOR RECEIVER: Sensitivity is better than 0.28 uV for 20-dB quieting and 0.19 uV for 12-dB SINAD. The squelch sensitivity is superb, requiring less than 0.1 uV to open. The receiver audio circuits are designed for maximum intelligibility and fidelity. COMPARE!
- ILLUMINATED KEYBOARD: Keyboard backlighting allows it to be seen at night.
- TRUE FM, NOT PHASE MODULATION: Transmitted audio quality is optimized by the same high standard of design and construction as is found in the receiver. The microphone amplifier and compression circuits offer intelligibility second to none.
- OTHER FEATURES: Dynamic microphone, built-in speaker, mobile mounting bracket, external remote speaker jack (head and radio) and much, much more. All cords, plugs, fuses, microphone hanger etc. included. Weight: 6 lbs.
- ACCESSORIES: CS-ECK 15-foot remote cable. CS-6R 6-amp ac power supply. CS-AS remote speaker. CS-TTK touchtone* microphone kit (wired and tested).

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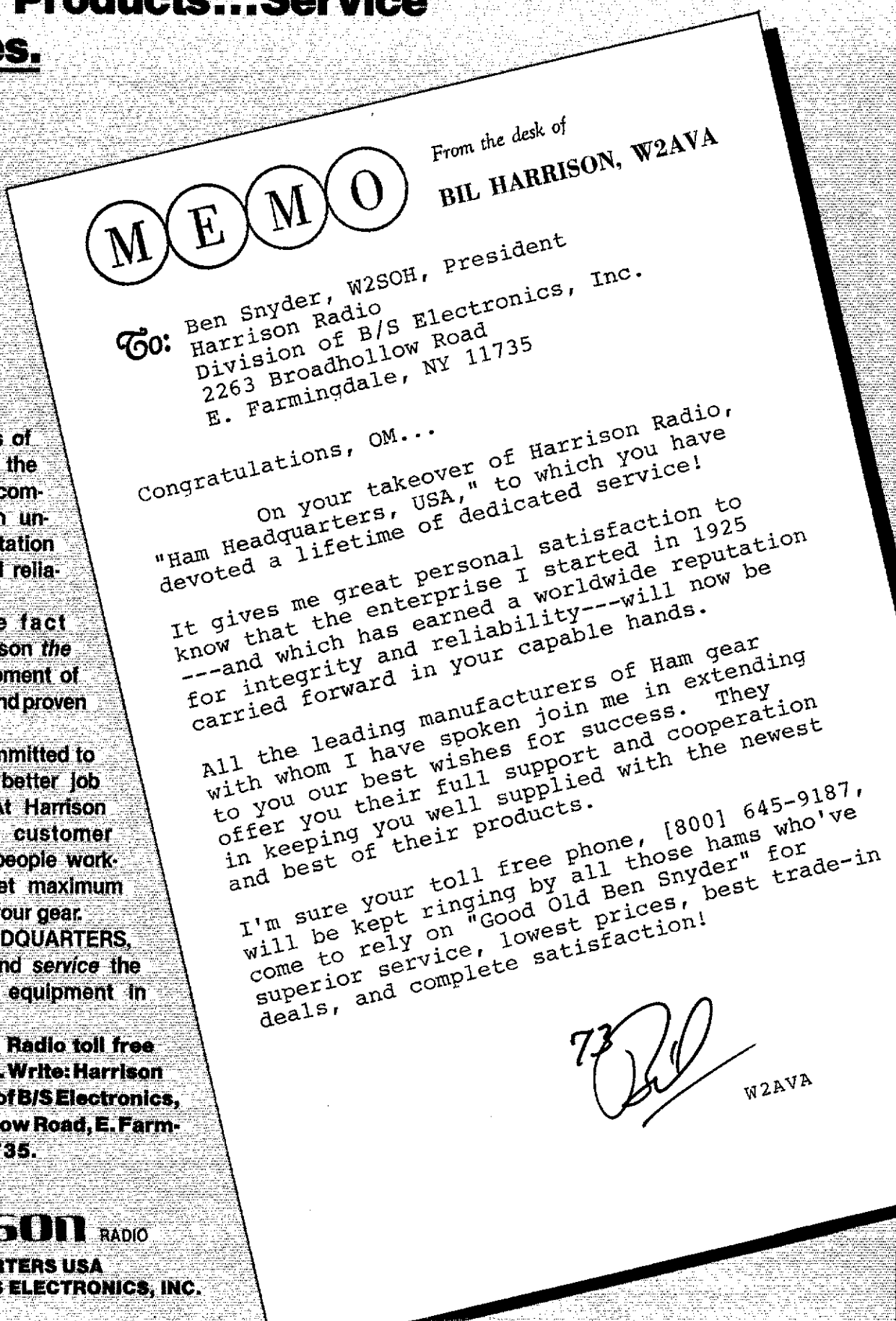

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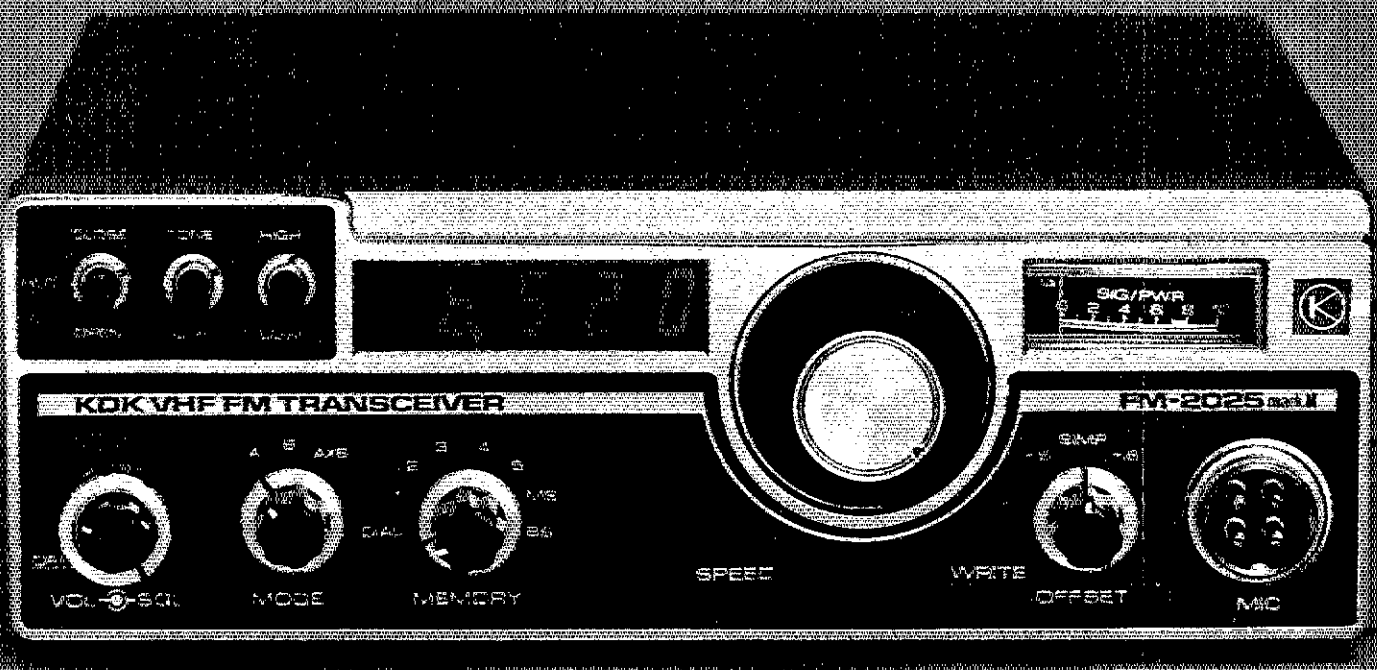

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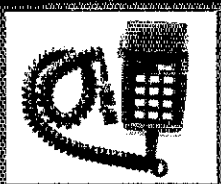

●Features such as ten channel memory in two banks of five each, a solid 25 watts of power, full MARS and CAP coverage from 143.000 Mhz to 148.995 Mhz, plus built in memory retention for up to one year . . . and much, much more makes this the radio of the year. If you have been waiting to move up to a new model, or have wished for a radio with "everything" . . . KDK has it!

●The ten channel memory is easily addressable and you have two banks of five channels each. You can even use both banks at once for odd splits.

●Standard 600 hz shift up or down. Band scan or memory scan. Memory scan is easy. There is also band scan with upper and lower limits you can choose yourself!

●Built in nicads for the memory retention which has drain in nano-amps, not milli-amps. The internal battery will hold the memory for up to one year! No other radio offers you this feature.

●Fast and easy dialing. Full solid state dialing and you can choose from the front panel either a fast or slow dial rate.

●No relays are used, only solid state switching. This eliminates a trouble spot many radios encounter.

●KDK has also eliminated another trouble spot by completely hand wiring each radio. No internal plugs to become intermittant and no wire wraps either, just good solid wiring.

●KDK gives you one of the hottest receivers you can find. By using UHF (not VHF) dual gate MOS FETs with electronic auto tuning for the RF amplifier and the first mixer, you have a combination of ultra sensitivity and maximum quietness.

●The audio output stage in the 2025A Mk II uses an integrated circuit which has internal protection against over-voltage and shorted output conditions. Plus it is a high audio output chip – just what you need in a noisy mobile situation.

●The transmitter uses direct VCO varicap modulation for true FM. Your transmitted audio sounds as it should; crisp, clear and natural.

●The power output stage of the 2025A Mk II will not break down even with an infinite VSWR load, and uses heavy duty solid state antenna switching with a four stage low pass filter. All this gives you an exceptionally clean, spur free output.

●KDK has included an adjustable sub audible tone circuit which can also be used for CTCSS or tone burst on transmit. Again, more features.

●Size is 2 7/10" high – 7 1/8" wide – 9 1/2" deep.

●You can switch from 25 watts to 3 watts low power.

●And, of course, the DC cable is included along with the microphone and mobile mounting bracket.

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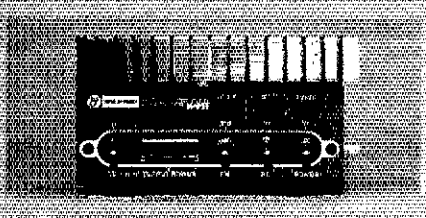
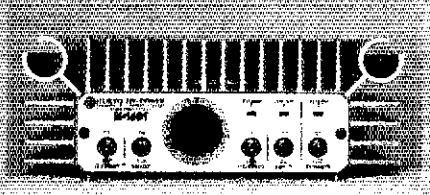
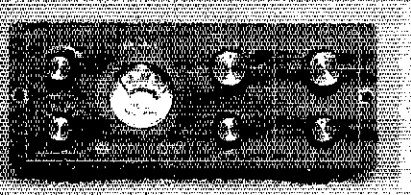


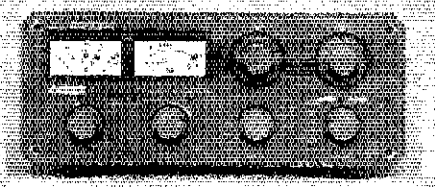
HL-82V — 10W to 80W 2 mtr power amp with 12db gain MOS-FET Rx preamp. Selectable output power levels and a precision output power meter. SSB or FM/CW operation. $159.95 Suggested Retail.



HL-160V — 3W input to 12W input produces 160W of output with 12db MOS-FET preamp. SSB, CW, FM, AM modes. Coaxial relay on output side. If you want to "hawg" the frequency, this is it... the "Boss Hawg" amp. $349.95 Suggested Retail.



MC-50 — Our most popular antenna coupler. Handles 150W output transceivers from 3.5 to 30 MHz WARC bands, 10 ohms, to 250 ohms & accurate SWR & power meter (±10%). Coupler or direct function. Ceramic coils. Quality throughout. $99.95 Suggested Retail.



MC-60 — The ultimate in quality transmatch design and construction. Takes a full 2 kW output at peak on most bands. Accurate VSWR and separate FWD metering. 3 coax & 2 wire antennas and dummy port, plus bypass. One box, coax switch, power meter, antenna tuner: what could be more convenient! $349.95 Suggested Retail.

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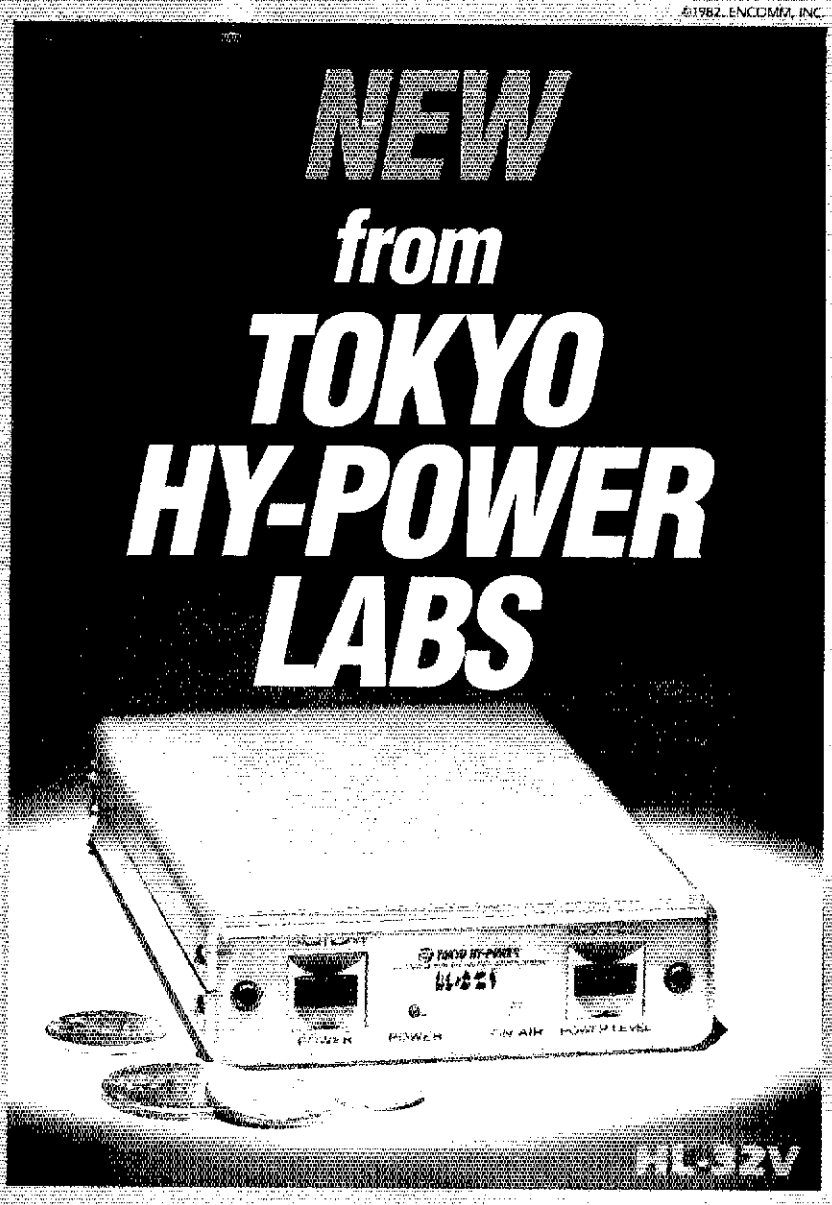

This is it! The compact HL-32V VHF handy-amplifier from THL. This low profile unit produces 10W to 30W of output with drive from your 0.5W to 3W handheld.

Turn it on with the convenient front panel controls including PWR LED and TX LED or slip the package under the seat out of sight and out of mind. Low insertion loss on receive and selectable power level design provides low VSWR to the transceiver. Use with any talkie from 0.5W to 3W for 10W to 30W output. Linear mode for SSB or FM (switch selected). And the best news of all: the price is only $89.95! Suggested Retail. At your favorite dealer now!

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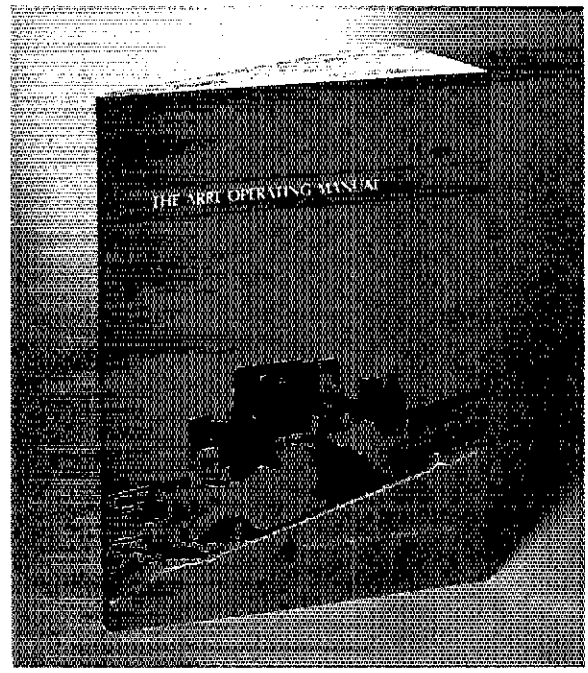
THE ARRL OPERATING MANUAL

We think that this is the finest book on Amateur Radio operating ever written, and the 1980 Edition is well on its way to becoming one of the ARRL's best sellers! Each chapter was written by an expert with extensive on-the-air experience in his or her field. You'll find dozens of useful charts and tables. All facets of operating are covered in a style which shows how fun and rewarding the Amateur Radio experience can be.

Chapters include: Basic Amateur Radio, Rules and Regs, Traffic Handling, Emergency Communications, DX and DXing, Contests, Awards Chasing, FM and Repeaters, VHF/UHF Operating, Satellites, Visual Communications, Microcomputers, and Shortwave Listening.

Contains these important references: 5BDXCC country check-off list with continents, ITU and CQ zones of each country, ARRL Numbered Radiograms, International Call Sign Allocations, Q Signals, CW Abbreviations, RST System, Beacon Frequencies, DX Operating Code, Spanish Phonetics plus much more!

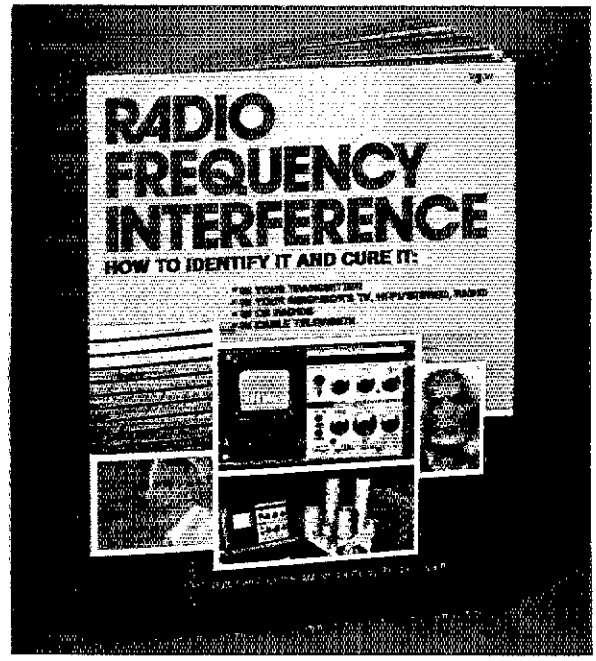


The 1980 Edition is the first in the large (8-1/2 x 11) format and replaces the *Operating Guide* and the three previous editions of the old *Operating Manual.*

154 Pages, $5.00 in the U.S., $5.50 elsewhere

RADIO FREQUENCY INTERFERENCE

This book has been prepared to help you slay the RFI dragon. You'll learn the causes of RFI and how to cure it. New material in the revised 2nd Edition includes a chapter on interference to and from cable television systems. Extensive coverage is given to preventing and curing interference to home entertainment devices. *Radio Frequency Interference* provides important information in fighting RFI. Available from your dealer or direct from A.R.R.L. 70 pages. $3.00 U.S., $3.50 elsewhere.



NEW 2ND EDITION

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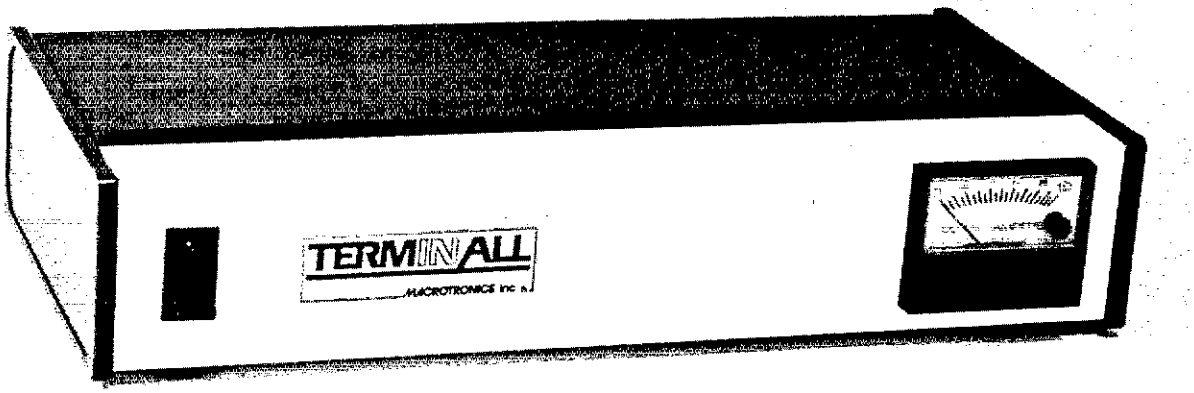
TERMINALL

The communications terminal that does it all!



TERMINALL is a hardware and software system which converts your TRS-80* (Model I or Model III) into a state of the art communications terminal. TERMINALL is simple to use. TERMINALL gives you more for your money. TERMINALL works with a general purpose computer and is expandable. TERMINALL has it all!

Simplicity

TERMINALL was designed from the outset to be easy to connect to your radio and easy to use. Plug into your receiver headphone jack and copy Morse code or radioteletype (RTTY). Plug into your CW key jack and send Morse code. Attach a microphone connector and send Baudot or ASCII RTTY using audio tones (AFSK). That's all there is to hooking it up.

The software may be loaded into your computer from cassette or disk. Enter your callsign and the time and you will start receiving immediately. No settings or adjustments are necessary to receive Morse code -it's fully automatic - and it works! You may type your message while receiving or transmitting.

You will be on the air, receiving and transmitting any mode in minutes. As we said, TERMINALL is simple.

More for your money

■ TERMINALL has the RTTY terminal unit - demod and AFSK - built in. This results in a lower total cost because separate terminal units usually cost at least $225 assembled, and most do not even have a crystal controlled AFSK. TERMINALL eliminates not only the higher cost of an external terminal unit, but also eliminates the hassle of interfacing to another piece of equipment.

■ **Fantastic Morse reception:** Six stage active filter demodulator copies the weak ones. Auto adaptive Morse algorithm copies the sloppy ones. Keyboard selectable noise threshold. Received code speed displayed on status line.

■ **Outstanding documentation.** Professionally written, 90 page user manual - contains: step-by-step instructions - explicit examples - numerous photographs and illustrations - theory of operation -parts layouts - schematic diagrams - trouble shooting guide.

■ **Built in software backup** - set up the program parameters and messages the way you like to operate - then have the program save a new copy of itself -on either cassette or disk!

■ **Software** supplied on both cassette and auto-run diskette at no additional cost.

■ **Built in separate, multi-stage active filter RTTY and CW demodulators.** No phase lock loops. RTTY demodulator has 1/0 and either 425 or 850Hz shift -keyboard selectable - and uses either the panel meter or scope outputs for easy tuning. Copy the weak ones. Copy the noisy ones. Copy the fading ones.

■ **Built in crystal controlled AFSK.** Rock stable for even the most demanding VHF or HF application. A must on many VHF RTTY repeaters.

■ **Built in hardware clock** - one second readout maintains correct time even during cassette I/O. User programmable time/date format.

■ **Built in 110 or 220** volt AC power supply.

■ Built in parallel printer driver software. Simply attach a parallel ASCII printer (e.g. the EPSON MX-80) to your printer port to obtain hardcopy in all modes. Note: parallel printers typically cost less than serial ASCII printers.

■ **Word wrapping,** word mode editing, diddle, ignore carriage returns, user programmable end of line sequence, adjustable carriage width, Transmit delay (fixed, none or auto adaptive) Break mode and more!

■ **The all-in-one TERMINALL design** makes it great for use on HF of VHF -Ham, Commercial, SWL or MARS! SWL's: TERMINALL may be jumpered for either 425 or 850 Hz reception to copy news and weather services.

General Purpose vs Dedicated

TERMINALL has capabilities far surpassing other "dedicated terminal" systems. And yet, since it works on a general purpose computer, the majority of your investment (the TRS-80) is spread out over many different applications - not just Radio communications. And your system is expandable. For example, Disk based mailbox software may be added at any time.

Simplicity of operation. Lower cost. General purpose computer. What are you waiting for? This is the way to go!

Complete with software on cassette and diskette, assembled and tested hardware, and extensive instruction manual. Specify Model I or Model III. Level II 16K required. **$499.**

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WP4BDS 334, WB4AOH 71, KP4DJ 129, WP4BCV 33, KP4FBT 30.

SOUTHWESTERN DIVISION

ARIZONA: SCM, Erich J. Holzer, N7EH — STM: W7EP. NMs: WA7KQE WA7FDN. The month brought winter to the section's Northland. CCARC reports their 22/82 rptr to have been the "only game in town" for the duration of the winter storm. They also report that KA7HBL received WAS. AAA5 club reports excellent PR from a local TV station in Phoenix. W7JU reports that W7CV (ex-W7BVZ) to be the proud possessor of the first "Worked All Arizona" certificate issued. Do you have your Worked All Arizona award? I would be glad to provide details. W7LUX reports some rather impressive 6-meter observations. If you are a vhf buff, an OVS appointment could be yours. I can provide details. The IBM ARC reports that some of their members attended the dedication of the FCC's Douglas Monitoring Station. The following provided communications for the Camp Wildcat Bike-a-thon between Tucson and Mesa: WB6HBS KC7CJ KB3UC WB7CZT AF7M N7EH K7CO K7CRN KA7FRY WB7RSE K7OMR WB7VOM K7KYW W8BID WB7CGQ WA7JCK WA6III N4DZN KA7DTT WB7BVS WB7BYK WA2ATF WB6OWL. W7KAX reports communications exercises involving an air show and hot air balloons. Thanks to the IBM for inviting me to their Nov. meeting. New appointees: KE7W ORS, WA7FDN NM. PSHR: W7EP K7NTG KA7HHJ. ATEN: QNI 1008, QTC 283. SWN: QNI 183, QTC 156. Traffic: KA7HHJ 180, W7AMM 138, W7EP 137, KD7I 121, K7NTG 98, K7NMQ 64, WA7KQE 42, K7UXB 29, N7EH 26, KE7W 21, K7JKM 19, W7LBW 15, WA7YUL 8, WA7NXL 6, WB7QOM 2.

LOS ANGELES: SCM, Stan Broki, N2YQ — SEC: N6UK. STM: K5DY. Congrats to the following new appointees: AA6RX OO, W6HCS OES, W6DDB EC Burbank, AI8A EC Sepulveda, N6MJ EC Pasadena, K6IYK DEC Northwestern Area. Welcome aboard. November has been a busy month. On Nov. 14 a section level meeting was held at N6UK's QTH. Over 20 appointees were present and all had a good eyeball and many good ideas were presented. One idea is now implemented and will be used weekly, that is a section-wide weekly League appointees Net. The meeting place is K6QQN/R on 147.105 in and 147.705 out. The time is 8 P.M. local on Thursday, holidays exempt. The Romona Radio Club has a new slate of officers: N6TG, pres.; W6BQX, v.p.; KA6JVJ, secy/treas. Congrats. URAC has KN6C, pres; WD6AGN, v.p.; KK6V, secy.; WA6UYG treas. Congrats. The Devonshire ARES group worked the Chatsworth Holiday Parade. Several amateur groups provided communications for the Hollywood Xmas Parade. The Downey ARC provided communications for the annual Downey Xmas Parade. Congratulations to N6BCY as a new net control for RN6. I hope everyone has a safe and enjoyable holiday season. 73. Traffic: K6OWA 113, W6INH 103, N6DZQ 84, WA6OCM 81, N6PZ 71, K6INK 63, N6BCY 57, KB6FC 43, W6NKE 43, WA6LVO 39, K5DY 38, K6CL 13, KT6D 10, W6BWG 7, N6HE 6. (Oct.) K5DY 101.

ORANGE: SCM, Fried Heyn, WA6WZO — ASCM: WA6WZN. SEC: W6UBQ. STM: KA6A. DECs: K6GGS W6LKN WB6JBI WB6YZY. NMs: WB6AKR W6CPB K6JT WA6CCA WA6WZO. AI6I, because of health, has resigned as EC liaison to the Riverside Co Volunteers in Prevention program of the Calif Dept of Forestry; EC WA6QMW will become the new CDF/VIP communications support coordinator and KA6DZU has been appointeed EC to take over Riverside RACES Dist. #1. Orange County ARC: KA6HNY, pres.; KD6EO, v.p.; W6IER, secy.; WA6FOW, treas. West Coast ARC: KA6NII, pres.; KA6OMZ, v.p.; KA6RRR, secy.; KA6RAF, treas. Riverside ARC: KA6DZU, pres.; K6UIZ, v.p.; WD6HEE, secy.; N6AXR, treas. Desert Waves ARC (Blythe): WA6VHB, pres.; WA6HRE, v.p.; N6ANL, treas.; K6OLT, secy. ARALB: KE6EF, pres.; AK6Y, v.p.; W6KXX, treas.; WA6UBU, secy. Rio Hondo ARC: W6CBA, pres.; KA6NXV, v.p.; WA6GCV, secy.; WB6ISR, treas. Coast Guard Aux/Flotilla 24: K6ZMI, cdr; WB6ULU, vcdr. Anaheim ARA: WB6RQT, pres.; WB6ARK, v.p.; N6TM, treas.; N6BNM, rec sec.; K6TWK, corr secy. Fullerton RC: WA6JQN, pres.; W6RJL, v.p.; KA6HUJ, secy.; KA6DLG, treas. New Novice nets: Org Co ARC on 21.175 MHz, Thurs 7 P.M. with KJ6C NCS; Coachella Valley ARC on 28.150 MHz, Thurs, 7:30 P.M., EC WB6VMR NCS. Congrats to Western ARA for officially winning the Org Co FD plaque. Congrats to OO N6PE for 5BWAS. WD6CZE awarded AARA "Ham of the Year". The 1982 ARRL SW convention "Ham Computer 82" will be held June 4-6 in San Diego.

Net	Freq	Time	QNI	QTC
SCN/1(>20)	3598 kHz	7 P.M. Dy	402	392
SCN/2(<13)	3598 kHz	8:15 P.M.	274	122
SCN/V(FM)	147.645(−.6)	9 P.M. Dy	441	281
SCN/SB	145.18(−.6)	9 P.M. Dy	263	84

(K5DY, SCN NM & KA6A, ANM) BPL: WA6EIG. PSHR: W6CPB W6NTN WA6OCA WB6QBZ. Traffic: WB6EIG 695, W6NTN 304, WB6QBZ 155, WA6OCA 70, K6XI 68, K6CZE 56, W6CPB 51, W6RE 35, W6TKV 26, KA6DZU 20, WA6WZO 3.

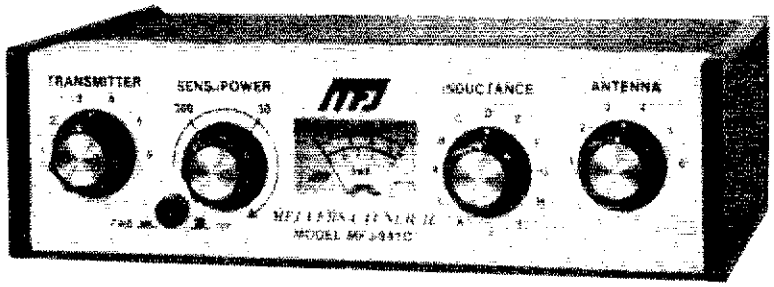
SAN DIEGO: SCM, Arthur R. Smith, W6INI — STM: N6GW. SEC: W6INI. San Diego City Emergency Management Coordinator, Bill Wolf, administered the loyalty oath to the first group of the newly organized Civil Defense Auxiliary on Dec 2. Of the 25 "charter" members were 21 ARES members. San Diego County's SET was held on Dec 5 with 90 participants. Red Cross, City of San Diego, and San Diego County Health Services Dept provided personnel for added realism. Three TV stations covered the drill. The ability to handle formal messages continues to be a much needed skill among ARES members. Southern District ARES members participated in a mass casual drill Nov 19, in support of the Red Cross. North County Traffic Net held 29 sessions and handled 79 messages. Upgraded to Extra, W6FAY; to Advanced, W6DMH KA6NQE. New EC for Eastern District of San Diego Co is N6CQW. Many thanks to outgoing EC W6OGC who held this post for two and one half years. Traffic: KT6A 714, W6HUJ 245, KM6I 214, N6GW 143, WA6DNT 136, K6HAP 118, KB6AI 101, WB6GMM 87, N6AT 55, K6QCW 18.

SANTA BARBARA: SCM, Robert N. Dyruff, W6POU — Sctn NTS opns up sharply under NM K6YD on new WB6RDV/R 145.18 out. ARES growing all counties. Congrats to: KA6BPH & W2KVA, reelected pres of Poinsettia and Satellite ARC, respectively. SARC got back its W6AB call! KA6EUS pres. Conejo Valley ARC, W6MSG NWS SKYWARN coord. SLO Co. K6CAB new Vent. Co. OES WD6DEX earned BPL. Editor N6AG supplied roster of 81 Lompoc ARC members. Sctn ARES NMs include W6HWK Vent. Co. WD6ETK SB So., WB6SYB SLO Co. SLO SET held Nov 7 with modest turnout. WB6SYT headed Atascadero Colony Days comms. W6MSG & AF6R on motorcycle run comms. Sctn officials with computers include DZT KPS RIC QKF KQ6I MA UEO VK POU UUQ

MFJ ANTENNA TUNERS 16 MODELS

MFJ-941C 300 Watt Versa Tuner II

Has SWR/Wattmeter, Antenna Switch, Balun. Matches everything 1.8-30 MHz: dipoles, vees, random wires, verticals, mobile whips, beams, balanced lines, coax lines.



Ham Radio's most popular antenna tuner. Improved, too.

$89.95 (+ $4)

Fastest selling MFJ tuner . . . because it has the most wanted features at the best price.

Matches everything from 1.8-30MHz: dipoles, inverted vees, random wires, verticals, mobile whips, beams, balanced and coax lines.

Run up to 300 watts RF power output.

SWR and dual range wattmeter (300 & 30 watts full scale, forward/reflected power). Sensitive meter measures SWR to 5 watts.

Flexible antenna switch selects 2 coax lines, direct or through tuner, random wire/balanced line, or tuner bypass for dummy load.

12 position efficient airwound inductor for lower losses, more watts out.

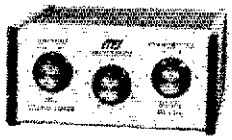
Built-in 4:1 balun for balanced lines. 1000V capacitor spacing.

Works with all solid state or tube rigs.

Easy to use, anywhere. Measures 8x2x6", has SO-239 connectors, 5-way binding posts, finished in eggshell white with walnut-grained sides.

4 Other 300W Models: MFJ-940B, $79.95 (+ $4), like 941C less balun. **MFJ-945, $79.95** (+ $4), like 941C less antenna switch. **MFJ-944, $79.95** (+ $4), like 945, less SWR/Wattmeter, **MFJ-943, $69.95** (+ $4), like 944, less antenna switch. Optional mobile bracket for 941C, 940B, 945, 944, $3.00.

MFJ-900 VERSA TUNER



MFJ-900 **$49.95** (+ $4)

Matches coax, random wires 1.8-30 MHz.

Handles up to 200 watts output; efficient airwound inductor gives more watts out. 5x2x6".

Use any transceiver, solid-state or tube.

Operate all bands with one antenna.

2 OTHER 200W MODELS:

MFJ-901, $59.95 (+ $4), like 900 but includes 4:1 balun for use with balanced lines.

MFJ-16010, $39.95 (+ $4), for random wires only. Great for apartment, motel, camping, operation. Tunes 1.8-30 MHz.

MFJ-949B VERSA TUNER II

MFJ-949B **$139.95** (+ $4)

MFJ's best 300 watt Versa Tuner II.

Matches everything from 1.8-30 MHz, coax, randoms, balanced lines, up to 300W output, solid-state or tubes.

Tunes out SWR on dipoles, vees, long wires, verticals, whips, beams, quads.

Built-in 4:1 balun. 300W, 50-ohm dummy load, SWR meter and 2-range wattmeter (300W & 30W).

6 position antenna switch on front panel, 12 position air-wound inductor; coax connectors, binding posts, black and beige case 10x3x7".

MFJ-962 VERSA TUNER III

MFJ-962 **$229.95** (+ $10)

Run up to 1.5 KW PEP, match any feed line from 1.8-30 MHz.

Built-in SWR/Wattmeter has 2000 and 200 watt ranges, forward and reflected.

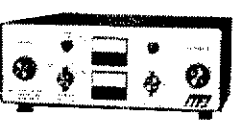
6 position antenna switch handles 2 coax lines (direct or through tuner), wire and balanced lines.

4:1 balun. 250 pf 6KV cap. 12 pos. inductor. Ceramic switches. Black cabinet, panel.

ANOTHER 1.5 KW MODEL: MFJ-961, $189.95 (+ $10), similar but less SWR/Wattmeter.

MFJ-10, 3 foot coax with connectors, $4.95.

MFJ-984 VERSA TUNER IV



MFJ-984 **$329.95** (+ $10)

Up to 3 KW PEP and it matches any feedline, 1.8-30 MHz, coax, balanced or random.

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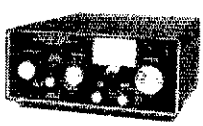
MFJ-989 VERSA TUNER V



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WP. Series of local & regional gov't disaster drills set for Jan, Mar, Jun & Oct (SET) using ARES date terminals for damage assessment via radio. Critique of recent fires held by DEC W6RIC with ARES. Vent. Co. ARC chap. mgr. SB Co. hospital emerg drill incl ARES ops in Santa Ynez and So. Cnty. Traffic: WD0DEX 521, W6JGS 240, K6YD 216, W6ZRR 113, KA6BPH 12, WA6ZQJ 12. (Oct.) K6YD 101.

WEST GULF DIVISION

NORTHERN TEXAS: SCM, Phil Clemments, K5PC — ASCM: WA5QFD. STM: W5VMP. SEC: W5GPO. NMs: AE5I AA5J WD5JYI KC5FX KA5IWF. I hope all had a very happy holiday season, and are enjoying all your new "toys"! Santa was real good to your SCM; Musta received false info on my conduct!! ARES has grown by leaps and bounds this past year, because of the fantastic leadership of your SEC, W5GPO, from 43 ECs and 700 ARES members to 15 DECs, 78 ECs and 1375 members!! This is by far the best and most qualified and prepared Section in the country for most any emergency situation. Not too early to start thinking about tornado season. If you desire to have a SKYWARN refresher course, better contact the wx buro folks now, as their budget has been cut to the bone, and there will not be as many schools this year as in the past. What do WB5UXG N5DIS WB5WKG and WB5JFL all have in common? They are all ECs, super FB operators, and beautiful YLs to boot! We are lucky to have these fine gals at the helm! Cannot say enough about the flood operations here in the Section this fall. All communications assignments were handled in a most professional and expedicious manner. KB5OU, EC Wise Co, is planning a meeting for all ECs in the Metroplex area to make plans for the wx season. All interested parties will be welcome, I am sure. Welcome aboard to N6BXZ, new EC Johnson Co! This fills a vital gap in ARES coverage, and establishes liaison with Tarrant and Dallas Co RACES. Your new EC for Tarrant Co is K5AVA, who is well known in the Metroplex as a super operator and leader! New EC for Bell Co is WB5VZL, our newest and youngest. Seems like about 1956 there was an EC in Bell Co that was also 17 yrs old, and he grew up to be SCM!! The ARES has been asked to participate in a seminar in Ft Worth in April by the North Texas Communications Assn on disaster preparedness and agency interface and liaison. WA5RER is new pres of Abilene Club. Garland and Dallas RACES units were called up to assist in communications at Parkland Hosp tire and evacuation on Nov 12th. KA5MQG sent nice letter re his new "Frugal Fifteen" beam, by W1ICP, from a recent CQ article. Carl is really knocking off the DX on the 15-mtr Novice band with the little antenna with only 30 watts. The NTHFA had another of their famous mini-DXpeditions to Telephone, TX, and reports are that fun and contacts abounded. PSHR: KC5FX KC5NN N5BT WD5JYI KB5UL N5DKW KA5IWF W5VMP WB5CRC. Traffic: N5BT 303, WB5CRC 152, KA5AZK 150, WD5JYI 146, KC5FX 132, N5DKW 101, KB5UL 95, WB5OXE 79, KC5NN 71, W9OYL 59, K5HGX 51, KA5IWF 43, WB5VTZ 43, W5ERT 39, KA5MSP 32, N5DYI 23. W5VMP 23, W5GPO 22, WA5EZT 16, WA5QFD 13, AJ5F 12, K5PC 12, W5PBN 10, WB5WDL 4, N5BUW 1.

OKLAHOMA: SCM, Leonard Hollar, WA5FSN — To those of you who have upgraded and hold LO appointments did you notify your SCM, in order to keep the records straight, both here and at Hq? Our congrats to all the new and upgraded calls. Ponca City working on a new (to them) 4WD ARES van. Okla Co ARES monitoring storm warning siren tests bi-monthly. Okla City and Norman groups got a workout when Norman was isolated from the world because of phone trouble. Wonder how many new computers appeared in shacks over Xmas? KB5EK has new PSHR and 75M WAC certs. W5AS has new 5BWAS plaque. Bartlesville commended by local hospital for assistance rendered. Also helping Pawhuska club get reorganized with donation of repeater. OO 2, OVS 1, ORS 24 reports. Where is yours? Because of condx beyond my control, it has been difficult for me to get around as I should so must depend on radio and club paper reports for material for this column. Hope this changes soon. Traffic: K5CXP 198, KA5CXW 176, W5REC 176, WA5RKU 135, WB5ELG 130, W5RB 121, KB5EK 103, WB5NKC 75, WA5OUV 69, W5AS 64, WA5FSN 61, W5UYH 60, W5SUG 40, W5VXU 31, WA5ZOO 31, W5VOR 29, WB5EAY 26, K5CAY 25, WD5IFB 25, WA5JGU 21, W5VLW 19, N0IN 9, K5MGD 6, W5JJ 2.

SOUTHERN TEXAS: SCM, Art Ross, W5KR — ASCM/TM: N5TC. SEC: WA5RVT. OVS reports: N5AF WA5QCP. EC AB5X moved to Deer Park. Now on 160 thru 2 mtrs. Working on signing up east Harris County (TX) amateurs for 1982 ARES. N5FN installed full wave delta loops on 80 and 40 mtrs. Eighty-mtr delta works on 160. K5OWK moved back to the Texas Rio Grande Valley. SEC WA5RVT, with WD5AAH KM5J KC5NY and Texas State Guard (not National Guard) took part in downed aircraft exercise. CONGRATULATIONS to ORS KB5NX, who became president-elect of the Sam Houston ARC, and upgraded to Extra Class. He reports the Cleveland repeater, KB5NX/R, has new autopatch. OBS W5KLV busy with traffic and 127 ARRL bulletin readings on 10 nets. EC KA5GYJ upgraded to Extra Class! GOOD SHOW! OVS N5AF worked Sitka, AK on 6 mtrs & is now filling out 50 MHz WAS application. Traffic: W5SHN 1277, WB5YDD 628, W5KLV 483, W5CTZ 332, WB5MMI 141, N5TC 138, KA5GYJ 121, N5AMH 112, N5DAA 105, WA5RVT 94, K5HZR 90, KB5TC 77, KB5NX 76, WB5EFJ 64, KA5MFG 45, K5OWK 43, WD5AAH 42, W5KR 41, N5CRU 30, WD5GKH 29, W5BGE 19, N5FN 14, AB5X 11, KA5KRI 8. (Oct.) K5ZC 23.

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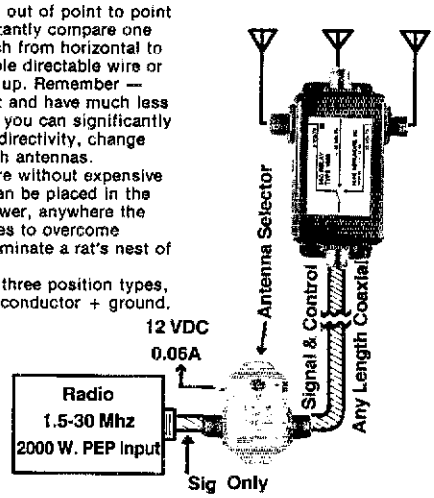

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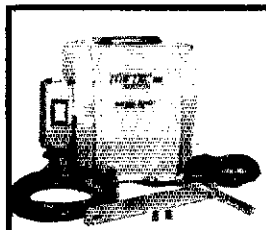

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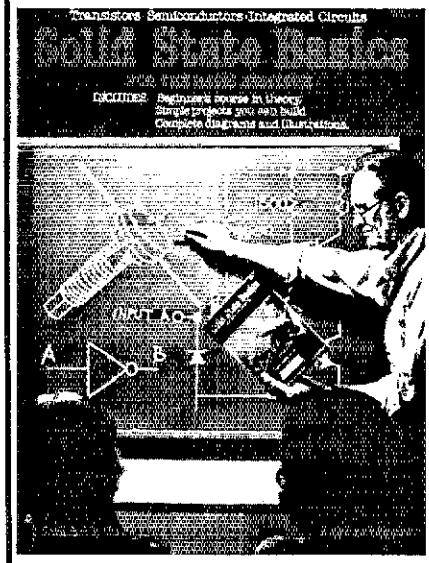

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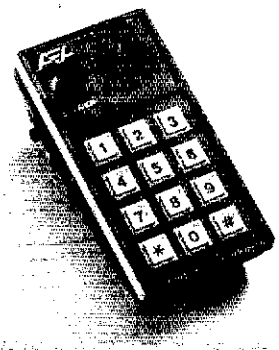

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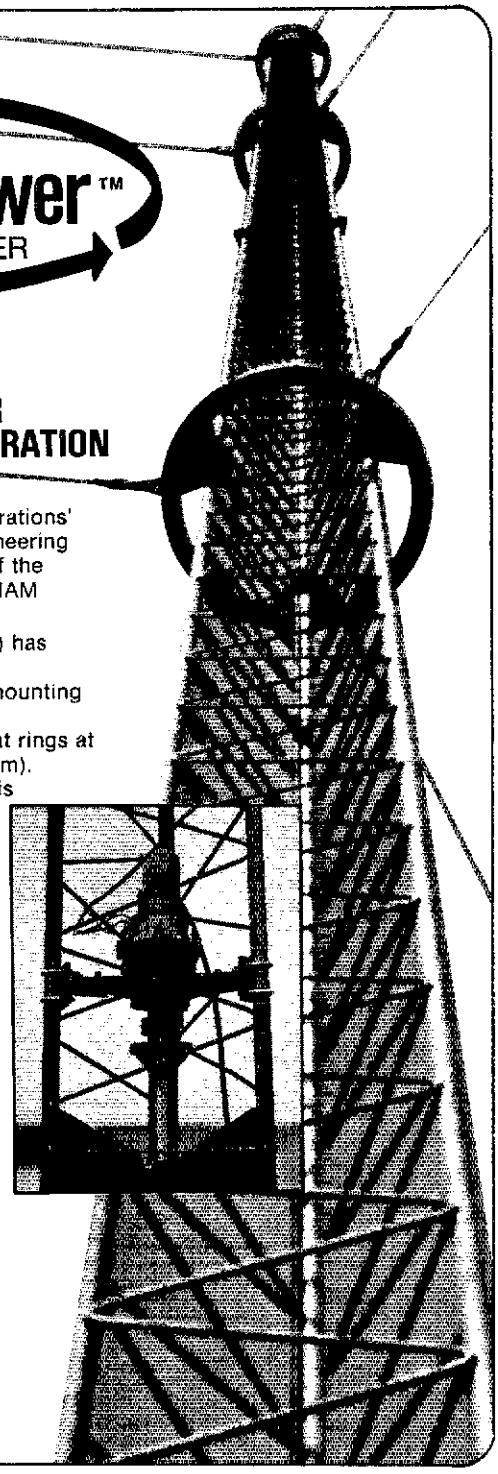

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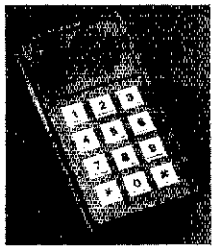

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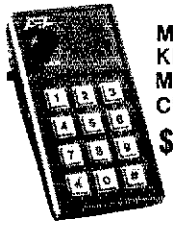

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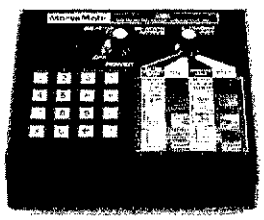

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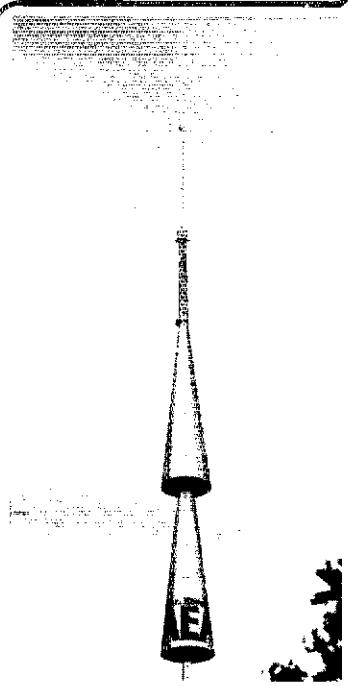

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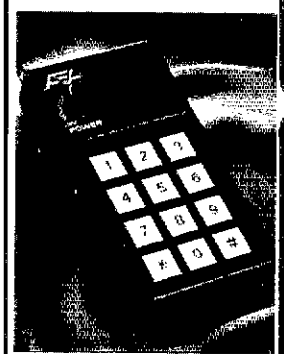

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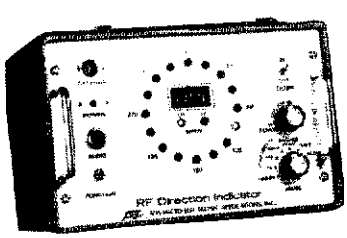

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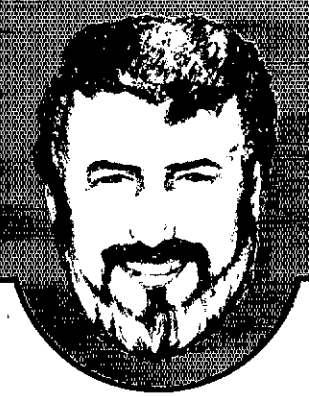

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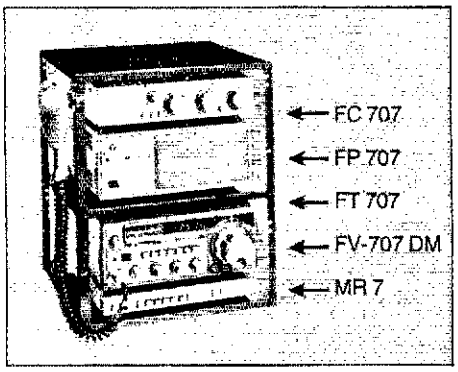

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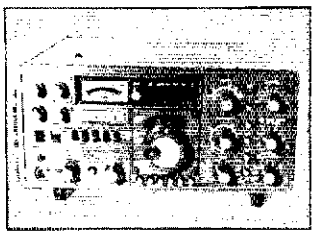

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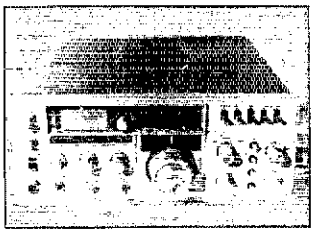

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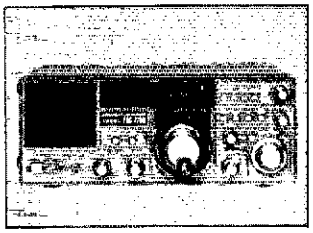

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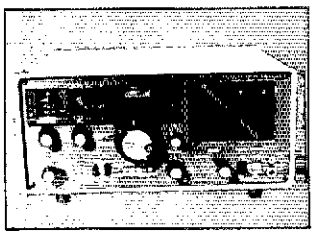

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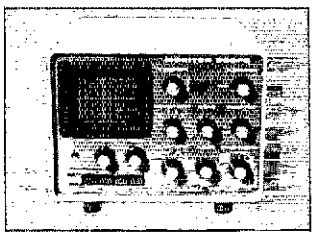

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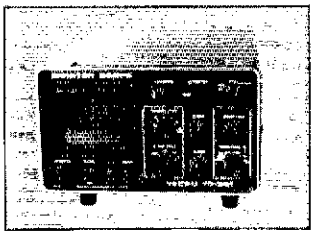

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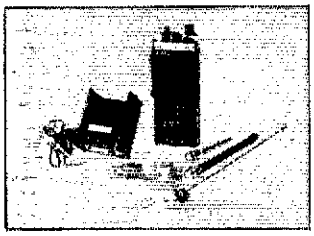

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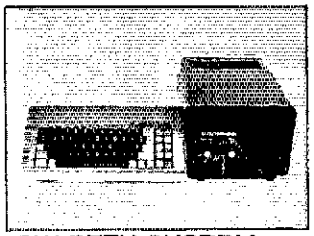

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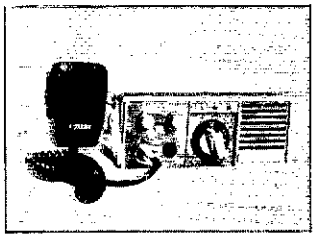

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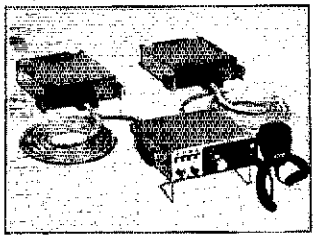

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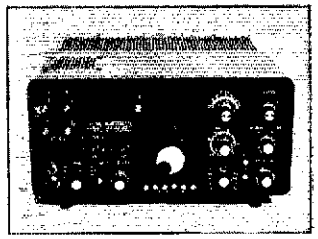

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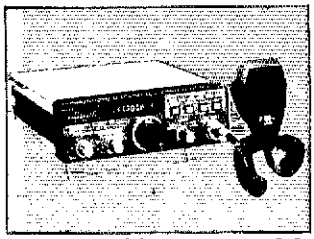

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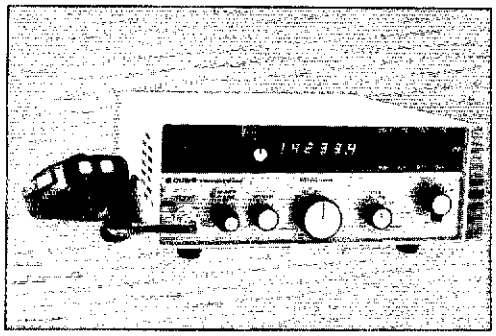

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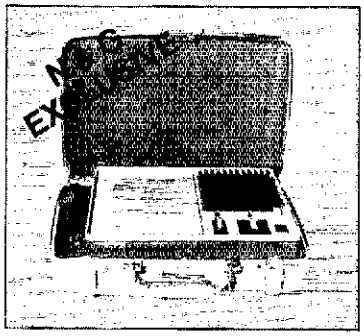

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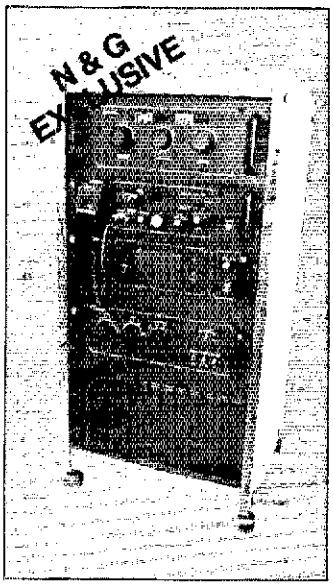

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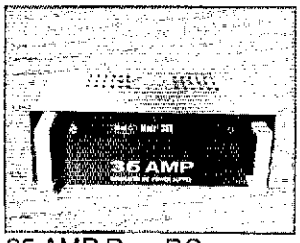

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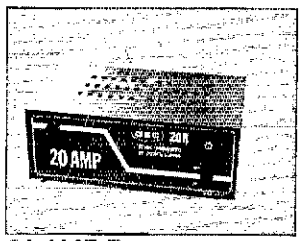

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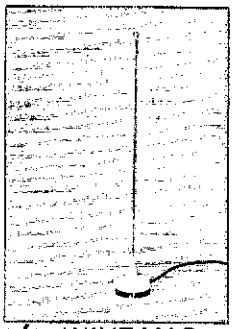

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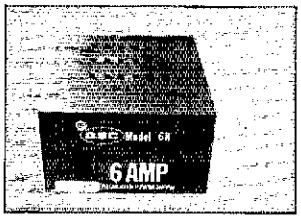

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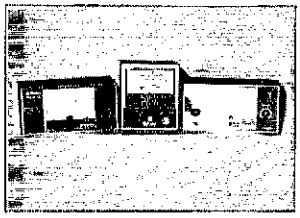

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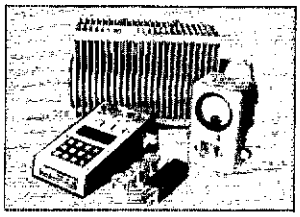

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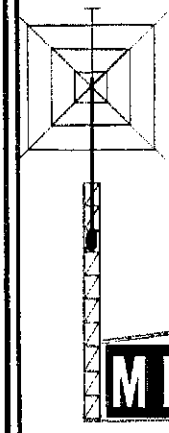

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- FREQUENCY COVERAGE: 131.000MHz to 179.995MHz
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- RECEIVING MODE: Frequency Modulation, 16F3
- RECEIVER SYSTEM: PLL Frequency synthesized dual conversion superheterodyne
- USABLE SENSITIVITY: 0.2uV across 50-ohm at 12db SINAD
- AUDIO SQUELCH SENSITIVITY: 0.2uV at threshold squelch, adjustable
- SELECTIVITY: Adjacent channel rejection (±12.5kHz) greater than 60dB
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- FREQUENCY STABILITY: Within ± 10PPM over the operating temp. range
- IF FREQUENCIES: 1st 10.7MHz, 2nd 455kHz
- AUDIO OUTPUT POWER: 100mW into 8-ohm load at 10% THD
- POWER CONSUMPTION: 25mA at receiver squelched; 100mA at 100mW audio output power
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- PHYSICAL SIZE: 5¾" (H) X 2⅝" (W) X 1.0" (D) without knobs
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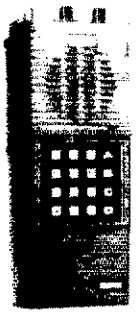

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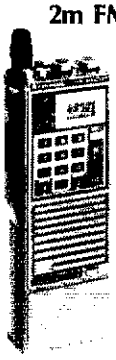

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DONS CORNER ?

Response to this column has been great. Let me know if you want me to (a) keep it up, and (b) what to write about.

In the obscure upper left corner of this page, I mention our personal gaurantee. Down in the right corner I go into more detail. Mumford asked for an explanation, and I guess that would help y'all, too. In the 41 years of Madison's existence, the biggest "problem" is tire kickers. Folks, that isn't true. Those kickers are trying to decide which rig to buy based on volumes of hearsay. Wouldn't it be nice if buying radios was like trying on a suit? Then you would know if it fits before you pay for it. Our Personal Guarantee is just that. If you are torn between the TS-830S and the IC-730, send a check for the 830 and try it for a week. Then return it, unscratched, intact, with all its documents, and a check for the difference and we'll ship you the IC-730. **Then** choose! So you liked the 830? Send the 730 back, and we'll ship the 830. Sure the freight will cost a couple of bucks, but if you're shelling out many of the long green, wouldn't it be nice to be sure? This, as far as I know, is a Madison exclusive.

Tang has seen the Kenwood 660. He has both positive and negative comments about it. The consumer will have to judge — but why 18 meters? Tang has been taking karate lessons after seeing a Bruce Lee movie. While he was at Kenwood, the company president walked by. Tang snapped to attention, saluted, and knocked himself out for three hours.

'till next time, Don

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RG8/u Dbl Shield	9888	65 c/ft	No. of Cond — 8 AWG (in mm) — 6-22 (7 x 30) 2-18 (16 x 30) (1 19)
RG8/u Foam 81VF	8214	36 c/ft	
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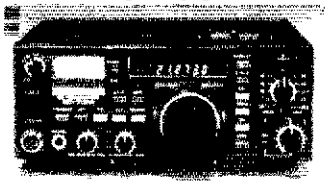

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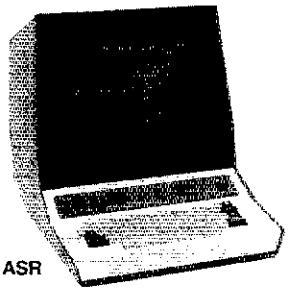
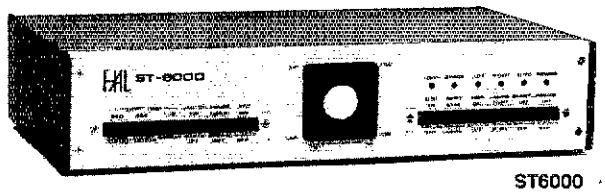


DS3100 ASR



ST6000

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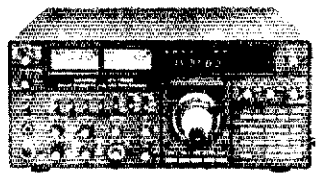

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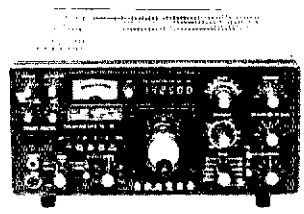

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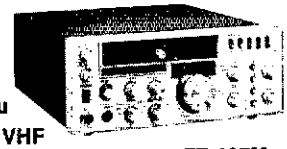

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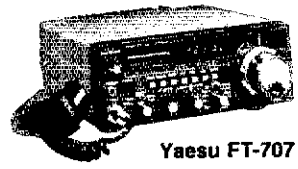

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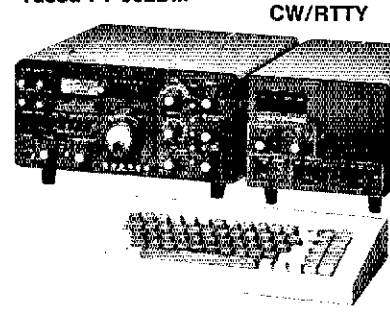

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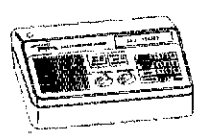
BC20/20-20 ch. aircraft	**$25 rebate**	$269.00
BC210XL-18 ch. programable	**$15 rebate**	$219.00
BC160-16 ch. programable	**$10 rebate**	$159.00
BC4/6 T.S.- 6 ch. hand held	**$10 rebate**	$124.00
BC100- programable hand held		$299.00



REGENCY

D810- **$309.00**
50 ch. aircraft, prog.

D300- 30 ch. programable	$209.00
D100- 10 ch. programable	$150.00
M400- 30 ch. mobile	$259.00
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R1040- 10 ch. programable	$139.00
H604- 6 ch. hand held	$124.00

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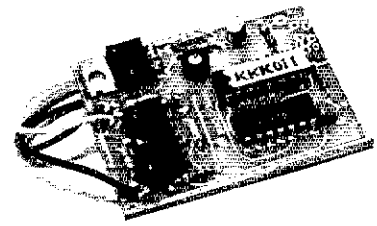
Identify your FM transceiver with automatic code on each transmission.



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Returnable for full refund within ten day trial period. One year for repair or replacement.

Your call sign programmed at factory, please be sure to state call sign when ordering.

Inquire about commercial models.

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(213) 645-1892

R390 A, good condition $300, ASR 28 Teletype good condition $250. Bill Hallmark 304-223-4609.

SELL: Heathkit SB-200 1.2 kW 80-10 amplifier-clean-$300 spare new 572-B finals $50/pair / ship. WA2KSY/4 803-546-3626.

DEAD Collins F455J type filter wanted. Good appearance imperative. Richard Polivka, 33736 Kennedy, Sterling Heights, MI 48077.

COLLINS 4:1 vernier knob wanted. Good condition imperative. George Russell, 15093 Loyola, Sterling Heights, MI 48078.

OFFICIAL Collins documentation wanted: Technical correspondence, service bulletins, catalogs/brochures, engineering specifications/revisions for Amateur gear and accessories, mechanical filters, etc. Will pay for high-quality Xerox copies or round-trip postage to copy on my machine. Gerald Fasse, W8UCI; 11320 Darla Court; Warren, MI 48089.

COLLINS KWS-1 1500 watt transmitter $675. O.B.O. — Collins CP-1 Crystal pack $250. O.B.O. — Sonar 2 m fm with a.c. supply $100. Collins (round emblem) 32S-3, 75S-3B (3 filters), 312B-4, 516F-2, cables, manuals $1750. CAll Dave K3KD 1-215-754-6286.

DRAKE R-4C, 4-NB, T-4XC, MS-4, AC-4, MN-2000, FS-4, new — immaculate. Best offer. George Russell 15093 Loyola; Sterling Hgts., MI 48078.

TOWER wanted 100' aluminum crank-up W1ZU

The ARRL Club and Training Department can help you set up licensing classes. Contact them at Hq.

COLLINS WARC conversions, $125. S-Line dual VFO, $150. KWM-2/75S twin transceive, $250. 75A-4/KWS-1 transceive, $350. K1MAN, 207-495-2215.

TOWER design, permit problems, stress calculations: Civil Engineer, Jesse Ball, W6BFO, 213-340-4411.

SIGNAL/ONE Repairs. Mandelkern. 505-523-2897.

CODE simplified. Powerful algorithmic design reduces Morse to logic-compatible serial, parallel, ASCII. Just $169. Includes shipping. Telecraft Laboratories, Box 1185, E. Dennis, MA 02641.

WANTED: Collins 500 and 200 crystal lattice filters. Numbers F455FA-05 and X455Q200. Please state condx and price. Write K1LKI.

SELL: Johnson Five Hundred. Clean w. manual but HV needs work $200 Johnson valiant, nice. Solid state rectifiers w. manual $125. Hammarlund HQ-170 w. speaker and manual; aligned this past summer and in fine shape $150. Heath HW-8 mint $100. Want!! Collins 30K-1 transmitter and 310C-3 exciter clean w. manuals. Want Collins 353C-31 mechanical filter for 75A-1. Want Electro-Voice Model 605-8 mic (vertical grille slots) with Model 428 PTT stand. Need clean original owners manual for collins 32V-1 xmtr. Somebody have these gems?? A. N. Gerli, AC1Y, 35 Brookmoor Road, Avon, CT 06001 203-666-1541 or 673-3662.

HALLICRAFTERS station: SX-117 rcvr, HT-44 xmtr, and PS150-120 pwr supply. Excellent cond. with manuals $340. Hallicrafters HA-6 6 meter xvtr with P-26 pwr supply and Janel PB-50 preamp $135. Will deliver within 100 miles. Tom, WB1GDA, 617-585-9425.

ROSS'S used equipment specials: Kenwood TS-520 S/cw $539, TS-820 S $699, TV-502 $139, TV-506 $199, VFO-120 $120. National NCX5 MK II ps sp $389. Santec HT-1200 $269. S.B.E. SB 2 LA $210. Swan 102-BX $588, 260 $249, 350 $189, SS 200-A $449. Tempo One, ac fan $319, Tempo 2020 $399, Tempo S5 T $265. Ten-Tec Omni D ser new display $679, Triton II $349. Wilson 1402 T 15 NC, nicads $109. Yaesu FL-101 $329, FT-101 B cw fan $489, FT-101 ZD cw fan $619, FT-107 DMS $785, FT-221 $339, FT-227 R $189, FT-620 B calibrator $299. All prices cash plus shipping. Closed Monday at 2:00. Ross Distributing Company, Preston, ID 83263. (208) 852-0830.

KENWOOD TR2400 w/BC-5 and ST-1 chargers, case. Package $329. Heath 10 watt amp. $35. KD4AJ 404-396-6760.

FOR SALE: Heath SB-220, spare 3-500's $500; E-Z Way RBX-60 crank-up/tilt over tower, no cement required, will support 14 sq. ft. unguyed, all steel, hot dipped galvanized $1450: AB1A 3 Tenney Road, Westford, MA 01886 617-692-3916.

TEMPO ONE power supply transformer. Guaranteed good. $40. Gary, KC4FN, 803-578-3425.

ATLAS 210X, NB $450. Shipping pre-paid N7FOF Box 96 Star, ID 83669.

ROSS's used equipment specials: Atlas 350 XL,DD6 $550. Bell antenna tuner CNA 1001 $289. Dentron 160 XV 160 M xvtr $95, MLA-2500 B $599. Drake R4 $199, R4A $249, T4X $279, T4X $269, TR 3 $280, TR DR 7 $1100. Heathkit DX-100 $100, SB-104 $339, SB 104A nb, cw $495. Hy-Gain 3750 $678. Icom IC-211 $450, IC-245 $209, IC-245 $225, IC-245 SSB $269, IC-245 SSB $319, IC-701 S-ac mike $675. Kenwood R-300 $189, R-599 A/2m cov. $249. R-820 all filters (4) mint $1049, RM-76 $59, TR-2400 $249, TS-120 S $479, TS-120 S $500, TS-130 s $629, TS-520 $459, TS-520 S $509. All prices cash plus shipping Closed Monday at 2:00. Ross Distributing Company, Preston, ID 83263. 208-852-0830.

TEMPO ONE 80 - 10M SSB/CW xcvr with AC One poer supply, manual. Needs 10m crystals. Excellent. $280. WB7VOO, 602-298-4820.

DRAKE HF station — T4XB, R4B, AC-4, MS-4, Turner 454-ssb mic - very clean $600. Spare R4B w/MS-4, $275. VHF — Heath HW-202 2M fm w/ac supply, $175. Drake TC-2 — SC-2 2m transverter combo + SC-6 6m converter. Includes cables, xtals for full coverage and CC-2 converter control box, $250 alone or $800 with Drake HF station. Call or write Mark Davis, 35944 Dalewood Dr., Newark, CA 94560. 415-792-9478.

ANTIQUE Viking Challenger kit, original box Best offer. W1WA, Box 1103, Marblehead, MA 01945.

VHF BALUNS: 1/2 price. KLM sleeve type. 3ea 144-148-50N, 3ea 420-470-50N. All unused 50 ohm with "N" connectors. $25 each. K6DZT, 5325 Oakhurst, Cambria, CA 93428.

SOLAREX 1480 10-watt 14-volt photovoltaic panel, $240 postpaid. Schnobel, General Delivery, Winnett, MT 59087.

SUPER low loss 75 ohm CATV 3/4" coax, armored for direct bury, construction job dropoffs, 400'/180'/120' pcs, 60¢/ft; also 6pr 19ga armored, 170'/60'pcs, 60¢/ft. K5LLJ, Mercer Const Co, Edna, TX 512-782-3822

BEAUTIFUL library buckram bound QST's, 1953 thru 1960, 1962 and 1963. Best offer. W1HUR, Box 152, Concord, NH 03301.

SELL: Heath, HR-10 Rcvr., HG-10B VFO, DX-60B Transmitter, many extras $100 KA2IRY, 42 Mary Pitken Path, Shoreham, NY 11786 516-744-5709.

HAM Programs for your TRS-80 (16k level II) models I and III. Dupe checker ($8), WAS ($8), 5BWAS ($10) DX-CC/48k ($12). Cassette. Master Gator Software, P. O. Box 10, Alachua, FL 32615.

SELL 800 cycle filter for Collins 75A-4 $35. Inquiries S.A.S.E. W2EZM, 431 Oakland, Maple Shade, NJ 08052.

SELLING, QST's 1940 thru 1946, 1944 Handbook, offers W8YMB, 3703 Boston Rd., Brecksville, OH 44141.

FOR SALE: QST-1956-1961 ARRL Handbooks-1937 on Radio Handbook-1941 Antenna HB-1941 TenTec Triton 1 transceiver 1965 all types of vac tubes free.. W3QJM, 2818 Oak Ave., Altoona, PA 16601.

WANTED the following equipment, two of each: CV-197, DX-89 C974, C975, CV115, CU285, C286, R389, R391, PP629, URR29, and an Empire PA210. For sale or trade on above the following Tektronix equipment 108, 113, 105, 107, 121, 132, 511, 512, 535, 536, and 12 plugins. Hewlett Packard equipment 524C, with all plugins, 540A, 100D, 212A 202A1 plus much misc. Dean Soderling, 6725 Portland Ave., Richfield, MN 55423.

TRADE: — QRP 80-40 meters one transistor CW transmitter. Can use multitester. Stan, W8QKU, 2748 Meade, Detroit, MI 48212.

YAESU FT101EE older model $450. Yaesu FT107M mint with power supply $950. NCL-2000 $425. Cincinnati area. 513-868-0186. KB9VU.

COLLINS F455E-05, F455H-21, F455J-21 mechanical filters wanted for cash or trade for other Collins filters. John Werner, 26316 Falmouth Drive, Warren, MI 48089.

APPLE II complete computer board very mint with Applesoft ROM, 48K RAM, ASCII keyboard $575. Power supply $35. Applesoft ROM card $99. Many Hires gemes. T. Kanai, 3 Duh Dr., Apt. 133, Bethlehem, PA 18015. 215-838-7201.

COMPLETE Ham Equipment, some collectors items: Harvey Wells Bandmaster transmitter and APS 90AC power supply; Hallicrafter S-380 receiver; National receiver Model NC-270; Lafayette VOM multitester 99-50973 ohm meter, 99-2509 Radio Field Strength Indicator, 223 Transistor Analyzer; Calrad Midland Multitester TK202 (new); Heathkit code oscillator 11 D-1416; EICO 995 in-circuit capacitor tester; Mercury tube tester Model 990; EMC tube tester Model SA205; Superior Instruments Supermeter Model 670-A; loudspeaker; time change clock; earphones. Lafayette CB HB-740, magnetic antenna. Best offer over $1200. Write to Estate of W2VI, c/o Superintendent, 40-01 Little Neck Pkwy., Apt. 3A, Little Neck, NY 11363.

FT101E $550 or even trade Atlas 210X 415-526-7345 (W6RQZ) or letter.

COLLINS late model (RE) S line. 75S-3C, 32S-3A, 516F-2, 312B-3, DX Engineering processor, Cover Craft covers, factory boxes and manuals $1,600. David, WA6YOC, P. O. Box 126, Tilburon, CA, tel. 415-383-4545.

WANTED: antenna rotator KLM HD-1500 with control box WB7CHS, 9007 N.E. 80th St., Vancouver, WA 98662 206-892-1094.

DX BLOOD hound: Collins 75A-4, mint, all filters, unmodified. Shipped prepaid UPS for $375 cashier's check. WB8IPG, 313-759-4539.

FOR SALE: Lunar Electronics 6M10-120P 6mtr amp. $200. Dentron Clipperton V 500 wt. 2 mtr amp. $375. Icom 260A $275 Argonaut 509 $200. Vista 30 amp. meter p.s. $75. WA9CUH 715-886-4111.

FOR SALE: Heathkit SB300 rcvr w/cw filter, Heathkit SB400 xmtr factory aligned in June 81 w/spkr & microphone $250 WA1PUL So. Drive, Ashaway, RI 02804 401-377-4500.

KENWOOD TS530S, VFO 120, MC50 $700. Heathkit SB200 $225, Heathkit electronic keyer $35, Rohn 60 ft 25 G tower, TA33 Mosley, HD73 Rotor, $300 NØAJZ 314-838-7285.

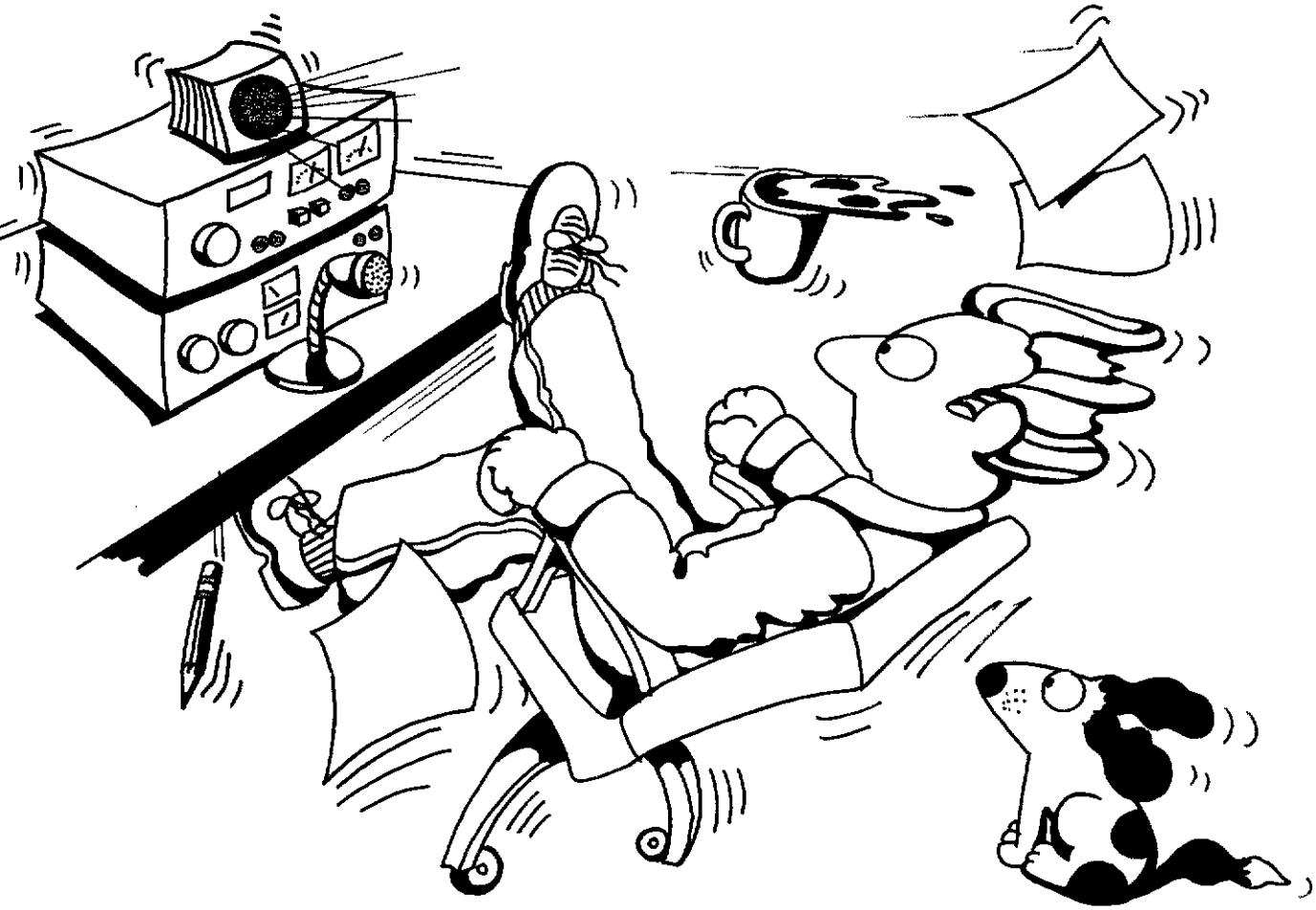
FOR SALE: Heath SB-104A with pwr supply, speaker, N.B. & cw filter. Excellent condition. $450. W6OWD 415-728-7136.

KDK FM-144 SX-110, 15/1 watts service manual. $180. WA2QBZ 315-337-9894.

HAMMARLUND receiver service by former factory service manager. Manuals HQ-100, HQ-145A, HX-50, others limited quantity of parts, HQ-110 receiver, SASE for reply. Wayne Cordell, K4HCS, Blue Ridge Communications, Route 4, Weaverville, NC 28787-704-645-7070.

FOR SALE, Kenwood TV-506 $100, TV-502S $100, AT 200 $75, Yaesu FRG-7000 $300, XiTex UDT170 $250, Heath SA2040 $75, Wilson Mark II $50. N2BJX, John 716-683-5703.

". . . (click) . . . just turned on the ALPHA . . ."



Ever notice how many of the **really dominating** signals you hear originate from ALPHAs? You know that a great amplifier alone doesn't guarantee a standout signal. Still, it obviously must be a big step in the right direction.

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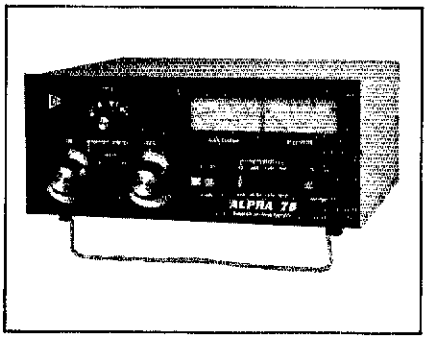

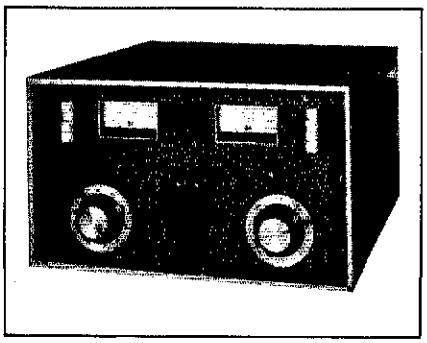

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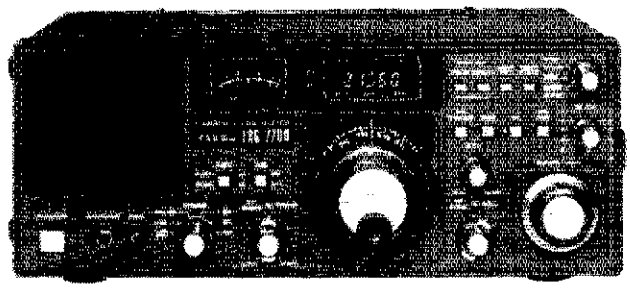

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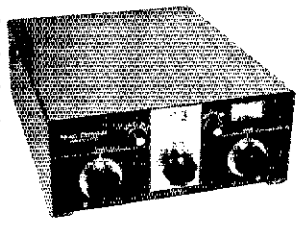

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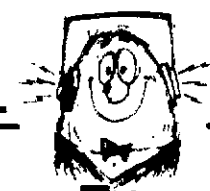

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WANTED — Heath SB301 SB303 - L.I., Metro N.Y. — Tom, WB2KAL 516-671-0510.

FOR SALE Icom 22A in excellent condition. Includes mike and mobile mount and full set of crystals. List of crystal frequencies on request. $100 shipped collect. Don Reichling, KB7VY, 3550 W. 8th St., Yuma, AZ 85364.

ARGONAUT 515 SSB/CW QRP Xcvr with cw notch filter and calibrator, excellent, $345. Ten-Tec 247 200 watt antenna tuner, mint, $45. Heathkit GR-78 shortwave receiver with manual, good, $55. KA7BMB, 602-298-4820.

COLLINS KWM2A noise blanker $95, 351R2 rack mount $35. New, sealed boxes. W9ZR, 807 Sunbeam, Oneida, WI 54155. 1-414-434-2938.

NEW Yaesu FRG-7700 receiver CW/SSB/FM timer. $400 KJ7Y, 509-884-6152.

YAESU FT-707, FP-707, FC-707, YM35, YM34, one year old, mint condition. $850/OBO. Send S.A.S.E. for list of other items. Bob, WA¢TAM. 213-518-1845, evenings.

KENWOOD TS-520 excellent with original box. 117Vac and 12 V supply. W6HXT, 5360 Lindero Pl., Las Vegas, NV 89119. 702-736-4775.

COLLINS KWM-380, serial #999 purchased July 1981 with 1.7 kHz, 360 Hz and 140 Hz filters; blower; speech processor; desk microphone; W.A.R.C. frequencys; computer interface; touch tone pad; service manual. All in original boxes and used less than two months. My cost was $4100. Must sell the worlds best rig due to personal problems. Jeff Poll, N5CSW, 9206 Canter Drive, Dallas, TX 75231 214-349-6432.

ESTATE Item: Collins KWM2-A, and 516F-2 supply, round emblems, high serial numbers, noise blanker factory installed, like new electrically, mechanically, and cosmetically. Will ship. $1200. W5FR 713-488-0517 any time.

SELL: Collins "S" line. 32S-3, 75S-3B, 800 Hz filter, 516F-2, microphone. Winged, excellent! $900 K5GO 501-521-9775.

FLESHER TU-170 factory wired, $125, W2GQC 607-642-8272.

WANTED — Service manual for Tempo One. Sate asking price. Frank Pallo, WA2STX, 1105 Frost Lane, Peekskill, NY 10566.

FOR SALE — UHF HT-220 4 frequency $400., Midland 13-510 $200., Metrum w/synthesiser $275., VHF MAXAR $380., UHF HT-220 receive only $130., VHF HT-220 w/T-Tpad $325., Kenwood R-5990 $325., Tube tester $70. Charles Wait, WB4MYA 615-552-2199.

WANTED — mint TR7/DR 7 with PS7. N¢AKZ, Dennis 612-535-7189.

SELL Cornell-Dubilier, Rotor, AR33, compass, cables K2TBZ, 212-680-7016.

FOR SALE Drake TR-6 LSB USB CW filters $550. TC-6 TC-2 SC-6 SC-2 CC-1 console CPS-1 power supply SCC-1 freq. calibrator $525. SB-220 with 10 meters $525. Willard Tucker, 18906 US 68, Fayetteville, OH 45118, 513-875-2992 after 5 P.M.

RTTY: Microlog ATR-6800 with module & monitor $1900. Linear amplifier Dentron MLA2500B/extra tube $650. Morsematic autokeyer AEA MM-1 never used $100. Scope Yaesu/YO101 in box and never used $200. VFO Yaesu FV101B with Yaesu 101 speaker $100. KC4FS Billy 1-305-753-0527.

WANTED: Used communications service monitor, prefer Cushman or IFR. NE4J, Tommy S. Evans, 401 East Vance Street, Wilson, N.C. 27893. 919-237-1898.

OLD Howard 38 xtal filter, no cabs, intermittent Heath IT-12 visual aural signal tracer new-condx. Old Triplett VOM fixable. Heath Twoer new condx. B.O.s. Bower, 507 Washington Ave., Linden, NJ 07036 201-486-9061.

KENWOOD TR-7625 2mFM Xcvr, excellent condition, $260. KD4CP, Larry 305-725-5264.

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SELL: Heath HW-101, HP-23B, HS-1661, HDP121, HD-15. Complete station $350. W4NWM 804-458-0638.

YAESU FT901DM station includes monitor scope/YO901, VFO/FV901DM, phone patch speaker/SP901, tuner/FC901 plus filters & mlv $1900 Billy KC4FS 305-753-0527.

MADISON Goodies: Santec HT1200 $269.; New Santec ST144UP $299.; Icom IC25A $309.; IC730-call; IC3AT/1C4AT $269. each; Kenwood TR7730/TTM call; AEA MBARO $269.; Morsematic $169, HAL CT2100 $699.; KB2100 $159.; Drake TR5 $995.; Rockwell KWM380 $3095./2 free filters; Rohn 25G $37.; 45G $83.50; Yaesu FT101ZD/Mark3 $749.; FT208R $289.; NC8 $80.; Robot 400 $675.; 800A $749.; Drake 700A/Monitor $1095.; New Collins CP1 $400.; 55G1preselector - round - $400.; new KWM2 noise blanker $200. sealed box; new 70K2 PTO $400. Prices fob Houston, include sufficient postage. Madison Electronics, 1508 McKinney, Houston, TX 77010. Day 1-713-658-0268, nite 1-800-231-3057 MWF 6-10 PM Central.

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SL-80	80	63'	$35.95
SL-40	40,15	33'	$34.95
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S-40	Coil Only		$17.95

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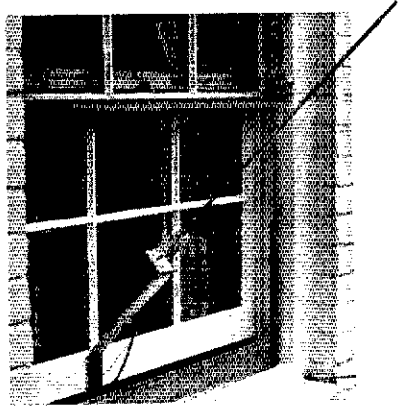

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Recent Magazine Articles on Filter Cascading

YAESU FT-901/902. See "73", Sept. 1981
HEATH SB104A See "Ham Radio", April 1981
KENWOOD TS820 See "CQ", March 1981

Read the original article or send $1 to FoxTango for complete details of the one that interests you. To make the modification, order the appropriate cascading kit from below. Each contains the parts specified in the article, the recommended Fox-Tango filter, and complete instructions.

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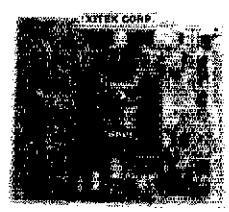

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WANTED: Collins KW-1 (not KWS-1) within 700 miles of San Francisco. Must be A-1 and original. Sam Thompson, W6HDU, 1031 San Antonio Ave., Alameda, CA, 94501. Phone 415-441-3247 until 6:00 P.M., 521-1429 after 9:00 P.M.

WANTED: back issues of Popular Electronics (before 1968), Elementary Electronics, Electronics World, Radio and TV Experimenter, and Electronics Illustrated. John Clements, WA6RXN, 7310 Ensign, Sun Valley, CA 91352.

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KENWOOD TR-7800 in carton, mint $300 W4MGG, 2941 Kedron, Winston-Salem, NC 27106.

WANTED — Hallicrafters FPM-300 Mark II transceiver with 115Vac & 12Vdc internal supplies. W3KLR 215-828-1087.

SELL Tempo S-1 talkie, charger, leather case, like new $110. Bob, WA6GBC 503-672-8685.

FOR SALE - SB303/SB600 $265. SB401 $250. SB610 $95. All mint. W2UGM, 66 Columbus Ave. Closter, NJ 07624. 201-767-0123.

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SELLING Shack. SB200 with Drake TV1000 filter $325., Tempo 1, AC1 and DFD $350., home brew keyer w/KR-2 paddle $20., Pace CB123SSB needs work $35., MFJ CW filter $15., Gold line10/100/1000 w meter $15., 100 w dummy load $10. WA2DQI 203-426-0538.

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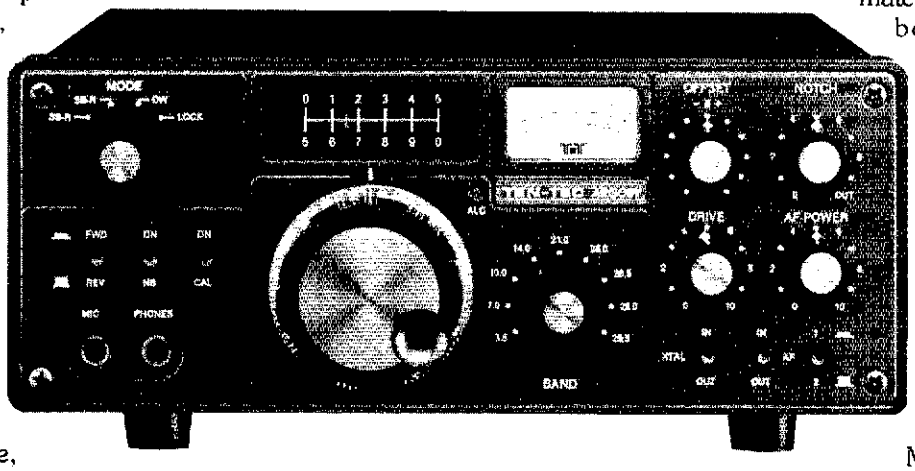

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The right receiver features. ***Sensitivity*** of 0.3 μV for 10 dB S+N/N. ***Selectivity:*** the standard 4-pole crystal filter has 2.5 kHz bandwidth and a 2.7:1 shape factor at 6/50 dB. Other cw and ssb filters are available as options, see below. I-f frequency is 9 MHz, i-f rejection 60 dB. ***Offset tuning*** is ± 3 kHz with a detent zero position in the center. ***Built-in notch filter*** has a better than 50 dB rejection notch, tunable from 200 Hz to 3.5 kHz. An optional noise blanker of the i-f type has 50 dB blanking range. ***Built-in speaker*** is powered by low-distortion audio (less than 2% THD)

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SELL: Heath SB-220 linear $450. SB-634 station console $125. HAL ST-6 RTTY demodulator $210. Xitex ABM-200 RTTY ASCII-baudot converter board $160. ASR-33 teletype with sound booth $175 must pickup. MC-50 microphone $30. Dennis, WA1MRM 603-424-7916 N.H.

ICOM IC-230 w/15kHz splits, manuals, exc. cond., $140. Pace Communicator II, 144-148 synthesized, manuals, mobil mount, problems with some frequencies in 146 segment, $100. Wanted: Kenwood equipment SP-820, MC-50, RM-76 controller, AT-200. Call Paul, WA1LZA, 617-275-8020, after 6 PM.

WANTED: Good condition German WW II military receiver, type Radione R3 or R2, with spare parts, tubes. Will pay good price. Raser, 5316-1/2 South Cornell, Chicago, IL 60615. 312-241-6569.

AMATEUR REPAIR — Professional service, reasonable rates, all brands, USA KDK repair center. Amateur Radio Repair Center of I.E.C., Inc., 1020 Brookstown Ave., Winston-Salem, NC 27101 919-725-7500.

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BTI LK-2000-HD $1000 KWM2, PM 2 $499, 30L1 $725, 75S3-B, 32S3, 516F2 $795. 3-1000-Z $200, SB201 $395. James Craig, 29 Sherburne Ave., Portsmouth, NH 03801.

HEATH HW-101, ssb filter, power supply and manual. New finals $350 shipped 918-747-2873 KA¢DFW/5.

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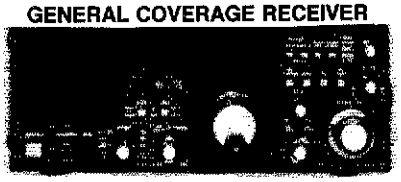

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RG213 noncontaminating 95% shield mil spec	36c/ft.
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RG8U 97% shield	30c/ft.
RG58U 95% shield	10c/ft.
RG58AU stranded center 80% shield	11c/ft.
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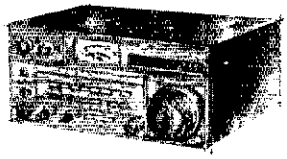

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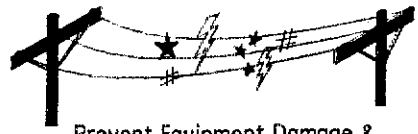

Prevent Equipment Damage & Conducted RF Interference To or From Your Ham Radio

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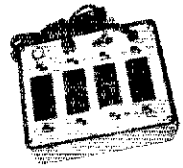

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RG-213	27¢/ft
RG-8U foam, 95% braid	23.5¢/ft
RG-8X foam, 95% braid	11¢/ft
RG-59U mil spec	9¢/ft
RG-11U	19¢/ft
450 ohm ladder line, 100ft roll	$10.25
8 conductor rotor cable	15¢/ft
14 Ga. Stranded Copper	(50ft. mult.) 7¢/ft
12 Ga. Solid Copperweld	(50ft. mult.) 7¢/ft
14 Ga. Solid Copperweld	(50ft. mult.) 5¢/ft
8 Ga. Solid Aluminum	(50ft. mult.) 6¢/ft

ANTENNA ACCESSORIES

Ceramic Dogbone Insulators	45¢/ea.
Amphenol Silver Plate PL-259	75¢/ea
W2AU Balun 1:1 or 4:1	$13.25
VAN GORDEN 1:1 Balun	$7.50
VAN GORDEN 1:1 Center Insul	$4.60
B&W Traps 80/40m thru 10m	$25.65/pr
B&W 375 or 376 Coax Switch	$19.25
B&W 593 Coax Switch	$17.95
B&W 595 Coax Switch	$22.50

ROTORS

CDE AR-22	$48.95
CDE CD-45	$89.55
CDE HAM 4	$162.95
CDE TAILTWISTER	$228.00

ANTENNAS

MINI PRODUCTS Mini Quad	$127.95
MINI PRODUCTS C-4 Vert.	$55.00
BUTTERNUT HF5VIII	$75.00
BUTTERNUT 2MCV	$27.50
HY-GAIN	call or write for quote
HUSTLER	call or write for quote
1982 CALL BOOKS: U.S. Edition	$14.95
DX Edition	$14.05

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KENWOOD TS-130S with MC-50 microphone and 270Hz cw filter $600. Also, for local pickup, Model KSR-28 teletype $175. George, WB1FXI 413-739-8247 evenings.

FOR SALE: TenTec Delta, with noise blanker and 215-PC microphone, $625. LM-13 frequency meter, with book, $60. BC-312M receiver, $100. BC-453 low frequency receiver, $35. Miscellaneous tubes. N6UX, P. O. Box 202, Keene, TX 76059.

WANTED: Ten-Tec Triton 4 or Model 540 transceiver with power supply. Tryout required. WDØBVF, RR 1, Box 212C, Willard, MO 65781.

MINT Yaesu FT-301S, all filters, FL-110, $450. FP-301D, $125. FV-301, $75. FC-301, $115. LL-301, $35. YD-844A, $25. Complete station, dust covers, manuals, boxes, $795. Tempo S-30 2M amplifier, $50. '81 DX Callbook $8. K1LEC 802-886-8121.

ROBOT 400. New, mint, $525 or best offer. Viking MBII tuner with balun, also mint, $225 or best. Jim Poehling, WB6TFS. 805-397-5579.

COLLECTORS 1934 HRO Senior. W3BIM 215-536-2769.

DEAR HAMS: Junior High School 22 needs your HELP. Plese contact WB2JKJ at Callbook address for details.

VHF SHOP - February sale - call or wirte for super deals on: Lunar's Mast-Mounted or Standard GaAsFET preamps, 6M10-120P 6 meter 120W amplifier/preamp (export), Tama 19 el 432 MHz Yagis. Microwave Modules transverters: MMT144-28 $207. MMT220-28 $260., MMT432/435-28S $285., MMT1296-144 $384. Astron Supplies: RS35Metered $148.75, RS35Amp $133., RS20Metered $103.75, RS20Amp $88., RS12Amp $68.50. Compare and save! For all your vhf/uhf needs: HT amps, kW amps to EME arrays, shop — "The Vhf Shop" CAll (M-F after 6:00 PM eastern, weekends anytime) K3MKZ Box 349, RD 4 Mountaintop, PA 18707. (717) 868-6565. Two stamps for catalog.

WANTED: Collins KW-1. Chuck, WA4GGL, Box 766, Dahlgren, VA 22448.

FACTORY overrun — coaxial cable — 1 million ft. in stock, 96% shielding mill ends 150-500' rolls: RG-6A/U Double shield $140/M', RG-11/U $145/M', RG-8X (Mini 8) $105/M', RG-58/U $68/M', RG-174/U Mil Spec $58/M', RG-58C/U stranded noncontaminating $88/M', PL-259 $45/100. Nemal Electronics, 5685 S.W. 80th Street, Miami, FL 33143 305-661-5534

YAESU FT-101E, FV-101, SP-101, plus extras. Mint, $750. KB8VV 419-893-4932.

KENWOOD TR-2400 HT with ST-1 desk quick charger and speaker-mic. Three months old with new warrantee and boxes. Like new - $290. Dentron MT-2000A antenna tuner. Mint condition in original box - $165. Mirage B-108 80 watt two meter amplifier with RC-1 remote switch. Three months old with new warrantee and boxes. Perfect condition - $140. Don Swango, KA5AJB, 634 Stillmeadow, Dallas, TX 75081. 214-234-5584.

AZDEN PCS-3000 and PCS-300 We'll beat any price in this issue! Your VHF-FM headquarters - LCC Engineering, 116 Country Farms Road, Box 140, Marlton, NJ 08053-0140. 609-983-8844 6 PM till midnight.

WANTED - Kenwood R-1000 receiver, SM-220 scope. Must be in perfect working order with operating manuals. KA6SFF 714-425-1258. 139 3rd Ave., Chula Vista, CA 92010.

1982 CALLBOOKS: US $19, DX $18, both $32. Six or more any mix, $15 ea. Ppd. Avatar Co., W9JVF, 1147 N. Emerson, Indianapolis, IN 46219.

SEACOAST lot- Great Abaco, Bahamas. 5 miles from Marsh Harbour International Airpot. Trade for Alpha linear or? Details-SASE-N4BAK.

DISCOUNT books. 1982 Callbooks; either, $16, both $29. WRTH 1979, 1981, $15; 1982, $18. Police Call, 9 volumes, 1981, $30; 1982, $55. We stock Sams, TAB, Hayden, ARRL, dozen others. Century Print, 6059 Essex, Riverside, CA 92504-1599. 714-687-5910.

1982 CALLBOOKS! Set $31. Postpaid. K4CLA, 562E Oak, Lexington, SC 29072.

Jobs for Hams

HAM RADIO specialists — Coed camps located in Milford, PA, approximately 80 miles from New York City. Excellent salary and working conditions. June 18 August 20. Contact Steve Brownstein, NJ YMHA Camps, 21 Plymouth Street, Fairfield, New Jersey 07006, 201-575-3333.

HAM RADIO counselor, 21 years or older, for summer sleepaway camp near Pittsfield, Massachusetts. Camp Emerson, 5 Brassie Road, Eastchester, NY 10707 914-779-9406.

WANTED for summer of 1982: Instructors in electronics and ham radio. Small boys science camp in Pennsylvania. Apply: Donald Wacker, P. O. Box 356, Paupack, PA 18451.

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203-667-2494 is a direct line, and will be answered only by Advertising Department personnel.

Index of Advertisers

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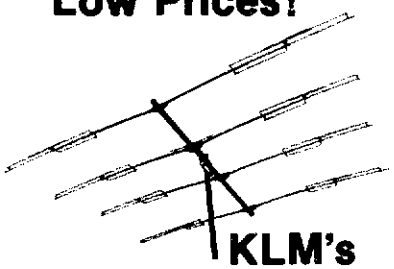
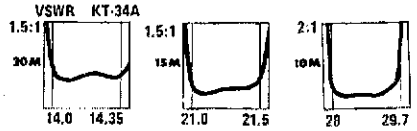


KLM's KT-34A

The new concept in triband antenna design. Gain and band width all in one compact package. VSWR curves.



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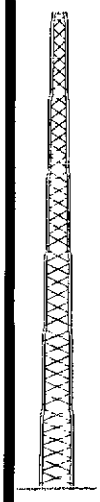
UNARCO-ROHN Self Supporting Towers — On Sale!



During February and March these rugged beauties are being offered at Big Discounts and – we are shipping them freight prepaid! Look over the specifications and pick the unit most suited for your needs, then – Call us to place your order with Master card/Visa or write and include your check for quick shipment – Freight Prepaid!

And – Save even more – include antenna and rotor of your choice with the order and we will ship them along freight prepaid also! Hows that for good old fashioned savings?

Tower Model	Tower Ht.	Load Rating	Ship Weight	Tower Base	Tower Price	Base Price	Total Price
HBX40	40 ft	10 sq ft	164	BXB6	269	24	293
HBX48	48 ft	10 sq ft	303	BXB7	349	26	375
HBX56	56 ft	10 sq ft	385	BXB8	419	30	449
HDBX40	40 ft	18 sq ft	281	BXB7	313	26	339
HDBX48	48 ft	18 sq ft	363	BXB8	399	30	429

BUTTERNUT

HF6V	80-10 mtr. Vertical	$109
TBR160	160-mtr. Coil Kit	$ 33
RM KIT	Roof Mount w/Stub Tuned Radials	$ 33
STR KIT	Stub Tuned Radial Kit	$ 20
2MCV	2 mtr. Trombone Vertical	$ 29

CUSHCRAFT

A3	3-El. Triband Beam	$169
A4	4-El. Triband Beam	$209
A743	40 mtr. Add-on Kit for A3 Antenna	$ 59
A744	40 mtr. Add-on Kit for A4 Antenna	$ 59
R3	New Motor Tuned 20/15/10 mtr. Vertical	$229
AV5	80-10 mtr. Trap Vertical	$ 89
20-3CD	3-El. 20 mtr. Beam	$169
20-4CD	4-El. 20 mtr. Beam	$239
15-3CD	3-El. 15 mtr. Beam	$ 89
15-4CD	4-El. 15 mtr. Beam	$ 99
10-3CD	3-El. 10 mtr. Beam	$ 69
10-4CD	4-El. 10 mtr. Beam	$ 89
A50-5	5-El. 6 mtr. Beam	$ 59
617-6B	6-El. 6 mtr. "Boomer"	$169
214B	14-El. 2 mtr. "Boomer"	$ 66
214FB	14-El. 2 mtr. FM "Boomer"	$ 66
228FB	28-El. 2 mtr. FM "Power Pack"	$189
32-19	19-El. 2 mtr. "Super Boomer"	$ 79
220B	17-El. 220 MHz "Boomer"	$ 69
ARX2B	2 mtr. "Ringo Ranger II"	$ 36
ARX450B	450 Mhz "Ringo Ranger II"	$ 38
A147-20T	2 mtr. Vert. & Horiz. 10-El. Beam	$ 59
A144-10T	10-El. 2 mtr. Satellite Antenna	$ 45
A144-20T	20-El. 2 mtr. Satellite Antenna	$ 66
A432-20T	20-El. 432 MHz. Satellite Antenna	$ 45
A14T-MB	Dual Antenna Mounting Assembly	$ 24

MANY OTHER CUSHCRAFT ANTENNAS IN STOCK – CALL!

HYGAIN

V2	New 2 mtr. Base Vertical	$ 36
TH5DX	5-El. Triband Beam	$209
TH6DXX	6-El. Triband Beam	$239
TH3MK3	3-El. Triband Beam	$179
TH3JR	3-El. Triband Beam	$139
TH2MK3	2-El. Triband Beam	$119
HY-QUAD	2-El. Triband Quad	$209
402BA	2-El. 40 mtr. Beam	$179
205BA	5-El. 20 mtr. "Long John"	$239
155BA	5-El. 15 mtr. "Long John"	$149
105BA	5-El. 10 mtr. "Long John"	$ 99
204BA	4-El. 20 mtr. Beam	$189
203BA	3-El. 20 mtr. Beam	$119
153BA	3-El. 15 mtr. Beam	$ 69
103BA	3-El. 10 mtr. Beam	$ 59
DB1015A	3-El. 10/15 mtr. Beam	$129
64B	4-El. 6 mtr. Beam	$ 49
66B	6-El. 6 mtr. "Long John"	$ 89
18HT	80-10 mtr. Hy-Tower Vertical	$279
18AVT/WB	80-10 mtr. Trap Vertical	$ 85
214	14-El. 2 mtr. Beam	$ 33
2BDQ	80/40 mtr. Trap Dipole	$ 49
5BDQ	80-10 mtr. Trap Dipole	$ 89
BN86	80-10 mtr. KW Balun	$ 14

HUSTLER

3TBA	New 3-El. Triband Beam	$169
4BTV	40-10 mtr. Vertical	$ 79
5BTV	80-10 mtr. Vertical	$ 99
G6-144B	2 mtr. Base Vertical	$ 69
G7-144	2 mtr. Base Vertical	$ 99

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10 & 15 mtrs.	$10	$15
20 mtrs.	$12	$18
40 mtrs.	$15	$21
75 mtrs.	$17	$32

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KLM

KT34XA	6-El. Tribander	$479
7.2-1	2-El. 40 mtr. Beam	$299
7.2-2	2-El. 40 mtr. Beam	$299
7.2-3	3-El. 40 mtr. Beam	$449
7.0-7.3-4A	4-El. 40 mtr. Beam	$629
144-148-13LB	13-El. 2 mtr. Long Boomer	$ 79
432-16LB	16-El. 432 Mhz. Long Boomer	$ 69
144-150-16C	16-El. 2 mtr. Circular Pol. Beam	$ 99
420-450-18C	18-El. 435 MHz. Circular Pol. Beam	$ 59

CALL FOR OUR LOW PRICES ON OTHER KLM PRODUCTS!

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CDE Tailtwister (30 sq. ft. rating)	$239
HYGAIN HDR-300 (Most H.D. Rotor for BIG Arrays)	$399
KENPRO KR 500 (Heavy Duty Elevation Rotor)	$179
8 COND (2-#22GA./6-#18GA.) Rotor Cable	$0.19/ft.
H.D. 8 COND (2-#16GA./6-#18GA.) Rotor Cable	$0.36/ft.

COAXIAL CABLE & CONNECTORS

RG213/U (95% shield - non-contaminating jacket)	$0.29/ft.
RG8X (95% shield-non contaminating jacket)	$0.18/ft.
RG11/U (75 OHM - 95% shield)	$0.35/ft.
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½" Copper Hardline w/poly jacket	$1.10/ft.
½" Alum. H.L. Conn (UHF or N - Male or Female)	$15.00
½" Copper H.L. Conn (UHF or N - Male or Female)	$22.00
Amphenol Silver Plate PL259	$ 1.25
Amphenol Nickel Plate PL259	$ 0.90
Amphenol N Type Male Conn For RG213/U	$ 2.95

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HG52SS	52 ft. Self Supporting	$839
HG54HD	Heavy Duty 54 Ft. Self Supporting	$1629
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HG50MT2	50 ft. Side Supported	$699

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HDBX32	32 ft. Free Standing (rated 18 sq. ft.)	$189
HBX40	40 ft. Free Standing (rated 10 sq. ft.)	$229
HDBX40	40 ft. Free Standing (rated 18 sq. ft.)	$259
HBX48	48 ft. Free Standing (rated 10 sq. ft.)	$289
HDBX48	48 ft. Free Standing (rated 18 sq. ft.)	$319
HBX56	56 ft. Free Standing (rated 10 sq. ft.)	$349
FK2548	48 ft. 25G Foldover Tower	$719
FK2558	58 ft. 25G Foldover Tower	$799
FK2568	68 ft. 25G Foldover Tower	$879
FK4544	44 ft. 45G Foldover Tower	$1019
FK4554	54 ft. 45G Foldover Tower	$1119
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1/4" CCM Cable Clamp (1/4" Cable)		$0.40
1/4" TH Thimble (fits all sizes)		$0.25
3/8 EE (3/8" Eye & Eye Turnbuckle)		$5.50
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14 Ga. Solid Copperweld (Multiples of 50 ft.)	$5/50 ft.
14 Ga. Stranded Copper (Multiples of 50 ft.)	$5/50 ft.
14 Ga. Stranded Copper (70 ft. coil)	$ 7.00
14 Ga. Stranded Copper (140 ft. Coil)	$ 14.00
18 Ga. Copperweld (1/4 mile spool)	$30.00
18 Ga. Copperweld (1/2 mile spool)	$58.00
Heavy Duty B&W End Insulator	$4/Pair
HYGAIN Model 155 Center Insulator	$ 6.95
HYGAIN Model 157 Center Insulator w/SO239	$11.95
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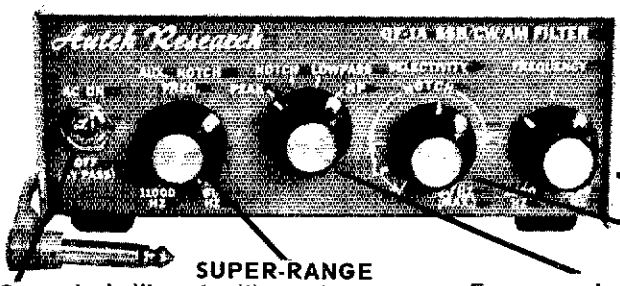
VISA

Does Your Shiny New Rig Really Have:

"STATE-OF-THE-ART" SELECTIVITY

EXCITING NEW RADIO ACCESSORIES



Add an Autek.

QF-1A Active Filter

For SSB & CW

PATENT PENDING

Only $73 ppd. U.S.A.

115 VAC supply built-in. Filter by-passed when off.

SUPER-RANGE Auxiliary Notch rejects 80 to 11,000 Hz! Covers signals other notches can't touch.

Four main filter modes for any QRM situation.

Continuously variable main selectivity (to an incredible 20 Hz!)

Continuously variable main frequency. (250 to 2500 Hz, all modes.)

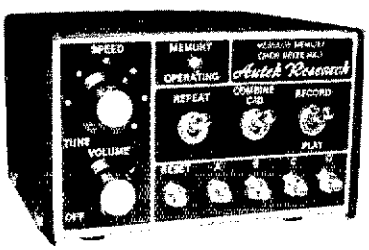
AUTEK pioneered the **ACTIVE AUDIO FILTER** way back in 1972. Today, we're still maintaining that engineering leadership. Our **QF-1A** evolved from suggestions from thousands of owners, and years of dedication to making the "ultimate" filter. No gimmicks — just something that really "works" like the ad says. You're in for a treat!

Autek filters gained their reputation by using a costly **INFINITELY VARIABLE** design. Yet, mass-production (we sell only **ONE MODEL** — the best) makes it a tremendous bargain. You're not limited by a few fixed positions. You vary selectivity 100:1, and vary frequency over the entire usable audio range. **PEAK CW** (or voice) with an incredible **20 HZ BANDWIDTH**, but also variable all the way to "flat." Imagine what the **NARROWEST CW FILTER MADE** will do to **QRM!** Reject whistles with the most flexible **NOTCH** you've heard. Wide or narrow. Depth to 70 dB. **LOWPASS** helps you cope with **SSB** hiss and splatter. Skirts exceed 80 dB. Most above features were in the popular QF-1 (See excellent review in March, 1977 **QST**.) The new "A" model is more selective, adds a **HIGHPASS** mode for **SSB**, and a great **AUXILIARY NOTCH** (35 to 60 dB) to give **TWO NOTCHES, NOTCH/PEAK, NOTCH/LOWPASS,** or **NOTCH/HIGHPASS!** If this doesn't convince you, please **ASK ON THE AIR.** Owners are our best salesmen!

Due to cost and panel-space limitations, even the latest rigs only include a fraction of the **QF-1A** features. We recommend you buy the best rig you can afford, spend $3,000 or more, then add a **QF-1A** and listen to the improvement! **WORKS WITH** Yaesu, Kenwood, Drake, Swan, Atlas, Tempo, Collins, Heath, S/1, etc., **ANY RIG!**

Hooks up in minutes. Plug into your rigs phone jack, or attach to speaker wires. Plug speaker or phones into **QF-1A** rear-panel jack. That's it! Filter supplies 1 watt to fill a room. No batteries rqd. (+12 VDC hookup possible.) 6½x5x2½". Handsome light/dark grey styling. Get yours today.!

CMOS PROGRAMMABLE KEYER MAKES CW FUN!



Calls CQ while you relax.
Also remembers name, QTH, contest exchanges.
Record anything you want in seconds!

Model MK-1 $104.50 ppd. U.S.A.

Our classic **MK-1** should make you wonder why anyone would buy an ordinary keyer, when memory costs so little! Records 4 messages. Just select "record," tap the A, B, C, or D message, and start sending at any speed! Record over old messages as easily. Playback by tapping the same button. Each message holds about 25 characters (letters, numbers). Total 100 characters. Handy repeat switch repeats message forever until reset. Very useful for **CQ's. YOU SIT BACK AND WAIT FOR A CALL!** Another switch combines two messages for 50 characters. "Memory-saver" feature standard.

This "state-of-the-art" keyer pleases beginners and CW "pros" alike. **DOT AND DASH MEMORIES. TRIGGERED CLOCK. IAMBIC. SELF COMPLETING. JAM PROOF.** 5 to 50+ **WPM. LATEST CMOS FOR LOW CURRENT.** Built-in monitor, speaker. Widely adjustable tone, volume. Perfect weighting at all times. No fiddling with an adjustment that varies with speed. **NEW: DUAL TRANSMITTER OUTPUTS** key **ANY** modern (post 1963) ham rig directly without a battery or relay, including difficult-to-key solid-state rigs. **115VAC** supply built in, or connect **9-14 VDC** to rear panel. Use with **ANY** paddle. 6x3½x5". Burned-in and tested. Sockets for **IC's.** Full instructions.

NOW AVAILABLE. 4096 BIT MEMORY EXPANDER (ME-1) allows 16 messages, 400 chars. & "combine" for longer messages. Plugs into memory socket of **ANY MK-1** ever made. Installs in 10 to 30 mins. Full instructions. Buy your **MK-1** now and easily add memory later if you wish!

FLASH! An MK-1 breaks its old world CW record! A single operator worked well over 4000 DX QSO's in 48 hours. And heard the weak ones through a QF-1. Second-place wasn't even close. Get the choice of champions — AUTEK!

ORDER BLANK (Or Use Separate Sheet of Paper)

Please Rush ppd. via Speedy UPS

- ☐ QF-1A Filter at $73.00
- ☐ MK-1 Keyer at $104.50
- ☐ ME-1 Expander for MK-1 at $35 (factory installed)
- ☐ ME-1 Owner installed at $25 (save $10)

Add 4% tax in Fla. Add $3 each to Canada, Hawaii and Alaska. $3 for UPS air. Add $18 each elsewhere (shipped air).

Enclosed is $_____

VISA or MC# _____ Exp. date _____

NAME _____

ADDRESS _____

CITY STATE ZIP

Send to Autek Research, Box 302E, ODESSA FL 33556.

PRICING: Autek is an innovator, so we're heavily copied. Yet, the "copies" cost you much more. We also give you a free AC supply and pay US shipping. How do we do it? Volume. And because WE SELL ONLY FACTORY DIRECT. No 25% to 50% middlemen markups.

DELIVERY: For 9 years we've shipped over 95% of orders from stock. Some companies have regular long delays. Not us. Order with confidence.

REPUTATION: Don't take our word. Ask on the air for a personal recommendation.

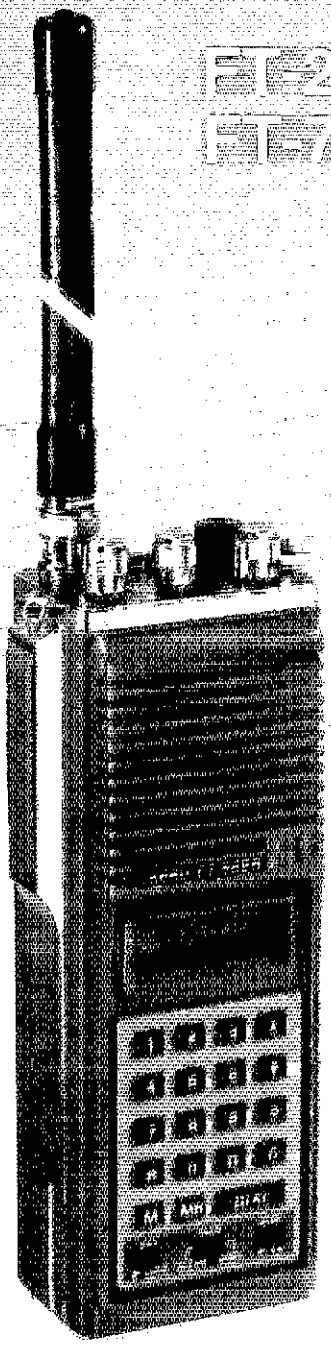
DIRECT MAIL: Your order or request for information will be processed just as fast and with fewer chances for error if you write. PLEASE ORDER BY MAIL. We're best set up for mail. However, if you need to call, our number is (813) 920-4349.

Autek Research

Box 302E
ODESSA, FL
33556

NO CUT CORNERS!

FT-208R — 2 Meters
FT-708R — 70 CM



LIQUID CRYSTAL DISPLAY
The LCD frequency readout provides high readability night and day, along with very low current drain.

KEYBOARD FREQUENCY ENTRY
All operating frequencies are entered from the front panel keyboard. Unusual repeater splits, scanning, and memory programming are all controlled via the keyboard.

UP/DOWN MANUAL SCAN
The FT-208R scans in either 5 kHz or 10 kHz steps, while the FT-708R steps are 25 kHz and 50 kHz. Automatic halting on a busy or clear channel is provided, with automatic pause and restart feature. Scan either the band or the memories.

LIMITED BAND SCAN
You can program upper and lower frequency limits, then command the transceiver to scan that segment or exclude that segment.

TEN MEMORY CHANNELS
The memories may be used for either simplex or repeater operation. No need to throw a "5 UP" switch for those 15 kHz channels, either!

LONG-LIFE MEMORY BACKUP
A Lithium cell provides the memory backup function. Now you won't dump memory when switching battery packs.

LOW CURRENT DRAIN
Typical standby current drain is 20 mA, for long battery life.

450 mAH BATTERY PACK
With more capacity than competing packs, the FNB-2 battery pack gives you those precious extra minutes of operating time that might prove critical in an emergency!

HI/LOW POWER SWITCH
In the high power position, the FT-208R packs a wallop at 2.5 watts output, while the Ft-708R output is 1 watt. Switch to low power for 1 watt output on the FT-208R, 200 mW on the FT-708R, for even greater battery life.

PRIORITY CHANNEL
A priority channel may be programmed from the keyboard, allowing you to check a favorite channel while operating on another.

AUTOMATIC BAND AND MEMORY SCAN WITH PAUSE/RESTART
Automatic scanning of the band or memories (or a segment of the band) with pause and restart feature.

16 BUTTON DTMF PAD
For autopatch operation, a 16 button dual tone pad is built into every FT-208R and FT-708R.

PROGRAMMABLE SPLITS
The popular ±600 kHz shift is standard (±5 MHz on the FT-708R) on the FT-208R. Odd splits of up to 4 MHz may easily be programmed from the keyboard. Additionally, a split memory/dial mode provides a third method of operating on unusual splits.

OPTIONAL 32 TONE CTCSS
Easy interface is provided to the synthesized SSY-32 CTCSS Encoder, providing all 32 common subaudible tones for repeater operation.

LOCK SWITCH
The keyboard lock switch allows you to disable entry from the keyboard, thus preventing inadvertent frequency change.

FULL LINE OF ACCESSORIES
A Yaesu tradition, a full line of accessories is available to maximize your enjoyment of the FT-208R and FT-708R.

For more than a quarter of a century, Yaesu has produced reliable, high-performance communications equipment for the Amateur and Land Mobile services. Contact us today for full information on our cost-effective line of HF, VHF and UHF transceivers — at Yaesu we want you to get your message across!

YAESU
The radio.

Price And Specifications Subject To Change Without Notice Or Obligation

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YAESU ELECTRONICS CORP. 6851 Walthall Way, Paramount, CA 90723 • (213) 633-4007
Eastern Service Ctr., 9812 Princeton-Glendale Rd., Cincinnati, OH 45246 • (513) 874-3100

Watt's new...on 2 meters?

All mode (FM/SSB/CW) 25 watts, plus...!!!

TR-9130

The TR-9130 is a powerful, yet compact, 25 watt FM/USB/LSB/CW transceiver providing increased versatility of operation on the two meter band. It features six memories, memory scan, memory back-up capability, automatic band scan, all-mode squelch, CW semi break-in, and incorporates microprocessor technology. It is available with a 16-key autopatch UP/DOWN microphone (MC-46), or a basic UP/DOWN microphone.

TR-9130 FEATURES:

- **25 Watts RF output**
  All modes, (FM/SSB/CW), utilize a new high power linear module, for more reliable FM operation and increased DX on SSB or CW.
- **FM/USB/LSB/CW all mode operation**
  For added convenience in all modes of operation, the mode switch, in combination with the digital step (DS) switch, determines the size (100 Hz, 1 kHz, 5 kHz, 10 kHz) of the tuning step, and the number of digits displayed.
- **Six memories**
  On FM, memories 1 through 5 for simplex or ±600 kHz offset, with the OFFSET switch. Memory 6 for non-standard offset. All six memories may be operated simplex, any mode.
- **Memory scan**
  Scans memories in which data is stored. Stops on busy channels.
- **Internal battery memory back-up**
  With 9 volt Ni-Cd battery installed, (not KENWOOD supplied), memories will be retained approximately 24 hours, adequate for the typical move from base to mobile. A terminal is provided on the rear panel for connecting an external back-up supply.
- **Automatic band scan**
  Scans within whole 1 MHz segments (ie., 144.0-144.999 MHz), for improved scanning efficiency.
- **Dual digital VFO's**
  Incorporates two built-in digital VFO's, selected through use of the A/B switch, and individually tuned.
- **Transmit frequency tuning for OSCAR operations**
  On SSB or CW, the tuning knob or UP/DOWN buttons on the microphone may be used to adjust the transmit frequency during transmission.
- **16-key autopatch UP/DOWN microphone version**
  The TR-9130 is available with the MC-46 16 key autopatch UP/DOWN microphone, or with the basic UP/DOWN microphone. Manual UP/DOWN scan of entire band possible using either microphone.
- **Squelch circuit on all modes (FM/SSB/CW)**
  The squelch circuit is effective on SSB, CW, and FM.
- **Repeater reverse switch**
  For checking signals on the repeater input, on FM.
- **Tone switch**
  For activating a tone device, (not KENWOOD supplied).
- **CW semi break-in circuit with sidetone**
  Built-in, for convenience in CW operations.
- **Digital display with green LED's**
- **High performance receive-transmit design**
  The use of a low-noise dual-gate MOSFET plus two monolithic crystal filters in the receiver front-end results in excellent two signal characteristics. Care in transmitter design assures clean signals in all modes.
- **Compact size and light weight**
  170 (6-11/16) W x 68 (2-11/16) H x 241 (9-1/2) D mm (inch), 2.4 kg (5.3 lbs.) weight.
- **Extended frequency range**
  Covers 143.9 to 148.9999 MHz, which includes certain MARS and CAP frequencies.
- **Transmit offset switch**
- **High performance noise blanker**
  Suppresses pulse-type noise on SSB and CW.
- **RF gain control**
  For all modes of operation.
- **RIT (Receiver Incremental Tuning) circuit**
  Useful during SSB/CW operations.
- **Amplified AGC**
  Enhances SSB and CW operation. The AGC time constant is automatically optimized for each mode of operation.
- **HI/LOW power switch**
  Selects 25 or 5 watts RF output on FM or CW.
- **Accessory terminal**
  A four pin accessory terminal is provided for use with a linear amplifier or other accessory.
- **Quick release mounting bracket** (Supplied)

More information on the TR-9130 is available from all authorized dealers of Trio-Kenwood Communications 1111 West Walnut Street, Compton, California 90220.

KENWOOD
...pacesetter in amateur radio

Accessories:

- KPS-7 Fixed station power supply.
- TK-1 AC adapter for memory back-up.

Subject to FCC Approval.
Specifications and prices are subject to change without notice or obligation.