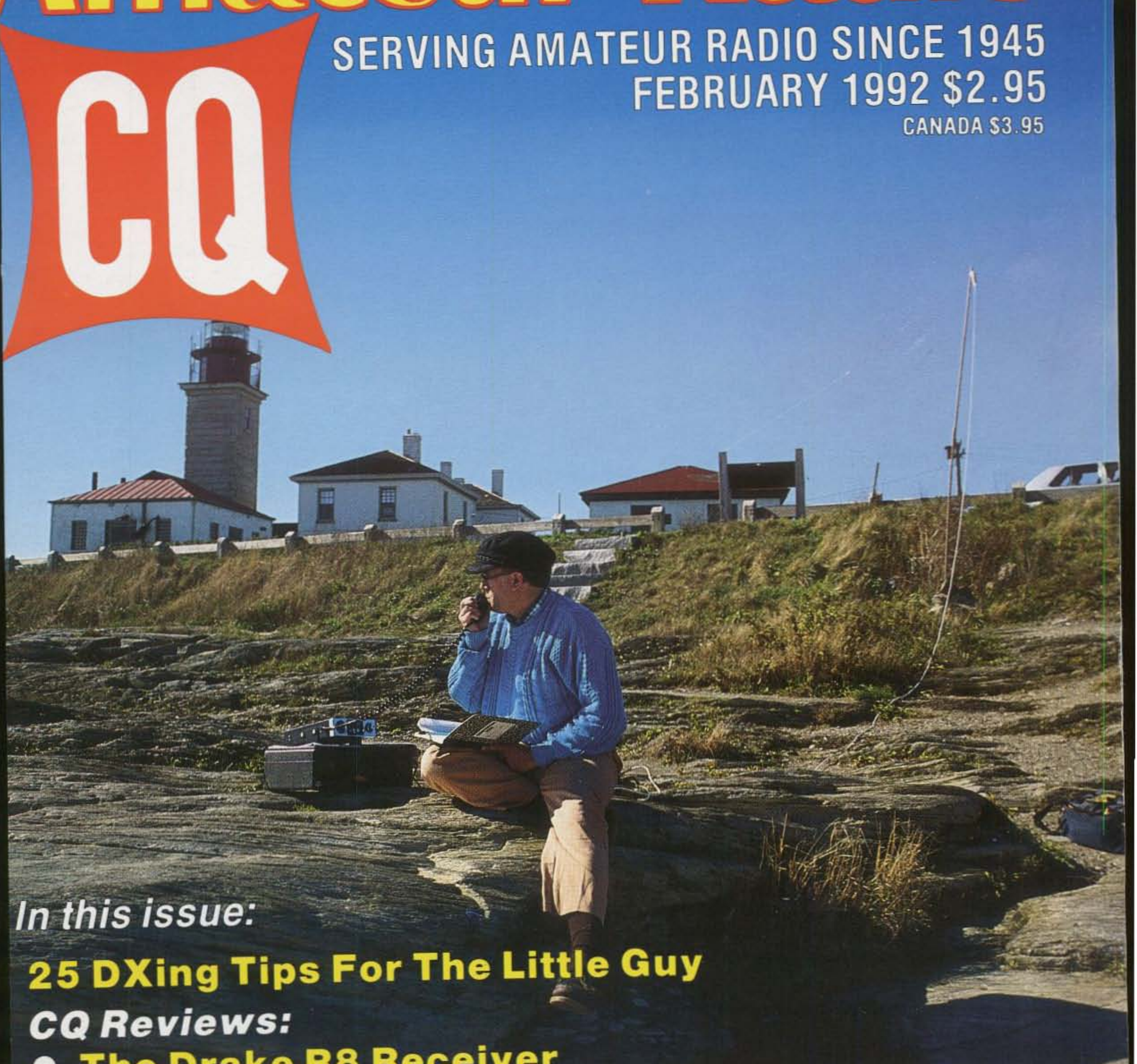
ICD 08241

Amateur Radio

CQ

SERVING AMATEUR RADIO SINCE 1945
FEBRUARY 1992 $2.95
CANADA $3.95



In this issue:

25 DXing Tips For The Little Guy

CQ Reviews:

- **The Drake R8 Receiver**
- **The N6RJ 2nd Op Computerized DX Operating Aid**

AMATEUR'S JOURNAL

KENWOOD

Freedom of Choice

TM-741A Modular FM Transceiver

The choice is yours. Kenwood's new FM Multibander allows you to start as a deluxe dual band radio – or add a third band. As a dual band, you'll have access to 144 and 450 MHz operation.

If you decide to add a third band – choose again. Select from the 28, 50, 220, or 1200 MHz bands. Then simply plug this option into the available slot.

Your ultra-compact TM-741A offers a full 50 watts on 10, 6, and 2 meters; 35 watts on 450 MHz; 25 watts on 220 MHz, and 10 watts on 1200 MHz!

On 2 meters, you'll find wide band receiver coverage with RX on 118 - 174 MHz, and TX on the Amateur bands. The 2 meter section is modifiable for MARS and CAP (permits required).

303 memory channels are available, with 101 in any one band. Cross band repeat between bands, or, choose dual band input with cross repeat to the third band. The offset function is active on the output, allowing you to repeat to repeaters.

Other features

Individual volume and squelch controls for each band. Remote mounting of front panel with optional cable kit. Optional selective calling or group calling. Optional DTMF memory stores 15 characters for repeater controlling. Versatile scanning. Auto offset on 2m. Fixed detect output for packet radio.

Multi-function DTMF microphone. Separate antenna and speaker outputs. Auto power off and time-out. 4 step dimmer. 3 step power. Clock, timer and calendar. DC cable, and mobile bracket.

UT-28S: 28MHz, 50 W, RX: 24-36 MHz, TX: 28-29.7 MHz. **UT-50S**: 50MHz, 50 W, RX: 46-57 MHz, TX: 50-54 MHz. **UT-220S**: 220 MHz, 25 W, RX: 215-230 MHz, TX: 220-225 MHz. **UT-1200**: 1200 MHz, 10 W, 1240-1300 MHz. **DTU-2**: digital paging unit. **PG-4K**, **PG-4L**: remote cable kit. **MB-11**: extra mounting bracket. **PG-2N**: extra DC cable. **PG-3B**: DC line noise filter. **TSU-7**: CTCSS encode/decode unit.

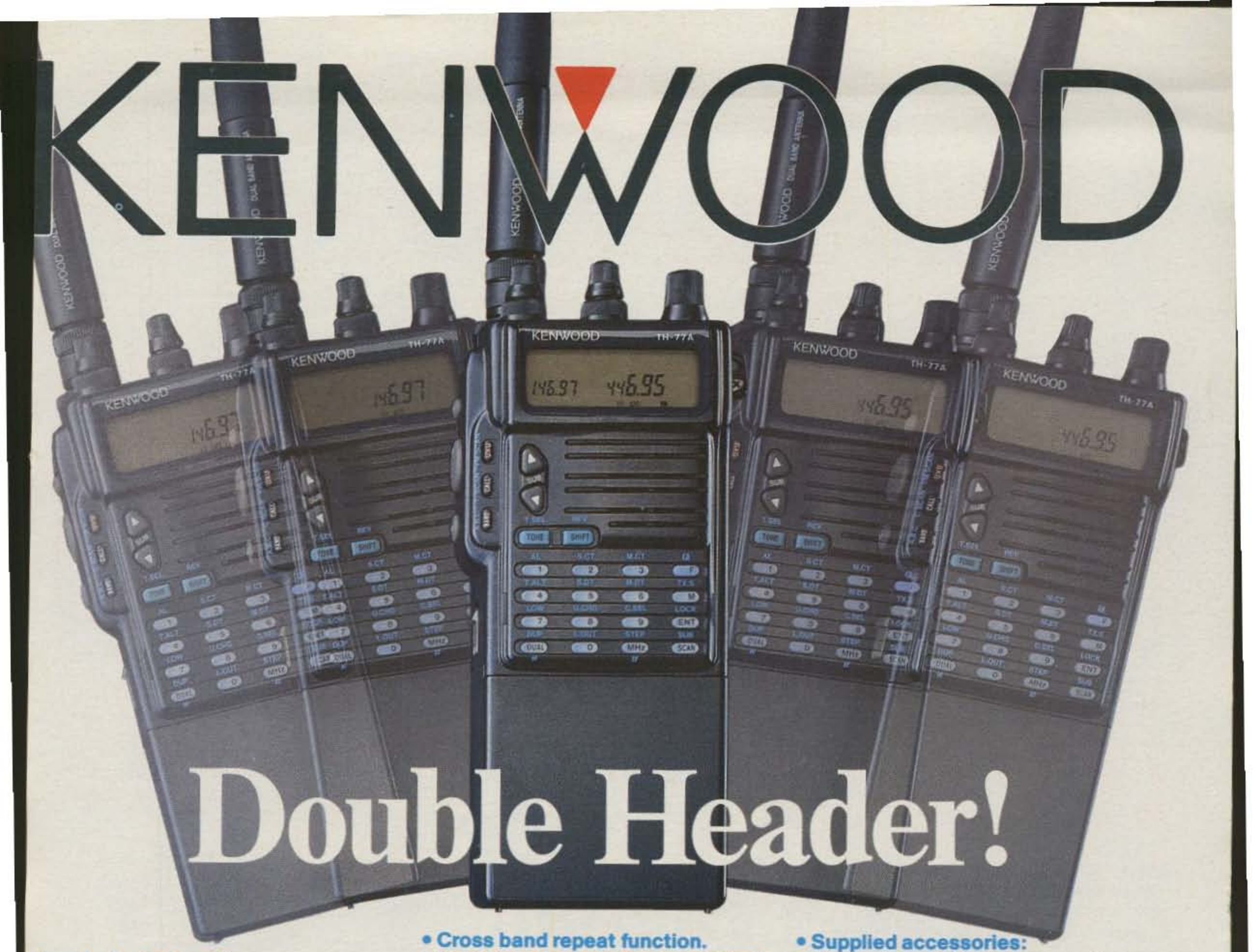
KENWOOD U.S.A. CORPORATION
COMMUNICATIONS & TEST EQUIPMENT GROUP
P.O. BOX 22745, 2201 E. Dominguez Street
Long Beach, CA 90801-5745
KENWOOD ELECTRONICS CANADA INC.
P.O. BOX 1075, 959 Gana Court
Mississauga, Ontario, Canada L4T 4C2

Kenwood meets or exceeds all specifications. Contact your dealer for a complete listing of specifications and accessories. Specifications are subject to change without notice. Complete service manuals are available for all Kenwood transceivers and most accessories. One year warranty in the U.S.A. only.

KENWOOD

...pacesetter in Amateur Radio

KENWOOD



Double Header!

TH-77A

Compact 2m/70cm Dual Band HT

Here's a radio that deserves a double-take! The TH-77A is a feature-packed dual band radio compressed into an HT package. The accessories are compatible with our TH-75, TH-25, and TH-26 Series radios. Repeater and remote base users will appreciate the DTMF memory that can store *all* of the DTMF characters (*, #, A, B, C, and D) that are usually required for repeater functions!

- **Wide band receiver coverage.** 136–165 (118–165 [AM mode 118–136] MHz after modification) and 438–449.995 MHz. TX on Amateur bands only. (Two meter section is modifiable for MARS/CAP. Permits required.)
- **Dual receive/dual LCD display.** Separate volume and squelch controls for each band. Audio output can be mixed or separated by using an external speaker.
- **Cross band repeat function.**
- **Dual Tone Squelch System (DTSS).** Uses standard DTMF to open squelch.
- **CTCSS encode/decode built-in.**
- **Forty-two memory channels.** All channels odd split capable.
- **DTMF memory/autodialer.** Ten 15-digit codes can be stored.
- **Direct keyboard frequency entry.** The rotary dial can also be used to select memory, frequency, frequency step, CTCSS, and scan direction.
- **Multi-function, dual scanning.** Time or carrier operated channel or band scanning.
- **Frequency step selectable for quick QSY.** Choose from 5, 10, 12.5, 15, 20, or 25 kHz steps.
- **Two watts (1.5 W on UHF) with supplied battery pack.** Five watts output with PB-8 battery pack or 13.8 volts. Low power is 500 mW.
- **DC direct-in operation** from 6.3–16 VDC with the PG-2W.
- **T-Alert with elapsed time indicator.**
- **Automatic repeater offset on 2 m.**
- **Battery-saving features.** Auto battery saver, auto power off function, and economy power mode.
- **Supplied accessories:** Flex antenna, PB-6 battery pack (7.2 V, 600 mAH), wall charger, belt hook, wrist strap, keyboard cover.

Optional accessories:
• **BC-10:** Compact charger • **BC-11:** Rapid charger • **BH-6:** Swivel mount • **BT-6:** AAA battery case • **DC-1/PG-2V:** DC adapter • **DC-4:** Mobile charger for PB-10 • **DC-5:** Mobile charger for PB-6, 7, 9 • **PB-5:** 7.2 V, 200 mAh NiCd pack for 2.5 W output • **PB-6:** 7.2 V, 600 mAh NiCd pack • **PB-7:** 7.2 V, 1100 mAh NiCd pack • **PB-8:** 12 V, 600 mAh NiCd for 5 W output • **PB-9:** 7.2 V, 600 mAh NiCd with built-in charger • **PB-11:** 12 V, 600 mAh OR 6 V, 1200 mAh, for 5 W OR 2 W • **HMC-2:** Headset with VOX and PTT • **PG-2W:** DC cable w/fuse • **PG-3F:** DC cable with filter and cigarette lighter plug • **SC-28, 29:** Soft case • **SMC-30/31:** Speaker mics. • **SMC-33:** Speaker mic. w/remote control • **WR-1:** Water resistant bag.

KENWOOD U.S.A. CORPORATION
COMMUNICATIONS & TEST EQUIPMENT GROUP
P.O. BOX 22745, 2201 E. Dominguez Street
Long Beach, CA 90801-5745
KENWOOD ELECTRONICS CANADA INC.
P.O. BOX 1075, 959 Gana Court
Mississauga, Ontario, Canada L4T 4C2

KENWOOD

...pacesetter in Amateur Radio

Complete service manuals are available for all Kenwood transceivers and most accessories.
Specifications and features are subject to change without notice or obligation.

KENWOOD

TS-950SD

"DX-clusive" HF Transceiver

The new TS-950SD is the first Amateur Radio transceiver to utilize Digital Signal Processing (DSP), a high voltage final amplifier, dual fluorescent tube digital display and digital meter with a peak-hold function.

• Dual Frequency Receive Function. The TS-950SD can receive two frequencies simultaneously.

• New! Digital AF filter. Synchronized with SSB IF slope tuning, the digital AF filter provides sharp characteristics for optimum filter response.

• New high voltage final amplifier. 50 V power transistors in the 150-watt final section, resulting in minimum distortion and higher efficiency. Full-power key-down time exceeds one hour.

• New! Built-in microprocessor controlled automatic antenna tuner.

• Outstanding general coverage receiver performance and sensitivity. Kenwood's Dyna-Mix™ high sensitivity direct mixing system provides incredible performance from 100 kHz to 30 MHz. The Intermodulation dynamic range is 105 dB.

• Famous Kenwood interference reduction circuits. SSB Slope Tuning, CW VBT (Variable Bandwidth Tuning), CW AF tune, IF notch filter, dual-mode noise blanker with level control, 4-step RF attenuator (10, 20, or 30 dB), switchable AGC circuit, and all-mode squelch.

Complete service manuals are available for all Kenwood transceivers and most accessories.
Specifications, features and prices subject to change without notice or obligation.

The Ultimate Signal.

DSP

Digital Signal Processing

Without DSP With DSP

• Digital Signal Processor. DSP is a state-of-the-art technique that maximizes your transmitted RF energy.

• High performance IF filters built-in† Select various filter combinations from the front panel. For CW, 250 and 500 Hz, 2.4 kHz for SSB, and 6 kHz for AM. Filter selections can be stored in memory!

• *Multi-Drive Band Pass Filter* (BPF) circuitry. Fifteen band pass filters are available in the front end to enhance performance.

• Built-in TCXO for the highest stability.†
• Built-in electronic keyer circuit.
• 100 memory channels. Store independent transmit and receive frequencies, mode, filter data, auto-tuner data and CTCSS frequency.
• Digital bar meter.

Additional Features: • Built-in interface for computer control • Programmable tone encoder • Built-in heavy duty AC power supply and speaker • Adjustable VFO tuning torque • Multiple scanning functions • MC-43S hand microphone supplied

Optional Accessories
- DSP-10 Digital Signal Processor *
- SO-2 TCXO* • VS-2 Voice synthesizer
- YK-88C-1 500 Hz CW filter for 8.83 MHz IF*
- YG-455C-1 500 Hz CW filter for 455 kHz IF*
- YK-88CN-1 270 Hz CW filter for 8.83 MHz IF
- YG-455CN-1 250 Hz CW filter for 455 kHz IF*
- YK-88SN-1 1.8 kHz SSB filter for 8.83 MHz IF
- YG-455S-1 2.4 kHz SSB filter for 455 kHz IF*
- SP-950 External speaker w/AF filter
- SM-230 Station monitor w/pan display
- SW-2100 SWR/power meter
- TL-922A Linear amplifier (not for QSK)

* Built-in for the TS-950SD
† Optional for the TS-950S

KENWOOD U.S.A. CORPORATION
COMMUNICATIONS & TEST EQUIPMENT GROUP
P.O. BOX 22745, 2201 E. Dominguez Street
Long Beach, CA 90801-5745
KENWOOD ELECTRONICS CANADA INC.
P.O. BOX 1075, 959 Gana Court
Mississauga, Ontario, Canada L4T 4C2

KENWOOD

...pacesetter in Amateur Radio

CQ The Radio Amateur's Journal

ON THE COVER: John Young, WD0FPY/1, enjoys some fresh air while sitting on the rocks working 10 meter DX at Newport, Rhode Island. Photo by Larry Mulvehill, WB2ZPI)

FEBRUARY 1992 **VOL. 48, NO. 2**

A publication of

CQ Communications, Inc.
76 North Broadway
Hicksville, NY 11801-USA.

Offices: 76 North Broadway, Hicksville, NY 11801. Telephone: 516 681-2922. FAX (516) 681-2926. CQ (ISSN 0007-893X) is published monthly by CQ Communications Inc. Second Class postage paid at Hicksville, NY and additional offices. Subscription prices: Domestic—one year $22.95, two years $43.00, three years $63.00; Canada/Mexico—one year $25.00, two years $47.00, three years $69.00; Foreign—one year $27.00, two years $51.00, three years $75.00; Foreign Air Mail—one year $80.00, two years $157.00, three years $234.00.
U.S. Government Agencies: Subscriptions to CQ are available to agencies of the United States government, including military services, only on a cash with order basis. Requests for quotations, bids, contracts, etc. will be refused and will not be returned or processed.

Allow six weeks for change of address. Printed in the United States of America.
Postmaster: Please send change of address to CQ Magazine, 76 North Broadway, Hicksville, NY 11801.

FEATURES

DEPARTMENTS

6 Reasons w
build your sys

IC-725 HF Transceiver PS-55 Power Supply IC-2KL Linear Amplifier IC-475 UHF Transceiver
IC-275 VHF Transceiver

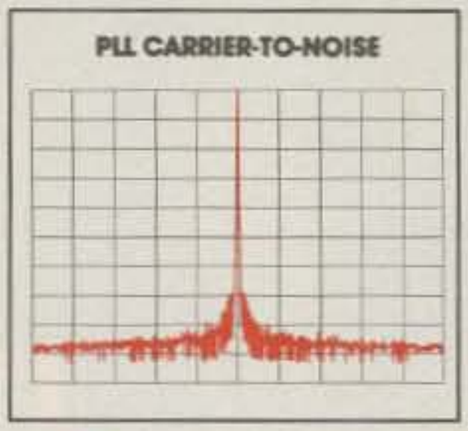
The IC-725 system above is just one example of how you can build your system.

"Don't just buy a radio. Build a system." Experienced ham operators have been giving this advice for a long time. As you build your station, you don't want "stand alone" rigs that cannot integrate with the rest of your equipment. You can avoid serious disappointments in the future by comparing compatibility, performance, reliability and service *before* you purchase each component of your system.

1 A HIGHER LEVEL OF PERFORMANCE

If you have ever made a weak signal QSO, had it fade out, then dialed the same frequency on an ICOM transceiver and found a strong, clear signal... you're already aware of ICOM's superior performance.

We have devoted three decades of research and design to ensure that our transceivers consistently meet or exceed your critical expectations. Our engineers have achieved a balance of dynamic range, selectivity and sensitivity thought unobtainable a few years ago. Their development of the ICOM DDS System, with an extremely low carrier-to-noise ratio, has resulted in loud and clear transmissions and the ultimate in HF receiver performance.



2 DESIGNED FOR COMPATIBILITY

It has been said many times, "Once you learn to operate one ICOM radio, every other ICOM is a snap to pick up." This is especially helpful as you upgrade or when you operate two or more transceivers simultaneously.

Even more important is the interchangeable, system design of ICOM equipment. This allows the integrated operation of your HF, VHF, UHF, antenna tuner, power amplifier, microphone and even your PC.

3 RELIABILITY YOU CAN COUNT ON

Ever wonder why you rarely see an ICOM radio at a swap meet? A remarkable majority of ICOM transceivers made in the last fifteen years are still making contacts in ham shacks around the world.

ICOM's outstanding reputation for reliability is a result of our integrity of construction. We use only the highest quality components and do not skimp on important details (i.e. heavy duty front panels and one-piece heat sinks).

When you compare a transceiver's value over several year's time, it is well worth buying the best.

4 CUSTOMER SERVICE THAT WILL KEEP YOU ON THE AIR

ICOM serves you regionally with four factory service centers. We provide a Customer Service Hotline for technical support and answers to your many

HF SYSTEMS

ny you should em with Icom.

IC-970 UHF/VHF Transceiver IC-2KL Linear Amplifier IC-765 HF Transceiver

This IC-765 system is another classic combination of ICOM components.

questions. ICOM averages 7 to 10 days turnaround on radio servicing. And we still carry complete lines of parts for radios built years ago. Can other manufacturers compare to ICOM's service?

5 THE LEADING EDGE OF TECHNOLOGY

ICOM continues to be on the leading edge of technology and innovation. We pioneered digital control technology and made history by eliminating the need for manual adjustment in the transmitter final amplifier stage.

ICOM produced the FIRST all-transistorized HF amateur transceiver. We were also the FIRST to use fiber optics to create a truly modular multi-band amateur mobile radio.

6 THE MORE YOU LEARN THE MORE YOU WILL WANT AN ICOM

Ask experienced amateurs what they look for in a transceiver. Learn which features and performance characteristics are essential to quality operation and which are not. Notice which brands are winning all of the contests and DX competitions around the world. The more you learn, the more distinct advantages you will see in ICOM's quality, performance, compatibility and reliability.

At ICOM, our heritage is built on amateur radio. We are dedicated to its growth and progress. Our company is comprised of over 90% licensed amateurs and we collectively strive to make ICOM equipment the benchmark to which all others are compared. Simply, the best.

10% FACTORY REBATE!

Purchase any ICOM HF transceiver from a participating dealer by **February 28, 1992,** and receive a factory direct **10% Rebate** off any HF accessory.

For more information, call:
Brochure Hotline 1-800-999-9877
Customer Service 1-206-454-7619

ICOM

Simply the Best©

CIRCLE 152 ON READER SERVICE CARD

— 11 STORE BUYING POWER —

HAM RADIO OUTLET®

WORLDWIDE DISTRIBUTION

Phone Hours:
9:30 AM to 5:30 PM

Store Walk-In Hours:
10:00 AM - 5:30 PM
Closed Sundays

NOW TOLL FREE IN CALIFORNIA!

CALL TOLL FREE:

West	1-800-854-6046
Mountain	1-800-444-9476
Southeast	1-800-444-7927
Mid-Atlantic	1-800-444-4799
New England	1-800-444-0047

Toll free, incl. Hawaii, Alaska, Canada; call routed to nearest store: ***all HRO 800-lines can assist you, if the first line you call is busy, you may call another.***

-NEW ADDRESS-
ANAHEIM, CA 92801
933 N. Euclid St.
(714) 533-7373
(800) 854-6046
Jim Rafferty, N6RJ, V.P.
Near Disneyland

OAKLAND, CA 94606
2210 Livingston St.
(510) 534-5757
(800) 854-6046
Rich, WA9WYB, Mgr.
I-880 at 23rd Ave. ramp

SAN DIEGO, CA 92123
5375 Kearny Villa Rd.
(619) 560-4900
(800) 854-6046
Tom, KM6K, Mgr.
Hwy. 163 & Claremont Mesa

-NEW ADDRESS-
SUNNYVALE, CA 94086
510 Lawrence Expwy. #102
(408) 736-9496
(800) 854-6046
Tom, KB6LUC, Mgr.
Lawrence Expwy.
So. from Hwy. 101

VAN NUYS, CA 91411
6265 Sepulveda Blvd.
(818) 988-2212
(800) 854-6046
Jon, KB6ZBI, Mgr.
San Diego Fwy.
at Victory Blvd.

Bob Ferrero W6RJ
President/Owner

Jim Rafferty N6RJ
Vice President

-NEW STORE-
PORTLAND, OR 97223
11705 S.W. Pacific Hwy.
(503) 598-0555
(800) 854-6046
Earl, KE7OA, Mgr.
Tigard-99W exit
from Hwy. 5 & 217

DENVER, CO 80231
8400 E. Iliff Ave., #9
(303) 745-7373
(800) 444-9476
George, KDØRW, Mgr.

PHOENIX, AZ 85015
1702 W. Camelback Rd.
(602) 242-3515
(800) 444-9476
Gary, WB7SLY, Mgr.
East of Highway 17

ATLANTA, GA 30340
6071 Buford Highway
(404) 263-0700
(800) 444-7927
Mark, KJ4VO, Mgr.
Doraville, 1 mi.
no. of I-285

WOODBRIDGE, VA 22191
14803 Build America Dr.
(703) 643-1063
(800) 444-4799
Curtis, WB4KZL, Mgr.
Exit 54, I-95, South to US 1

SALEM, NH 03079
224 N. Broadway
(603) 898-3750
(800) 444-0047
Jim, K3QIO, Mgr.
Exit 1, I-93;
28 mi. No. of Boston

AZ, CA, CO, GA, VA residents add sales tax.
Prices, specifications, descriptions, subject to change without notice.

ICOM

IC-765

100W HF Transceiver
General Coverage Receiver
Maximum Operation Flexibility
SALE! CALL FOR PRICE

ICOM

IC-735

100W 12 volt • 12 channel memory
General Coverage • IF Notch & QSK
CALL FOR LOW PRICE

ICOM

IC-725

100W General Coverage
Receiver, HF All Band
Compact Transceiver
GREAT PRICE

ICOM MONTH IS HERE!

SPECIAL PRICING ALL MONTH LONG AT ALL STORES

Icom Days At The Following Stores:

Feb 1 Sunnyvale • Van Nuys
Feb 8 Phoenix • Salem • San Diego
Feb 15 Woodbridge•Denver•Portland
Feb 22 Oakland • Atlanta • Anaheim

On These Dates At These Stores:
- Free prize drawing each hour
  (must be present to win)
- Grand prize drawing
  (need not be present to win)
- Demos by ICOM representatives
- Refreshments

(no purchase necessary)

ICOM

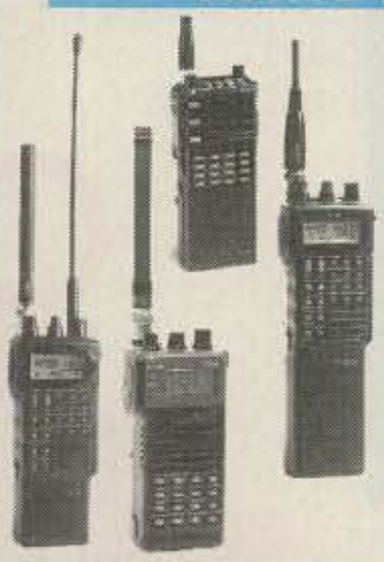
IC-229H

2 Meter Mobile

50 W • 20 Memories • Small Size
Extended RX Coverage, 118-174 MHz
GREAT PRICE

ICOM

HANDHELDS



IC-2GAT
2 Meter HT • 7 Watt
IC-4GAT
440 MHz • 5 Watt
IC-W2A
Deluxe Duo-Band
Wide RX Band HT
IC-2SAT, 2 Meter
IC-3SAT, 220 MHz
IC-4SAT, 440 MHz
IC-24AT, Duo Band
IC-2SRA, 2M + Wide Rx

ICOM

IC-901

Fiber Optic Multi-Band Transceiver

2 Meter and 440 MHz
Extra Large Multi-Color LCD
HM 14 Touch Tone Microphone
CALL FOR PRICE

This month we get down to the nitty-gritty construction details for this project. You may want to duplicate it or use elements for your own design. Perhaps, like most of us, though, it's enough to read about it and appreciate the effort.

The Craftsman Special

A Homebrew HF Linear Amplifier
Part II—Construction

BY ROSS CLARE*, GW3NWS

With Part II we conclude this article on GW3NWS's homebrew amplifier. Once again let me remind you that this project involves potential lethal voltages and current. Be extremely careful when working around high voltage.

—K2EEK

We'll begin Part II with an overview of the bias and grip trip circuits plus a discussion of the power supply. It's probably a good idea to reread Part I to refresh your memory before you continue.

Fig. 6– Front view of the completed amplifier. The top left control is the turns-counter dial for the Tune capacitor. Below that is the vernier drive associated with the Loading capacitor. The handles are surplus from another project. Operational controls and indicating lights are grouped at the lower left. The two small controls at the lower right are ALC Adjust and the multimeter switch. The bandswitch is in the center of the panel. The top meter measures plate current and the lower one is the multimeter. The front panel was completely wire-brushed prior to lettering. This view also shows clearly the details of the RF switch (center).

Bias and Grid Trip Circuits

There are four bias circuits in this amplifier (fig. 2):

1. **Cut-Off Bias**— – 40 volts is applied to the cathodes of the tubes when K7b opens.

2. **Operating Bias**—about 8.2 volts is provided by zener diode D1 (7.5 V) plus the base/emitter voltage of Q1 (about 0.8 V) and current amplifier Q1.

3. **Dynamic Bias**—is cut-off bias produced by R14 and removed by Q2 when the amplifier is driven.

4. **Fault Cut-Off Bias**—is provided by R2 when the fuse F1 ruptures.

The HV Power Supply

In order to run an amplifier at its full power output when driven with a 100% duty cycle mode like FM or RTTY for long periods of time, the HV power supply must be designed and built to operate at that DC power level continuously. The HV power supply shown in fig. 10 is designed for continuous service. It uses an oil-filled transformer and paper filter capacitors. The transformer is continuously rated at 2.5 KVA at a secondary voltage of 2000 volts with taps at 1700 and 1400 volts. At an HT voltage of about 2500 volts on load, in the SSB and CW modes, the amplifier is capable of about 4 kilowatts peak input and 2.5 kilowatts PEP output. K1 is an ordinary 20 amp 2-pole relay which was modified to work at about 4 KV reliably. A blow-by-blow account of this modification would be of little use, because the relay you might use will probably be a different type. The

Glenview, Newport Rd., Magor, Gwent NP6 3BZ UK

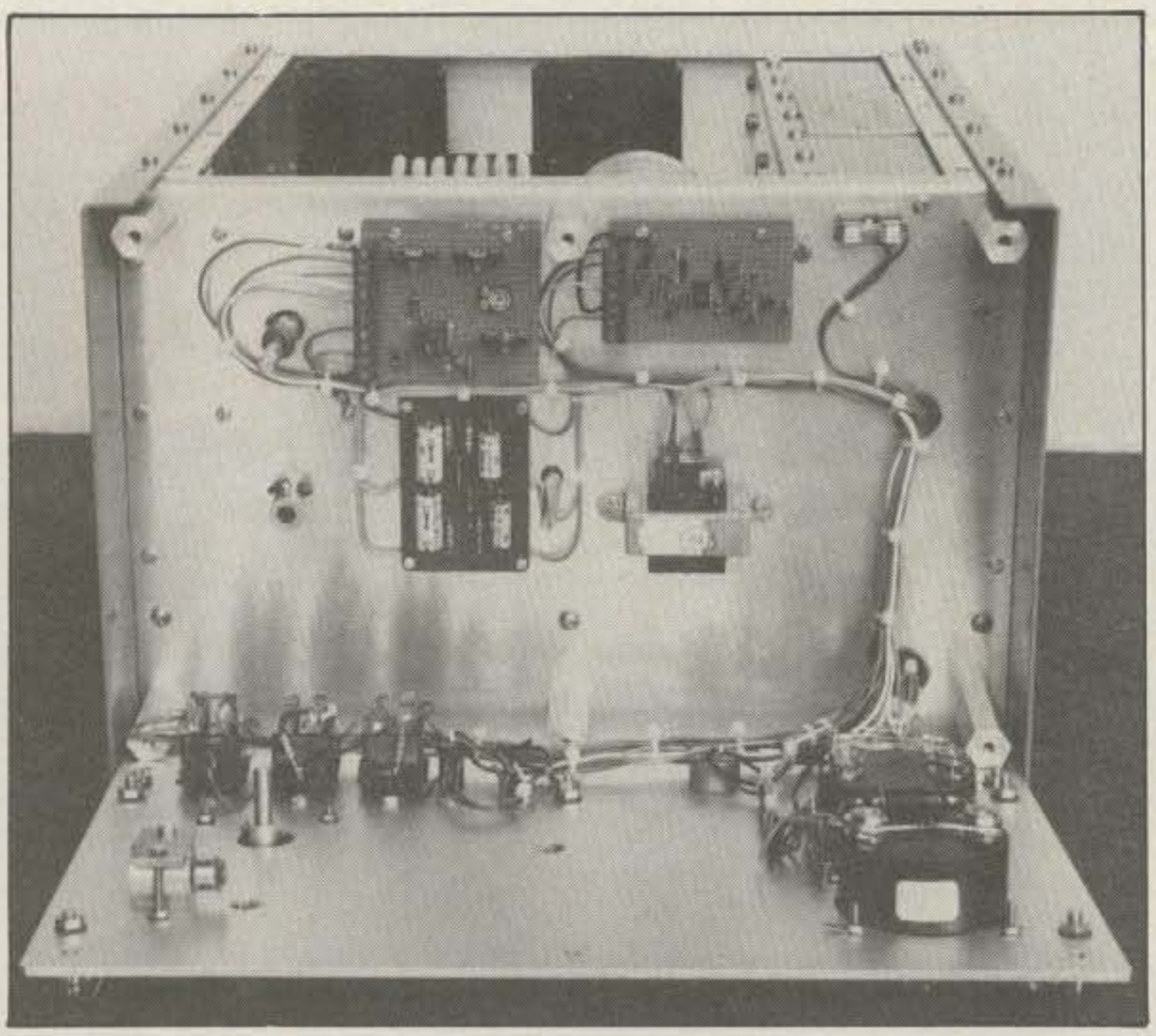


Fig. 9– The front panel is a sub-assembly of the main amplifier unit. Four aluminum pillars support the front panel. The remainder of the electronics are located in this area. The board at the top left is the RF power calibration and peak-hold circuit board. To its right is the filament voltage error detector board. The small transformer and circuit board below these two (center) contain the 12 volt power supply for the RF peak-hold unit. At the lower left are the turns-counter mechanism and the operating switches. The 2 amp meter shunt can be seen mounted on the rear of the plate meter at the lower right.

ternal arc can cause serious damage to the tube. In this respect, the inclusion of R3 in the HV line is essential. In effect, it increases the time constant of the discharge circuit, and any transient flashover is starved of energy, causing it to decay very quickly and thus causing no damage to the tube. The event therefore will probably go unnoticed. Its effect upon the power supply's regulation is small and of no consequence.

Construction

The amplifier can be built as illustrated with all the features, or some of the features can be left out, which represents a considerable savings in effort and expense. The HV transformer, HV filter capacitors, and variable capacitors are all second hand. All the metalwork was fabricated from 14-gauge aluminum sheet, except for the front panel which is 10 gauge. With the exception of a simple vice-mounted metal bender which I bought second hand, the amplifier was constructed using basic hand tools only and no other workshop facilities. The amplifer is built on a 13"L × 15"D × 2½H" chassis which is made from three pieces of aluminum. The cabinets are also homemade. Layout of the major components can be seen in figs. 10 and 11. The enclosure at the right of the chassis houses the blower, the filament transformer, the low-voltage power supply, and 24 volt regulator, which is mounted to the rear of the inner panel. The 3 minute timer and the grid-trip circuit are mounted on top of the filament transformer.

With the exception of the dynamic bias circuit, all the "electronics" are built on "Veroboard" (perforated strip board). The operating bias circuit (Q1) is supported on an L-shaped bracket and mounted near the blower exhaust. The rest of the associated components are connected directly to the 2N3055. A 4 °C/watt heatsink was found to provide plenty of cooling for the 338 K filament regulator, and to ensure maximum air flow, the heat sink is mounted off the chassis by two ½ inch spacer bolts. The dynamic bias circuit is built on a small tag board in an effort to keep the capacitance down. The blower was bought especially for the job. It's a high-quality unit with an internally mounted motor, which helps to keep the size down.

The blower is bolted directly to the side partition and blows air vertically downward to pressurize the chassis. Even when running at high speed this blower is almost completely vibration free. The joint between the blower discharge and the chassis is sealed by four pieces of stick-on weatherproofing.

Fig. 3 shows the blower delay circuit, which consists of a small 70 °C button-thermostat cemented to the center of a square-bodied 2 K ohm (10 K ohm for 240 volts) 10 watt wire-wound resistor. This arrangement gives about 3 minutes of blower "overrun." The output Pi network inductors are self-supporting, being made entirely from ¼ inch seamless copper tube. They are made in two parts—the HF coil for 10, 15, and 20 meters and an LF coil for 40 and 80 meters. Table II gives the dimensions and values. The LF coil is mounted on two ceramic stand-off insulators which are bolted to the side partition. The HF coil is then bolted directly between the LF coil and the vacuum variable capacitor. The tap connections to the band switch are made from thin copper strip. When the amplifier was built and tested to satisfaction, the complete coil assembly was removed, silver plated, and refitted. Over the years I have built many amplifiers and carefully measured the efficiency and general performance of them. I have come to the conclusion that silver plating of PA components for use at HF only produces a very small improvement in overall efficiency. Even at 30 MHz this is at best less than 1 %. It is expensive and it looks good, but don't lose any sleep over it!

Band	C1	C2	L (μH)
160	900p	3700p	11
80	450p	1850p	5.4
40	225p	925p	2.7
20	112p	460p	1.4
15	75p	310p	0.9
10	56p	230p	.7

Table II– Output Pi network values (Rp = 1000 ohms; QL = 10). HF coil (L1) 7¼ turns, 2¼" diameter, 3" long. Taps from plate end: 10 meters—3 turns, 15 meters—4¼ turns, 20 meters—7⅛ turns. LF coil (L2) 14½ turns, 2¼" diameter, 6" long tapped at 9¼ turns from output (50 ohm) end 40 meters. L1 and L2 are made from ¼" diameter seamless copper tube. One-sixty meter values included for information. RFC2—140 turns No. 20E on ceramic form, close-wound winding length 4".

The band switch was made up from bits and pieces of other switches to do this job. The switch is mounted about 1 inch above the chassis and central in the front panel. The input band switch is mounted vertically in the chassis and coupled to the rear of the output switch shaft by a pair of 1:1 90 degree bevel gears. The input switch shaft is steadied by a panel bush fixed vertically on another L bracket. If you can't manage this arrangement, don't worry about it. Use two separate switches but remember to keep the input circuits well screened from the output circuits and both switches on the same band! (*For a variation on band switch design see "How To Build A High-Quality, High-Power, Multi-Wafer Bandswitch For Your Next Amplifier Project," by Wade A. Calvert, CQ, July 1991, p. 32.*)

The **Tune** capacitor is mounted off the inner panel by a U-shaped bracket to

FT-1000

A Few Expert Opinions...

"...The most important performance aspects of any transceiver are ease of use and basic receiver performance. The FT-1000 excels at both...The FT-1000...has a very strong receiver; it has the best overall performance and the highest third order input intercept of any commercial radio ever tested in the ARRL lab...The FT-1000 needs little for me to consider it the ultimate contesting and DXing machine available today..."
—QST Magazine

"The FT-1000 is an excellent top flight transceiver in all respects. It has all the features one would expect in a radio of this class...Of all the top of the range models..., the FT-1000 is the friendliest to use. The ergonomics has been well thought out with simple and obvious control of all functions..." **—Radio Communications (U.K.)**

"The FT-1000 is indeed a fascinating new generation of HF transceiver...The receiver side is very impressive. The sensitivity, dynamic range, and selectivity figures are more than adequate for today's needs..." **—CQ Magazine**

"Until now a RF output power of 100 watts applied as the norm for semiconductor component shortwave transceivers; some newer high class units offered 150 watts. The FT-1000 is set for a maximum RF output of 200 watts. During normal SSB and CW use the power transformer remains hand warm—an improvement over the past when a transformer would occasionally 'burn up'..." **—cq DL (Germany)**

"The biggest attraction of the FT-1000 is the very quiet receiver. In a side-by-side comparison between the FT-1000, the ICOM IC-781, the ICOM IC-765, and the Kenwood TS-950, the FT-1000 came out the winner by a long shot... when comparing its receiver to those found in current equipment of the like monetary value from other manufacturers, the FT-1000 beats all."
—73 Magazine

YAESU
Performance without compromise.℠

One-Year Limited Warranty on all Amateur Radio Products
Specifications subject to change without notice.

FAMILY MATTERS

When choosing a new dual-band antenna, consider pedigree.

The **Hustler** family of UHF and VHF antennas has earned a world - wide reputation for excellence.
Our newest family member is the G6-270.
Created from the same design philosophy as our well-known G7 and G6 series.
The G6-270 delivers what you expect from **Hustler**. Real specifications. Rugged design. Solid gain and wide bandwidth. Reliable performance.
Invite our newest family member to your home today.

Mechanical

Length: _____ 7' 6"

Weight: _____ 5.3 lbs.

Wind Survival — 100 mph

Mounting _____ 1-1/4" to 1-1/2" mast
Supplied U-bolts
Mounting plate will accept 2" U-bolts

New

2M/440
Dual-band
from

HUSTLER®

See your
favorite Amateur
radio dealer

Electrical

Max. Power _____ 200 watts

Gain _____ 6 dBd VHF
6 dBd UHF

Design _____ 5/8 over 5/8VHF
4 x 5/8 UHF

Bandwidth _____ 2 MHz under 1.5:1 V
10 MHz under 1.5:1
Shunt fed - D.C. Gro

Termination _____ Type N female

CIRCLE 176 ON READER SERVICE CARD

Newtronics Antenna Corp.

One Newtronics Place, Mineral Wells, Texas 7

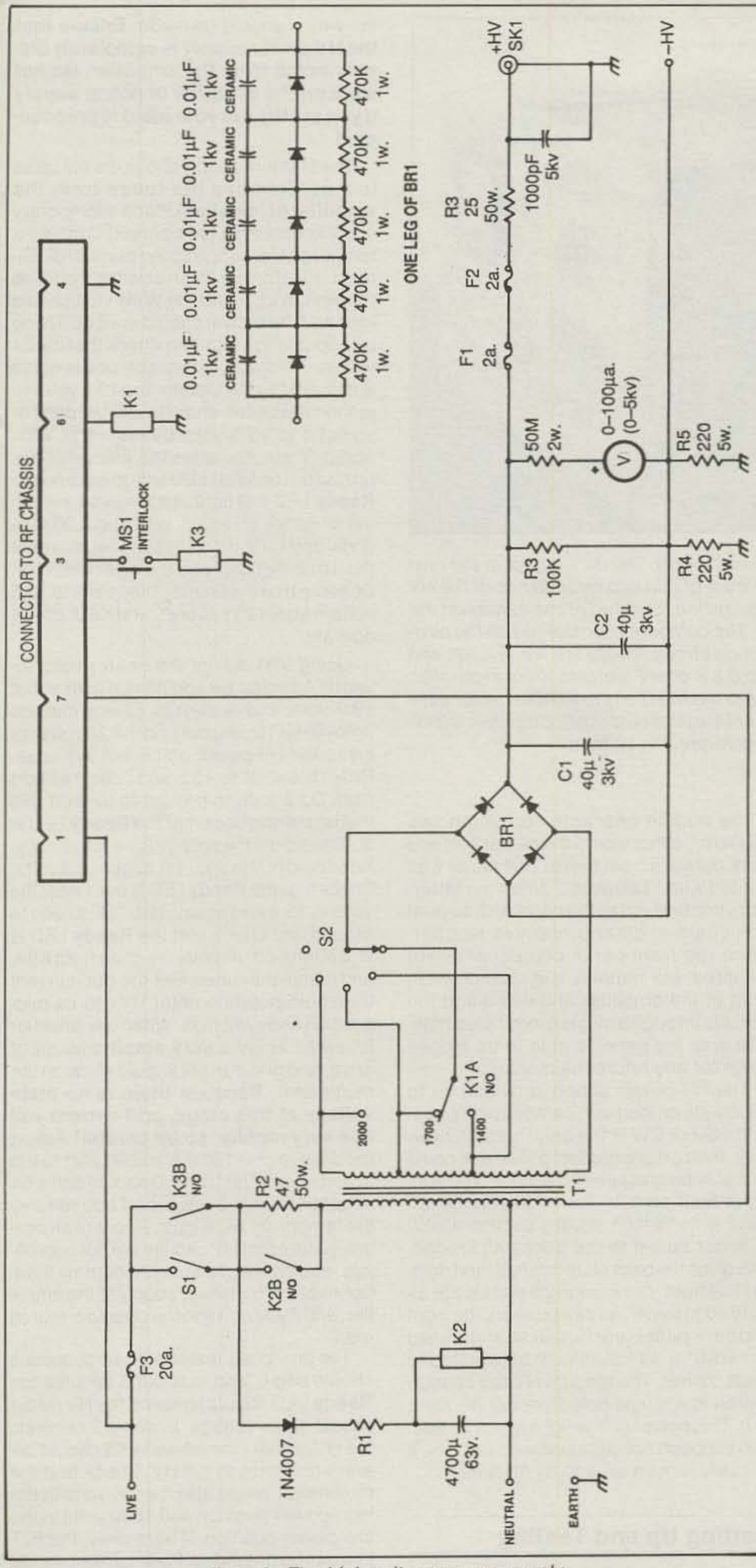


Fig. 10– The high-voltage power supply.

T1—HV power transformer, primary to suit your requirements, but preferably 220 VAC rated at 2.5 KVA, Secondary 2000 V tapped at 1700 V and 1400 V (2000 V tap not used).
BR1—20 pieces, 1000 volt PIV 3 amp diodes (1N5408), 5 diodes per leg, each diode shunted as shown.
F1 & F2—Two pieces 2 amp super quick, sand-filled 1.25" semiconductor fuses (FF rated) in series.
C1 & C2—40 uF 3 KV oil-filled paper capacitor.
K1—24 volt coil, 20 amp relay, modified to work at high voltage (see text).
K2 & K3—24 volt 20 amp double-pole relay.
MS1—Small magnetic switch, actuating magnet fixed to cover of power unit.
S1—Single pole 20 amp toggle switch.
S2—Single pole four-way ceramic rotary switch.
R1—Selected to provide about 1 second delay without exceeding K2 coil voltage (for 220 V supply, about 2 K, 20 watts).
R2—10 pieces 10 K 15 watt wire-wound resistors in series mounted on perforated board.
SK1—PET 100 high-voltage connector.

enable the HF coil to be fixed directly to it. The shaft of the tune capacitor is extended through the front panel and operates a turns-counter dial through another pair of bevel-gears. A three-section 1500 pF capacitor is used for loading the amplifier. This unit is fixed directly to the chassis below the tune capacitor. The safety choke is fixed horizontally to the chassis by yet another L bracket to the rear of the loading capacitor.

The tube bases are mounted centrally in two 2½ inch diameter holes by ½ inch wide strips of double-sided glass-fibre PC board material. This makes a very strong bond and a good low-inductance ground return to the chassis. The grids are grounded directly to these strips. This technique is okay at HF, but unsuitable at VHF. The plate RF choke is handmade and detailed in Table II. After winding, the choke was checked with a GDO to find and eliminate any in-band resonances. Much thought was given to the cooling system, and the arrangement used here is as good as any. Cold air is drawn into the cabinet through side vents, across the Pi network components, and into the blower air intake. This keeps the cabinet interior cold. Air is discharged into the chassis under pressure and exhausted through the tube plate coolers and chimney extensions.

The chimney extensions are made from pieces of PVC drain pipe. Fortunately, 2½ inch internal diameter is a standard size, just right for these tubes. I didn't know how well this material would stand up to the temperature of the plate cooler. However, as there is a considerable temperature drop from the actual plate core to the outer ring (in this case about 40°C), the PVC drain pipe was worth considering, so I decided to warm up a sample. Using my wife's frying pan, a little cooking oil, and a mercury glass thermometer, the pipe

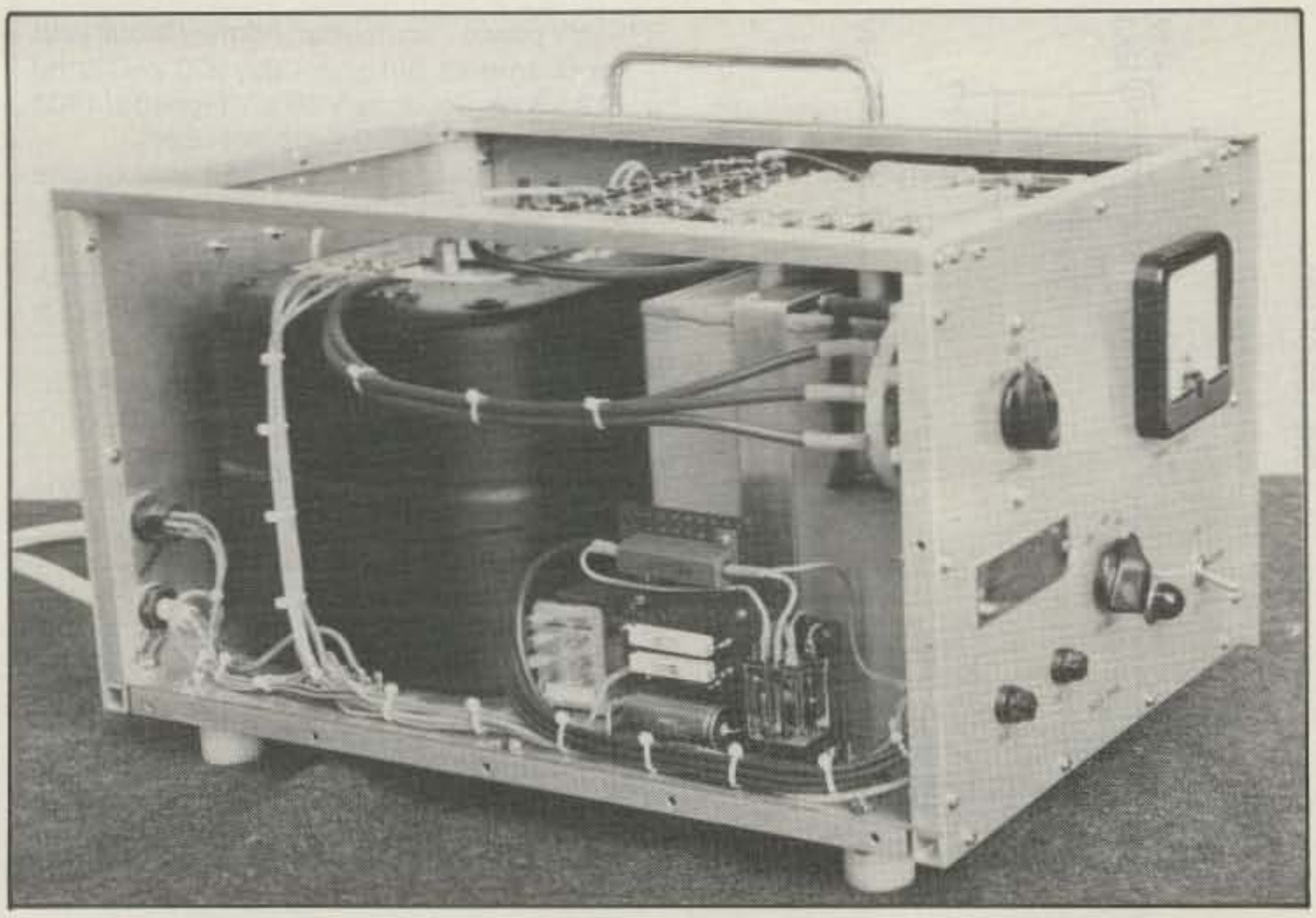


Fig. 11– An oblique view of the high-voltage power supply. The dark object at the rear is the oil-filled high-voltage transformer. To the front of that can be seen one of the HV filter capacitors and the manual HV tap change switch. Located at the center on the base plate is the modified HV tap change relay. The components mounted on the perf-board are all associated with the inrush protection circuit. These are K2, R1, R2, and the 4700 uF delay capacitor. R1 is made of two 6.8 K ohm 7 watt resistors in parallel. R2 is a 50 watt metal-clad resistor. Fuse posts are mounted on the front panel for easy access. The two rotary switches on the front panel are (top) output adjustment and (bottom) primary adjustment, for different line voltages.

was gently fried on the gas cooker. The softening temperature of the material was noted at about 200°C.

According to my ever-patient wife, this scene confirmed her long-held belief that building amplifiers is no good for my mental health. However, all was well, and I decided to use the PVC. Again, this material is quite satisfactory at HF, but at VHF the effects of dielectric heating may well cause it some distress. The efficiency of the cooling system was tested by fixing temperature-sensing labels to the tube seal areas and running the amplifier at 1500 watts CW output into a dummy load for 15 minutes. The indicated maximum temperature was 195°C, 30°C less than Eimac's limit. The incoming air temperature was 23°C. The front panel carries the two meters, the multimeter and operational switches, the **ALC** potentiometer, the turns counter for the **Tune** capacitor, and the vernier drive for the **Load** capacitor.

After cutting, drilling, and deburring, the front panel was degreased, the work bench made scrupulously clean (a very rare event in this shack), and the hands washed in preparation for lettering. If you haven't done this before, some practice would not be a bad idea. If you want to make the front panel look professional, it is important to ensure that the wording appears central above or below its associated control. To do this, simply add up the number of letters in the word, decide which is the middle character or which two should fall either side of the center line, and work outward from there. This panel was printed with "Letraset." When the lettering is finished, spray the panel with several thin coats of clear protective lacquer. Once the front-panel components are mounted, the panel is laid face down in front of the amplifier and wired into the chassis through a single grommeted hole. This way the panel is able to be hinged down for any future maintenance.

The HV power supply provides up to 2500 volts on load at 1.2 amps continuously. If SSB or CW is the only interest, however, then a more modest power unit could probably be pressed into service. The supply is built on a ¼ inch thick aluminum plate with ½ inch square section aluminum bar bolted to the edges all around. This gives the base plate strength and rigidity. The front, back, and side panels are also fixed to these. As can be seen, the front and back panels are further strengthened by two 1" × ½" aluminum bars bolted to each corner. The manual HV tap change switch is a single-pole five-way ceramic unit. This power unit weighs about 80 lbs., and although not equipped with casters, it is easily moved around by my wife!

Setting Up and Testing

Before testing, a thorough inspection of the wiring should be made. **Ensure that the HV power supply is completely disconnected from the amplifier. Do not work on the amplifier or power supply if you are tired or your mind is preoccupied.**

The filament supply should be set up as follows. **Remove the tubes from the amplifier (if installed).** Place a temporary short across K8A n/c contact. Connect a temporary AC supply to the primary of filament transformer T1 and switch it on. The **Power On** LED and the **Wait** LED should light and the blower should start up. Using a good-quality voltmeter check that the 24 volt control supply is available and is within about ± 100 mV. Monitor the 13.5 volt line at the tube bases and after 30 seconds or so set it to 13.5 volts by means of VR1. About 3 minutes after the filaments are turned on the **Wait** LED will go out and the **Ready** LED will light. If all is okay, switch the amplifier off again, wait about 30 seconds, and switch it on again. This will reset the 3 minute timer and the error detector. Observe that the filament line rises to 13.5 volts in about 25 seconds and K8 does not operate.

Using VR1 adjust the heater volts towards 14 volts. K8 should pull in at about 13.7 volts and remain in. Check that the amplifier is locked out and the 24 volt supply to the HV power unit is not available. Reset the volts to 13.5 and "dab" a short from D3 anode to ground to turn off this thyristor and check that the **Ready** LED is lit. Now adjust the voltage towards 12 volts. K8 should pull in again at about 13.3 volts. Check that the **Ready** LED is out. Reset the volts to 13.5 and again "dab" D3 anode to ground and check that the **Ready** LED is lit. Switch it off, remove the short from K8A, and install the tubes. Set the grid current threshold potentiometer RV1 to its mid-position and switch on. When the amplifier is ready, apply a **very small** amount of drive, and grid current should show on the multimeter. **Because there is no plate voltage at this stage, grid current will rise very rapidly, so be careful!** Adjust the drive to give 100 mA and set RV1 to trip at that value. The trip LED should come on at about 80 mA. Switch it off and remove the temporary AC supply. Replace all covers, ensure that HV circuits are not accessible, and connect a suitable dummy load. Connect the HV power supply to the amplifier, and if you can find the courage, switch it on.

The previously tested start-up sequence should begin, and in about 3 minutes the **Ready** LED should light and the HV meter should show voltage. In about 2 seconds the HV primary inrush-relay K2 should operate to establish full HV. Check that the multimeter reads about 2400 volts in the high-power position and 1800 volts in the low-power position. If all is okay, the PTT line can be grounded. Plate current should be **zero** with the dynamic bias enabled and

HF Equipment

	Regular	SALE
IC-781 Xcvr/ps/tuner/scope • *Special* $6395.00		**5099**

IC-765 Xcvr/ps/keyer/tuner	$2800.00	**2399**

IC-751A 9-band xcvr/.1-30 MHz rx	$1440.00	**1219**
PS-35 Internal power supply	228.00	**209.95**
FL-63A 250 Hz CW filter (Ist IF)	59.00	
FL-52A 500 Hz CW filter (2nd IF)	115.00	
FL-53A 250 Hz CW filter (2nd IF)	115.00	
FL-70 2.8 kHz wide SSB filter	59.00	
IC-735 HF xcvr/SW rcvr/mic	1064.00	**899.95**
PS-55 External power supply	228.00	**209.95**
AT-150 Automatic antenna tuner	446.67	**399.95**
FL-32A 500 Hz CW filter	69.00	
EX-243 Electronic keyer unit	64.50	
UT-30 Tone encoder	18.50	

IC-725 HF xcvr/SW rcvr/mic	$893.00	**759.95**
AH-3 Automatic antenna tuner	488.33	**449.95**
IC-726 10-band xcvr w/6m	1283.00	**1089**

HF Accessories:

	Regular	SALE
IC-2KL HF solid state amp w/ps	$2079.00	**1719**
IC-4KL HF 1 kw amp w/ps • *Special*	7275.00	**5799**
EX-627 Automatic antenna selector	314.67	**279.95**
PS-15 20A external power supply	183.00	**169.95**
PS-30 Systems p/s w/cord, 6 pin plug	363.00	**329.95**
SP-3 External speaker	65.00	
SP-7 Small external speaker	51.99	
CR-64 High stab. ref. xtal; 751A, etc	79.00	
SM-6 Desk microphone	47.93	
SM-8 Desk mic; two cables, scan	89.00	
AT-500 500w 9 band auto ant tuner	589.00	**539.95**
AH-2 8-band tuner w/mount & whip	780.00	**689.95**

Accessories for IC-781/765/765/726/725 • CALL

MasterCard VISA DISCOVER AMERICAN EXPRESS

ICOM

★ Large Stocks
★ Fast Service
★ Top Trades at **AES**®

VHF/UHF Base Transceivers

	Regular	SALE
IC-275A 25w 2m w/ps • *Closeout*	$1299.00	**1129**
IC-275H 100w 2m FM/SSB/CW	1455.00	**1219**
IC-475A 25w 440MHz w/ps • *Closeout*	1399.00	**1199**
IC-475H 100w 440 FM/SSB/CW	1665.00	**1399**
IC-575A 25w 6/10m xcvr/ps	1455.00	**1199**
IC-575H 25w 100w 6/10m xcvr	1564.00	**1329**
IC-1275A 10w 1.2GHz FM/SSB/CW	1923.00	**1619**

VHF/UHF FM Transceivers

	Regular	SALE
IC-229A 25w 2m FM/TTP mic	$392.00	**329.95**
IC-229H 50w 2m FM/TTP mic	425.00	**359.95**
IC-38A 25w 220 MHz FM xcvr	409.00	**349.95**
IC-448A 25w 440 FM/TTP • *Closeout*	599.00	**379.95**
IC-449A 35w 440FM xcvr/TTP	473.00	**399.95**
IC-1201 10w 1.2GHz FM/SSB/CW	831.00	**719.95**

Dual band FM Transceivers

	Regular	SALE
IC-2410A 25w 2m/440 FM/TTP mic	$889.00	**749.95**
IC-2410H 45w 2m/35w 440 FM/TTP mic	932.00	**789.95**
IC-3220A 25w 2m/440 FM/TTP mic	685.00	**579.95**
IC-3220H 45w 2m/ 35w 440 FM/TTP mic	727.00	**609.95**
IC-2500A 35w 440/10w 1.2GHz FM	1039.00	**869.95**

Multi-band FM Transceiver

	Regular	SALE
IC-901 50w 2m/35w 440MHz FM xcvr	$1039.00	**869.95**
UX-R91A Broad band receiver unit	405.00	**359.95**
UX-19A 10w 10m unit	311.00	**279.95**
UX-59A 10w 6m unit.	363.00	**329.95**
UX-S92A 2m SSB/CW module.	623.00	**549.95**
UX-39A 25w 220MHz unit	363.00	**329.95**
UX-129A 10w 1.2GHz unit	571.00	**509.95**
UX-49A 440MHz module for IC-900	363.00	**319.95**
IC-970A 25w 2m/430MHz xcvr/ps	2409.00	**2029**
IC-970H 45w 2m/430 MHz transceiver	2567.00	**2159**
UX-R96 50-905 MHz receive unit	405.00	**349.95**
UX-97 1.2GHz band unit	1039.00	**869.95**

VHF/UHF Mobile Antenna

	Regular	SALE
AH-32 2m/440 Dual Band mobile ant	$39.00	
Larsen PO-K Roof mount	23.00	
Larsen PO-MM Magnetic mount	28.75	

VHF/UHF Repeaters

	Regular	SALE
RP-1520 2m 25w repeater	$2319.00	**1949**
RP-2210 220MHz 25w repeater	1715.00	**1449**
RP-4020 440MHz 25w repeater.	2392.00	**2009**
RP-4020/50W 440MHz 50w repeater.	2599.00	**2189**
RP-1220 1.2GHz 10w repeater	2703.00	**2269**

Handhelds

	Regular	SALE
IC-2AT 1.5w 2m HT/TTP	$247.00	**209.95**
IC-02AT/High Power 2m	333.00	**289.95**
IC-03AT 2.5w 220 HT/TTP	319.00	**269.95**
IC-2SA 2m HT	345.00	**289.95**
IC-2SAT 2m/TTP	372.00	**319.95**
IC-2SRA 2m/25-905MHz rx	600.00	**509.95**
IC-24AT 2m/440MHz/TTP	492.00	**419.95**
IC-3SAT 220MHz HT/TTP	351.00	**299.95**
IC-4SAT 440MHz HT/TTP	351.00	**299.95**
IC-4SRA 440MHz/25-905 rx	600.00	**509.95**
IC-2GAT 2m HT/TTP	372.00	**319.95**
IC-4GAT 440MHz/TTP	372.00	**319.95**
IC-12GAT 1.2GHz/TTP	381.00	**329.95**
IC-W2A 2m/440 HT	627.00	**529.95**

Aircraft band handhelds

	Regular	SALE
A-2 5W PEP synth aircraft HT	525.00	**479.95**
A-20 aircraft HT w/VOR • *Closeout*	625.00	**499.95**
A-21 Navicom Plus Aircraft HT	660.00	**599.95**

For info/prices on HT accessories • CALL

Shortwave Receivers

	Regular	SALE
R-1 100kHz-1.3GHz AM/FM handheld	$624.00	**539.95**
R-71A 100kHz-30MHz rcvr	1019.00	**869.95**
RC-11 Infrared remote controller	70.99	
FL-32A 500 Hz CW filter	69.00	
FL-63A 250 Hz CW filter (Ist IF)	59.00	
FL-44A SSB filter (2nd IF)	178.00	**169.95**
EX-257 FM unit	49.00	
EX-310 Voice synthesizer	59.00	
CR-64 High stablity oscillator xtal	79.00	
R-72 30kHz-30MHz SW receiver	972.00	**829.95**

Accessories for R-1/R-72/R-100/R-9000 CALL

R-100 100kHz-1.856GHz AM/FM, 12vdc	707.00	**599.95**
R-7000 25MHz-2GHz receiver	1221.00	**1029**
RC-12 Infrared remote controller	70.99	
EX-310 Voice synthesizer	59.00	
TV-R7000 ATV unit	139.00	**134.95**
SP-3 External speaker	65.00	
CK-70 (EX-299) 12V DC option	12.99	
MB-12 Mobile mount	25.99	
R-9000 100kHz-2GHz all mode rec	$5677.00	**4699**

All Prices are subject to change without notice.

AES® Over 35 Years in Amateur Radio
HOURS • Mon-Fri 9-5:30; Sat 9-3

Orders/Trades • Call Toll Free

Order Toll Free: 1-800-558-0411 ***FAX: (414) 358-3337***

AMATEUR ELECTRONIC SUPPLY® Inc.

5710 W. Good Hope Road; Milwaukee, WI 53223 • Phone (414) 358-0333

AES® BRANCH STORES

WICKLIFFE, Ohio 44092
28940 Euclid Avenue
Phone (216) 585-7388
1-800-321-3594

ORLANDO, Fla. 32803
621 Commonwealth Ave.
Phone (407) 894-3238
1-800-327-1917

CLEARWATER, Fla. 34625
1898 Drew Street
Phone (813) 461-4267
No Toll Free Line

LAS VEGAS, Nev. 89106
1072 N. Rancho Drive
Phone (702) 647-3114
1-800-634-6227

Associate Store
CHICAGO, Illinois 60630
ERICKSON COMMUNICATIONS
5456 N. Milwaukee Avenue
Phone (312) 631-5181
1-800-621-5802

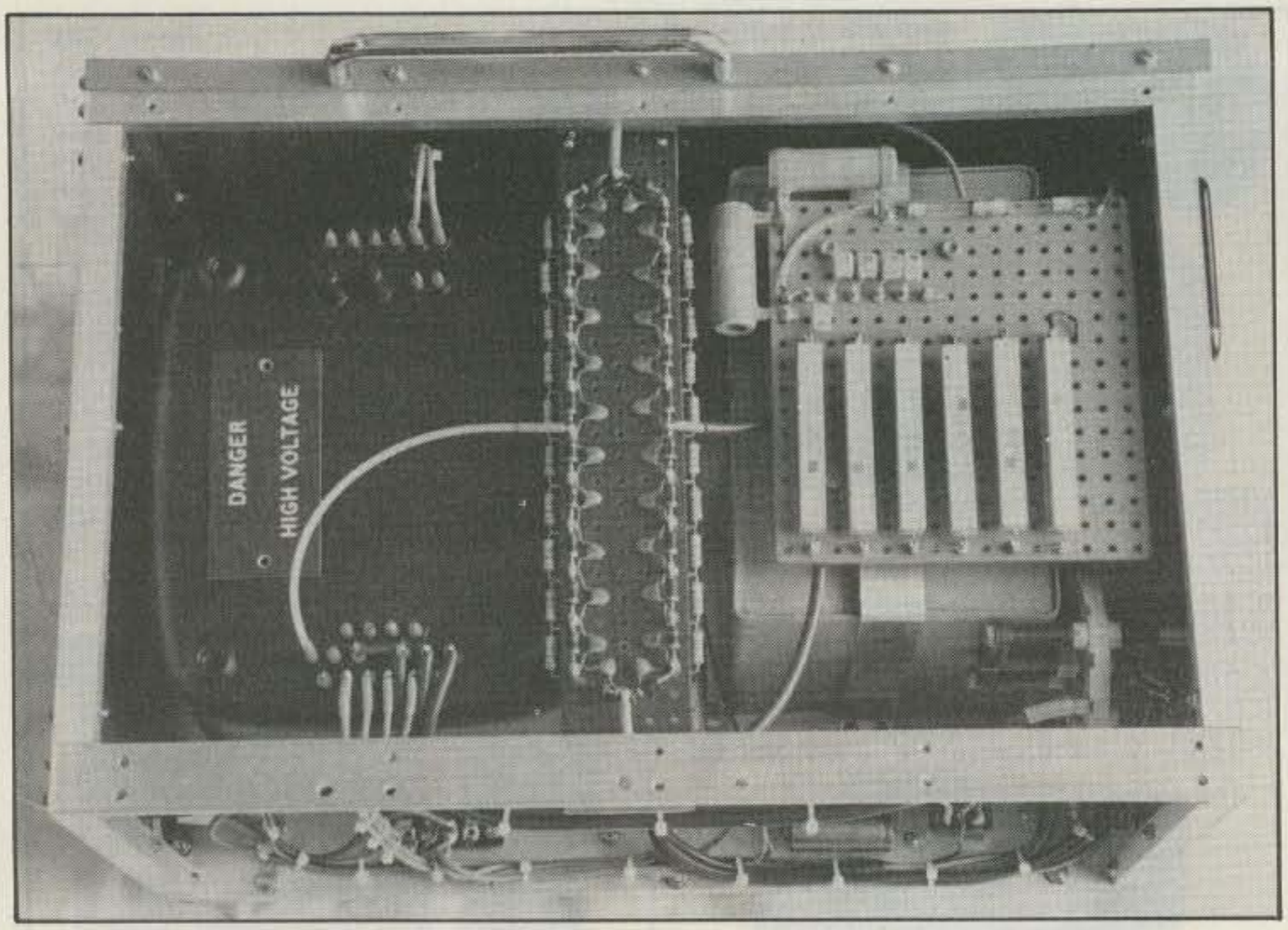


Fig. 12– Underside view of the high-voltage power supply. The HV rectifier assembly is mounted in front of the HV transformer and above and behind the filter capacitors. The perfboard mounted on top of the capacitors holds the HV bleeder resistors, the HV meter multiplier resistors, and the two series-connected HV fuses. The two power resistors mounted at right angles to each other on the perfboard corner make up the arc suppression resistor R3 (actually two 50 ohm, 25 watt units in parallel).

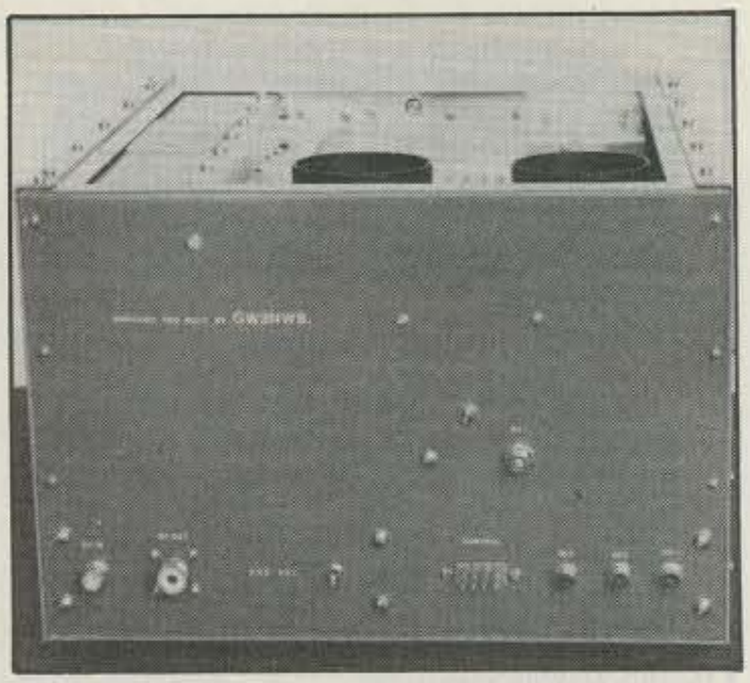


Fig. 13– The rear view of the HV power supply shows a simple layout utilizing commonly available connectors. As can be seen in the initial photo for this article, there are two handles mounted on top of the completed power supply cabinet. This unit is quite heavy, and the handles make it simpler to move it about.

just visible (about 30 mA) with it switched out. *There should be no grid current.*

Fig. 5 shows the RF wattmeter and peak hold circuit. The RF wattmeter is calibrated by comparing it with a known accurate instrument and running the amplifier into a dummy load (*a big dummy load*). Forward power is set by VR1, reflected power by VR2, and peak power by VR3. The cathode input circuits are adjusted by inserting an SWR bridge into the coax line between the exciter and amplifier and tuning the input coils for minimum reflected power at the center of each band. Values and dimensions are given in Table I. To optimize these adjustments, the amplifier should be operating at full power. Access to these coils is through small coincident holes in the amplifier bottom plate.

Amplifier Tune Up

With the amplifier in the **Ready** state, the high-power position connected to a high-power 50 ohm dummy load, apply a small amount of drive, resonate the plate circuit, and adjust for maximum output. Now increase drive gradually while maintaining plate circuit resonance and aim for a plate current of 1.2 amps at resonance. With proper loading this should yield 1500 watts output comfortably at a grid current of approximately 65 mA. In the low-power position adjust the drive for about 600 mA of plate current (to maintain the same plate impedance as when in the high-power position) while keeping the plate circuit resonant. This will produce about 650 watt output at about 80 mA grid current. ALC action should be adjusted in the high-power position to the point where output just begins to fall, and then turned back slightly.

If you have a monitor scope then you can visibly confirm that the ALC setting is okay when properly set up, tuned, and driven. All harmonic and spurious power has been measured to be at least 46 dB below peak power output.

Conclusion

The amplifier has been in regular use for nine months and has performed well. I wonder what I'll get next Christmas . . .

Ameritron gives you . . .

a full kilowatt OUTPUT from a quiet desktop linear . . . for $1095

Ameritron gives you a ***full*** kilowatt ***output*** (nearly the ***input*** of some linears) of peak envelope power for only $1095 -- from a whisper quiet linear that's perfect for your operating desk because it measures just 8¼" H x 14" D x 14¼" W. You also get 850 watts output CW and 500 watts RTTY.

The AL-80A covers 160-15 meters (10 meters with license), including MARS and WARC. You could spend over *twice* the money for a legal limit amplifier *twice* the size -- and all you'll get is an additional 1/3 S-unit -- a difference you won't ever notice.

Ameritron AL-80A **$1095** Suggested Retail

Tuned Input lets your rig deliver full output

The Ameritron AL-80A uses a direct switched, 100% shielded pi-network tuned input circuit so even the fussiest solid state transmitter works flawlessly with it.

Pi-L Output Network

A carefully designed Pi-L output network using the optimum Q for each band gives you exceptionally smooth tuning, extremely wide range load impedance matching and full band coverage. Ball bearing vernier reduction drives on both the plate and load control make tuning precise and easy.

Eimac 3-500Z in shielded RF tank gives you nearly 70% efficiency

You get the Eimac® 3-500Z transmitting tube with an estimated life of 20,000 hours ICAS. The AL-80A is built on a rugged steel chassis. It has a separate RF compartment that's fully shielded to keep RF from leaking out. This keeps RFI and TVI to a minimum.

A superb RF design and layout, a Hi-Q tank circuit and commercially rated power components gives you nearly 70% plate efficiency over the entire operating range. This puts the power into your antenna instead of heating up your amplifier.

A whisper quiet internal fan draws in cool air over the power supply components and the Eimac® 3-500Z tube to remove heat for longer tube life.

Built-in adjustable ALC circuit makes sure your exciter never overdrives your AL-80A. The result is a clean signal without flat-topping.

Gutsy Heavy-Duty Power Supply

The guts of the AL-80A is its heavy ***heavy*** duty power supply. A 22 pound transformer using a high silicone steel core, computer grade capacitors, heavy duty bleeders and ten 3 amp, 1000 V power rectifiers give you a stiff 2700 volts fully loaded. Some amplifiers using **two** 3-500Zs use a light power supply so they can't give much more power output than the AL-80A.

Step-Start Inrush Protection™

The AL-80A special Step-Start Inrush Protection stops damaging inrush current with a start up sequence that's easy on your tube and power supply components.

Multi-Voltage Primary

Too high line voltage stresses components and causes them to wear out. Too low line voltage causes a "soft-tube" effect -- low output and signal distortion.

The Multi-Voltage Primary in the AL-80A lets you compensate for too high or too low line voltage so you get the longest component life and peak operating efficiency — regardless of line voltage.

Dual Illuminated Meters

Grid current of the 3-500Z is monitored continuously by one meter. Grid current gives the best indication of overall performance.

Multi-meter measures plate voltage, plate current, peak RF output power and drive power/ALC detector voltage.

Call your dealer for your best price today!

Bust through QRM with a full kilowatt -- right out of the box. Call your dealer for your best price and order today. Two year limited warranty.

600 WATTS OUT . . . $649

A tough low cost linear with REAL transmitting tubes!

Ameritron's new AL-811 linear amplifier gives you plenty of power to bust thru QRM. You get a quiet desktop linear that's so compact it'll slide right into your operating position -- you'll hardly know it's there . . . until QRM sets in. And you can conveniently plug it into your nearest 120 VAC outlet.

NEW

AL-811 **$649** Suggested Retail

You get three tough 811A transmitting tubes. Plus you get extra heavy duty power supply, all HF band coverage, pressurized ventilation, tuned input, dual illuminated meters, adjustable ALC, operate/standby switch, transmit LED, UPS shippable and much more . . . for an incredible $649. Call your dealer for yours today!

AMERITRON offers the best selection of legal limit linears!

These 3 rugged linears all use a super heavy duty hipersil® power supply capable of 2500 watts!

Ameritron's most powerful amplifier

AL-1500 **$2625** Suggested Retail

Ameritron super power amplifier uses the herculean 8877 ceramic tube.

It's so powerful that 65 watts drive gives you full legal output —— and it's just loafing because the power supply is capable of 2500 watts PEP.

Ameritron's Dual 3-500Z linear

AL-82 **$1995** Suggested Retail

This linear gives you full legal output using a pair of Eimac® 3-500Zs. Some competing linears using dual 3-500Zs don't give you 1500 watts because their lightweight power supplies can't use the tubes to their full potential.

Ameritron 's 3CX1200A7 linear

AL-1200 **$2045** Suggested Retail

Get ham radio's toughest tube with the Ameritron AL-1200 -- the Eimac® 3CX1200A7. It has a 50 watt control grid dissipation -- 12 times tougher than the 4 watt rating of the 3CX800A7 -- yet you get the same full legal output as you get from a pair of 3CX800A7s.

AMERITRON brings you the finest high power accessories!

Legal limit antenna tuner

ATR-15 **$399** Suggested Retail

Ameritron — the high power specialist — brings you the ATR-15 antenna tuner that's designed for legal limit amplifiers. Heavy duty silver plated bandswitch virtually eliminates switch failure. High power transmitting capacitors. 1.8-30 MHz. Peak reading SWR/wattmeter. 6 position antenna switch. Selectable 1:1 or 4:1 balun. 5¼ x 13¼ x 13½ inches. Meter lamps uses 12 VDC.

The Eimac® 3-500Z Tube

Ameritron uses genuine Eimac® 3-500Z tubes -- not the cheaper 3-500Zs imported by some competitors. We're proud to say "Quality Made in USA!"

Remote Coax Switches

RCS-8V **$149** Suggested Retail

RCS-8V, DC-UHF 5 KW Coax Switch. Replace 5 coax feedlines with one with this Ameritron Coax switch. Weatherproof box mounts outdoors on your tower or mast. Attractive control unit sits on your operating desk. Low SWR to 450 MHz. Low loss. Rated at 5 KW to 30 MHz, 1 KW at 150 MHz.

RCS-4, $134.50. 4 position HF switch. Similar to RCS-8V. Requires no control cable Handles 2500 watts PEP.

RCS-4 **$134.50** Suggested Retail

Legal Limit Dummy Load

Oil cooled so you can run the maximum legal limit of 1500 watts for 5 minutes. High quality industrial grade transformer oil included (no PCB). 50 ohms. SWR under 1.2:1 to 30 MHz. Low SWR to 400 MHz. 7½" H x 6-5/8" Diameter.

ADL-1500 **$59.95** Suggested Retail

AMERITRON®

. . . the high power specialist

921 Louisville Rd. • Starkville, MS 39759

Phone: (601) 323-8211 • **FAX:** (601) 323-6551

Call for a catalog or your nearest dealer!

Made in U.S.A.

CIRCLE 96 ON READER SERVICE CARD

CQ REVIEWS:

The Drake R8 Communications Receiver

BY JOHN J. SCHULTZ*, W4FA

Mention the name "Drake" at a gathering of old-time radio amateurs and watch all the ears pop up. Drake gear had a deservedly excellent reputation, and anyone who is very active on the bands these days has surely worked stations still using a set of Drake "twins" or a Drake transceiver. The R.L. Drake Company went out of the amateur radio equipment business in 1979. However, rumors that the company would once again produce amateur radio equipment constantly surface.

That rumor was sort of fulfilled when Drake introduced their R8 communications receiver. Perhaps the introduction of the R8 is the prelude to Drake more fully coming back into the amateur radio equipment market. However, in the meantime, the R8 receiver is a very interesting piece of equipment to examine. The R8 should be viewed, however, as exactly what it is—a sophisticated, state-of-the-art, HF communications receiver that amateurs might enjoy using for shortwave monitoring or as the second receiver in a more complex station setup. Anyway, we'll take a detailed look at the R8, both outside and inside.

The R8 looks a bit "austere," but it is a fine receiver.

Specifications

Table I shows the specifications for the R8. Note that the specifications are a lot more specific and detailed than that supplied for many, if not most, general-purpose HF receivers. Specification readers might particularly like to focus in on the selectivity figures (all of the filters are standard), dynamic range, third-order intercept point, and interesting IF frequencies of 45 MHz and 50 kHz. I don't recall such a low frequency being used for a second IF for many years. It also seems to go against the old rule-of-thumb that a second IF frequency should be no less than 5% of the first IF frequency. The only major thing the specification table omits is that thee are 100 programmable memories in the R8!

The dimensions of the R8 also deserve note. It is not a miniature receiver that can be put in a small suitcase. It definitely is intended for base-station use, although it can be powered from an external 12 VDC source for portable operation.

*302 Glasgow Lane, Greenville, NC 27858

Looking at the R8

The advertising photographs for the R8 make it appear rather "austere." And indeed, when you unpack it from its shipping container, it does sort of look austere with its black case and front panel, the latter contrasted by white control lettering and some gray and orange control keys.

However, when you start taking off the top and bottom covers and look at the PC boards inside, there is nothing austere looking. The large PC boards are very neatly arranged and constructed with a very generous use of internal shielding. The overall construction appears to be very sturdy and service-friendly.

Front-Panel Displays And Controls

The photo shows the front-panel displays and controls. The display field looks "busy" because every possible indicator is illuminated. In reality, only certain data is displayed, and the frequency display stands out quite clearly by itself.

Scanning below and to the left of the display for frequency readout (which also doubles as a dual-zone time display and timer), you can see indicators which pretty much summarize all the features in the receiver. There are dual noise blankers, a timer function, notch filter on/off, five selectable bandwidths, five selectable modes, VFO A/B selection, antenna selection, RF preamplifier/attenuator in/out, AGC selection, memory channel number (upper right), and six numeric indicators for scanning modes. The only indicator outside the main field is an LED above the **Synchro** control to indicate that the use of a synchronous detector is active on AM. All of the analog controls should be clear from their labeling.

Rear Panel

The rear view shows the rear-panel connections. They are a bit more extensive than you might expect and include an SO-239 input connector for an optional VHF converter, regular antenna input plus push-type wire insert connectors for low- or high-impedance antennas, external

IC-W2A

IC-24AT

ICOM

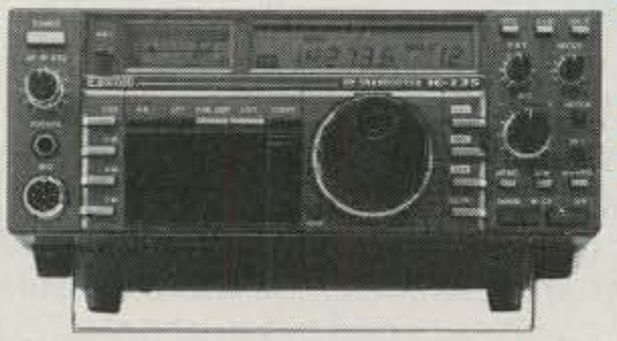
IC-2410

IC-3220H

IC-229H

IC-765

IC-781



IC-735

Oklahoma Comm Center

IC-2SAT

IC-2GAT

HUSTLER rfconcepts PC Electronics STANDARD

YAESU TEN-TEC ALINCO Larsen Antennas Ameco

Outbacker Antennas cushcraft CORPORATION W5YI MFJ DIAMOND ANTENNA

AEA Nye-Viking Kantronics M² ENTERPRISES

Ramsey Kits TELEX hy-gain Bug Catcher COMET ARRL

SPECIAL SPECIAL

CALL

For This Month's Special-Buy
Some Quantities Are Limited

CALL TOLL FREE 1-800-70K-HAMS
1-800-765-4267

Oklahoma Comm Center

FREE SHIPPING UPS SURFACE (except towers/antennas)

9500 Cedar Lake Ave., Suite 100
Oklahoma City, Oklahoma 73114
Local & Info (405) 478-2866 FAX (405) 478-4202

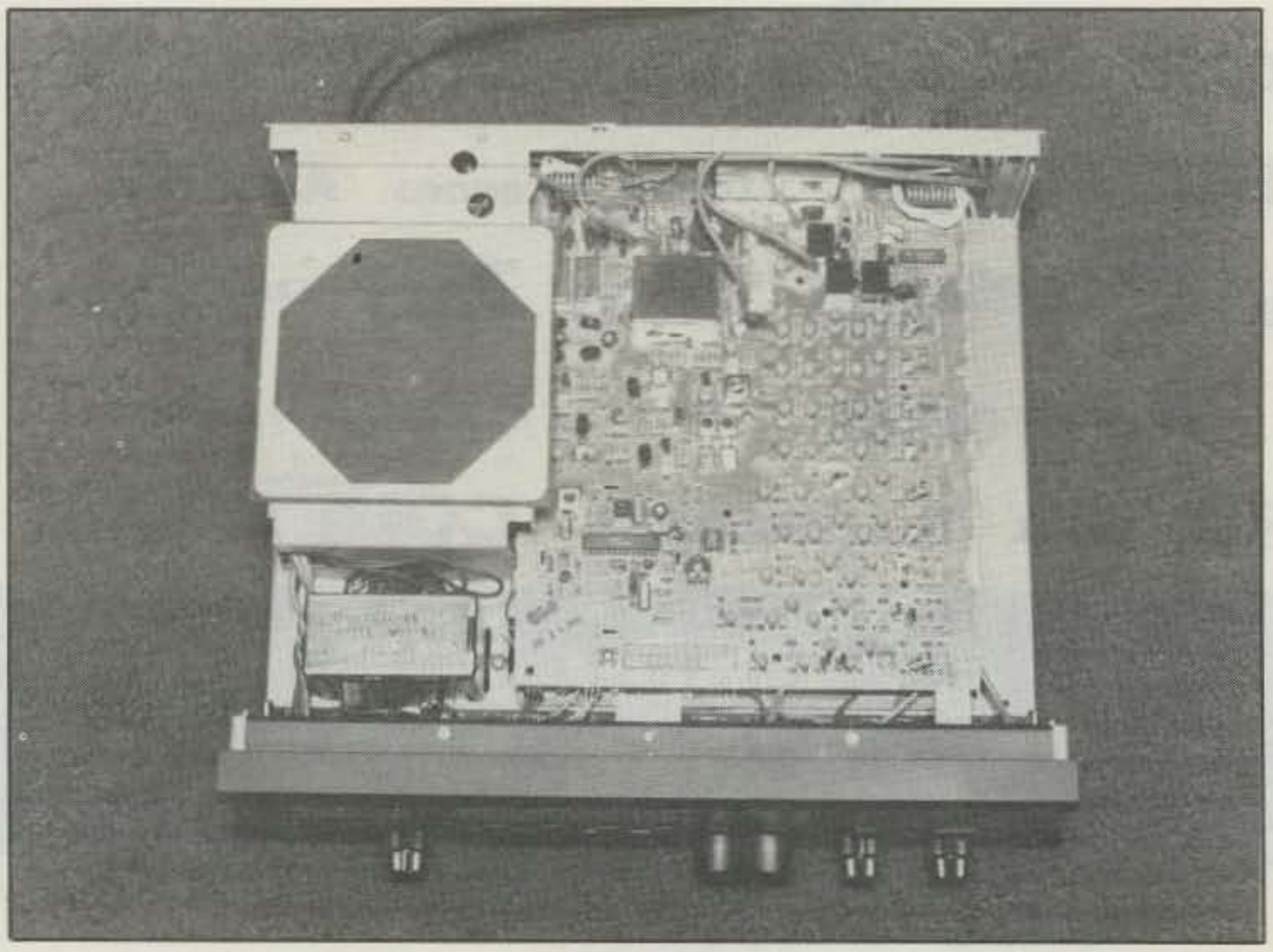
VISA C.O.D.

Hours of Operation
M-F 10-6
Sat 10-3

Oklahoma owned and operated. Not affiliated with any other store.

Frequency Range	0.1-30 MHz
Modes	AM, LSB, USB, CW, RTTY, FM
Sensitivity: SSB, CW (10dB S+N/N)	Less than1 µV, 0.1-1.5 MHz Less than 0.5 µV, 1.5-30 MHz Less than 0.25µV, 5.0-30 MHz (preamp on)
Sensitivity: AM (10dB S+N/N) (1000 Hz, 30% mod)	Less than 3.0 µV, 0.1-1.5 MHz Less than 1.5 µV, 1.5-30 MHz Less than 0.8 µV, 1.8-30 MHz (preamp on)
Sensitivity: FM (12 dB SINAD)	Less than 0.5 µV, 1.5-30 MHz
Frequency Stability	Less than±10ppm,-10° to 50° C
Frequency Accuracy	Less than ±100 Hz, -10° to 50° C
Selectivity: AM, LSB, USB, RTTY, CW	6 KHz @ -6 dB, less than 12 KHz @ -60 dB 4 KHz @ -6 dB, less than 8 KHz @ - 60 dB 2.3 KHz @ -6 dB, less than 4.5 KHz @ -60 dB 1.8 KHz @ -6 dB, less than 3.6 KHz @ -60 dB 500 Hz @ -6 dB, less than 1.5 KHz @ -60 dB
FM Only	12 KHz @ -6 dB, less than 25 KHz @ -60 dB
Ultimate Selectivity	Greater than 95 dB
Image Rejection	Greater than 60 dB, 100 KHz to 1.5 MHz Greater than 80 dB, 1.5 MHz to 30 MHz
IF Rejection	Greater than 80 dB, 45 MHz Greater than100 dB, 50 KHz
Dynamic Range	Greater than 90 dB, 1.5-30 MHz @ 20 KHz spacing
IP_3 - Intercept Point	Greater than +5 dBm @ 20 KHz spacing Greater than -20 dBm @ 5 KHz spacing
1st IF	45 MHz
2nd IF	50 KHz
AGC	Threshold: 0.8 µV Attack time: 1mS Release time: SLOW: 2 Sec FAST: 300mSec Less than 4 dB change in audio output for 100 dB input change ref. AGC threshold
Ant 1, Converter	50 ohms unbalanced
Ant 2	50 or 500 ohms unbalanced
Notch Filter Attenuation	AF type, 40 dB min. Depth (500-5000 MHz)
External Speaker Output	2.5 W, 4 ohms @ less than10% distortion
Recorder output	300 mV, 4.7K ohms
Demod output	300 mV, 4.7K ohms
Clock Accuracy	Less than ±2 sec/month
AC Power Requirements	100/120/200/240VAC, ±10% 50 or 60 Hz, 40 Watts nominal
DC Power Requirements	11-16 VDC @ 2 A
Operating Temperature	-10° to +50° Celsius
Weight	13 lbs. (5.9 Kg)
Size	Width 13 1/8" (33.4 cm) Height 5 1/4" (13.4 cm) including feet Depth 13" (33 cm), including front knobs and rear connectors

Table I– Specifications for the R8 receiver.



Taking off the top cover, you can see the large internal speaker and one of the topside PC boards which is very nicely laid out and uncluttered with regard to component placement.

speaker, low-level audio output, timer output for control of a recorder, 9-pin DB-9 for RS-232C interface, etc. There is even a little connector labeled **Mute** which can mute the R8 when it is used with a transmitter.

Operation

Normal operation of the R8 is quite uncomplicated for anyone used to the conventional VFO A/B system. You can tune the VFOs as desired or enter frequencies into them via the keypad, which is very user friendly. To enter a frequency, key it in immediately and directly. Then if you press an additional key, the new frequency immediately appears. If you do not press the additional key, the R8 switches automatically to the new frequency in 2 to 3 seconds! Neat! Mode selection, bandwidth selection, AGC selection, etc., are all completely independent of each other.

Memory operation involves the transfer of data to or from a VFO using the familiar **V to M** and **M to V** keys. Only the VFOs are tunable. Each memory channel can store quite a bit of data: frequency, mode, bandwidth, AGC setting, preamplifier/attenuator in/out, antenna selection, notch filter on/off, noise blanker mode, and synchronous detector on/off. Overall, memory operation is very easy to use after you practice it a few times.

The R8 has three scan "modes" and three scan "methods," as listed in Table II. Any combination of mode and method may be used to form nine scan programs. I won't get into all of the details, but the operator can step through each memory channel manually using the tuning knob as a memory channel switch or can let the R8 automatically go through any one of its quite versatile scan programs.

The R8 has various defaults for the frequency readout, depending on the mode selected—for instance, display resolution down to 10 Hz on SSB and 1 kHz on AM. However, the defaults can be independently *user* altered in any desired manner such that the display resolution can be set down (or up) to 10, 100, or 1000 Hz for *any* mode. The tuning dial incorporates automatic variable speed tuning. Tuning slowly, the tuning knob seems to cover about 2 kHz/revolution on SSB/CW and 15 kHz on AM, which provides for very smooth tuning even using a narrow IF filter position.

Performance

As far as I could determine, the R8 easily performed as specified. It is a quiet receiver and very stable. The IF filtering is very good, and it provides as much tuning and memory flexibility as can be expected while still being reasonably user friendly. All modes seem to have been well bal-

Doug Hall Electronics

Announcing the RBI-1

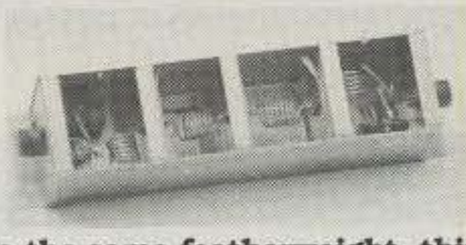
Now you can control any of the 16 Kenwood® TM—XX1 series mobiles with any advanced computer controls, inc. repeater controller.
Simply connects to the Kenwood® through the mike jack. Controls frequency, power, RF power, CTCSS, Shift, etc. Supports up to four radios and four bands. Expands user function output. No computer interface required. Just plug in and play!

For more information call or write:

Doug Hall Electronics
815 East Hudson Street
Columbus, Ohio 43211
Voice: 614/261-8871
Fax: 614/261-8805

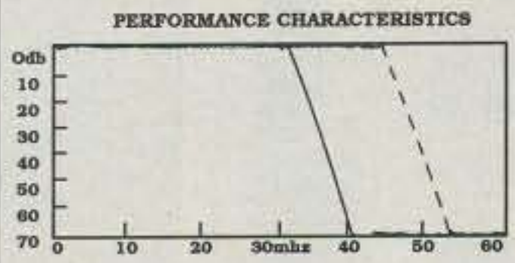
CIRCLE 69 ON READER SERVICE CARD

HEFTY! HEFTY! WIMPY! WIMPY!



If you've become accustomed to the same featherweight, thin-walled, high cutoff low pass transmitting filters sold by many manufacturers to the Amateur Service for decades, then you'll appreciate I.C.E.'s musclebound high performance harmonic choppers for use with rigs up to 6kw from DC to 30mhz.

PERFORMANCE CHARACTERISTICS



SOLID LINE — MODELS 420, 421
DOTTED LINE — AVERAGE OF MOST FILTERS MADE IN THE LAST 30 YEARS

Models 420 (400W PEP) and 421 (6KW PEP) feature the lowest cutoff (-3db at 32mhz.) of any filter ever built for this application, and their sharp attenuation slopes go to work on spurious products immediately above the 10 meter band, reaching a near block before the TV I.F. frequency of 41mhz. Most filters made in the past 30 years that we have sweep tested don't even begin to attenuate before 45mhz, making them nearly useless for some of the most delicate forms of interference caused to consumer services.

Better yet, the brute-tough, robust construction of 420 series units mean long term dependability for serious operators and station owners. Both filters are built in split rectangular chassis, mill-finished 1/8" thick aluminum with 1/4" thick RF containment walls. Feed through fittings are machined from teflon TFE. Capacitor sections sheared from brass plate stock, smoothed & finished, and also Teflon insulated (421). Through coils wound from 1/8" copper tubing.

Both units feature all stainless steel ground fittings and construction hardware, have extended bottom plates for mounting, and are individually boxed with mounting screws, slip-off connector covers, and 4-page manual.

SPECIFICATIONS:

POWER RATINGS:	400W PEP, 200DC (420) 6KW PEP, 3KW DC (421)
IMPEDANCE:	50 OHMS
INSERTION LOSS:	.1db - .4db

MODELS, PRICES:

420(S0239s)	$ 29.95	421 (S0239s)	$ 39.95
420B(BNC)	29.95	421N (N CONNS)	41.95
420R (RCA PIN)	29.95	(1 YEAR WARRANTY ON ALL MODELS)	
420N (N CONNS)	31.95		

1-800-ICE-COMM

INDUSTRIAL COMMUNICATION ENGINEERS, LTD.
RESEARCH · ENGINEERING · DESIGN · FABRICATION · MARKETING

Order Line	1-800-423-2666
Main Office	(317) 545-5412
Customer Service	(317) 547-1398
Fax (24 hours)	(317) 545-9645
Mail	P.O. Box 18495 Indianapolis, Indiana 46218

MADE IN THE U.S., WHERE MOST OF THE WORLD'S FINEST PRODUCTS ARE DESIGNED AND BUILT.

CIRCLE 20 ON READER SERVICE CARD

Learning Morse Code?
Want to increase your code speed quickly and easily, and enjoy doing it?

Who says Morse Code has to be slow, hard and dull?

Thousands of radio enthusiasts have discovered just how easy and fun learning and improving their Morse Code skills can be. ***MorseMan* Plus**, the premier Morse Code trainer for the IBM-PC computer, has helped many radio enthusiasts realize their dream of obtaining an amateur radio license and upgrading. Just look at what your friends, and the experts say:

"A slick commerical program that clearly ranks among the top Morse trainer programs" - Karl Thurber, W8FX, **CQ Magazine**
"slickest program to come along in a long time - I highly recommend it to those who want to learn Morse properly" - Ike Kerschner, N3IK, **Monitoring Times**
"One of the top Morse trainers available", Gordon West, WB6NOA
"Thanks to your Morseman software, I just passed my Extra", KF8DS

If you are just a beginner, then ***MorseMan* Plus** will teach you the code, at your own pace and speed, and is even **Farnsworth selectable**. After you know the code, ***MorseMan* Plus** lets you progress rapidly by allowing you to choose from a variety of training methods that are geared toward helping you gain proficiency in the fastest possible time. You can choose from copying **random characters**, true **random words** (from a 50,000 word database), listening to computer **simulated QSO's** (over 3 trillion different ones possible), **realistic random callsigns** (in pileup fashion) - you can even taking a **simulated FCC/VEC code exam**. You can also **create and send ASCII text files** as well as **practice only the characters** that you desire. ***MorseMan* Plus** will even record everything it generates to a file for later use.

So, if you want to get ahead in your Morse Code training, without the headaches, then get ***MorseMan* Plus.** For only **$24.95** (plus $4.00 s/h, $9.00 overseas) you can have the best training program available. Call **1-800-525-7235** anytime, **24 hours** a day (or **fax 205-757-8664**) to order with Visa or Mastercard, or send Check/MO to the address listed below.

(MorseMan Plus requires an IBM-PC or compatible with at least 512k RAM and DOS 3.0 or later. Please specify disk size when ordering)

***MorseMan* Plus** - accept no substitute!

High quality computer logging at a low-end price
LOG-EQF *Plus*

Now you can have all of the advanced features of the high-priced logging programs, without the big dent in the wallet!

Exclusively from Renaissance, you can have the latest and slickest logging program available for the IBM-PC. LOG-EQF Plus (version 4.0) has the features that you need, without compromise.

*fully menu driven
*look up any previous contacts with any station
*interfaceable with all Kenwood radios
*full mouse support
*prints/tracks QSL labels
*imports logs from CT,NA,Aries and dBase
*contest mode tracks dupes, band multipliers & partial calls
*can be ran from single disk

*displays country, beam heading, CQ/ITU Zone and continent with prefix
*variable date format
*sort and recall on any field
*full TNC support with small monitor window and full screen terminal
*DXCC module for tracking countries worked
*fun to use!!!
*...and much more!

All of this, and more, for only **$39.95** (+$4.00s/h, $9.00 overseas). No where else can you get such a bang for the buck. Try all of the other logging programs, but you'll end up using LOG-EQF Plus! Call **1-800-525-7235 anytime** to order with Visa/MC, or send check/MO to address below.

renaissance software & development
killen plaza - box 640
killen - alabama 35645
(205)757-5928 - fax (205)757-8664

CIRCLE 73 ON READER SERVICE CARD

MODE / METHOD		Scan All Memory Locations MEM 1	Scan All Unlocked Memory Locations of User-Selected Lists LIST 2	Scan From VFO A to VFO B A-B 3
SEEK '4'	Stop at First Carrier detected	(F) (1) (F) (4)	(F) (2) (F) (4)	(F) (3) (F) (4)
TIME '5'	Pause at Detected Carrier 5 Seconds Then Resumes SCAN.	(F) (1) (F) (5)	(F) (2) (F) (5)	(F) (3) (F) (5)
CARRIER '6'	Pause at Detected Carrier until Carrier Drops for 5 Seconds, Then Resumes SCAN.	(F) (1) (F) (6)	(F) (2) (F) (6)	(F) (3) (F) (6)

Table II– Scan "modes" and "methods" which result in scan programs.

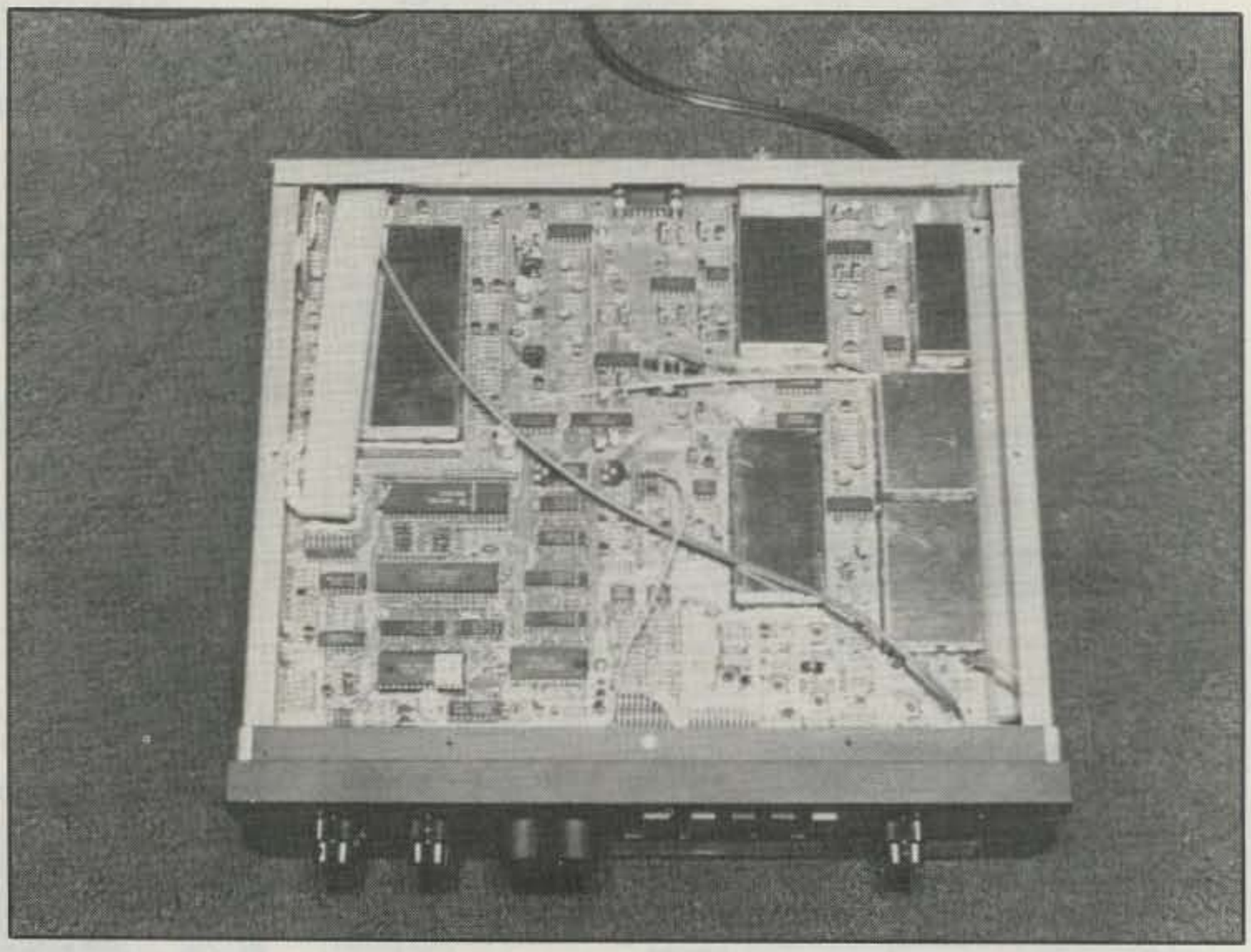
anced in their treatment. The synchronous detector on AM is quite helpful under some fading conditions, as I'm sure SWL buffs already know.

The controls are all easy to manipulate, but the tone control is barely useful and the main tuning knob lacks that smooth, weighted feel it should have. I substituted an old SP-600 tuning knob which weighs about twice as much and is 1½ times the diameter of the original knob. What a difference. Unfortunately, it is not an acceptable fix, because it blocks other controls on the R8.

On some frequency ranges and in the AM or FM mode there is a slight popping noise as the last digits on the frequency display change. I never found it to distract from reception, however.

The main QRM-fighting feature in the R8 is the good IF filter bank, while the AF notch filter and passband offset tuning (IF shift) are supplements. The notch filter is moderately useful but the passband offset tuning is quite good. One might only wonder if it would not have been more handy to have the notch filter and passband offset controls on the same side of the receiver.

Notwithstanding any of the foregoing relatively minor comments, let me hasten to add I spent many hours enjoying the operation of the R8. In fact, it is hard to stop



Taking off the bottom cover reveals another very large PC board with a number of individually shielded sections.

Famous Daiwa Cross Needle SWR & Power Meter. Easy to use, you know forward, reflected power and SWR at a glance. Three power range switch plus average and PEP selection.

Model	Freq.MHz	Power	Conn.	list	Sale
CN101	1.8-150	15/150/1.5kW	SO239	$99.95	$69.95
CN103M	140-525	"	SO239	104.95	79.95
CN103N	140-525	"	N type	109.95	89.95

Cavity Switches have superior port to port isolation, frequency, and high power characteristics.

Model	Ports	Freq.	Power	Conn.	list	Sale
CS201	2	DC-600	1kW	SO239	$24.95	$19.95
CS201GII	2	DC-1300	1kW	N type	46.95	39.95
CS401	4	DC-800	1kW	SO239	109.95	79.95
CS401G	4	DC-1300	1kW	N type	129.95	99.95
CS4	4	DC-1500	.5kW	BNC	44.95	39.95

Finally! A Digital Power & SWR Meter with many Hi-Tech features. Presents digital forward power, SWR and analog bargraph simultaneously. Average or peak (PEP). Tune antenna w/o looking via CW beep tones. 4 Zone Digital Clock.

Model	Freq.MHz	Power	Conn.	list	Sale
DP810	1.8-150	.1-1.5kW	SO239	$269.95	$229.95
DP820	140-525	.01-150W	N type	299.95	249.95
DP830 <	1.8-150	.1-1.5kW	SO239	> 399.95	329.95
	140-525	.01-150W	N type		

Cross Needle meters for mobile and base use. Read forward, reflected and SWR simultaneously at a glance. CN400 Series w/back light.

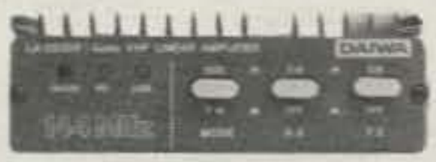
Model	Freq.MHz	Power	Conn.	list	Sale
CN520	1.8-60	.2/2kW	SO239	$87.95	$69.95
CN410M	3.5-150	15/150W	SO239	84.95	69.95
CN460M	140-450	15/150W	SO239	84.95	69.95
CN465M	140-450	15/75W	SO239	84.95	69.95

PS304
1-15V
30 Amp
list $169.95
Sale $139.95

PS140
13.8V
14 Amp
list $99.95
Sale $79.95

PS120
3-15V
12 Amp
list $105.95
Sale $89.95

Compare price and features Daiwa power supplies are hard to beat! Compact, full featured with the latest Hi-Tech circuitry & protection!



State of the art 2 Meter Linear Amplifiers for Mobile or Base use. 13.8V DC operation.

Model	P in	P out	list	Sale
LA2035R	1-15W	35W	$119.95	$99.95
LA2065R	1-14W	65W	169.95	139.95
LA2080H	1-15W	80W	206.95	169.95
LA2055H	1.5 or 25W	150W	449.95	349.95

Minutes from Washington D.C.

Electronic Equipment Bank

Plan a visit on your next trip

$250 OFF Plus* **ICOM 735**

New compact full featured, HF RX .1-30, 13.8V DC 100W
list $1149 **Sale $899**
***$20 OFF Any Above Daiwa Item**

$80 OFF Plus* **IC229H**

Latest compact 45W mobile.
list $449 **Sale $369** ***$20 OFF Daiwa**

Up to $110 OFF Plus*
***$20 OFF Daiwa**

Model	Band	$list	$Sale
IC2SAT	2mt	372	309
IC24AT	2/.7mt	492	409
ICW2A	2/.7mt	629	519
IC2SR	2mt/Rcv.	599	499

EEB

$70 OFF Plus* **YAESU FT2400**

Latest full featured 2mt. mobile, 50W, LCD, 31 Mem., CTCSS call code & more.
list $419 **Sale $349** ***$20 OFF Daiwa**

Up to $79 OFF Plus*
***$20 OFF Daiwa**

Model	Band	$list	$Sale
FT411E	2mt	359	299
FT470	2/.7mt	478	399

$600 OFF Plus* **YAESU FT1000**

The Contester's dream rig. Dual receivers, DDS low phase noise, 200W, opt.DVS-2 $269. list $3399 **Sale $2799**

***$100 OFF Any Daiwa items above w/FT1000 purchase**

323 Mill Street N.E. • Vienna • VA 22180
Orders 1-800-368-3270 Tech-Metro 703-938-3350
FAX 703-938-6911

Prices subject to change • Prices do not include freight
Sorry no COD's • Prices Good Thru 31 March 92'

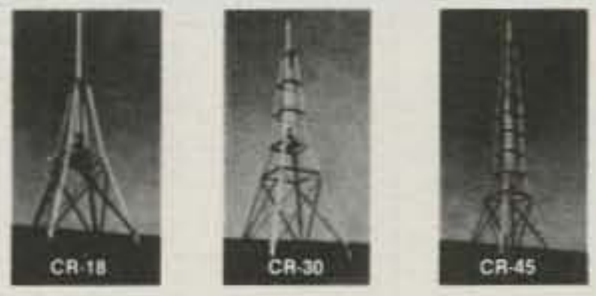
CREATE ROTATOR SALE

New Generation Creative Rotators! Built to last, Solid State Controls! Compare specs and you'll buy CREATE!

Model	Sq.Ft.	Rot.Tq.	Brk.Tq.	Preset	list	Sale
RC5-1	10	43ft.#	506ft.#	No	$329.95	$269
RC5-3	10	43	506	Yes	439.95	379
RC5A-1	25	116	1085	No	519.95	449
RC5A-3	25	116	1085	Yes	609.95	529
RC5B-3	35	160	1450	Yes	919.95	799

CREATE ROOF TOWERS

CREATE High Grade Aluminum Roof Top Towers are great for your antenna requirements. Guying is recommended to insure safety.



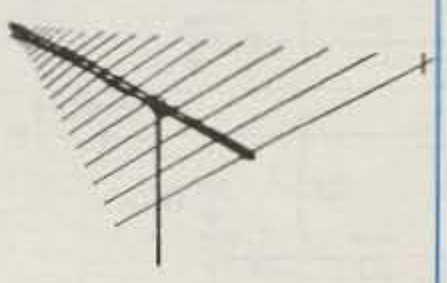
Model	Height	Max. Wind Load Ft.2	Max. Vert. Load lbs.	Weight lbs.	list	Sale
CR18	5'10"	21@90mph	440	18	$169.95	$147.95
CR30	9'10"	27@90mph	1,322	33	289.95	259.95
CR45	14'9"	23@90mph	881	57	491.95	357.95
CK46 Thrust Bearing					44.95	39.95

DATONG AUDIO FILTERS

ust plug into external speaker jack, drives external speaker. ower 10-15VDC.
L3 Hi/Lo Pass, Auto/Manual, Notch/Peak, CW, SSB, RTTY. he Best Audio Filter around plus ANF.
t $309.95 **Sale $279.95**
NF Auto/Manual, Notch Filter. Sweeps audio and notches out terodynes. list $179.95 **Sale $159.95**

CREATE LOG PERIODIC

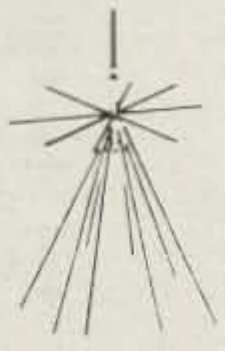
Wide Band Log Periodic Antenna. Forward Gain 10-12 dB, Front to Back 15 dB, Tx 500W, Mounts Horizontal or Vertical Polarization.



Model	Freq.	Boom	Ele.	Long Ele.	list	Sale
CLP5-130-1	50-1300	5'9"	23	9'10"	$279.95	$239.95
CLP5-130-2	108-1300	4'6"	19	4'6"	179.95	149.95

NEVADA WB1300 DISCONE

Ultimate Wide Band Omni-Directional Discone Antenna. 25-1300 MHz, Tx 50 MHz Up, 200W, Type N connector, for low SWR.



WB1300 Less Cable ..... **Sale $89.95**
WB1300C w/50 Ft. RG-8X Cable N-N ..... **Sale $99.95**

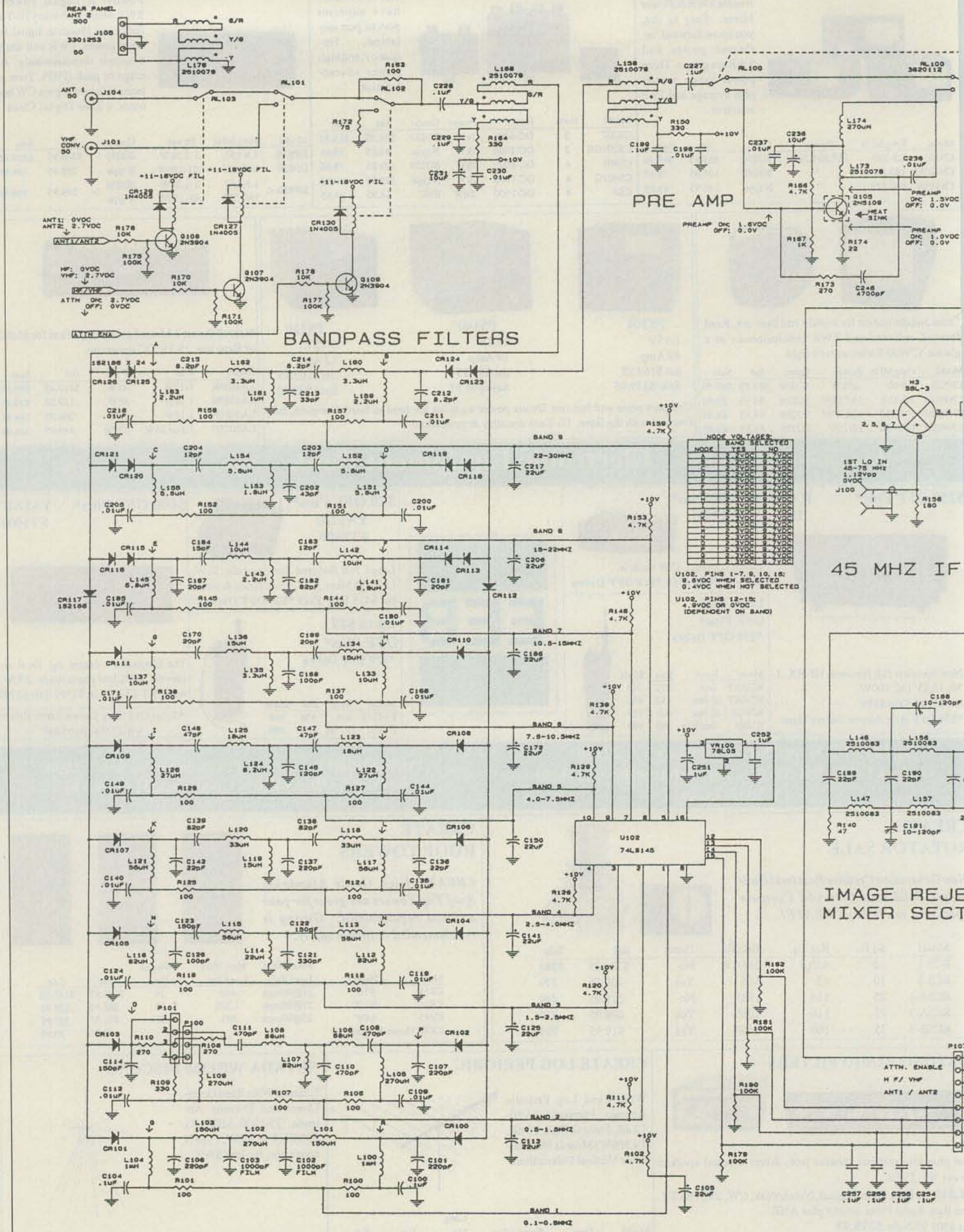
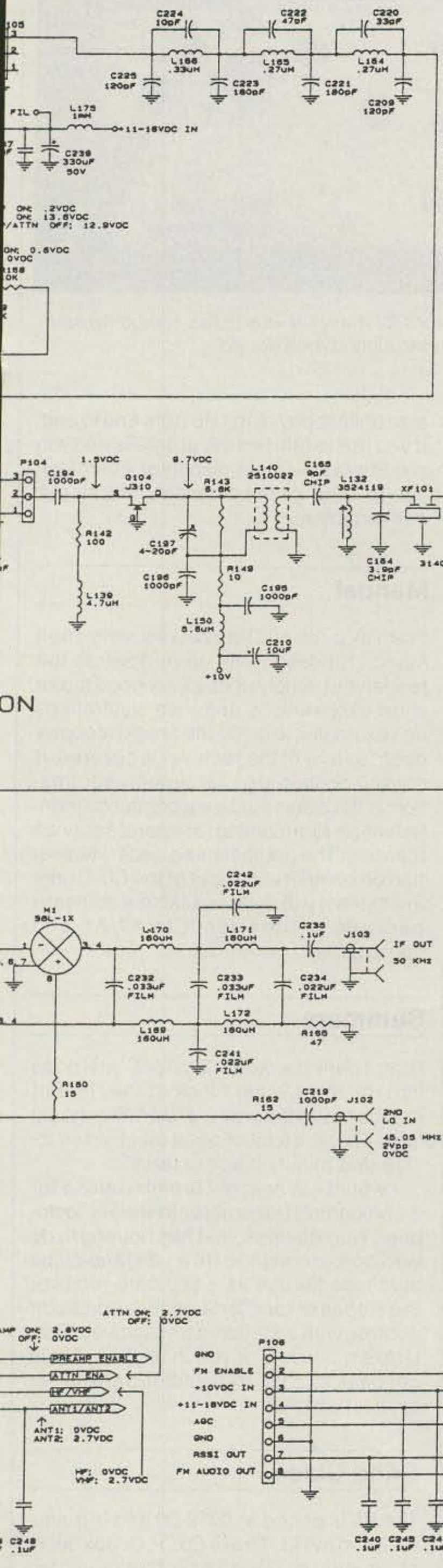


Fig. 1–A bit of the "front-end" circuitry. (Reproduction by permission R.L. Drake Co.)

NOTES:

MODE VOLTAGES MEASURED WITH RF GAIN TURNED FULL CW, AND NO INPUT SIGNAL.



FM DETECTOR

HIGHEST DESIGNATORS	
CAPS	C257
DIODES	CR130
INDUCTORS	L176
RESISTORS	R183
TRANSISTORS	Q110

FRONT END BOARD
D-8211

using the receiver because of all the tuning versatility it provides.

Circuitry

How did Drake achieve the desired performance level for the R8, include all the IF filters as standard, and still keep the price competitive? At least part of the answer is due to the use of the 45 MHz/50 kHz IF scheme I mused about at the start of this article.

Fig. 1 presents part of the "front end" circuitry of the R8. The most fascinating stage in my mind is the one labeled **Image Reject Mixer Section** where the 45 MHz first IF is converted directly down to the 50 kHz second IF. A very neat bit of engineering is involved here. The 45 MHz IF signal coming into the mixer, after going through a four-pole monolithic crystal filter and a buffer stage, is split into two phased signal paths going into diode mixer rings M1 and M2. The output signals are then filtered and combined such that almost all of the image frequency energy is lost in a 47 ohm terminating resistor.

Why does it work and why resort to such a scheme? Textbooks will provide the first answer. Mixer-stage technology has advanced by leaps and bounds driven on greatly by the economics involved in developing satellite equipment, although at the end of the day an engineer still has to put together something that works. By getting down to a low second IF frequency immediately, the R8 can utilize LC filters at the second IF rather than much more expensive crystal filters as would be necessary if the second IF were in the HF range. That answers the second part of the question. And that's why all the filters are standard in the R8. There is an added bonus in that the LC filters are extremely stable and rugged. The diagram for the actual filters gets to be a bit complicated, so I'll not present it here. However, the inductors in the filters operate with circuit Q's of up to 300, which is the reason, or at least part of the reason, why the shape factor of the filters is so good.

Going back to fig. 3, you can see from the antenna input side that there are nine input bandpass filters plus a variety of broadband impedance matching transformers. The RF "Pre Amp" stage uses a 2N5109, chosen because of its high intercept point. Drake says it is basically the same amplifier as was used in the R7.

Unfortunately, the foregoing is only a *bit* of the interesting information I gleaned from Steve Whitefield, WA3OJX, designer of the R8. Steve can cover the whole design philosophy of the R8 from end to end. If you like to talk technical details and you see Steve at a Drake display at a hamfest, you're in for a very pleasant, informative conversation.

The rear panel contains a variety of connectors for external interfaces, including computer control, but it is generously dimensioned.

Manual

The R8's manual deserves very high marks. It doesn't talk up or down to the reader, but simply uses a very good mix of short explanations and then illustrations and examples to guide the reader along as each feature of the receiver is covered. It doesn't contain any real circuitry information, but I understand a supplemental manual will be forthcoming (a separate service manual). The manual has a separate section on computer control of the R8. Drake indicates it will have available a software package written for IBM XT/AT and compatibles.

Summary

I can't deny the word "austere" still pops into my mind when I look at the R8. But maybe that's the way a good radio should look. There is a lot of good electronics inside that mostly black exterior.

I would not hold my breath waiting for a companion transmitter to the R8 to appear. Nonetheless, that has nothing to do with considering the R8 as a stand-alone purchase for use as a separate receiver in a station or for interfacing, via computer control, with a station's transceiver. Give Drake a "budge" if you think they should get back into HF transmitter/transceiver production.

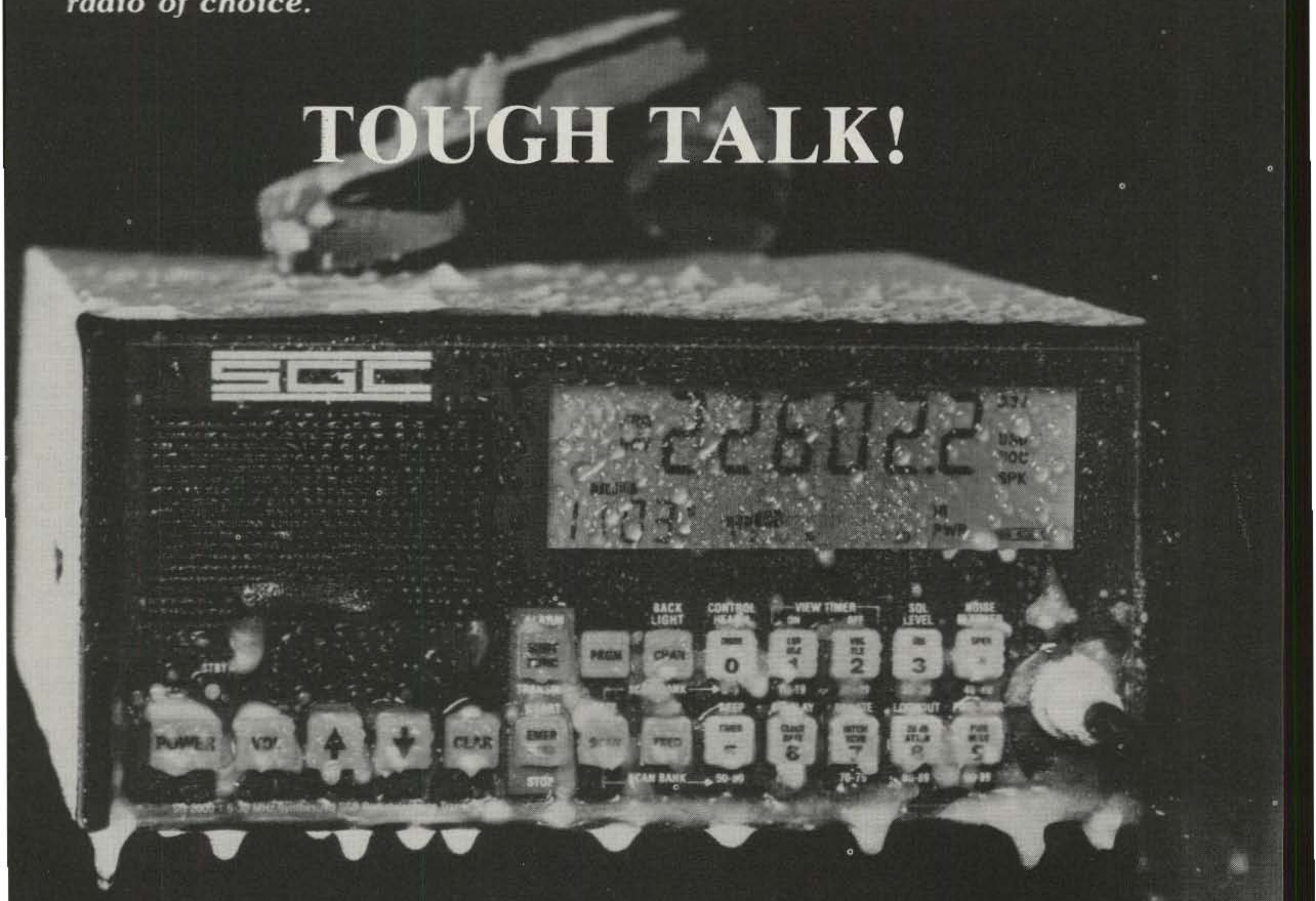
Price Class

The R8 is priced at $979.00 and is manufactured by R.L. Drake Co., P.O. Box 3006, Miamisburg, OH 45342. Drake invites readers with questions about the R8 to call toll-free at 1-800-9 DRAKE 4. CQ

MODEL SG-2000 HF SSB RADIOTELEPHONE
GLOBAL COMMUNICATIONS FOR DATA AND VOICE

You're in contact anywhere, anytime with the power packed SG-2000 HF SSB transceiver. Engineered for simple operation, the SG-2000 features an alarm generator, 644 factory programmed ITU voice and data channels, 100 user programmable channels and 100 memory channel scanning. Receive and transmit strong clear voice signals. Manage data communications easily on RTTY, ARQ, PACKET and telegraphy. Utilize up to 8 front panels as full function remote stations. A user-friendly American product, sophisticated housing and the SGC technical superiority and quality workmanship make the SG-2000 your radio of choice.

TOUGH TALK!



GC Building, 13737 S.E. 26th St. P.O. Box 3526, Bellevue, WA 98005 USA. Telex: 328834. Fax: 206-746-6384. Tel: (206) 746-6310

SGC

WO9I comes up with a pretty good list of helpful suggestions for the fledgling DXer and aspiring award chaser.

25 DXing Tips For The Little Guy

BY BRIAN D. SMITH*, WO9I

Are you a little guy? No, not a QRPer. A little guy, one of the legions who venture into the ether like armorless knights in search of DX dragons. Restricted by tight budgets and/or logistical problems (apartment living and the like), we run into pile-ups barefoot, brandishing our flimsy wire antennas—and more often than not, emerge bruised, battered, and empty-handed.

Nay, dragon slaying seems to be the exclusive domain of our stouter rivals, who can spew kilowatts from their lofty, rotatable towers and crush our puny signals like so many ants beneath their boot heels. For us little guys, the DX Century Club certificate is aptly named because it seemingly takes about a century to earn.

It doesn't have to, however. I'm a lifelong little guy: I've never used anything better than aged tube rigs and wire antennas, and I've never operated from anywhere except Indiana (located in what DXers call "The Black Hole"). Yet I have one of those little DXCC sheepskins in my shack too, and honest to Hiram, I nabbed it in far less than 100 years. Does that make me a DXpert? Hardly. The *Callbook* bulges with ops who've forgotten more about DX than I'll ever know—but that's not the point.

The bottom line is that if I can make DXCC, practically any of you can do likewise. I'll address the rest of my comments to fellow little guys (and inexperienced DXers who always wanted to work the world). You big guys, go play in the pile-ups.

Here are 25 DXing tips designed for small-fry DXers. Happy dragon hunting!

1. Sharpen your sword. Never embark on a DX quest without first tuning up your rig. Sometimes you get exactly one shot at a rare station before the rest of the world catches up with you.

2. Read the signs. Before starting the hunt, check band conditions to see if it's worth the effort. WWV (at 5, 10, 15, and 20 MHz) gives propagation info at 18 minutes past every hour. Also, 10 meter beacons around the world operate between 28.200 and 28.300 MHz; listen and learn what part of the world is coming in. Finally, tune around and check the IDs in ongoing QSOs. They'll tell you whether someone in your region is working Soviet Georgia or Atlanta, Georgia.

3. Never send "CQ DX." Rare DX stations seldom answer such calls, especially when transmitted by weak signals. Unless you need a QSL from England or Germany, don't bother.

4. Take the 'tests. If I could operate only a few days a year, I'd pick the weekends of the major international contests such as the CQ World-Wide, the ARRL DX Contest, CQ WPX, and so forth. Ignore your score; the idea is to bag scarce DX, and these events are a little guy's Disneyland—bands crawling with rare stations, short QSOs, and best of all, wide dispersement of the heavy hitters, who are usually mounting their own contest efforts. Don't neglect the lesser-known contests. For example, the Soviet Union's CQM brings out many of that nation's seldom-heard sections (UH, UI, UM, etc.).

5. Don't touch that dial. When a contest ends, call it quits, right? Wrong! Rare stations—particularly DXpeditions—sometimes hang around to see if anyone else wants to work them. The big guns are usually in their holsters by then, which is exactly why you're still blazing away.

6. Stroll the alleys. Peek into the DX alleys, which are usually located just inside the General band (14.026 MHz, etc.). On non-contest days many rare stations hang out here. However, these are also the most congested places of all. But hey, sometimes the propagation gods smile on you.

7. Know when to say when. Don't spend your life trying to break pile-ups; when the band's open, there's plenty of good stuff elsewhere (usually from the same region), and lots of big guys don't know how to root it out. How to tell good odds from bad? Good odds: the DX station is booming, the op is working stations quickly, other stations from your call area are getting through, and/or you don't hear much competition. Bad odds: weak DX station, slow op, propagation favors other call areas, pile-up is loud and limitless.

8. Nail the newcomers. Now for real guerrilla tactics: Move to the low edge of a band and, tuning slowly across it, listen for the sound of any station coming on the air, such as a "tuning up" signal, "QRL?" or, of course, CQ. Should one of these surface, stop immediately and listen for an ID. (Ninety-nine times out of 100 it won't be rare DX, but trust me: that 100th time will more than make up for it.)

9. Late means wait. As you're hunting stations coming on frequency, also check for QSOs that are about to end ("73," "TNX FER QSO," etc.)—and wait for an ID.

10. Develop DX ears. DX signals rarely sound like statesiders. They're weaker and more unstable (and those which cross over the North Pole sound "fluttery"). Teach your eardrums the difference.

11. Hang ten. Ten meters is the little guy's equalizer. When the surf's up on 10, the DX comes in waves, and a puny signal (even a 5 watter) floats just fine. Ten meters tends to open to a small geographic area at a time (meaning less competition); also, signal strengths can fluctuate wildly within a few minutes. If you find a new one that's too weak to work, lock onto it and relax. Within 15 minutes its signal may peak, giving you a clear shot.

12. WFWL (work first, worry later). If an exotic-sounding station appears, don't look up its QTH—pounce! I once heard a 3B8 sending CQ. "What's a 3B8?" I wondered, but the second he stopped transmitting, I chased him. Only *after* the QSO did I discover I had just worked Mauritius.

13. Rehearse. Rare DX stations are sometimes barely audible, or covered with QRM. A trained ear can pull them through,

*1742 Century Way, Apt. 8, Indianapolis, IN 46260

but an untrained ear hears only clutter. So hone your hearing. Practice working common DX stations (such as G's and JA's) with faint signals.

14. Upgrade. Much of the delectable DX swims in the Extra portion of the band. Thus, reeling it in is often a question of "How low can you go?" Remember, only *7 percent* of all American amateurs can operate in these murky depths.

15. Rock around the clock. DX conditions vary with the time of day, so don't just operate from 7 to 9 o'clock every evening. Vary your routine: Stay up all night on a Friday, rise before dawn on a Sunday. Remember, sunrise and sunset can produce interesting conditions, so try them often.

16. Turn lemons into lemonade. "Bad breaks" aren't always what they seem. Sometimes they even work to the little guy's advantage. *Example 1:* While trying to work a weak ZK1 (South Cook Islands) during a contest, I was dismayed when a loud Californian began blasting away on a nearby frequency. Then I realized that because of the W6, most people who were casually tuning around wouldn't hear the ZK. During a brief lull I caught his "QRZ?", jumped in, and nailed him instantly. *Example 2:* A T30 (West Kiribati) operating SSB dodged a stateside pile-up by QSYing to a U.S. CW-only frequency. Just one American moved with him—yours truly, who fired up a key and worked him cross-mode.

17. Talk the talk. Even with Q signals, all CW stations don't sound the same. DX stations favor expressions such as "TKS" (instead of the American "TNX") and "DR" (as in "DR OM BRIAN"). Soviets often close with "DSW" (a Russian good-luck term). And of course, stations whose transmissions alternate between "599 K" and "QRZ?" are often worth working. Familiarity with international callsigns helps, too, as I learned one evening in 1988 when I tuned in Y88POL. Just another East German, right? But wait! East German suffixes usually have only two letters . . . hmmm. Moments later I worked a new one—Antarctica.

18. Less is Morse. Not only is CW less popular than SSB (decreasing your competition), but it's more effective in marginal conditions—a plus for weak stations.

19. Read the news. Serious operators learn about DXpeditions and such by subscribing to publications such as *QRZ DX?* and *The DX Bulletin.* And for those with packet capability, lots of DX packet clusters spot rare stations.

20. Never assume. Once, during a Boy Scout jamboree weekend, I heard a Liberian station with a special callsign, using Scouts as ops. No one was answering its CQ, probably because everyone believed the station was working only fellow Scouts. But when I asked, "Are you working only Scout stations?" I was rewarded with a "No, you're 5 by 6"—and a new one.

21. Beat the bushes. Many people think all the primo DX hangs out on the low ends, but that's a fallacy. Ever work Morocco? I did—on a 10 meter *Novice* CW frequency! And I once heard Zimbabwe on 21.080. Moral: Don't just look in the clearings; rummage through the high weeds, too.

22. Listen for swan songs. Normally, when sunspots are high, upper HF bands such as 10 and 15 meters close in the evening. During their final moments, however, strange conditions sometimes occur. Try to catch each band just before it gives out (see whether any signals are audible; if so, tune around). As the band dies, most of your competition will give up and head south. I bagged my first CEØ (Easter Island) under just such conditions.

23. Check and double check. Don't just scribble down a DX callsign; make absolutely certain you heard it correctly. On CW I've worked lots of ops who can't tell a "4" from a "V" or an "H" from an "S." Missing even one dot in a callsign can turn a prize catch into the one that got away.

24. Nab 'em in the net. DX nets are groups of hams who meet regularly (check DX publications for details) and allow participants to take turns trying to work the rare ones on frequency. Purists pooh-pooh the practice, but all's fair in love and DX.

25. QSL religiously. Send a card after every DX QSO: via the bureau, direct or direct with SASE. Direct QSLs with SASEs aren't cheap (generally $1 per card, plus your own 50¢ airmail postage); then again, if you QSLed your first 100 countries this way, you'd end up spending $150—hardly an exorbitant sum. My advice: QSL the common stations VIA BURO and shell out a few bucks for the tough stuff. To me, that's just part of the cost of entertainment—same as golf balls and fishing worms.

For the big guns who are still in the audience (I knew you wouldn't leave), I'd like to close with two humble requests:

1. When you hear a pile-up caused by a DX station you don't need, resist the urge to work it again. (And please, none of this, "Hello, Abdul, I worked you last night and you're still sounding good here" or "Just got your QSL card—thanks" stuff.) We're all impressed with your signal, but how about giving the rest of us a chance for new one?

2. When a station is working QSOs contest-style ("599 K"), don't tell him your life story. To my chagrin, I've even heard ops with old-style U.S. callsigns respond to a "599" with "R R TNX UR 599 599 IN DALLAS OP GEORGE GEORGE 73 K." Please, just send "TU 599 K" and save everything else for the ragchews.

Finally, for the DX stations who handle pile-ups by taking one call area at a time, we little guys thank you. But once in a while, how about starting with the Ø's and working backward?

CQ REVIEWS:

The N6RJ 2nd OP Computerized DX Operating Aid

BY LEW McCOY*, W1ICP

I remember many years ago when Larry LeKashman, W2IOP, came out with a device called the 2nd OP. It was designed to help DXers find a country from its prefix, its bearing and time zone, and other pertinent information. I bought one and used it throughout my early DXer career.

I would guess that many of the amateurs who operate the low bands (160 through 10) have some DX blood in them. I know I did—and still do. All amateurs can vividly remember their very first contact. Mine, believe it or not, was a DX station, HZ1AB, who answered my first CQ call back when I was W9FHZ (Fanny's Handy Zipper). I quickly became a rabid DXer. In fact, I know I am only one of two stations that legitimately have all the DXCC deletions, Charlie Mellen, W1FH, being the other. This has no real bearing on this product review, but being an old timer, I like to brag.

I say the above has no bearing on the review, but actually it does. N6RJ is Jim Rafferty, who is the new producer of the 2nd OP. John Fail, KL7GRF, is the software and file designer of the current computer model of the 2nd OP. (This review covers the computer version of the 2nd OP.) The user needs an IBM-PC-XT-AT-PS/2 type of machine with a hard disk, 640K of memory, DOS 3.3 or greater, and a compatible printer.

Before installing the software into the computer, a study of the excellent 90-page manual is in order. I have found that most extensive software programs require considerable study involving much time, and the 2nd OP is no exception. There is so much information in the manual and there are so many functions in this program that it pays to become familiar with it—and I mean *really* study it.

After the program is installed on your hard disk and you have made back-up copies, it is ready for use. The program is copy protected in the sense that once you initialize the master disk, your name and call are put in. However, it is always possible to update the software should you happen to change your QTH, as much of the information is based on your latitude and longitude.

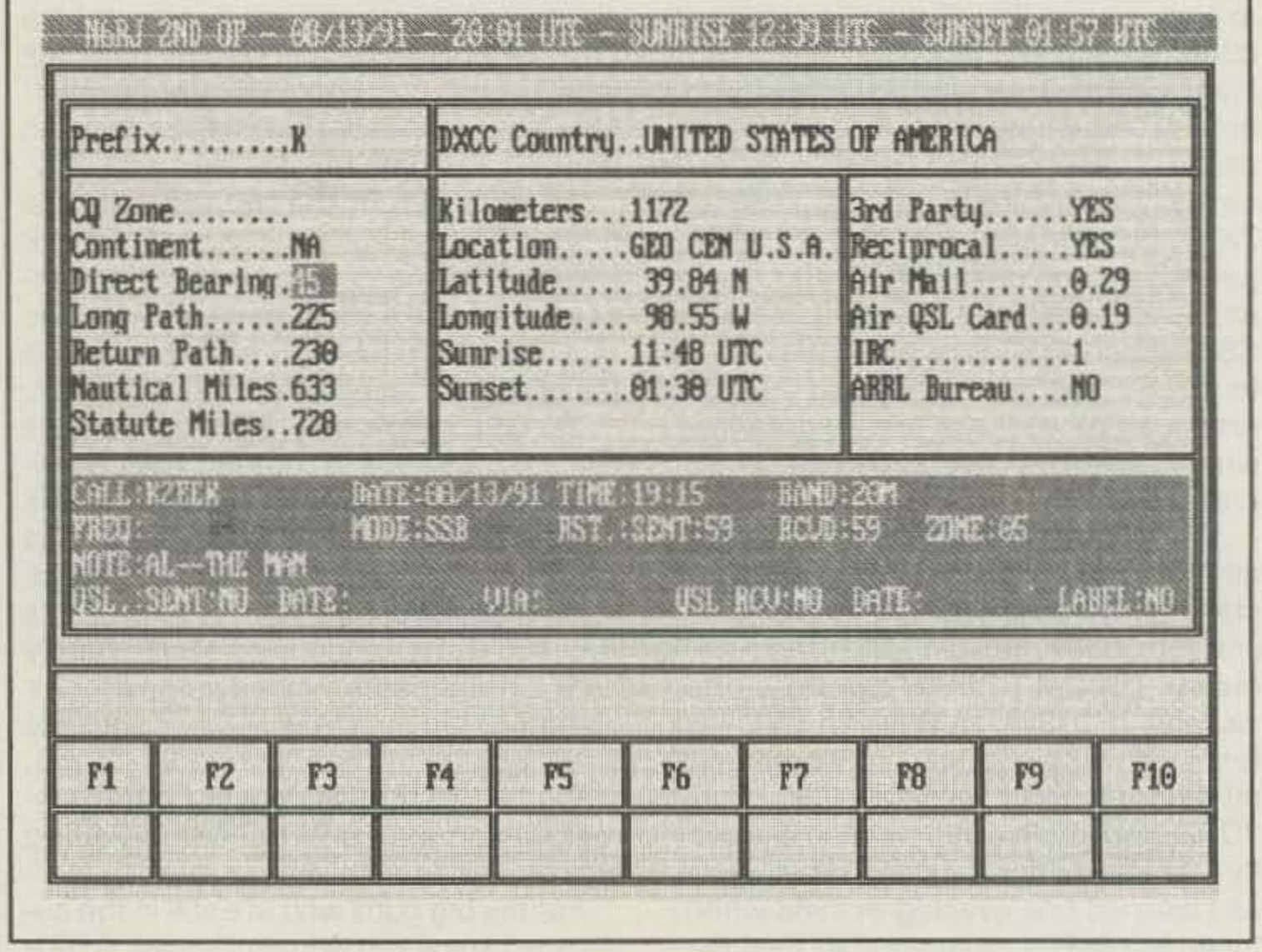


Fig. 1– This is what your computer screen shows for a printout of your log information for a given station.

There are so many features in the 2nd OP it is well nigh impossible to find a place to begin the description. There are several multiple key functions. For example, using the **F1** key displays a menu with its functions. These include station log activities, print QSL labels, oblast functions, display QSL bureau data for a country (yes, they are *all* listed), display a "need" list by band/mode for a displayed country, add/edit notes on countries, display last entry in log-book file, display *CQ* Zone number for entered callsign, and deleted DXCC Countries functions.

Keep in mind this is on one function key so it should give the reader some idea of the extent of the program. For example, F2 is a print function key and permits you to do the following: print a DXCC Country listing including ranges, bearings, etc.; DXCC need list; DXCC worked/confirmed listing by band, mode, etc.; oblast worked/confirmed listing; extensive station log printing capabilities; WAZ summary printing; print QSL labels; and finally, print return address labels.

F3 is the program setup key, and F4 is a **SCANLOG** function for accessing data. F5 gives you the color choices if you have

Technical Editor, CQ, 200 Idaho St., Silver City, NM 88061

a color monitor. F6 is a powerful 2nd OP summary function key. It provides you with many lists such as DXCC countries worked/confirmed on all bands (or on one band—including satellites). It also provides worked/confirmed one band/one mode or mixed modes. All of the above functions for DXCC are also provided for WAZ, including a six band worked summary plus other functions.

The F7 key is a function key for the very popular K1EA contest logging program data files into 2nd OP format. F8 is the **FASTLOG** function, which allows you to make entries in a very rapid manner. Last, F9 will access the 2nd OP packet communications functions, which are very extensive.

What I have described above is only the tip of this very large iceberg. The program calculates sunrise and sunset times for your location (latitude/longitude) for each time you start the program, and therefore they are always current. Also, 2nd OP will display your grid square locator based on your geographical location.

Fig. 1 is a screen printout that I made showing one method of entering a contact. When you enter the call of the station, the program automatically gives you direct (beam) bearing, long-path and short-path compass bearings, distance in miles and kilometers, location plus latitude and longitude, UTC sunset and sunrise, QSL mailing costs—and on and on. In other words, if you want the information, it is there, available, in front of you.

One of the problems modern DXers have is that of countries changing prefixes. For example, Rhodesia was ZE and is now Zimbabwe, or Z2. The 2nd OP has a limited ability to cross-reference these prefixes for you. I have cards going back to World War II, and it took me a little while to "log" all these cards into the records. But, for example, you can bring up a list of all the deleted countries, etc. I guess what I am trying to say is that *all* the DX information an amateur could want is in the program. It just takes a while to become accustomed to having all this information at your fingertips.

I can't help but comment as an aside that with the current upheaval in Russia—or rather the Soviet Union—we are almost certain to have a whole lot of deleted countries and new ones added, primarily because there will be so many border changes. It is almost certain that none of the Soviet States will be the same as to geographical boundaries—which, if I guess correctly, will mean lots of "new" countries.

Getting back to the review, let me go through just one of the program operations, **SCAN LOG**, and list the key functions in this mode:

F1 (FIND)—Find a log entry by callsign or date.

F2 (SUMMARY)—Display a summary of the log on the screen.

F4 (DELETE)—Delete presently displayed log entry.

F5 (EDIT)—Edit displayed log entry.

F6 (CALL)—Switch to callsign search.

F7 (DATE)—Switch to date search.

F8 (FASTLOG)—Enter log entry.

F9 (PACKET)—Go to packet communications.

F10 (DONE)—Done with SCAN log functions.

In packet operation you can use the "dumb terminal" function of 2nd OP. You must enter the appropriate COM port, baud rate, word length, etc., for your TNC. In your initial installation you must provide the necessary packet information as a one-time chore.

OSCAR and satellite information is another extensive file for listing your countries, QSLs, etc.

Summary

The 2nd OP is produced by GRF Computer Services, 6170 Downey Avenue, Long Beach, CA 90805, and is available at various retail outlets. Suggested retail is $59.95. CQ

W4UW takes us along the circuitous route of baluns in parallel. This route also sheds some light on antenna construction techniques.

Balun/Balun

BY RICHARD A. GENAILLE*, W4UW

The most difficult thing that the writer of an article has to do, it seems, is come up with a "catchy" title. A title that catches the editor's fancy and one which stimulates the curiosity of the potential reader sometimes takes more thought than what was put into the subject of the article. I couldn't really combine in a title how to use two baluns in parallel, cut ferrite rod, and determine where your actual ground is. Therefore, "Balun/Balun"!

The purpose of this article is really to tell you how you can connect two baluns, of different ratios, in parallel on the input sides (usually 50 ohms) while feeding two center-fed dipoles on different bands, each having different feedpoint resistances. This is desirable when one wishes to use a single transmission line to feed multiple dipoles.[1] As in the case of most experimental work, there is always some interesting fallout. Cutting ferrite rod so that it doesn't break into unusable pieces and determining your working ground level are two "freebies." I hope that this is the kind of article that is saved for future reference.

I recently experimented with a multiple dipole antenna which was designed to function on 40 meters and the WARC bands. A remotely controlled bridge[2] for reading the impedance at the feedpoint of the multiple dipole antenna was designed, constructed, and used in connection with that project and this one as well.

To prove out the technique of using two baluns in parallel I decided to resort to a multiple dipole antenna choosing frequencies which, when installed at a convenient height above ground, would provide feedpoint impedances sufficiently different so as to make it desirable to use parallel baluns for impedance transformation to 50 ohms. The radiation resistance chart shown in fig. 1 told me that a dipole installed about ⅜ wavelength above ground should have a radiation resistance of almost 100 ohms, whereas a dipole at a little less than ¼ wavelength above ground should have a feedpoint resistance of about 60 ohms. Based on the chart I chose 20 meters for one dipole and 12 meters for the other. At about 14¾ feet above ground the 12 meter dipole was about ⅜ wavelength above ground and the 20 meter dipole was a little less than ¼ wavelength above ground with an expected feedpoint resistance of 100 ohms and 60 ohms, respectively.

I have a 36 foot square concrete parking pad at the back of my house which has been reinforced with 6-6-6 steel reinforcing mesh—i.e., 6 gauge steel wire on 6 inch centers. Two large oak trees are conveniently located at diagonal corners, giving me a more than adequate span over the pad for the 20 meter dipole. The thought crossed my mind that if I checked the feedpoint resistances of both antennas at resonance and found them to be what I expected, then I had a resonably good ground plane over which I was working. My actual measurements using my remotely controlled bridge indicated 65 ohms for the 20 meter dipole and slightly over 100 ohms for the 12 meter dipole. That brought to mind one of the "freebies."

Assuming that I erected an antenna at a given height above my backyard so as to be approximately ⅜ wavelength high over the surface, I would expect to see a feedpoint resistance, at resonance, of almost 100 ohms if the actual ground was at the surface (which would be unusual unless one had a backyard covered with copper plate!). If the feedpoint resistance was measured to be 95, 90, or 85 ohms, it could be assumed that the actual ground is somewhat below the surface. Just how much would have to be interpolated, and further discussion of how one would proceed from this point is not the subject of this article. While the values mentioned can be found on either side of the curve, it should be obvious that the estimated height would be more than ⅜ wavelength unless one had a plasma level several feet above the ground surface, causing the actual ground to be above the surface! Knowing where your actual ground is may be of interest or value to some of the more curious among us.

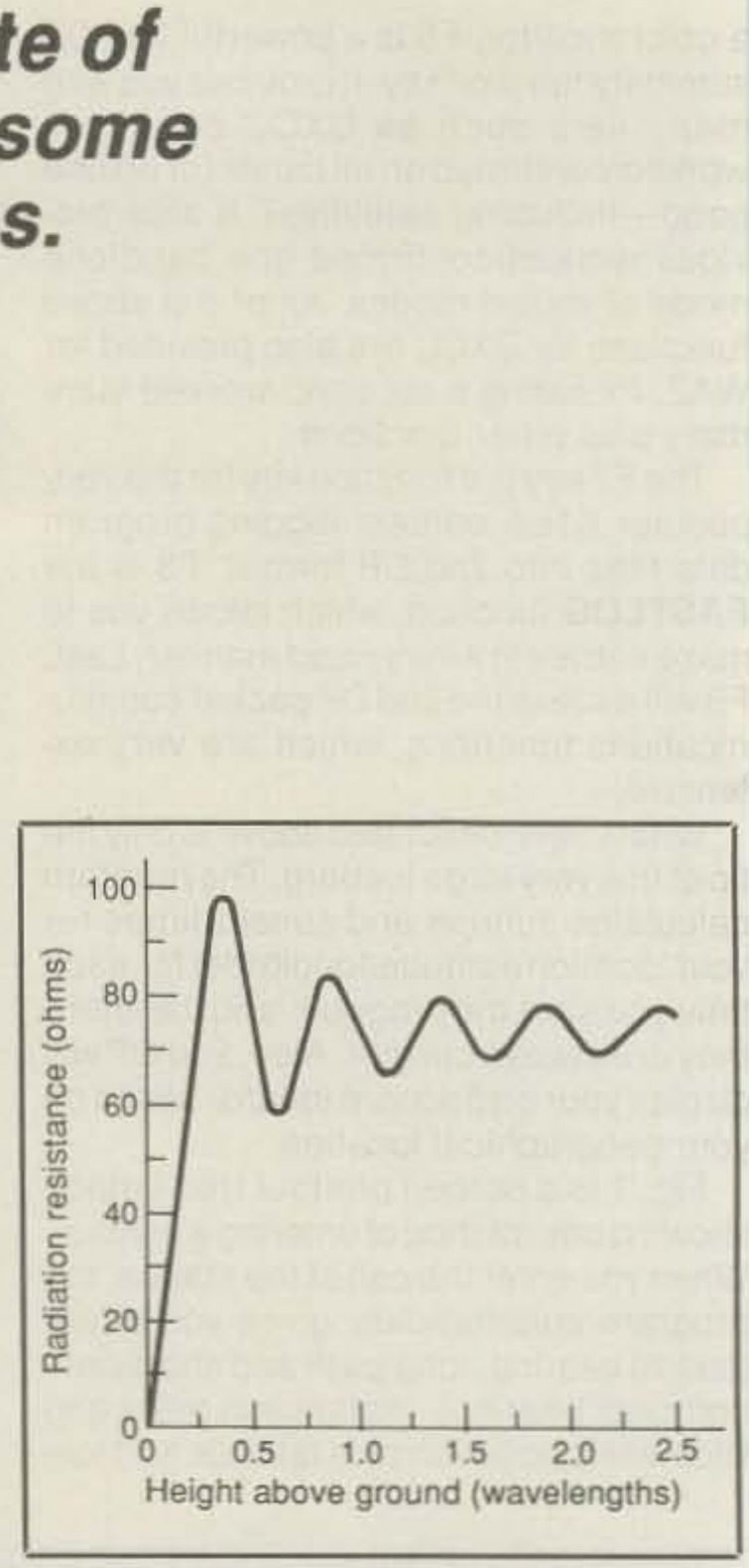


Fig. 1– Radiation resistance of horizontal half-wave dipole at various heights above ground.

Back to the Parallel Connected Baluns!

After checking the feedpoint impedances of the 20 and 12 meter dipoles, I proceeded to wind a couple of baluns that would provide me with the necessary transformation for 50 ohms to 65 ohms and 50 ohms to 100 ohms. Details for the construction of each balun are shown in fig. 2. There is a lot of excellent information in Sevick's book (mentioned in reference 1) which takes the fear out of winding your own baluns. I used ferrite rods of u125, ½ inch in diameter and about 3 inches long for the balun cores.

At this point let me interject another "freebie." I had an Amidon R61-050-750 ferrite rod 7½ inches long lying around which I thought I would use if I could cut it in half. I had bad luck previously when I tried to cut a ferrite rod and wound up massacring the rod. I tried using a hacksaw, but is that ferrite ever hard to cut! I

*719 Quarterstaff Rd., Winston-Salem, NC 27104

e Couldn't Have Said It etter Ourselves!

FRANK W. COOPER W3NV

October 15, 1991

Mr. Bill Sattler
% DX Engineering, Inc.
618 Spaulding Ave.
Brownsville, Oregon 97327

Dear Bill:

I thought you might like to hear about the results I have been having with your two super beams! As your records will show I have your 20 meter six element beam on the 58' boom and the 24 foot boom 11 element log periodic for 10,12,15 and 17 meters.

The performance has been nothing but spectacular. Words cannot describe the super results i have had with these two beams. I have heard and worked everything on the bands with only my exciter running 100 watts! Have no need for my linears even when the pile-ups for the ZA' a and 3B7's were unbelievable the beams put me right through with the usual 5/9 plus reports!

I know location is important and most Florida spots are good but believe me the beams are doing a super job and it would be remiss not to write and tell you how pleased I am with my choice of antennas! Keep up the good work!

I might mention that I am quite surprised and pleased with the performance of the Log Periodic antenna. Never was too keen on that type of antenna but it sure does a super job and makes operating four bands just great. Your new 5 band log sounds great and I might have chosen that if it was available at the time of my purchases.

I am enclosing some better photos of the beams which I thought you might enjoy seeing. Thanks again for doing such a super engineering job on the antennas and it has made my dxing a real fun part of the hobby.

73 de W3NV

Frank W. Cooper

fwc/c
enc: photos
P.S. You should see my log!
Hundreds of DX QSO's and always
5/9 or better even under marginal
conditions!

Engineering designs
l manufactures
h performance
teriél for the
er and contester:

- noband Yagis, 80 meters
- ough 6 meters
- gh performance
- log periodic arrays
- rtical phasing boxes,
- meters, 80 meters
- 40 meters
- gi phasing boxes
- gh power remote
- ax switches
- re...

DXE

FREE CATALOG
call toll-free (800) 373-0239,
fax 503-466-5453, or write to:

DX Engineering Inc.
618 Spaulding Avenue
Brownsville, Oregon 97327

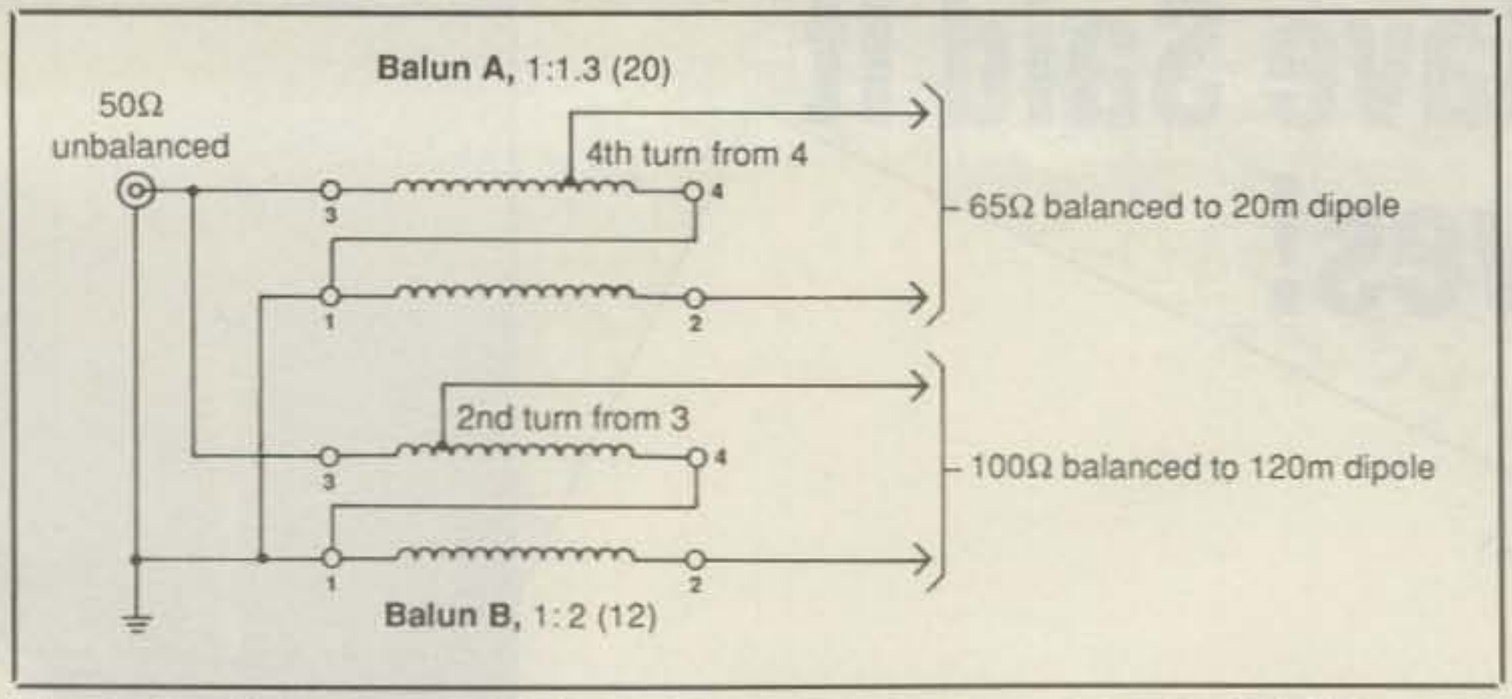


Fig. 2– Parallel connected baluns 1:1.3 and 1:2 ratios. Balun A: 30 bifilar turns, 14AWG, enameled wire, spread out 2 inches, wound on ½ inch diameter ferrite rod, u125 3 or 4 inch rod. Balun B: 24 bifilar turns, 13AWG, enameled wire, spread out 2 inches, wound on ½ inch diameter ferrite rod, u125 3 or 4 inch rod. Note: Balun A and Balun B were made primarily to cover the 20 and 12 meter bands, respectively. Both could have been made to cover 80 through 10 with some additional effort, but that was unnecessary for the purpose of this article. Ferrite cores could have been used, but rods are generally easier to handle. Thirteen AWG wire was used on Balun B accidentally. Fourteen AWG could be used with similar results.

happened to mention this problem to Sevick in one of our telephone conversations, and he suggested scoring the ferrite rods with a file around the circumference of the rod and snapping the rod in two. My small files left a lot to be desired. Then I hit upon the idea of scoring the rod with a tubing cutter. I wrapped a layer of masking tape around the rod and proceeded to carefully run the cutter around the rod. Tightening the cutter very slightly after each turn, I managed to score the rod sufficiently so that it broke in two very neatly at the point where I had scored it with the tubing cutter. Photo 1 shows the "complicated" arrangement for cutting the ferrite rod!

Back to Balun/Balun!

After fabricating each balun, I connected it to a low-level SWR bridge and terminated the balun with a noninductive resistor of the correct value. Since each balun needed to serve only one band, I adjusted the length of the windings to optimize the balun for the particular band, ensuring that I had a zero SWR. I then connected the baluns in parallel on the input (50 ohm) side. I checked the SWR again with the bridge, and lo-and-behold, I had a 2:1 SWR. How could that be?

It quickly dawned on me that the noninductive terminations were a proper load for each balun, and with either 20 meter or 12 meter input to the bridge I would have two 50 ohm inputs, at either frequency, paralleled to give me 25 ohms. Actually, this shows that the baluns are working correctly, since the noninductive resistors are not frequency sensitive, at least at HF. As Sevick points out in his book, "the transformer that sees its proper match takes the load while the other one is essentially transparent." What this means is that when you feed 20 meter power up your transmission line, the balun connected to the 20 meter dipole is active, providing a match to your 50 ohm transmission line. The other balun, connected to the 12 meter dipole, is inactive and vice-versa. Regardless of which band you are operating, the input to the paralleled baluns is always 50 ohms at resonance. It works slick as a whistle! Two bands with one transmission line, perfect SWR, and no antenna tuner required!

Weather protection for the paralleled baluns is provided by a piece of plastic pipe as shown in Photos 2 and 3. The pipe is 5 inches long and a little over 2 inches in inside diameter. Most plumbers have scrap pieces around for free. The end caps for the balun case were made from old 2 inch panel meter cases, the metal variety that has about a 2 inch outside diameter. The 2 inch plastic pipe has an inside diameter of just over 2 inches so the meter cases slip into the pipe snugly. I used a circle cutter to cut a couple of circular end-discs to fit inside or outside of the meter cases to provide further protection and to provide for the coax fitting on the bottom side. Four small screw eyes were added for fastening the wires of each dipole center end. The meter-case/parallel-balun assembly is inserted into the plastic pipe and fastened with several small metal screws. With a little dexterity and longnose pliers one can make the connections between the upper end of the balun and the screw eyes. I used solder lugs on the inside under the screw eye nuts and soldered a short length of wire to each lug, passing the wires through small holes in the pipe cover in order make a good electrical connection to the dipole wires.

I wasn't really expecting spectacular results from a 20/12 meter multiple dipole 14 or so feet above ground, but I was surprised when I managed to work into Europe with S9 signal reports on both bands

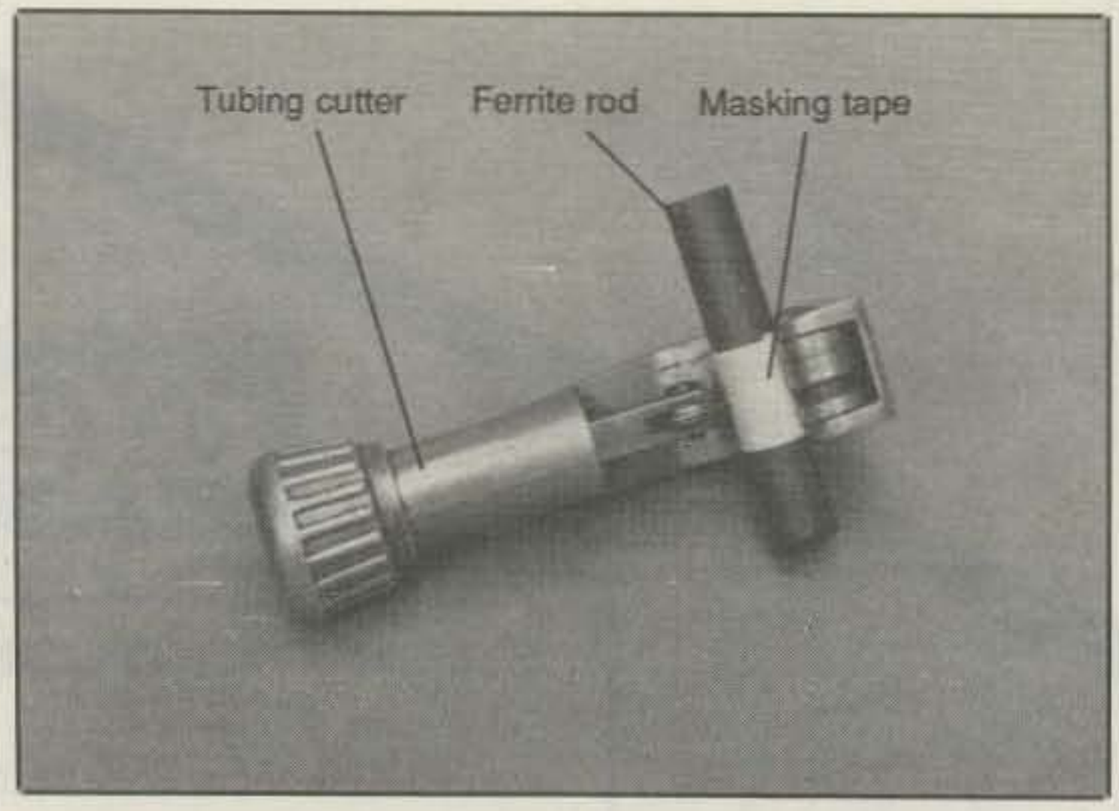


Photo 1– Using a tubing cutter to score the ferrite rod.

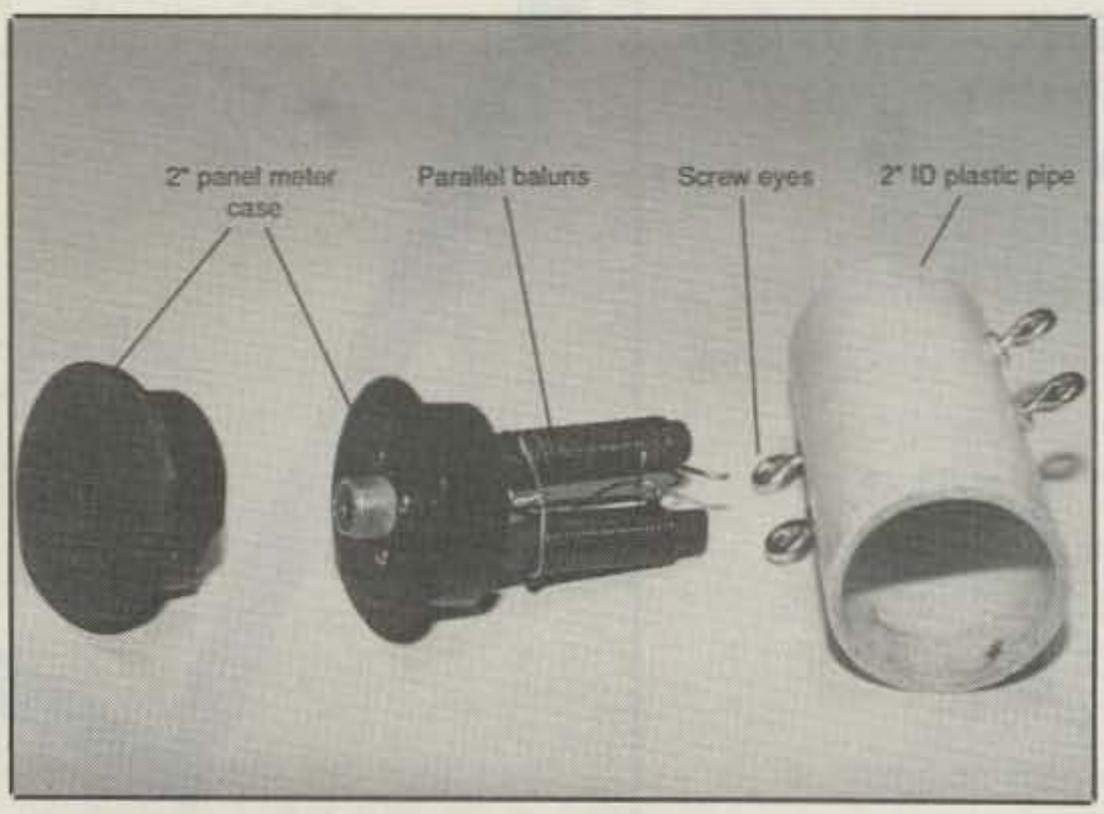


Photo 2– Parallel balun components ready for assembly.

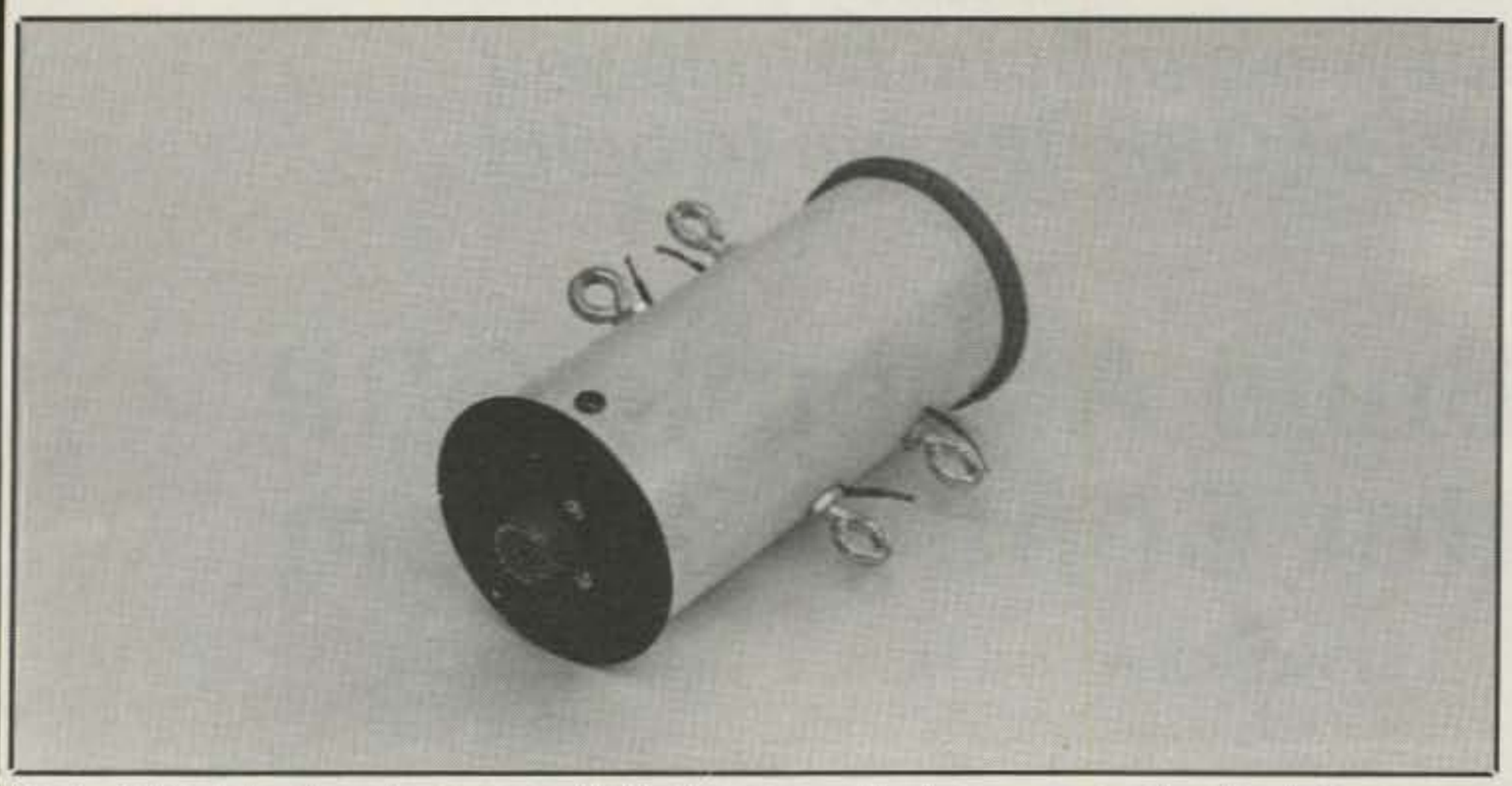


Photo 3- Finished product—parallel balun assembly for use as center insulator/transformer for 20/12 meter multiple dipole system, 65 ohms balanced for 20 meters, 100 ohms balanced for 12 meters.

and running barefoot at that. Attribute it to propagation or whatever, but it proved that dipoles operated close to ground level work, and certainly work even better when properly matched to the transmission line.

Paralleling baluns does work, and the technique may come in handy someday in laying out your antenna system.

I would like to express my appreciation to Jerry Sevick, W2FMI, for the encouragement and suggestions provided by him during my experiments with parallel baluns.

References

1. Sevick, Jerry, W2FMI, *Transmission Line Transformers*, 2nd edition, ARRL, 1990.

2. Genaille, Richard A., "A Remotely Controlled Bridge For Impedance Matching," *CQ*, August 1991.

Here's a simple project you can build to help you get started in the world of QRP. It's fun to build and easy to use.

How To Build A Simple QRP Transmitter Control System

BY PAT BUNN*, N4LTA

Many amateurs get their start in QRP operating by constructing simple crystal-controlled transmitters. Many designs are available which are easy to build and get into operation. With a simple transmitter, in conjunction with the station transceiver for receive, you can work the world. In my opinion, this is the best way to get started in QRP and home construction.

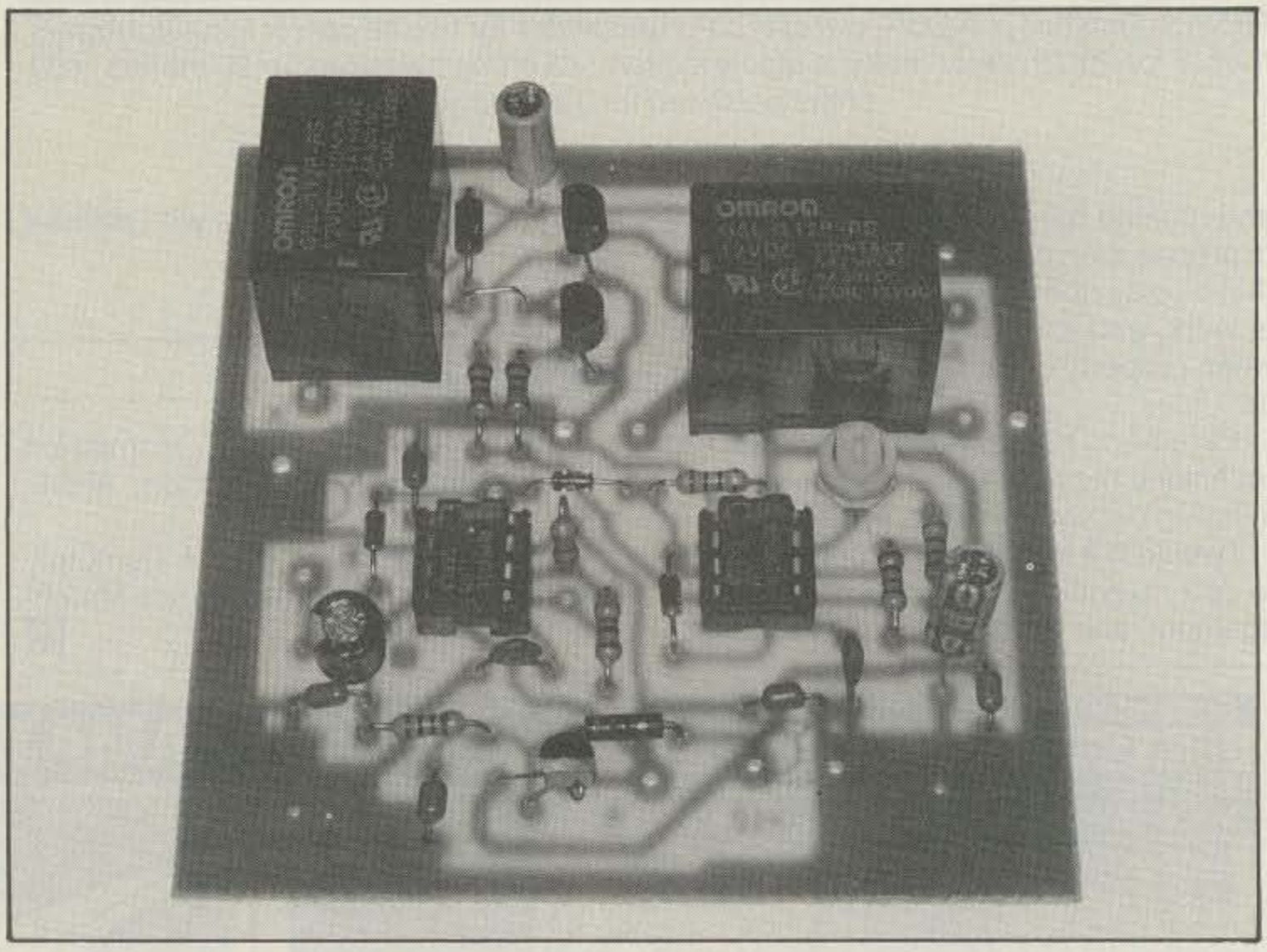
Once the simple transmitter is finished, the new QRPer is faced with the problem of getting it on the air. Do I rig up a transmit/receive switch? How do I get a sidetone? Will it blow out the front end of my transceiver if I forget to switch it? Many times a transmitter is placed aside simply because it is too much trouble to use it.

The QRP controller described in this article will solve all of the above problems and also allow semi-break-in CW operation. Combined with your station transceiver or receiver and a simple transmitter, the controller will allow you all the conveniences of a modern CW station. Just plug in your key and start operating.

The controller handles antenna switching, sidetone, and receiver muting. I have used it sucessfully with several "Cubic Inchers" and with a 1 watt 10 meter transmitter.

The controller circuit is composed of two 555 timer ICs. One handles the semi-break-in timing and the other generates a sidetone signal. The sidetone signal level is high enough to drive a small speaker, or it can be injected into the receiver audio chain. The circuit includes a receiver mute output and has provisions for back-to-back diodes at the receiver input for protection. At QRP levels I have not found these to be necessary.

A "keyed +12 volt" output is available for transmitters that do not include a keying stage. This output is conditioned to eliminate "key clicks" caused by rapid rise time in the keying waveform. The PC board has provisions to add a relay that can operate as an auxiliary antenna relay or mute relay for receiving equipment that requires an isolated relay contact.



This view of the completed project was shot using a light table to show you both sides of the PC board. (Photo by Robert S. Le Blanc)

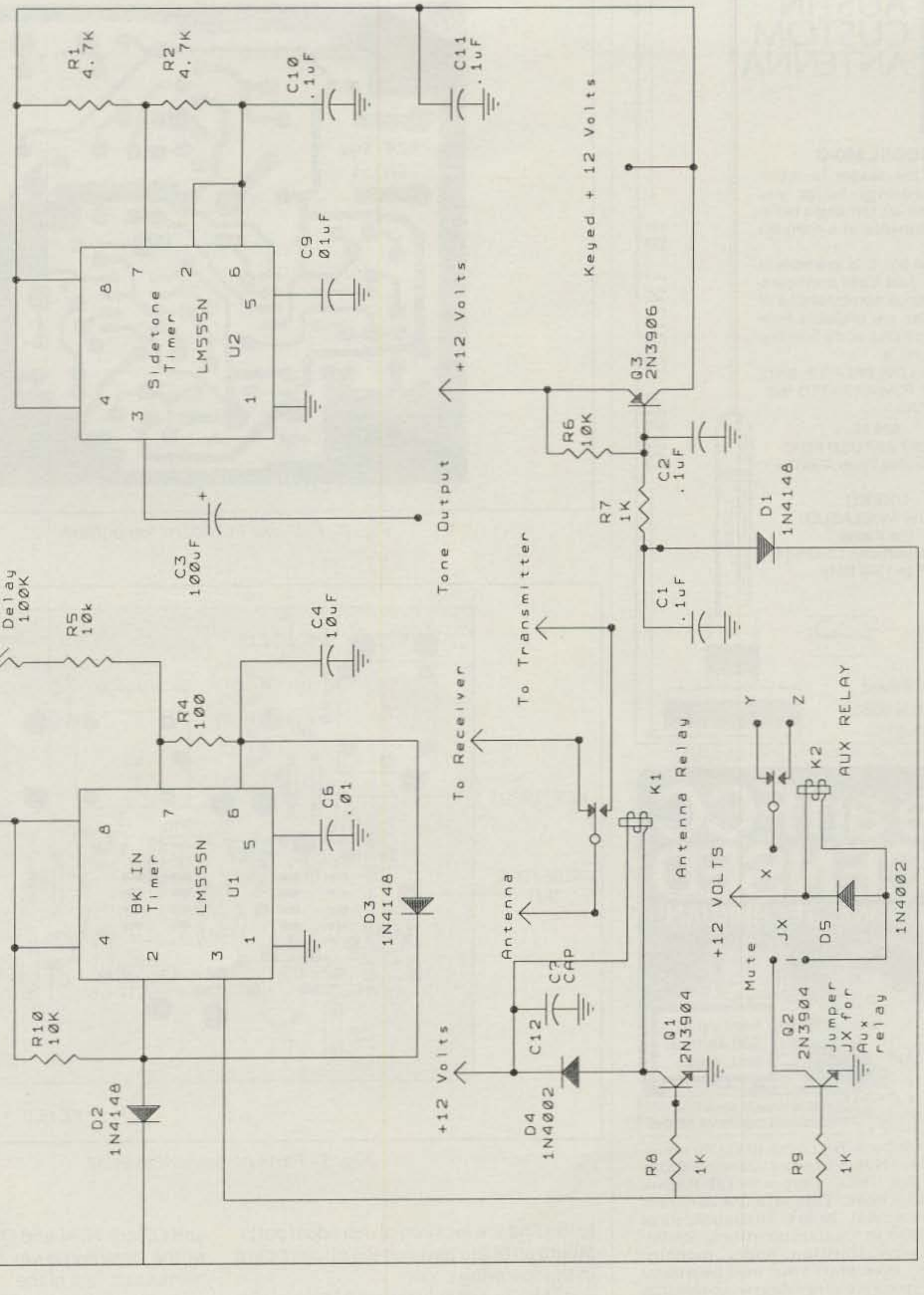
Fig. 1 shows the circuitry of the controller. U2 is a 555 timer configured as an astable sidetone oscillator at about 700 Hz. The actual frequency is determined by R1, R2, and C10. Increasing the value of R1 and R2, or C10 decreases the frequency of the sidetone. U2 is powered by the "keyed +12 volt" output from Q3. As the key is pressed, U2 turns on and the oscillator starts.

U1 is another 555 timer configured as a retriggerable "one-shot" timer. As the key is continually pressed, the timer turns "on" for a preset time determined by potentiometer R3, and timing capacitor C4. Each time the key is pressed, the timer is "retriggered" with a new timing cycle. When keying ceases, the circuit "times out" and the timer "turns off." The output of the timer is connected to antenna relay K1, via Q1, and also to the muting transistor Q2. The muting output is an open collector output which drives to ground during muting. Relay K2 can be jumpered to operate as a mute relay or as an auxiliary antenna relay. This relay can be used for muting receivers that require an isolated contact for muting (many tube-type receivers).

The "keyed +12 volt" output is switched by transistor Q3. For low-power loads of up to 200 ma, use a 2N3906 or other PNP switch. For higher loads use a 2N4036 or a TIP 30. The output of Q3 is conditioned to reduce rise-time by the RC time constants of C1, C2, and R7.

Construction of the controller is straightforward. The entire unit is built on a printed-circuit board. The solder-side foil layout is shown in fig. 2. An overlay of the component-side is shown in fig. 3. Use the overlay

*171 Spring Lake Drive, Spartanburg, SC 29302



Parts List

C1, C2, C8, C10, C11, C12—0.1 uF polyester or monolythic capacitor 25 VDC
C3—100 uF 25 VDC electrolytic capacitor
C4—10 uF 25 VDC electrolytic capacitor
C6, C9—.01 uF 25 VDC ceramic disk capacitor
K1, K2—PC mount relay (Omron G5L112 P-P5-DC12)
D1, D2, D3—1N4148 signal diode
D4, D5—1N4002 rectifier diode
Q1, Q2—2N3904 or other small signal NPN transistor
Q3—2N3906 or other small signal PNP transistor; use TIP 30 or 2N4036 for larger loads
R1, R2—4.7 K ohm ¼ watt carbon film resistor
R3—100 K ohm cermet trim pot (Panasonic 36C15)
R4—100 ohm ¼ watt carbon film resistor
R5, R6, R10—10K ohm ¼ watt carbon film resistor
R7, R8, R9—1K ohm ¼ watt carbon film resistor
U1, U2—LM555N timer IC
Misc.—PC board, RG174 coax, wire, solder

Fig. 1–Schematic diagram for the QRP transmitter controller.

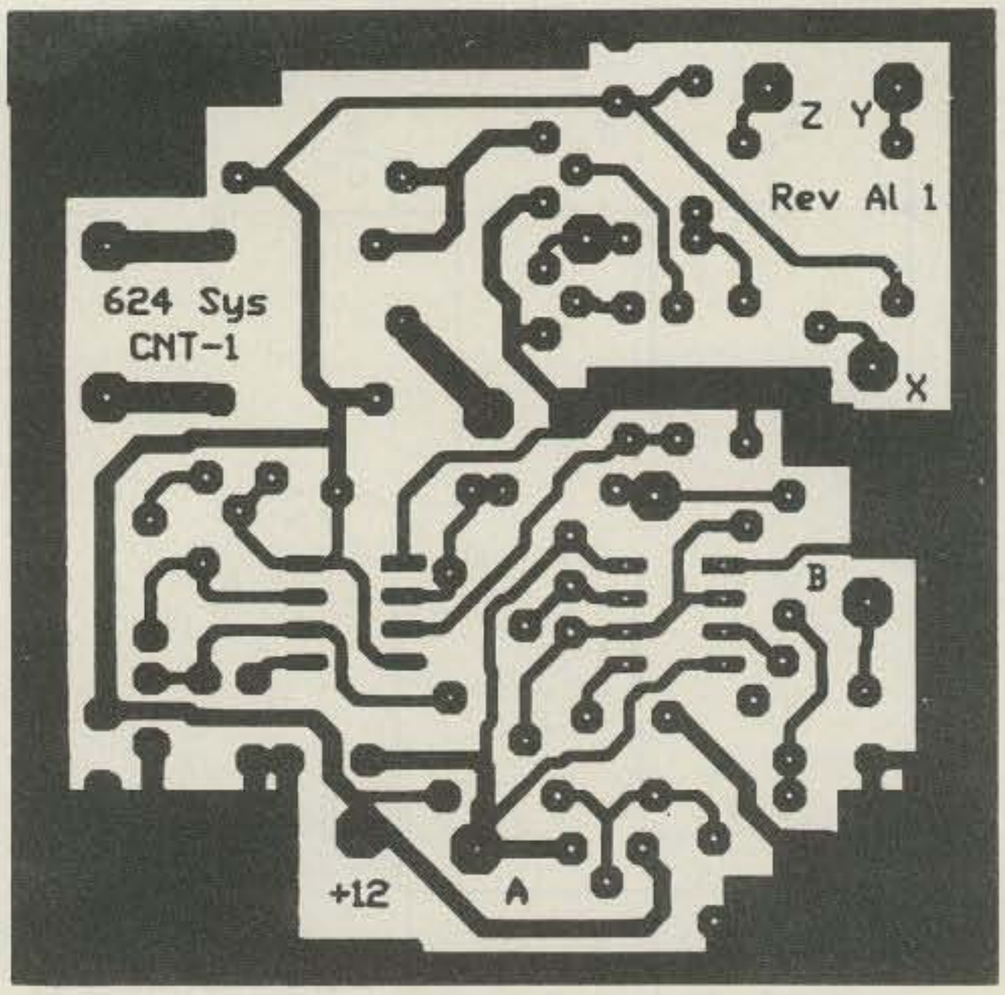


Fig. 2– Full-size PC board foil pattern.

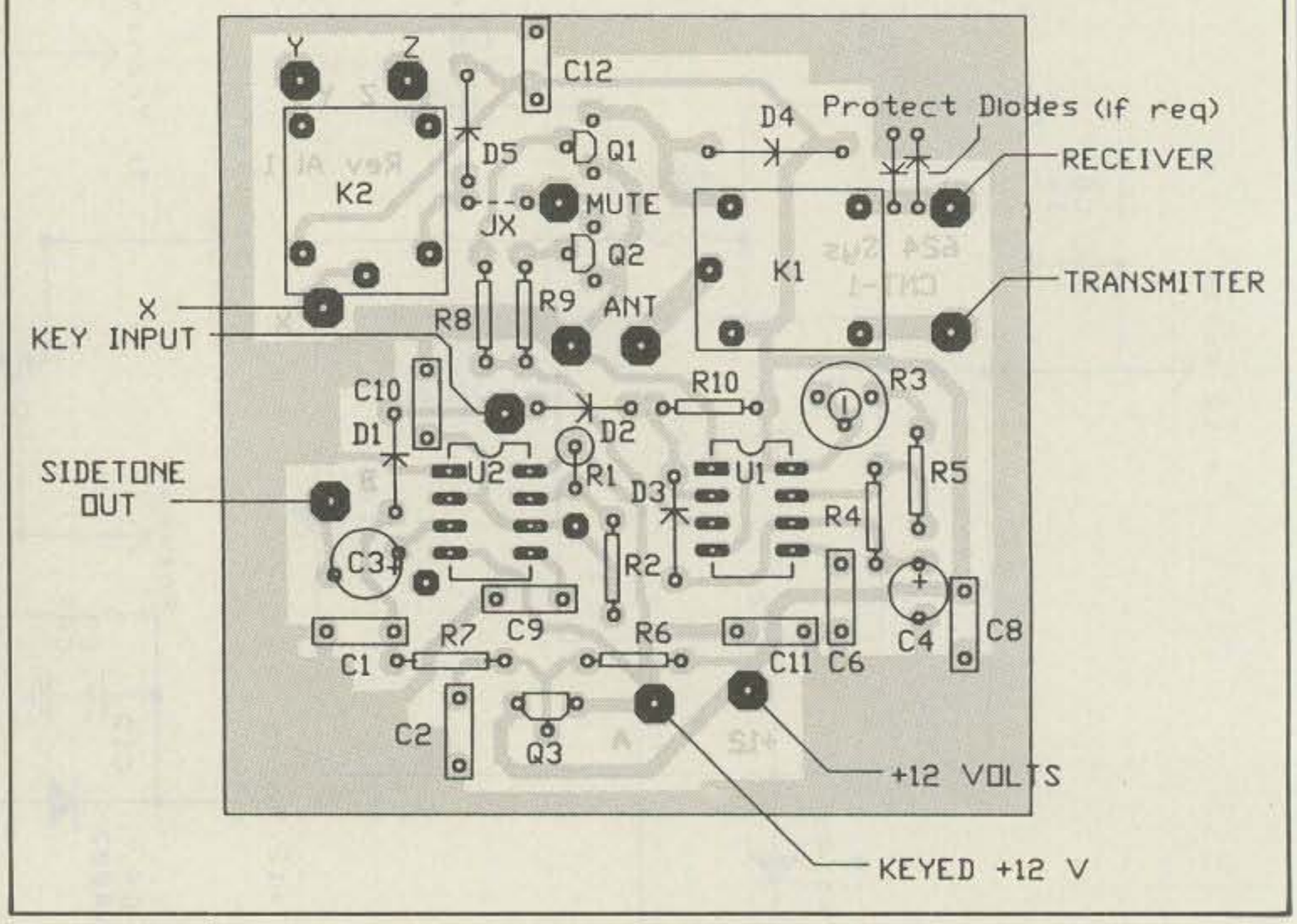


Fig. 3– Parts placement overlay.

to the find the location of individual parts. Mount all of the parts on the circuit board in the following order:

1. Mount and solder both 555 timer ICs. You may wish to use a socket for these parts. Be very careful to orient the ICs as shown on the overlay.

2. Mount all of the diodes and solder into place. Carefully observe the proper polarity. The banded end of the diode corresponds to the bar end of the diode in the schematic.

3. Mount all three transistors, carefully observing pin configuration and type. Q1 and Q2 are NPN and Q3 is a PNP device of the desired power rating. Solder the transistors into place.

4. If you are planning to use auxiliary relay K2, install it on the PC board now and connect jumper X. With jumper X connected the relay will operate at the same time the antenna relay operates.

5. Mount and solder all of the remaining parts on the PC board. If desired, the PCB trim pot can be replaced with a panel-mounted potentiometer for a remote semi-break-in delay control.

6. If you plan to use the controller for

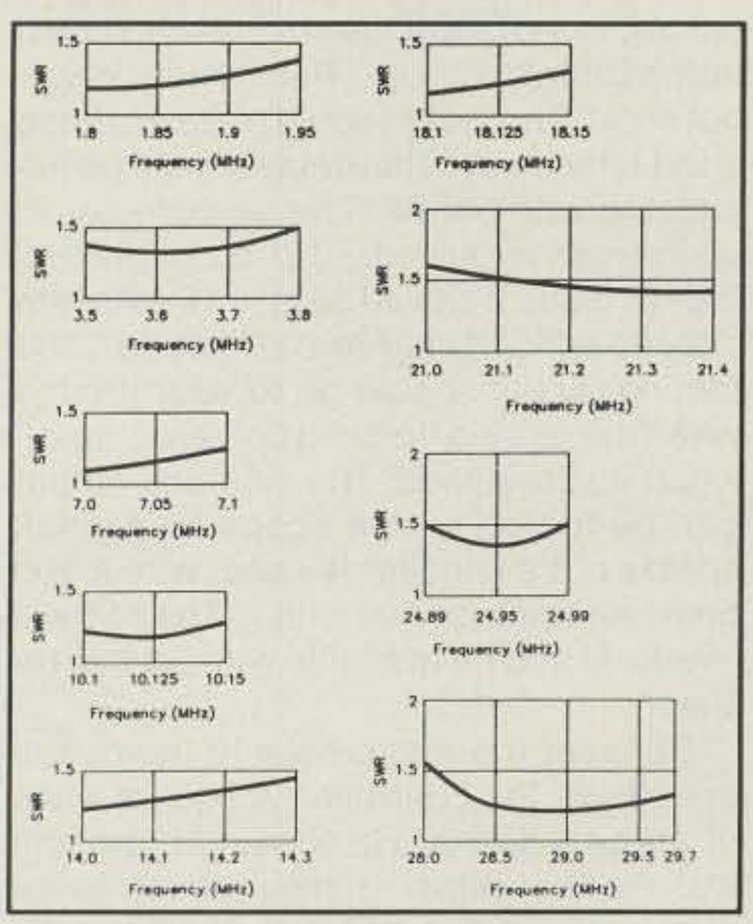
Secret of 20,000 hams revealed

More than 20,000 amateur radio operators all over the world realize the advantages of a unique multiband antenna. With proper installation, **there is virtually no need for an antenna tuner.** The typical SWR is 2:1 or less in most cases as a recent article in **QST** showed.

The **GARANTENNAS** are modified off-center-fed dipoles. To match the low-impedance 50Ω coax feedline to the high-impedance antenna feedpoint, a custom designed 1:6 balun comes with each antenna.

AS SEEN IN QST

Recently, QST-Magazine published an informative article on off-center-fed dipoles. This article also depicted the **GARANTENNA** model GD-8/500W and model GD-9/2KW. Due to space limitations, we can only print the SWR values for the very popular nine-band GD-9/2KW as seen in QST.



As you can see, the bandwidth with an SWR of 2:1 or less is very broad, therefore there is virtually no need for a transmatch, as countless hams have testified in writing to the manufacturer, Garant Enterprises.

9 Bands with 1 Antenna

You can pick from a wide selection of different models. If you have the space, you should install our GD-9 **GARANTENNA** or our model GD-7 which have a max. length of 255'. The GD-9 covers 160-80-40-30-20-17-15-12-10M, while the GD-7 covers 160-80-40-20-17-12-10M.

Not all hams can install 255' of antenna wire. Lots of hams select our **GARANTENNA** models GD-8 or GD-6 which have a max. length of 137'. The GD-8 let's you work on 80-40-30-20-17-15-12-10M and the GD-6 works on 80-40-20-17-12-10M.

For hams with very small lots we have the **GARANTENNA** models GD-3 and GD-5 available. Those antennas have a max. length of 67'. The GD-5 enables you to work 40-30-20-15-10M and the GD-3 works on 40-20-10M. In a test, the **GARANTENNA** model GD-3/2KW showed an SWR of 2:1 or less between 6.85 - 8.25MHz; 13.3 - 15.6MHz and 27.9 - 30.4MHz. This makes the **GARANTENNA** GD-3/2KW the ideal 3-band antenna for a QTH with limited space.

500W or 2KW PEP

Our model numbers explain how many bands an antenna covers, i.e. a GD-6 works on six bands, while a GD-9 works on nine bands. You may select between baluns with different power ratings - 500W PEP or 2KW PEP. On request, we supply you also with our commercial balun which has a power rating of 5KW PEP. Our 500W PEP balun is a voltage balun, while our 2KW PEP balun is a current balun.

3-Year Limited Warranty

To prove to you that we believe in our merchandise, we sell the genuine **GARANTENNA** with a 3-Year Limited Warranty. We don't know of any other antenna manufacturer who does that. We only can do that, because we know that our products are excellent.

First Class Quality

All our baluns are **custom designed.** The case is **injection moulded.** We don't supply you with run-of-the-mill baluns that are cut from plastic pipes. Our cases are made out of black polystyrol which is UV resistant. Our 500W PEP balun can handle tension up to 1,700N while our 2KW PEP balun can handle up to 4,500N. We use only stainless steel hardware to guarantee you peace of mind for years to come. Both our baluns use ferrite toroids for better performance. Our baluns are designed that you can hardly see them, especially the little one. The 500W PEP balun weighs only 120 grams (4.25oz.). The 2KW PEP balun weighs 300 grams (10.6oz).

If you ever have questions about any of our **GARANTENNAS**, before or after the purchase, give us a call. Our technical consultants Ed (VE3LML), Ine (VE3OTV) or Axel (VE3OPF) are here to help you.

Customer Satisfaction Is Our First Priority

From time to time, we survey our customers and ask them how our antennas perform at their QTH. Here are a few of the many customer comments we have received in the past. All those letters are real. We guarantee it. We even show the name and call of each writer who has given us permission to do so.

Adrian, KC4MTP wrote, "I am well pleased with my GD-6/500W antenna. I have a Kenwood TS140 and running 50 watts. I have contacted hams coast to coast. **It is so simple. Just turn on the transmitter and start sending. No tuner needed."**

Steven, N6RYA commented, "Although I had to compromise on the ideal installation, **the antenna performs as well as I could hope for** with my modest station (TS-430S). **I am more than satisfied with the GD-8."**

Colin, WB3CZP told us, "My GD-8/500W performs better than I ever anticipated. I receive good signal reports and **the SWR is well within specs. Also, it (the antenna) is almost invisible and was easy to put up."**

Ted, N6SQI stated, "I am very pleased with the GD-9/500W antenna. Both for DX and local. **I can usually contact anything I can hear. I also like the ease of switching bands."**

John, W0HBE wrote, **"I was impressed by the low SWR on all bands and comparison tests have proved to me that the Garant GD-8 is far superior to any other wire antenna."**

Wilf, VE3MNJ, "The service from your organization was fine. The GD-8/500W works well. Its main advantage, from my point of view, is that **it eliminates the need for a transmatch on all bands."**

John, KA3SDQ on his GD-8/500W, " Prompt delivery, helpful phone ordering and information, combined with **a quality product. Garant truly has an unbeatable combination."**

Harry, N8GEC on his GD-6/500W, **"This antenna is bringing in all the bands 10 thru 80 meters with less than 1.2 SWR and in most cases less than that.** I have mounted it as an inverted-V on a 40ft tower. **I think the antenna is excellent.** It is light in weight and no traps to worry about."

James, VE7JN wrote, "I purchased a GD-6/500W last year and have been very pleased with the results over the past fall and winter. The performance is quite outstanding. I am mainly interested in 80 and 40, and this antenna does an extraordinary job on these bands with very low SWR across both bands. The reports have been amazing. I have used it on 20M with almost as good reports as with the TA-33 beam and better VSWR across the band. I work 18 and 24MHz bands using the GD-6 with very good results. On 28MHz the VSWR is quite good, in fact it goes nearly to 1:1 around 29MHz. The balun looks good and I like the way it is constructed to keep the rain from getting into the coax. Your service and products are very good."

Bob, VE1ANY, "My antenna is a GD-8/2KW, 25' center, 20' at ends. Neither a dipole nor an inverted-V, but it works well. Not bothered by wind, rain, snow or heat. SWR is quite low. Love an antenna you can put up and forget about. Bottomline is **IT WORKS."**

FREE SHIPPING

We'll ship all genuine **GARANTENNAS** free of shipping charges across the U.S.A. and Canada. Customers in DX, please, inquire about shipping charges to your home QTH.

FREE DATA REPORT

Free of charge, we'll mail you our complete data report on all models of the genuine **GARANTENNAS.** It contains more technical data, SWR curves, pages and pages with customer comments, **and our low manufacturer-direct mail-order prices.** We ship worldwide and accept **VISA and MASTERCARD.** For your FREE data report, write, phone or fax to:

GARANT INTERNATIONAL, Inc.
P.O. BOX 890, Dept. 611
DEARBORN, MI, 48121, U.S.A.

GARANT ENTERPRISES
P.O. BOX 2895, Dept. 611
Thunder Bay, ON, P7B 5G3, Canada

Phone Hotline: 1-807-767-3888
Telefax Hotline: 1-807-767-0888

FREE-INFO COUPON

GARANT INTERNATIONAL, Inc.
P.O. Box 890, Dept. 611
DEARBORN, MI, 48121, USA

Okay, show me what the **GARANTENNA** can do for me. Mail me your **FREE DATA REPORT** by return mail.

Name:_____

Address:_____

City:_____

State:_____ ZIP:_____ Call:_____

PLEASE PRINT CLEARLY. THANK YOU!

high-power operation, then you may wish to install back-to-back protection diodes at the receiver output on the PC board. The location of these diodes is shown on the fig. 3 overlay. 1N4148 will work well for this application.

Go back and carefully check all parts for proper polarity and location. Almost all problems can be traced to improper parts installation. Look carefully for solder bridges. If everything checks out, you are done.

Testing the controller is easy. Connect a 12–15 volt power supply to the +12 volt terminal on the PC board and to the ground foil. A 9 volt battery will also work for testing. When the controller is powered up, nothing should happen. Short the key input to ground. The K1 and K2 relays should immediately "pick up." Remove the key input short. The relay should release after a short time delay. This delay should be adjustable with pot R4. Use a voltmeter to verify that the "keyed +12" output follows the key input. It should be at +12 volts with "key down" and near zero at "key up." The muting output should go to near ground when the relay is "picked up" and "float" when it is released. The sidetone output can be tested with a scope or a small speaker. If a speaker is used, wire a 100 ohm resistor in series with it. The 555 will overheat and be unstable without this resistor.

Connect the test device to the output and "key" the controller. A square wave of about 600–800 Hz should be present with the key "down." If the above tests are successful, then you are ready to put the unit "on the air." If not, retrace your steps, looking for a misplaced component or solder bridge.

To use the controller wire it up as shown in fig. 3. Everything is straightforward. I use RG-174 mini-coax to make all of the RF connections. The antenna relay will work at levels above 100 watts. If the controller is used at higher power levels, install the back-to-back diodes to protect the receiver. Set the delay pot to suit your CW speed and "Fire Away."

I hope that this simple controller will help many of you to get a simple QRP transmitter "on the air." QRP is fun and inexpensive. Order a crystal, build up a transmitter, wire up the controller and get ready to have *fun*. See you on the air soon.

Notes

An etched and drilled printed-circuit board is available from the author for $7.50. A complete kit of all parts, including the printed-circuit board, is available for $20.00. An extra relay is available for $3.00. Both of these offers include postage.

The Omron relay, part #Z731-ND, is available from Digi-Key Corporation, P.O. Box 677, Thief River Falls, MN 56701-0677 (800-344-4539).

ASTRON CORPORATION
9 Autry
Irvine, CA 92718
(714) 458-7277

MODEL VS-50M

ASTRON POWER SUPPLIES

• HEAVY DUTY • HIGH QUALITY • RUGGED • RELIABLE •

SPECIAL FEATURES

- SOLID STATE ELECTRONICALLY REGULATED
- FOLD-BACK CURRENT LIMITING Protects Power Supply from excessive current & continuous shorted output
- CROWBAR OVER VOLTAGE PROTECTION on all Models except RS-3A, RS-4A, RS-5A, RS-4L, RS-5L
- MAINTAIN REGULATION & LOW RIPPLE at low line input Voltage
- HEAVY DUTY HEAT SINK • CHASSIS MOUNT FUSE
- THREE CONDUCTOR POWER CORD except for RS-3A
- ONE YEAR WARRANTY • MADE IN U.S.A.

PERFORMANCE SPECIFICATIONS

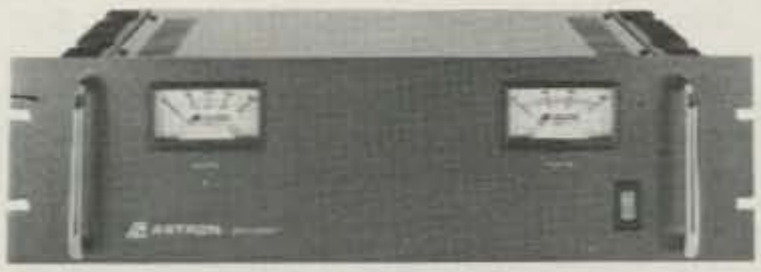
- INPUT VOLTAGE: 105-125 VAC
- OUTPUT VOLTAGE: 13.8 VDC ± 0.05 volts (Internally Adjustable: 11-15 VDC)
- RIPPLE Less than 5mv peak to peak (full load & low line)
- All units available in 220 VAC input voltage (except for SL-11A)

SL SERIES

MODEL	Colors Gray	Colors Black	Continuous Duty (Amps)	ICS* (Amps)	Size (IN) H × W × D	Shipping Wt. (lbs.)
• LOW PROFILE POWER SUPPLY						
SL-11A	•	•	7	11	2¾ x 7⅝ x 9¾	11

RS-L SERIES

MODEL	Continuous Duty (Amps)	ICS* (Amps)	Size (IN) H × W × D	Shipping Wt. (lbs.)
• POWER SUPPLIES WITH BUILT IN CIGARETTE LIGHTER RECEPTACLE				
RS-4L	3	4	3½ x 6⅛ x 7¼	6
RS-5L	4	5	3½ x 6⅛ x 7¼	7



RM SERIES MODEL RM-35M

• 19" RACK MOUNT POWER SUPPLIES

MODEL	Continuous Duty (Amps)	ICS* (Amps)	Size (IN) H × W × D	Shipping Wt. (lbs.)
RM-12A	9	12	5¼ × 19 × 8¼	16
RM-35A	25	35	5¼ × 19 × 12½	38
RM-50A	37	50	5¼ × 19 × 12½	50
RM-60A	50	55	7 × 19 × 12½	60
• Separate Volt and Amp Meters				
RM-12M	9	12	5¼ × 19 × 8¼	16
RM-35M	25	35	5¼ × 19 × 12½	38
RM-50M	37	50	5¼ × 19 × 12½	50
RM-60M	50	55	7 × 19 × 12½	60

RS-A SERIES

MODEL RS-7A

MODEL	Colors Gray	Colors Black	Continuous Duty (Amps)	ICS* (Amps)	Size (IN) H × W × D	Shipping Wt. (lbs.)
RS-3A		•	2.5	3	3 × 4¾ × 5¾	4
RS-4A	•	•	3	4	3¾ × 6½ × 9	5
RS-5A		•	4	5	3½ × 6⅛ × 7¼	7
RS-7A	•	•	5	7	3¾ × 6½ × 9	9
RS-7B	•	•	5	7	4 × 7½ × 10¾	10
RS-10A	•	•	7.5	10	4 × 7½ × 10¾	11
RS-12A	•	•	9	12	4½ × 8 × 9	13
RS-12B		•	9	12	4 × 7½ × 10¾	13
RS-20A	•	•	16	20	5 × 9 × 10½	18
RS-35A	•	•	25	35	5 × 11 × 11	27
RS-50A	•		37	50	6 × 13¾ × 11	46

RS-M SERIES

MODEL RS-35M

MODEL	Continuous Duty (Amps)	ICS* (Amps)	Size (IN) H × W × D	Shipping Wt. (lbs.)
• Switchable volt and Amp meter				
RS-12M	9	12	4½ × 8 × 9	13
• Separate volt and Amp meters				
RS-20M	16	20	5 × 9 × 10½	18
RS-35M	25	35	5 × 11 × 11	27
RS-50M	37	50	6 × 13¾ × 11	46

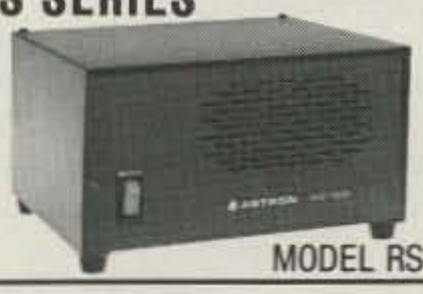
VS-M AND VRM-M SERIES

MODEL VS-35M

• Separate Volt and Amp Meters • Output Voltage adjustable from 2-15 volts • Current limit adjustable from 1.5 amps to Full Load

MODEL	Continuous Duty (Amps) @13.8VDC	@10VDC	@5VDC	ICS* (Amps) @13.8V	Size (IN) H × W × D	Shipping Wt. (lbs.)
VS-12M	9	5	2	12	4½ × 8 × 9	13
VS-20M	16	9	4	20	5 × 9 × 10½	20
VS-35M	25	15	7	35	5 × 11 × 11	29
VS-50M	37	22	10	50	6 × 13¾ × 11	46
• Variable rack mount power supplies						
VRM-35M	25	15	7	35	5¼ × 19 × 12½	38
VRM-50M	37	22	10	50	5¼ × 19 × 12½	50

RS-S SERIES



MODEL RS-12S

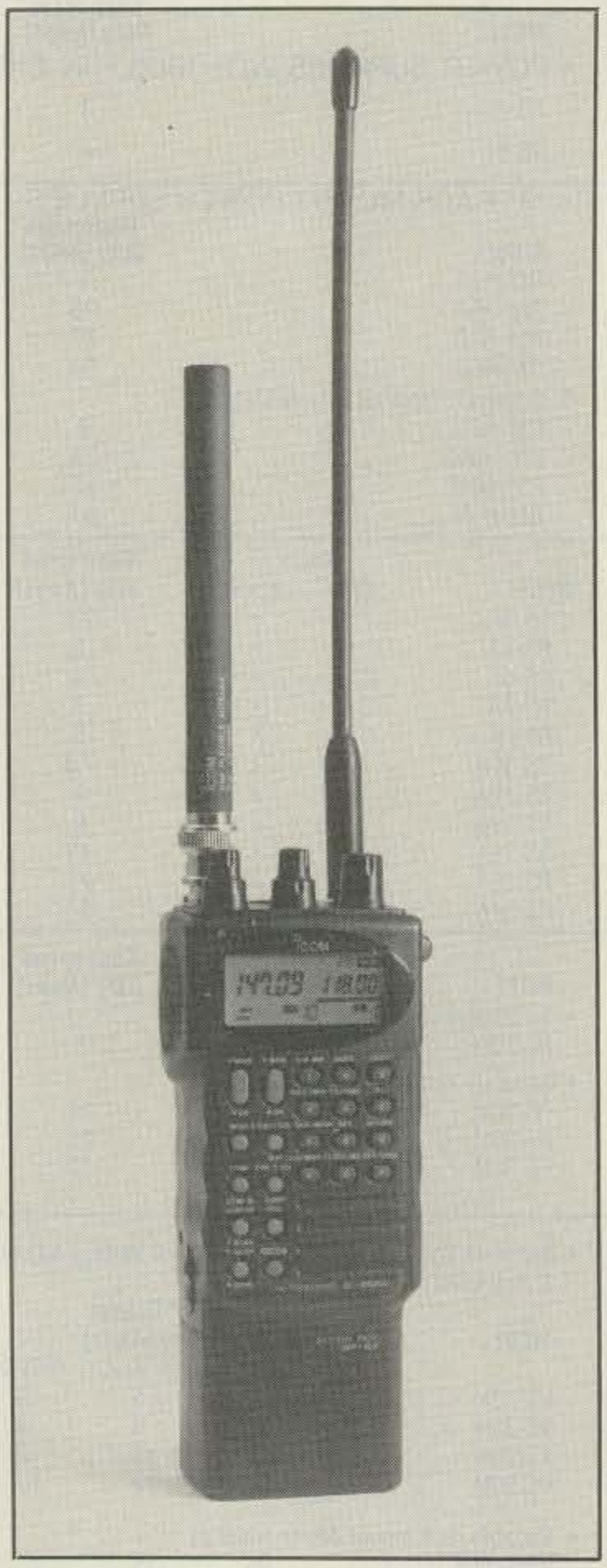
• Built in speaker

MODEL	Colors Gray	Colors Black	Continuous Duty (Amps)	ICS* Amps	Size (IN) H × W × D	Shipping Wt. (lbs.)
RS-7S	•	•	5	7	4 × 7½ × 10¾	10
RS-10S	•	•	7.5	10	4 × 7½ × 10¾	12
RS-12S	•	•	9	12	4½ × 8 × 9	13
RS-20S	•	•	16	20	5 × 9 × 10½	18

CQ SHOWCASE

ICOM IC-2SRA & IC-4SRA Handheld Transceivers

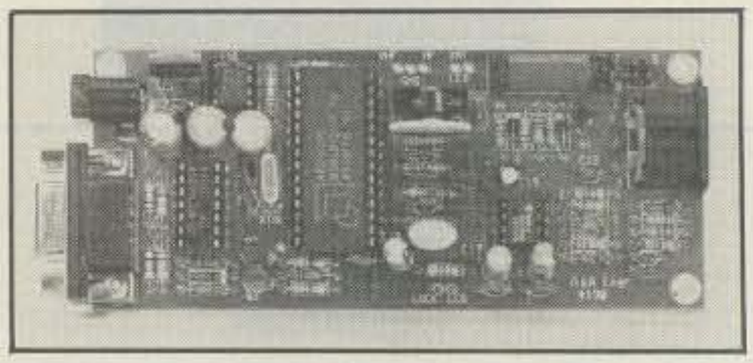
ICOM has introduced the IC-2SRA 144 MHz and IC-4SRA 440 MHz handheld transceivers. A wide-band receiver is built directly into the units. They receive everything from 25–905 MHz, weigh 13.6 oz., are compact in size, provide 5 watt output power (by connecting an external 13.5 volt power supply), have independent squelch and volume controls, and have a frequency monitoring system, built-in pager, code squelch unit, and 96 memory channels.



The IC-2SRA and 4SRA also include a 24 hour clock, 4 DTMF memory channels, and more. The IC-2SRA and 4SRA are each priced at $599. For more information, contact ICOM America, Inc., 2380 116th Ave. NE, Bellevue, WA 98004, or circle number 107 on the reader service card.

A & A Engineering BayCom Modem

BayCom is a software-based packet system for the PC/clones that does not require an expensive TNC. The software is public domain and makes a computer emulate a TNC. All program updates are done to the software. The software requires a modem interface between the transceiver and the computer serial port.



The A&A version of the modem plugs directly into a standard 9-pin serial port, or 25-pin port with an optional cable adapter. A 45 second watchdog timer and reed relay PTT are standard. Operating power required is +8 to +14 volts DC at 100 ma. A small, compact wall power supply is included with every kit or assembly. A & A offers a blank board (#190-PCB) for $12.95, complete kit (#190-KIT) for $59.95, and assembled and tested board (#190-ASY) for $89.95. Shipping $5.00 per unit in the U.S. For more information, contact A & A Engineering, 2521 W. LaPalma #K, Anaheim, CA 92801 (714-952-2114), or circle number 104 on the reader service card.

Ameritron T/R Switch

Ameritron has released the QSK-5 electronic T/R switch for linear amplifiers. It gives switching over six times faster than a vacuum relay. The self-contained QSK-5 provides full CW break-in and rapid switching in digital modes like packet and RTTY, as well as faster, quieter switching in SSB. It handles 2500 watts PEP and 2000 watts CW in normal amateur service when the SWR is below 1.5 to 1. It handles 750 watts on continuous carrier modes such as RTTY and packet. An optional cooling fan (CF-5, $39.95) allows sustained operation at 1500 watts in any mode.

The QSK-5 is priced at $349. For more information, contact Ameritron, 921 Louisville Rd., Starkville, MS 39759 (phone 601-323-5869), or circle number 103 on the reader service card.

ACE AR2800 Mobile/Base Receiver

ACE Communications' 1000-channel mobile/base receiver features frequency coverage from 500 kHz to 1300 MHz, and allows reception of all broadcast bands, shortwave frequencies, military communication bands, plus all public-service bands. AM or narrow FM, SSB reception reception modes, in addition to FM broadcast and TV audio modes are selectable at any frequency. Twenty-six front-panel keys allow programming of 1000 total scan

memory channels. Extra features include selectable single channel priority, keyboard lockout, BNC antenna connector, and display backlight for night use.

The unit measures 2¼"H × 5¾"W × 7¼"D and weighs 12 ounces. It is priced at $449, which includes 120 to 12 volt wall-plug adapter/charger, DC power cord, telescopic antenna, desk stand, and mobile mounting hardware. For more information, contact ACE Communications, Monitor Division, 10707 East 106th St., Fishers, IN 46038 (317-842-7115), or circle number 105 on the reader service card.

"Technician Class No-Code" By Gordon West

The *Technician Class New No-Code* 232-page FCC license preparation book has all the latest question pool's 372 Element-2 questions and 326 Element-3A questions, with every question and the 4 possible answers listed along with the actual FCC question number. The correct answer is listed right after the four possible answers, and the correct answer is explained in detail. In addition, the book includes information and charts describing the Amateur Radio Service, plus tips on how to study for the exam, how to fill out the forms, and where to take the exam (a form 610 is included in the book).

Published by Master Publishing, the book is available for $9.95 from Radio Shack stores and leading amateur radio dealers, or for more information, contact Master Publishing, Inc., 14 Canyon Creek Village MS 31, Richardson, TX 75080.

We're Back

HR BOOKSTORE

1992 EDITIONS

NEW!

NEW!

1992 RADIO AMATEUR CALLBOOKS

NORTH AMERICAN EDITION
The only up-to-date source book for all the latest FCC and foreign government callsigns and addresses for Hams in North America. Includes handy operating aids such as time charts, QSL bureau addresses, census information and much more. Calls are listed for all countries in North America from snowy Canada to tropical Panama. Buy a new Callbook and get the most use out of your investment. ©1991
❑ CB-NA92 Softbound $29.95

INTERNATIONAL EDITION
This is the only book for calls and addresses of foreign hams! Includes all the latest from foreign governments. In addition, as the "Iron curtain" dissolves, addresses are being added daily for Hams in the USSR and other countries. All sorts of awards, including the coveted DXCC and WPX require confirmation of contact before the award can be issued. Without up-to-date addresses, how are you going to get them? You simply must have a copy of this book! Handy operating aids round out this super book value. ©1991
❑ CB-I92 Softbound $29.95

Buy'em Both Special - Both books, regularly $59.90
❑ CB-NAI92 Save $4.95 $54.95

THE 1992 ARRL HANDBOOK
Hundreds of hours have been spent revising and up-dating this new volume to reflect the latest in Amateur technology. In addition to being the definitive reference volume for Radio Amateurs, there are plenty of projects for every interest in Amateur Radio - from antennas for every application to the latest state-of-the-art projects - you'll find it all in the 1992 HANDBOOK. ©1991.
❑ AR-HB92 Hardbound $24.95

1991-92 ARRL REPEATER DIRECTORY
Latest edition of this great book value. Now has over 19,000 listings for repeaters from 10 meters to 2.3 GHz! ATV and packet digi-peaters are listed too. You must have the latest copy at home or in your car. © 1991.
❑ AR-RD91 Softbound $5.95
❑ AR-2RD91 Buy 2 and save $9.95

KB1T 1992 HAM RADIO CALENDAR
Here's the perfect gift idea for this holiday season.
Tired of using an oil company calendar to keep track of ham activities? How bout one just for hams! Full color pictures, helpful hints and tips, in addition to all major contests and hamfests all in one package. Attractive layout will fit in anywhere in your house. Buy one for yourself and your best ham friend. ©1991 *Available November.*
❑ KB1T92 $11.95

PASSPORT TO WORLDBAND RADIO 1992 Ed
Brand new, fully revised and expanded. Now includes a bigger better SWL'S buyer's guide. Also includes all the latest broadc schedules from countries around the world. Great reference te Hams as well as the serious SWL and casual listener ©1991
❑ IBS-RDI92 Softbound

BOOKS AND SOFTWARE

ARRL UHF/MICROWAVE EXPERIMENTER'S MANUAL
Long awaited by the above 30MHZ crowd, this book has quickly become one of our best sellers. Hams, technicians and professional engineers will find this manual to be extremely useful. Twelve chapters include a brief history, safety, propagation, microwave devices, transmission media, design and fabrication techniques, system design, antennas and feedlines, EME operation, microwave measurements and how to use the computer to simplify microwave operation. © 1990 448 pages 1st edition. 25 applications.
❑ AR-MEH Softbound $19.95
❑ FAR-FMEH (MS-DOS Program disk) $9.95
❑ AR-UHF Book and disk. Save $2.00 $27.90

WEATHER SATELLITE HANDBOOK
by Ralph Taggert, WB8DQT
Taggert has long been recognized as one of the foremost experts on weather satellite picture reception. This new edition of his famous book has been updated and expanded to include all the latest information on satellite picture reception. Subjects covered include a complete section on what satellites are in orbit, everything you'd want to know on what kind of antenna, receiver, video formats and displays to use, plus much more! You get all the information you need to get your satellite system up and running. © 1990 4th Edition
❑ AR-WSH Softbound $19.95
❑ FAR-WSH (MS-DOS Software) $9.95
❑ AR-FWSH BUY 'EM BOTH $27.9

SECRETS OF RF CIRCUIT DESIGN
by Joe Carr, K4IPV
Joe Carr has long been respected as one of Amateur Radio's best authors. His clear concise writing style demystifies and explains, in simple easy-to-understand terms, complex subjects. Packed with helpful diagrams and equations, this book covers everything from antenna design to using zener diodes. Carr gives you tips on how to align RF circuits, design and wind inductors, locate and eliminate electromagnetic interference, plus much, much more. © 1991
❑ T-3710 Softbound $19.95

N6RJ'S ELECTRONIC SECOND OP
3.1 NEW RELEASE
Major Revision Now Packet Compatible
by Jim Rafferty, N6RJ (for MS-DOS computers)
N6RJ's world famous Electronic Second Op has been extensively re-written to meet the needs of today's active Radio Amateur. DXCC, prefix and oblast records are automatically kept and are available in an instant. Will not run on floppies — you must have a hard drive. There's much more to this program than can be listed here. ©1991 MS-DOS computers. 5 1/4 and 3 1/2 versions available, please specify Drive A.
❑ FCB-RJ5 (5.25" MS-DOS) $59.95
❑ FCB-RJ3 (3.5" MS-DOS) $59.95

WHERE DO WE GO NEXT
by Martti Lane, OH2BH
The "insider's story" of what it is like to be on a DX'pedition. OH2BH has travelled far and wide and been to some of the most inhospitable locations in the world DX'ing. Learn how DX'peditions are planned and executed by the experts. Secrets revealed include how to work hundreds of DX'ers per hour with minimal antennas and marginal power. You almost feel as if you are there — working the pile-up yourself! Richly illustrated with both color and black and white shots. Includes selections from WA6AUD of West Coast DX Bulletin fame, K7JA, 9L1US, AH3C, N7NG and other noted DX'ers. Great for all levels of DX'er. ©1991 306 pages
❑ WWGN Softbound $22.95

ARRL ANTENNA BOOK by Jerry Hall, K1TD, NEW!
The 16th edition of this antenna classic represents over two years of hard work by editor K1TD. 900 figures and charts cover just about every subject imaginable. Some of the highlights are: Chapters on Loop antennas, multi-band antennas, low frequency antennas, portable antennas, VHF and UHF systems, coupling the antenna to the transmitter and the antenna, plus p-l-e-n-t-y more. 700+ pages. © 1991.
❑ AR-AM Softbound $19.95

REFLECTIONS- Transmission Lines and Antennas
by Walt Maxwell, W2DU
Over the years, many myths and half truths have become "fact." Noted antenna expert Maxwell debunks them with clear, concise and accurate explanations. The first seven chapters are taken from his QST column "Another Look At Reflections." Seventeen additional chapters contain new and unpublished material covering matching networks, antennas and how to use Smith charts. Also available is a MS-DOS disk with programs taken from the book. © 1990 1st Edition 384 pages
❑ AR-RTLA Hardbound $19.95
❑ FAR-RTLADOS (MS-DOS Disk) $9.95
❑ AR-RTLADOS Program and disk $2 off $27.90

ANTENNAS by John Kraus, W8JK
Kraus' classic antenna book has been extensively revised and up-dated to reflect the latest state-of-the-art in antenna design and theory. Includes over 1,000 illustrations and nearly 600 worked examples and problem solutions. Chapters cover basic concepts, print sources and point source arrays, dipoles, helixes, broadband and frequency independent antennas, special applications and tons more information. 2nd edition. 917 pages ©1988.
❑ MH-35422 Hardbound $59.95

ARRL OPERATING MANUAL NEW!
This book has been revised and is fully up-to-date! Cramm full of the information every ham should have at their fingert In addition to message handling, emergency operating, repeaters and contesting, this book includes hints, tips and tricks from some of the best in Amateur Radio and over 60 pages in full color describing operating awards from around world. ©1991
❑ AR-OG Softbound $1

ARRL RADIO BUYERS SOURCEBOOK NEW!
QST Anthology
Making a decision on what radio to buy can be very difficult. Sometimes the radio you want is out of your budget but you sti to know about all of it's bells and whistles. Taken from the Pro Review section of QST, this handy source book is full of helpful information. Includes supplemental comparison charts so you compare radios on an feature by feature basis. Also includes a articles describing fixes and modifications to currently available radios. ©1991 360 pages
❑ AR-RBS Softbound $

1992 POPCOM BUYER'S GUIDE NEW!
The all new POPCOM Buyer's Guide is chockful of information SWL, scanner buff, broadcast band DX'er, and Ham will find invaluable in their library. Includes listings from all equipment a accessory manufacturers plus much more. Full of helpful hints and techniques to make your listening more enjoyable. Great reference tool to have on hand as you tune the across the ban ©1991.
CQ-PC92 Softbound

QRP NOTEBOOK Vol. 2 by Doug DeMaw W1FB
Brand new edition of a QRP best seller. DeMaw is known wor as one of the experts on QRP communication. This extensive revised book is full of prjects ranging from simiple one transistc transmitters to a full featured receiver. Equipment designs tak advantage of the latest IC technology. Build your own radio an enjoy the trhill of working DX using low power. It's hard to des but it's a blast! ©1991 Second Edition.
AR-QRP2 Softbound

IONSOUND ver. 4.0 *NEW IMPROVED* NEW!
by Jacob Handwerker, W1FM
Wonder when and on what frequency you'll be able to find that DX country you need for honor roll? IONSOUND is a state-of- software tool designed to predict ionospheric propagation to an of the world. Using the latest in propagation engineering mode handy tool is a valuable addition to the active ham's software li Can be customized for a number of different variables. Menu d for ease of use. Manual in an ASCII printable file is included. co-processor recommended but not required. IBM PCs and compatibles.
❑ ION5 (5.25" disk MS-DOS Computers)
❑ ION3 (3.5" disk MS-DOS Computers)

SHIPPING AND HANDLING: $4.00 to US and Canadian address via US mail. Shipping via UPS Brown $5.00 to US address only. NO COD orders. UPS Red or Blue cost plus $4.00 handling. All other orders shipped via US mail F.O.B. Rindge, NH, USA plus a $4.00 handling charge.

HR BOOKSTORE
P.O. Box 209, Rindge, NH 03461

(800) 457-7373

(603) 899-6957
(603) 899-6826 F

CIRCLE 169 ON READER SERVICE CARD

MFJ-949D *Deluxe* 300 Watt Tuner

Lets you tune out SWR on virtually any antenna 1.8-30 MHz . . . plus, you get dummy load, Cross-Needle meter, antenna switch, balun, 1-year *unconditional* guarantee . . . for only $149.95

MFJ-949D

$149.95

- *Peak reading Cross-Needle Meter*
- **Full size** *dummy load*
- **Custom** *inductor switch*
- *Antenna Switch*
- *4:1 Balun for balanced lines*
- *Covers 1.8 to 30 MHz*
- *1 year* **Unconditional** *Guarantee*
- *Made in USA*

More hams use the MFJ-949D than any other tuner...why settle for an imitation?

More hams use the MFJ-949D than any other antenna tuner in the world!

Why? Because the MFJ-949D gives you your very best value, first-rate performance, proven reliability, unbeatable quality and the best guarantee in ham radio -- all from the most trusted name in antenna tuners.

All the Features You'll Ever Need

The MFJ-949D matches your rig to virtually any antenna from 1.8 to 30 MHz.

You can tune out SWR on dipoles, inverted vees, verticals, random wires, beams, mobile whips, balanced lines and coax.

A lighted peak and average reading Cross-Needle meter shows you SWR, forward and reflected power -- all in a single glance.

A 6-position antenna switch lets you select 2 coax lines (direct or through tuner), random wire or balanced line and dummy load.

Has 4:1 balun for balanced lines.

Special Inductor Switch

The inductor switch is the most likely component to burn up in your antenna tuner.

The inductor switch in the MFJ-949D is *specially designed* to withstand the extreme voltages and currents that are developed in your tuner -- it's not an underrated off-the-shelf switch that can put you off-the-air.

Full Size Dummy Load

The MFJ-949D has a *full size* dummy load measuring 3/4 inch diameter by 5 inches. It easily handles 300 watts of abusive tune-up power.

Watchout for midget size dummy loads -- marginal ones could burn up your rig and put you off-the-air.

Unbeatable Quality

Each MFJ-949D aluminum cabinet is chemically etched to strongly bond MFJ's tough *baked-on* paint. You won't find a tougher, longer lasting finish anywhere.

Detailed logging scales and legends are clearly silk screened on the front and back panels with *permanent* black ink -- it's not merely a plastic decal or glued-on paper strip that can peel off.

MFJ uses a *custom* cabinet for each model.

Imitators may use the *same* cabinet for different models using different decals and leaving unused open holes that can be a haven for bugs and other small creatures.

Continuing Service

MFJ Customer Service Technicians will help you keep your MFJ tuner performing flawlessly -- no matter how long you own it. Just call our *toll-free* help line 800-647-TECH(8324) -- no other tuner manufacturer gives you toll-free help.

No Matter What™ Guarantee

You get MFJ's famous *one year No Matter What*™ *unconditional* guarantee. That means we will repair or replace your MFJ-949D (at our option) *no matter what* for a full year.

Others may give you a limited warranty on defects in material and workmanship. But what do you do if it burns up and they say, "Sorry, your limited warranty does not cover that?"

Why take chances?

There's just no shortcut. MFJ is the most trusted name in antenna tuners -- we've made more tuners for more years than anyone else.

Why take chances with an imitation when you can get the MFJ-949D -- the world's leading antenna tuner with years of proven performance -- **and** a *no matter what* unconditional guarantee at an affordable price?

Why Buy *Made in USA*

The MFJ-949D is made in USA. You're keeping your money here in the USA and helping fellow Americans.

If you buy a foreign made product, how do you get service if there's no service center in the USA?

Are you willing to pay expensive freight and duties to a foreign country for service?

Does a foreign company have to honor their warranty in the USA?

Call your Dealer for your *Best* Price

Call your favorite dealer for your *best* price and order your MFJ-949D today!

FREE MFJ 12/24 Hour Clock

For your **free** MFJ-108 12/24 hour clock, buy an MFJ-949D between November 15, 1991 and February 28, 1992. Then return your ***original*** *receipt* with your request for a free MFJ-108 clock and $5 shipping and handling to: **Free MFJ Clock Offer,** MFJ Enterprises, Inc., P.O. Box 494, Mississippi State, MS 39762. **Limit: One per customer.** Must be postmarked by March 31, 1992.

MFJ-948 Deluxe 300 Watt Tuner

MFJ-948

$129.95

If you don't need a dummy load but want **all** the other features of the MFJ-949D choose the new MFJ-948 for only $129.95.

The MFJ-948 features a **peak** reading **lighted** meter with a built-in lamp switch, a one year unconditional guarantee and is made in the USA.

Remember, with MFJ you're getting proven performance and reliability from the most trusted name in antenna tuners.

MFJ Low Pass Filter

MFJ-704

$39.95

1 year guarantee

Plugs between your transceiver and antenna. Suppresses TVI, RFI, telephone and other interference by reducing unwanted harmonics going into your antenna. 9 Chebyshev poles, teflon dielectric capacitors, high-Q inductors, ground plane shielding give you excellent TVI/RFI suppression. Handles 1.5 KW 1.8-30 MHz with low loss, low SWR. Made in USA.

Cross-Needle SWR/Wattmeter covers 1.8-60 MHz

MFJ-815B

$69.95

Cross-needle SWR/Wattmeter lets you read peak/average, forward/reflected power and SWR. 200/2000 watts forward and 50/500 watts reflected power ranges. Covers 1.8-60 MHz. Has meter zero adjustment. 7¼x4½x3½ inch aluminum cabinet. Meter lamp uses 12 VDC or 110 VAC with MFJ-1312, $12.95. One year *unconditional* guarantee. Made in USA.

650 MHz Dummy Load

MFJ-264

$59.95

1 year guarantee
Made in USA

DC-650 MHz 50 ohm dummy load handles 1.5 KW SWR below 1.3 to 650 MHz and below 1.1 at 30 MHz. 100 watts continuously, 1.5 KW for 10 seconds.

Nearest Dealer/Orders: 800-647-1800
Technical Help: 800-647-TECH(8324)
FAX: (601) 323-6551

MFJ ENTERPRISES, INC.
Box 494, Miss. State, MS 39762
(601) 323-5869; **TELEX:** 53 4590

MFJ . . . making quality affordable

Add $5 each shipping/handling;

CIRCLE 155 ON READER SERVICE CARD

OUR READERS SAY

MAN Overboard

Editor, *CQ:*

Several months ago I agreed to a lengthy phone interview about Radio Shack's new HTX-202 2-meter HT with Hap Holly, KC9RP, for his "Radio Amateur Information Network (RAIN) Dial-up Information Service," a telephone dial-up news service. I also gave Hap permission to duplicate the material in his column in *Radio Scan* magazine. My (perhaps naive) impression was that the information was intended for anyone from club newsletter editors to commercial broadcast stations who might find it useful.

It came to my attention, a week or so ago, that K1MAN had broadcast the interview recently on 10 meters. This morning, I'm told, it was rebroadcast on 14.275 MHz.

Since my function at Radio Shack includes promoting our products through the editorial side of both broadcast and print media, much of the interview is simply "advertising," that has absolutely no place in any amateur band. I have always refused to discuss, over the ham bands, information of a questionable nature regarding any Radio Shack product.

I neither expected, participated in, nor condoned transmitting this material on the ham bands. Had there been any hint that it might be used in this manner, there would have been no interview. I take the strongest possible exception to K1MAN's embarrassing use of this material, and have so informed the FCC. Hap has been advised that any future interviews, with any Tandy or Radio Shack employee, must clearly state that the material is copyrighted, and must not be broadcast on any amateur frequency.

Ed Juge, W5TOO
Radio Shack

In Response

Editor, *CQ:*

The other morning I received a phone call from Ed Juge, W5TOO, of the Tandy/Radio Shack Corp. He was very upset that my August interview with him re the new Realistic HTX-202 handheld aired earlier this month by Glenn Baxter, K1MAN, as part of his IARN (International Amateur Radio Network) Amateur Information Bulletin Service, which airs 6 times daily on 80, 20, and 10 meters. At first I took strong exception to Mr. Juge's attitude. At the risk of my sounding like a flag waver, the U.S. Constitution clearly states that no one person will create any law that limits a free press. I felt Mr. Juge was trying to do just that. After giving it some thought, however, I realized he had a right to be irate. Mr. Juge gave me the interview for the purpose of transcribing it for the "RAIN FOCUS" column for the September issue of *Radio Scan* magazine. It was my fault that he did not fully understand that the interview would be heard over amateur radio. Radio Shack's expansion into the handheld amateur market warranted some coverage in the amateur press. But while products are reviewed informally on the ham bands, the inclusion of a product review by someone in Mr. Juge's position in an on-the-air bulletin service would be perceived by many as crass commercialism. As I am learning, perceptions are everything. In my zeal to provide the amateur community with the particulars about the HTX-202 handheld, I inadvertently put Mr. Juge in a difficult position. I am indeed sorry for having done so.

To reiterate, Mr. Juge took great exception to his interview being aired on the IARN bulletin service. Thinking about it now, I can see why. So to avoid any confusion in the future, I do not want *any* of my RAIN programming to air on the IARN after 1800 UTC, November 23, 1991.

Unfortunately, I have no way of stopping Glenn Baxter, K1MAN, from airing RAIN interviews and commentaries. Like NewsLine and EastLink, the RAIN Dial-up Service (708/299-INFO) is on an automatic telephone answering machine. Anyone can call and record it. I have no way of controlling where my programming is aired or by whom, any more than the ARRL can control who records and airs W1AW bulletins.

It's no secret that for the past 5 years I have openly supported the work of Glenn Baxter and the IARN. Conceptually, the IARN is a great idea, as it has saved lives. I still view it as a viable alternative to traditional ham radio bureaucracy. It exists to assist the peoples of other nations in times of disaster.

It is also no secret that the IARN is an organization openly hated by most of the world's ham radio societies, because it bypasses them and deals directly with their officials. Their jealousy is understandable, as nobody likes his territorial sovereignty encroached upon by outsiders, regardless of their skills and logistical support.

Though the IARN has accomplished much since its inception in 1985, it has one major flaw: the organization exists at the whim and will of one man—Glenn Baxter, K1MAN. His organization appears to be a one-man show minus internal checks and balances. As a former board member, I should know. I feel the outstanding work of the IARN is being seriously compromised by Glenn's ongoing feuds with the FCC and others. All organizations are judged by the quality of their leadership—it's a fact of life. Due to what looks to be poor judgment in recent months regarding programming Glenn has produced, the IARN has lost much of the public support it once enjoyed.

Last Spring, I finally realized what was happening to the IARN, and I began quietly backing away from it. Though Glenn publicizes the IARN as being an international organization with "world headquarters" in Belgrade Lakes, Maine, it appears for all practical purposes to be a one-man operation, albeit with some outside help and laudable intentions. I now find myself in the same position as have others who have tried to lend their support to IARN. I will continue to support the concept of the IARN, but for now I cannot support the person who runs it. I hereby resign from the IARN as a member, board member, and supplier of audio programming. As I do not have the finances to copyright or legally protect my material, I can only hope that Glenn will abide by my wishes and cease airing my RAIN programming as of 1800 UTC, November 23, 1991.

I suspect next week, or 2 weeks from now, Glenn will spend 5 or 10 minutes lambasting me for defecting. So be it. I made the mistake of supporting Glenn in the first place; now I'm paying the price. What Glenn will never know is my having to write this hurts more than anything he might say about me on the air.

Hap Holly, KC9RP
Radio Amateur Information Network

MFJ TUNERS

MFJ's *world famous* 3 KW Versa Tuner V

If you won't settle for less . . . here is the finest 3 KW tuner money can buy!

The MFJ-989C is not for everyone.

However, if you make the investment, you'll get the finest 3 KW tuner money can buy. Here's why.

Massive Transmitting Capacitors

You get two *massive* 250 pf transmitting variable capacitors with detailed logging scales. They can handle *amps* of RF current and withstand 6000 RF volts because the plates are smoothed and polished and have extra wide spacing.

Precision Roller Inductor

A precision roller inductor lets you tune your SWR down to the absolute minimum. A 3-digit turns counter plus a spinner knob gives you exact inductance control.

Ball bearings on both the front and back shafts give you a velvet smooth vernier feel. Steel end plates and steel shafts give you lifetime durability.

You won't have arcing problems with this roller inductor. That's because firm springs put considerable pressure on a plated contact wheel for excellent electrical contact.

Wide, low inductance straps are used for high current connections and a new core gives you excellent RF properties for minimum loss.

MFJ-989C **$349.95**

Cross-Needle Meter

You get a lighted *peak* and average reading Cross-Needle SWR/Wattmeter with 200 and 2000 watt ranges. Its new directional coupler gives you accurate SWR and power readings over the entire 1.8 through 30 MHz range.

Super Heavy Duty Balun

You get a super heavy duty current balun for balanced lines. It's made with two giant 2 1/2 inch powder iron toroid cores and wound with *teflon* wire connected to high voltage ceramic feedthru insulators. It lets you operate high power into balanced feedlines out core saturation or voltage breakdown.

Ceramic Antenna Switch

You get a two wafer 6 position *ceramic* antenna switch with extra large contacts for trouble free switching.

Plus much, much more

You also get a *built-in 300 watt dummy load*, full one year *unconditional* guarantee, flip stand, all aluminum cabinet, tough baked on paint, locking compound on all nuts and bolts. 3 KW PEP. Meter lamp needs 12 volts. Compact 10 3/4x4 1/2x15 inches. Made in the USA. Add $10 s/h.

Don't settle for less--get yours today!

MFJ's *Deluxe* 300 Watt Tuner

MFJ-949D **$149.95**

More hams use the MFJ-949D than any other antenna tuner in the world! **Why?** Because the MFJ-949D gives you proven reliability, the ability to match just about anything and a one year *unconditional* guarantee.

You get a lighted *peak* and average reading Cross-Needle SWR/wattmeter, antenna switch, 4:1 balun for balanced lines, 1.8-30 MHz coverage and a *full size* dummy load that easily handles 300 watts of abusive tune-up power.

The inductor switch is *specially designed* to withstand the extreme voltages and currents that are developed in your tuner—it's not an underrated of-the-shelf switch that can put you off-the-air.

Each MFJ-949D aluminum cabinet is chemically etched to strongly bond MFJ's tough *baked-on* paint. You won't find a tougher, longer lasting finish anywhere.

MFJ's *New 300 Watt* Tuner

MFJ-948 **$129.95**

If you don't need a dummy load but want *all* the other features of the MFJ-949D, choose the MFJ-948 for $129.95.

The MFJ-948 features a **peak** reading **lighted** meter with a built-in lamp switch, one year **unconditional** guarantee and is made here in the USA.

MFJ's *smallest* Versa Tuner

MFJ-901B **$59.95**

The MFJ-901B is our smallest -- 5x2x6 inches -- (and most affordable) 200 watt PEP tuner -- when both your space **and** your budget is limited. Good for matching solid state rigs to linears.

MFJ'S *Super Value* Tuner

MFJ-941E **$109.95**

The new MFJ-941E gives you a 300 watt PEP tuner that covers everything from 1.8-30 MHz -- plus you get a cross-needle meter, antenna switch and balun . . . for an incredible $109.95. Lamp uses 12 VDC or 110 VAC with MFJ-1312, $12.95.

Antenna switch selects 2 coax lines (direct or through tuner), random wire, balanced line or external dummy load. 4:1 balun. 1000 volt capacitors. Measures 10-5/8'' x 2-7/8'' x 7''.

2-Knob *Differential-T*™ Tuner

MFJ-986 **$289.95**

The new MFJ-986 Differential-T™ 2-knob tuner uses a differential capacitor to make tuning foolproof and easier than ever. It ends constant re-tuning with broadband coverage and gives you minimum SWR at only *one* best setting. Handles 3 KW PEP.

Roller inductor makes tuning smooth and easy. Turns counter lets you quickly re-tune to frequency.

MFJ's peak and average reading cross-needle meter reads forward/reflected power in 200/50 and 2000/500 watt ranges. Meter lamp uses 12 VDC or 110 VAC with MFJ-1312, $12.95. Current balun reduces feedline radiation and forces equal currents into antenna halves that are not perfectly balanced. It covers 1.8-30 MHz. Get yours today! Add $10 s/h.

MFJ's *Random Wire* Tuner

MFJ-16010 **$39.95**

Operate all bands anywhere with any transceiver with the MFJ-16010. It lets you turn a random wire into a transmitting antenna. 1.8-30 MHz. 200 watts PEP. Ultra small 2''x3''x4''.

MFJ's *Mobile* Tuner

MFJ-945D **$89.95**

Don't leave home without this *mobile* tuner! Have an uninterrupted trip as the MFJ-945D extends your antenna bandwidth so you don't have to stop, go outside and adjust your mobile whip.

Small 8 x 2 x 6 inches uses little room. *Lighted Cross-Needle* SWR/Wattmeter makes tuning easy while in motion. Has lamp switch. 1.8-30 MHz. 300 watts PEP. Mobile mount, MFJ-20, $4.95.

MFJ's *Versatile 1.5 KW* Tuner

MFJ-962C **$229.95**

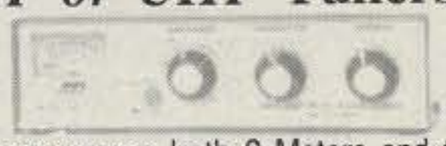
MFJ-962C lets you use your barefoot rig now and have the capacity to add a 1.5 KW PEP amplifier later. It covers 1.8-30 MHz.

You get MFJ's **peak** and average reading Cross-needle SWR/Wattmeter. It reads forward/reflected power in 200/50 and 2000/500 watt ranges. Lamp uses 12 VDC or 110 VAC with MFJ-1312, $12.95.

Plus . . . 6-position antenna switch and teflon wound balun with ceramic feedthru insulators for balanced lines. 10¾ x 4½ x 14-7/87 in. $10 s/h.

MFJ's *VHF or UHF* Tuners

MFJ-921 or MFJ-924 **$69.95**



MFJ-921 VHF tuner covers both 2 Meters and the 220 MHz bands. **MFJ-924** covers **440** MHz. Built-in **SWR/Wattmeter.** 8'' x 2½'' x 3''. 2-knob tuning convenient for mobile or base.

Nearest Dealer/Orders: 800-647-1800
Technical Help: 800-647-TECH (8324)

• **1 year unconditional guarantee** • 30 day money back guarantee (less s/h) on orders from MFJ • Free catalog

MFJ ENTERPRISES, INC.
Box 494, Miss. State, MS 39762
(601) 323-5869; **TELEX:** 53 4590
FAX: (601) 323-6551; Add $6 s/h.

MFJ . . . making quality affordable

CIRCLE 156 ON READER SERVICE CARD

Announcing (from p. 6)

Feb. 15, **Cherryland ARC Hamfest,** Immaculate Conception School, Traverse City, Michigan. Contact Ken Musson, W8QKP, 9680 Peninsula Drive, Traverse City, MI 49684 (616-947-1372).

Feb. 15, **Orange County ARC Winter Hamfest,** John S. Burke Catholic High School, Goshen, New York. Contact James Capicotto 914-564-2707.

Feb. 16, **Aurora Repeater Assn. 10th Annual Swapfest,** Jefferson County Fairgrounds, Golden, Colorado. Contact Judi, WD0HNP, 303-450-6910, or Jan, KA7TYU, 303-680-8857.

Feb. 22, **Vermont Winter Hamfest,** Milton High School, Milton, Vermont. Contact Mitch Stern, WB2JSJ, 802-879-6589, or Tom Taylor, N1EXY, 802-893-4834. (VE exams at 2 PM, $5.)

Feb. 22, **Charleston Hamfest,** National Guard Armory, Charleston, South Carolina. Contact Jenny Myers, 803-747-2324, or Linwood Sikes, 803-556-5566. (VE exams at 11 AM on the campus of the Citadel, walk-in only; for info call 803-566-0352 or 803-873-9465; no laptop computers or keyboards allowed.)

Feb. 22-23, **ARRL 1992 Ohio State Convention,** Cincinnati Gardens Exhibition Center, Cincinnati, Ohio. Contact Stan Cohen, WD8QDQ, 513-531-1011, or Joe Halpin, W8JDU, 513-851-1056.

Feb. 23, **Neosho Valley ARC Electronics Hobbyist Auction,** Strawn school building, New Strawn, Kansas. Contact NVARC, P.O. Box 931, Burlington, KS 66839, or call Bob at 316-364-5446.

Feb. 23, **Livonia ARC Swap 'n Shop,** Dearborn Civic Center, Dearborn, Michigan. Contact Neil Coffin, WA8GWL, Livonia ARC, P.O. Box 2111, Livonia, MI 48151 (SASE), or call 313-427-3905. (VE exams.)

Feb. 23, **Cuyahoga Falls ARC Hamfest,** ST.V. Center, Cuyahoga Falls, Ohio. Contact Bill Sovinsky, K8JSL, 2305 24th St., Cuyahoga Falls, OH 44223 (216-923-3830). (Wheelchair accessible.)

Feb. 29, **Orange ARC 7th Annual Hamfest/Fleamarket,** VFW Hall, Orange, Texas. Contact Sherwood Buckalew, KA5VOT, 409-883-6111, or Dan Killough, WB4GYS, 409-769-8436. (VE exams start at 9 AM; preregistration preferred, call for info.)

Feb. 29, **Central Dakota ARC Hamfest,** Comfort Inn, Bismarck, North Dakota. Contact Central Dakota ARC, P.O. Box 7162, Bismarck, ND 58507, or call Dee, KB0CGK, 701-224-9139.

Feb. 29, **Dalton ARC Hamfest,** North Georgia Fairgrounds, Dalton, Georgia. Contact Harold Jones, N4OTC, P.O. Box 143, Dalton, GA 30722-0143 (404-673-2291). (Exams preregistration only; for info call Bert Coker, N4BZJ, 404-673-2214.)

Feb. 29, **Hernando County ARA 10th Annual Hamfest,** Hernando County Fairgrounds, 2 miles south of Brooksville, Florida. Call 904-796-4840 after 7 PM.

March 1, **WECAFest '92,** Yonkers Raceway, Yonkers, New York. Call 914-962-9666. Handicapped accessible; exams.)

March 1, **York (Ham and Computer) Springfest,** Dover Firehall, York, Pennsylvania. Contact York Springfest, P.O. Box 316, New Freedom, PA 17349-0316, or call 301-239-3878. (Exams.)

MFJ gives you *all 9* digital modes

and *keeps on* bringing you state-of-the-art advances

Now with *FULL COLOR SSTV* . . . the latest MFJ breakthrough!

MFJ-1278

$279.95

No old stale technology at MFJ!

Using the latest advances, MFJ brings you 9 exciting digital modes and keeps on bringing you state of the art advances like ***color*** SSTV. You get tons of features others just don't have.

Only MFJ gives you *all 9* modes

Count 'em -- you get 9 fun modes -- Packet, AMTOR, RTTY, ASCII, CW, FAX, SSTV, Navtex and Contest Memory Keyer.

You can't get all 9 modes in *any* competitive multi-mode. Nobody gives you modes MFJ-1278 doesn't have.

NEW! New Full Color SSTV!

Enjoy the latest MFJ-1278 breakthrough -- full color SSTV display with an appropriate terminal program like MFJ-1289!

The best modem you can get

Tests in *Packet Radio Magazine* prove the modem used in the MFJ-1278 copies HF packet more accurately than all other modems tested.

MFJ-1278 is the *only* multi-mode with a ***true*** DCD circuit. This dramatically reduces sensitivity to noise and dramatically increases completed QSOs.

Exclusive Built in Printer Port

The MFJ-1278 has a printer port that lets you plug in your Epson or IBM compatible printer. You don't have to buy a silly $40 cable just to plug in your printer.

20 LED Tuning Indicator

MFJ's unequaled tuning indicator makes it really easy to work HF packet. Just tune your radio to center a single LED and you're precisely tuned in to within 10 Hz -- and you use it the same for all modes.

New Easy Mail™ Personal Mailbox

You get MFJ's new Easy Mail™ Personal Mailbox with soft-partitioned memory so you and your ham buddies can leave messages for each other 24 hours a day.

Multi-Gray Level FAX/SSTV Modem

You'll see tomorrow's news today when you copy outstanding FAX news photos with crisp clear details. MFJ-1278 is the *only* multi-mode with a built-in multi-gray level modem. It lets you transmit and/or receive multi-gray level pictures with an appropriate terminal program.

NEW! MFJ's new Automatic Signal Analysis™ gives you *exclusive* HF packet idenification!

MFJ's new ASA automatically identifies HF packet, RTTY, ASCII and AMTOR signals. A quick "OK" command selects the mode!

One FREE Upgrade!

When you buy your MFJ-1278 *today*, you don't have to miss new modes and features that come out *tommorow*. **Why?** Because your 1278 comes with a coupon good for one ***free*** eprom upgrade exchange that'll add new features.

Plus More . . .

Plus you get . . . 32K RAM, ***free*** AC power supply, Host mode, Kiss interface for TCP/IP and MSYS compatibility, fast throughput anti-collision technology, independent transmit level for each radio port, random code generator, lithium battery backup, RS-232 *and* TTL serial ports, socketed ICs, tune up command, peripheral I/O port, automatic serial numbering, programmable message memories, dual radio ports (*each* HF or VHF), CW paddle jack, audio amplifier and speaker jack so you can monitor CW sidetone, transmit and receive audio and packet connect bell, ***new*** fully intergrated instruction manual with *Fast Start*™ booklet and more. 9½ x 9½ x 1½ inches.

No Matter What™ Guarantee

You get MFJ's one year No Matter What™ Guarantee.

That means we will repair or replace your MFJ multi-mode (at our option) *no matter what* happens to it for a year.

Others give you a 90 day ***limited*** warranty. What do you do *after* 90 days? Or *before* 90 days if they say, "Sorry, your *limited* warranty does not cover *that* problem?" Why take chances when MFJ gives you ***No Matter What*** protection for a full year?

Get nine new ways of having fun

Don't settle for old stale technology. **Choose** the multi-mode that gives you the latest advances and all 9 modes. Get yours today!

New MFJ-1278T *Turbo*

with *fast* 2400 baud modem

MFJ-1278T

$359.95

The new MFJ-1278T **Turbo** gives you *fast* 2400 baud packet -- **twice** the baud rate of any competitive multi-mode. By communicating faster you'll reduce chances for error, lessen congestion and more efficiently utilize our ham frequencies. You'll also get 1200/300 baud for compatibility with older TNCs.

2400 modem available separately, MFJ-2400, $69.95. **New!** G3RUH compatible 9600 Baud modem, **MFJ-9600, $109.95.**

NEW! MFJ 9600 Baud Modem

MFJ-9600

$109.95

G3RUH compatible 9600 baud modem. Specially designed for the MFJ-1278 and other MFJ TNCs. Plugs right in to MFJ-1278 for very easy installation. Screws, cable and LED included. Not all radios compatible with 9600 baud.

Radio specific TNC cables

New pre-wired cables instantly connect your MFJ multi-mode or MFJ TNC to almost any radio for only . . . $14.95 each!

Now you'll get on the air even faster when you choose an MFJ-1278 or MFJ-1278T Multi-mode or an MFJ-1270B, MFJ-1274, MFJ-1270BT or MFJ-1274T packet radio controller.

These new MFJ cables are pre-wired for most 8 pin rigs and HTs. You won't have to wait to get your cable wired because MFJ solves that little problem for only . . . $14.95!

Choose the custom cable for your radio from the models listed below. Take it home with your MFJ Multi-mode or TNC and your MFJ MultiCom™ package with computer cable for IBM compatible, Commodore 64/128 or Macintosh (described at right). ***What else do you have to do? Just*** plug it all in and you're hooked up and on the air fast . . . . Enjoy!

MFJ TNC to Radio Cables: $14.95 *each*

MFJ-5024, **Icom, Yaesu HTs, Alinco DJ-560**
MFJ-5026, **Kenwood HTs**
MFJ-5080, **Yaesu 8 pin rigs**
MFJ-5084, **Icom 8 pin rigs**
MFJ-5086, **Kenwood and Alinco 8 pin rigs**

MFJ-1289 MultiCom™ . . . exciting MFJ-1278 software

High resolution AP news photo received on 20.738 MHz using MFJ MultiCom and MFJ-1278 with multi-gray modem.

MFJ-1289 **$59.95**

New menu-driven MultiCom™ brings out the full power of your MFJ-1278 with multi-gray modem. No set-up required — just load and use. You get incredible high resolution WeFAX maps and AP news photos right off HF. You also get **color SSTV** display and packet pictures.

Bursting with features . . . One-Key Macros™ combine multiple keystrokes into a single touch, Call-Alert™ sounds an alarm when any characters you tell it to watch for come in, Auto-Set™ instantly switches entire stored sets of parameters, Auto-Router™ stores digipeater node routes for instant use, Packet Multi-Plex™ lets you transmit or receive a binary file and continue your QSO, Multi-Word™ gives a powerful word processor that is tailor-made for multi-mode communications.

Custom QSL created with paint program

Multi-Gray WeFAX weather map received on 16.410 MHz using MFJ MultiCom and MFJ-1278 with multi-gray modem.

can be transmitted by FAX, SSTV or Packet. On-line help. RS-232 cable. Tons more.

MultiCom64™ and MultiComMac™

. . . new MultiCom packages give you most of the capabilties of the IBM compatible MultiCom for your C64/128 or Macintosh computer . . .

They come complete with interface cable and friendly instructions -- everything you need. Here are the models available:

C64/128: MFJ-1282B MultiCom64™ $39.95.
Macintosh: MFJ-1287B MultiComMac™,$49.95.

Nearest Dealer/Orders: 800-647-1800

MFJ ENTERPRISES, INC.
Box 494, Miss. State, MS 39762
(601) 323-5869; **TELEX:** 53 4590
FAX: (601) 323-6551; Include s/h.

MFJ . . . making quality affordable

CIRCLE 164 ON READER SERVICE CARD

ANTENNAS & ACCESSORIES

A LOOK AT THE SHACK FROM BOTH ENDS OF THE COAX

BY KARL T. THURBER, JR., W8FX

Antenna Notes—Part IV

Last time we got together we featured a variety of antennas and accessories topics. We're on the same track this month, so let's get started.

Antenna Notes

Flagpole and Vent Antennas. In the November 1990 column we alluded to the perennial problems experienced by those who for various reasons can't erect a large outdoor antenna, especially for HF communications. You know, you live in a restricted development, a condominium, or apartment where a tower-mounted beam or a 160 meter dipole is out of the question. In the same column we took note of the first commercial HF flagpole antenna we'd seen, the Tice Electronics FP3V Flagpole Vertical *(the antenna is no longer available, as the company has since gone out of business)*. We noted that the FP3V was a small (10 foot), three-band (10, 15, and 20 meter) trap antenna designed to fit almost anywhere.

A reader, Roy L. Wilson, Jr., took us to task, telling us that in the September 1983 issue of *CQ*'s sister publication, *Popular Communications*, columnist Don Jensen mentioned such an antenna, which was manufactured by Sabre Communications Corporation (P.O. Box 536, Sioux City, IA 51102). The Sabre antenna covered much more than the amateur bands and handled 2 KW PEP from 3.5 and 6 MHz, and 8 KW between 6 and 30 MHz. Designed for military and tactical applications, the antenna was said to take about 30 minutes to install or to take down using three people.

We stand corrected, Roy, although I suspect the price tag on the deluxe, military-style Sabre antenna would be a little more than most amateurs would care to pay for a simulated flagpole!

Beam Wind Tip de WA0KKC. Richard Mollentine, WA0KKC, a frequent contributor to the column, recently came in with another tip. He offers that in a severe storm he always has found it best to turn his beam to present as little resistance to the wind as possible. To get a fairly precise indication of the wind's direction, he has attached a long "streamer" to his tower, near its top. For the streamer he uses a narrow, 3 inch wide section of plastic trash bag that is simply stapled to itself.

Thanks, Dick. Just wonder where one might buy a surplus wind sock for an even spiffier appearance?

The Forbes Group Ventenna. While we're dwelling on unusual antennas for the urban dweller, we shouldn't skip over the Ventenna, designed for VHF and UHF applications.

Mark Forbes, KC9C, provided us with some information on his new Ventenna. The Ventenna is designed to get your signal up in the air, on the roof of your house, condo, or apartment. There it is mounted on an existing vent pipe, or on a "dummy" vent near to the peak of your roof (vent pipe fixtures are available at hardware stores for a few dollars). The antenna, which mounts on 1.5 or 2.0 inch ABS plastic or metal vent pipe, handles up to 1500 watts PEP and includes an inline SO-239 type RF connector. The Ventenna is pretuned and wideband, having a claimed SWR of less than 2:1 over its operating range, so no measuring or adjustment is required. In any case, the unity-gain antenna on your roof should outperform a rubber duck or an indoor antenna.

The Ventenna is available in three single-band models to separately cover the 144, 220, and 440 MHz bands; each is priced at $39.95. For more information, contact The Forbes Group, P.O. Box 445, Rocklin, CA 95677.

From the Laboratory. David A. Clingerman, W6OAL, operates the Olde Antenna Lab (OAL). Dave is a retired Navy Aviation Electronics Technician who has also worked as a radio frequency (RF) engineer, RF manager, and electronics engineer in later government and civilian endeavors.

Dave currently produces a number of different antennas in his Denver lab. Some are quite unusual. The antennas are mostly for VHF, UHF, and microwave use; Dave's special focus is on antennas for amateur television (ATV) work. His offerings include several omnidirectional "wheels," four-element 70 cm Yagis, 32-element 23 and 70 cm collinear arrays, 24 cm skeleton slots, 140–1400 MHz discones, 10-element 23 cm helixes, 2 meter and 70 cm J-poles, 2 meter and 70 cm coaxial collinear base station verticals, and corner reflectors for 13, 24, and 70 cm. He also offers 24 and 70 cm parabolic dish feeds, bandpass filters, power splitters, and Z-verters (to convert 75 ohm hardline for 50 ohm use). I'd say that Dave is most proud of his wheels, which have been selling like hotcakes since Dayton.

The 70 cm Little Wheel, which Dave says has been used on every successful ATV balloon launch, is a lightweight, omnidirectional antenna that offers horizontal polarization and has its origins in 1950s 2 meter mobile operation in New England. The Little Wheel consists of three broadband quarterwave elements in parallel and arranged in a cloverleaf pattern. A capacitive stub is employed at the feedpoint to balance the inductance and drive the terminal impedance toward 50 ohms. At resonance the SWR is said to be near 1:1 across a 20 MHz bandwidth. Dave says that the 70 cm Little Wheels worked so well that he created a Mini Wheel for 23/24 cm and a Micro Wheel for 13 cm. A Nano Wheel also is available for 33 cm.

All of the Wheels are offered in kit form or fully assembled. Kits are $19.95, while built and tested models are $29.95. A stacked pair is $49.95, while a stacked quad is $149.95.

For more detailed specs on the Wheels or other OAL products, contact Dave at The Olde Antenna Lab, 4725 W. Quincy #1014, Denver, CO 80236.

Ham-Pro Antennas. Peter K. Onnigian, W6QEU, Ham-Pro president, and Philip Onnigian, KC6UPL, sales manager, sent us an impressive pile of information on Ham-Pro's line of rugged Yagi monobanders that cover 20 meters through 70 cm.

While the company is devoted to technical excellence in its electrical design approach, they also heavily stress superior mechanical design to alleviate one's worry of whether the antenna will stay up during the next bad storm. As one of Ham-Pro's ads says, "You don't want your antenna lying down on the job."

Reflecting Ham-Pro's over 30-year background in commercial FM and TV transmitting antenna manufacturing, all of their antennas are manufactured to, or exceed, Electronics Industries Association (EIA) Standard RS-409, which defines minimum electrical and mechanical standards for amateur antennas. The Ham-Pro antennas, which are based on computer-aided structural design, are rated for 87 MPH steady winds (112 MPH gusts); the VHF antennas are claimed to safely withstand those winds even with a quarter-inch ice coating.

The monobanders use a patented, factory tuned and sealed "Balanced Double Gamma Feed System" that is said to eliminate the need for stepladder or tower tuning as well as random feedline radiation (and pickup) that distorts the antenna pattern. The feed system also is said to provide an extremely broad SWR bandwidth. Other Ham-Pro features include professionally measured and certified range gains and patterns as well as very high front-to-side ratios.

At least ten monobanders are offered in various combinations of band coverage and element configuration. These range from 4 elements on 20 meters to 24 elements on 70 cm. Prices range from about $60 to $530, depending on model. The antennas carry a 2-year materials and workmanship warranty and a 30-day money back guarantee.

For more information and specs, contact Ham-Pro Antennas, 6199-B Warehouse Way, Sacramento, CA 95826. A free copy of EIA Standard RS-409 also is available upon request.

Gene Hansen SUPERTENNA. The SUPERTENNA has been around for many years and today is going head-to-head with other serious HF mobile antennas such as the WB5TYD Texas Bugcatcher, the WD4BUM Carolina Bugcatcher, the Australian Outbacker™ and other popular and efficient mobile designs.

The SUPERTENNA is an all-band mobile, mobile home, and marine antenna that claims high efficiency but does not require the operator to switch a resonator or change a whip to change bands, since the antenna is multiple-resonant on five bands (10, 15, 20, 40, and 80 meters). The antenna has a large, high center loading coil.

The antenna taps are preset but can be

317 Poplar Drive, Millbrook, AL 36054

Shown here is the Gene Hansen SUPERTENNA HF mobile antenna ready to strut its stuff on the road. The antenna is resonant on five HF bands (10, 15, 20, 40, and 80 meters) and requires no band switching. (Photo courtesy Gene Hansen Company)

changed easily if needed, with initial tuning being accomplished with an inline SWR bridge. The bandwidth and SWR are typical for an antenna with an efficient, high-Q center loading coil, so that at least on the lower HF bands an antenna tuner is required. The antenna includes an 8 foot whip, a 30 inch lower mast section, and an easy-on, easy-off quick disconnect connector on top for easy garaging. The antenna features stainless steel, corrosion-resistant hardware, and a stainless steel mast. There are no moving parts or screw-on joints that would adversely impact the antenna's weather resistance or performance.

For more information, contact the Gene Hansen Company, 1000 Hansen Road, Corrales, NM 87048-0419.

Nevada Discone. Discones are increasingly popular for VHF and up. Electronic Distributors Corporation (EDCO) offers the Nevada WB1300 Discone, which has a good reputation as a wideband omnidirectional antenna covering 25–1300 MHz. Like most discones, the WB1300 is fundamentally a receiving antenna, but it also can be used for transmitting on the 50, 144, 430, 900, and 1200 MHz bands; however, power handling is limited to 200 watts.

The 2.2 lb. antenna has a length of 5 feet 6 inches and thus is suitable even for indoor or attic installation in restricted environments. The antenna is of stainless steel construction and comes complete with mounting kit and a short mast section.

EDCO, through its dealers, also handles a good selection of Creative Design roof towers, rotators, and wideband log periodic antennas (two models, one covering 50–1300 MHz and another covering 105–1300 MHz). For more information and pricing, contact Electronic Distributors Corporation, 325 Mill St., Vienna, VA 22180.

Mini Delta Antennas. Delta Antenna Products has announced a 40 meter version of its popular coax-fed, Mini Delta low-band driven tri-

angle antenna, which the company claims has many of the basic radiation characteristics of a quad. The 40 meter version is priced at $59.95 and includes insulators, wire, and the coax center connector. Also available is a 10 meter version (priced at $49.95) that covers the entire band, including the Novice phone band. In addition, an information kit that includes complete assembly instructions and antenna dimensions (but less hardware) for the bands of your choice is available for $7.00.

For more details on the Mini Deltas, contact Delta Antenna Products, P.O. Box 716, Tehachapi, CA 93581.

New ONV Safety Belt. Hardly anyone needs to be reminded about the need to be safe when working on antennas, especially when climbing towers. After all, who wants to make his or her last SWR adjustment right then and there on the tower?

Allen F. Massa, WA2IZN, and Dorothy A. Massa, KB2DAD, now offer the ONV Safety Belt. A new model with seat harness is priced at $89.95 and accommodates up to a 46 inch waist; a similar model to accommodate up to a 56 inch waist is $10 extra. The regular ONV safety belt is still offered for $74.95. A tool pouch and several rope lanyards and safety lines also are available.

For more information, contact ONV Safety Belt Co., P.O. Box 404, Ramsey, NJ 07446.

Soft Stuff

Update: YAGIMAX 3.0. In last July's column we covered YAGIMAX 2.20 for the IBM PC. To briefly review, it's an antenna analysis and design program offered by Lew Gordon, K4VX, also the author of the earlier YAGINEC. YAGIMAX allows element-by-element optimization and generates patterns for Yagis stacked in free space, in either the E or H plane.

Lew recently sent us a copy of YAGIMAX 3.0, which represents a complete revision over previous versions, both in style and format. In his words, YAGIMAX was now one year old and was in need of a facelift, which he took care of. The new version has lots of the bells and whistles that PC users have come to expect in their software. Consequently, the new version features a topline menu which is ALT-key and mouse driven. Help screens are available to assist the new user, and "hot" function keys are available to execute various program functions. The new, slicker version is about 60 percent faster than previous versions and also corrects some minor bugs in Version 2.

YAGIMAX is available from many shareware sources, including bulletin boards (BBSs). Lew requests a donation if you use the program. For additional information, contact Lew Gordon, K4VX, P.O. Box 105, Hannibal, MO 63401.

QSO Software Addition. In the February 1990 column we described QSO Tutor, a computer-based study aid for amateur radio exams. Programs are separately available for each license class from Novice through Extra; each is $29.95.

Newly available is QSO Comp-Troller® in separate versions for the IBM PC and the Macintosh. The two programs are designed to control late-model Kenwood radios that support the IF-32C interface; future versions should support non-Kenwood models. As the company's advertising states, "as a corporate comptroller manages the internal services and details of a corporation, so will QSO Comp-Troller manage the interface between you and your transceiver."

Frequencies can be directly input by the user and annotated with a text note that describes the memory. Memories also can be read from the transceiver and stored on, or read from, disk. The program also provides additional memories that perform identically to the transceiver's traditional memories and that can be used to recall settings. The program also keeps track of any adjustments made directly on the rig and reflects them on the computer display. Other features include an integrated logging routine, graphical S-meter and slope tuning displays, on-screen GMT and local time indicators, a frequency allocation chart, monitoring of in/out of band transmit condition, multi-operator logging, an enhanced scanning capability, and more.

QSO Comp-Troller is priced at $99.95 and is available from QSO Software, 208 Partridge Way, Kennett Square, PA 19348.

DBase Logging Software. Recently we've seen several amateur-radio-based add-on logging and contesting programs that are designed to run in conjunction with a commercial database manager, such as Ashton-Tate's Dbase™. One of these add-ons is a logger known as Ham Radio Logging Software for Dbase™ Users. It's offered by Steven L. Smith, KG5VK.

Steve's program has many of the logger features that computer users have come to expect, including callsign prefixes and beam headings, state and country look-up, DXCC status and update, ITU and CQ zones, and the like. Right now Steve's program is still in the development stage, so he's looking for feedback. If you're a confirmed Dbase user, you'll probably like the style of this logger, which is available from various shareware sources. Registration for a nominal fee (to defray costs and ensure delivery of future updates) is available from Steven L. Smith, KG5VK, 30 Amy Lane, Benton, LA 71006.

Reminders 3.0! This program is designed to help the busy person organize and monitor his or her schedule. In the company's words, "Reminders! manages your agenda to keep you on time and out of trouble." It's designed specifically to automate the chores you struggle with or simply can't do in a daybook or so-called "executive scheduler." Reminders! combines to-do lists, note pads, and phone books with calendars, schedules, and logs to help you keep track of it all.

The pop-up program is divided into five major modules: reminders, schedule, phone book, options, and print. With these modules you can schedule an appointment; write a reminder note to yourself; display and work with your reminders in a schedule format; keep, manage, and autodial phone book information; transfer data to other computers; and print schedules, to-do lists, logs, and phone book data.

You can examine your schedule by the day, week, or month, or for any specific time period. If you like, you can browse a prioritized to-do list or switch to a daily schedule that shows appointment durations and time conflicts. You also can search for a key word or words in your databases and set alarms for time-sensitive events using a small terminate-and-stay-resident (TSR) program that consumes only 6K of RAM when resident and allows you to pop up Reminders! while running other programs. Different reminder categories can be established to manage individual events or multiple users. The program has clear pull-down menus and complete mouse support.

I found the program to be quite customizable and to work well, although I did find some instability from memory conflicts on my particular

system. This instability was attributable to some of the other TSRs that I customarily run; disabling them allowed Reminders! to work properly. Reminders!—especially with its programmable alarm feature—would be particularly valuable to a busy traffic-handler or active participant in several nets to keep track of skeds.

The program is $99.95 and has a 60-day money-back guarantee. It is available from POP Computer Products, Inc., P.O. Box 1389, Evergreen, CO 80439. Fig. 1 shows Reminders! in action.

Power Disk. In last August's column we discussed two excellent IBM PC utility packages, Multisoft's PC-Kwik Power Pak and Power Disk. To review briefly, the former is a high-powered, integrated utility performance enhancement package that comes close to "doing it all." The program contains a number of complementary utilities, including a disk cacher, video screen accelerator, a RAM disk, an enhanced keyboard speed-up module, a pop-up command line editor, a smart print spooler, and considerably more. What sets apart this $129.95 utility package from the pack is that the utilities work intelligently among themselves to smartly conserve and share available memory.

The second program we examined last August was Power Disk, a comprehensive, speedy, and safe disk enhancement utility offered separately for $79.95. The program includes a high-performance disk defragmenter, a disk data reliability test and repair utility, and a handy tool for mapping viewing disk file structures. Recently we received the Version 1.1 update of Power Disk which contains some nice new features. Some of these include mouse support, the ability

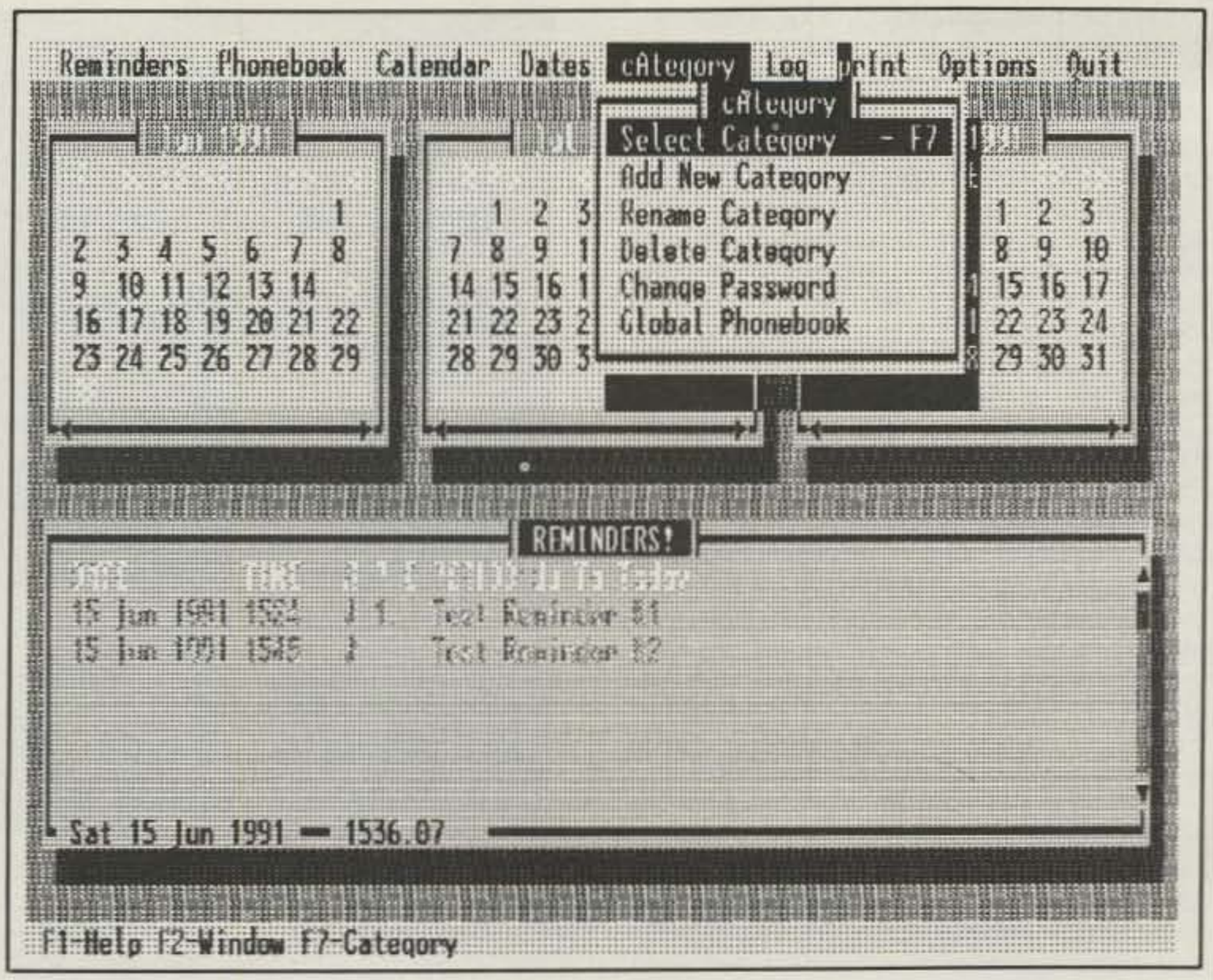


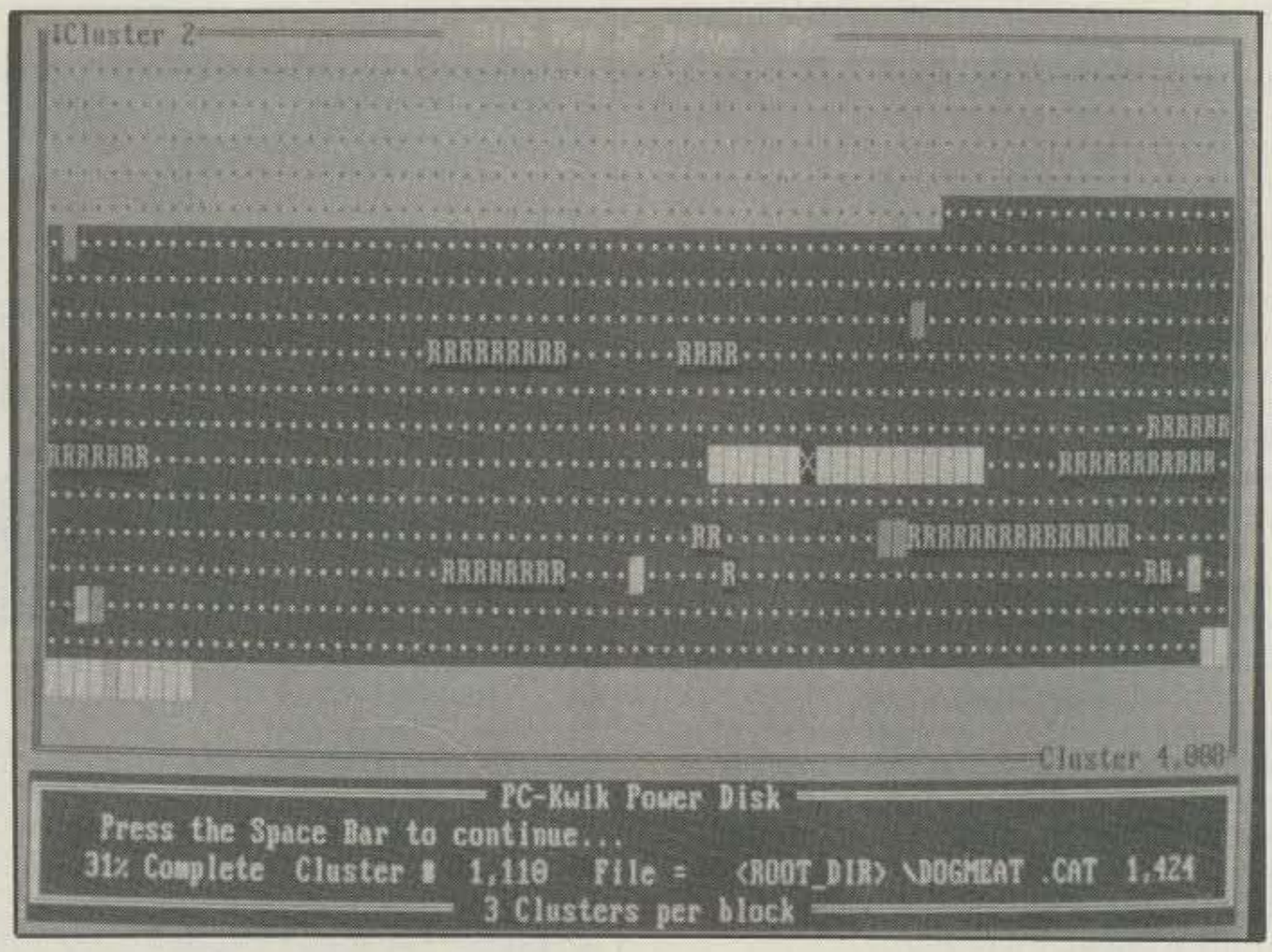
Fig. 1– Reminders! is a pop-up electronic calendar and day book that is similar to the paper desk book or executive scheduler. The program combines to-do lists, notepads, and phonebooks with calendars, schedules, and alarms to organize your world. It is designed both for desktop and laptop computers. Very active traffic handlers and net users should find the program's programmable alarm feature handy in keeping up with skeds.

to save user configuration settings, a sophisticated directory sorting feature, an escape-to-DOS shell allowing execution of DOS commands within the program, and an enhanced mapping utility known as PowerScope (formerly Disk Explorer in the earlier version).

The major Power Disk enhancements are focused in the new PowerScope module. It sports several new disk mapping features which allow you to select a disk cluster, zoom in on it, and view files in both ASCII and hexadecimal formats. PowerScope also lets you view both individual and fragmented files on the disk.

Version 1.1, like its predecessor, is priced at $79.95; it supports both fixed and removable disks up to or exceeding 1 gigabyte, and it includes special safety features to help ensure your not suffering data loss while defragmenting and reorganizing your disk. It's a very professional program that ranks with other top-notch utility packages such as PC Tools and the Norton Utilities. As a a nice added touch, Multisoft offers toll-free technical support, a refreshing freebie in these days of 900-number and support-for-a-fee arrangements.

I should caution you, however, about using powerful utility software, based on my own experience. All disk optimizers, including Power Disk, are designed to work with the removal of all terminate-and-stay resident (TSR) programs that might inadvertently access the disk while it's being reorganized. I knew better than to try to reorganize a hard disk with any TSRs active, but while checking out V1.1 on a PC XT class compatible, I forgot to remove all TSRs and so had the program malfunction while reorganizing. This caused the partial loss of two directories of data. Fortunately, I had back-ups, so I ultimately ended up with no loss of data. However, the episode underscored the fact that the manufacturers of otherwise safe programs such as Power Disk aren't kidding when they caution you about following the specific precautions they suggest. Take heed!



Multisoft's Power Disk is one of the fastest and most fully featured disk defragmenters, reorganizers, and optimizers on the market. After thorough testing, the program goes to work, collecting scattered pieces of files and assembling them contiguously on the disk. Version 1.1 has a newly updated PowerScope mapping utility for critically examining disk clusters and displaying individual and fragmented files on the disk. (Photo courtesy Multisoft Corporation)

For more information, contact Multisoft Corporation, 15100 SW Koll Parkway, Beaverton, OR 97006.

Norton AntiVirus. Recently we had the pleasure of reviewing (and reporting on) Symantec's

The Norton Utilities Version 6.0. This is a superb package of data recovery and supporting programs that you probably shouldn't be without if you entrust large amounts of hard-to-replace data to your PC.

Symantec now has issued The Norton Anti-Virus™ Version 1.5, an update to their comprehensive software package to protect against more than 700 common computer viruses. The utility also detects file irregularities that might be the result of unknown viruses.

First, though, let's talk about just what we mean by a computer virus. Simply put, it's a rogue sort of software program that in some way alters the way your computer operates without your permission or knowledge. Computer viruses are much like biological viruses, which first infect one person and then spread to others with which they come into contact. The computer virus replicates (copies) itself but remains concealed by attaching itself to another software program where it's able to run alongside the desired program. While it's busy spreading itself, the virus does nothing else until something triggers it, such as the approach of a particular date or time. When triggered, some viruses are malicious, doing damage to your computer system or software programs. Others are benign, usually just announcing their presence with a special message or warning. There also are other rogues out there, such as so-called Trojan Horses and worms, but we won't be concerned with them here.

The Norton AntiVirus is designed to work in the background. If a virus is detected, the program can stop it before it spreads any further. A major benefit of the program is its ability to stop viruses before they enter your system. Also, you can update the program yourself to protect against new viruses by adding "virus definitions" obtained through accessing Symantec's 24-hour Virus Newsline via FAX, telephone, or BBS. According to the company, 25 or more new viruses are reported every month on DOS-based computers alone.

The updated version includes more virus detection and repair capabilities; a new, smaller, and configurable device driver that requires as little as 1K of RAM; boot sector virus detection; increased network support; and doubled scanning speed over the previous version. The program searches for and identifies specific viruses, protects applications against virus infections, and even attempts to repair application programs that already have been infected.

The program's first line of defense is the "Virus Intercept" background scanner, which performs automatic checks of your computer's memory and system files on your hard disk to ensure that they are free of infection. The scanner also constantly monitors all programs that are run and all files that are either brought onto or taken off of your computer to keep infections from spreading. The second line of defense is the customizable "Virus Clinic™," a diagnosis and repair tool. It scans all drives for the presence of viruses and can repair or remove the damage caused by many viruses. It is priced at $129; a similar product, SAM (Symantec Anti-Virus for Macintosh) is also offered.

To put matters into perspective, The Norton AntiVirus is a comprehensive solution that performs some very useful functions, especially if your PC is used by others and if you exchange program disks frequently with other users or if you regularly download untested software from BBSs. However, if you don't do these things, viral protection programs may be overkill, since virus infections actually are relatively rare. In any case, you can minimize your risk by adhering to disciplined backup procedures and by being more selective in running "foreign" programs on your PC. Bear in mind that viruses seem to be transmitted most frequently in connection with passed-around or pirated commercial software, so don't let your greed do you or your PC in! Still, Symantec suggests that it's (1) better to have too much anti-virus protection than too little and (2) an ounce of protection is worth a pound of cure.

For more information, contact Symantec Corporation, 10201 Torre Avenue, Cupertino, CA 95014-2132.

Fig. 2– Label Logic computer component labeling kit. One of those "Why didn't I think of this one?" type products, these high-quality, silk-screened computer labels go a long way toward eliminating confusion and time wasted in tracing cables and guessing at connections. Each kit contains over 200 computer labels. (Illustration courtesy AMT Communications)

Short Bursts

Label Logic. Surely one of those "Why didn't I think of this one?" products, AMT Communications' Label Logic™ neatly identifies computer components with small, ready-to-use silk-screened vinyl labels to help simplify software and hardware installation. They also virtually eliminate time wasted in tracing cables and guessing at connections.

Each kit contains over 200 labels that detail most every conceivable description and system configuration for PCs, Mac, and networks. Label descriptions range from the general (such as VIDEO, PRINTER, and MOUSE) to the specific (COM1. 1.2 MEG, IRQ4, etc.). Labels can be combined (e.g, SLOT 3, LPT1, LASER PRINTER) to fully identify peripherals, ports, and cables. Several blank labels are supplied so you can write in your own descriptions.

Each kit also includes a comprehensive fold-out "EZ Reference Card" to document your PC's system configuration; you can attach the

card to the computer for at-a-glance recall. There's space to record component serial numbers, hard-disk information, details on up to eight expansion slots, network information, and CMOS setup data. The firm suggests you attach a printout of your CONFIG.SYS and AUTOEXEC.BAT files to the Reference Card and that you keep a copy in a safe place—not just to help you recover from a computer failure, but also to help with an insurance claim should the PC be damaged or stolen.

The kit retails for $6.95 and is available in many computer stores. Contact AMT Communications, 2741 Plaza Del Amo, Suite 201, Torrance, CA 90503 for dealer information.

Incidentally, the labels really do a good job, especially in reducing frustration when rearranging computer cabling or reinstalling a PC that's been removed for service; I no longer try to fit little Dymo® plastic labels on my PC or its cables. Now if AMT would just offer specialized electronics, audio, video, and amateur radio label sets, we'd really be set!

Fig. 2 should give you an idea of what Label Logic is all about.

A Look at the RCMA. An interesting organization of which we recently became aware is the Radio Communications Monitoring Association (RCMA). Founded in 1975, it is a nonprofit society devoted to two-way radio communications monitoring that caters to the needs and interests of monitor or scanner radio listeners. RCMA is the largest full member club in the umbrella Association of North American Radio Clubs (ANARC).

According to information I received from RCMA, among its goals the organization promotes an understanding of the legal and ethical aspects of radio monitoring, encourages local clubs to organize and promote the hobby in a professional manner, and publishes a monthly, 40-plus page "RCMA Newsletter" which provides a wide range of information relating to radio communications above 30 MHz. Yearly dues are $24 in the U.S.

For more information and a membership application, contact the RCMA at P.O. Box 542, Silverado, CA 92676.

Uh-Oh: Backlog Increases. Recently, we've truly been inundated by information on both new antenna products and new software, and we have many software packages awaiting review. For those who have sent us material to share with readers, please be patient. Our own personal schedule, publishing delays, and magazine space limitations unfortunately dictate that it may be as long as five or six months before we can work in all of the information we want to share with readers.

We do appreciate the fact that recent software submissions have tended to be complete (and not test) versions, include a *printed* manual, fully describe how one can obtain the software, and include pricing. In keeping with the old saw that "One picture is worth a thousand words," we always can use antenna and accessory photos and high-quality software screen prints for illustration.

Wrapping It Up

That's all for this time, guys and gals. Next time more Antennas and Accessories topics of current interest. See you then.

Overheard: What good does it do to be able to get to the faulty part if you don't have at hand the tool to get the danged thing off?

73, Karl, W8FX

DON'T GAMBLE
when you want the best

21 Reasons To Buy
OPTOELECTRONICS' MODEL 3000

1. RANGE- 10Hz to 3GHz.
2. Hi-Speed ASIC (Application Specific Integrated Circuit) State-Of-The-Art.
3. 256 Times Faster than other hand held counters.
4. 10 Digit LCD. Readability even in Bright Sunlight.
5. 6 Functions - Frequency, Period, Ratio, Time Interval, Average and Prescale.
6. RF Signal Strength Bargraph - 16 Segment, Zero & Full Scale Adjust. Excellent for locating Hidden Transmitters.
7. Four extremely Fast Gate Times .01, .1, 1, 10 sec.
8. Dual High Impedance Amplifiers.
9. Maximized Sensitivity
10. Hold Switch - Locks in measurements FAST.
11. ± 1PPM Accuracy
12. Direct Count - 1Hz resolution to 220MHz
13. Sensitivity <1mv 10MHz - 200MHz, <5mv - 2GHz.
14. Single Shot Time Interval 100ns, .1ns averaged.
15. Push-button Input, Gate & Function selection.
16. Extruded Aluminum Enclosure.
17. NiCad & Charger Included.
18. Low Battery Indicator.
19. 1 Year Parts & Labor Warranty
20. 30 day Money Back Guarantee.
21. OPTOELECTRONICS backs this with our 18 Years of Dependability & Service.

All this and more for the Low Price - $375.

Also Available at Special Package Price:

For A Limited Time Only
Model 3000, Backlight/Beeper, Carry Case & TA-100s Whip Antenna
All this for only $449.

OPTIONS:

TCXO 30 ± .2ppm TCXO ..... $100.
BLB30
Back light & two step audible signal level indicator .. $ 75.
CC30 Carry Case ..... $ 15.
TA100S Telescoping Whip Antenna ..... $ 12.

OPTOELECTRONICS

YOU CAN'T LOSE!

Factory Direct Order Line

1-800-327-5912

(305)771-2050 • FAX(305) • 2052 5821 NE 14th Ave. • Ft. Lauderdale, FL 33334

5% Ship/Shandling (Max. $10) U.S. & Canada. 15% outside continental U.S. Visa & Master Card Accepted.

In that never-ending quest for DX and DXpeditions, AA2CE planted a new DX flag on the Ile de Self Serve. Though original, the committee is still out verifying documentation.

DXpedition To Self Serve Island

BY JACK MINDY*, AA2CE

It's been scientifically proven again and again that the shortest measurable time span is the time between a new amateur's first overseas contact (10 meters, of course) and the urge to actually go on a DXpedition to one of those rare countries such as Albania or Bhutan. My son, Steve, and I probably set a new record for that impossibly short particle of time soon after we first got our Novice licenses a couple of years back.

A few months ago, with only a barefoot Kenwood 440 and a Butternut Butterfly on the roof, we worked two JTs (Mongolia) and a BY (China) within a half-hour period. We knew then that we had to satisfy that true-DXer's dream—a trip to one of the Most Wanted places on the DXCC list. It wasn't a question of *whether* we'd do it, but *where*.

Bouvet? No, it's been done.

Agalega & St. Brandon Islands? Nah, too hard to say.

Heard Island? Never—uh—heard of it.

Yemen? Not *this* week, thanks.

No, we realized we'd have to find a DX location so rare it doesn't show up on *any* DX list. And after minutes of painstaking research, Steve found just such a place. A DXer's dream.

Once we settled on the destination, the logistics of the DXpedition were the next concern. Food, water, transportation, and, of course, the rig, power supply, and antenna. It was of paramount importance that our equipment be easy to move and set up.

Final decision to be made: on what band(s) to operate. Checks of propagation forecasts, MUF, LUF, sunspots, etc., made our decision an easy one—2 meters.

The rig would be an Alinco DR-110T putting out 45 watts into a ⅝-wave whip attached to a ground plane of 2800 pounds of specially formed sheet metal which was designed with aerodynamics in mind in order to keep wind load to a minimum. For isolation the unit was mounted on four round rubber insulators (size 195/60VR14, not stocked by Jameco or Digi-Key). The generator would be powered by a 150 hp DOHC gasoline engine (premium unleaded), eliminating any worry of fluctuating voltages from the rather primitive local power company.

Since we always pride ourselves on proper operating techniques, the decision was made early on that we'd do everything possible to keep the pile-ups to a manageable level, and hopefully avoid the unpleasantness (and bad publicity) associated with some recent expeditions. We agreed to operate split-frequency, so as to reduce QRM. Since our whip antenna was determined to be resonant at 146.58 MHz, we would transmit on 146.28 and listen on 146.88 (those with Technician licenses might prefer the term "down 600").

*60-E4 Whitney Ridge Rd., Fairport, NY 14450

Steve, AA2CD (ex-KF8CP), provides a "rare one" for another lucky DXer.

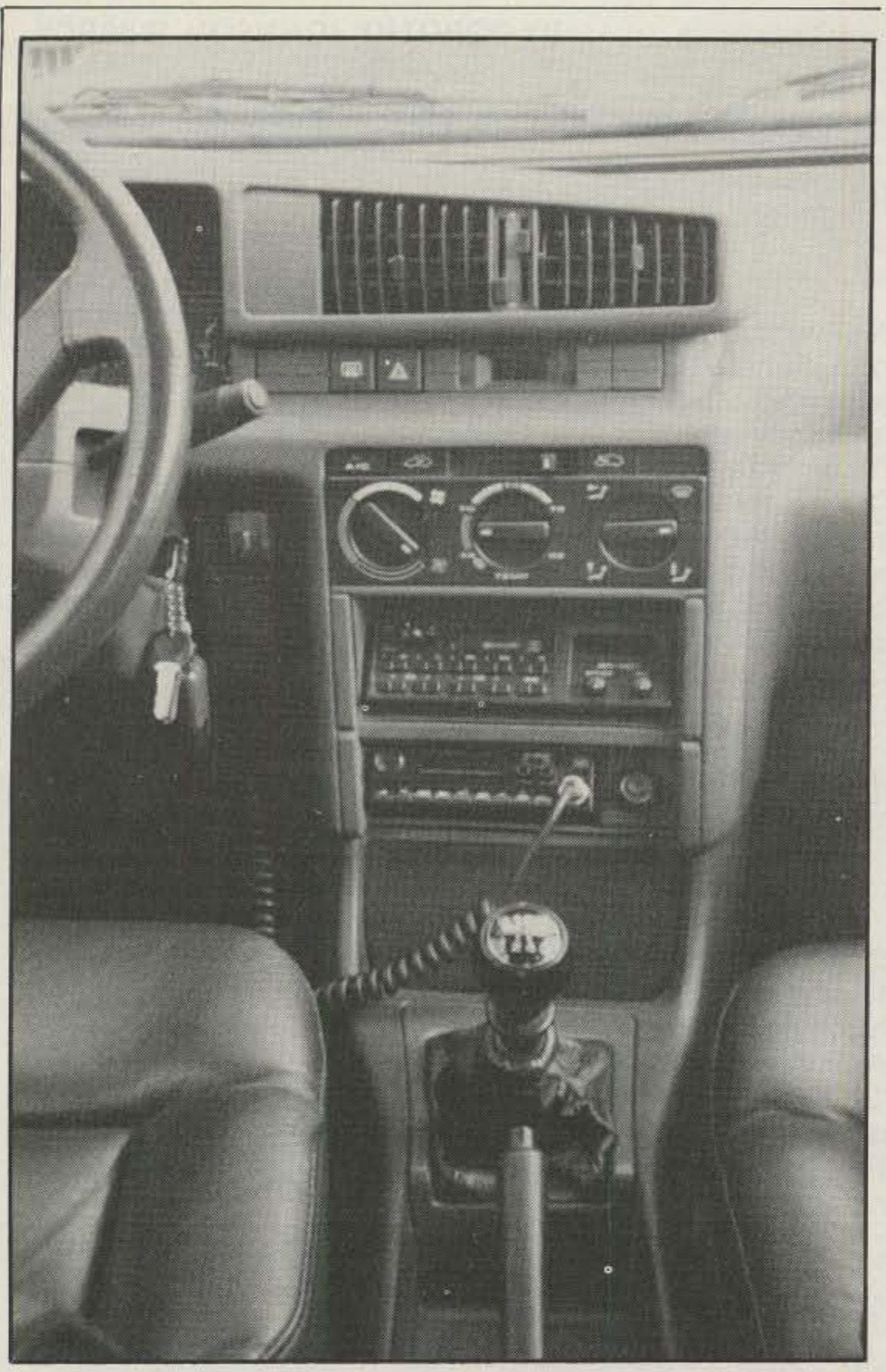
Finally, the big day arrived. Final checks were made; goodbyes were said; the happy Dxpeditioners departed for their most exotic of destinations—Self Serve Island!

The journey itself seemed to take ages, as often is the case when anticipation runs so strong. In reality, travel time was measured in minutes—four of them. It was that darn red light that seemed to make the trip go so slowly.

And soon the travelers, weary but excited, arrived at their goal. Unfortunately, as much as we wanted to get on the air right away, we had to cool our heels a while. Since we arrived on a Saturday afternoon (admittedly bad planning on my part), our island destination was crowded with non-amateur travelers who temporarily blocked our access. However, after jockeying for position, we found a location that gave us a clear shot out, as well as easy access to the island's plentiful supply of fuel, necessary for operation at full output.

Using the callsign that island authorities had posted for us nearby, $140GL, we were ready to make DX history.

Ignoring the stares of curious onlookers, Steve, AA2CD, powered up the Alinco and listened to make sure our chosen frequency wasn't in use. Then the long-awaited first "CQ" from Self



Jack, AA2CE (ex-KF8CY), designed the $140GL operating position for efficiency and operator comfort. Five-speed ALC (antenna location controller) employs good ergonomics.

Serve Island. In no time our log pages and pencils were literally flying in the breeze. However, we were able to retrieve them all.

We tried to keep our QSOs brief in order to give as many amateurs as possible an opportunity to work a "new one." As is common in these situations, the majority of the stations to which we talked gave us a 59 signal report. Although we noticed some QRN and "picket fencing" in a few instances, virtually all of the signals seemed amazingly consistent, and we gave all our contacts 59s back. There was almost no QSB noticed during the entire DXpedition.

As is usually the case with an event that takes so much advance planning, our stay on Self Serve Island was all too brief. It seemed that we had just arrived when it was time to go. Perhaps the timing was right, however, as we noticed a sudden increase in QRN (honking-type noises) from local sources, mostly Volvos, Subarus, and vehicles that looked very much like my father's Oldsmobile.

We hated to leave our operating position. (Frankly, we tried to favor QRP operators over those linears from 4-land.) You may QSL direct, although we're not good in the book. If you prefer, you may include your Mobil card instead of the usual IRC or green stamp.

And for those who couldn't get through, we're already planning a repeat DXpedition in the near future. Perhaps as soon as next weekend. CQ

AWARDS

BY DOROTHY JOHNSON, WB9RCY

NEWS OF CERTIFICATE AND AWARD COLLECTING

The Story of the Month for February is:

Ed Dranchak, NT9V
USA-CA All Counties #670
All SSB, 7-5-90

"A persistent brother-in-law, Steve, NM9W, kept at me to become an amateur radio operator for many years. About five years ago he succeeded. I've spent many enjoyable hours on the low bands making contacts and more importantly making friends. Being retired with an understanding XYL (also a ham) has helped a lot.

"I hold 5-Band WAS, and DXCC with 279 countries confirmed. I belong to 10X, The YL System, HIDXA, INDEXA, OMISS, Century Club, and the MARAC and Geratol Nets.

Ed Dranchak, NT9V, USA-CA All Counties #670, ready for action at his QTH in Indiana.

"I am a Volunteer Examiner with the ARRL and W5YI groups. Having someone become a ham, or upgrade, brings me great satisfaction.

"Other hobbies include golf, fishing, bowling, and woodworking.

"I am a World War II veteran, having served with the 5th Air Force in the Far East. I have 6 children and 12 grandchildren.

"Dateline 11-21-89: Tuning across 20 meters I came upon the County Hunters Net where I heard WB4FFV putting out Tripp County, South Dakota. We exchanged 5/9 signal reports and the quest for USA-CA had begun. Yes, I'd been struck by the "Malady." Many hours and days of eating meals in the shack were to follow. I put on 15 pounds in the process.

"Dateline 6-12-90: WB4FFV was mobile in Webster County, Iowa, my last county for the USA-CA All Counties Award. Signals were up and down; I almost did not make it. However, we finally exchanged 3/3–5/5 signal reports. The quest was over.

"The award belongs not only to me, but to all the mobile stations and others for going out of their way to make all this come together. I extend my sincere thanks to all.

"I have installed a low-band rig in our car. I will continue to put out counties for others and pay back in a small measure what others have done for me.

"Yes, I am working on doing it all over again—for the second time around. The "Malady" lingers on.—73 de Ed, NT9V."

333 South Lincoln Ave., Mundelein, IL 60060

Awards Issued

Graham Horlin-Smith, VK5AQZ, submitted his completely filled and certified Record Book and received USA-CA All Counties #731, USA-CA 3000 #757, USA-CA 2500 #837, USA-CA 2000 #914, USA-CA 1500 #1004, USA-CA 1000 #1199, and USA-CA 500 #2546, All SSB, dated 10-25-91, #1 to S. Australia.

Stanley W. Head, Jr., K8OI, enhanced his good record with USA-CA 2500 #836, Mixed, dated 10-10-91.

Szabo Laszlo, HA0HW, added a gold seal to his certificate by claiming USA-CA 1000 #1200, Mixed, dated 10-25-91.

USA-CA 500 certificates went to:

Raymond Lee, VS6UW, USA-CA 500 #2545, All CW, 10-7-91.

Graham Horlin-Smith, VK5AQZ, USA-CA 500 #2546, All SSB, 10-25-91.

Coleman Green, N2GFM, USA-CA 500 #2547, All SSB, 10-28-91.

J. E. Yogi Bear, WB3FQY, USA-CA 500 #2548, All 10M SSB, 10-28-91.

Awards Available

The Great Lakes Award. The Great Lakes Award is presented by the Michigan Amateur Radio Alliance (MARA). The award is offered for working the States and parts of Canada that border the Great Lakes.

MI-IL-IN-WI-OH-PA-NY-MN-CANADA. All contacts must be on or after 8/31/91. You may use any band and any mode, except repeaters. Contacts must be verified by QSL cards.

For an application send an SASE to Great Lakes Award, 0-11555 Eighth Avenue NW, Grand Rapids, MI 49504.

Anguilla Award. The Anguilla DX Association has announced the availability of a new DX award for contacts with the Island of Anguilla (VP2E) in the British West Indies. There are no date restrictions on contacts for the award unless otherwise specified in the rules.

Requirements: Applicant must work six VP2E stations or achieve 30 points as follows: EME 15 points; 6 meters 15 points; Oscar 10 points; QSO with VP2EA since January 1, 1990 (previous QSOs count 1 point) 10 points; QSO with VP2EQ 10 points; QSO with any VP2E station 3 points.

The Anguilla Award offered by the Anguilla DX Association, British West Indies.

USA-CA Special Honor Roll

Graham Horlin-Smith, VK5AQZ
USA-CA All Counties #731
All SSB, 10-25-91

USA-CA Honor Roll

	3000			**1000**	
VK5AQZ		757	VK5AQZ		1199
			HA0HW		1200
	2500				
K8OI		836		**500**	
VK5AQZ		837	VS6UW		2545
			VK5AQZ		2546
	2000		N2GFM		2547
VK5AQZ		914	WB3FQY		2548
	1500				
VK5AQZ		1004			

The total number of counties for credit for the United States of America County Award is 3076. The basic award fee for subscribers to *CQ* is $4.00. For nonsubscribers it is $10.00. Initial application must be submitted in the USA-CA Record Book, which may be obtained from CQ Communications, 76 North Broadway, Hicksville, NY 11801 USA for $1.25. To qualify for the special subscriber rate please send a recent *CQ* mailing label with your application. To be eligible for the USA-CA applicants must comply with the rules of the program as set forth in the revised USA-CA Rules and Program dated April 2, 1985. A complete copy of the rules may be obtained by sending an SASE to Dorothy Johnson, WB9RCY, USA-CA Custodian, 333 South Lincoln Avenue, Mundelein, IL 60060 USA. DX stations must include extra postage for airmail reply.

Endorsements: The certificate may be endorsed for 6 meters, Data, Oscar and EME, All SSB, All CW, All RTTY or Mixed.

SWL: The award is available on a heard basis.

Note: Contacts with revoked license VP2EZ do not count toward this award. QSOs with previous holders of that call issued from 1969 through 1984 remain valid for points.

The award is $3 U.S. or 5 IRCs. GCR okay. Send applications to John L. Rouse, KA3DBN/VP2EBN, 2703 Bartlett Lane, Bowie, MD 20715.

Copper Country Award. The Copper Country Radio Amateur Association, Inc. sponsors the Copper Country Award. To qualify for the award make four QSOs, each with a different Copper Country ham, using at least two different amateur radio bands (all modes equal). Contacts must have taken place on or after 1 September 1990.

Copper Country hams are amateur operators in residence in Keweenaw, Houghton, Ontonagon, and Baraga counties in Michigan. Contacts can be any mode but must be person to person (no digital bulletin board messages).

To claim your 8″ × 10″ award certificate send evidence of your four QSOs (log entries preferred), $1, and an SASE to Awards Manager, Copper Country Radio Amateur Association, P.O. Box 217, Dollar Bay, MI 49931 USA.

Jubilee Medal. The Jubilee Medal commemorates the 65th anniversary of the first radio contact between the USSR and the USA: "Radio Amateur Ivan Nikitin from the Kiev Province for the first time have taken the signals of WOC American Radio Station for Iowa State and received the official confirmation about it . . . "—*Radiolubitel Magazine, July 1926*.

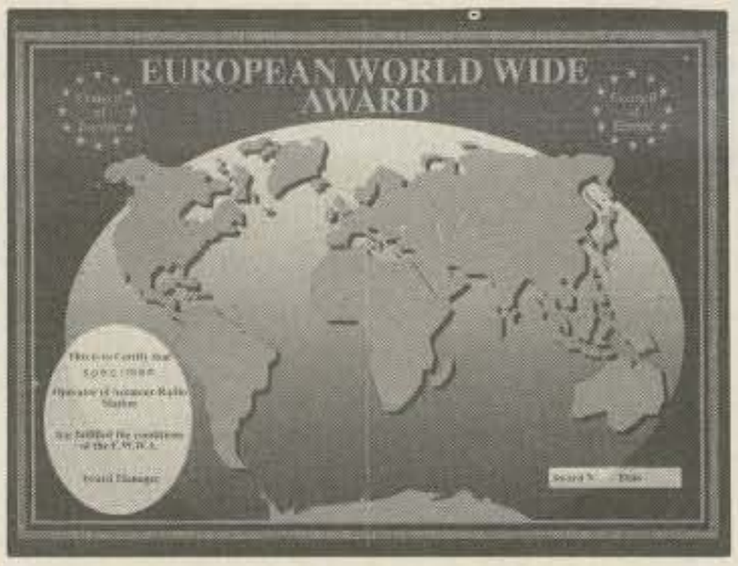
This large ceramic medal is awarded for working 10 USSR stations and 10 USA stations. One QSO with Oblast 065 and one QSO with the state of Iowa must be included. All stations in Oblast 065 use the following prefixes: UB5U, UB4U, RB5U, RB4U, and the special callsign for this celebration, URØUCH. QSOs made at any time, in any mode, on any band are valid.

Send GCR list (no QSLs) with payment of $5 U.S. or 15 IRCs by *registered mail only* to Manager UB5UCH, P.O. Box 1, Obukhov-1, 255400, Ukraine, USSR. The award is available to SWLs under the same rules.

Remark: Stations which are located in the USA must send $5 US to the following addressee only: W1BR, Bill Aspin, 188 N. Mieliens Rd., Munger, MI 48747 USA.

European World-Wide Award. The following are general explanations of the award criteria.

1. **Sovereign states**, members of the UN or those recognized by a number of UN member states but who have not asked for UN member status due to internal reasons (i.e., constitutional provisions, as is the case of Switzerland).



European World-Wide Award sponsored by the Council of Europe.

2. The different **republics** of the Soviet Union and the different historical parts of the United Kingdom.

3. **Territories** of a Sovereign State situated on another continent and having a local government and economic status.

4. An **island**, group of islands, or island of the same group, politically and economically dependent upon a state and separated by a minimum of 200 nautical miles from the mainland or the territory on which they are dependent, of which at least half should be international waters, or any territory from the same state separated by another sovereign state, according to current international law. For a separate status within a group, the territory must be separated by a minimum of 200 nautical miles from any territory of the sovereign state on which they are dependent. The above territories must have a resident population on a permanent basis (minimum one full year).

5. **International, regional, political, or intergovernmental organizations** other than the UN or belonging to the UN system, having an extraterritorial status given by a sovereign state and more than twenty members belonging to the United Nations.

6. **The UN office** in New York, the bureau of the ITU in Geneva, and the UN office in Vienna.

7. **Scientific bases** in Antarctica, having signed the Antarctica Treaty, with official prefixes from countries included in the above criteria. Only one contact per country having more than one base in the Antarctic will be creditable toward obtaining the award; e.g., a contact with a Chilean base and an Argentinian base will be honored as two contacts, but two contacts with different Argentinian bases will only count as one contact.

8. All the above must have an official prefix included in the official ITU prefix list.

Note: All the terms mentioned above, in case of conflict, should be interpreted according to the rules on current international law.

Exclusions:

1. Any unclaimed territory or territories where sovereignty is not exercised on a permanent basis.

2. Areas with the status of demilitarized zone, neutral zone.

3. Military bases abroad.

4. Any other entity not included in the general criteria or above, that results from a political fiction (embassies or other offices abroad, monuments, religious entities not having a state status, agencies of international organizations outside of their state of siege).

Procedure: States or territories which comply with the above criteria and are not on the reference list that follows may apply for recognition and inclusion on the official EWWA list. Send application and relevant documentation to Council of Europe, Regie Des Moyens Audio-Visuels, Mr. Kremer Francis, F6FQK, P.O. Box 431 R6, 67006 Strasbourg Cedex, France, or the regional checkpoint.

Members of the EWWA Board will be elected on a personal basis and with worldwide representation by majority vote of the rest of the members. Members are elected for a period of nine years and may be reelected. Every three years a third of the number of members will be elected by majority vote of the other members, among the candidates sent to the CERAC.

The award manager will be CERAC's station director (TP2CE), Francis, F6FQK, or any member of CERAC with official delegation from him.

Contacts valid for this award must have been made on or after January 1st 1980.

Rules: The EWWA is available to all licensed amateur radio stations and SWLs that meet the following conditions.

HF

Mixed (CW-Phone-RTTY): 200 confirmed contacts with 200 different countries from the official EWWA countries list. Contacts must have taken place from January 1, 1980 onward.

CW: Same as above in CW mode.

Phone: Same as above in phone mode.

RTTY: Same as above in RTTY mode.

Five-band EWWA: The five-band EWWA certificate is available for working and confirming 100 countries from the EWWA countries list on each of the following bands: 80, 40, 20, 15, and 10 meters. It is obtainable in mixed, CW, phone, and RTTY modes.

Nine-band EWWA: Same as the five-band EWWA, but in each of the following bands: 160, 80, 40, 30, 20, 17, 15, 13, 10 meters.

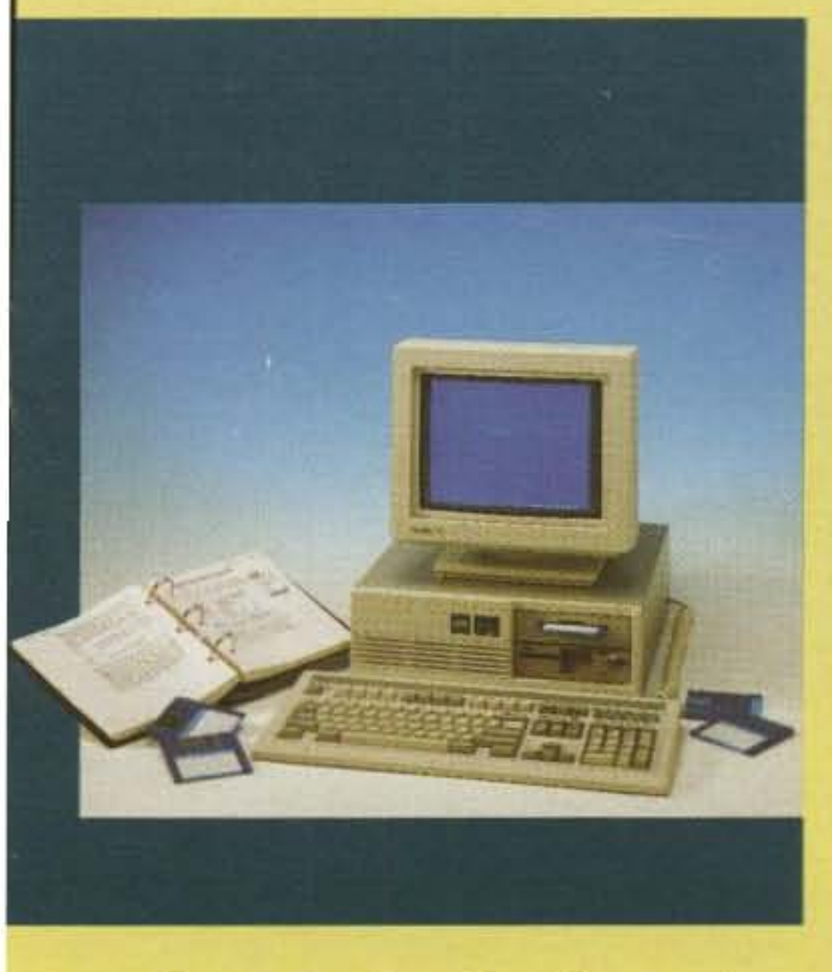
Top list HF EWWA: To qualify for the top list EWWA a total of 292 confirmed country contacts are necessary from January 1, 1980 in Mixed, CW, phone, RTTY.

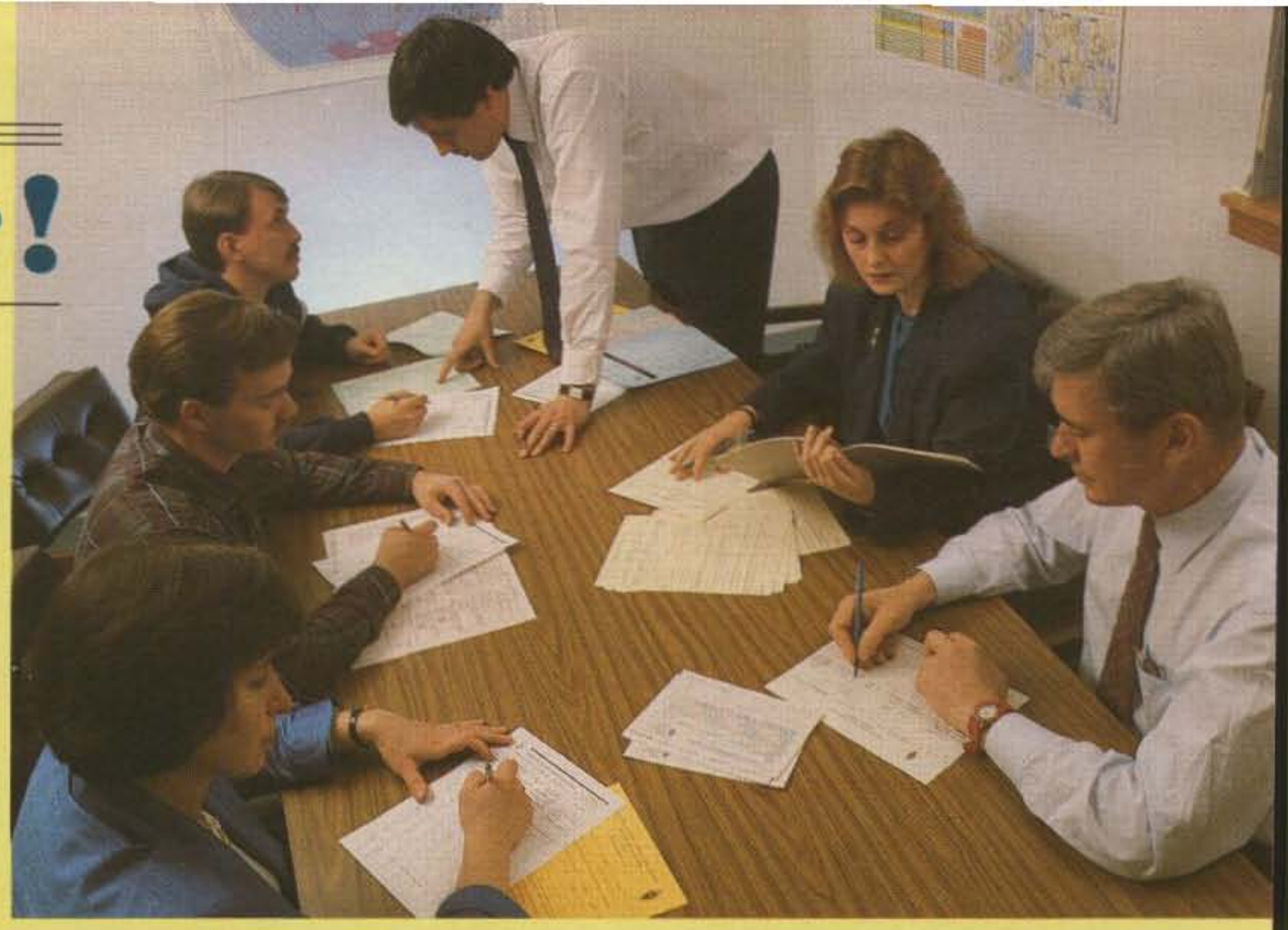
Each award may be worked separately—i.e., the top list EWWA may be obtained directly, without having to qualify first for any of the basic diplomas. Each top list award will include a special pennant.

VHF

One-hundred confirmed contacts with 100 different countries from the EWWA

Examiner!





- create exams for all written and Morse code exams with ARRL computer software.
- use the multiple-choice Morse code exam format, at your VE team's option.

To become an ARRL VE, please complete and return the VE Application shown.

Give us the opportunity to provide you with first-class service.

YOU DESERVE IT!

ARRL VEC

American Radio Relay League - VEC
225 Main Street
Newington, CT 06111

ARRL/VEC
VOLUNTEER EXAMINER APPLICATION FORM

PLEASE TYPE OR PRINT CLEARLY IN INK

CONTROL NUMBER:
[ARRL/VEC will assign]

CALL: _____ ☐ ADVANCED ☐ EXTRA LICENSE EXPIRATION DATE: _____

NAME: _____
(first, MI, last)

MAILING ADDRESS: _____

CITY: _____ STATE: _____ ZIP: _____

DAY PHONE: (___) _____ NIGHT PHONE: (___) _____

WAS YOUR LICENSE EVER SUSPENDED OR REVOKED? ☐ YES ☐ NO

HAVE YOU EVER BEEN DISACCREDITED BY ANOTHER VEC? ☐ YES ☐ NO

If yes, which VEC(s) and when?

DO YOU HAVE A CALL SIGN CHANGE PENDING WITH THE FCC? ☐ YES ☐ NO

DO YOU HAVE ANY KIND OF FORM 610 PENDING ACTION WITH THE FCC? ☐ YES ☐ NO

PERSON TO CONTACT IF YOU CANNOT BE REACHED? _____ (name) _____ (phone)

MAILING ADDRESS WHERE UPS OR DAYTIME DELIVERY IS RELIABLY POSSIBLE:

_____ (name) _____ (street address)

_____ (city) _____ (state) _____ (ZIP)

PLEASE LIST ANY FOREIGN COUNTRIES THAT YOU WILL BE SERVING: _____

FOR INSTANT ACCREDITATION, HAVE YOU PARTICIPATED AS A VE IN ANOTHER VEC PROGRAM, AND IS YOUR ACCREDITATION IN THAT PROGRAM CURRENT? ☐ YES ☐ NO

(OPTIONAL) IF YES, WHICH VEC? _____

CERTIFICATION

By signing this Application Form, I certify that to the best of my knowledge the above information AND the following statements are true:

1) I am at least 18 years of age.
2) I agree to comply with the FCC Rules (see especially Subpart F—Section 97.515 [b]).
3) I agree to comply with the examination procedures established by the ARRL as Volunteer Examiner Coordinator.
4) I understand that violation of the FCC Rules or willful noncompliance with the VEC will result in the loss of my VE accreditation, and could result in loss of my Amateur Radio operator and/or station licenses, or both.
5) I understand that even though I may be accredited as a VE, if I am not able or competent to perform certain VE functions required for any particular examination, I should not administer that examination (Section 97.525[a] [3]).

_____ (signature) _____ (call sign) _____ (date)

[Please attach a photocopy of your Amateur Radio license, and if applicable a photocopy of any other VEC accreditation held, to this application.]

Participants in the "North Central Mini," MARAC.

countries list in the VHF bands from January 1, 1980. It is obtainable in FM, SSB, CW, or mixed modes.

Special OSCAR Award

One-hundred confirmed contacts with 100 different countries from the EWWA countries list via OSCAR satellites from January 1, 1980.

QSL cards and a copy of the log sheet containing the callsign of the station worked, country, mode, frequency or band, date and time should be sent to the Award Manager, F6FQK, or your regional checkpoint (list follows) with the appropriate fee to cover costs—7 ECU ($10 US) payable in USD, French Francs, German marks, Italian lire, Spanish pesetas, or pounds sterling, plus sufficient funds or IRCs to return the QSL cards.

All QSOs must be made with licensed amateur radio stations working in authorized amateur radio bands.

All stations worked must be land-based stations.

All stations must have been contacted from the same country as included in the EWWA countries list. Amateur radio operators portable in other countries must include a copy of their individual licenses and the official permission of the authorities for the portable operation, with specific mention of the callsign used in the portable operation. These copies must be sent to F6FQK.

Amateur radio coming from a land on the CEPT list and having a regular license and working another CEPT land is not concerned by the above paragraph.

Checkpoints are as follows.

South America: LU7HJM, Jose Maria de la Vega, P.O. Box 1401, 5000 Cordoba, Argentina.

Central America: OA4OS, Natan Sterental, P.O. Box 4147, Lima 1, Peru.

U.S. and Canada: VE2PJ, Terrance Lowde, 910 Argyle, Sherbrooke, Quebec J1J 3J4, Canada.

Caribbean: FM5DN, Richer Leonce, 4km500 Rte de Balata, 97234 Fort de France, Martinique.

Australia, Oceania, Asia: Vacant, including the post of board member for this area.

Africa: 7X2RO, Afif Benlagha, 11 rue d'Alembert, 16000 Alger, Algeria; and 6W6JX, Pipien Jean Louis, Salins du Sine, Saloum BP 200, Kaolack, Senegal.

Europe: F6FQK, Kremer Francis, 31 rue Louis Pasteur, 67490 Dettwiller, France; and DL3MBE, Hans Scharfen, Dytalstrasse 22F, D-8900 Augsbourg, Germany.

East Europe: HA5WE, Peter Zudor, Paulay E. u. 13 I. em. 1, 1061 Budapest, Hungary.

Italy: I2MQP, Mario Ambrosi, Via A. Stradella 13, 20124 Milan, Italy.

USSR: UA4CX, Yuri Novikov, P.O. Box 374, 410026 Saratov, USSR.

The EWWA Board of Directors requests your comments and suggestions for improving the EWWA. Please address all correspondence, including petitions for new country status, to Conseil De L'Europe, Regie Des Moyens Audio-Visuels, Mr. Kremer Francis, F6FQK, BP 431 R6, 67006 Strasbourg Cedex, France.

Applications for the EWWA will be considered from January 1, 1980.

Of Interest To County Hunters

Arnie and Lorraine Bachman, K9DCJ and WDX9DCJ, hosted the annual convention of the North Central District of the Mobile Amateur Radio Awards Club in Mt. Horub, Wisconsin in September 1991. From all accounts, it was an enjoyable and fulfilling experience for all in attendance (see the accompanying photo).

Until next month, 73 and Think Spring!

73, Dorothy, WB9RCY

STANDARD®

WORLD'S SMALLEST FULL-KEYBOARD HANDHELD

•

REPLACEABLE MEMORY CHIP
40 to 200 channels

•

WIDE BAND RECEIVE COVERAGE

Let STANDARD take you to the TOP. C168A for 2 Meter and C468A for 70 cm operation. 5 watts output from 12 volts. 7 types of SCAN (pause, busy and hold). CTCSS encode/decode included. Rubberized non-slip knobs and keypad. Rugged Aluminum Back. Doubles as a powerful heat sink and securely mounts belt clip. Acoustically Balanced Speaker, delivers full-fidelity audio. Direct Keyboard Entry. Four Batteries Available, plus battery case (5 AA) as options.

For more information on this and other STANDARD products, contact your nearest dealer or call STANDARD Amateur Radio Products at (312) 763-0081.

Specifications, price and features are subject to change without obligation or notice. All products carry a ONE YEAR limited warranty.

STANDARD Amateur Radio Products, Inc.
P.O. Box 48480
Niles, Illinois 60648

STANDARD.

CIRCLE 145 ON READER SERVICE CARD

VHF PLUS

BY JOE LYNCH, N6CL

ALL ABOUT THE WORLD ABOVE HF

A Giant Homebrew Array For 6 Meters

This month I begin with a description of an antenna array that was inspired by a column written by my predecessor, Steve Katz, WB2WIK. In his September 1986 column Steve published a description of a modification of the Cushcraft A50-6, their very popular 6-element, 6 meter antenna. The modification made by Ron Bussiere, N4KCM, involved lengthening the boom by about 4 feet and adding a seventh element. The results consisted of rather spectacular front-to-back and front-to-side ratios.

Being inspired by the write-up of that antenna, Bob Sanders, WW4T, with the help of Ray Rector, WA4NJP, built five similar arrays. Bob placed four of them at heights of 50, 70, 90, and 110 foot levels on 70 feet of Rohn 25 tower sections to create the rotating portion of the installation. The array sits atop an old 40 foot stationary tower (that Bob acquired for the price of hauling it). The array is fed with 7/8 hardline and homebrew connectors and was rotated for a long time with a Ham II rotator. Bob recently replaced the Ham II with a Tail Twister just because he had the Tail Twister. Bob uses a modified Henry 2K linear that puts out slightly over 1 KW and measures 1 KW at the antenna array through over 300 feet of hardline.

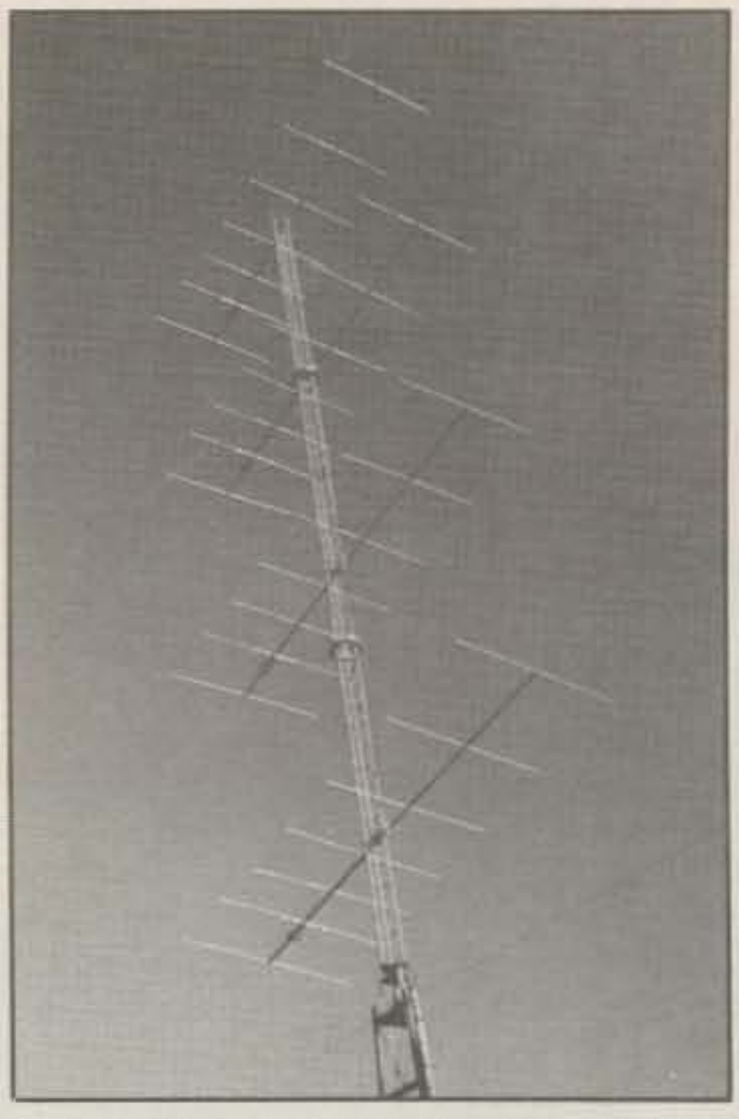
Bob has found the main lobe of the array to be at 1 to 3 degrees. The front lobe is a bit broad, measuring at around 45 degrees, according to "shadetree engineering." However, Bob says that this is tolerable. He has found very clean sidelobe rejection, and the front to back, while not at the claims made by Ron, is very satisfactory. Bob has experienced "speaker quality" echoes from the moon when the moon is at the horizon. Bob has made one EME QSO with Ray, who has a two-over-two 8-element W1JR designed array on a fully steerable AZ-EL rotator.

The fifth antenna Bob built was placed on top of his HF antenna tower at a height of 90 feet. He refers to this antenna as his reference antenna. Bob has observed some interesting happenings when comparing the array to the reference antenna.

Curiously, at times Bob has found the reference antenna to be the better performer during the entire opening, because of the higher angle of radiation of the signals. Bob and Ray have confirmed their observations of a change in the angle of radiation of the incoming signals by moving the elevation rotator on Ray's array back and forth. Through this movement they have observed the increase or decrease in signal strength of the incoming signal because of the changing angle of radiation during a particular opening. They have found this phenomena to occur several times during some openings.

Bob has named his array "Maude" after an old reliable and strong mule his grandfather once owned. The array typifies the strength of the old mule. The elements of the antennas are stainless steel. The guy rings on the rotatable portion are homebrew and of comparable quality to commercially available guy rings. Bob says the array is so well balanced that it can be rotated with one hand. The height for the location of the first antenna was set by the location of the guy wires and the height of the stationary tower. The spacing between each antenna is approximately one wavelength. The total time for construction was around three years, with most of that time spent gathering the right parts and dreaming about the ultimate results. The complete cost of the antenna array and tower ran about $1200.

Bob has not been home to take advantage of many of the 6 meter openings. Nevertheless, he has worked five continents and around 35 to 40 countries since putting up the antenna over a year ago. Bob will correspond with anyone interested in building a similar array. His address is: Bob Sanders, WW4T, 7571 Hog Mountain Road, Statham, GA 30666.



This is "Maude," Bob Sanders, WW4T's homebrew stacked array. (Photo courtesy WW4T.)

Frank Moorhus, AA2DR, at home in his potato patch just after working DX on 6 meters from his truck. (Photo courtesy AA2DR.)

More 6 Meter Propagation

Several more of you reported excellent openings during the last days of October and the first weeks of November. Rich Zwirko, K1HTV, reported working ten new countries during that time period. The stations Rich worked for new ones were: 9J2HN, 7Q7RM, PJ9EE, ZS6WB, A22BW, P43AS, FR5EL, CN8JP, FM5WD, and PJ7/W6JKV. Peter, PY5CC, reported HH7PV, 9X5NH, P4/K4PI, and G4SMC/8R1 as new ones for him.

During the same time period Emil Pocock, W3EP, logged the following: PY0FF, P4/K4PI, A22BW, G4SMC/8R1,

P.O. Box 73, Oklahoma City, OK 73101

YS1ECB, YN1CC, 6Y5IC, CX4HS, ZP6CW, V51E, V50AC, V51KC, ZS9A, 7Q7RM, 7Q7CM, 9L1US, Z23JO, VK4BRG, CN8ST, CN2JP, XQ3SIX, FR5EL, PJ7/W6JKV, ZBØT, and YU3AN (for country number 81). Emil reported that it was easy to work at least 30 countries and that the band was open to somewhere from his QTH almost daily from October 24 through November 18.

Also during the same reporting period Mike, W6YLZ, logged 120 JAs, LUs, ZS9A, V51, HI8, 6Y5, ZLs, PJ4, PJ7, 8R1, 9Y4, KP2, FO5, YN1, HH7, XN1, KP4, XQ3, ZP6, PZ1, VKs, DU1, VS6, JD1, FS7, and TI4.

Additionally, Walt, AJ6T, reported working XE, 6Y5, ZF, HH, LU, KH6, KG6, V73, JA, and ZL, all using 10 watts. Mark, KE7NS, reported that he worked ZL, VK, V73, KH6, JA, and FK. On October 19 BV2DP, KG6DX, VS6WV, XX9JN, and a number of VKs and JAs were worked by many Europeans. On October 20 Jim, WB2ODH/6, reported working KH3AE for a new one.

If you think you need to have been on 6 meters for a long time, you are mistaken. Carl Huether, KM1H, after an absence of several years, started his present 6 meter operation on October 31. On November 2 he was working stations throughout the Caribbean. When on the following day FR5EL answered his CQ, Carl was hooked. During the four weeks he has been on he has worked 46 countries. On November 8–9 he logged over 100 QSOs on Aurora. On November 14 he worked 31 Europeans. His 46th country was C6A/KM1E, via sporadic-E on December 10.

Ernie Brown, W5FYZ, Pam, N5KW, W5OZI, Larry, W5NZS, and a number of other W5s worked Costa, CU1EZ, during a very brief opening around 1700Z on November 6 (your editor was also one of the lucky ones!). Earlier that morning V51E was giving many southern-tier North Americans a contact from Namibia while running 100 watts to a whip from his car! In early November Andy, YS1AG, using only 3 watts, reported working 40 stations in the northeast U.S. and southeast Canada area during one opening.

Many stations throughout the world reported that the days of November 8–10 were the best ever heard. On November 9 Terry, N6CW, reported logging TI2, LU, ZP6, KP4, CX, CE, XE3, PZ1EL, PY5, KP2A, V73AT, JA, ZL, FK8EB, VK, KG6DX, and V63JC. Again, on November 9, stations in North Carolina through Georgia and Florida reported working numerous KH6 stations, KH3, and a number of other South Pacific stations. Andy Blackburn, WD4AFY, as well as others, was treated to a long-awaited 50th state during this opening. Also, on November 9 Eric, TI2NA, worked stations in North America, the Caribbean, and South America virtually all night. Reportedly he took off for only about an hour during the night to get a little sleep.

ON THE ROAD...

Model DR-590T

Detachable Control Panel Offers Security and Convenience

This twin band mobile transceiver is the ultimate in flexibility. It can receive VHF and UHF simultaneously in addition to full duplex crossband operation; with the addition of the optional DTMF Decoder, the DR-590T can be remotely operated through another transceiver. Also, with its detachable front panel you have the option to mount the power module and control panel separately for added security.

The DR-590T by ALINCO is a sophisticated, high powered, FM dual band transceiver with 40 memory channels that can be selectively used to memory, shift frequencies, shift directions, and channel steps. Three transmit power settings and automatic repeater functions make this model one of our most popular products.

Ask to see ALINCO products at your dealer and become familiar with our quality line and accessories. We've always been here, and now we're ready to go wherever you do.

...IN THE HAND.

Model DJ-560T

Full Features, High Performance

A complete dual band that you can put into your pocket or knapsack, our DJ-560T is an ideal traveling companion on your next hiking or fishing trip.

The unit has independent VHF and UHF with separate controls for volume and squelch, full duplex operations, built-in DSQ for paging, CTCSS for squelch control, various scanning functions, 40 memory channels, ABX function which allows transmission on VHF or UHF band automatically on an incoming signal, and numerous other features that you wouldn't expect to find on a handheld transceiver so compact and portable.

ALINCO ELECTRONICS INC.

ALINCO ELECTRONICS INC.

CIRCLE 154 ON READER SERVICE CARD

ALINCO ELECTRONICS INC.
438 Amapola Avenue, Unit 130
Torrance, CA 90501
Tel. (213) 618-8616 Fax (213) 618-8758

Two Year Limited Warranty.

Specifications and features are subject to change without notice or obligation.

Bob Reif, W1XP, doing what all DXers should do on vacation, creating a pile-up. He made over 90 contacts on 6 meters from PJ7 while not busy enjoying his vacation. (Photo courtesy KA1JVU.)

However, he was once again heard working stateside the following morning for several more hours. On November 9 visible aurora appeared over many areas of the middle part of the U.S. (including just north of our QTH in Oklahoma City). A number of stations in the U.S. reported making many contacts via aurora on 6 meters. However, many operators were divided between working aurora on 2 meters or 6 meters. I completed contacts with a number of needed surrounding states on aurora on 6 meters and one new state on 2 meters. Additionally, on November 9 stations in VK3 reported working VK2 on aurora.

On the 10th at my QTH VK4BRG was 20 over 9 for nearly an hour. Altogether we logged seven VK4s, a VK2, and FK8EB during that opening. Also on November 10 Pete, WA5JCI, worked 3D2AA for country number 81. On that same day he also heard VKs for 6 hours. During the following days some stations in New Zealand reported working into Europe for the first time. On the same day other ZLs reported working Africa for the first time. It is likely that the first ever ZL WAC will come out of these openings. Then on November 13 Joel, CN2JP (N6AMG), worked JW0A via the South Pole!

It appears, however, that even though the month of November came in like a lion, it went out like a lamb. By the end of November we saw nothing in the way of significant openings. The one exception reported was a brief sporadic-E enhanced opening to KG6DX from the Carolinas and Georgia on November 23 and some brief F2 openings between VE1YX and FY, between W2 and Central America, and between W2 and islands in the Atlantic.

With the exception of a sporadic-E opening on December 10 that netted a number of W1s, 2s, 3s, 4s, 5s, 8s, 9s, 0s, and eastern VE QSOs with Bob, C6A/KM1E, the shutdown extended into early December, as well. As I am writing this column 28.885 MHz is quiet, reflecting the absence of activity on 6 meters. Hopefully, right after I send in this column the band will open and I can report the results to you next month.

6 Meter Mobile DXing

While everyone else was working the DX with fixed stations and multi-element beams, Frank Moorhus, AA2DR, was working the DX the hard way. He operated from his Chevy S10 pickup. He used an FT-726 with a Mirage (running around 100 watts) and a Saturn 6 (a 3-element 6 meter halo antenna). On October 29 he worked TI2HL, XE1GE, and VK4BRG. On November 2 he worked PY5CC. On November 8 he worked CT1BH and CN2JP. On November 11 he worked HK3AVR. Finally, on November 23 he worked TI2KD/5, YN1CC, and CU1EZ. Frank states that he has a potato farm and that when conditions are just right he drives out to that special spot on the farm and works the 6 meter DX. Frank, reserve a spot for my mobile station. I need a few of those countries.

DXpedition Descriptions

As reported last month, Bob Reif, W1XP, showed up on 6 meters CW as PJ7/W1XP.

Navassa Island Activated

For those of you who receive this column during mid-January, turn on your radios now and listen for a group operating from Navassa Island. Beginning January 17 and lasting through January 23, WA0DAN, KW2P, AA4NC, AA4VK, and N0TG will be signing their own calls /KP1 and running stations on 160 through 6 meters, with 150 watts on 6 meters. They will have a beacon operating and will activate the 6 meter station when alerted to a band opening. QSLs for this operation go to N0TG.

As it turned out, Bob, his wife, Karen, KA1JVU, Frank Stites, W1MUX, and his wife, and a third couple, who are not hams, took a vacation that included travel to Sint Maartin and Saba (PJ6). When they were packing for the trip, Frank suggested that Bob include a 6 meter radio among the amateur radio items. As a result of that suggestion Bob packed an ICOM IC502. He was not sorry.

On the first day in Sint Maartin he unpacked the radio and turned it on to hear nothing. However, the next day at 1245Z he worked K5CM. After that he was off and running. Between his starting time and 1430 he worked 60 other stations in W1, W2, W4, W5, W8, W9, W0, VE2, VE3, and XE1 call areas. Following that very successful day he reported not hearing anything until October 29. On that day at 1343Z he worked Bill, W3XO, to begin one of three openings that would net him another 30 contacts.

Finally on November 2 he had a brief opening to Europe, during which he worked FC1GTV and F6CER. He reported hearing more than he could work and that beacons were invaluable for determining band openings. He said that most of his operations were on CW. He tried to make a few SSB contacts, but found that CW would get through when SSB would not. With the '502 he ran 1 watt to a 10 foot whip. He stated that the last item packed was the '502 and whip. He expects that on future DXpeditions/vacations he will be packing a 10 watt transverter and a two-element collapsible beam, all designed to fit into a suitcase.

On the same day (November 2) that Bob was packing his suitcase to fly onto PJ6, Jim Treybig, W6JKV, was unpacking his to begin a nearly month-long operation from the dual countries of (French) Saint Martin and (Dutch) Sint Maartin. Operating principally as PJ7/W6JKV, he made 845 QSOs in 47 countries. He estimates that from there he worked most states except Alaska. As W6JKV/FS he made around 200 QSOs in 9 countries. Using EME on 2 meters he made 22 contacts. Jim reported that initially he was plagued by TVI. His first location, atop a multi-story building, found him on every television in the building. He subsequently moved to a house where he had no TVI at the house, but still had TVI at the building. He found out that the problem was with the local cable company. So as a dedicated DXer, he hired the cable company to go out and fix the problem in the building. Thereafter, he had minimal TVI problems. Jim found it best to operate from PJ7 as his base. He determined that when the band was in good shape he would cross the border and set up shop in FS. Jim used an ICOM 575 with an M2 long-boom 11-element beam on the PJ7 side and a 5-element beam on the FS side. Jim used a TS751 and a preamp and a brick with M2 array on 2 meters for EME. He reported that the little '751 mobile radio performed very well for the EME work. Jim reports that his next DXpedition will take him to somewhere in the South Pacific sometime in the spring. We'll keep you posted.

As this column is being written, Joel Paladino, N6AMG, is completing his trip to Morocco and the Azores. He gave many a new country from Morocco while operating CN2JP. His operation from there also included 2 meter EME. His operation from the Azores, where he operated CU3/N6AMG, was not quite as successful, as it coincided with the shutdown of the band. A more complete report from Joel will be published in a future edition of this column.

Earlier last year the YOTA-SAWE EME Group, an organization mainly composed of French amateurs, made a DXpedition to San Marino to activate that country on 432 EME. The team consisted of Gerald, F1JBP, Patrick, F6HYE, Ranier, DJ9BV, Regis, FC1GKF, and (non-amateur) Liska.

The team arrived in San Marino on September 23. They spent the better part of the next 24 hours setting up their equipment at the site of ARRSM (Associazione Radioamatori Repubblica di San Marino) club station. They began operation, signing the call T70A, at 2030Z on 24 September with a CQ. They reported a tremendous pile-up of Europeans calling them. Their first contact was with DL9KR. They managed to work 13 additional stations during the first hour of operation (no easy task considering the sequencing for 432 EME QSOs, something we will cover in a future column). Later that night they completed two QSOs with North Americans (VE1BVL and K1FO, the latter for his 54th country on 432 EME). A burnt coax connector forced an early QRT for the team for that night. The next evening they worked VK3UM on CW and SSB and several more Europeans.

On the 26th they worked a number of North Americans, including Alan, K2UYH, on CW and SSB (for Alan's 65th country on 432 EME), a few more Europeans, and another VK. On the 27th they worked still more Europeans and North Americans, another VK, a UA9, and one JA. The 28th

netted them still more Europeans and North Americans as well as a UT5 and another three JAs. Finally on the 29th they wrapped it up by working SM6EUP, NC1I on CW and SSB, DL5LQ, and (at 0540Z) K4QIF. They completed a total of 90 QSOs, 86 of them on random. Of the 90 QSOs five were on SSB. At 0550Z moonset and high winds forced the operation to finally shut down.

During their operation they were plagued by QRM from commercial TV and FM stations, UHF telephone circuits, a coastal navigation system, and what they believed to be spread-spectrum signals from AWACS planes observing Yugoslavia. Additionally, they had voltage fluctuations that ranged between 130 and 240 volts. The voltage fluctuation problem was solved when Paolo, T77T, arranged for the use of a 7 KVA diesel generator from the civil security corps of San Marino. However, they were also harassed by high winds (reaching 60 MPH) and heavy rain. The winds and rain eventually forced an early QRT on Saturday.

Finally they were the recipients of some local publicity, when a local TV station did a film clip for the evening news. The publicity would have been nice, except that the interview with TV film crew and visits from local amateurs cut into their daytime sleep periods.

This group expects to activate another country for 432 EME operations sometime this year. Thanks go to Alan, K2UYH, and the "432 EME and Above News" for this report.

Forthcoming DXpeditions

Bill Wiseman, KM1E, will be planning a return operation from the Bahamas as C6A/KM1E during the month of March. He has already been worked by a number during his first stay. The QSL route is via his home call.

For those of you who need South Korea, Gary Kohtala, WA7NTF, is expected to be on as HL9TG in the very near future (if not already). He hopes to have a (N4LTA furnished) beacon running as well as activating HL for at least a year. He is in the military and expects to be able to stay in South Korea until his present enlistment is up, which is about 2½ years.

More Newsletters

Thanks to Kent Britain, WA5VJB, I have information on two other newsletters. The first is published by the Rochester VHF Group and is appropriately entitled "The Rochester VHF Group Journal." Membership in this excellent organization is just $10. Their membership runs from June 1 to May 31 each year. Mail your check to: The Rochester VHF Group, P.O. Box 92122, Rochester, NY 14692.

The second is published by the Society of Radio-Amateurs The Netherlands and is entitled "V R Z A EME Newsletter." The newsletter is full of technical notes and operating news for the whole spectrum of EME work (yes, even to 24 GHz). The subscription rate is free. However, the publishers request a donation to cover the cost of printing and mailing. To be added to their mailing list write to: Mr. H. Ripet, Zuidbuurtseweg 1, 3133 KC Vlaardingen, The Netherlands.

Emil Needs Your Help

Emil Pocock, W3EP, is working on a study of incidents of sporadic-E on 2 meters. He is looking for hard data from the period of 1951 to 1979. He would like to have any information you may have on 144 MHz sporadic-E openings. The information should consist of: station/person reporting, date and times (UTC date/time preferred), stations heard and/or worked, locations of both (if known), what evidence that sporadic-E was involved, and any other information that might be useful.

Emil's objectives are to: (1) create a data base of all known 144 MHz sporadic-E events in North America; (2) analyze openings in terms of date and time of day; (3) test for cyclical appearances (daily, weekly, annually, or solar cycle related); and (4) compare these events with an 88 MHz data base he has previously assembled. Emil has a forthcoming article to be published in *QST* pertaining to the analysis of his data on 88 MHz sporadic-E openings. He said that he has made some "new and surprising" conclusions based on his research. If you have data that you feel will be useful to Emil, drop him a note at: 625 Exeter Road, Lebanon, CT 06249.

6Y5RC Beacon

Wenti, 6Y5IC, reports that the 6Y5RC beacon is back on the air. He states that at work he is only 5 minutes from home should anyone hear the beacon and desire to get Wenti to come up on 6 meters. You can make a direct-dial call to him at work at 809-926-7568.

QSL Routes

The following are routes for QSLing your VHF and above QSOs as reported to this editor.

3D2PO via VK3OT
5V7JG via F6AJA
7P8EN via ZS4TX
7Q7TT via N6ZZ
9L1US via WA8JOC
9Q5EE via K1RH
9Q5TE via SMØBFJ
9X5NH via DJ6EA
CN2JP via WA8LLY

ARRL Files Petition Concerning 222 MHz Band

On November 12, 1991 the ARRL filed two petitions concerning operations on 222 MHz. The first, RM-7868, seeks to allow Novices full amateur radio privileges on the band. The second, RM-7869, seeks to set up a protected weak signal frequency allocation of 150 kHz, from 222.000 to 222.150 MHz. A full report concerning these petitions will be in next month's column.

CN8ST via K8EFS
CO2KK via W9JUV
CU3/N6AMG via WA8LLY
FM5WD via W3HNK
JI1CQA & JJ1PPXZ/JR6 via JI1CQA
KP2A via W3HNK
P43FM via PA0FM
T70A via F6BCG
V51E via K8EFS
V51KC via Bureau
VS6WV via K0TLM
XX9SW via KU9C
XX9JN via KU9C
ZD8ACJ via G0ACJ

7Q7CM, Colin Morgan, Private Bag 303, Chichiri, Blantyre 3, Malawi

7Q7JL, John, P.O. Box 2907, Blantyre, Malawi

7Q7LA, Mr. Lantrobus, P.O. Box 59, Mangochi, Malawi

CT3FT, Cedric J. Rourke, P.O. Box 86, Porto Santo Is, Maderira, P-9400 Portugal

DJ6EA, Udo Weber, Sternbergstr 54, D-7406 Moessingen, Germany

KG6UH/DU1, Luis Anciaux, USNR, USCINC, PACREP-LNO US Embassy Manila, APO San Francisco 96440, U.S.A.

EI5FK, Charles Coughlan, 12 Forest Bridge Cres, Wilton, Cork, Republic of Ireland

FY3FV, Patrick, P.O. Box 999, 97300 Cayenne, French Guiana

JI1CQA, Noriyuki Ito, 1-4-10 Higashe-Magome, Ota, Tokyo 143, Japan

WA8LLY, S. T. Lund, 10180 Mill Station Road, Sebastopol, CA 95472, U.S.A.

KM1E, Bill Wiseman, P.O. Box 120, Woolwich, ME 04579, U.S.A.

W3HNK, Joseph L. Arcure, Jr., P.O. Box 73, Edgemont, PA 19028, U.S.A.

K8EFS, Merlin (Andy) Anderson, 4300 South Cochran, Charlotte, MI 48813-9109, U.S.A.

KU9C, Steven M. Wheatley, P.O. Box 50521, Indianapolis, IN 46250, U.S.A.

W9JUV, Joe Schroeder, 2120 Fir, Glenview, IL 60025, U.S.A.

K0TLM, Tom Bishop, 4936 N. Kansas Ave, Kansas City, MO 64119, U.S.A.

OE2UKL (ex-OE5UKL), Kurt Ullmann, Sonnenweg 13, A-5162 Obertrum a See, Austria

OD5SK, Mr. Samir Khayat, P.O. Box 180, Tripoli, Lebanon

PY5CC, Peter Z. Sprengel, P.O. Box 7, Matinhos, PR 83260, Brazil

VK3OT, Steve Gregory, P.O. Box 622, Hamilton, Victoria 3300, Australia

ZS4TX, Mr. B. Van der Walt, P.O. Box 28691, Danhof 9310, Republic of South Africa

ZS6RAD (ex-ZS4AAB), Rad Handfield-Jones, P.O. Box 2994, Halfway House, 1685 Republic of South Africa

ZS6XL, Mr. S. D. Harmsen, P.O. Box 4939, Randburg 2125, Republic of South Africa

And Finally

I want to thank everyone who sent in his or her survey. I also want to express my appreciation to Bob Cerasuolo, WA6IJZ, and the "West Coast VHFER" for reprinting the survey. Results of the survey will be published in a future column.

In the coming months we will be exploring how to use weather to predict band openings and recent developments in very highly stable local oscillators used at 10 GHz.

Input for this column came from "The West Coast VHFer"; Ted Collins, G4UPS's 6 meter information sheets; "432 and Above EME News"; and from you. Your input is especially appreciated.

Please drop me a note at my post office box or call me at 405-528-6625 if you have late breaking news that you feel I need to publish. Remember, this is your column. I am merely the reporter, but a very happy one when reporting on your accomplishments. 73, Joe, N6CL

Radio FUNdamentals

BY BILL ORR, W6SAI

THINGS TO LEARN, PROJECTS TO BUILD, AND GEAR TO USE

The Birth of Consumer TV (1939–1941)

Yes, television flourished in the late thirties! In April 1939 leading radio manufacturers announced TV sets for the public at the New York Radio Show. RCA, General Electric, Westinghouse, Stewart-Warner, Philco, DuMont, and Pilot (household names for home entertainment equipment in those days) showed models of black-and-white sets with picture screens ranging from 3 to 10 inches. Prices started at $125 for the 3 inch set (equivalent to about $1500 in today's inflated currency). The 3 inch set, by the way, wasn't a superhet. It was a tuned-RF design with a bandpass filter in the front end. A separate receiver was necessary to pick up the sound transmission. The set had 12 tubes, plus the 3 inch CRT. Larger sets had up to 30 tubes, received both the picture and the sound portions of the signal, and incorporated a 9 channel tuner. Dumont showed an experimental receiver with a gigantic 14 inch screen which could be viewed by a number of individuals simultaneously! Awesome.

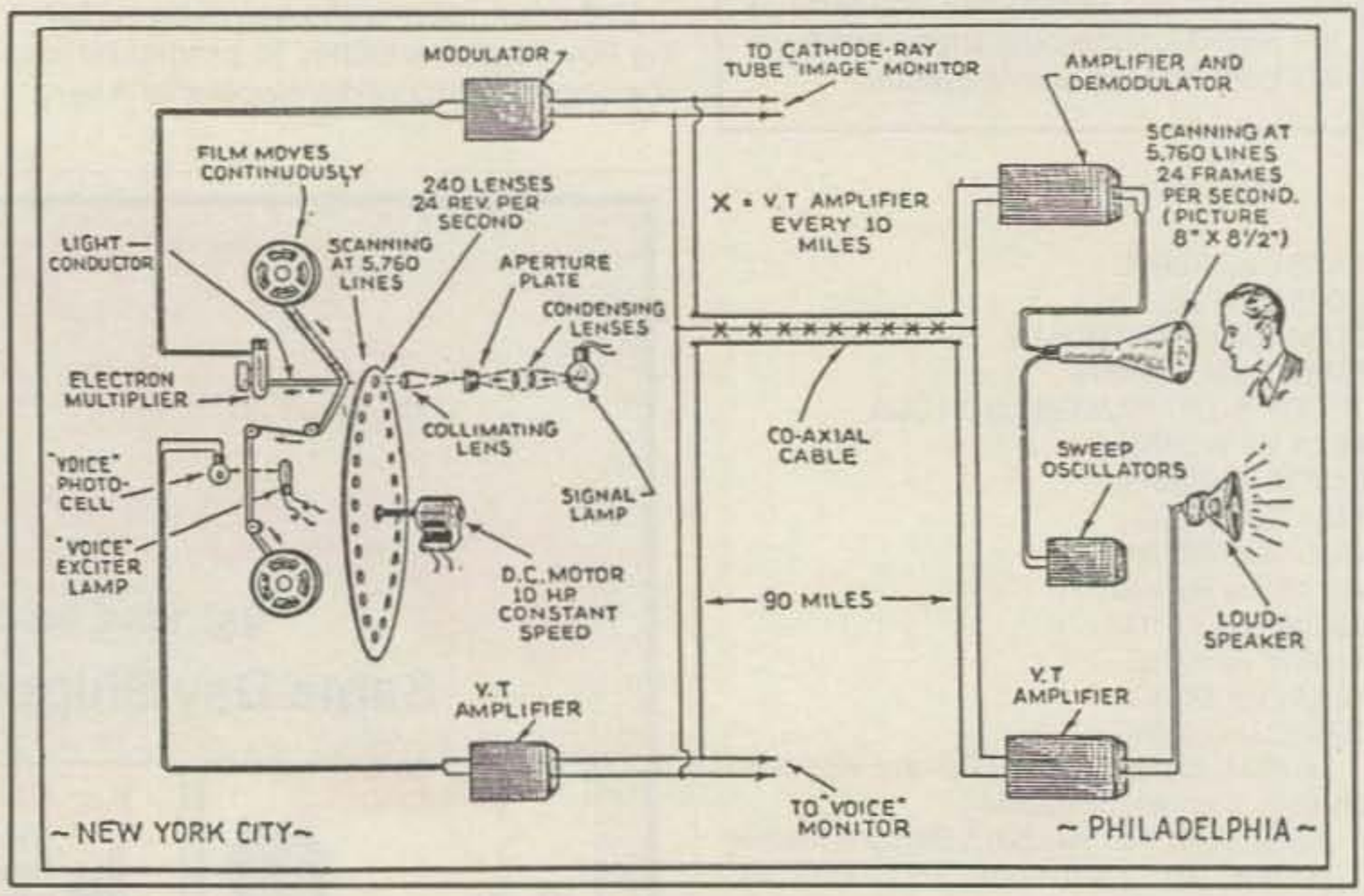


Fig. 1–Television "piped" from New York to Philadelphia in 1939 via coax cable. (Drawing from Shortwave & Television, *September 1939)*

The Bell Labs Experiment

The quick flare of interest was brought about in part by publicity given to a Bell Telephone Lab experiment wherein a long-distance public demonstration of "TV Over Wires" showed a movie film transmitted from New York over a coaxial telephone line to Philadelphia, a 190 mile circuit! It was possible for TV to conquer the so-called radio horizon of a few dozen miles at VHF (fig. 1).

The coax line was about ⅜ inch in diameter with air insulation and the loop signal loss was 2100 decibels! This enormous loss was compensated for by placing a three-stage tube amplifier every 10 miles along the line. The TV signal was down-converted to a single-sideband signal covering 144 to 950 kHz and then up-converted to a practical TV channel at the receiving end. The picture definition was 240 lines derived from a mechanical scanning disc. It was a blurry picture, but easily recognizable. The feat made headlines across the United States and the public awareness of television was awakened.

Although this was a one-shot stunt, it convinced the public and the government that nationwide TV was feasible and was rapidly coming out of the experimental cocoon that had enveloped it since the first rudimentary transmissions in the early thirties.

48 Campbell Lane, Menlo Park, CA 94025

Commercial TV Legalized

The Federal Radio Commission gave tentative okay for television commercialization in 1939. Lowell Thomas was on the tube with nightly broadcasts, along with a newsreel of the week's events. Lucy Monroe enthralled the viewers with her songs and the "Parker Family" soap-opera was a big hit.

The stations, however, still retained experimental licenses, and the whole legal and financial structure of television was very shaky. CBS was on channel 2 in New York with the W2XAB call; Dumont was W2XWV on channel 4; NBC was W2XBS on channel 1 (soon to be deleted). Chicago had Zenith TV (W9XZV) on channel 1; Philadelphia had W3XAU owned by WCAU on channel 5. On the west coast, Earl C. Anthony Co. owned W6XEA on channel 6; Don Lee Broadcasting had W6XDL on channel 1; and the Hughes Tool Company had a construction permit for W6XHT, channel 2, in San Francisco. All in all, over 48 television stations were on the air by mid-1941, most of them running very low power. The General Electric transmitter near Schenectady, New York (W2XB on channel 2) ran a gargantuan 10 KW visual and 3 KW aural signal, followed by W2XBS in New York and W3XE in Philadelphia, easily the largest TV installations in the States!

Many of the early TV stations used amplitude modulation (AM) for the sound, but the FRC stipulated that FM be used in the future. Some stations contemplated the use of color broadcasts. This was not approved by the FRC, and most broadcasters stayed clear of the idea, as it would obsolete transmitting equipment and the thousands of black-and-white receivers already in consumer's hands. Besides, the color pictures weren't very clear, anyway.

While NBC and RCA had been conducting experimental TV broadcasts for years, they shied away from attempting to put receivers in the hands of the general public, limiting their sets to company engineers. But the advent of TV receiver-only manufacturers, not beholden to a TV station or a network, forced their hands. This compelled RCA, for one, to offer their receiving sets for sale to the general public. This in turn prompted others to obtain FRC licenses for TV transmitters. The TV boomlet was on, only to be brought to an

Now you see it....

The PK-88 is becoming one of the most widely used packet controllers in the world. In some areas, it is outselling its closest competitor by 10 to 1!

With the built-in 18k byte maildrop, you can use it as a "mini-BBS" in your area, and even automatically forward and reverse-forward traffic with your local PBBS. Or, just use it as a packet controller to help you catch that rare DX on your local DX packet cluster.

The PK-88 can be used with a dumb terminal or any computer with an RS-232 port and a communication software program (such as PC-Pakratt-88).

Now you don't.

Psst! It's in here!

The PCB-88 includes all the features of the PK-88 (above), and is easily installed in your IBM PC or compatible computer. Even if your shack is short on space, you can still have the best packet setup available.

In addition to the PK-88's features, the PCB-88 also includes TAPR's state machine DCD circuit and modem disconnect header for added performance and convenience.

To help make setup and operation a breeze, we've included AEA's powerful yet simple PC-Pakratt-88 software and an AC-1 12 VDC adapter (keeps the PCB-88 on when the computer is off – U.S. models only).

The PK-88 and PCB-88 packet controllers are the best money can buy, and that's no illusion!

AEA
Advanced Electronic Applications, Inc.
P.O. Box C2160 / Lynnwood, WA 98036
Customer Service (206) 775-7373 • Upgrade Hot line (206) 774-1722
Catalog Request line (800) 432-8873 • CompuServe User ID 76702,1013

abrupt halt in early 1942 by the entry of the United States into the war. Manufacturing facilities and engineering turned to the war effort, and the few existing TV stations were closed down in short order. "High definition" TV and the flood of inexpensive receivers would have to wait until the war was over.

An Inexpensive 6 Meter Yagi Beam

Yes, the sunspot cycle is dropping, with dire results for the higher frequency bands. Yes, 6 meters is alive and well and likely to remain so for another year. Yes, there's plenty of mouth-watering DX on the band during the months of good skip—perhaps not as good as last year, California working into Africa, New England working into Australia and New Zealand, and so forth.

Even as the cycle declines, you can work some DX with a ground plane antenna, but to really compete with the Big Boys you need a multi-element Yagi up high in the air.

Here's a nice design for a 5-element Yagi on a 23 foot long boom. It was derived from the YO 4.11 Optimizer program of K6STI. Forward gain is only about 0.4 dB below theoretical maximum possible with 5 elements. Specifically, the free-space gain is 10.29 dBd at the design frequency of 50.125 MHz and the front-to-back ratio is about 19 dB.

The element dimensions and spacings are given in fig. 2. I suggest the use of a boom made up of two sections of 2 inch diameter aluminum tubing. Top guys are suggested if you think there is too much sway in your design. Medium-wall tubing for the boom eliminates the need for top guys. Heavy-duty TV mast sections may also be used. It is your choice.

Feedpoint impedance of the Yagi varies with frequency, and is about 15 ohms at the design frequency. Either a Gamma- or a T-match may be used (see fig. 3 for details). Maximum SWR between 50 and 50.25 MHz is less than 1.35-to-1.

Antenna construction and adjustment are well-covered in the *Beam Antenna Handbook*, so they will not be discussed here.

Antenna Height

It is interesting to compare antenna performance at various heights. Fig. 4 shows the elevation plot at 30 feet. The lowest lobe is concentrated at about 9 degrees. Not bad, but the main lobe drops to about 5 degrees at an elevation of 60 feet (fig. 5). At 90 degrees the lobe is down to about 3 degrees above the horizon.

What's the best DX height? Well, a lot of 6 meter operators make use of two antennas, one at a relatively low height (30 to 40 feet) and the other up in the air at 60

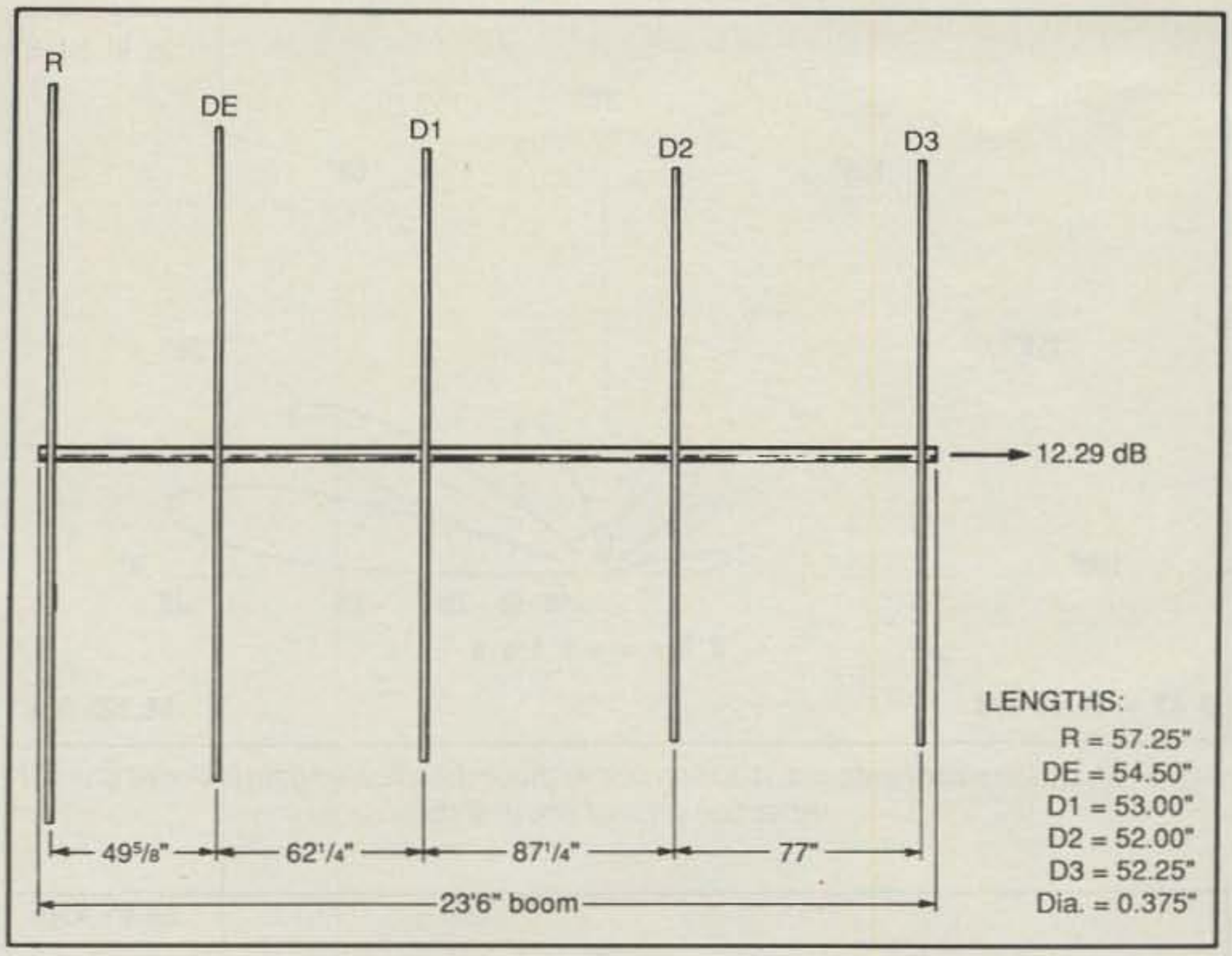


Fig. 2– Plan view of 6 meter Yagi. Elements are mounted above boom on small plates attached to boom with U-bolts.

to 90 feet (fig. 6). They find that one antenna usually works better than the other, depending upon propagation and path length. Some DXers stack the antennas on a rotating mast and have a phasing system that allows either or both antennas to be used at the flick of a switch.

Department of Goofs and Errors

In the December column I proposed that a DXpedition take off immediately for Kahoolawe Island in Hawaii and thus put a new country on the air. Alas, my good friend Jim Maxwell, W6CF, shot me out of the saddle with an up-to-date copy of the DXCC rules, a turgid and melancholy 16-page dissertation on what is and what is not a "country" as far as amateur radio is concerned. I am sure the delegates to the United Nations would raise their eyebrows to the sky if they read this opus, but that's the way it is, at least as far as DXCC is concerned. So unpack your gear, forget about Kahoolawe Island, and instead concentrate on the Gold Coast of Maui, with the luxury resorts, the Mai-Tais, the hula dancers, and the gorgeous sunsets! DX will have to wait another day.

The Dead Band Quiz

So. Let's see how aware you are of one of today's popular Sunday night TV programs. Look at the following quotation. Under what circumstances do you see this on the screen, what's the name of the program, and where does it appear in the program?

"Arnold raced out of the door, and . . ."

Can you complete that sentence? Answer will be in a future column.

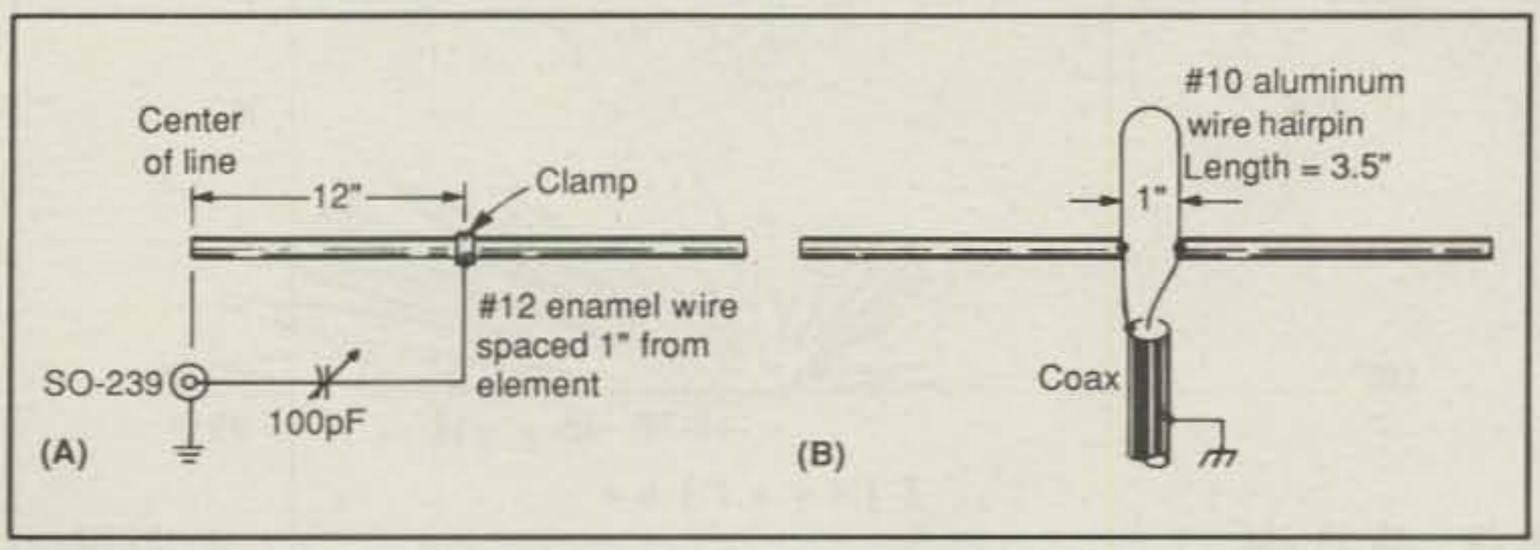


Fig. 3– (A) Gamma match. Additional data on adjustment is given in my column in the August 1989 issue of Ham Radio magazine. (B) Hairpin match. Adjust element length and hairpin spacing for best match.

The Dead Band Quiz (September 1991 Issue)

Congratulations! I pride myself that I have a bunch of sharp, heads-up readers of this column. I thought I would really stump you with a quotation from *The Hunt For Red October*, the block-buster book made into a smash movie. But, no. The following amateurs knew that Jack Ryan was the hero who had problems falling asleep on an airliner: KB7SS, WY0Z, KJ6LD, AA4WX, Bernie Gratz, WM1V, N2KIX, WG5O, WB6IYM, K9AY, K0MFI, NZ5T, N6TPT, N7KA, KA0ZIA, WB3HOT, N4VQG, WB6SYN, N9ALK, AA1M, NZ3I, KA4RRU, KC9C, WA1DEY, KK6CY, KE0CR, KD5IA, WD4CNZ, AA5IE, N4VPN, W4UNP, NR3Z, KD5YG, AD0V, KA4IUP, K1SC, KB2XR, NC8I, W9XD, AG6D, WB5TUF, KG5ME, KC4NHB, K4JBY, KC4GR, N6DXX, N4XMX, WA2KDB, KB2GCG, N0AON, and K3NCO.

As to the Old Maestro theme song, it was Ben Bernie and all the Lads, circa 1933. Congratulations to AA4WX and N4VPN, two persons who were keen enough to know about Ben. (His theme song was *It's a Lonesome Old Town*, right?)

Also thanks to N4XMX, W6PRH, W1JR, WA5JCI, and KK6CY for their personal notes. I really appreciate hearing from all of you ! 73, Bill, W6SAI

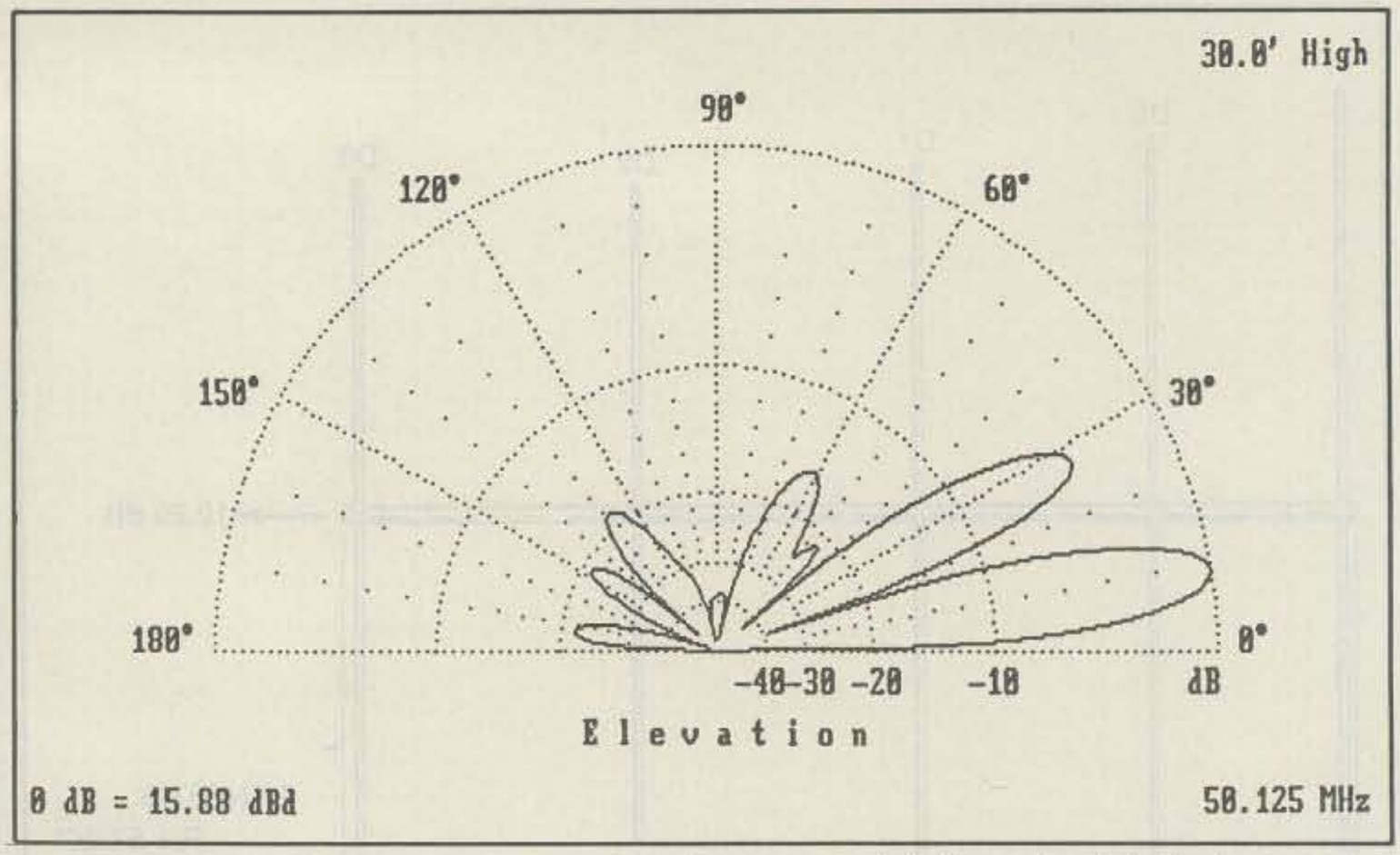


Fig. 4– Elevation plot of antenna at 30 feet above ground. Indicated gain includes ground reflection gain of about 6 dB.

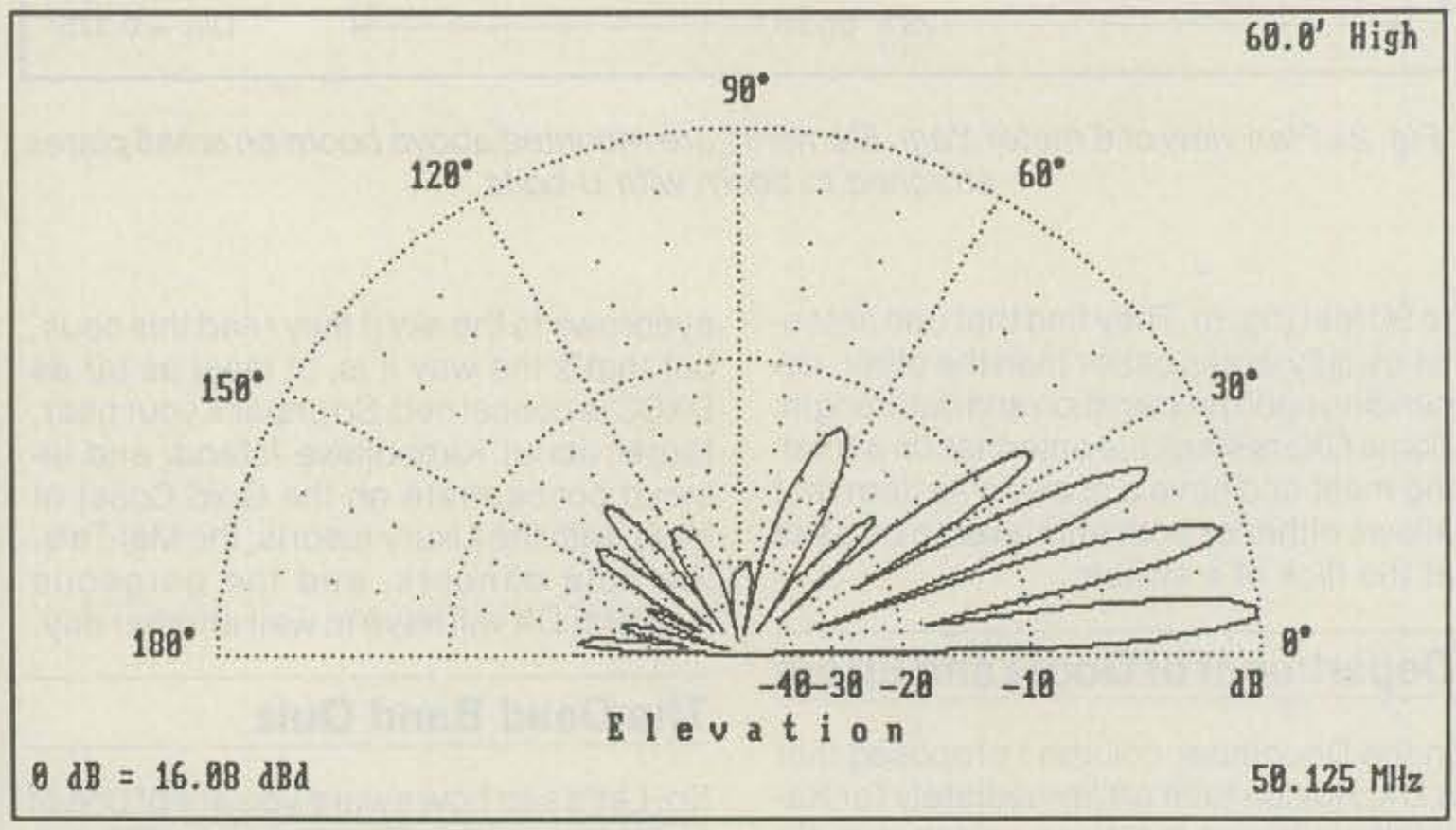


Fig. 5– Beam is raised to 60 feet. Main lobe angle drops to about 5 degrees elevation.

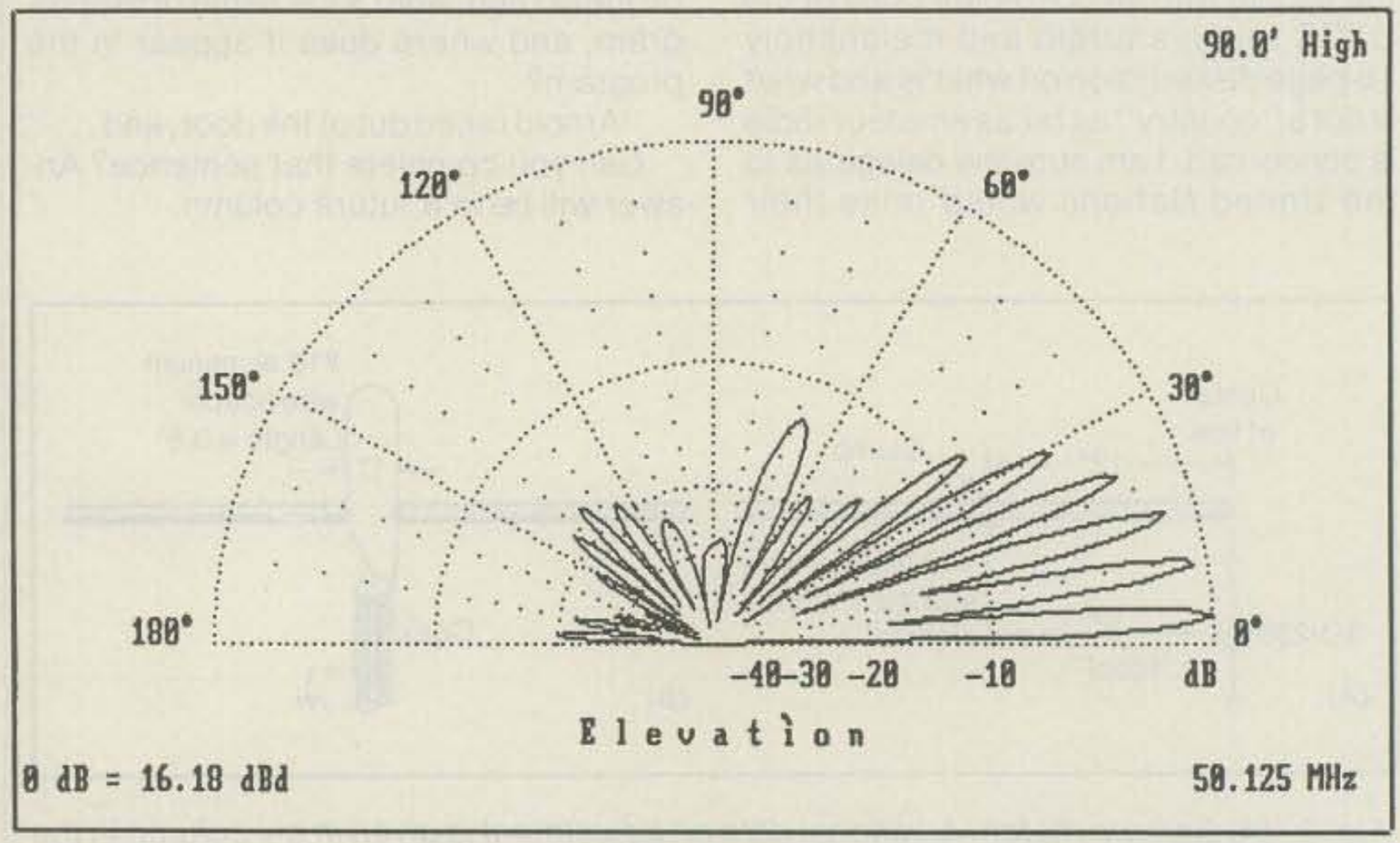


Fig. 6– Beam at 90 feet. Main lobe is concentrated below 5 degrees. Six meter DXers certainly do like that!

THE JAPAN RADIO CO.

NRD-535

THE NEXT GENERATION IN HIGH-PERFORMANCE HF RECEIVERS

Once again JRC breaks new ground in shortwave receiver design. The new NRD-535 has all the features SWLs and amateurs have been waiting for. General coverage from 0.1 to 30 MHz in AM, USB, LSB, CW, RTTY, FAX and Narrow FM modes. Advanced ECSS operation for phase-lock AM reception. Variable bandwidth control (BWC). Tuning accuracy to 1 Hz possible with direct digital synthesis. 200 memory channels with scan and sweep operation. Triple Superheterodyne receiving system. Superb sensitivity, selectivity and image rejection. Dual-width noise blanker eliminates impulse noise. Squelch, RF Gain, Attenuator, AGC and Tone controls. Optional RTTY demodulator available. 24 hour clock/timer. Easy to read vacuum fluorescent display with digital S-meter. AC and DC operation. Plus the most comprehensive computer interface found on any radio to date. Call or write today for a full color brochure, price list and dealer information.

JRC Japan Radio Co., Ltd.

MAIN OFFICE: Akasaka Twin Tower (Main), Akasaka 2-chome, Minato-ku, Tokyo 107, JAPAN
Tel.: (03) 584-8836 Telex: 242-5420 JRCTOK J

IN U.S.A.: 430 Park Avenue (2nd Floor), New York, NY 10022
Tel.: (212) 355-1180 FAX: (212) 319-5227 Telex: 961114 JAPAN RADIO NYK

PACKET USER'S NOTEBOOK

BY BUCK ROGERS, K4ABT

CONNECTING YOU AND PACKET RADIO IN THE REAL WORLD

Picking Up The Pieces

Last month I presented a glimpse of yet another aspect of digital communications. This was the application whereby packet radio and AMTOR are brought together to form a means of exchanging traffic from one mode to the other. AMTOR and packet communications are radically different in that the forward error correction (FEC) is handled somewhat differently.

Although AMTOR and packet are quite different, they both are still digital, and they do use some common ASCII characters. The ASCII characters in AMTOR are limited, but nevertheless there are enough to get the job done. This marriage of AMTOR and packet is called APlink. Before proceeding, I should provide some background for the introduction to the balance of this month's "Packet User's Notebook."

Last month I spoke briefly about Steve Waterman, K4CJX (see photo), who assisted me in contacting other APlink operators who were involved with the making of *The Last Voice From Kuwait* video. I've had so many inquiries about APlink that I asked Steve if he would prepare a short explanation of APlink, how it began, and how it is used. Here is Steve's answer to my request.

AMTOR/Packet Link, or APlink

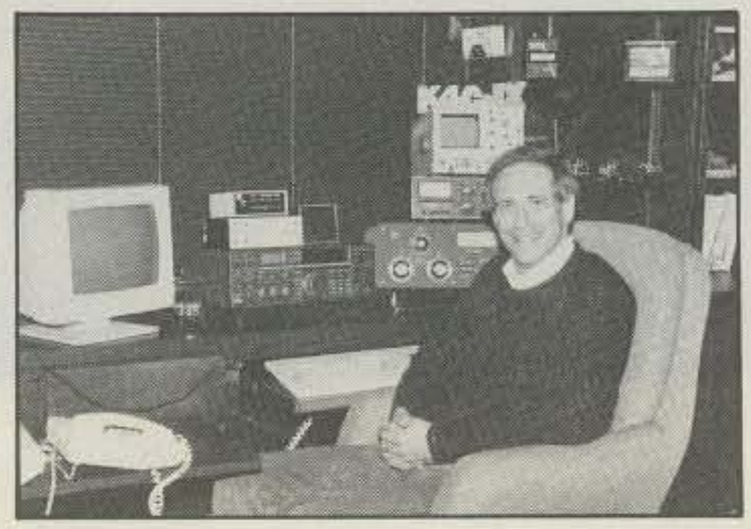
by Steve Waterman, K4CJX

APlink, or AMTOR-Packet Link, was written by Victor Poor, W5SMM, for the purpose of having an HF traffic-delivery/bulletin-board system that would be able to provide an automatic interchange of traffic between the National Packet System and his sailboat HF AMTOR system, worldwide.

This methodology of linking HF AMTOR with VHF packet proved to be so reliable that shortly thereafter it was adopted by a group of stations for the purpose of handling amateur-to-amateur and National Traffic System Messages (NTS) over long distances. Today there is a well-proven "network" of APlink stations throughout the world who deliver traffic continuously.

These APlink stations scan the HF bands, spending approximately two seconds on about 12 to 16 frequencies. When a user links on to the APlink station, the scanning stops, the interchange of traffic occurs, and when the link is broken, the APlink starts scanning once again after a few seconds' pause. This is a tremendous advantage and allows stations to utilize a particular APlink, no matter where in the world it may be.

1584 Oxford Court, Gallatin, TN 37066



This month Steve Waterman, K4CJX, gives an explanation of how APlink began.

Forwarding of messages received is initiated manually by the system operator (SYSOP). Messages for that particular area are transferred to either another APlink station, to an AMTOR user who checks in, or into the National Packet System. Hierarchical routing is used on APlink just like it is on packet.

I started continual operation of the K4CJX APlink in mid-April of this year. Thus far I have handled approximately 11,100 messages. Some of these messages come in through the VHF packet port from the middle Tennessee packet system. These messages are either NTS traffic going out of the southeastern area or messages to countries outside the USA. I also receive messages from other APlink stations to forward to another distant APlink station, to be picked up by AMTOR users, or to put through the VHF packet port to the local packet system to be distributed throughout the south.

There is a group of users who are not APlink stations but who use the APlink system to communicate with each other, as one would with a packet bulletin board, or to send and retrieve NTS messages. Because of the scanning ability of the APlink stations, great distances may be covered.

Just as there is an interchange of traffic between AMTOR and packet, so there is a cooperative interchange among the people within the digital community. I have the greatest respect for the APlink SYSOPs, the packet SYSOPs, and the users of these systems. After all, they are people! This cooperative interchange has moved digital technology forward.

Although AMTOR is slow and does have a limited character set, it is also very reliable under lousy HF band conditions. And although packet is successfully used on HF, neither are really optimal for high-speed operation under adverse conditions. This has spawned continual development of digital transmission methodology, and with the coming of "CLOVER" and other better transmission protocols, we will all benefit.

K4CJX APlink scans the following HF frequencies: 7070.5, 7072.5, 7075.5, 10126, 10128, 10139.5, 14068, 14069.5, 14071.5, 14076, 21073.5, and 21074.5.

The K4CJX station consists of the following: a ICOM 765 at 100 watts; an Alpha 78 amplifier (used to auto-forward to other APlinks); a HAL PCI 3000 in a 386 25 MHz, 89 MB HD clone using W5SMM's APlink software; a HAL SPT-2 and a BK scope for staying on frequency; and a multiband inverted Vee up about 55 feet on an "almost official" 300 foot Tennessee ridge. Packet is linked with an MFJ 1270 and an Alinco 2 meter transceiver.

(Packet and AMTOR users may send messages to Steve at the following APlink address: K4CJX@MIDTN.TN.USA.NA.)

Bridging The Gap

Just as the advent of APlink has bridged the gap from HF to VHF for traffic handling between AMTOR and packet radio, there are new technologies that are changing the way our networking protocols perform.

For several months I've been caught up in the moving mode, which has kept me busy with several personal matters. Now that I have a breathing spell, I can attend to more interesting concerns. I've devoted much attention to the activity that has been taking place with the latest "TheNet" code. It now appears that about all that has happened is that it was rewritten to add a couple of commands.

For the new packeteer NetRom and TheNet nodes represent networking technology of yesterday. There is no returning to the nodes after experiencing an easier means of establishing a packet connection. As Bruce LaPointe, WD4HIM, said to me in a recent telephone QSO, "It would be like returning to AM on 20 meters, if we went back to nodes after using the ROSE

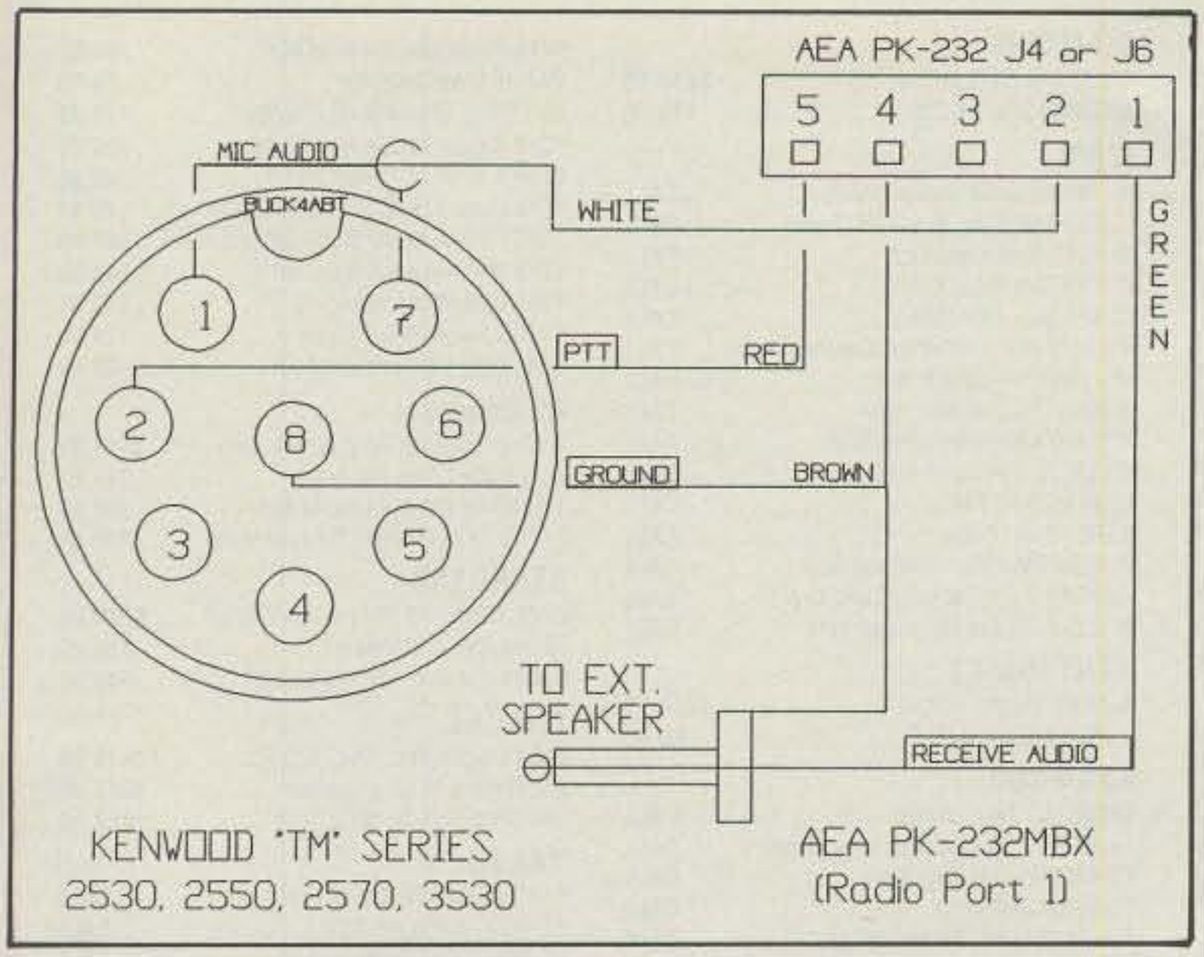


Fig. 1– Interfacing the Kenwood TM-25 series to the AEA PK-232. Note: I use "Radio Port 1" for the VHF port, and "Radio Port 2" for use with the HF transceiver; user option.

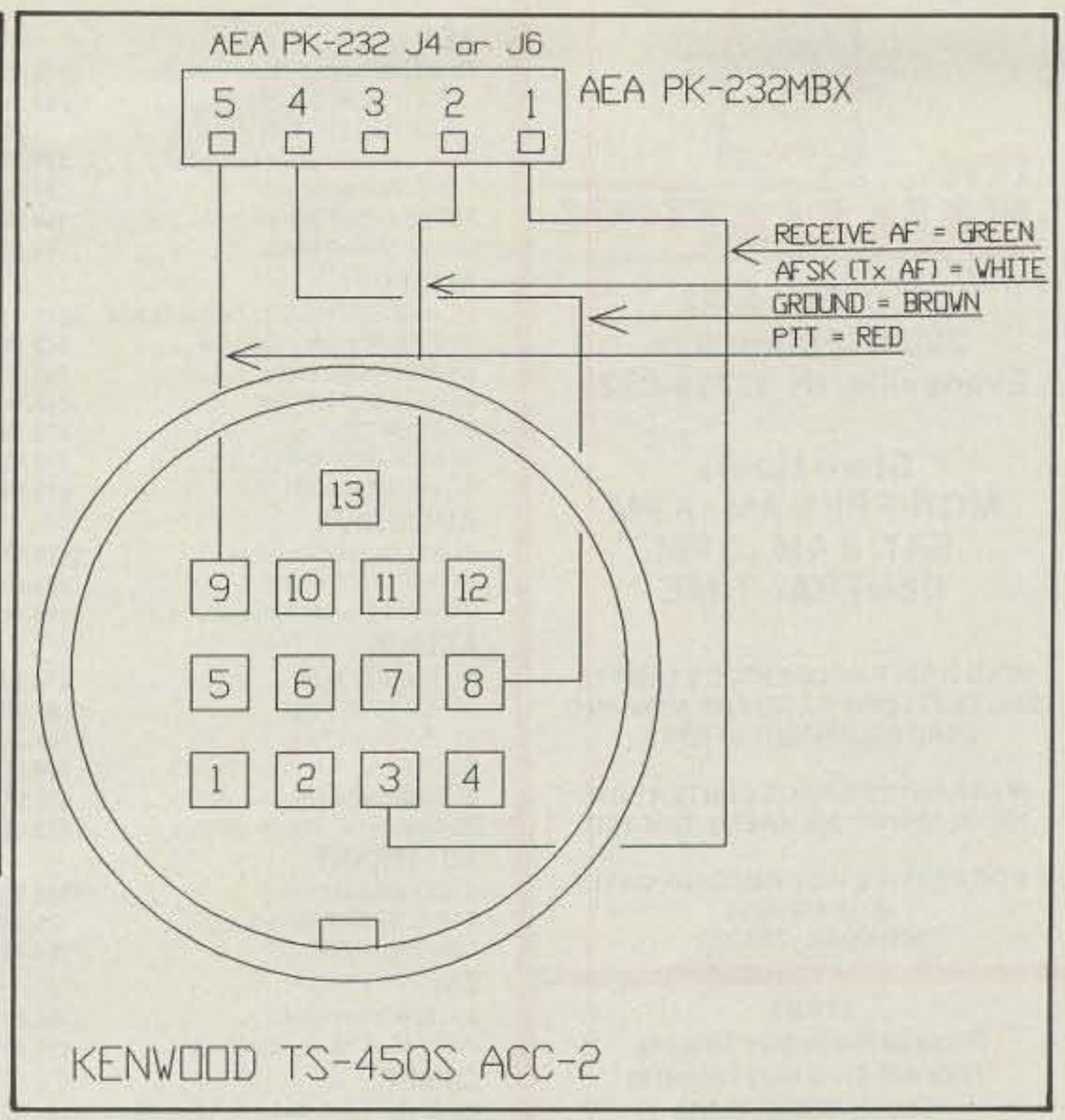


Fig. 2– Here I have interfaced the Kenwood TS-450S accessory port 2 to "Radio Port 2" of the PK-232MBX controller. Port selection is a user option.

switch." For now the latest and most efficient means of packet radio keyboard networking is via the ROSE.

Digipeaters, Nodes, and Now the ROSE Switch

At first we had the station-to-station connects. Then in very short fashion we found that we had the capability of "store-and-forward" within the TNC. Not long afterwards we began to place some of these prized transceivers and terminal node controllers atop some high buildings and mountaintops, and we called them "DIGIpeaters," which stands for digital-repeater.

With digipeaters we could try connecting to a distant station by issuing the callsign of the station with which we wanted to connect, along with a string of digipeaters that we hoped would get us there. There was a limit of seven or eight digipeaters the TNC would allow to be entered. The problem was compounded by the distant station having to get its "acknowledgements" (ACKs) from the calling station. Therefore, if more than two or three digipeaters were used in the string, the connect was short lived.

In those days a connect string through digipeaters might look like this:

C WB4GQX V K4ABT-1,WB4GQX-1, KD4NC-3,SAWNEE

A few years went by and we began to see the beginning of the Net/ROM and "TheNet" node code being applied to the packet system. In those days we referred to the node as a bridge. However, as networking topology grew, the bridge became what we now know as a "Gateway." The term "node" was more widely used for the higher level networking protocols. Only when two or more nodes are attached in such a manner as to allow the transfer of data between frequencies, LANs, and data rates do we call them bridges, or gateways.

The nodes gave us a new and different means of connecting to other stations farther away simply because the node, once connected to, performed as if it were our own remote-controlled TNC. That is, we could connect to the node and issue a new connect command to connect to the next node, and so on, until we had reached the destination node. From the last node in the string we could issue a connect to our target station.

NET/ROM and TheNet nodes had minds of their own inasmuch as they would hear a neighbor node, and each would store the route to that neighbor node in a node list, or table. This allowed each node to have a ready list for the users to look at and to use as a path to the next node. In order for the nodes to maintain this list, they would periodically send out a list to the neighbor nodes, which created extra clutter to be put into the airwaves.

There were other problems here also. Some node ops would set the parameters of their node(s) to transmit "node-list" broadcasts as often as every 15 minutes. Because of the nighttime propagation at VHF, this gave the nodes a false sense of having neighbors that didn't exist during the daylight hours. Although the phantom neighbor was no longer there in the daytime, the node list would still contain its name or call.

In an effort to reduce the clutter created by the nodes updating each other, the node ops tried "locking-in" the paths that were there, but this also became a futile task. There were changes to the nodes, and others would stay in the "locked-in" node lists for as long as the node op allowed it to remain.

Even with the minor pitfalls of the nodes, at the time we were content with what we thought to be a good networking system. That idea would soon come to an end as technology moved ahead.

Aww "RATS"

During this same period work was progressing with something called the "COSI" and later the "ROSE" switch. An organization wishing to build a true AX.25 system of networking with a minimum of on-the-air clutter was working with this code.

The Radio Amateur Telecommunications Society (RATS) was spending long hours perfecting a system whereby only the callsign of the station being called and a destination address would be needed to establish a connect. The RATS organization is how the name "ROSE" began to be used to describe this new protocol. It is an acronym that stands for RATS Open Systems Environment.

Tom Moulton, W2VY, and other members of RATS continued to build the com-

CIRCLE 40 ON READER SERVICE CARD

A recent check in to the local DX packet-cluster node in El Paso, Texas caused some excitement among area DXers. Larry Junstrom, KN4UB, plays bass guitar for the well-known rock-and-roll band .38 Special, and he chases DX in his spare time from his home in Jacksonville, Florida. He packs a laptop computer complete with TNC and HT to keep up to date on his hobby while away from home. Larry took time from his busy schedule during the band's latest concert tour to visit the shack of Rick Rumbaugh, WA5PIE. A few locals gathered to perform grid leak tests on a round of 807's while Larry worked a new one!

puter code that would soon become the packet radio medium of exchange. In the beginning it had some bugs that had to be overcome, but as time went by those problems were set to rest.

Humans Resent Change

"Humans are creatures of habit. They resent change." That statement may or may not be true, but for some of us it means "Try it; you may like it." Since I began using the ROSE switched network, I've seen it evolve through four levels of progression.

How well I recall the time when I removed a digipeater and replaced it with a NET/ROM node. All heck broke loose! I was the brunt of some tasteless "behind the back" titles. Some users even said they were going to quit packet and go hunting, etc. As the node began to get some use and the users began to understand how to use it, there was no longer the outcry of "foul!" Instead there was a sudden interest in this new way of packet communicating. Even the "quitters" came back, and as they learned the use of the nodes, they taught others about this better way to communicate.

That same clamor returned when we implemented the ROSE network in place of the nodes. It was almost a repeat performance, with one exception: This time the ranks of packet were much larger than when I made the transition from the digi to the node.

To Each Season

Each of us has different tastes, desires, and needs. Likewise, we have preferences that make us try other means of communicating besides using the BBS to send and receive messages from a distant friend. I personally like to send and receive messages via the packet BBS network, but I also like to have a QSO keyboard to keyboard on packet with a real live human. This brings me to the point of why and how the ROSE switch is being revisited in this column.

There are networks scattered about the country that permit BBS forwarding of traffic at all hours of the day and night. To try making a connection to another station against the onslaught of a gigabyte file forward is far more futile than a salmon swimming upstream against rapids made of ice cubes.

Decisions, Decisions

Because the frequency of 145.010 MHz in the southeast is primarily used for BBS forwarding, we elected to stay away from the throughput frequency and develop an alternate frequency for use as a long-haul frequency.

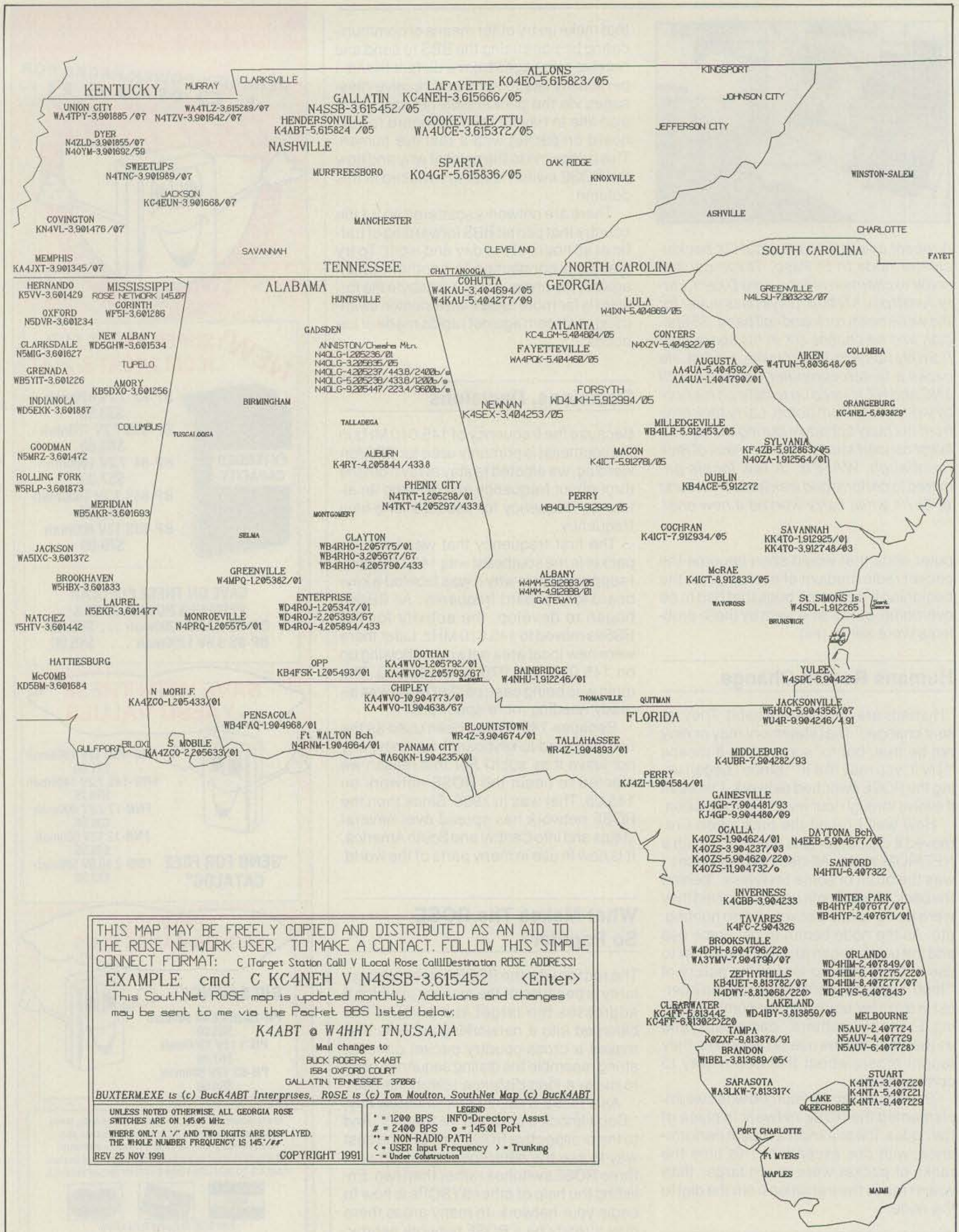
The first frequency that was used for packet in the southeast was 145.050 MHz. I suppose that is why it was labeled a keyboard-to-keyboard frequency. As BBSes began to develop, the activity for the BBSes moved to 145.010 MHz. Later there were new local area networks showing up on 145.090, 145.070, and 145.030. The mold was being cast; packet radio was already needing more spectrum.

Because 145.05 had been used as the first keyboard-to-keyboard frequency, why not leave it as such? For this reason we elected to begin the ROSE network on 145.05. That was in 1988. Since then the ROSE network has spread over several states and into Central and South America. It is now in use in many parts of the world.

What Makes The ROSE So Popular?

The reason why the ROSE is gaining popularity is because of the manner in which it addresses the target station(s). It has bloomed into a networking scheme that makes a cross-country packet connect string resemble the dialing sequence used to make a long-distance telephone call.

As a ROSE SYSOP I can sincerely say, "Don't knock it until you've tried it." And to the prospective ROSE SYSOP, the best way to see the difference is to start with three ROSE switches rather than two. Enlisting the help of other SYSOPs is how to begin your network. In many areas there may already be a ROSE network nearby, so all that is required is to add your new switch and inform the neighboring SYSOP that your ROSE is there. Configure your switch to report to the neighbor switch and



THIS MAP MAY BE FREELY COPIED AND DISTRIBUTED AS AN AID TO THE ROSE NETWORK USER. TO MAKE A CONTACT, FOLLOW THIS SIMPLE CONNECT FORMAT: C [Target Station Call] V [Local Rose Call]][Destination ROSE ADDRESS]

EXAMPLE cmd C KC4NEH V N4SSB-3.615452 <Enter>

This SouthNet ROSE map is updated monthly. Additions and changes may be sent to me via the Packet BBS listed below:

K4ABT @ W4HHY TN.USA.NA

Mail changes to

BUCK ROGERS K4ABT
1584 OXFORD COURT
GALLATIN, TENNESSEE 37066

BUXTERM.EXE is (c) BucK4ABT Interprises, ROSE is (c) Tom Moulton, SouthNet Map (c) BucK4ABT

UNLESS NOTED OTHERWISE, ALL GEORGIA ROSE SWITCHES ARE ON 145.05 MHz.

WHERE ONLY A "/" AND TWO DIGITS ARE DISPLAYED, THE WHOLE NUMBER FREQUENCY IS 145."/##"

REV 25 NOV 1991 COPYRIGHT 1991

LEGEND
* = 1200 BPS INFO=Directory Assist
# = 2400 BPS o = 145.01 Port
** = NON-RADIO PATH
< = USER Input Frequency > = Trunking
- = Under Construction

Fig. 3– The SouthNet ROSE network map, which is updated monthly.

you're on your way to happy packeting.

The ROSE uses a single addressing scheme to each switch that provides a virtual circuit using the AX.25 protocol. The switch SYSOP builds the path profile to each neighbor switch and uploads it to his ROSE switch. The only time a switch may need to be configured is when a path change is to be made or a new switch is added. All these changes can be made from the ROSE switch op's own QTH. The ROSEop can install a password that allows only designated ops to make changes.

The TNC and software you are presently using works very well in the ROSE AX.25 packet environment.

A simple and easy illustration of how a connect is made via the ROSE network can be thought of in terms of using the telephone area code to establish the first three digits of the address of a ROSE switch. The final three digits of the ROSE address are derived from the telephone exchange for the city or town where the ROSE switch operates.

For instance, the area code of Gallatin, Tennessee is 615, and let's imagine the local exchange (prefix) number is 452. The ROSE switch operating in this area would have as one of its address/coverage numbers an address of 615452. ecause there is more than one exchange (prefix) number covered by the Gallatin, Tennessee ROSE switch, it will have the other prefixes within its coverage area listed in a "coverage table" contained in the switch configuration.

With this information the user can begin to see the method that determines which switch is used to connect to a station within an area covered by a given ROSE switch.

Using this directory from the "INFO" feature of a local ROSE switch, the user can easily find the switch near a station to which they wish to connect.

Lafayette TN—KC4NEH-3,615666
Gallatin TN—N4SSB-3,615452
Tennessee Tech—WA4UCE-3,615372
Sparta/McMinnville—KO4GF-5,615836
Chattanooga TN—W4KAU-5,404277
Chattanooga TN—W4KAU-3,404694
Allons TN—KO4EO-5,615823
Hendersonville TN—K4ABT-5,615824

Using the above directory and the map in fig. 3, here is how the user would use a ROSE system. A ROSE connect string consists of three parts.:

1. The CALL of the station to which you wish to connect.
2. The CALL of your local ROSE switch.
3. The ADDRESS of a ROSE switch near the station you are calling.

Here is an example of how a user in Cookeville, Tennessee would connect to Bill, N4SSB, in Gallatin, Tennessee:

C N4SSB V WA4UCE-3,615452
1 2 3

The "HEARD" Feature

The HEARD feature in the ROSE provides the user with a means to see who is on the air, or how long ago it was that the call of a station was heard. The HEARD list shows the order of the stations from the most recent to the longest time lapse. There can be up to 36 stations in a list heard on the frequency by the switch at the address that you define as the target or destination address.

Assume that you wish to receive the HEARD list from the switch at Lafayette, Tennessee and you are located nearest the Gallatin, Tennessee switch. You would use the following procedure:

C HEARD V N4SSB-3,615666

Immediately you receive:

PLEASE WAIT, Call Being Set Up, etc.

In a few seconds you receive:

CALL COMPLETE, You're connected to HEARD: X.25 ROSE Switch (Location, etc.)

Press the enter key a second time and the HEARD list will begin downloading to your screen. You should receive a list of the 24 most recent stations HEARD by the Lafayette, Tennessee switch. When you receive "END" you may DISCONNECT from the switch in the normal disconnect sequence.

Information and "Directory Assistance" are other features that you'll find in the ROSE, but this will be enough to get you started in the use of the ROSE switched network.

Happy Packeting, de BucK4ABT.
K4ABT @ W4HHY.TN.USA.NA

WASHINGTON READOUT

BY FREDERICK O. MAIA, W5YI

REGULATORY HAPPENINGS FROM THE WORLD OF AMATEUR RADIO

The Battle For A Personal Radio Service Will It Ever Be Won?

For decades there has been a need for people to be able to communicate short range by radio at low cost. Former FCC Chairman E. K. "Jack" Jett was the first government official to recognize this need nearly 50 years ago when he proposed in Docket 6615 on January 15, 1945 to allocate spectrum for a Citizens Radiocommunication Service.

The July 28, 1945 issue of the *Saturday Evening Post* details Jett's thoughts in an article he wrote entitled "Phone Me By Air." It has become a classic in the world of personal radio. Jett's dream was to create a radio service whereby ". . . any American citizen, firm, group or community unit may privately transmit and receive short-range messages over certain wave lengths." His ideas were very imaginative and many thought them frivilous. As it turned out, people should have listened to his views more carefully than they did!

WW II Radio Development

Jett said that ". . . remarkable progress achieved during the war had opened the door to a large variety of new applications of radio" and that ". . . it will be necessary to wait until the return of peace for the start of this new service." He did, however, tell how he thought the service should work and what the equipment would be like.

Jett envisioned that radio might be used in an emergency to call the police. He imagined a handie-talkie weighing ". . . only six pounds or so, three inches square and twelve inches long . . . its antenna telescoping into the set and pulled out about three feet." He also said there was a need for delivery trucks to be contacted by their company. "His walkie weighs about fifteen pounds and is approximately eight inches square and three inches thick," he predicted.

Jett recognized that Citizen's Radio was not possible before World War II ". . . because sufficient frequencies in the higher portion of the radio spectrum had not been developed to meet needs of that kind." He said, ". . . in 1925 the useful radio spectrum ended around 3000 kilocycles (3 MHz). By 1940 the ceiling for allocations was 300,000 kilocycles (300 MHz), but only the frequencies up to 100,000 (100 MHz) were really in effective use."

"After the outbreak of hostilities in Europe in 1939, very rapid strides were made in opening up frequencies above 300,000 kilocycles. Developments were speeded up still more after Pearl Harbor." Jett partially credited the amateur radio operators who ". . . rendered possible the swift advance of the industry" and ". . . scientists and manufacturers who crowded at least a quarter century's normal progress into a few years."

The amateur who played the major part in the development of CB radios was Al Gross, W8PAL, who now makes his home in Arizona. He was one of the designers of the WW II proximity fuse for anti-aircraft shells, a tiny radio beam that sensed how close a shell was to an enemy plane. He also developed a small, low-powered pocket radio transceiver for U.S. intelligence agents dropped behind enemy lines. The miniaturization secret to both devices was a new idea called the printed circuit board.

Jett wrote, "The usable radio spectrum has undergone a tremendous expansion. . . . The FCC was able recently to announce allocations covering frequencies up to 30,000,000 kilocycles (30 GHz), a hundredfold increase since the prewar maximum of 300,000. Experiments now going on, or to be undertaken later, may raise the ceiling much higher and bring it nearer the fringe where heat and light waves begin," he wrote. "The usable spectrum, which in 1914 was only twice as big as the present broadcast band of 1050 kilocycles, is now more than 15,000 times as large."

The wartime expansion of the radio spectrum thus set the stage for certain new services such as Citizens Radio. "The need for the latter was indicated by requests received by the commission before 1940 and has been emphasized by the wide and enthusiastic response to the announcement of its establishment," Jett said.

"In making provision for the Citizens' Radio, the FCC sought to locate it as far down as possible in the spectrum for two reasons. One is that less is known about the behavior of frequencies as we go higher in the scale. The other is that the lower the frequency the greater is the prospect of building satisfactory equipment for its use."

Jett felt that due to radio wave propagation and other spectrum needs ". . . the lowest place it could assign for personal use of citizens was the 460,000 to 470,000 kilocycle band." He said this spot was "admirably suited to the new service. . . . In the 460,000 kilocycle band, sky waves do not have to be taken into account, day or night. The only ones that matter are those parallel to the ground." In later years the FCC would fail to pay attention to what Jett said. The original Jett proposal was based on the concept of spectrum re-use, which can only take place in the VHF and higher frequency bands.

"Thanks to . . . limited reach, the same wavelengths may be employed simultaneously in thousands of zones in this country," he said. "In each zone, the Citizens' Radio frequencies will provide from 70–100 different channels. In each locality, radiocasters will avoid interference with one another by listening, before going on the air, to find out whether the lane is free. Thus the 460,000 to 470,000 kilocycle band is expected to furnish enough room for millions of users."

He said due to experience gained in making military radios, ". . . manufacturers will be able to design and construct sets for these frequencies soon after the war ends. . . . Walkie-talkies will be transported in small cases like portable typewriters. Their transmissions will cover three to five miles."

"Although Citizens' Radio equipment hasn't yet reached the blueprint stage, leading manufacturers tell us that not long after the war—after quantity production starts—(2 watt) walkie-talkies probably will retail for about $100, and (lower power half watt) handi-talkies for approximately $50."

Jett also said, "If you become a Citizen's Radio operator, you won't have to listen all the time to be sure not to miss messages intended for you." He mentioned a system ". . . based on the transmissions of certain combinations of telegraphic impulses . . . functioning very much the same manner as the telephone, so that quiet would prevail at all times except when you are being called."

Personal Radio Needed

"The Citizens' Radio should minimize the

National Volunteer Examiner, Coordinator, P.O. Box 565101, Dallas, TX 75356-5101

KENWOOD

FREE SHIPPING ON KENWOOD RADIOS!

TS-950SD
Digital, 150W, Dual RX. Also Available w/out Digital. A Top Performer ..... **Call!**

TS-850SAT
General Coverage HF XCVR, 110W. Available Without The Autotuner. Available All Mode DSP ..... **Call!**

TS-450SAT
General Coverage HF XCVR, 100W, Available w/out Autotuner. A Great Mobile Performer ..... **Call!**

AT-250	Autotuner	**Call**	R-5000	HF Receiver	**Call**	TR-751	2m All Mode	**Call**
AT-450	TS-450 Autotuner	**Call**	RZ-1	Scanning Receiver	**Call**	TS-140S	HF Rig	**Call**
AT-850	TS-850 Autotuner	**Call**	TH-27	2m Tiny HT	**Call**	TS-690S	HF & 6m Rig	**Call**
DSP-100	Digital Signal Unit	**Call**	TH-77	2m/440 Tiny HT	**Call**	TS-790	Dual Band Base	**Call**
PS-52	Power Supply	**Call**	TH-225	2m 5W HT	**Call**	**New! HamWindows Software for Windows 3, Kenwood Rig and TNC Control & More ..... Call!**		
PS-53	Power Supply	**Call**	TM-241	2m 45W Mobile	**Call**			
R-2000	HF Receiver	**Call**	TM-741	2m/440 Mobile	**Call**			

Please Call Today For Your Special Kenwood Pricing!

YAESU

FT-1000D
200W HF XCVR, Dual RX, Deluxe and Standard Models Available. A Top Performer ..... **Call**

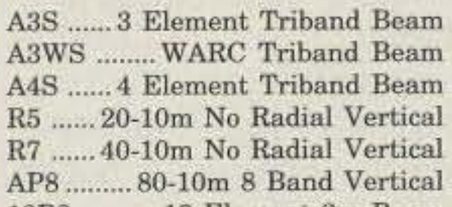
FT-990
General Coverage HF XCVR, 110W, Built-in Pwer Supply and Autotuner. A Great Performer ..... **Call**

FT-736
Dual Band Base XCVR, Great For Satellite Work, Expandable to 220 MHz and/or 6m ..... **Call**

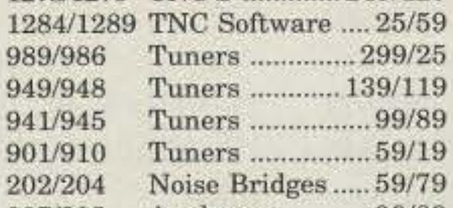
FRG-8800	HF Receiver	**Call**	FT-747	HF Mobile Rig	**Call**	FT-411	2m HT	**Call**
FT-767	HF XCVR	**Call**	FT-2400	2m Mobile XCVR	**Call**	FT-415	New 2m HT	**Call**
FT-757	FX Mobile Rig	**Call**	FT-5200	V/UHF Mobile	**Call**	FT-470	2m/70cm HT	**Call**

Please Call Today For Your Special Yaesu Pricing!

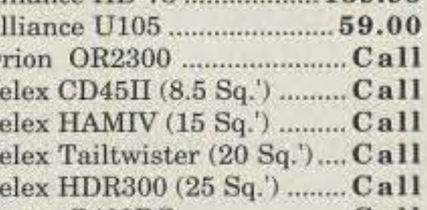
ICOM



IC-781
Top Of The Line HF XCVR, Dual RX, Built-in Pan Adapter, Auto Tuner & More ..... **Call**



IC-765
General Coverage HF XCVR, Automatic Antenna Tuner, CW Keyer, and more ..... **Call**



IC-735
General Coverage HF XCVR, 100W, Compact Size, Great For Mobile HF Work ..... **Call**

IC-751A	HF XCVR	**Call**	IC-3220H	2m/440 Mobile	**Call**	IC-24AT	2m/440 HT	**Call**
IC-726	HF XCVR w/6m	**Call**	IC-229H	2m Mobile 45W	**Call**	IC-2GAT	2m HT 7W	**Call**
IC-725	HF XCVR	**Call**	IC-W2A	2m/440 HT	**Call**	IC-2SAT	2m Tiny HT	**Call**

Please Call Today For Your Special Icom Pricing!

ALINCO

DR-590T	2m/440 Mobile	**Call**
DR-570T	2m/440 Mobile	**Call**
DR-112T	2m 45W Mobile	**Call**
DR-110T	2m 45W Mobile	**Call**
DJ-F1T	2m Micro HT	**Call**
DJ-120T	2m Tiny HT	**Call**
DJ-160T	2m Small HT	**Call**
DJ-560T	2m/440 HT	**Call**

Alinco Accessories In Stock!

ASTRON

FREE UPS SHIPPING

MODEL	AMPS	ICS	PRICE
RS12A	9	12	79.00
RS20A	16	20	99.00
RS20M	16	20	119.00
RS35A	27	35	159.00
RS35M	27	35	179.00
VS-35M	27	35	179.00

M = Dual Meters / V = Variable.

TELEX / HYGAIN

Telex / Hygain Crankups

MODEL	HT.	LOAD
HG37SS	37'	9 Sq.'
HG52SS	52'	9 Sq.'
HG54HD	54'	16 Sq.'
HG70HD	70'	16 Sq.'

We Stock Hygain Antennas, Call!

CUSHCRAFT

A3S	3 Element Triband Beam
A3WS	WARC Triband Beam
A4S	4 Element Triband Beam
R5	20-10m No Radial Vertical
R7	40-10m No Radial Vertical
AP8	80-10m 8 Band Vertical
13B2	13 Element 2m Beam
17B2	17 Element 2m Beam
26B2	26 Element 2m Beam
ARX2B	2m Vertical
AR270	2m/440 Vertical
CS-147M	2m Mag Mount

Call For More Cushcraft Items!

MFJ

1278/1270	TNC'S	249/129
1284/1289	TNC Software	25/59
989/986	Tuners	299/25
949/948	Tuners	139/119
941/945	Tuners	99/89
901/910	Tuners	59/19
202/204	Noise Bridges	59/79
207/208	Analyzers	99/89
486/422	CW Keyers	169/119
407/401	CW Keyers	69/49
815/817	Wattmeters	79/89
1702/1704	Coax Switches	19/59

We Stock Most MFJ Products!

ROTATORS

Alliance HD-73	**139.95**
Alliance U105	**59.00**
Orion OR2300	**Call**
Telex CD45II (8.5 Sq.')	**Call**
Telex HAMIV (15 Sq.')	**Call**
Telex Tailtwister (20 Sq.')	**Call**
Telex HDR300 (25 Sq.')	**Call**
Yaesu G400RC	**Call**
Yaesu G500A	**Call**
Yaesu G800SDX	**Call**
Yaesu G1000SDX	**Call**
Yaesu G5400 Az./El.	**Call**

Please Call For Rotor Pricing!

AMERITRON

AL-1500	1500W HF Linear Amp	
AL-1200	1500W HF Linear Amp	
AL-82	1500W HF Linear Amp	
AL-80	1000W HF Linear Amp	
AL-811	600W HF Linear Amp	

Please Call For Special Prices!

BUTTERNUT

HF-2V	80/40 Vertical	149.95
HF-5B	5 Band Beam	259.95
HF-6V	80-10 Vertical	159.95
A17-12	17 / 12m Kit	39.95
RMKII	Roof Mount Kit	59.95
TBR160	160m Kit	59.95

DIAMOND

X-500 / X-200 / X-50	**Call**
SG-7900 / SG7500	**Call**
NR-770 / NR-790	**Call**
SX-100 / SX-1000 / SX-200	**Call**

Call For More Diamond Products, Many Othes Are In Stock Too!

U.S. TOWERS

- All Steel Construction
- Hot Dip Galvanized
- Towers Totally Self-Support
- Many Available Accessories
- Highest Quality, Best Selling Crankups Available
- Larger Models Available
- Shipped Freight Collect Direct From Factory
- CA Residents Add 6% Tax

Call now and let our experts design a package just for you!

MODEL	MIN. HT.	MAX. HT.	WINDLOAD	PRICE
MA-40	22'6"	40 FT	10 SQ. FT	629
MA-550	22'1"	55 FT	10 SQ. FT	999
MA-770	23'10"	71 FT	10 SQ. FT	2249
MA-850	24'6"	85 FT	10 SQ. FT	3489
TX-438	22'6"	38 FT	18 SQ. FT	919
TX-455	21'0"	55 FT	18 SQ. FT	1385
TX-472	23'8"	72 FT	18 SQ. FT	2279
TX-489	24'4"	89 FT	18 SQ. FT	3959
HDX-538	22'6"	38 FT	30 SQ. FT	1179
HDX-555	22'0"	55 FT	30 SQ. FT	2079
HDX-572	23'8"	72 FT	30 SQ. FT	3559
HDX-589M	24'8"	89 FT	30 SQ. FT	7119

ROHN TOWER

GUYED TOWER PACKAGES

HEIGHT	25G	45G	55G
50	849	1229	1549
60	939	1389	1939
70	999	1719	2159
80	1199	1869	2369
90	1289	2039	2579
100	1369	2199	2989
110	1449	2459	3209
120	1669	2619	3429

These towers are shipped freight collect from Plano. Includes all required hardware & rotor plate.

SELF SUPPORTING TOWERS

MODEL	HGT	LOAD	COST
HBX40	40	10 Sq.'	449
HBX48	48	10 Sq.'	589
HBX56	56	10 Sq.'	699
HDBX40	40	18 Sq.'	569
HDBX48	48	18 Sq.'	689

10% West of Rockies Charge.

All BX series towers include top and rotor plates, and base stubs.

Free Shipping On BX Towers!

FOLDOVER TOWERS

FREE SHIPPING ON FOLDOVERS

MODEL	HEIGHT	LOAD
FK2548	48 FT.	15 Sq.'
FK2558	58 FT.	13 Sq.'
FK2568	68 FT.	11 Sq.'
FK4544	44 FT.	34 Sq.'
FK4554	54 FT.	29 Sq.'
FK4564	64 FT.	28 Sq.'
25G Double Guy Kit		$ 299.00
45G Double Guy Kit		319.00

Rohn Foldover Towers Are Shipped Freight Prepaid From The Factory; State Sales Tax Due In Most States.

STACKED SECTIONS

20G	Light Duty 12"	54.50
25G	Medium Duty 12"	65.50
45G	Heavy Duty 18"	153.50
55G	Extra Heavy 18"	197.50
EF245	Ginpole 25/45/55	375.00
EFBX	Ginpole HBX	399.00
M200H	2" O.D. Steel Mast	39.00
TB-3	2" Thrust Bering	75.00
AS-25G	Rotor Shelf (25G)	29.85
AS-455G	Rotor Shelf (45/55)	74.25
GA25G	Guy Assembly	56.25

Other Rohn Items In Stock Too!

Please Call For a Shipping Quote On Rohn Towers and Accessories.

COAX & CABLE

ANDREW HELIAX®
LDF4-50 1/2" Copper ..... 2.29/Ft.
LDF5-50 7/8" Copper ..... 5.69/Ft.
Connectors: 1/2"....29.00 7/8"....74.00

Coax
9086 - 9913 Equivalent, 100% shield, air diel., solid center ..... $ .49/Ft.

RG-213/U - Mil. spec. RG-8, 95% shield, non-contaminating, polyethelene Dielectric ..... $ .39/Ft.

RG-8X - 95% Shield, Mini RG-8, Foam Dielectric ..... $ .25/Ft.

Coax Loss Chart (DB/100Ft.)

Cable	30MHz	150MHz	450MHz
7/8" Heliax®	.2	.5	.9
1/2" Heliax®	.4	.9	1.6
9086	.64	1.7	3.1
RG-213/U	.9	2.3	5.2
RG-8X	1.2	3.5	5.8

Rotor Cable
8 Conductor (2-#18, 6-#22) ..... .25/Ft.
Heavy Duty (2-#16, 6-#18) ..... .45/Ft.

GUY HARDWARE

3/16 EHS Guywire (3990#)	.15
1/4 EHS Guywire (6650#)	.18
3/16CCM Cable Clamp	.45
1/4CCM Cable Clamp	.55
1/4TH Thimble	.45
3/8EE Turnbuckle	7.95
3/8EJ Turnbuckle	9.95
1/2X9EE Turnbuckle	11.95
1/2X9EJ Turnbuckle	12.95
1/2X12EE Turnbuckle	13.95
1/2X12EJ Turnbuckle	14.95
3/16 Preformed Guy Grips	2.49
1/4 Preformed Guy Grips	2.99
GAS604 Screw Anchor	19.95
500D Guy Insulator	2.79
502 Guy Insulator	5.49
5/8X8' Copper Gnd. Rod	12.95

PHILLYSTRAN

NON-CONDUCTING GUY CABLE

HPTG2100I (2100#)	$ .39/Ft.
HPTG4000I (4000#)	.64/Ft.
HPTG6700 (6700#)	.84/Ft.
End Kits 2100/4000/6700	4/5/6

SAFETY BELTS

Nylon safety belts are available in four sizes. S, M, L, X-L **79.95**

CARBON STEEL MASTS

WALL	5'	8'	10'	12'	20'
.12	29	39	49	59	89
.18	49	75	89	109	149
.25	---	---	129	—	249

2" O.D. - Galvanized To Resist Rust.

ORDER TOLL FREE: 1 - (800) 272 - 3467

LOCAL AND TECHNICAL HELP : 1 - (214) 422 - 7306 FAX: 1 (214) 881-0776

C.O.D.
MC / VISA

TEXAS TOWERS

M-F: 9AM-5PM
SAT.: 9AM-1PM

A Division of Texas RF Distributors, Inc., 1108 Summit Ave. Suite #4, Plano, TX 75074

isolation of farm and ranch people and afford them improved communication facilities. . . . When storms, floods, earthquakes or other disasters after the war disrupt wires, families and communities will nevertheless remain in touch with the outside world. The value of this potential service can best be appreciated by reference to a similar one performed by amateurs," Jett said. "After Pearl Harbor, it took some time to organize an adequate air raid defense setup. With millions of private transmitting sets in operation it should be possible to prepare a more adequate civil defense system . . . "

Jett told how doctors, small business (big and little stores, laundries, express), construction projects, river and harbor craft . . . taxi companies would all, ". . . save time, gasoline and tires. Members of volunteer fire companies will employ their own handie-talkies. . . . Small towns may also find walkie-talkies satisfactory for their police."

He was also the first to anticipate UHF repeaters and remote control. ". . . in the very large cities the high buildings and hilly terrain will obstruct a transmission path and thus shorten substantially the span of messages sent out on the 460,000 kilocycle band. . . . this will be corrected, at least partially, by the installation of relay transmitters at various locations which will automatically pick up and repeat signals on a certain wavelength and spread them throughout the urban area."

He also predicted all sorts of bells-and-whistles! "An apparatus can't be American if some extra gadgets aren't attached to it. The Citizen's Radio sets will be no exception. A device could be incorporated to the transmitter in your car so that, as you entered a driveway, you could throw out a short electrical impulse which would actuate equipment installed in your garage to open the doors mechanically, turn on the floodlights and perhaps ring a bell in the house to inform your family of your return."

Jett also suggested the use of Citizens' Radio to remotely control other devices such as burglar alarms. "It would be especially advantageous where such distances are involved or the terrain is such as to make it economically unsound to lay out wires."

FCC Licensing and Regulation

"Before anyone may start sending out communications over the Citizen's' Radio, it will be necessary, of course, to be licensed by the commission. But that won't be difficult. . . . Technical knowledge won't be required, because the equipment will be simple to operate. . . The applicant probably will go to one of the commission's field offices and obtain his operator's license by merely certifying that he has read and understands the FCC's brief regulations governing the Citizens' Radio."

"If the selection of channels by the licensees were left entirely to chance, it is probable that some wave lengths would carry very little traffic and that others would be so overcrowded that it would be hard to get any message through. To promote efficient distribution of the load, the commission will suggest that all licensees in each community or sector form a club and that the members use, and encourage non-members to use, frequencies or operating channels that will cause the least interference in the area.

"Under such an arrangement, each channel will be sort of party line, with certain users assigned to it. For the convenience of all radiocasters, each zone no doubt will want to issue its own directory, similar to the telephone book, listing the frequency and hours of each licensee. Another function of the clubs will be to adopt such rules and operating procedures for their area as judgment and experience dictate.

"Since cooperation and due consideration for the needs of others will be in the obvious interest of all, the FCC thinks that local self-government will work out well. It is strengthened in this expectation by the signal success of a similar system in the radio-amateur field.

"At present, it plans only two nationwide restrictions. One is that no charge be made for the transmissions or for the use of the technical facilities of the licensee for handling messages. The other is that the service must not be used for broadcasting to the general public. However, additional restrictions will be imposed if necessary."

Jett said that "The commission is . . . prepared to abolish (the service) if there isn't enough demand for it. On the other hand, if its usefulness justifies the step, more frequencies will be made available."

Boon to Business

Jett believed the new service would have a positive impact on the nation's post-war economy. "Besides serving the varied needs, the Citizens' Radio probably will help to maintain a high level of employment after the war. Manufacturers say that sets may sell at the rate of hundreds of thousands and, eventually, as prices are brought down or their popularity grows, even millions a year.

"Translated into money, such a tremendous volume would mean a yearly turnover of perhaps hundreds of millions of dollars; because in addition to the manufacturers and workers involved directly, wholesalers, retailers, salespeople and servicemen would find businesses or jobs created for them on a large scale. Thousands of veterans should be able to capitalize on their war radio experience and become ace repairmen in civilian life."

What Went Wrong!

What was planned and what eventually happened are two different stories! The first Citizens' Band was pretty much as FCC Chairman Jett pictured. The 10 MHz from 460 to 470 MHz (UHF) was allocated to the Citizens' Radiocommunication Service. Class A stations could operate on any frequency within the band. Class B stations could operate only on 465 MHz. Class A was to be more like a commercial service, while Class B was for the individual person.

There were no channel assignments specified for the Class A stations. Using 150 kHz spacing, there was room for 66 channels. Two hundred channels could be accommodated using 50 kHz spacing. And, using 25 kHz spacing, there would have been room for 400 channels.

Jett had said that the Citizens' Radiocommunication Service would be expanded, reduced, or eliminated based on demand. As it turned out, the concept was decades ahead of its time. The demand just was not there. Some equipment was available on the market, but not much. The public failed to flock to UHF-CB, and the FCC ultimately reassigned most of the 460–470 MHz spectrum to other uses. It must have crushed Jack Jett!

The original Class A citizens band was cut down to 48 specific channels, and one channel (465 MHz) was left for Class B stations. Later on the Class A channels would be further reduced to 16 (8 for base to mobile and 8 for mobile only). The Class B channel was ultimately abolished.

27 MHz Citizens' Radio

On September 11, 1958 the FCC (and Docket 11994) established the Class D citizens' band at 27 MHz to see if they could stimulate interest in Citizens' Radio. CBers were even allowed at first to build their rig from a kit and the "Benton Harbor Lunchbox" from Heathkit became a popular choice—22 channels at first, later a 23rd, in the former 11 meter amateur band. But the commission failed to heed Jett's original "sky wave propagation" theory. They simply reallocated the 11 meter amateur HF spectrum to short-range public mobile use.

To the FCC it seemed like a logical move. A lower frequency would mean lower priced and more widely available equipment, and the amateurs were not using the band anyway. Eleven meters, at the time, was also allocated to Industrial, Scientific, and Medical apparatus. Diathermy machines made a terrible racket on the band and amateurs much preferred the adjoining 10 meter band due to its lack of interference. Amateurs screamed bloody murder, however, when they lost the band to CB! There were "Save Eleven" contests and activity all over.

The 27 MHz Citizens Band started off slowly. It took more than ten years for it to really become popular. Actually it was the long-distance trucker using "handles" to disguise his identity that got CB going. Looking for "smokey" (the police) and the short-supply gasoline of the mid-1970s, the "eighteen wheeler" totally revolutionized 11 meter radio. Everyone, it seemed, wanted to become a trucker, locate fuel, and avoid speed-traps. The trucker was there first and "What you see is what you get." The language of the "super slab" prevailed. Even the First Lady became "First Mama."

Although intended for short-distance, low-cost directed personal and business messages, most CBers used 11 meters as a recreational hobby and/or nondirected traffic aid. Eleven meters also became what amounted to a code-free hobby amateur band. FCC restrictions on permissible communications (no more than 5 minutes in length or 150 miles distant) and technical constraints (controlled antenna types and heights) were largely ignored.

The transmission range of the Citizens' Radio Service was supposed to be local—no more than 150 miles. But HF radio waves propagate worldwide, and so did many of the CB radio contacts. Using sideband, "shooting skip" became a national pastime. The public was now participating in amateur radio without an amateur ticket. It got so popular and congested that some operators were encouraged to move illegally to unauthorized adjacent frequencies.

The CB craze got totally out of hand in the mid 1970s as the public flocked to 11 meters by the millions. There were about a million CB operators in 1974 when the oil embargo started. By 1979 the Citizens' Radio Service zoomed to some 15 million licensees. On January 1, 1977 the Commission was forced to add another 17 new channels. There were CB clubs, CB magazines—CB everything.

The FCC at first allowed a system of self-assigned temporary licensing. Unable to keep up with the actual license demand, however, and without the needed funding, the commission was forced to seek other ways of handling CB licensing and callsigns. The FCC considered mechanisms such as point-of-sale licensing by retailers and "presumptive" licensing whereby an applicant would rely on a certified mail return receipt to establish that the FCC had acted favorably on a license request or renewal.

The FCC finally decided, however, that CBers would be allowed to operate under a single "blanket license" without the necessity of identifying their station. They could, however, use any self-assigned callsign or pseudonym "handle." It really meant that no license or callsign was needed and certainly stretched communications law.

In 1978 the FCC considered establishing a new Class E Citizen's Service at either 220 or 900 MHz. On June 7, 1979 the FCC in Docket 79-140 narrowed their search down to just 900 MHz after amateurs objected to the possible 222–224 MHz location. The ARRL strongly supported a new CB band at 900 MHz. Manufacturers, however, wanted a 220 MHz band due to its accompanying lower equipment costs. The 900 MHz transmitters were to have been identified automatically. Five years later, however, the Commission scrapped the whole thing, concluding that other uses of the radio spectrum would better serve the public interest. The "other uses" turned out to be cellular telephone service.

The CB rage self-destructed in the 1980s. There is still 11 meter use, primarily as a recreational outlet and traffic aid, but it is certainly nothing like it used to be. The Commission really has no way of knowing just how many CB operators there are. The best guess (based on imported radios) is around three million. Such is the history of the FCC's plan to provide low-cost short-range communications for the masses. It was a great idea, but it just didn't work at 27 MHz.

Need for Personal Radio

There is still a big need for a short-range low-cost public data and voice radiocommunications service. Cellular radiotelephone service has taken up some of the slack, but it is certainly not low cost. The question is where to put such a service. All of the usable radio spectrum is now allocated.

I am personally concerned about the future of the 902–928 MHz amateur band. Due to the nonavailability of amateur transmitting equipment, it is hardly used by the amateur community and presents a rich opportunity for re-allocation. This valuable band is located adjacent to the two smaller bands that accommodate more than 6 million cellular telephone subscribers.

The Amateur Service shares this band with the fixed, mobile, and radiolocation services only in our hemisphere. In other parts of the world one of the uses of 902–928 MHz is "broadcasting" instead of amateur radio. Like the old 11 meter amateur band, it is also an ISM (Industrial, Scientific, and Medical) use band.

In response to hundreds of requests from the amateur community, the FCC has been looking into permitting "secondary" non-amateur communications on the amateur bands. These requests involve uses such as classroom instruction, personal and club business, information bulletins, and providing logistic support to parades, public safety agencies, local, state and federal government, weather bureau, news media, and such.

Could the need for a low-cost public personal radio service and "secondary" non-amateur utilitarian communications by amateurs both be met in the 902–928 MHz band? Could amateurs and non-amateurs co-exist at 900 MHz? Would the ability of the non-amateur group to communicate with amateurs provide an incentive for them to become more technically proficient or even to upgrade to amateur status? Could "trunked" (automatic channel assignment), "party line," and repeater channels be authorized? What about telephone interconnection? An interesting thought. One thing for sure. The cellular telephone companies certainly wouldn't like it.

73, Fred, W5YI

WORLD OF IDEAS

BY DAVE INGRAM, K4TWJ

A LOOK AT THE WORLD AROUND US

QRP: More Fun Than Ever

This month's column spotlights a continuously popular subject among classic-rig enthusiasts and key collectors everywhere—QRP. I trust you will find it interesting.

Like many of you, I am simply a QRP addict at heart (my most prized award is QRPp DXCC trophy #26). Also understand our main purpose here is to show you how folks are having fun with QRP rather than to present a step-by-step construction guide for a specific rig.

Three additional points warrant mentioning at this time. First, being a QRPer does not dictate you run iess than 5 watts exclusively; it is an elective. Second, homebrewing small QRP rigs is great fun, and hamfest-obtained goodies or parts can be carried home in a coat pocket rather than filling several large boxes. Finally, many of today's amateurs with 100 watt transceivers are unknowingly operating QRP right now. What? No offense intended. Read on.

While many big-time DXers and contesters use high power to quickly snag needed contacts without waiting or struggling, they also enjoy building and operating pocket-size QRP gear during their leisure. Great idea! Further, expertise in using QRP always sharpens operating skills. Another point: amateurs running 100 watt rigs with short random wires (less than one-half wavelength for a selected band), simple ground-mounted verticals without radials, and house rain gutters as antennas are lucky to actually radiate a 5 or 10 watt signal. Since we all work those chaps on the air, it is factual proof QRP really does "get out"!

Can a 5 watt signal and a good antenna really be that effective in making on-the-air QSOs? You bet, especially if they are combined with a band such as 30 meters, which favors low power (5 watts in a 200 watt world always has better odds than 5 watts in a 1500 watt world, as on 40 meters). Last week, for example, I slipped right through pile-ups and worked ZA/Albania, ZS/South Africa, and PJ2/Curacao on 10.105 MHz while running only 5 watts. ZA was the most challenging; it took four calls. My antenna was a full-wave delta loop. Several other stations continued calling ZA1QA for an hour (7–8 PM). Evidently they were using old coax-fed rain gutters, or short multi-band doublets. That's not exciting, but operating real honest-to-goodness QRP with a neat little battery-powered rig and good antenna is a blast! Try it. You will love it!

As additional QRP incentive, we have some really neat rigs and ideas to share with you this month. You probably are jumping ahead into the pictures and schematics, so hold on to your hat (key!), and let's get started.

Fig. 1– WA8MCQ's unique "QRP Key." The base measures only 2¼ × 1¼ inches and houses a 1.5 watt transmitter. (See text.)

The QRP Key (With Built-In Transmitter!)

One of the miniature keys featured in my new book *Keys, Keys, Keys* is the little ½ × 2 inch delight shown in fig. 1. Danny, K3TKS, purchased some of these keys for less than $5.00 at a recent hamfest. He swapped one with Michael, WA8MCQ, in exchange for one of two small boxes so each could build a combination base and transmitter for the key. Michael was the first to build his QRP key, and it is the one shown in fig. 1. The full story of WA8MCQ's QRP key appeared in the January 1991 issue of *QRP Quarterly Magazine*, incidentally, and is only briefly spotlighted here. If you need additional information and/or really want to enjoy QRP in high style, contact Michael, WA8MCQ, at 7945 Citadel Drive, Severn, MD 21144 for info on subscribing to the *QRP Quarterly* (include an SASE).

The QRP key's base/box measures only 1¼ "H × ⅞"W × 2¼ "D and houses a 1.5 watt output transmitter for 40 meters CW. Michael says this worked out to be the optimum power level because components for a 5 watt rig simply could not be shoehorned into the small box! Judging by the underside view in fig. 2, we definitely agree!

Miniature components are obviously vital to such pocket rigs. WA8MCQ used ⅛ watt resistors, ultra-miniature trimmer capacitors, and ¼ inch toroids to maximum advantage. There was not room for a heat sink on the final transistor, so the rig's bottom cover is left off for cooling during operation. A BNC connector was used in lieu of the larger SO-239, and one mounting screw hole was left open for passing an RG-174/DC power cable. The frequency warping capacitor is adjustable from the rear with a small screwdriver (notice the small cutout in the bottom of the box).

The circuit diagram of WA8MCQ's three-transistor treat is shown in fig. 3. A 35 pFd capacitor on the base of Q1 shifts the crystal frequency approximately 1 kHz; it can be deleted to minimize space. Likewise, an experimentally found value fixed capacitor can be used to replace the 90 pFd variable between the collector of Q1 and base of Q2. Zener D1 is included for SWR protection. It is rated at 33 volts and does a good job of protecting the final transistor when the rig is keyed without an antenna. Since a regular tank circuit with the popular T-50-2 toroid is rather large, WA8MCQ went smaller and more elaborate by using miniature toroids and dual-section filtering. Notice the oscillator/Q1 circuit runs continuously while only the buffer and final (Q2 and Q3) are keyed. If desired, you can thus eliminate the keying circuit with Q4/2N3906 and insert a key directly in the 12 volt line.

I have built several QRP transmitters with similar circuit designs, and found they can easily be shifted to 30 meters as follows. Change the crystal to 10.105 MHz (or frequency of your choice), remove one or two turns from the primary of T1, remove three turns from L3 and L4, and substitute 390 pFd capacitors for the (4) 470 pFd ca-

4941 Scenic View Drive, Birmingham, AL 35210

CW IS SOOOOOO EASY!

You can copy code, no matter what your experience has been! CW is easy when you use hypnosis training from PASS Publishing

Just starting out? **CW Lite** is the easiest Morse code training method in the world, bar none! And it is the fastest, too! Just close your eyes and relax. **CW Lite** does the rest! Learn CW the way it should be learned. Subliminals speed you along. $14.95 ppd in US.

Tried CW and failed? **CW Mental Block Buster** is for you. **CW Mental Block Buster** explodes mental blocks about CW. Hypnosis, visualization, affirmations. Based on 40 yrs research. Includes tape and workbook. Only $24.95 ppd in US.

*March 23, 1991—Thank you for you **CW Mental Block Buster** tape. It really works. I have tried to learn CW for a period of 31 years. The best I could do was 3 wpm. I was at the point to give up a life long dream to be a ham. I saw your ad, and it seemed to offer a new approach. I faithfully used the tape twice a day and did the workbook exercises. I also began to use some slow speed practice tapes. Much to my surprise, I could copy 8 wpm with no problem! I passed my Novice and then the 13 wpm General—KB2HTB*

Hypnosis tapes are not copy-practice tapes. Money back guarantee (less restocking fee) when you use the tape 30 consecutive days.

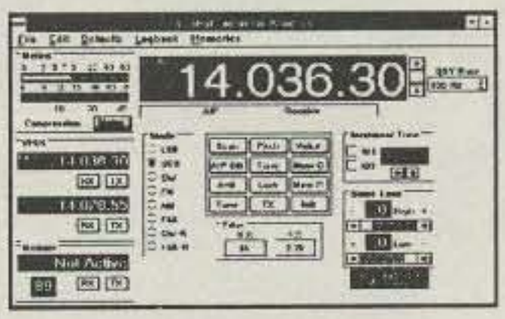
Order today! **NY residents add 8% sales tax. Info: 516-584-8164.**

PASS Publishing, Dept. K, Box 570, Stony Brook, NY 11790

Microsoft Windows-based rig control & logging comes to amateur radio with Control Center

Introducing the FIRST Windows based rig control and logging/information manager for amateur radio

Now you can take advantage of the the great Microsoft Windows 3.0 operating environment with Control Center. Control Center will let you control any Kenwood Radio that is interfaced to the RS232 port of your PC. You can change frequency, memories, scan, change filters, meters (displayed on screen), modes, sidetone - just about everything that you can normally control from the rig panel! Plus you have full featured logging and information management with the built in Control Center Information Manager.



And, of course as with all Microsoft Windows based programs, you can run Control Center in the background while you let your PC run other programs.

So why live with the limitations of DOS, when you can have Control with Control Center and Windows 3.0! For **$89.95** (plus $4 s/h, $9 overseas) you can put your PC back to work for you and put the fun back into amateur radio! Call **1-800-525-7235** anytime, 24 hours (or fax 205-757-8664) to order with Visa or Mastercard, or send check/MO to the address below.

Coming soon for Icom radios and for the Macintosh!

(Control Center requireds an IBM-PC or compatible computer capable of running Windows 3.0 or later in Standard or Enhanced mode and a Kenwood radio interfaced via an RS232 port. A mouse is strongly recommended.

More amateur radio software bargains from Renaissance!!!

10-X

Number management for Ten-Ten & other awards

A great way to keep track of those numbers! 10-X goes resident as a TSR, allowing you to run other programs and call 10-X anytime you need it, with just a keystroke, without exiting your current program. 10-X will also run as a regular DOS program. 10-X will easily lookup by call or 10-10 number, keeps track of all information (such as name, QTH, award info), prints submission lists of new numbers or lists of all numbers worked. Tracks virtually an unlimited amount of numbers! Great for any number based awards system. 10-X is only **$16.00** (plus $4 s/h, $9 overseas) and requires an IBM-PC or compatible with 640k RAM and a hard drive.

Ham-Paks

Software Collections

Ham-Pak 1 - a top notch collection of 42 public domain and shareware disks for ham radio. This collection contains programs for logging, rig control, radio modifications, satellite tracking, packet, RTTY, SSTV, CW-decoding, contest logging, DX-headings, grayline maps, written exam prep, QSL label making, antenna design, progragation and much, much more. Ham-Pak 1 contains all of our popular disks 1082-1150, from our ham radio series 1. Ham-Pak 1 also contains the famous MorseMan Plus code training program and the expanded words disk. Quite an assortment, even if we say so ourselves! This is a total value of $157.90 for only **$109.95** on 5.25" disks (plus $4 s/h, $9 overseas)! A total savings of $47.95 over the regular price! (add $30 for 3.5" disks)

Ham-Pak 2 - the same as Ham-Pak 1 without the Morseman Plus code trainer. A total value of $126 for only **$94.95** on 5.25" disks (plus $4 s/h, $9 overseas). A total savings of $31.05! (add $30 for 3.5" disks) **Call 1-800-525-7235 anytime to order with Visa/MC or send check/MO.**

renaissance software & development

killen plaza - box 640
killen - alabama 35645

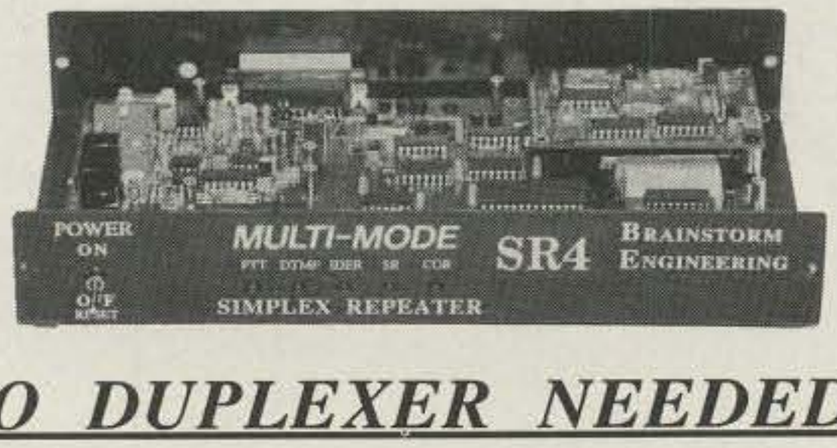
(205)757-5928 - fax (205)757-8664

CIRCLE 39 ON READER SERVICE CARD

BRAINSTORM ENGINEERING

2948 1/2 HONOLULU AVE. LA CRESCENTA, CA. 91214
PHONE (818) 249-4383 FAX (818) 248-0840

MULTI-MODE SR4 SIMPLEX REPEATER



*NO DUPLEXER NEEDED!**

USE ONE RADIO AND ONE SIMPLEX FREQUENCY!**

GENERAL INFORMATION

THE SR4 IS A FULLY SELF-CONTAINED, MICROPROCESSOR BASED, REMOTE PROGRAMMABLE CONTROLLER, CAPABLE OF OPERATING ONE OR TWO RADIO TRANSCEIVERS IN SIMPLEX REPEATER, SPLIT SIMPLEX REPEATER, DUPLEX REPEATER CONTROLLER, VOICE MAIL AND VOICE IDer MODES SEPARATELY OR SIMULTANEOUSLY.

- ONE RADIO SIMPLEX REPEATER
- DUAL RADIO SIMPLEX REPEATER
- CROSS BAND SIMPLEX REPEATER
- CROSS BAND DUPLEX REPEATER
- CROSS BAND SPLIT SIMPLEX / DUPLEX REPEATER
- **2 MINUTES & 48 SECONDS OF TIME**
- DUAL RADIO SPLIT SIMPLEX REPEATER
- DUPLEX REPEATER CONTROLLER
- BI-DIRECTIONAL DUPLEX REPEATER
- REPEATER BACK-UP SYSTEM
- REMOTE LINK
- MOBILE EXTENDER

• VOICE MAIL • AUTOMATIC VOICE IDENTIFIER • AUXILIARY OUTPUT

$399.00 & UP

*no duplexer needed for simplex repeater functions
** for "one radio simplex repeater"

MASTERCARD • VISA • AMERICAN EXPRESS • DISCOVER

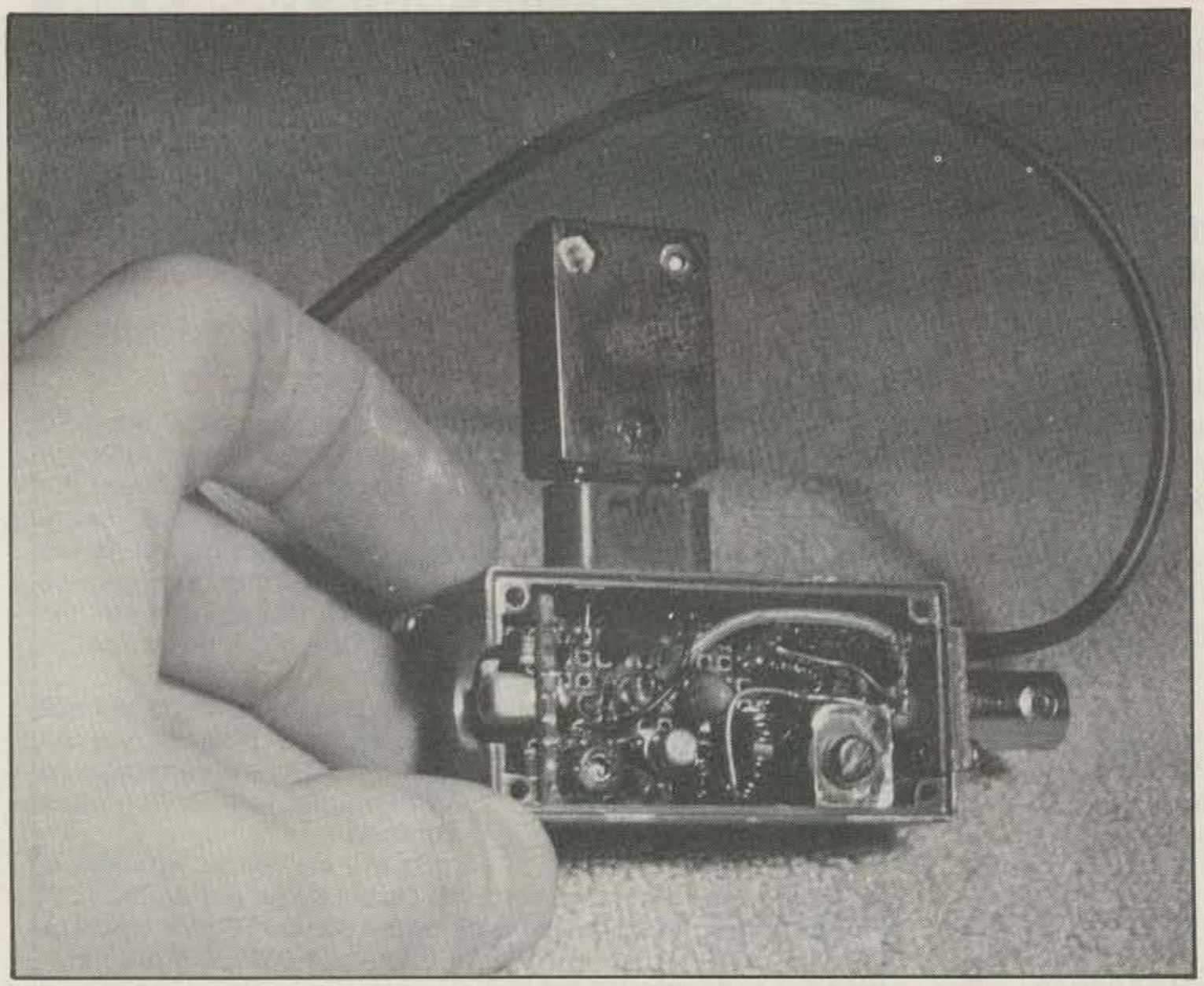


Fig. 2– Bottom view of WA8MCQ's "QRP Key." A super-small soldering iron and miniature components are the secret to constructing such pocket-size rigs.

pacitors in the output tank circuit. Once you get this rig perking on 30 meters, going back to QRM-laden 40 meters will be a hard decision. Thirty is a super band, and it is open almost all the time.

How does the QRP key work? WA8MCQ used it to contact a number of stations during the 1990 QRP Homebrew Sprint with good results (the operator rather than the rig makes the difference!). I recently received another letter from Michael and he is still having a ball with the rig. He is even contemplating adding VFO control or a mating receiver. Today's QRPers take the pursuit quite seriously, and accomplish some amazing results.

QRP in a Bottle

Surely the most thrilling aspect of QRP is building miniature rigs that really work, and two shining examples of that fact are shown in fig. 4. These 500 mw 40 meter crystal-controlled transmitters slip into an approximately 1.5 × 1 inch pill bottle (small, eh?). Notice each transmitter's circuit board is barely larger than a regular FT-243 crystal! The left transmitter was built by N2GAR, and the right transmitter was built by Michael, WA8MCQ. QRP expertise and workmanship are obvious on both rigs, but let's focus on WA8MCQ's unit for closer study.

This complete transmitter is built on a piece of 1.4 × .8 inch perfboard. Comput-

Parts List
Q1—2N3904
Q2—2N2222A
Q3—2N3553
D1—33 volt 1 watt zener
L1—15 turns, FT-23-43
L2—20 turns, FT37-61
L3, L4—16 turns, T25-2
T1—primary 15 turns, secondary 3 turns on FT23-43
Note: all coils wound with #28 or #32 enamel-covered wire.

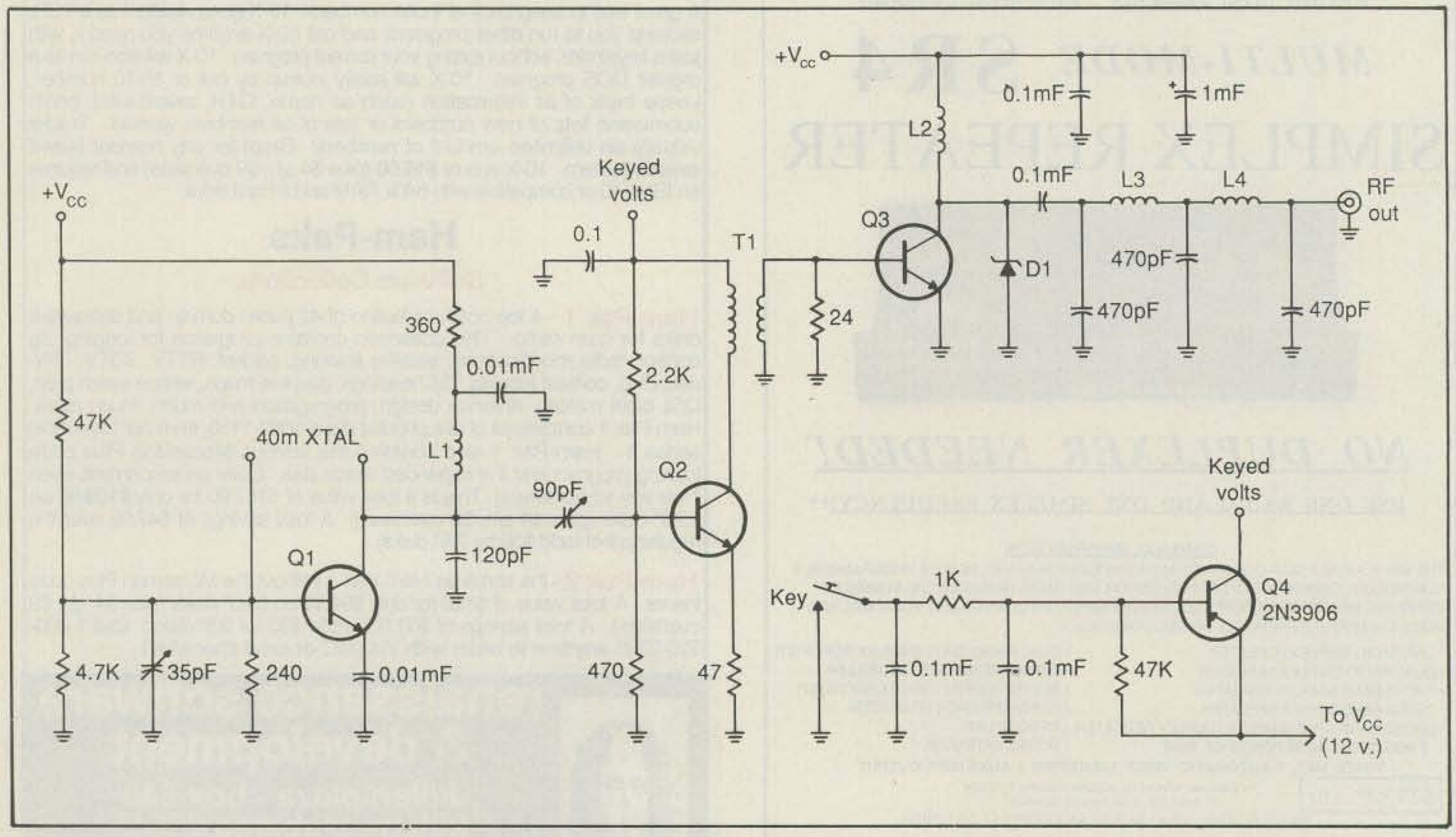


Fig. 3– Circuit diagram of the QRP key. The rig works 40 meters as shown. See details for 30 meter conversion in text.

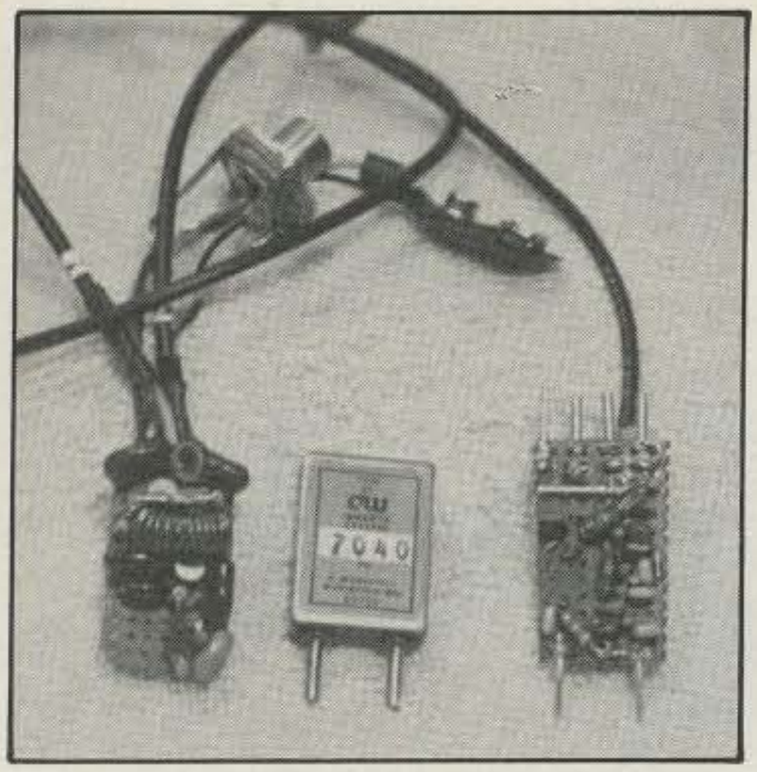


Fig. 4– This 500 mw transmitters are only 1½ × 1 inch in size and work great. The rig on the left was made by N2GAR. The one on the right was made by WA8MCQ. (See text.)

er-type DB-25 pins are used for DC and key connections on the top, while similar pins are used as a crystal socket on the bottom. The pins are secured to the perfboard with single strands of wire from a piece of stranded wire itself. They are twisted around the DB-25 pins and soldered for rigidity. The RG-174 coax emerging from the board's top goes to a BNC antenna connector.

Whip out your magnifying glass and study this rig's fine details. Notice 1/10 watt resistors and tiny monolithic capacitors, plus ultra small T-25 and FT-23 toroids are used. Can you spot the transistors? They are plastic-cased 2N3904s which Michael hand-filed to matchhead size. Incredible! An exceptionally small trimmer capacitor is also mounted on the board for warping the crystal's frequency approximately 1 kHz. It is adjusted with a small jeweler's screwdriver inserted through a hole in the rig's pill-bottle cabinet.

The schematic diagram of WA8MCQ's ½ watt gem is shown in fig. 5. Dual 2N3904 transistors are used. However, 2N3906s can be substituted. All coils were wound with #28 or #32 enameled copper wire (almost like sewing!). If you build this rig in true QRP style, its largest components will be the toroidal coils rather than the .01 mFd capacitors.

I should also point out this transmitter can be assembled with larger components and regular T-50-2 toroids if space is not a limitation. In the latter case, subtract one turn from each coil for 40 meter resonance. Likewise, the rig can be set for 30 meter operation by subtracting four turns from each coil (large or small toroids) and changing the output filter's capacitors (on each side of T-25-2) from 470 pFd to 390 pFd.

A good crystal frequency to select for use with this transmitter is 10.104 MHz. The third/lower transistor circuit is "a deluxe option" you can include or delete as desired. This option lets you connect the keying line to ground. Otherwise, direct 12 volt keying is necessary. Points A and B should be connected together to key the whole transmitter. If your particular crystal is sluggish or chirps, connect point A directly to the 12 volts and key only the final (point B).

How does this low-power marvel perform on the air? WA8MCQ made a dozen solid contacts in seven states during spare time on two weekends. Personally, I would say that is terrific for a transmitter that slips into your pocket!

What's next in the incredibly shrinking world of QRP? WA3GVS gives us a peep with his complete 40 meter CW transceiver in a pill bottle (fig. 6). Is this not amazing? The VFO, receiver, and transmitter are built on tiny circular perfboards that stack one on top of the other—and this thing really works! Going one step further, we understand WA5JAY is now building an SSB transceiver in a similar size pill bottle!

Looking back at WA8MCQ's transmitter schematic (fig. 5) and thinking about my own "mini-30" transceiver described in this column a couple of years ago, adding a direct conversion receiver with full break-in would not be difficult. Getting both units into a pill bottle, however, is a different story! The circuit diagram of my "mini-30" rig's receiver section is shown in fig. 7. A regular 40673 MOSFET product detector circuit followed by an LM386 audio stage is all that's required. A local oscillator signal for one of the 40763's gates can be tapped off from the collector/crystal connection of the "first" 2N3904 using a 50 pFd capacitor. Antenna/signal input for the other 40763 gate can be tapped from the "transistor side" of the tank circuit (junction of T-25-2 and 470 pFd capacitor). Another 50 pFd capacitor is used for coupling, and a pair of 1N914 diodes provide receiver protection during transmit (and full break-in). Although a tuned circuit should be included on the 40763's input,

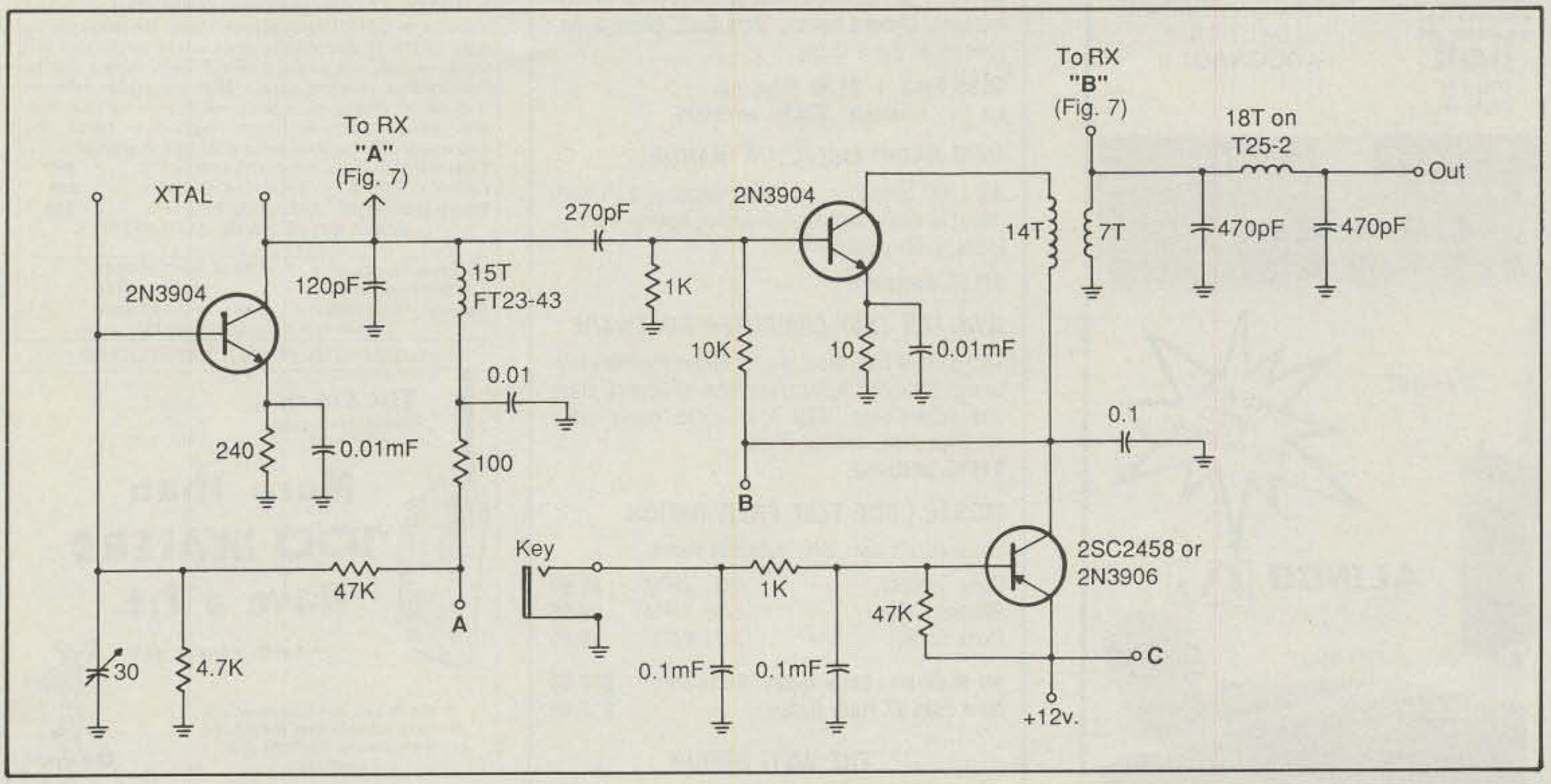


Fig. 5– Schematic diagram of WA8MCQ's 500 mw transmitter shown in fig. 4. (Thanks to the QRP Quarterly *for permission to reprint this info.)*

I get by that requirement by letting the transmitter's tank circuit serve double duty. Sensitivity is more than ample for 30 or 40 meters, unless you are listening for weak DX.

The 40763 is an outstanding device for QRP work, but it will suffer overload when used in the vicinity of AM broadcast stations. I avoid that problem simply by not using the rig when I am near an AM station (clever, eh?). A better solution would be to mount the entire rig in a metal box. There is no sidetone with my setup, but clicks and buzzes in the earphones are sufficient for monitoring your fist. Remember, I am sharing ideas to inspire your creative thinking rather than discussing a wire-to-wire ready-to-duplicate unit. Indeed, such personal touches you alone conjure up are the spice of QRP life.

One example of that statement is my own continuing quest to build a full QRP transceiver in a ballpoint pen case. You may recall seeing my first step, the ballpoint pen 30 meter transmitter (complete with battery and push-button key on top) in this column a few years ago. My next evolution of this little tyke will use a PNP transistor in the transmitter with dual emitter resistors that are keyed for T/R switching. When the key is up, the significantly weaker oscillator signal combined with base-to-emitter diode action produces product detection. The resultant signal

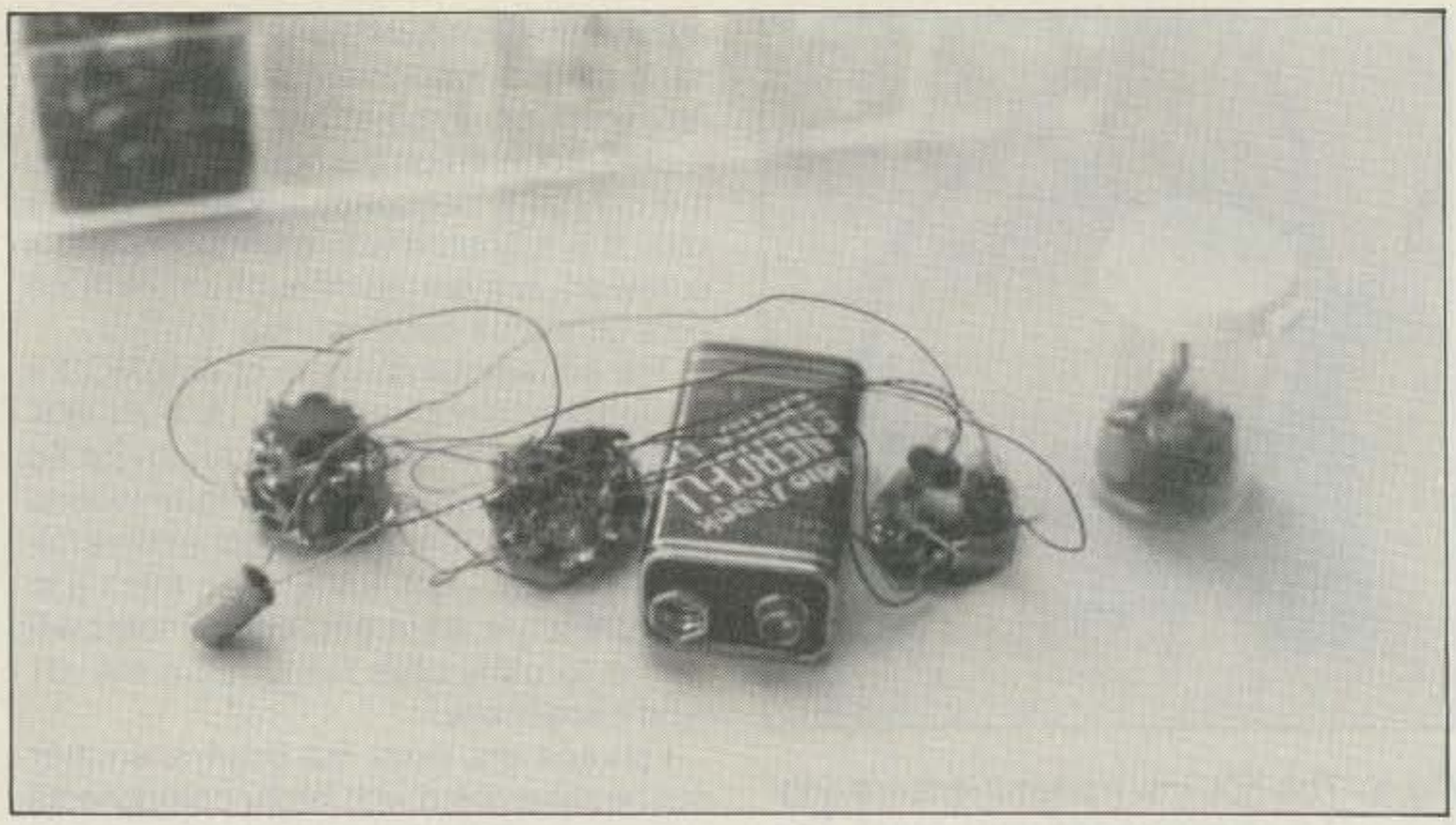


Fig. 6– Would you believe a complete 40 meter CW transceiver could be squeezed into a pill bottle? Here it is! The rig was designed and built by WA3GVS.

across the emitter resistor is then amplified by a simple LM386 circuit to drive an earphone. Closing the key shorts out the emitter resistor for transmitting at full power. It is a tinker's project, sure, but that is the fun of QRP.

If you prefer more tried and proven rigs for QRP, drop a large self-addressed, stamped envelope to 624 Kits, 171 Springlake Drive, Spartanburg, SC 29302. This small company was founded by K4LTA and produces some nice ready-to-build items complete with circuit boards. Particularly attractive is 624's kit of W1FB's super-small 40 or 80 meter transceiver, a universal 1 watt transmitter for 160–20 meters, deluxe direct-conversion receiver, and modified cubic-incher transmitter for 80–

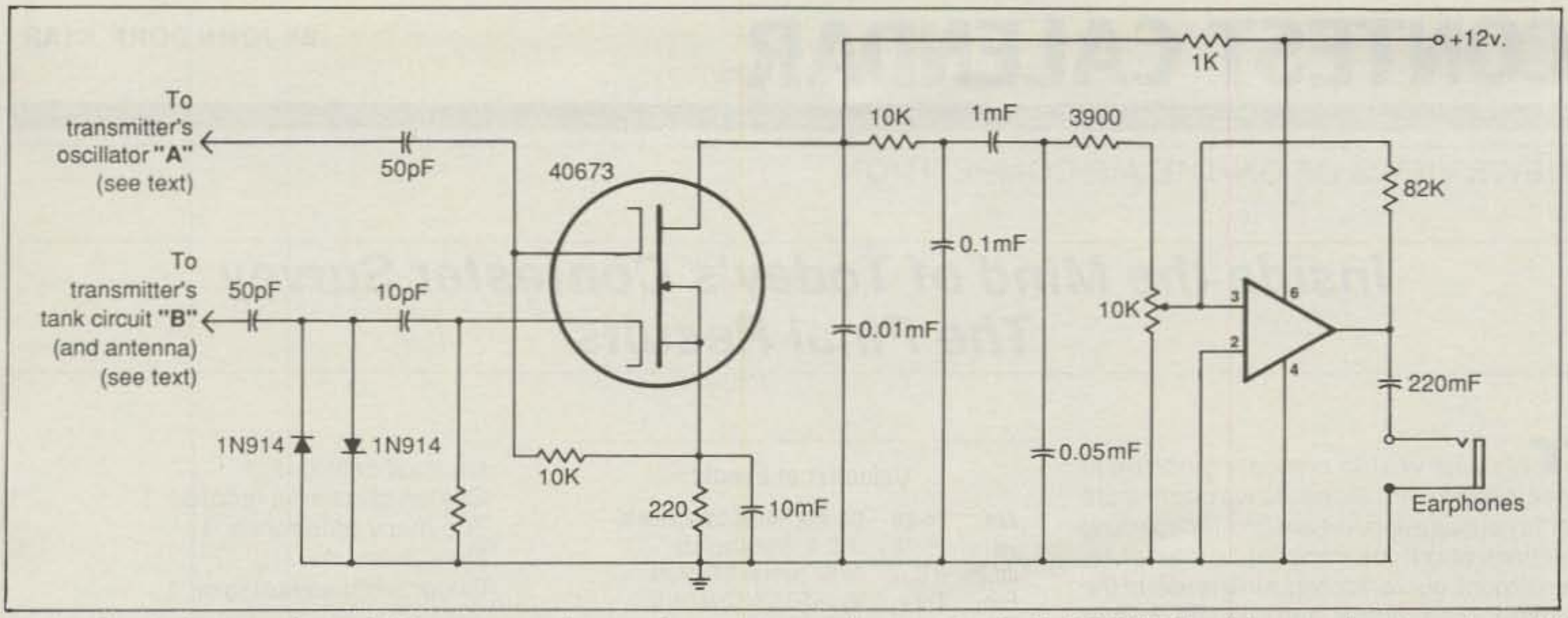


Fig. 7–Circuit diagram of my mini direct-conversion receiver which can be combined with WA8MCQ's mini transmitter to make a mini transceiver. (Discussion in text.)

20 meters. 624's prices are unbelievably reasonable (low cost!), plus they have a good variety of small components for homebrewing your own circuits.

More Coming

We have once again run short of space before getting to describe all the goodies! We simply will have to continue next month, and that column is looking even more exciting. Lined up for your enthusiastic study are a first on-the-air report of MFJ's new 20 meter QRP transceiver; Quantum's belt-carried battery pack for long-term QRP fun; a look at Brian, N4DKD's inexpensive 30 meter transmitter with four 2N2222 transistors in parallel; and much more. It promises to be a fascinating column indeed. Watch for it!

Meanwhile, we look forward to talking with all of you on the air (14.180–14.240, 2200–2300 GMT Sundays, and 30 CW weeknights). Please remember to include an SASE if you write to me (or any of our other column guests), and be patient for replies. Here's wishing 1992 will be your best year for hamming yet.

73, Dave, K4TWJ

CONTEST CALENDAR

BY JOHN DORR, K1AR

NEWS/VIEWS OF ON-THE-AIR COMPETITION

Inside the Mind of Today's Contester Survey
The Final Results

This past year in contesting has been one loaded with issues. As we continue to enjoy our passion, we are finally beginning to think about the important areas of recruitment, our relationship to the rest of the amateur community, and a wealth of other topics. Last year's survey, the results of which we are reporting this month, was intended to probe the thinking of today's contest operator to try to discover what you think our "state of the union" is these days.

Several consistent themes emerged from your responses. We are in part an aging lot that is losing the edge in desire and ability. In some minds this is reflected in our lack of aggressivity in bringing fresh blood into the fold. For those ready to give up, don't lose hope. I also received a number of replies from new contesters who had a common idea: Give the "little guy" more recognition. Perhaps we need to revamp our views on recruiting by leading the charge for more awards and acknowledgment for the "new guys."

Even though this is my third survey, I never cease to be amazed at the effort that many of you put into your responses. This year's prize was again won by Lynn Shriner, W5FO, who submitted a nine-page tome that will make any survey taker swell with pride. In each and every case, I appreciate the effort you took to voice your views being summarized this month.

I am happy to report that I received a total of 232 responses to my survey. This year the average level of contesting experience was 17.8 years, with responses from every state and 18 countries.

Calendar of Events

Jan.	**24-26**	**CQ WW 160M CW Contest**
Jan.	25-26	U.B.A. SSB Contest
Jn.25	-Fb. 2	ARRL Novice Roundup
Feb.	1-2	YL ISSB CW QSO Party
Feb.	1-2	Maine QSO Party
Feb.	1-2	Vermont QSO Party
Feb.	2	North American CW Sprint
Feb.	2-3	Classic Radio Exchange
Feb.	8-9	QCWA CW QSO Party
Feb.	8-9	Dutch PACC Contest
Feb.	8-9	EA RTTY Contest
Feb.	8-9	YLRL YL/OM SSB QSO Party
Feb.	8-10	New Hampshire QSO Party
Feb.	9	North American SSB Sprint
Feb.	15-16	ARRL DX CW Contest
Feb.	**21-23**	**CQ WW 160M SSB Contest**
Feb.	22-23	YLRL YL/OM CW QSO Party
Feb.	22-23	U.B.A. CW Contest
Feb.	29	Utah 160 Meter Challenge
Mar.	1-2	Wisconsin QSO Party
Mar.	7-8	ARRL DX SSB Contest
Mar.	7-8	YL ISSB SSB QSO Party
Mar.	7-8	QCWA SSB QSO Party
Mar.	13-15	Japan Int'l DX CW Contest
Mar.	15-16	Bermuda Contest
Mar.	21-23	Virginia QSO Party
Mar.	**28-29**	**CQ WW SSB WPX Contest**
Apr.	18-19	SARTG WW AMTOR Contest

Now the Results

Question 1: In a few words, what is the single most important issue facing contesting today (e.g., lack of new blood, ethics, etc.)?

There was tremendous variation in the responses to this question. As I anticipated, it was difficult for many of you to identify a single issue as most important. In some cases, I received four or five pressing issues in one survey reply! You should note (as referenced by my earlier comments) that there were 16 responses indicating lack of recognition for the "little guy." Interestingly, they had an average contesting experience level of 1.8 years.

As indicated by the survey, here are the major issues facing contesting today followed by the number of respondents.

Lack of new blood: 51 respondents
Ethics: 37
Controls/impact of technology: 19
Poor operating style: 19
Cost of being competitive: 18
Too few incentives for "little guy": 16
Justification of spectrum use: 14
Zoning: 12
TVI/RFI: 10
Too many contests: 8
No issues: 8
Overall value of contesting: 7
Excessive power: 7
Lack of new challenges: 6
Taking contests too seriously: 4
Signing "last 2 letters": 3
Demise of domestic contests: 3
Operating speeds too fast: 2
Length of contests: 2
"Hired guns": 2
Quality of operating: 2
Unusual callsigns: 1
Overemphasis on records: 1
Too many categories: 1
Nets: 1
Geographic advantages: 1

Question 2: Do you think the sport of contesting will continue to improve over time or have we seen the best?

Okay, I admit this was a badly worded question that could not be answered with a yes or no. However, most of you figured out the intent and replied strongly in favor of contesting's continued improvement in the future. However, there were a disturbing number of "experienced" contesters (e.g., greater than 30 years) who felt otherwise. Food for thought, isn't it?

Yes: 163
No: 52

Question 3: What is the age of the youngest and oldest contester whom you personally know (approximate answer is acceptable)?

I'm not sure which would be a more interesting experience, operating next to a 9-year-old or a fellow pushing 90! Anyone care to challenge these claims with new data?

Youngest: 9
Oldest: 90

Question 4: As you have grown older, what has changed about your ability to operate?

I think most will agree that there are few surprises in the answers to this question. While there were numerous responses indicating a decline in operating ability for various reasons, I was pleased to see that many people are experiencing gains in operating abilities such as code speed, strategy, tactics, etc. And who would have predicted 10 years ago that one fellow in our group feels that his typing speed has impacted his ability to operate!

Lower endurance/stamina: 90
Level of experience: 40
Other responsibilities: 31
Lower desire/interest: 23
Improved CW speed: 20
Family commitments: 20
Smarter operating tactics: 19
Poorer hearing: 17
More equipment: 13
Better operator: 13
Lower concentration: 12
Less patience: 11

2 Baldwin Street, Windham, NH 03087

WE SHIP WORLDWIDE

Barry Electronics Corp.

WORLD WIDE AMATEUR RADIO SINCE 1950

Your one source for all Radio Equipment!

For the best buys in town call:
212-925-7000
Los Precios Mas Bajos en Nueva York
WE SHIP WORLDWIDE!

L. Juli

Wherever I go I take my radio.

KITTY SAYS: WE ARE NOW OPEN 7 DAYS A WEEK.
Saturday & Sunday 10 to 5 P.M.
Monday-Friday 9 to 6:00 PM
Come to Barry's for the best buys in town

DRSI

ONV Safety belts-in stock

ICOM

IC-R71A, 751A, 781, 229H, R-7000, IC-765, IC-726, 3220H, 735, IC-901, IC725, IC-2410A/2500A, R-1, R-72, R-100

YAESU

FT-767GX, FT-757GXII, FT-747GX, FT-990, FRG-8800, FT-736R, FT-1000D, FT-415/815 FT-5200, FT-2400, FT-470

CES

Simplex Autopatch SDI-50 Will Patch FM Transceiver To Your Telephone. Great For Telephone Calls From mobile To Base. Simple To use. SDI-50

KENWOOD

ANTENNAS
A-S, AES, Cushcraft, Hy-Gain, Hustler, KLM, METZ, Urban, MODUBLOX, TONNA, Butternut, Multi-Band

TS450S/AT, R-5000, TS-850S, TM 241A/441A, TR-751A, Kenwood Service Repair, TH225A, TM-631A, TS140S, TS690S, RZ-1, TS-790A, TS950SD, TH-77A, TH27/47A, TM-941A, TM-741A.

YAESU	ICOM
FT-23R/26/76	IC2/3/4SAT
FT411E-811-911	IC02AT/2SRA
FTH-2008/7008	IC2/4GAT/24AT
	IC-A20/U16

Landmobile HT's
ICOM: U16, H16, V100, U400
MAXON, MOTOROLA,
YAESU: FTH 2008/7008
UNIDEN, REGENCY, KING,
MARINE ICOM: M7, M56, M700
AVIATION ICOM: A20 H.T., TAD

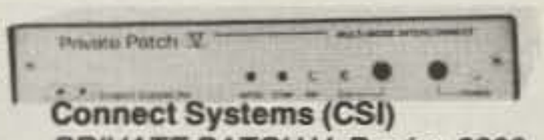
IC-W2A

IC-H16/U16

MOTOROLA RADIUS COMMERCIAL RADIOS

TH-77A

FT-470



Connect Systems (CSI)
PRIVATE PATCH V, Duplex 8200, CS800

TUNERS STOCKED:
NYE MBV-A 3 Kilowatt Tuner

MFJ-989C

AMPLIFIERS STOCKED:
RF Concepts
Mirage
TE Systems

MARINE RADIOS
ICOM M7, M11, M56, M700TY, M800
AVIATION PORTABLE ICOM A-21
KING KX-99

Budwig ANT. Products

FLUKE 77, 83, 85, 87 Multimeters

GEOCHRON
World Time Indicators

VoCom/Mirage/Alinco
VoCom/Mirage/TE SYSTEMS
Amplifiers & 5/8λ HT Gain
Antennas IN STOCK

G&G ELECTRONICS ART1,
Air Disk, SWL, Morse Coach

Computer Interfaces Stocked: MFJ-1270B, MFJ-1274, MFJ-1224, AEA PK-88, MFJ-1278T, PK-232 MBX W/FAX, DRSI PRODUCTS

AOR-AR900, 1000, 2500, 2800, 3000—wide range scanners

Wide selection of SW & Amateur Publications

Panasonic
Shortwave Radios/Marine

DAIWA

COMMERCIAL & HAM REPEATERS STOCKED. WRITE FOR QUOTES

Kantronics
KAM, KPC II,
KPC IV, Data Engine,
DVR 2.2

Covercraft/Coaxseal Stocked

SHORTWAVE RECEIVERS STOCKED

MOTOROLA AUTHORIZED DEALER
KACHINA COMMUNICATIONS DEALER

JRC
NRD-525, JST135, NRD-535

Professional Soldering Station
48 Watts
$79

Phillips DC-777
FM, MW, LW, SW
cassette car stereo

AUTHORIZED
SONY®
DEALER

DIGITAL FREQUENCY COUNTERS
OPTOELECTRONICS model 1300 H/A, 0-1300MHz
2300, 2210 H, 0-2200 MHz, 2600H, UTC-3000, 2810

Long-range Wireless
Telephone for export in stock

Radios for Business, Gov't, 2-way, etc. Stocked & serviced, call for great prices!

Media Mentors—
Amateur Radio Course

COMET ANTENNAS STOCKED

HEIL EQUIPMENT IN STOCK

DRAKE

Alpha Delta Products Stocked

EIMAC
3-500Z
572B, 6JS6C
12BY7A &
6146B

AEA Isopoles (144, 220, 440 MHz), Isoloop.

BIRD
Wattmeters &
Elements
In Stock

BENCHER PADDLES, BALUNS, LOW PASS FILTERS IN STOCK

MIRAGE AMPLIFIERS
ASTRON POWER SUPPLIES
Belden Wire & Cable, Int'l Wire
OPTO KEYERS STOCKED

New TEN-TEC
PARAGON, OMNI V

Hy-Gain Towers will be shipped direct to you FREE of shipping cost.

IIX Towers, Antennas, Mobile Radio mounts stocked. Call.

AMERITRON AUTHORIZED DEALER

MAIL ALL ORDERS TO: BARRY ELECTRONICS CORP., 512 BROADWAY, NEW YORK CITY, NY 10012 (FOUR BLOCKS NORTH OF CANAL ST., BETWEEN SPRING AND BROOME ST.)

New York City's LARGEST STOCKING HAM DEALER
COMPLETE REPAIR LAB ON PREMISES

"Aqui Se Habla Espanol"
BARRY INTERNATIONAL TELEX 12-7670

Monday-Friday 9 A.M to 6:00 P.M.
Saturday & Sunday 10 A.M. to 5 P.M. (Free Parking)

IRT/LEX-"Spring St. Station". **Subways:** BMT-"Prince St. Station". IND-"F" Train-Bwy Station"
Bus: Broadway #6 to Spring St. Path-9th St./6th Ave. Station.

COMMERCIAL RADIOS STOCKED: ICOM, Motorola, MAXON, Standard, Yaesu. We serve municipalities, businesses, Civil Defense, etc. Portables, mobiles, bases, repeaters...

ALL SALES FINAL

We Stock: AEA, ARRL, Alinco, Ameco, Ameritron, Antenna Specialists, Astatic, Astron, B&K, B&W, Belden, Bencher, Bird, Butternut, CDE, CES, Cushcraft, Daiwa, Eimac, Henry, Heil, Hustler, Hy-Gain, Icom, KLM, Kantronics, Larsen, MJF, Mirage, Nye, Palomar, RF Products, Saxton, Shure, Tempo, Ten-Tec, TUBES, Yaesu, Vibroplex, Duplexers, Repeaters, Scanners, Radio Publications, Uniden, Kenwood, Maxon, RFC.

WE NOW STOCK COMMERCIAL COMMUNICATIONS SYSTEMS
HAM DEALER INQUIRES INVITED PHONE IN YOUR ORDER & BE REIMBURSED
COMMERCIAL RADIOS stocked & serviced on premises.
Amateur Radio Courses Given On Our Premises, Call
Export Orders Shipped Immediately. TELEX 12-7670

Technical help offered upon purchase

FAX: 212-925-7001

Question	Yes	No	Total	% Yes Responses
1	N/A			
2	163	52	195	83.6
3	N/A			
4	N/A			
5	111	89	200	55.5
6	203	17	220	92.3
7	56	162	218	25.7
8	165	55	220	75.0
9	N/A			
10	N/A			
11	N/A			
12	157	73	230	68.3
13	71	155	226	31.4

Table I– Summary of survey results.

Greater patience: 10
More money for contesting: 10
Availability of technology: 10
Poorer eyesight: 6
Faster operating speed: 6
Improved endurance: 4
Increased desire: 3
TVI: 1
Reduced typing skills: 1

Question 5: Are experienced contesters doing anything about bringing more youth into contesting?

This is a question that has become a critical issue to the future of contesting. I would love to hear from those indicating a positive response to this question. Specifically, what progress do you see in this area? What are you doing from which others can learn? I'll be glad to summarize your responses in a future column.

Yes: 111
No: 89

Question 6: Is contesting an asset or a liability for amateur radio?

This question brought out the respondents who regularly read about contesting but openly complain about their existence. However, I was surprised to see the number of active contesters who indicated the same concerns I mentioned in a recent column about the consideration we should show towards the "non-contesting" community.

Asset: 203
Liability: 17

Question 7. Has the integration of technology into contesting gone too far?

As an operator at K1EA's station, I am the wrong guy to answer this question. Yet as the growing majority of contesters employ more and more technology to their art, it makes even a technological bigot like me sit back and think. Many negative respondents to this question were not afraid of technology *per se*, but rather missed the "old days" of sitting in front of the rig and finding DX the old-fashioned way. Sometimes I reminisce and think about the fun I had in front of a KWM-2.

Yes: 56
No: 162

Question 8: Do you feel the competitive nature of contesters is germane to other areas of life (e.g., career, other hobbies, relationships)?

There have been numerous surveys that have asked this question in different forms (the excellent work of John Crovelli, W2GD, for the *NCJ* a few years back comes to mind). It seemed that this was a question, for some reason, that encouraged spirited replies such as "who cares" or "of course!" Then again, there was one fellow who wondered what competition had to do with the Germans (read the question one more time).

Yes: 165
No: 55

Question 9: In one sentence, what has been your most memorable contest experience (e.g., participating in the last multi-multi operation at W2PV)?

This was a difficult question to summarize, as you can imagine. In broad terms, your responses described highlights from your own experience level and exposure to contesting. It reflected one of the appealing factors in contesting; a person's glory can be based on his or her own individual goals and objectives. You can have a great time in contesting without ever winning the "big one."

Here are a few of your responses as a representative sampling.

"Working JAs on 160 meters from the East Coast."

"Having rare DX call me!"

"The WRTC."

"Breaking 1 million points."

"Working the PA QSO party as a mobile."

"Finally winning a plaque."

"Every time I break my own personal best."

"Making my very first amateur QSO during the 1989 CQ WW."

Call Area	Number of Responses	DX Country	Number of Responses
W1	26	G	9
W2	22	DL	4
W3	19	KL7	3
W4	17	KP4	2
W5	19	PY	2
W6	26	VP2M	1
W7	14	KH4	1
W8	9	SM	1
W9	10	OH	1
W0	8	OZ	1
VE	7	VK	1
		DU	1
		JA	1
		TG	1
		KH6	2
		ZS	1
		YV	1
		LU	1
None indicated	21		
Total	**232**		

Table II– Geographic response analysis.

"Having the opportunity to operate at some of the best stations."

"My 20 year friendship with 'xxxx'."

"The next contest I enter."

"My first run of JAs."

Question 10: What other hobbies do you enjoy outside of contesting/amateur radio?

In the spirit of contest log checking, I could not resist the temptation to perform a "unique analysis" on our other hobbies. How do you guys find the time to do anything else?

Farming, sports, deer hunting, running, martial arts, computers, reading, woodworking, bird watching, bowling, biking, theater, gourmet cooking, pistol shooting, boating/sailing, flying, scuba diving, singing, poetry, wooden sailboat racing, skiing, tennis, Scottish country dancing, scanners, machinery, jazz and big band music, traveling, beekeeping, satellite TV, chess, bush walking, art/drawing, drag racing, African movies, camping, soccer, basketball leagues, history, political activism, billiards, raising birds (cockatiels), genealogy, painting, volunteer firefighting, youth sports, bridge, baseball card collecting, bungee jumping, restoring cars, show dogs, orchid raising, model aircraft, hiking, stamp collecting, fishing, tuba playing, golf, rock climbing, astronomy, photography, surfing, XYL, skin diving, cars, weight training, knitting, coin collecting, classic auto restoration, model railroading, dog training, Arabian horses, and finally, kayaking.

Question 11: What percentage of your vacation/holiday time do you use for contesting and related activities (e.g., antenna work, DXpeditions, etc.)?

The average contester seems to devote a reasonable amount of his or her free time to contesting. You may be surprised how much time you give to contesting when you add up those Friday and Monday vacation slips between October and March. This editor has one other comment. For the four guys using more than 90% of their vacation schedule for contesting: "Get a life!"

Less than 10%: 87
10 to 25%: 85
25 to 50%: 32
50 to 90%: 19
Greater than 90%: 4

Question 12: Do you use some form of computer support while operating?

Is there anyone left in contesting who still uses paper logging for major contests? There are still a few who are sticking to the old ways of paper logging. To be fair, though, not everyone can afford a computer or have access to one (especially in some DX locations). Take a look at Question #7. There is almost a 1-to-1 correlation between computer users and those who feel that technology has not gone too far in contesting.

Yes: 157
No: 73

Question 13: Given the right set of circumstances (e.g., best station, access to good operators to learn from, QTH), can most anyone eventually win the Single Operator category in a major DX contest?

This was one of the survey's more subjective questions. I wanted to see how many of us accept the fact that there will only be certain competitors that are the "winners" in contesting. It is good to see that even though there is an overwhelming majority who agree with winning's limitations, we still love to get on and enjoy the competition just the same.

Yes: 71
No: 155

Closing Comments

As you have probably figured out by now, I like to run this kind of column every year or so. It not only makes us be somewhat introspective, but from a selfish standpoint, it gives me ideas for future columns. While on the subject, I'm brewing up some ideas that should be fun for the next few months. Thanks again for your continued input and support.

In the spirit of support, I am reminded that the *NCJ* will be running a commemorative anniversary issue around this timeframe. If you even have the remotest interest in contest operating, this will be the "great mother of all issues" and a must for all. Don't miss it. Contact the ARRL if you need additional information on availability.

Remember, the deadline for the May issue is March 1st.

73, John, K1AR

North American "Sprint"

CW: Feb. 2 SSB: Feb. 9
Sunday 0000Z to 0359Z (Sat. night)

This is the spring edition of the "Sprint" run by the National Contest Journal. As the name implies, it's a shorty, only four hours long.

North Americans will be contacting other North American stations as well as stations in other countries, single operator only. North American boundaries are as defined by the rules used in the *CQ* WW DX Contest.

Exchange: Call, QSO no., name, and QTH (state, Canadian area, or country).

Scoring: Multiply total QSOs by the sum of states, Canadian areas, and other North American countries worked for your final score (U.S. and VE not countries; KH6 not a state). There are eight Canadian multipliers: VE1/VO1/VO2, VE2-VE7, VY1/VE8. Non-North American countries do not count as a multiplier.

Frequencies: Three bands only: 80, 40, and 20 meters. CW—3540, 7040, 14040. SSB—3850, 7225, 14250. (Plus or minus QRM.)

Awards: A trophy to the highest scoring entrant. Certificates to the top scorer in each U.S. call area, Canada, and North American country. Also to the ten top scores, to each member of the winning team, and the highest scoring entrant on each team.

Team competition is limited to a maximum of 10 operators as a single unit. Precontest registration is required for each team before the start of the contest—with WN4KKN for the CW and K7GM for the SSB.

There are other detailed rules, a special QSY rule, disqualifying penalties, etc. I suggest you write to WN4KKN or K7GM if you do not have a copy of the *National Contest Journal.*

Entries must be received no later than 30 days after the end of each "Sprint."

The CW go to: Trey Garlough, WN4KKN, 330 Walnut Ave., Santa Cruz, CA 95060.

SSB go to: Rick Niswander, K7GM, Box 2857, College Stn., TX 77841.

EA RTTY Contest

1600Z Sat. to 1600Z Sun., Feb. 8–9

This is the 1992 edition of the Spanish RTTY Contest sponsored by U.R.A.D. It is open to participants worldwide on 80–10 meters.

Classes: Single operator, all bands and single band, multi-single, and SWL.

Exchange: Signal report and Spanish Province (for EA stations). All others use *CQ* zone.

Scoring: For non-EA stations: On 10–20 meters credit 1 point for contacts in your continent, 2 points for QSOs outside your continent. On 40 and 80 meters triple your QSO points (e.g., 3 within your continent). QSOs between stations in the same country are only valid for multiplier credit and have no QSO point value.

Multipliers: Non-EA stations count each DXCC country and EA province (maximum 52) per band. Spanish stations use *CQ* zones and DXCC countries per band.

Final Score: Multiply total QSO points times multiplier.

Awards: Gold, silver, and bronze medals for the top three single-operator/all-band entries in Spain and outside Spain. Certificates will be awarded to winners in each class for every DXCC country and EA district.

Send your entries to: EA RTTY Contest, c/o EA1MV, Antonio Alcolado, P.O. Box 240, 09400 Aranda de Duero (Burgos), Spain. The mailing deadline for entries is April 10, 1992.

Dutch "PACC" Contest

1200Z Sat. to 1200Z Sun., Feb. 8–9

It's the world working The Netherlands on all six bands, 1.8 through 29.7 MHz, in the band sections recommended for contest operation by the IARU. The same station may be worked on each band, but on one mode only, phone or CW, for QSO and multiplier credit. Note that SSB QSOs are not allowed on 160 meters.

Categories: Single operator, multi-operator, and SWL.

Exchange: RS(T) plus a QSO number starting with 001. Dutch stations will add two letters to identify their province. There are 12 provinces: DR, FR, GD, GR, LB, NB, NH, OV, UT, FL, ZH, and ZL.

Scoring: Each QSO with a PA/PB/PI station counts one point. DX stations determine their multiplier by the number of provinces worked on each band (maximum of 72).

Final Score: Total number of QSO's times the number of provinces worked on each band.

Awards: Certificates to the top scoring station in each category in each country and call areas of JA, LU, PY, UA9/0, VE/VO, VK, W/K, ZL, and ZS. Also second- and third-place awards if returns justify.

SWL's must log the call of the Dutch station as well as the station being worked and both serial numbers. Scoring same as above. Indicate the multiplier in a separate column in your log only the first time it is worked on each band. Include a summary sheet showing the scoring, your name and address in block letters, and the usual signed declaration.

Mailing deadline is March 31st to: PACC Contest, Att: F. Th. Oosthoek, PA0INA, P.O. Box 499, 4600 AL Bergen op Zoom, The Netherlands.

QCWA QSO Party

CW: 0001Z Sat. to 2400Z Sun., Feb. 8–9
SSB: 0001Z Sat. to 2400Z Sun., Mar. 7–8

This is the 35th annual edition of QCWA's fun and traditional QSO Party, which is open to QCWA members worldwide. Please note that CW QSOs are only valid in the CW section and visa versa for SSB.

Classes: Single operator, all bands.

Exchange: QSO number, operator's first name, chapter identification (members not belonging to a chapter should send "AL"), and state or DXCC country.

Scoring: Final score equals the total number of stations worked times the multiplier. Multipliers are the number of QCWA chapters worked during the contest (credit a chapter multiplier only once). Frequencies: CW: 3530–3560, 7030–7060, 14030–14060, 21040–21070, 28040–28070. SSB: 3900–3930, 7230–7260, 14280–14310, 21350–21380, 28400–28430. No QSOs on WARC bands. Check 160 meters at 0400–0500Z and 1200–1300Z.

Awards: Plaques will be awarded to the top scorer worldwide on each mode.

Separate logs and scores must be submitted for both modes. All logs must be

received by April 10, 1992 and sent to: Harold Chase, W1EES, 75 Chestnut Circle, West Suffield, CT 06093.

ARRL International DX Contest

CW: Feb. 15–16 Phone: March 7–8
0000Z Saturday to 2400Z Sunday

This is a great DX contest that you should not miss. I strongly recommend that you study the announcement in the December issue of *QST* for more details. Also send a large SASE (2 IRCs for DX) for sample log and entry forms.

All bands may be used, 1.8 through 28 MHz, but not 10, 18, or 24 MHz. Aeronautical or maritime mobile stations cannot be worked for contest credit. Following is a brief outline.

Categories: Single operator, both single and all band, and single operator assisted. Multi-operator, one transmitter and two transmitters. Also multi- operator, multi-transmitter. Also QRP, all band only (5 watts or less output). Multi-transmitter stations must remain on a band at least 10 minutes once a contact is made.

Exchange: RS(T) and state or province for W/VE; RS(T) and power input for DX stations (three-digit number).

QSO points: W/VE stations earn three points for each DX contact. DX get three points for each W/VE contact.

Multiplier: Each DXCC country worked on each band for W/VEs. DX stations use US states (48), District of Columbia (DC), and VE districts VE1–8, plus VO and VY1 for their multiplier (10). (Maximum multiplier of 58 per band.)

Final Score: Total QSO points times the sum of the multiplier from each band. Entries with 500 or more QSOs must include a QSO check sheet.

Awards: Certificates given in each category, in each country, and in each ARRL section, plus a wide selection of plaques. Also certificates to DX stations making over 500 QSOs.

Log entries are accepted on 5¼" MS-DOS formatted diskettes. Submit an ASCII file along with a signed summary sheet. No paper logs are required with this method.

Disqualification regulations will be strictly enforced and are listed in the official rules. Mailing deadline for all entries is April 8th, and they go to: ARRL DX Contest, 225 Main Street, Newington, CT 06111.

CQ WW 160 Meter SSB Contest

2200Z Fri. to 1600Z Sun., Feb. 21–23

Just a reminder that the SSB section of our 160 Meter Contest will be coming up the last full weekend of this month.

Extensive coverage has been given to this event, with complete rules in the November issue. They are the same rules that have been used these past many years and are well known worldwide.

Mailing deadline for your entry in last month's CW contest is February 28th, and March 30th for this month's SSB section.

They can be sent directly to the 160 Contest Director, Donald McClenon, N4IN, 3075 Florida Ave., Melbourne, FL 32904. And, of course, they can always be sent to the *CQ* office. *CQ* 160 Meter Contest, 76 North Broadway, Hicksville, NY 11801. **(Be sure to indicate CW or SSB on the envelope.)**

BILL'S BASICS

BY BILL WELSH, W6DDB

"HOW TO" FOR THE NEWCOMER TO AMATEUR RADIO

DX Data For Beginners—IRCs and More

The February 1986 issue of *CQ* includes my article about International Reply Coupons (IRCs), which can be used to pay return postage for desired DX (foreign) QSL cards. I have a class handout version of the article, which is available at no charge to anyone who requests one and supplies a self-addressed, stamped envelope.

The U.S. Post Office has issued a new IRC which is good for minimum *airmail* return postage from other countries, whereas the previous IRC is just good for minimum *surface* return postage from other countries. Theoretically, the older (surface) IRCs continue to be sold at 95 cents each. Valid older IRCs from other countries (stamped on the left front side) can be redeemed at 50 cents each in stamps. U.S. issued older IRCs can be exchanged at one cent less than the purchase price of 95 cents each. If you encounter resistance to the redemption of older IRCs, refer your postmaster to section 392 of the international mail manual.

If you send a new (airmail) IRC to a DX amateur, it is advisable to include a note telling her/him that the new IRC is good for airmail postage.

Jeffrey Wilderman, the two-month-old son of Bruce Wilderman, K3IA, of Dresher, Pennsylvania. It looks like he is getting an early introduction to code.

Green Stamps

It is common for the operator of a rare DX station to request a green stamp from anyone desiring one of her/his confirmation of contact (QSL) cards. I have heard many new amateurs object to sending an American dollar bill (green stamp) to a DX station. Such Americans usually say that they don't understand why they should pay for the DX card, since they are sending one of their cards to the DX operator. I have told my ex-students that such requests for green stamps are usually warranted. This article is intended to explain why most of us support this practice.

No matter how much you and I may want to receive cards from a rare DX station, it is unlikely that the DX operator wants (or needs) our cards. The cards we send enable the DX operator to locate the contacts in her/his log prior to sending cards in reply. After serving that function, our cards are probably of no further use to the DX operator.

45527 Third Street East, Lancaster, CA 93535-1802

Some rare DX locations are the homes of amateurs, making it a bit easier to work such locations. A good example of this is Tom Christian, VR6TC, on Pitcairn Island in the South Pacific. It is difficult for someone like Tom to operate normally in the amateur radio bands because thousands of amateurs are anxious to contact him. His normal operation amounts to a continuous contest. It is unreasonable to expect a rare DX operator such as Tom to supply cards to all the amateurs who work him.

Unlike Tom, many rare DX locations become available to us on the air thanks to the dedicated efforts of amateurs who devote their time, effort, and money to making rare DX contacts available to the rest of us. I really appreciate these wonderful people. Iris, W6QL, and Lloyd, W6KG, Colvin are prime examples of this type of dedicated amateur. Thousands of us have worked them in many DX locations, including many of the rarest DX spots in the world. In essence, a relatively small number of top amateurs do an excellent job of keeping DX operation very interesting for the rest of us.

Operation from DX locations away from home is referred to as a DXpedition. Such operation involves a lot of expenses. The total cost of DXpeditions is usually shared among the operators who travel to DX locations, with some backing from interested groups. However, it is common for DXpeditions to be in need of financial help. They need your green-stamp contributions. I hope you will join me in supporting DXpeditions. I have always sent a green stamp with a card going to a rare DX station because I know financial support is appreciated.

My previous articles have warned against sending green stamps to Soviet amateurs, since Russian amateurs were not permitted to have foreign currency. That restriction was lifted in 1990, and it is now safe to send green stamps to Soviet amateurs.

You do not have to be a dedicated DXer to contact many DX stations. Such stations are so active that anyone is liable to work several of them.

Please be aware that some foreign postal employees are not as honest as their American counterparts. Consequently, it is advisable to conceal green stamps if you send them to DX operators. Also, do not show your callsign or his callsign on the envelope you mail.

Brian Treadwell, WV4V, wrote and published "The Green Stamp Guide" during 1987. The price is $2.45 each, which includes the cost of U.S.A. postage. This excellent guide can be purchased from DX QSL Associates, 434 Blair Road NW, Vienna, Va 22180. If you want price lists for all of Brian's services, send your request and business-size (#10), self-addressed, stamped envelope to the same address.

Foreign Postage

This month's column includes some coverage of international reply coupons and green stamps. Consequently, it seems reasonable that the availability of foreign (DX) postage should also be mentioned.

Green stamps and IRCs are subject to being stolen, no matter how well we conceal them. There is a much greater possibility that a DX operator will receive our self-addressed envelope than that she/he will receive green stamps or IRCs. Simply purchase foreign postage and attach it to your self-addressed envelope, which is go-

COMMUNICATIONS ELECTRONICS INC.™

Emergency Operations Center

has expanded to our new two acre facility and World Headquarters. Because of our growth, CEI is now your one stop source for emergency response equipment. When you have a command, control or communications need, essential emergency supplies can be rushed to you by CEI. As always, for over twenty three years, we're ready, willing and able to help. For 1992, we're introducing new products from Uniden, Shinwa, ICOM, Ranger Communications Inc., Grundig, Sangean, Magnavox and RELM.

NEW! Shinwa SR001-B

List price $799.95/CE price $479.95/SPECIAL

Continuous coverage from 25.000 through 999.995 MHz.

If you're looking for an excellent synthesized scanner designed for mobile surveillance use, the new Shinwa SR001 scanner offers features never before offered at such a low price. When you purchase the wide band scanner from CEI, you'll get a free infrared wireless remote control that allows you to control your scanner from over 20 feet away. Selectable frequency steps of 5.0/10.0/12.5/20.0/25.0/50.0 or 100.0 KHz. are available. Dual antenna inputs terminating in an "N-type" and "BNC" connectors are included. Other features include 200 memory channels grouped in 10 banks of 20 channels, easy to read multi color LCD display, lithium battery for memory back-up, 35 channel per second high speed scanning. priority, timer and even an alarm to alert you to transmissions on your choice of one special frequency. We even include a mobile mounting bracket. The SR001 can be used for base station use with the purchase of the ACS-B 12 volt DC power supply for only $34.95 each. A great sounding external speaker #SPE-B is available for only $24.95.

SHINWA POCKET PAGERS

The fire department hazardous materials response teams and police department SWAT crews who need a reliable radio alerting system stake their lives on Shinwa. We offer a two-tone pocket pager with monitor feature and even a voice storage option at an affordable price. To order, we need your paging frequency as well as tone reed frequencies. For other configurations or two-way radio information, please fax us your specifications to 313-663-8888 or phone 313-996-8888.

ICOM ICR1-B

List price $799.95/CE price $529.95/SPECIAL

Continuous coverage from 100 kHz through 1.300 GHz.

The ICOM ICR1 keeps you in touch with the world when you're on the go. The palm-size ICR1 is equipped with AM, FM and wide-FM modes to fully answer your monitoring needs. With 100 memory channels and a dual frequency selection system, you get a top-class communications receiver. Not only can you program scan searches only for signals within a specified frequency range, it's also possible to write frequencies of received stations automatically into memory. In addition, unwanted frequencies can be skipped. Order ICBC72-B battery rapid charger for $99.95 and a BP84 1,000 ma. battery pack for $74.95.

ICOM ICR100-B

List price $799.95/CE price $579.95/SPECIAL

Continuous coverage from 100 kHz. through 1856 Mhz.

Now you can bring a wider world of broadcasting, VHF air and marine bands, emergency services and many more communicatons into your vehicle. Icom's advanced ICR100 fully covers all the stations worth hearing with up to 100 memory channels and a multitude of features.

SCANNERS/CB/RADAR

UNIDEN

PRO310E-B Uniden 40 Ch. Portable/Mobile CB	$72.95
PRO330E-B Uniden 40 Ch. Remote mount CB	$99.95
GRANT-B Uniden 40 channel SSB CB mobile	$152.95
WASHINGTON-B Uniden 40 Ch. SSB CB base	$229.95
PC122-B Uniden 40 channel SSB CB mobile	$113.95
PC66A-B Uniden 40 channel CB Mobile	$78.95
PRO510XL-B Uniden 40 channel CB Mobile	$39.95
PRO520XL-B Uniden 40 channel CB Mobile	$54.95
PRO535E-B Uniden 40 channel CB Mobile	$69.95
PRO538W-B Uniden 40 ch. weather CB Mobile	$78.95
PRO810E-B Uniden 40 channel SSB CB Base	$174.95

UNIDEN RADAR DETECTORS

RD3000ZX-B Uniden 3 band suction mount radar	$129.95
RD2400ZX-B Uniden 3 band radar detector	$109.95
RD80-B Uniden 2 band radar detector	$64.95
CARD-B 3 band credit card size radar detector	$99.95
RD3XL-B Uniden 3 band radar detector	$109.95
RD9XL-B Uniden "micro" size radar detector	$69.95
RD27-B Uniden visor mount radar detector	$39.95

Cobra®

19 PLUS-B Cobra CB radio	$36.95
18RV-B Cobra CB radio	$54.95
41PLUS-B Cobra CB radio	$72.95
70LTD-B Cobra remote mount CB radio	$99.95
19LTD-B Cobra Classic series CB radio	$44.95
21LTD-B Cobra Classic series CB radio	$54.95
25LTD-B Cobra Classic series CB radio	$89.95
29LTD-B Cobra Classic series CB radio	$109.95
146GTL-B Cobra AM/SSB CB radio	$129.95
148GTL-B Cobra AM/SSB CB radio	$149.95
90LTD-B Cobra Base station	$89.95
142GTL-B Cobra AM/SSB Base station	$199.95
2000GTL-B Cobra Deluxe AM/SSB Base station	$379.95

COBRA RADAR DETECTORS

RD3163-B Cobra 3 band radar detector	$109.95
RD3175-B Cobra 3 band radar detector	$129.95
RD3173-B Cobra 3 band radar detector	$139.95
RD3183-B Cobra 3 band radar detector	$139.95

Bearcat 200XLT-B

List price $509.95/CE price $239.95/SPECIAL

12 Band, 200 Channel, Handheld, Search, Limit, Hold, Priority, Lockout

Frequency range: 29-54, 118-174, 406-512, 806-956 MHz.

Excludes 823.9875-849.0125 and 868.9875-894.0125 MHz.

The Bearcat 200XLT sets a new standard for handheld scanners in performance and dependability. This full featured unit has 200 programmable channels with 10 scanning banks and 12 band coverage. If you want a very similar model without the 800 MHz. band and 100 channels, order the BC100XLT-B for only $179.95. Includes antenna, carrying case belt loop, ni-cad battery pack, AC adapter and earphone. Order your scanner from CEI today.

Bearcat 800XLT-B

List price $549.95/CE price $239.95/SPECIAL

12-band, 40 Channel, Nothing excluded in the 800 MHz. band.

Bands: 29-54, 116-174, 406-512, 806-956 Mhz.

If you do not need the 800 MHz. band, order the Bearcat 210XLT-B for only $178.95.

Magnavox® Satellite Phone

CE price $48,880.00/Special order - allow 45 days for delivery. When war broke out in Iraq, you heard all the action because CNN had a satellite telephone. When a disaster such as an earthquake or a hurricane strikes your community and communications are disrupted, you can depend on instant reliable communications, just like CNN did using your Magnavox MagnaPhone. Inmarsat communication satellites are in geostationary orbit along the equator. They beam two-way voice and data transmissions between your satellite phone and fixed earth stations. In most instances, telephone calls are dialed directly once you have selected the satellite serving your location. No matter where you are on the planet, the MagnaPhone automatically selects the Land Earth Station (LES) nearest the destination called. This makes placing a call as easy as using a standard telephone. Dual ID numbers permit a separate Inmarsat telephone number to be used to route calls to one of the external telephone ports which could be used for a fax machine or a computer data line. For telephone, telex, fax and data communications anywhere in the world, the new MX2020P MagnaPhone is the most compact Inmarsat-A, Class 1 terminal available today. Like a cellular phone, airtime will be billed to your account. The new MagnaPhone weighs just 47 lbs (21 kg), including the antenna. Add the optional ruggedized case (only $950.00) and it can travel as airline baggage on commercial carriers. When you arrive at your destination, installation can be done in less than 5 minutes. For more information call our Emergency Operations Center at 313-996-8888.

RELM UC202-B 2 Watt transceiver on 154.57 MHz.	$114.95
RELM RH256NB-B 25 Watt VHF transceiver	$299.95
RCI2950-B Ranger Comm. 25 Watt 10 Meter xcevr.	$229.95
MR8100-B Uniden surveillance scanner .	CALL FOR PRICE
BC55XLT-B Bearcat 10 channel scanner	$114.95
AD100-B Plug in wall charger for BC55XLT	14.95
PS001-B Cigarette lighter cable for BC55XLT	$14.95
VC001-B Carrying case for BC55XLT	$14.95
BC70XLT-B Bearcat 20 channel scanner	$159.95
BP70-B Ni-Cad battery pack for BC70XLT scanner	$39.95
BC142XL-B Bearcat 10 channel 10 band scanner	$84.95
BC147XLT-B Bearcat 16 channel 10 band scanner	$94.95
BC172XL-B Bearcat 20 channel 11 band scanner	$124.95
BC177XLT-B Bearcat 16 channel 11 band scanner	$129.95
BC590XLT-B Bearcat 100 channel 11 band scanner	$194.95
BC760XLT-B Bearcat 100 channel 12 band scanner	$254.95
BC002-B CTCSS tone board for BC590/760XLT	$54.95
BC003-B Switch assembly for BC590/760XLT	$22.95
BC855XLT-B Bearcat 50 channel 12 band scanner	$199.95
BC560XLT-B Bearcat 16 channel 10 band scanner	$94.95
BP205-B Ni-Cad battery pack for BC200/100XLT	$39.95
TRAVELLER2-B Grundig shortwave receiver	$84.95
COSMOPOLIT-B Grundig shortwave receiver	$179.95
SATELLIT500-B Grundig shortwave receiver	$499.95
SATELLIT650-B Grundig shortwave receiver	$849.95
ATS800-B Sangean shortwave receiver	$89.95
ATS803-B Sangean shortwave receiver	$159.95
74102-B Midland emergency weather receiver	$34.95
77116-B Midland CB with VHF weather & antenna	$66.95
77118-B Midland CB mobile with VHF weather	$62.95
77913-B Midland CB portable with VHF weather	$79.95
76300-B Midland CB base station	$92.95
NPD-B Uniden National Police Directory	$19.95
FBE-B Frequency Directory for Eastern U.S.A.	$14.95
FBW-B Frequency Directory for Western U.S.A.	$14.95
RFD1-B MI, IL, IN, KY, OH, WI Frequency Directory .	$14.95
RFD2-B CT, ME, MA, NH, RI, VT Directory	$14.95
RFD3-B DE, DC, MD, NJ, NY, PA, VA, WV Directory	$14.95
RFD4 AL, AR, FL, GA, LA, MS, NC, PR, SC, TN, VI .	$14.95
RFD5 AK, ID, IA, MN, MT, NE, ND, OR, SD, WA, WY	$14.95
RFD6 CA, NV, UT, AZ, HI, GU Frequency Directory .	$14.95
RFD7-B CO, KS, MO, NM, OK, TX Freq. Directory	$14.95
PWB-B Passport to World Band Radio	$16.95
ASD-B Airplane Scanner Directory	$14.95
TSG-B "Top Secret" Registry of U.S. Govt. Freq.	$16.95
TTC-B Tune in on Telephone Calls	$14.95
CBH-B Big CB Handbook/AM/FM/Freeband	$14.95
TIC-B Techniques for Intercepting Communicatons	$14.95
EEC-B Embassy & Espionage Communications	$14.95
SMHV1-B Scanner Modification Handbook/Volume 1	$18.95
SMHV2-B Scanner Modification Handbook/Volume 2	$18.95
LIN-B Latest Intelligence by James E. Tunnell	$17.95
A60-B Magnet mount mobile scanner antenna	$39.95
A70-B Base station scanner antenna	$39.95
USAMM-B Mag mount VHF ant. w/ 12' cable	$39.95
USAK-B 3/4" hole mount VHF antenna w/ 12' cable	$34.95

Add $5.00 shipping for all accessories ordered at the same time.

Add $15.00 shipping per radio and $6.00 per antenna.

BUY WITH CONFIDENCE

Michigan residents please add 4% sales tax or supply your tax I.D. number. Written purchase orders are accepted from approved government agencies and most well rated firms at a 10% surcharge for net 10 billing. All sales are subject to availability, acceptance and verification. Prices, terms and specifications are subject to change without notice. All prices are in U.S. dollars. Out of stock items will be placed on backorder automatically or equivalent product substituted unless CEI is instructed differently. Shipments are F.O.B. CEI warehouse in Ann Arbor. Michigan. No COD's. Not responsible for typographical errors.

Mail orders to: Communications Electronics, Box 1045, Ann Arbor, Michigan 48106 U.S.A. Add $15.00 per radio for U. P.S. ground shipping and handling in the continental U.S.A. For Canada, Puerto Rico, Hawaii, Alaska, or APO/FPO delivery, shipping charges are two times continental U.S. rates. If you have a Discover, Visa, American Express or MasterCard, you may call and place a credit card order. 5% surcharge for billing to American Express. For credit card orders, call toll-free in the U.S. Dial 800- USA-SCAN. For information call 313-996-8888 FAX anytime, dial 313-663-8888. Order from Communications Electronics today. Scanner Distribution Center™ and CEI logos are trademarks of Communications Electronics Inc.

Sale dates 11/1/91 through 4/30//92 AD #101691-B

For more information call

1-313-996-8888

Communications Electronics Inc.
Emergency Operations Center
P.O. Box 1045, Ann Arbor, Michigan 48106-1045 U.S.A.
For orders call 313-996-8888 or FAX 313-663-8888

CIRCLE 10 ON READER SERVICE CARD

ing to be sent with your QSL to the DX operator. The DX amateur can put her/his QSL in the envelope you supplied and mail it to you without having to convert IRCs or green stamps to postage stamps.

Several sources of foreign postage exist, and two are mentioned herein.

James E. Mackey has data sheets available at no charge to anyone who sends a business-size (#10) envelope with his or her request for DX postage service information to P.O.B. 270569, West Hartford, CT 06127-0569.

Brian Treadwell, WV4V, owns and operates DX QSL Associates, which offers a wide range of products and services to amateurs who work DX stations. Brian offers postage stamps for more than 200 of the countries shown in the ARRL DXCC list. He also sells QSL bureau envelopes, European airmail envelopes, and fill-in-the-blanks QSL cards. Data sheets can be requested from DX QSL Associates, 434 Blair Road NW, Vienna, VA 22180.

The Russian Trawler

Mark F. Tattenbaum, KA2VYW, publishes *The Russian Trawler, A Journal of Soviet Radio*. Mark's address is 74 Elm Street, Tonawanda, NY 14150. *The Russian Trawler* provides information about Russian awards, oblast changes, active amateurs (times and frequencies), Radio Moscow changes, etc.

As an example of the unusually good coverage in this newsletter, it lists the following maps as being available from the National Technical Information Service, U.S. Department of Commerce, 5285 Port Royal Road, Springfield, VA 22161:

PB-87-928331, The Soviet Population ($10).

PB-89-928347, 26 by 40 inch Soviet Union Map ($12.95).

PB-90-928363, 26 by 39 inch Soviet Union Administrative Divisions ($15).

PB-91-928102, 33 by 34 inch Soviet Republics Political and Economic Overview ($12).

One issue of *The Russian Trawler* lists sources of Russian books, maps, periodicals, records, and souvenirs, such as:

Import Publications, 320 West Ohio Street, Chicago, IL 60610.

Victor Kamkin, Inc., 4950-56 Boiling Brook Parkway, Rockville, MD 20852.

Progress Books, 71 Bathurst Street, Toronto, Ontario M5V 2P6, Canada.

Znanie Book Shop, 5237 Geary Boulevard, San Francisco, CA 94118.

The preceding map information was provided by the CIA, whereas the Soviet Embassy in Washington, DC furnished the latter list of suppliers.

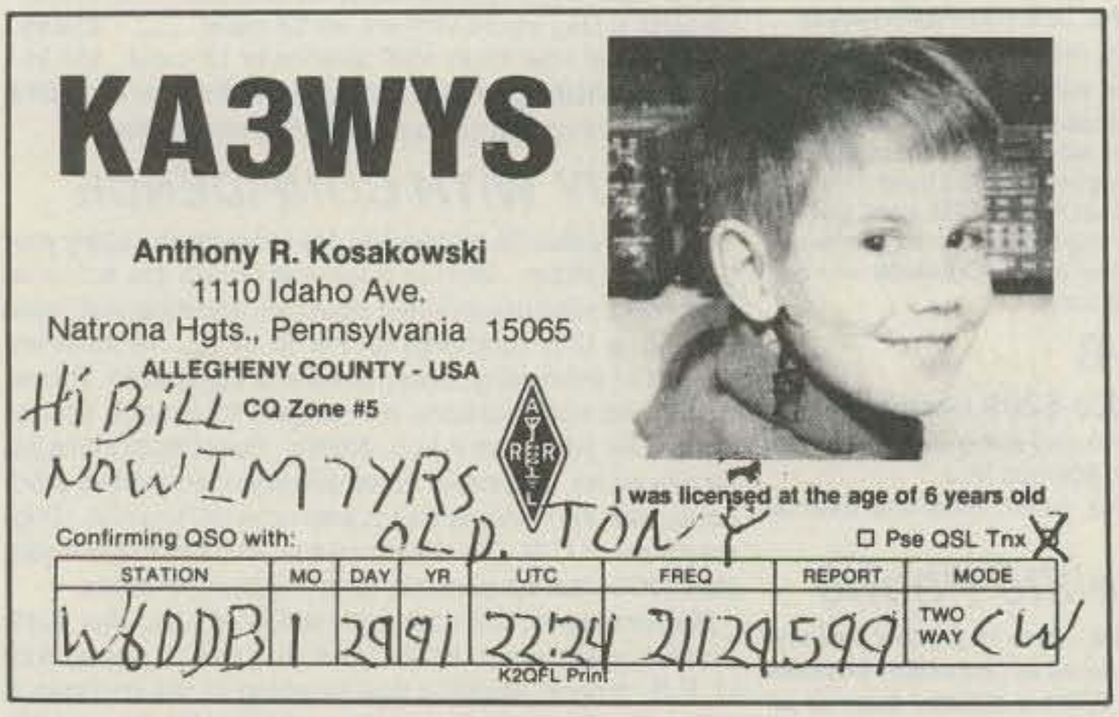
If you want to receive four issues of *The Russian Trawler*, send $4.00 and four self-addressed, stamped envelopes to Mark. He also has a set of Russian contest forms, oblast lists, and Russian diploma application at $4.00 plus a self-addressed envelope with double first-class postage attached.

Soviet Callbook

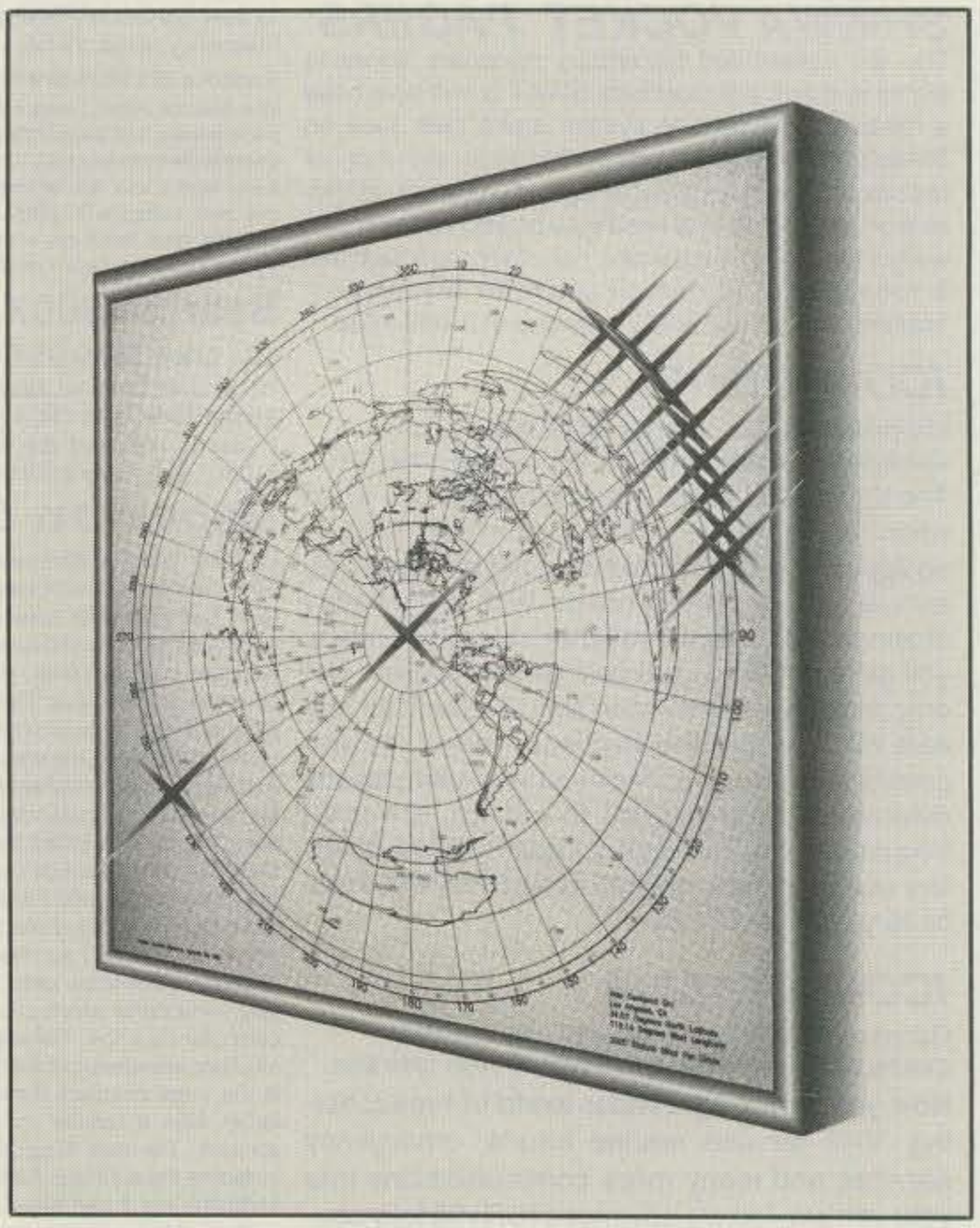
The *1991 Soviet Callbook* lists more than 52,000 Russian callsigns with addresses stated in both English and Russian. It includes a complete listing of all Soviet prefixes by republics. More than 300 Soviet regional QSL bureaus are listed, along with the worldwide QSL bureaus. Another feature of this call book is the USSR zip-code/oblast table. Please allow 4 to 6 weeks for delivery. If express delivery is desired, it will be provided at an added cost of $5.00. It is available directly from Infotech Publishers, Box 41, Minsk, 220050 USSR. It is also available from EVM World Trading, Inc., 8023 19th Avenue 5-B, Brooklyn, NY 11214 at $23.95, which includes shipping and handling costs. The 1992 supplement is sent with the 1991 book at no extra charge.

Soviet Ham Press Digest

The *Soviet Ham Press Digest (SHPD)* is published by the Prometheus Amateur Association. It is edited by Alex Ulyanich, RB5IJ, Box 195, Donetsk, 340000 USSR. SHPD contains interesting amateur radio items extracted from about a dozen top Russian magazines and bulletins/newsletters. This approach results in detailed coverage of all major amateur radio activities throughout Russia. SHPD one-year subscription cost is $12, and subscriptions



Here is seven-year-old Tony Kosakowski, KA3WYS, of Natrone Heights, Pennsylvania. I enjoyed a very nice contact with him on the 15 meter Novice band. Tony recently passed the 13 wpm General/Advanced code test and he hopes to upgrade soon. He is a first-grade student. Tony has worked 158 countries and more than 600 stateside contacts. He also enjoys baseball, bicycling, cars, soccer, swimming, and trucks. He likes making friends with amateurs he contacts on the air. Tony is a member of the Western Pennsylvania DX Association. His father is John, KC3TM.



Vector Control Systems' electronic beam heading indicator.

can be sent to George Yankopolus, NA3O, 13 Glen Meadow Drive, Glen Mills, PA 19342. The August 1991 issue of *SHPD* includes an excellent article about what should (and should not) be done when sending mail to Russian amateurs. Briefly stated, the major points in this article are:

1. Do not put any callsign on the envelope being mailed.
2. Do not send self-addressed envelopes.
3. Mail your QSL in an international-type airmail envelope.
4. Conceal any IRCs or U.S. dollar bills inside a piece of paper.
5. Attach IRCs to QSL card, using tape.
6. Seal the envelope flap normally and then secure it with tape.
7. Avoid using unusual stamps. It is wise to use metered postage instead of stamps.
8. IRCs and U.S. dollars are legal.
9. Do not send IRCs, U.S. dollars, or anything else with cards being mailed to the Central Radio Club in Moscow. Such items are routinely removed at the CRC, with just the QSL being forwarded.
10. If something of value is being mailed in a parcel, insure it.
11. Mail direct, rather than via P.O. Box 88, Moscow, Russia. This has been made easier by the publication of the *Soviet Callbook*.

50 MHz DX Bulletin

Bob Cooper, K6EDX/VP5D, and Shel Remington, NI6E/KH6, now publish this bulletin. Details can be requested from Shel at P.O. Box 1222, Keaau, Hawaii 96749.

Worldwide Aeronautical Communications Frequency Directory

Universal Radio Research has published a 42-page 5½ by 8½ inch book covering aeronautical communications in the 2 to 26 MHz high frequency range. It includes the how, what, when, and where of aeronautical monitoring. An alphabetical country/city list of commercial aeronautical frequencies is included in addition to an extensive glossary of the abbreviations, acronyms, and terms which are heard on the air.

If your receiving capability extends outside the amateur radio bands, this book may be of interest to you. It is available from Universal Radio, 1280 Alda Drive, Reynoldsburg, Ohio 43068 at $6.95, plus a $1.00 shipping charge.

Electronic Beam-Heading Indicator

Vector Control Systems sells an electronic beam-heading indicator at an approximate cost of $200, which includes a metal frame and the shipping charges. A 12 VDC wall-mount power supply is included. Endpoints are adjustable over 360 degrees, which allows your rotator to be mounted with its stop at any position. This indicator is compatible with any rotator that uses a DC signal from a potentiometer for the direction indicator. The input signal is adjustable from 0.5 to 30 VDC, for a complete revolution. The great circle map is centered on your QTH, of course. Coastlines are black, country boundaries are green, radial lines and 2000 mile distance circles are in blue, and callsign prefixes are in red. The beam pattern indication is variable from 0 to 90 degrees in 10-degree steps. The beam pattern center LED is five times brighter than the 72 LEDs used to show the 5-degree azimuth points. The long-path beam heading can be switched on and off, as desired. The accessory frame enables you to easily mount the model VBI-360 indicator on the wall for easy viewing during station operation.

My November 1991 column includes a description of the great circle map offered by Vector Control Systems. If you purchase one, Vector Control Systems provides a country prefix listing at no additional charge. The cost of one map is $35. The overall size is approximately 22.5 inches wide by 21.5 inches high, with a pertinent (information) area about 20.25 inches wide by 19.5 inches high. The diameter of the Earth presentation is 18 inches.

John Hurst, KU6X, is president of Vector Control Systems. He is marketing a couple of highly useful products. A data sheet can be requested from Vector Control Systems, 1655 North Mountain Avenue, Suite 104-45, Upland, CA 91786. Their telephone number is 714-985-6250, and their FAX number is 714-985-3482.

BY CHOD HARRIS, VP2ML

NEWS OF COMMUNICATION AROUND THE WORLD

First DX Contact

QSL manager Ralph Hirsch, K1RH, came across a somewhat unusual note on a QSL request for Sig, 9Q5EE. Ralph was used to "Thanks for first 9Q5," and even some "Thanks for first African," but a "Thanks for my first DX contact" is pretty rare. Most DXers, and even non-DXers, have worked at least one other country before they catch Sig in Zaire. However, Tom Tappen, KB8KQW, worked Zaire for his very first contact outside the US!

This rare event turned out to be even more remarkable once Ralph received Sig's logs from Zaire. Sig was forced to leave Zaire on very short notice, when the US recommended that embassy personnel leave the country due to the fighting in Kinshasa, the capital. Sig had to leave the amateur bands abruptly and catch a relief plane out of the country. Sig finished up his operation as 9Q5EE on 20 meter SSB, and his very last QSO was with KB8KQW!

Tom describes the contact: "The contact was not intentional. The few other times I had worked 20 meters, I got stateside contacts. When Sig came back with 'QTH Kinshasa,' I gave my QTH and asked where Kinshasa is (Nebraska?). Sig came back, 'confirm through manager K1RH.' Not knowing DX protocol (I hadn't planned on working DX until I had more experience), I agreed. Sig said, '73,' and that was that.

"I looked up Kinshasa in my 30-year-old atlas (which I had thought was only about 10 years old), and I could not find Kinshasa in Nebraska, nor in Africa. I went to the library and discovered it used to be Leopoldville, Belgian Congo; I had heard of that."

Tom is now N8QWB, and thinks it's too easy to get an amateur license. "I got my General and I don't know how a radio works. They shouldn't give questions in study books that will be on the test." Tom is working to master computers before he tries more DXing.

Tom Tappen, KB8KQW's first DX QSO was 9Q5EE's last.

Oleg, ES1RA; Igor, UI8IAY; and Vlad, UI8IAQ at the UI9IWA club station in Samarkand. (WB2AQC photo)

Tools for the Beginning DXer

Tom's problems after he worked his first DX contact suggest some of the first items the beginning (and even the more experienced) DXer should have available. The first is a good, relatively up-to-date atlas.

A 30-year-old edition won't bear much resemblance to current country names and borders. The rapid changes in Europe and the USSR will make many atlases obsolete soon. The National Geographic Society has taken to selling its out-of-date maps as gift-wrapping paper! The good news for the DXer is that many soon-to-be obsolete atlases will be available at discount prices. Keep your eyes open for sales, remaindered books, etc. For a few bucks, you can update your DX library.

Two factors are important in choosing an atlas for DXing. First, get the biggest maps you can. The larger the map, the more detail, and the easier it is to find a QTH. Second, check out the index. An atlas is only as good as its index. Prepare a list of hard-to-find spots of interest to DXers (Peter I Island, Kingman Reef, Pratus Island, Penguin Islands, etc.). See how quickly you can find these locations through the index. (The atlas I use to publish "The DX Bulletin" is the National Geographic Society's *Atlas of the World*. This is an excellent reference book, but probably overkill for most DXers.)

Another useful DX accessory is the "ARRL DXCC Countries List." In fact, a current copy of this list may be the single most useful accessory any DXer, beginner or not, should have in the shack.

The September 1991 edition of the "ARRL DXCC Countries List" is a significant improvement over previous editions. In addition to the features in previous editions, the new edition includes details on field checking of DXCC QSL cards, recent changes to the DXCC list, DX Advisory Committee members, QSL bureau information, and more. Let's look at the new edition and see how to get maximum value out of this slim booklet.

The most obvious feature of the "ARRL DXCC Countries List" is the list of current DXCC countries, which spans nine pages. The countries are in alphabetic order by the most common prefix. In the new edition the countries are in "computer sort" order. That is, the countries whose prefixes begin with numbers (3D, 4X, etc.) are listed *before* those beginning with letters. This puts the countries on the "ARRL DXCC Countries List" into the same order as used by most computer logging programs. (This improvement alone is enough to justify purchase of the new edition.)

Each country listing includes the full name of the country, its WAC continent, ITU and CQ zone, and spaces for noting worked/confirmed on various modes and bands. Seventeen meters joins the list of bands; 30 meters still isn't on the list. However, 30 meter DXers can use the blank column at the end. The country names are almost up-to-date; keeping track of the rapidly changing country names is nearly impossible.

There are several special marks by many of the country prefixes, which contain more useful information. First-time applicants for DXCC will pay particular attention to the bold dots in front of the prefix. This mark indicates which 250 countries are eligible for field-checking of initial DXCC applications. Cards for countries not so marked must be checked in Newington (or by one of the ARRL staff at various conventions).

An asterisk next to the prefix means that QSLs for this country may be forwarded via the ARRL outgoing QSL service. This will

P.O. Box 50, Fulton, CA 95439

Orlando HamCation and Computer Show

March 13, 14 and 15, 1992

1992 ARRL North Florida Section Convention

Lots of **FREE** parking on site!

Special **DESIGNATED** space for exhibitors, handicapped and RVs

Expanded RV areas, with hookups, inside the fairgrounds fence

Enlarged tailgate area
100 plus commercial exhibitors
480 plus indoor swap-shop tables
Talk-in on 146.16 / .76 repeater
Foxhunt contest on Saturday

Ladies programs and amateur forums on Saturday at Host Hotel

FCC exams at Host Hotel, on Sunday at 9 AM sharp, (pre-registration required)

FREE transportation between host hotel, forums, and fairgrounds

Location:
Central Florida Fairgrounds
4300 West Colonial Drive
Orlando, Florida

For more information:
Orlando HamCation
P.O. Box 547811
Orlando, Florida 32854-7811
SASE REQUIRED
(407) 898-1027 - Commercial booths
(407) 841-4345 - Indoor Swap Tables
(407) 657-9052 - all other

Host Hotel
Ramada Orlando Central
(407) 295-5270
(mention HamCation for special rates)

CIRCLE 52 ON READER SERVICE CARD

QQSL™ - Quick QSL's
The Ultimate QSL Label Program!

With most ham radio software, the QSL label is created as an afterthought. With QQSL, labels are the only thought! This in-depth attention to your QSL label has produced the finest QSL label program for the IBM PC (or clones) today. $24.95 anywhere in the world, includes lifetime license (minimal media/shipping/handling charge for upgrades). More information upon request.

Bill Mullin - AA4M/6, Dept. C,
3042 Larkin Place, San Diego, CA 92123-3026

International Radio and Computer, Inc.

3804 S. US #1, Ft. Pierce, FL 34982
1 (407) 489-0956 FAX - 1 (407) 464-6386

ALL FOX TANGO FILTERS/YAESU BACK ISSUES
SPECIAL AFTER CHRISTMAS SALE
CLOUSEOUT ON MANY ITEMS
UP TO 50% OFF
OUR 13th YEAR

SEND $.52 for FREE 20 PAGE CATALOG TODAY!
Limited Supply
WELCOME TO 17 METERS. ADD ALL 3 WARC BANDS TO YOUR FT-101. — $39.95 Plus Shipping

THE WIREMAN INC.

1-800-727-WIRE

FOR ALL AMATEUR WIRE & CABLE
"CERTIFIED QUALITY"
1-803-895-4195 (Tech Help & Ragchew)
CERTIFIED COMMUNICATIONS
261 PITTMAN ROAD, LANDRUM, SC 29356

WACOM DUPLEXERS

Our Exclusive Bandpass-Reject Duplexers
With Our Patented

B_p B_r CIRCUIT® FILTERS

provide superior performance . . . especially at close frequency separation.

Models available for all commercial and ham bands within the frequency range of 30 to 960 MHz.

CALL
817/848-4435

WACOM PRODUCTS, INC.

P.O. BOX 21145
WACO, TEXAS 76702 • 817/848-4435

CIRCLE 37 ON READER SERVICE CARD

New AOR Receiver

400 Channels.
100KHz to 2036MHz

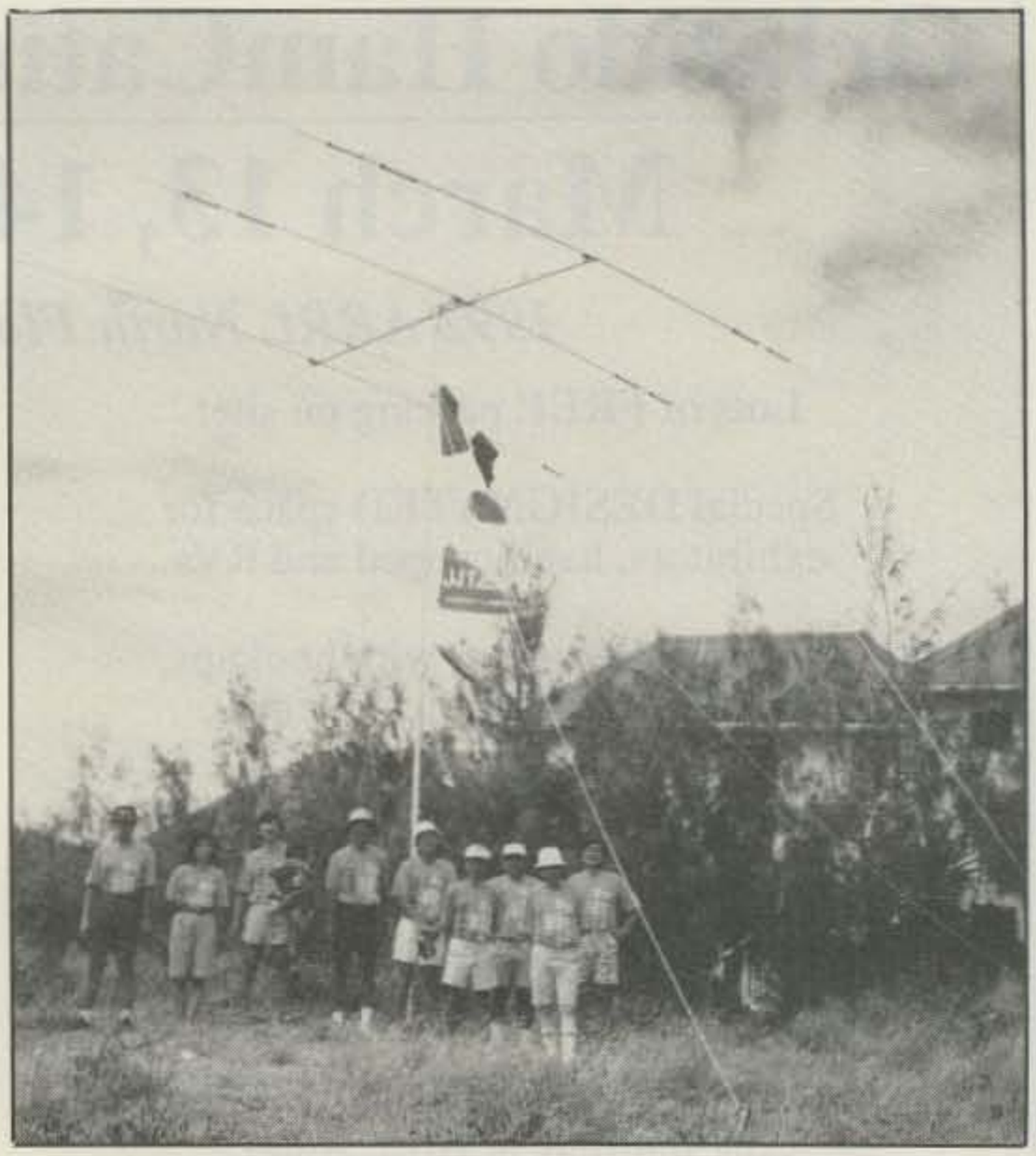
AR3000
Total Price. Freight Prepaid
(Express Shipping Optional)
$1095

- Continuous coverage
- AM, FM, wide band FM, LSB, USB, CW modes.
- 4 Scan Banks, Programmable Attenuation.
- Tuning increments as low as 50Hz.
- Search with lock out.
- 15 front end filters.
- RS232 port built in.
- 25 Day Satisfaction Guarantee. Full refund if not Satisfied.
- Includes AC/DC power cord. Telescope Antenna.
- Size: 3 1/7"H x 5 2/5"W x 7 7/8"D Wt. 2lb. 10oz.

ACE COMMUNICATIONS
10701 E. 106th St. Indpls., IN 46256
Toll Free 800-445-7717
Visa and Mastercard
(COD slightly higher)
FAX (317) 849-8794

CIRCLE 41 ON READER SERVICE CARD

Members of the Turin North-Western DX Club of Italy operated from 4U1ITU in September. Standing I1LNU, IK1OWC, and I1YRL; seated I1GNF and I1HAG.



Members of the Japan Radio Co. Ham Club operated from St. Martin FS in April. They made 12,000 QSOs with JRC's equipment.

The WPX Program

Mixed

1532	K6DYP	1534	4N4VF
1533	F6CXJ	1535	VE3GQV

SSB

2270	K6DYP	2273	KC4ODE
2271	IK5MEQ	2274	UA1ZO
2272	LU2NI	2275	VE3GOV

CW

2713	JL1QAS	2714	K6DYP

Endorsements

Mixed: 450 K6DYP, N7JB, F6CXJ, 4X4VF, VE3GOV. 500 K6DYP, N7JB, F6CXJ, 4X4VF, VE3GQV, DE@RST. 550 K6DYP, N7JB, F6CXJ, VE3GQV, DE@RST. 600 VE7CXN, K6DYP, N7JB, F6CKJ, VE3GQV, DE@RST. 650 K6DYP, N7JB, F6CXJ, VE3GQV, DE@RST. 700 IT9BCC, N7JB, F6CKJ, DE@RST. 750 IT9BCC, N7JB, F6CXJ, DE@RST. 800 N7JB, DE@RST. 850 N7JB, DE@RST. 900 W@IZV, DE@RST. 950 DE@RST, IV3PVD. 1000 DE@RST, IV3PVD. 1200 WN4KKN, I2EAY. 1700 KS3F. 1850 N6JM. 1900 N6JM. 1950 W4UW. 2200 I8RFD. 2250 I8RFD. 2600 N2AC.

SSB: 350 WB@GFV, K6DYP, N1IBQ, IK5MEQ, LU2NI, UA1ZD, VE3GQV. 400 WB@GFV, IK5MEQ, LU2NI, UA1ZO, VE3GQV. 450 N7JB, LU2NI, UA1ZD, IK8EUX, VE3GQV, IK4FNF. 500 N7JB, LU2NI, UA1ZO, IK8EUX, VE3GQV, IK4FNF. 550 JE3AVS, N7JB, LU2NI, UA1ZO, VE3GQV. 600 N7JXS, JE3AVS, N7JB, LU2NI, UA1ZO, VE3GQV. 650 UA1ZO, CT1CIR. 700 CT1CIR. 750 CT1CIR. 800 CT1CIR, WN4KKN. 950 5Z4BP. 1000 5Z4BP. 1050 IK2DUU. 1100 KA@ZFX, IK2DUU. 1150 IK2DUU. 1350 N2AC. 1600 KD9OT. 1650 KD9OT. 2300 NJ@C.

CW: 350 K6DYP, N7JB. 400 K6DYP, N7JB, JH3AIU. 450 K6DYP, N7JB, JH3AIU. 500 JH3AIU. 550 FD1MNW, JH3AIU. 600 FD1MNW, JH3AIU, IV3DVD. 650 W4TYU, JH3AIU, VE2BP. 700 JH3AIU, VE2BP. 750 W4UW, JH3AIU. 800 DL5XAS, JH3AIU. 850 DL5XAS, JH3AIU. 900 WN4KKN, JH3AIU. 950 JH3AIU. 1000 JH3AIU. 1050 I2EAY. 1150 VS6UW, I8RFD. 1200 I8RFD. 1300 LA8XG. 2350 N2AC.

10 Meters: KE4BM, NJ1T, KC4ODE, UA1ZO, JH3AIU
15 Meters: UA1ZO
20 Meters: K1CVF, UA1ZO, JH3AIU, VE3GQV
40 Meters: NJ1T, UA1ZO, JH3AIU
80 Meters: UA1ZO
160 Meters: CT1YH

Asia: YS3OSE, UA1ZO, JH3AIU
Africa: WN4KKN, UA1ZO, JH3AIU
No. Amer.: K3OSE, DL5XAS, I7VEZ, KC4ODE, UA1ZO, JH3AIU, VE3GQV
So. Amer.: CT1YH, I7VEZ, UA1ZO, JH3AIU
Europe: UA1ZO, JH3AIU, VE3GQV
Oceania: N7JXS, YS3OSE, I7VEZ, UA1ZO, JH3AIU

Award of Excellence Plaque Holders: I8YRK, W4CRW, SM@AJU, K5UR, K6XP, N5TV, K2VV, VE3XN, W6OUL, DL1MD, DJ7CX, DL3RK, WB4SIJ, SM6DHU, N4KE, I2UIY, DL7AA, ON4QX, WA8YTM, YU2DX, OK3EA, I4EAT, OK1MP, N4NO, ZL3GQ, VK9NS, DE@DXM, DK4SY, UR2**, AB9O, FM5WD, I2DMK, W4BQY, I@JX, SM6CST, VE1NG, I1JQJ, WA1JMP, PY2DBU, HI8LC, KA5W, K@JN, W4VQ, KF2O, K3UA, HA8XX, HA8UB, W8CNL, K7LJ, W1JR, F9RM, W5UR, WB8ZRL, SM3EVR, CT1FL, K2SHZ, UP1BZZ, W8RSW, WA4OMQ, EA7OH, K2POF, DJ4XA, IT9TQH, W8ILC, K2POA, N6JV, W2HG, ONL-4003, VE7DP, K9BG, W5AWT, KB@G, HB9CSA, F6BVB, W1BWS, YU7SF, G4BUE, N3ED, DF1SD, K7CU, I1POR, LU3YL/W4, NN4Q, KA3A, VE7WJ, YB@TK, VE7WJ, VE7IG, K9QRF, YU2NA, N2AC, W4UW, NX@I, W9NUF, N4NX, SM@DJZ, DK5AD, WB4RUA, DK5AD, WD9IIC, W3ARK, I6DQE, LA7JO, VK4SS, K6JG, I1EEW, I8RFD, I3CRW, VE3FXR, N4MM.

Award of Excellence Plaque Holders with 160 Meter Endorsement: FM5WD, SM@DJZ, DK5AD, SM6CST, I1JQJ, PY2DBU, W3ARK, HI8LC, KA5W, UR2**, VE3XN, K6XP, LA7JO, W4VQ, K6JG, K3UA, HA8UB, W4CRW, N4MM, K7LJ, SM@AJU, KF2O, SM3EVR, K5UR, UP1BZZ, OK1MP, N5TV, K2POF, W8CNL, DJ4XA, IT9TQH, DL9RK, N6JV, ONL-4003, W1JR, W6OUL, W5AWT, KB@G, F6BVB, W4BQY, YU7SF, W5UR, N4NO, DF1SD, K7CU, I1POR, W8RSW, N4KE, I2UIY, YB@TK, W8ILC, W1BWS, VE7WJ, K9QFR, NN4Q, W4UW, K9QFR, NN4Q, W4UW, NX@I, G4BUE, LU3YL/W4, I4EAT, WB4RUA, VE7WJ, N4NX, DE@DXM, VE7IG, K9BG, I1EEW, AB9O.

Complete rules and application forms may be obtained by sending a business-size, self-addressed, stamped envelope (foreign stations send extra postage if air-mail desired) to: "CQ WPX Awards," 880, CR13, Clovis, NM 88101-9511 USA.

help DXers select which cards may be sent on their way by this inexpensive ARRL-membership service.

Finally, a cross next to the prefix means that a US amateur may legally handle third-party messages with amateurs in that country. This is a very handy reference for DXers who may be asked to forward news to a stateside relative. A glance at the "ARRL DXCC Countries List" will answer third-party questions quickly.

Accompanying the list of DXCC countries is a list of notes. Most of these notes set time limits for DXCC credit with a country. For example, many African countries came into being in the 1960s. The "start date" for many of these countries is listed in the notes. An example of this is in the Germany listing. Only contacts with DA–DL stations after September 17, 1973, and with Y2–Y9 stations starting October 30, 1990 count for DXCC credit for Germany. (Contacts with Y2–Y9 stations 1973–1990 count for the now-deleted country of East Germany GDR.) In some cases the DXer will have to refer to these notes to determine for which DXCC country a given card may count.

The list of current DXCC countries is but a part of the "ARRL DXCC Countries List." The publication starts off with the DX Century Club rules. This describes the various DXCC awards, submission rules (including the new fee structure), and the famed country list criteria. These much-discussed rules are the framework for new DXCC countries. Thousands of man-hours have been spent pondering these rules, looking for potential New Ones for DXCC.

5 Band WAZ

As of Oct. 31, 1991, 334 stations have attained the 200 zone level.

New recipients of 5 Band WAZ Award with all 200 zones confirmed:

PA0ZH

The top contenders for 5 Band WAZ are:

N4WW, 199	VE7DX, 199
SP9PT, 199	W0PGI, 199
K6YRA, 199	W2YY, 199
PY7ZZ, 199	W9WAQ, 199
DL9WW, 199	K6EID, 199
K0CS, 199	I8IGS, 198
KB0G, 199	VE7AHA, 198
UA4RZ, 199	SM6AHS, 198
AA4KT, 199	K1ST, 198
K7UR, 199	W1JR, 198
K9EL, 199	4X4DK, 198
NA0Y, 199	

756 Stations have attained the 150 zone level as of October 31, 1991.

Applications and reprints of the latest rules may be obtained by sending a self-addressed stamped envelope (75 cents) size 4½ × 9½ to the WAZ Manager, Jim Dionne, K1MEM, 31 De Marco Rd., Sudbury, MA 01776. Applicants should include sufficient postage for safe return of their QSL cards. The processing fee for all CQ awards is $4.00 for subscribers and $10 for non-subscribers. Please make all checks payable to the Awards Manager. In order to qualify for the subscriber rate, please enclose your latest *CQ* mailing label with your application. Send any questions to K1MEM by mail and include an SASE (please do not telephone).

The WAZ Program

Single Band WAZ

10 Meter SSB

409	W4UW	410	WA8SXM

15 Meter SSB

401	K1MM	403	JE4UBC
402	JH4DYP	404	SM6DHU

20 Meter SSB

863	CE1FGT	866	KB4SA
864	N6PTI	867	SM6DHU
865	VE3GQV	868	WN5MBS

10 Meter CW

121	K1MM	123	SM6DHU
122	W4CKD		

15 Meter CW

217	K1MM	219	SM5JE
218	OZ1LQH	220	W4CKD

17 Meter CW

2	K1MM

20 Meter CW

409	SP8JMA	411	SM6DHU
410	W4CKD		

WNZ

6–10M Mixed	KC6EYZ

All CW

3	WA2UKA	4	K3UA

All Band WAZ

SSB

3843	PS8YL	3848	IK2DUW
3844	ZS6AOO	3849	LU2NI
3845	I0FDH	3850	KB6CLL
3846	K6TLA	3851	DJ1UJ
3847	IK2CBD	3852	EA5FNE

CW/Phone

7104	LA8D	7113	NC8I
7105	W8SSI	7114	SM7FHJ
7106	WB8LVA	7115	K0QYD (CW)
7107	YU7FW	7116	KA6L
7108	KB8CFE (CW)	7117	YU3MJ (CW)
7109	G3CWW (CW)	7118	JR4VGD
7110	K6ICG	7119	EA1AK
7111	NE8V	7120	EA6FD (CW)
7112	JE2DZC	7121	W2YQN

Applications and reprints of the latest rules may be obtained by sending a self-addressed stamped envelope (75 cents) size 4½ × 9½ to the WAZ Manager, Jim Dionne, K1MEM, 31 DeMarco Rd., Sudbury, MA 01776. Applicants forwarding QSL cards either direct to the WAZ manager or to a check point should include sufficient postage for safe return of their QSL cards. The processing fee for all *CQ* awards is $4.00 for subscribers and $10 for non-subscribers. Please make all checks payable to the Awards Manager. In order to qualify for the subscriber rate, please enclose your latest *CQ* mailing label with your application. Send any questions to K1MEM by mail and include an SASE (please do not telephone).

The DXCC rules also include deletion and accreditation rules, and a new section on the field-checking program. (We'll have more to say about both the deletion criteria and the accreditation rules in future columns.) By the way, the first 100-plus field checkers have been appointed by ARRL President Larry Price, W4RA, and the program is underway.

Immediately following the list of current DXCC countries is the deleted countries list. These are entities that once counted as DXCC countries, but are not on the current list. The old Yemens, East Germany, Panama Canal Zone, and others comprise this list. While of no interest to current DXing, the deleted countries list is useful for old timers who have cards from years back. Again, the notes indicate effective dates of the deleted countries. Perhaps it's a sign of the times that the deleted countries list now occupies two pages in the "ARRL DXCC Countries List"!

Following the list of deleted countries is the prefix cross-reference table. This is an extremely useful table for DXers trying to determine the DXCC country of some old QSLs. For example, a reader wants to determine the DXCC status of a ZD4AM card from the Gold Coast Colony, from 1957. Does this card count for the current DXCC country of Ghana 9G?

The first step is to look in the current country list. Is there a listing for ZD4? There is not. The next step is to look in the prefix cross-reference table. There ZD4 (before 1958) is equivalent to 9G. Maybe the card *will* count for Ghana! Now back to the current country list, under 9G. The Ghana entry has no black dot; thus any Ghana cards will have to be checked by ARRL headquarters, and not through the field-checking program. Also, the ARRL outgoing QSL bureau does not forward cards to Ghana. However, US amateurs *may* handle third-party traffic with 9G stations, if there is any. Finally, a tiny "6"

THE WPX HONOR ROLL

The WPX Honor Roll is based on the current confirmed prefixes which are submitted by separate application in strict conformance with the *CQ* master prefix list. Scores are based on the current prefix total regardless of an operator's all-time count. Honor Roll must be updated annually by addition to, or confirmation of, present total. If no update, file will be made inactive. Lifetime Honor Roll fee is $4.00 (U.S.) for each mode, with no fee for additions.

MIXED

4217	YU2AA	2663	K0BLT	2314	I6SF	1811	I2DMK	1528	W9IL	1254	WB3DNA	994	WM0G
4016	F9RM	2649	I2PHN	2288	W1BWS	1783	DK5AD	1522	YU3NU	1249	DF4ZL	975	F6CDJ
3804	K2VV	2577	ZP5JCY	2276	IT9QDS	1759	K2OLG	1516	VE1RJ	1249	N3ED	963	CT3CU
3170	EA2IA	2564	PA0SNG	2219	W2FXA	1752	4N7ZZ	1515	DF6EX	1236	AK0G	957	IK2ILH
3105	K6XP	2534	IT9TQH	2202	I2MQP	1748	YT7WW	1496	VE3FXR	1236	KI3L	932	NJ1T
3101	K6JG	2524	I1EEW	2158	KF2O	1737	W8UMR	1468	K5DB	1222	WD9IIC	906	YU7FT
3078	VE3XN	2484	YU7SF	2062	K5UR	1733	WE2L	1457	HA0HW	1208	I2EAY	880	W4USW
2955	N6JV	2479	I2UIY	2042	SM6DHU	1698	K8LJG	1455	YU7DR	1192	KS0Z	878	WB2PCF
2933	N4NO	2466	YU7BCD	2040	YT3AA	1680	HA0IT	1446	W7CB	1183	W3KH	875	RB5MP
2902	W4BQY	2458	N2AC	2040	W0SFU	1656	YU7RU	1439	YB0TK	1146	YU3PG	850	I1ZQD
2821	N9AF	2448	KA5W	2036	SM0AJU	1646	N2AIF	1393	NV9S	1135	WB2ABD	833	WK0B
2787	N4MM	2437	YT7DX	2021	HA8XX	1633	G4OBK	1384	KS4S	1120	W0JIE	733	N3KR
2779	PY4OD	2412	IN3ANE	2013	UA3FT	1599	KB0G	1379	I0AOF	1116	W9IAL	684	K6DYP
2764	I2PJA	2382	SM7TV	1945	KL7AF	1589	YU2CQ	1330	PY2DBU	1101	G4SDJ	663	VE7CBH
2761	PY1APS	2376	I8YRK	1908	W4UW	1568	SM6CST	1329	F1HWB	1065	YV7QP	658	VE3OMM
2760	WA8YTM	2345	K9BG	1892	K9QFR	1563	YU1GR	1313	YU4BR	1058	KA5TQF	642	VE3GRV
2748	W9DWQ	2340	4X4FU	1856	N6JM	1560	WB2YQH	1294	JA6GWU	1041	I5ZTC	641	VE6BMX
2705	SM3EVR	2322	HA0DU	1854	I2EOW	1553	WB4RUA	1286	AI6Z	1032	K9BQL	634	WK3Z
2671	YU1AB	2320	YU2NA	1847	K2POF	1544	WB8ZRL	1273	YU1PJ	1008	IK2BLA		

SSB

3937	F9RM	2221	OZ5EV	1802	EA3AQC	1489	4X6DK	1138	LU8DY	987	WB6SRK	707	I6KYL
3634	I0ZV	2221	NJ0C	1781	K9QFR	1465	CX6BZ	1138	N2AIF	981	I3ZSX	699	KA9MOM
3253	K2VV	2216	I8YZP	1763	W4UW	1446	EA2AOM	1136	I7VEZ	971	HP6AYV	697	A41JV
3170	ZL3NS	2211	I1EEW	1762	K5UR	1414	IN3QCI	1134	WN5MBS	942	KC2FC	697	YV7QP
2984	VE1YX	2193	I4CSP	1718	PY4OY	1411	N6FX	1125	HA0IT	942	NG9L	695	NM5Y
2812	K6JG	2180	WA8YTM	1713	K5RPC	1405	IK8GCS	1109	KF7RU	941	5Z4BP	695	YU1PJ
2753	K6XP	2111	I2UIY	1686	CT4UW	1403	I2TZK	1105	G4OBK	941	KB2DE	690	I8IYW
2742	I2PJA	2085	I2MQP	1673	EA4KK	1394	K9LJN	1101	FE6FNA	910	KB0G	649	SM6CST
2622	I2PHN	2067	I8YRK	1673	LU8ESU	1391	YU7SF	1088	W5ILR	908	K8MDU	646	KB8DAE
2607	WD8MGQ	2037	EA8AKN	1665	I2EOW	1349	K2POF	1084	K8LJG	898	IK2AEQ	643	SV0FC
2544	CT4NH	2029	KA5W	1634	KD9OT	1341	KE6KT	1073	KS4S	894	N3ED	627	KA5RNH
2485	ZP5JCY	2024	W9DWQ	1633	KC8YM	1332	F1HWB	1056	G4SDJ	881	VE3FXR	625	G4XTA
2445	N4MM	2010	PY4OD	1603	SM0AJU	1317	N2AC	1025	W3GXK	881	WM0G	624	YB1RED
2390	I0AMU	1971	WF4V	1602	WE2L	1236	LU7HJM	1019	CT1CQK	855	AI6Z	610	JH6WMJ
2379	IT9TQH	1969	I5ZJK	1590	XE1OX	1229	IT9JKY	1010	CT1DIZ	837	OE6CLD	609	VK5NVW
2359	W0YDB	1948	WA4QMQ	1565	CT1AHU	1219	WB8ZRL	1010	K2EEK	829	KA5TQF	609	KE7UH
2271	N4NO	1940	YU7BCD	1552	CT1BY	1164	KB0C	1010	LU1VK	829	KB4HU	608	CE5FSB
2256	PA0SNG	1856	KF2O	1522	SM6DHU	1148	DK5WQ	1004	K3IXD	822	WD5KBB	608	VE3GQV
2244	I4ZSQ	1852	YU2NA	1511	KL7AF	1144	KA0ZFX	996	W5AWT	748	EA3FHT	605	TU2UI
2222	W4BQY	1841	HR1KAS	1490	IK5ACO	1142	IK2DUU	988	W5LLU	708	EA3EQT		

CW

3116	K2VV	2252	W9DWQ	1533	EA7AZA	1420	K2POF	1222	YU2CQ	1003	IK0ADY	855	W0JIE
3083	WA2HZR	2225	N2AC	1531	TI4SU	1420	G4SSH	1198	VS6UW	993	N3ED	849	IS0FIC
2933	N6JV	2085	4X4FU	1527	G4UOL	1419	SM0AJU	1195	I1EEW	988	VE4CE	846	AC5K
2717	VE7CNE	2071	WA8YTM	1513	K9LJN	1417	KF2O	1194	VE3FXR	987	NJ1T	813	ZP5JCY
2555	N4NO	2006	LZ1XL	1500	KL7AF	1329	HA0IT	1179	K8LJG	969	WB8ZRL	808	YV7QP
2486	PY4OD	1951	YU7BCD	1488	VE1RJ	1327	G3VQO	1109	W5AWT	960	YU1PJ	801	IK2ECP
2386	W3ARK	1884	VE7DP	1486	SM6DHU	1320	I7PXV	1093	EA1AK	959	KA1CLV	748	W4UW
2345	IT9TQH	1797	N4MM	1472	N6FX	1303	N2AIF	1091	NF5Z	951	N4IR	744	RB5MP
2344	I1YRL	1734	KA5W	1469	W8IQ	1295	I8YRK	1068	IK3GER	933	K3UA	729	JA0BSL
2334	EA2IA	1642	I2UIY	1452	SM6CST	1294	ZS6BCR	1051	I2EAY	923	YU4BR	713	K9QFR
2328	K6XP	1633	K5UR	1445	W9PWM	1268	G4OBK	1029	AI6Z	905	W9IAL	695	WB5MTV
2318	K6JG	1632	IT9VDQ	1439	YU3NA	1261	LA9XG	1022	EA5AR	859	AH6JF	629	W8LRY
2290	YU7SF	1612	KA7T	1433	F6HKD	1243	KB0G	1013	YU3PG	858	KS4S	606	KA5TQF
2263	W4BQY	1572	YU2NA	1430	W1WAI	1230	DJ1YH						

steers the DXer to the end of the current countries list, where note number 6 reads: "(9G) Only contacts made March 5, 1957, and after, count for this country."

Now the DXer must have another look at the ZD4AM card. Was the date of the QSO March 5, 1957 or later? If so, then the card will count for Ghana credit in the current countries list. However, if the date of the contact was prior to March 5, 1957, of what value is the card? The next step is to the deleted countries list. There is no 9G entry, but there is a deleted country with the ZD4 prefix—Gold Coast, Togoland. Note 45 below reads: "(ZD4) Only contacts made March 5, 1957, and before, count for this country."

Thus, depending on the date of the ZD4AM QSO, the card will count either for the now-deleted country of Gold Coast, or for the current country of Ghana. Through the use of the prefix cross-reference table, the current countries list, the deleted countries list, and the notes, the DXer should be able to determine the DXCC status of all but the most obscure cards.

There is still more to the "ARRL DXCC Countries List." The cross-reference list is followed by a list of the current DXAC members and details of ARRL's QSL services. The description of the free, incoming QSL bureau includes the addresses of the US and Canadian bureaus and suggestions for using the bureaus. However, anyone who hasn't used the local bureau previously should send a self-addressed, stamped envelope (SASE) to their bureau for a copy of their individual requirements and preferences.

The instructions about how to use the members-only, outgoing QSL service even include IARU-recommended QSL card dimensions. A particularly useful feature of this description is a list of the countries *not* served by the outgoing QSL bureau. This table saves flipping through the entire list of current countries looking for the asterisk. Another (fortunately short) list names those countries that forward QSL cards only to members of the national society. France, Germany, Japan, and Portugal are

CIRCLE 127 ON READER SERVICE CARD

CIRCLE 135 ON READER SERVICE CARD

QSL Information

3B8CF/3B7 to 3B8CF
3B9FR to F6FNU
3C1EA to EA4CJA
3D2RW to ZL1AMO
3D2VJ to G4ZVJ
3D2YI to JI1NJC
3X0HNU to F6FNU
4J3GM to RA6GM
4J4JJ to UG6JJ
4K1A to UZ1PWA
4K1AFM to UA1AFM
4K1B to UV6AAP
4K2MAL to RA4RC
4K3OLL to RA3YG
4K4POL to UA0KCL
4N7ZZ to YU7FIJ
4S7CF to 9V1JY
4U1UN to W8CZN
4U46UN to W8CZN
5B4/YU3PR to YU4YA
5N31FEA to 5N9FEA
5V7JG to F6AJA
5W1VJ to G4ZVJ
5W1YA to W6YA
6D2X to KD5GY
7J1AGE to N2BA
7Q7TT to N6ZZ
7Z1AB to WB2QMP
9H1EL to LA2TO
9J2HN to JH8BKL
9J2SZ to SP8DIP
9K0TC to 9K2RA
9K2LX to ON7LX
9K2SB to 9K2RA
9K2ZZ to W8CNL
9L1US to WA8JOC
9L3BM to VE3VON
9Q5SF to DJ0PL
9X5NH to DJ6EA
9X5SW to DL1HH
A25FN to W1LQQ
A35VJ to G4ZVJ
A35XJ to KE6XJ
A41KB to ON6BY
A61AD to WB2DND
BV2A to K2CM
BV2DA to DL7FT
C53GB to F1MXH
C6A/W9ILY to W9ILY
C9RZZ to SM7DZZ
CO2SO to I0WDX
CO2VG to I0WDX
CO6CG to HK5LEX
CS7LR to CT4LR
EK250 RA to UA9OBA
EM3W to UZ3AYR
ES1CC to DJ0QJ
FF0XX to F1DBT
FG/F1JOT to FD1JOT
FG/F6AUS to F6AUS
FG/F9IE to F9IE
FM5AN to N3AAL
FM5DN to F6FYD
FS4PL to FG4BG
FY0E to F6DQM
FY5FP to ON4ZD
GD0IEQ to G0IEQ
GW4UZL to WT2Q
HB0/HB9NL to HB9NL
HF0POL to SP3HLM
HR1LW to JA1LW
HV3SJ to I0DUD
HZ1AB to K8PYD
J28FO to F6FNU
J73/OH3VV to OH3VV
J73A to N6CW
J78DX to JA7XBG
J8/K5BDX to NA5U
J8/WX9E to KE9PM
J82A to K3IPK
J88AR to WA4WIP
J88BS to WA4WIP
KG4DD to N4FTR
KG6SL to WA6AHF
KH2N to KC5TA
KH8/SM5BOQ to SM5BOQ
N4JQQ/C6A to N4JQQ
OD5SK to KB5RA
OK3CLA/5N31 to OK3LZ
OX3EW to KB5LRO
OY3QN to OZ1ACB
P40 P to NX1L
PA3FFJ to PI4DEC
PY0FF to W9VA
R3DSR to UA3DSZ
R50DPK to UZ3DYD
RJ4X to UJ8JMM
RV4HA to UA4HVV
RX3ARM to RA3RQT
S01A to EA2JG
S03UN to EA2JG
S79MX to HB9MX
ST0DX to WA2NHA
SU1ER to OE6EEG
SV0HV/SV5 to KA5EJX
TA3F to DL5YCQ
TA3PB to DL5YCQ
TL8CP to F6ESG
TL8JL to K4UTE
TM5SIR to F5SM
TT8SA to F6FNU
TZ6RC to NM3B
TZ6VV to N0BLD
U10CC to RT4UF
UD6DKW to W3HNK
UF7FWW to UF6FFF
UI9ACQ to KA6V
UL0A to UL7ACI
UL7LGW to UW6HS
UZ2FZW to UA2FM
UZ9MXM to UA9MGX
V29W to KD6WW
V31RA to N4VXX
V31XL to N6LL
V47KP to K2DOX
V47TV to OH3VV
V73BQ to KX6BA
V85KX to G3JKX
VP2V/N4DDK to VE7YL
VP8BC to G4KBC
VP8CFM to GM4KLO
VP9/WB2YQH to WB2YQH
VP9MP to WB2YQH
VQ9KA to KD7OD
W1NU/VP9 to W1NU
XE2MOO to KD5RQ
XN1YX to VE1YX
XN50A to VE3XN
XQ6OS to CE6OS
YA/OK1IAI to OK1IAI
YB8HX to KA6KKN
YC3OSE to JI1NJC
YE8V to YB8VM
YJ0AJU to WA6ZEF
YJ0ARW to ZL1AMO
YN/SM0OIG to SM0KCR
YX5LA to YV5ARV
Z2/DF3XZ to DF3XZ
ZA1DX to HA5YPP
ZA1HA to HA6KNB
ZA1KA to UA6KNB
ZA1ZMX to F6EXV
ZA1ZSW to I0JBL
ZA1ZXV to F6EXV
ZD8ACJ to G0ACJ
ZD8OK to GW0FJT
ZF2JR to N6RJ
ZF2ME/ZF8 to WA2ICE
ZF8AA to N8AG
ZK1DM to ON4QM
ZK1XC to K6PBT
ZK2OQ to SM5BOQ
ZK2XD to W6YA
ZS4NS/7P8 to ZS4NS
ZS9A to ZS1IS
A25JP to P.O. Box 1022, Gaborove, Botswana
A45YT to P.O. Box 26992, Nizwa, Oman
BZ4RBX to P.O. Box 538, Nanjing, China
CE9AA to P.O. Box 2, Statl Island, Chile
EA9GD to P.O. Box 348, Melilla, North Africa
JY5IN to P.O. Box 925677, Amman, Jordan
OD5QX to P.O. Box 597, Tripoli, Lebanon
UD6DMK to P.O. Box 208, Baku City
UL7LF to Marite 74/5, Rudnyn 459120
UR5M to P.O. Box 22, Schastye 348903
V51MA to P.O. Box 17, Kombat 9000, Namibia
VR6BX to Brian, Box 21, Pitcairn Island
VS6VO to P.O. Box 12727, Hong Kong
XX9AS to P.O. Box 1787, Macao, Via Hong Kong
YS1SPY to P.O. Box 1476, San Salvador, El Salvador
ZA1QA to P.O. Box 4622, Komoro, Hungary

among those countries which process bureau cards for members only.

Yet another feature of the "ARRL DXCC Countries List" is the International Telecommunications Union (ITU) list of international callsign allocations. For *current* stations this list will usually determine DXCC countries. This guide is very useful for WPX contacts, when many strange prefixes appear. Can you determine the DXCC country of stations with the following prefixes: HN0, HU7, H21, H56, or H93? The callsign allocation list will provide four out of five answers: HN is Iraq, HU is El Salvador, H2 is Cyprus, and H9 is Panama. (H5 is not allocated by the ITU; its use is unofficial. The South African homeland of Bophuthatswana uses this callsign, which counts for the DXCC country of Republic of South Africa ZS.)

A DXCC award application form can be found on the final pages of the "ARRL DXCC Countries List."

The new edition of the "ARRL DXCC Countries List" is available from the ARRL and many local radio stores for $2.00. Every DXer should have a copy.

February DX News

The ARRL CW Contest on February 15–16 will attract many contesters to the Caribbean and elsewhere. DXers should carefully check the bands before the contest to catch contesters warming up and testing equipment before the test. Contesters can often be found on other modes or on the new bands outside the test. This is an excellent opportunity to pick up some more band-countries.

On a more dramatic basis, a group of Soviet amateurs plans a trip to Afghanistan this month or next. Tentative callsign is **YA5MM**. Bill Remington, W3XU, is helping collect donations for the trip. His address is 1078 Shallcross Lake Road, Middletown, DE 19709.

WAZ Correction

Worked All Zones Award Manager Jim Dionne, K1MEM, says that the 12 meter award listed for HB9ALO should have been **CW** award number 3, not a mixed award.

QSL Notes

This QSL information has been provided by readers in good faith. However, it has not been confirmed nor cross-checked. Please send any corrections to P.O. Box

CQ DX Awards Program

SSB

1913	ZS6AOO	1916	WA9BDX
1914	LU2NI	1917	WB2JZK
1915	N4TOG	1918	UB5LRS

CW

841	OH3NM	842	W2EBM

RTTY

9	K1GVW	10	W4IF

SSB Endorsements

320	K6WR/323	300	NI5D/305
320	W9OKL/322	300	KE5PO/303
320	K4CXY/321	300	ZS6AOO/302
310	K2JF/318	275	WB2JZK/276
310	K9QVB/316	275	VE7HAM/275
310	WE2L/314	200	LU2NI/218
310	K9TI/313	150	WA9BDX/188
310	W0ULU/313	150	OA4DX/151
310	I2EOW/313	28 MHz	WA9BDX
300	F6BFI/306		

CW Endorsements

320	K9QVB/322	300	KB9XG/303
310	W9WAQ/317	275	K2JF/298
310	W1WAI/314	275	OH3NM/297
310	K9TI/312	250	DJ1YH/263
310	WA4IUM/310	200	G4ASL/200
300	K4CXY/307	28 MHz	OH3NM

Total number of active countries is 323. A new CQ DX RTTY award is now available. The basic award fee for subscribers to CQ is $4. For non-subscribers, it is $10. In order to qualify for the reduced subscriber rate, please enclose your latest CQ mailing label with your application. Endorsement stickers are $1.00. Updates not involving the issuance of a sticker are made free when an SASE. is enclosed for confirmation of total. Rules and application forms for the CQ DX Awards Program may be obtained by sending a business size, No. 10 envelope, self-addressed and stamped, to CQ DX Awards Manager, Billy Williams, N4UF, Box 9673, Jacksonville, FL 32208 U.S.A. DX stations must include extra postage for air-mail reply. Please make all checks payable to the awards manager.

50, Fulton, CA 95439.

F6FNU has returned from his prolonged vacation and requests that QSLs be sent to his usual address: Antoine Baldeck, B.P. 14, Arpajon Cedex, France.

Among the numerous recent Albanian operations were some by Japanese operators. Their QSL routes are: **ZA1ZJ** via Nao Mashita JA1HGY, 8-2-4 Akasaka, Minato, Tokyo 107, Japan; **ZA1ZST** via JF1IST; **ZA1ZDB** via JH1EDB; **ZA1ZPL** via JK1OPL; **ZA1ZLZ** via JI1DLZ; **ZA1ZGV** via JR6GV.

ZA1QA's QSL route is Box 5, Komoro 4622, Hungary, but some envelopes are going to Japan's Komoro post office. You might try putting "Europe" on the envelope.

The **ZA1A** cards are going out in batches, as they are processed. That means some DXers will get their cards before their neighbors. Please be patient, and don't send a second QSL request.

The CQ WW SSB Contest operation of **LU4FM** will be QSLed 100% via the bureau; don't bother to send cards.

QSL to CQ WW SSB operation of **VC1DX** via the VE1 QSL bureau.

G5LP, listed QSL manager for **GX0ING**, is shown as a Silent Key in the 1991 Callbook, but he had already passed his call to his son. Go ahead and QSL.

John Reika, who operated as **SU1EK** in 1989, will handle remaining QSL chores himself. Anyone still needing an SU1EK card can contact John at 1427 Pine Vista Road, Escondido, CA 92027.

QSL the South Pacific calls of **ZK1XR, 3D2JM,** and **T20WW** to Joseph Raynak, NW3W, 2766 Coltwood Dr., San Jose, CA 95148.

Bob Nadolny, WB2YQH, is QSL manager for the following Bermuda stations: **VP9NMN, VP9MN, VP9MP, VP9AE, VP9YL, VP9BS,** and **VP9BBQ.**

F5IN is QSL manager for contest calls **TQ5A, TX5A, FQ0M,** and **FQ2M**, and for **FQ8M** in this year's *CQ* WWs.

HA8XX now handles all QSLs for his Pacific operations: **ZK1XX, ZK1XL, ZK2XB, ZK2XA, ZL0ADN/ZL7,** and **ZL0AAD/ZL7.**

Tony Smithson, **9Y4/KN4TX**, is operating from Galeota Point in Trinidad. QSL to Box 4055, Mayaro, Trinidad & Tobago, West Indies.

The new address for the W5 QSL bureau is P.O. Box 50625, Midland, TX 79710.

Ray Riker, NY2E, QSL manager for **HS0B, HS0M, HS0SM, and contacts outside of North America with HS0AC** and **HS0ZAA,** has a new address: 360 Ponte Vedra Road, Palm Springs, FL 33461. (KM1R handles North America cards for HS0AC and HS0ZAA.)

Lawton Coonts, KB5RA, QSL manager for **OD5SK** and **CU2DX**, also has a new address: Box 915552, Longwood, FL 32791.

QSL **CY0SAB** from Sable island to Wayne King, VE1CBK, P.O. Box 32, Site 35, RR #1, Windsor Junction, Nova Scotia Canada B0N 2V0.

Corrections and Changes

Russ McKay, WA2CBU, reports that he is no longer QSL manager for **UL7NW.**

Carsten Thomsen, **OY1CT,** QSLs direct via Box 25, FR 340 Kvivik, Faroe Island (via Denmark), or via the OY bureau. He favors 3503, 7003, 10102, 14017, 21017, and 28017 kHz.

PROPAGATION

BY GEORGE JACOBS, W3ASK

THE SCIENCE OF PREDICTING RADIO CONDITIONS

Sunspot Cycle Progress

The Royal Observatory of Belgium reports a mean sunspot number of 144 for October 1991. The day-to-day observations varied widely, from a low of 77 on October 21st to a high of 234 reported on the 28th.

The mean value for October results in a 12-month running smoothed sunspot number of 147 centered on April 1991. This is the same level recorded for March 1991.

The National Geophysical Data Center in Boulder predicts a smoothed sunspot number of 116, plus or minus 14, for February 1992.

Canada's Dominion Radio Astrophysical Observatory in Penticton, British Columbia reports a 10.7cm solar flux level of 200 for October 1991. This results in a smoothed value of 207 centered on April 1991.

LAST MINUTE FORECAST

Day-to-Day Conditions Expected for February 1992

Propagation Index	*Expected Signal Quality* (4)	(3)	(2)	(1)
Above Normal: 2, 26, 29	A	A	B	C
High Normal: 1, 3, 8, 18-19, 27-28	A	B	C	C-D
Low Normal: 4, 7, 11, 14, 17, 20, 22, 25	B	C	D	D-E
Below Normal: 5-6, 9, 12, 15, 21, 23	C	C-D	D-E	E
Disturbed: 10, 13, 16, 24	C-D	D	E	E

Where expected signal quality is: **A—Excellent opening, exceptionally strong, steady signals greater than S9.**

B—Good opening, moderately strong signals varying between S6 and S9 +, with little fading or noise.

C—Fair opening, signals between moderately strong and weak, varying between S3 and S6, with some fading and noise.

D—Poor opening, with weak signals varying between S0 and S3, and with considerable fading and noise.

E—No opening expected.
3dB per S-Unit.

HOW TO USE THIS FORECAST

1. **Find *propagation index* associated with particular band opening from Propagation Charts appearing on the following pages.**
2. **With the *propagation index*, use the above table to find the expected signal quality associated with the band opening for any day of the month. For example, an opening shown in the charts with a *propagation index* of 3 will be good (B) on February 1st; excellent (A) on the 2nd; good (B) on the 3rd; good-to-fair (B-C) on the 4th; fair-to-poor (C-D) on the 5th and 6th; etc.**

Conditions Observed During CQ WW DX SSB Weekend

Conditions were not as good as expected during the CQ WW DX SSB Contest weekend of October 26 and 27, but they would have been a lot worse had the contest been held a day later!

Actually, conditions during the first day of the contest on October 26th were pretty close to the *CQ* forecast for that day. The daily sunspot number was 171 and the 10.7cm solar flux level was 248. The worldwide geomagnetic A figure was reported to be 24. This combination of solar and geomagnetic levels would usually define *Low Normal*, or generally fair-to-good conditions. However, at least three major solar flares were reported during the day, at approximately 0654, 0914, and 2125 UTC. These caused several hours of poor conditions, mainly on paths passing through or near the northern and southern auroral zones.

Overall, the Space Environment Services Center (SESC) at Boulder rated HF propagation conditions on October 26th as "unsettled to minor storm level." Initial reports received from several participants in the contest rated conditions over a very wide range varying between poor and very good, depending upon the time, the band, and the path. The *CQ* forecast called for variable conditions between poor and good.

The second day of the SSB Contest, October 27th, was a total disappointment. The *CQ* forecast called for *High Normal* conditions, with good openings on most bands. However, Mother Nature played a trick on us, and a major radio storm began on that day. The daily sunspot number for October 27th was 217, and the 10.7cm solar flux level was 246. Normally this high level of solar activity would have resulted in super conditions. However, the worldwide geomagnetic A level was 38, which indicated a major radio storm was in progress, with associated disturbed propagation conditions. To make matters worse, three major solar flares were reported on October 27th at approximately 0101, 0644, and 1603 UTC, which caused most HF propagation to black out for several hours, particularly for paths crossing the auroral zones. The SESC rated the day as "unsettled to major storm level." While conditions were generally poor, some participants have reported fair and even a few good openings for part of the day, mainly to southern and tropical areas.

Because of the major radio storm on October 27th, scores during the 1991 *CQ* SSB Contest weekend are expected to be considerably lower than the record-breaking scores reported during the contest periods of the past several years.

Conditions could have been worse, however. The radio storm which hit the contest on October 27th with an A-level of 38 intensified considerably on Monday, October 28th, reaching a worldwide geomagnetic A level of 77. The storm continued to worsen further on the 28th, with the A level reaching 97. On both October 28th and 29th HF propagation conditions were very disturbed and were practically non-existent for most of the time. Had this occurred two days earlier during the contest weekend, the results would have been an utter disaster!

February Conditions

Beginning about the middle of February and continuing through March and early April, typical *equinoctial* propagation conditions can be expected on the HF amateur bands. This usually means a noticeable improvement in conditions between the northern and southern hemispheres–for example, between the United States and South America, Africa, Australasia, Antarctica, and parts of Asia. Equinoctial propagation occurs during the spring and fall months, when the sun is most directly overhead at the equator, producing similar ionospheric characteristics over large areas of the world. It tends to maximize during sunrise and sunset periods and over both short and long path openings.

During the *daylight* hours, optimum DX propagation conditions are expected on *15* meters. The band is forecast to open to all areas of the world sometime during this period, often with exceptionally strong signal levels and little fading or noise. Conditions on *10* and *12* meters should run a close second, with openings forecast to most areas of the world during the *daylight* hours. The fewer number of openings expected on this band from North America to Europe and the Far East should be balanced by improved conditions on open-

11307 Clara Street, Silver Spring, MD 20902

HOW TO USE THE DX PROPAGATION CHARTS

1. Use chart appropriate to your transmitter location. The Eastern USA Chart can be used in the 1, 2, 3, 4, 8, KP4, KG4, and KV4 areas in the USA and adjacent call areas in Canada; the Central USA Chart in the 5, 9, and 0 areas; the Western USA Chart in the 6 and 7 areas; and with somewhat less accuracy in the KH6 and KL7 areas.

2. The predicted times of openings are found under the appropriate meter band column (10 through 80 meters) for a particular DX region, as shown in the left-hand column of the charts. An * indicates the best time to listen for 160 meter openings.

3. The *propagation index* is the number that appears in ( ) after the time of each predicted opening. The index indicates the number of *days* during the month on which the opening is expected to take place as follows:

(4) Opening should occur on more than 22 days
(3) Opening should occur between 14 and 22 days
(2) Opening should occur between 7 and 13 days
(1) Opening should occur on less than 7 days

Refer to the "Last Minute Forecast" at the beginning of this column for the actual *dates* on which an opening with a specific *propagation index* is likely to occur, and the signal quality that can be expected.

4. Times shown in the charts are in the 24-hour system, where 00 is midnight; 12 is noon; 01 is 1 A.M.; 13 is 1 P.M., etc. Appropriate *standard* time is used, *not* GMT. To convert to GMT, add to the times shown in the appropriate chart 8 hours in PST Zone, 7 hours in MST Zone, 6 hours in CST Zone, and 5 hours in EST Zone. For example, 13 hours in Washington, D.C. is 18 GMT. When it is 20 hours in Los Angeles, it is 04 GMT, etc.

5. The charts are based upon a transmitted power of 250 watts CW, or 1 kw, PEP on sideband, into a dipole antenna a quarter-wavelength above ground on 160 and 80 meters, and a half-wavelength above ground on 40 and 20 meters, and a wavelength above ground on 15 and 10 meters. For each 10 dB gain above these reference levels, the *propagation index* will increase by one level; for each 10 dB loss, it will lower by one level.

6. Propagation data contained in the charts has been prepared from basic data published by the Institute for Telecommunication Sciences of the U.S. Dept of Commerce, Boulder, Colorado 80302.

ings into the southern hemisphere. Excellent worldwide DX openings to most areas of the world are also forecast for *17* and *20* meters during the *daylight* hours. Conditions are expected to optimize for an hour or two after *sunrise* and again during the *late afternoon*. With increasing hours of daylight during February, expect the *10, 12, 15, 17,* and *20* meter bands to remain open for an hour or so longer into the early evening than during the winter months.

Although the solar cycle is declining, be sure to check the *6* meter band for possible DX openings, particularly when conditions are High or Above Normal. Openings are expected to be less numerous than in previous years of higher solar activity, but some still may be possible during the hours of *daylight*. The best bet is for openings towards Central and South America, but openings to other areas of the world may also occur. The most probable times for *6* meter openings are shown in the DX Propagation Charts followed by **.

During the *early evening hours* and to as late as *midnight*, *seven* bands should be available for DX openings; *15, 17, 20, 30, 40, 80,* and *160* meters! *Fifteen* and *seventeen* meters should hold up for openings towards Central and South America, the Pacific area, Far East, and Asia. Openings to many areas of the world should be possible on *20* meters during this period, but with signals strongest from southerly and westerly directions. Good DX conditions

February 15 - April 15, 1992
Time Zone: EST (24-Hour Time)
EASTERN USA TO:

	10 Meters	*15 Meters*	*20 Meters*	*40/80 Meters*
Western & Central Europe & North Africa	06-09 (1) 09-10 (2) 10-12 (3) 12-13 (4) 13-14 (2) 14-15 (1) 09-11 (1)**	06-07 (1) 07-08 (2) 08-11 (3) 11-15 (4) 15-16 (3) 16-17 (2) 17-18 (1)	00-03 (1) 03-06 (2) 06-09 (3) 09-11 (2) 11-13 (3) 13-18 (4) 18-22 (3) 22-00 (2)	17-18 (1) 18-19 (2) 19-22 (3) 22-01 (4) 01-02 (3) 02-03 (2) 03-04 (1) 19-21 (1)* 21-00 (2)* 00-02 (1)*
Northern Europe & European USSR	08-09 (1) 09-10 (2) 10-11 (3) 11-12 (2) 12-13 (1)	07-08 (1) 08-09 (2) 09-12 (3) 12-13 (2) 13-14 (1)	00-02 (3) 02-03 (2) 03-05 (1) 05-07 (2) 07-09 (3) 09-14 (2) 14-18 (3) 18-21 (2) 21-00 (1)	17-19 (1) 19-22 (2) 22-01 (3) 01-02 (2) 02-03 (1) 20-01 (1)*
Eastern Mediterranean & Middle East	08-09 (1) 09-11 (2) 11-12 (3) 12-13 (1)	07-08 (1) 08-09 (2) 09-10 (3) 10-13 (4) 13-14 (2) 14-15 (1)	04-06 (1) 06-08 (2) 08-12 (1) 12-14 (2) 14-15 (3) 15-17 (4) 17-20 (3) 20-22 (2) 22-02 (3) 02-04 (2)	18-20 (1) 20-23 (2) 23-00 (1) 20-23 (1)*
Western Africa	07-10 (1) 10-12 (2) 12-13 (3) 13-15 (4) 15-16 (3) 16-18 (2) 18-19 (1) 08-12 (1)**	06-09 (1) 09-11 (2) 11-14 (3) 14-17 (4) 17-18 (3) 18-19 (2) 19-21 (1)	02-06 (2) 06-13 (1) 13-15 (2) 15-17 (3) 17-00 (4) 00-02 (3)	18-20 (1) 20-22 (2) 22-00 (3) 00-02 (2) 02-03 (1) 22-02 (1)*
Southern Africa	07-08 (1) 08-10 (2) 10-11 (3) 11-13 (4) 13-14 (2) 14-15 (1) 11-13 (1)**	06-10 (1) 10-12 (2) 12-14 (3) 14-17 (4) 17-18 (2) 18-19 (1)	05-07 (2) 07-14 (1) 14-15 (2) 15-17 (3) 17-20 (4) 20-21 (2) 21-23 (1) 23-02 (3) 02-03 (2) 03-05 (1)	18-20 (1) 20-23 (2) 23-00 (1) 21-23 (1)*
Eastern & Central Africa	09-11 (1) 11-13 (2) 13-15 (4) 15-16 (3) 16-17 (2) 17-18 (1) 09-11 (1)**	07-09 (1) 09-11 (2) 11-13 (3) 13-17 (4) 17-18 (3) 18-19 (2) 19-20 (1)	12-14 (1) 14-16 (2) 16-18 (3) 18-23 (4) 23-02 (3) 02-03 (2) 03-05 (1)	19-23 (1) 23-01 (2) 01-02 (1) 23-01 (1)*
Central & South Asia	08-11 (1) 19-21 (1)	07-08 (1) 08-09 (2) 09-11 (3) 11-12 (2) 12-13 (1) 19-20 (1) 20-21 (2) 21-22 (1)	06-07 (1) 07-09 (2) 09-11 (1) 17-19 (1) 19-21 (3) 21-22 (2) 22-00 (1)	19-22 (1) 04-06 (1)
Southeast Asia	10-13 (1) 18-20 (1)	07-08 (1) 08-10 (2) 10-12 (1) 12-14 (2) 14-18 (1) 18-21 (2) 21-22 (1)	05-07 (1) 07-09 (2) 09-11 (1) 14-17 (1) 19-20 (1) 20-23 (2) 23-01 (1)	05-07 (1)
Far East	09-11 (1) 18-20 (1)	07-08 (1) 08-10 (2) 10-12 (1) 15-16 (1) 16-17 (2) 17-19 (3) 19-21 (2) 21-22 (1)	06-07 (1) 07-09 (3) 09-11 (2) 11-13 (1) 17-19 (1) 19-22 (2) 22-00 (3) 00-02 (2) 02-03 (1)	05-08 (1)
South Pacific & New Zealand	08-12 (1) 12-14 (2) 14-16 (3) 16-18 (4) 18-19 (3) 19-20 (2) 20-21 (1) 16-18 (1)**	07-08 (1) 08-10 (2) 10-13 (1) 13-16 (2) 16-19 (3) 19-21 (4) 21-22 (3) 22-23 (2) 23-00 (1)	11-19 (1) 19-21 (2) 21-23 (3) 23-03 (4) 03-05 (3) 05-07 (2) 07-09 (3) 09-11 (2)	00-01 (1) 01-02 (2) 02-05 (3) 05-07 (2) 07-08 (1) 01-03 (1)* 03-06 (2)* 06-07 (1)*
Australasia	09-11 (1) 14-15 (1) 15-16 (2) 16-18 (4) 18-19 (3) 19-20 (2) 20-21 (1) 17-19 (1)**	08-09 (1) 09-12 (3) 12-15 (1) 15-16 (2) 16-19 (3) 19-21 (2) 21-22 (3) 22-23 (2) 23-00 (1)	06-08 (2) 08-10 (4) 10-12 (2) 12-15 (1) 15-17 (2) 17-21 (1) 21-23 (2) 23-02 (3) 02-03 (2) 03-06 (1)	02-04 (1) 04-05 (2) 05-06 (3) 06-07 (2) 02-05 (1)* 05-06 (2)* 06-07 (1)*
Caribbean, Central America & Northern Countries of South America	07-08 (1) 08-09 (2) 09-16 (4) 16-18 (3) 18-19 (2) 19-20 (1) 09-11 (1)**	05-06 (1) 06-07 (2) 07-11 (4) 11-13 (3) 13-19 (4) 19-21 (3) 21-22 (2) 22-00 (1)	03-05 (2) 05-06 (3) 06-09 (4) 09-10 (3) 10-14 (2) 14-16 (3) 16-00 (4) 00-03 (3)	16-19 (1) 19-20 (2) 20-03 (4) 03-05 (3) 05-06 (2) 06-07 (1) 20-22 (1)* 22-03 (2)* 03-05 (1)*
Peru, Bolivia, Paraguay, Brazil, Chile, Argentina & Uruguay	07-08 (1) 08-10 (3) 10-13 (2) 13-15 (3) 15-17 (4) 17-18 (2) 18-19 (1) 09-12 (1)** 15-17 (1)**	06-07 (1) 07-10 (2) 10-13 (1) 13-15 (2) 15-16 (3) 16-20 (4) 20-22 (3) 22-23 (2) 23-00 (1)	15-16 (1) 16-17 (2) 17-18 (3) 18-02 (4) 02-03 (3) 03-04 (2) 04-05 (1) 05-07 (2) 07-09 (1)	19-21 (1) 21-00 (2) 00-03 (3) 03-04 (2) 04-06 (1) 21-05 (1)*
McMurdo Sound Antarctica	16-17 (1) 17-19 (2) 19-20 (1)	12-16 (1) 16-18 (2) 18-21 (3) 21-22 (2) 22-23 (1)	18-20 (1) 20-22 (2) 22-00 (3) 00-05 (2) 05-06 (1) 06-08 (2) 08-09 (1)	23-01 (1) 01-05 (2) 05-06 (1)

Time Zones: CST & MST
(24-Hour Time)
CENTRAL USA TO:

	10 Meters	*15 Meters*	*20 Meters*	*40/80 Meters*
Western & Central Europe & North Africa	08-10 (1) 10-12 (2) 12-13 (1)	07-08 (1) 08-09 (2) 09-11 (3) 11-13 (4) 13-14 (3) 14-15 (2) 15-16 (1)	00-06 (1) 06-09 (2) 09-11 (1) 11-13 (2) 13-15 (3) 15-17 (4) 17-20 (3) 22-00 (2)	17-19 (1) 19-22 (2) 22-00 (3) 00-01 (2) 01-02 (1) 20-22 (1)* 22-00 (2) 00-01 (1)*
Northern Europe & European USSR	08-09 (1) 09-11 (2) 11-12 (1)	07-08 (1) 08-09 (2) 09-12 (3) 12-13 (2) 13-14 (1)	07-10 (2) 10-13 (1) 13-15 (2) 15-18 (3) 18-20 (2) 20-22 (1) 22-02 (2) 02-07 (1)	19-22 (1) 22-00 (2) 00-02 (1) 22-01 (1)*
Eastern Mediterranean & Middle East	09-10 (1) 10-11 (2) 11-12 (1)	07-08 (1) 08-09 (2) 09-12 (3) 12-13 (2) 13-14 (1)	05-06 (1) 06-08 (2) 08-12 (1) 12-14 (2) 14-18 (3) 18-20 (2) 20-23 (3) 23-01 (2)	19-22 (1) 20-22 (1)*
Western Africa	08-09 (1) 09-11 (2) 11-12 (3) 12-14 (4) 14-16 (3) 16-17 (2) 17-18 (1) 08-10 (1)**	06-08 (1) 08-10 (2) 10-13 (3) 13-16 (4) 16-17 (3) 17-19 (2) 19-20 (1)	04-06 (2) 06-12 (1) 12-15 (2) 15-17 (3) 17-23 (4) 23-01 (3) 01-02 (2) 02-04 (1)	18-20 (1) 20-23 (2) 23-01 (1) 21-00 (1)*
Southern Africa	07-08 (1) 08-10 (2) 10-11 (3) 11-12 (4) 12-13 (2) 13-14 (1) 11-13 (1)**	07-09 (1) 09-11 (2) 11-12 (3) 12-16 (4) 16-17 (2) 17-18 (1)	05-07 (2) 07-13 (1) 13-15 (2) 15-16 (3) 16-19 (4) 19-20 (3) 20-22 (2) 22-00 (3) 00-02 (2) 02-05 (1)	19-20 (1) 20-21 (2) 21-22 (1) 20-21 (1)*
Eastern & Central Africa	09-11 (1) 11-13 (2) 13-16 (4) 16-17 (2) 17-18 (1) 13-15 (1)**	08-09 (1) 09-12 (2) 12-16 (3) 16-18 (4) 18-19 (2) 19-20 (1)	12-14 (1) 14-16 (2) 16-19 (3) 19-21 (4) 21-22 (3) 22-23 (2) 23-00 (1)	19-20 (1) 20-22 (2) 22-23 (1) 20-22 (1)*

Central & South Asia	07-09 (1) 18-20 (1)	07-08 (1) 08-10 (2) 10-11 (1) 18-19 (1) 19-21 (2) 21-22 (1)	06-07 (1) 07-09 (2) 09-11 (1) 16-18 (1) 18-19 (2) 19-21 (3) 21-23 (2) 23-02 (1)	05-07 (1) 18-20 (1)
Southeast Asia	09-10 (1) 10-12 (2) 12-14 (1) 16-17 (1) 17-19 (3) 19-20 (2) 20-21 (1)	08-09 (1) 09-10 (2) 10-12 (3) 12-13 (2) 13-17 (1) 17-21 (2) 21-22 (1)	06-07 (1) 07-08 (2) 08-10 (3) 10-12 (2) 12-18 (1) 18-21 (2) 21-23 (1)	04-07 (1)
Far East	15-16 (1) 16-17 (2) 17-18 (3) 18-19 (2) 19-20 (1)	09-11 (1) 14-16 (1) 16-17 (2) 17-19 (4) 19-20 (3) 20-21 (2) 21-22 (2)	06-07 (1) 07-08 (2) 08-10 (3) 10-12 (2) 12-16 (1) 16-20 (2) 20-22 (1) 20-00 (3) 00-02 (2) 02-03 (1)	02-04 (1) 04-06 (2) 06-08 (1) 05-07 (1)*
South Pacific & New Zealand	10-12 (1) 12-14 (2) 14-16 (3) 16-19 (4) 19-20 (2) 20-21 (1) 11-14 (1)** 17-19 (1)**	08-12 (1) 12-14 (2) 14-16 (1) 16-18 (2) 18-19 (3) 19-22 (4) 22-23 (3) 23-01 (2) 01-02 (1)	17-19 (1) 19-21 (2) 21-23 (3) 23-04 (4) 04-05 (3) 05-07 (2) 07-09 (4) 09-10 (3) 10-11 (2) 11-12 (1)	22-00 (1) 00-01 (2) 01-06 (3) 06-07 (2) 07-08 (1) 00-02 (1)* 02-05 (2)* 05-07 (1)*
Australasia	09-11 (1) 14-15 (1) 15-16 (2) 16-18 (4) 18-19 (3) 19-20 (2) 20-21 (1) 16-18 (1)**	07-08 (1) 08-11 (3) 11-14 (1) 14-16 (2) 16-18 (1) 18-19 (2) 19-21 (3) 21-23 (2) 23-00 (1)	05-07 (2) 07-08 (3) 08-10 (4) 10-12 (2) 12-14 (1) 14-16 (2) 16-21 (1) 21-23 (2) 23-01 (3) 01-04 (4) 04-05 (3)	02-04 (1) 04-06 (3) 06-07 (2) 07-08 (1) 04-05 (1)* 05-06 (2)* 06-07 (1)*
Caribbean, Central America & Northern Countries of South America	07-08 (1) 08-09 (2) 09-10 (3) 10-16 (4) 16-18 (3) 18-19 (2) 19-20 (1) 09-11 (1)*	06-07 (1) 07-08 (2) 08-10 (4) 10-13 (3) 13-19 (4) 19-20 (3) 20-21 (2) 21-23 (1)	06-09 (4) 09-11 (3) 11-15 (2) 15-17 (3) 17-23 (4) 23-02 (3) 02-05 (2) 05-06 (3)	18-19 (1) 19-20 (2) 20-00 (3) 00-02 (4) 02-03 (3) 03-04 (2) 04-06 (1) 19-21 (1)* 21-03 (2)* 03-05 (1)*
Peru, Bolivia, Paraguay, Brazil, Chile, Argentina & Uruguay	07-08 (1) 08-10 (3) 10-12 (2) 12-14 (3) 14-16 (4) 16-17 (3) 17-18 (2) 18-19 (1) 09-11 (1)** 14-16 (1)**	06-07 (1) 07-10 (2) 10-13 (1) 13-14 (2) 14-16 (3) 16-20 (4) 20-22 (3) 22-00 (2) 00-01 (1)	13-15 (1) 15-16 (2) 16-18 (3) 18-01 (4) 01-03 (3) 03-05 (2) 05-07 (3) 07-08 (2) 08-09 (1)	19-20 (1) 20-00 (2) 00-02 (3) 02-03 (2) 03-04 (1) 21-03 (1)*
McMurdo Sound Antarctica	14-16 (1) 16-19 (2) 19-20 (1)	13-16 (1) 16-18 (2) 18-21 (3) 21-22 (2) 22-23 (1)	16-19 (1) 19-20 (2) 20-04 (3) 04-05 (2) 05-07 (1) 07-08 (2) 08-10 (1)	22-02 (1) 02-04 (2) 04-06 (1)

Time Zones: PST (24-Hour Time) WESTERN USA TO:

	10 Meters	*15 Meters*	*20 Meters*	*40/80 Meters*
Western Europe & North Africa	08-09 (1) 09-11 (2) 11-12 (1)	07-08 (1) 08-10 (2) 10-12 (3) 12-13 (2) 13-14 (1) 19-21 (1)	00-06 (1) 06-09 (2) 09-11 (1) 11-14 (2) 14-16 (3) 16-19 (2) 19-22 (1) 22-00 (2)	19-20 (1) 20-22 (2) 22-00 (1) 20-22 (1)*
Central & Northern Europe & European USSR	08-09 (1) 09-10 (2) 10-11 (1)	07-08 (1) 08-09 (2) 09-11 (3) 11-12 (1) 19-21 (1)	05-06(1) 06-09 (2) 09-12 (1) 12-14 (2) 14-16 (3) 16-17 (2) 17-18 (1)	19-21 (1) 21-23 (2) 23-00 (1) 21-23 (1)*

Eastern Mediterranean & Middle East	08-09 (1) 09-10 (2) 10-11 (1)	07-08 (1) 08-09 (2) 09-11 (3) 11-12 (1) 20-22 (1)	05-06 (1) 06-09 (2) 09-12 (1) 12-16 (2) 16-18 (1) 18-22 (2) 22-02 (1)	18-21 (1)
Western & Central Africa	08-10 (1) 10-12 (2) 12-14 (3) 14-15 (2) 15-16 (1)	07-10 (1) 10-12 (2) 12-14 (3) 14-16 (4) 16-17 (3) 17-18 (2) 18-19 (1)	01-06 (1) 06-08 (2 08-12 (1) 12-15 (2 15-17 (3) 17-21 (4) 21-00 (3) 00-01 (2)	18-22 (1)
Eastern Africa	09-12 (1) 12-14 (2) 14-15 (1)	08-11 (1) 11-14 (2) 14-16 (3) 16-17 (2) 17-18 (1)	06-08 (1) 12-14 (1) 14-16 (2) 16-20 (3) 20-22 (2) 22-23 (1)	18-20 (1)
Southern Africa	07-08 (1) 08-11 (3) 11-12 (2) 12-13 (1)	06-09 (1) 09-12 (2) 12-15 (3) 15-16 (2) 16-17 (1)	04-06 (1) 06-08 (2) 08-13 (1) 13-15 (2) 15-18 (3) 18-19 (2) 19-21 (1) 21-23 (3) 23-00 (2) 00-02 (1)	18-21 (1)
Central & South Asia	07-09 (1) 17-18 (1) 18-19 (3) 19-20 (2) 20-21 (1)	07-08 (1) 08-10 (2) 10-11 (1) 16-17 (1) 17-19 (2) 19-20 (3) 20-21 (2) 21-22 (1)	16-18 (1) 18-21 (2) 21-23 (1) 02-03 (1) 03-05 (2) 05-07 (1) 07-09 (3) 09-10 (2) 10-12 (1)	05-07 (1) 18-20 (1)
Southeast Asia	06-09 (1) 09-11 (2) 11-12 (1) 14-15 (1) 15-16 (2) 16-18 (4) 18-19 (2) 19-20 (1) 16-18 (1)**	07-08 (1) 08-10 (4) 10-12 (3) 12-17 (1) 17-20 (3) 20-21 (2) 21-22 (1)	23-01 (1) 01-03 (2) 03-06 (3) 06-07 (2) 07-09 (3) 09-11 (2) 11-14 (1)	00-02 (1) 02-05 (2) 05-07 (1)
Far East	14-15 (1) 15-16 (2) 16-18 (4) 18-19 (2) 19-20 (1) 15-17 (1)**	08-10 (2) 13-14 (1) 14-15 (2) 15-17 (3) 17-20 (4) 20-21 (3) 21-22 (1)	04-06 (2) 06-07 (1) 07-08 (3) 08-09 (4) 09-10 (3) 10-11 (2) 11-19 (1) 19-21 (2) 21-23 (4) 23-00 (3) 00-03 (2) 03-04 (3)	00-02 (1) 02-05 (2) 05-06 (3) 06-07 (2) 07-08 (1) 02-04 (1)* 04-06 (2)* 06-07 (1)*
South Pacific & New Zealand	09-10 (1) 10-12 (3) 12-16 (2) 16-20 (4) 20-21 (3) 21-22 (1) 10-12 (1)** 18-20 (1)**	07-08 (1) 08-09 (2) 09-11 (3) 11-17 (2) 17-18 (3) 18-22 (4) 22-23 (3) 23-01 (2) 01-02 (1)	06-07 (3) 07-09 (4) 09-10 (3) 10-11 (2) 11-17 (1) 17-19 (2) 19-20 (3) 20-01 (4) 01-04 (3) 04-06 (2)	19-21 (1) 21-22 (2) 22-23 (3) 23-05 (4) 05-06 (3) 06-07 (2) 07-08 (1) 22-01 (1)* 01-05 (2)* 05-06 (1)*
Australasia	11-13 (1) 13-14 (2) 14-16 (3) 16-19 (4) 19-20 (3) 20-21 (1) 16-18 (1)**	06-07 (1) 07-09 (3) 09-11 (2) 11-13 (1) 13-15 (2) 15-17 (1) 17-18 (2) 18-21 (4) 21-22 (2) 22-23 (1)	12-20 (1) 20-22 (2) 22-00 (3) 00-04 (4) 04-06 (3) 06-08 (4) 08-10 (3) 10-12 (2)	00-01 (1) 01-02 (2) 02-06 (3) 06-07 (2) 07-08 (1) 02-04 (1)* 04-06 (2)* 06-07 (1)*
Caribbean, Central America & Northern Countries of South America	07-08 (1) 08-09 (2) 09-10 (3) 10-16 (4) 16-17 (3) 17-18 (1) 09-11 (1)**	05-06 (1) 06-07 (2) 07-09 (4) 09-14 (3) 14-17 (4) 17-16 (3) 18-20 (2) 20-21 (1)	05-07 (4) 07-09 (3) 09-14 (2) 14-16 (3) 16-22 (4) 22-00 (3) 00-03 (2) 03-05 (3)	18-20 (1) 20-01 (3) 01-04 (2) 04-06 (1) 19-21 (1)* 21-03 (2)* 03-04 (1)*
Peru, Bolivia, Paraguay, Brazil, Chile, Argentina & Uruguay	07-08 (1) 08-09 (3) 09-11 (2) 11-14 (3) 14-17 (4) 17-18 (2) 18-19 (1) 09-11 (1)**	06-07 (1) 07-09 (2) 09-12 (1) 12-14 (2) 14-15 (3) 15-20 (4) 20-23 (3) 23-00 (2) 00-01 (1)	12-14 (1) 14-16 (2) 16-18 (3) 18-01 (4) 01-02 (3) 02-06 (2) 06-08 (1)	19-21 (1) 21-23 (2) 23-01 (3) 01-02 (2) 02-03 (1) 22-02 (1)*
McMurdo Sound Antarctica	13-14 (1) 14-18 (2) 18-19 (1)	14-16 (1) 16-17 (2) 17-19 (3) 19-21 (4) 21-22 (3) 22-23 (2) 23-00 (1)	16-18 (1) 18-19 (2) 19-21 (3) 21-02 (4) 02-04 (3) 04-05 (2) 05-07 (1) 07-08 (2) 08-09 (1)	22-02 (1) 02-04 (2) 04-06 (1)

*Indicates best times to listen for 80 meter openings. Openings on 160 meters are also likely to occur during those times when 80 meter openings are shown with a Propagation Index of (2) or higher.

**Indicates best times to listen for F-2 layer openings on 6 meters.

For 12 meter openings interpolate between 10 and 15 meter openings.
For 17 meter openings interpolate between 15 and 20 meter openings.
For 30 meter openings interpolate between 40 and 20 meter openings.

are also forecast for *30*, *40*, and *80* meters for openings towards the east and the south. Openings in the same direction, but with higher noise levels and weaker signals, should also be possible on *160* meters.

Between *midnight* and the *sunrise* period it should be a toss-up between *20*, *30*, and *40* meters for DX honors. These bands should open to many areas of the world during this period, with conditions favoring openings towards the south and the west. Expect similar conditions on *80* meters, but with weaker signals and higher noise levels. Be sure also to check *160* meters for some unusual DX openings towards the south and the west during this period. Conditions on all bands (*20*, *30*, *40*, *80*, and *160* meters) are expected to peak at local sunrise.

VHF Ionospheric Openings

As mentioned previously, be sure to check for *6* meter DX openings during the *daylight* hours. Some short-skip openings over distances of approximately 1200 to 2300 miles may also occur. Best times for such openings are during the *afternoon* hours.

Trans-equatorial (TE) scatter propagation tends to increase during the equinoctial period, and some *6* meter openings may be possible between 7 and 10 PM local time. The best bet for such openings is between the southern tier states and South America for paths approximately at right angles to the equator. An occasional TE opening may also be possible on *2* meters. Unlike *F2*-layer or sporadic *E* openings on *6* meters, TE openings are characterized by very weak signals with considerable flutter fading.

Auroral displays tend to occur somewhat more frequently during the equinoctial period. Unusual short-skip conditions often occur on the VHF bands during such displays. Openings, generally over

distances of several hundred and up to approximately 1300 miles, may take place by means of reflection from the ionized region produced by an auroral display. Auroral-type openings are characterized by flutter fading and multi-path echoes. To take maximum advantage of such openings, rotatable antennas should be beamed towards the auroral display, if it is visible.

Large areas of sporadic-*E* ionization also accompany most auroral displays. Reflection of VHF signals from these regions can make possible short-skip openings between distances of approximately 750 and 1300 miles. Signals reflected in this manner are usually strong and stable as compared to those reflected directly from an auroral display.

Auroral activity often occurs during periods of radio storminess on the HF bands. Check the Last Minute Forecast for those days expected to be Below Normal or Disturbed during February. These are the days on which VHF auroral-type openings are most likely to occur.

This month's Propagation Charts contain band-opening predictions for major DX paths for the period February 15 through April 15, 1992. A short-skip propagation forecast for February appeared in last month's column.

73, George, W3ASK

HAM SHOP

FREE TO CQ SUBSCRIBERS

Advertising Rates: Non-commercial ads are 20 cents per word including abbreviations and addresses. Commercial and organization ads are 60 cents per word. Boldface words are $1.20 each (specify which words). Minimum charge $2.00. No ad (non-subscriber) will be printed unless accompanied by full remittance. Non-commercial ads free to CQ subscribers, as space permits, maximum 3 lines each. All ads must be typewritten double-spaced. Recent CQ mailing label must accompany ad.

Closing Date: The 10th day in the third month preceding date of publication. Because the advertisers and equipment contained in Ham Shop have not been investigated, the Publisher of *CQ* cannot vouch for the merchandise listed therein. The publisher reserves the right to reject any paid or nonpaid advertisement. Direct all correspondence and ad copy to: CQ Ham Shop, 76 N. Broadway, Hicksville, NY 11801.

ROSS'$$$$ NEW February (ONLY): KENWOOD TS-850S $1459.90, TM-741A $699.50, VFO-700S $149.90. ICOM 725 $725.00, 2SAT $299.90, 900 $439.99. YAESU FT-703RTT $259.90, FT-709R $289.99, FT-470 $388.00. MFJ 815B $41.90, 941E $89.90, 207 $89.90. HUSTLER RM 40 $19.90, 5BTV $103.90. TEN-TEC 535 $1129.90, 425 $2599.90. ALL LIMITED TIME OFFER. Call or send 2 stamps for used list and more specials. Looking for something not listed or hard to find? Call or write. Over 9000 ham-related items in stock for immediate shipment. MENTION AD. Prices cash, F.O.B. Preston. Hours Tuesday–Friday 9:00 to 6:00, 9:00 to 2:00 P.M. Mondays. Closed Saturday & Sunday. ROSS DISTRIBUTING COMPANY, 78 South State, Preston, Idaho 83263 (208-852-0830).

CW? No Problem. You can increase your speed, no matter how many times you've failed before. **Results guaranteed** when you follow the instructions. PASS Publishing's **CW Mental-Block Buster** program helps you **explode mental blocks** that hold you back. Based on 40 years of research, the **CW Mental-Block Buster** user guided meditation, dynamic visualizations and powerful affirmations to blast through mental blocks. **You can do code!** That means new bands, more contacts, more fun! (This is not a CW practice tape.) The **CW Mental-Block Buster** audio cassette and practice booklet are only $24.95 ppd. in the US (NY residents add $2.00 sales tax). (Quantity discounts available for classes.) PASS Publishing, P.O. Box 570, Stony Brook, NY 11790.

THE DX BULLETIN is your premier weekly source of all DX information: DXpeditions, propagation, QSL routes, and much more. SASE or call for samples. Box 50-C, Fulton, CA 95439 (707-523-1001).

JOIN FAIRS—The Foundation for Amateur International Radio Service. FAIRS is hams dedicated to building international friendship by providing technical assistance, training, exchange visits, and equipment donations on a global basis. Free information P.O. Box 341, Floyd, VA 24091 (703-763-3311/382-9099).

"STAINLESS STEEL"—Over 800 types/sizes hardware in stock. Send $1 for catalog. Credit with order. Shepter Stainless, Inc., P.O. Box 58126, Cincinnati, OH 45258. 73, WA8JOC, Pres.

---

50 MHz DX BULLETIN: $20/18 issues p/y. Sample $2. P.O. Box 1222, Keaau, Hawaii 96749.

R.F. TRANSISTORS FOR SALE: Looking for dealers, repair shops, and manufacturers. MRF455, MRF454 series, Toshiba 2SC2290, 2SC2879, and more. Call: 201-839-3360.

LAMBDA AMATEUR RADIO CLUB international for gay and lesbian hams. Box 24810, Philadelphia, PA 19130 (215-978-LARC).

CUSHCRAFT, Barker & Williamson, Periphex batteries, ARRL books, Baluns, Center insulators, Ladder line, GRE Super Converters & Amplifiers, Surplus Tubes. Atkinson & Smith, Inc., 17 Lewis St., Eatontown, NJ 07724 (1-800-542-2447).

Mirage 220 MHz amplifier. 10 W in for 60 plus out. Remote control head and cable included. Excellent condition, in storage for last four years. $160 postpaid. Peter O'Dell, WB2D, 516-681-2922 days, 516-862-9025 evenings.

MORSE CODE COMPUTER INTERFACES with Software for IBM ($49.95) or COCO ($39.95). Ham License Study Programs $14.95. Free Public Domain and Ham catalog for IBM or COCO. Dynamic Electronics, Box 896, Hartselle, AL 35640 (205-773-2758).

AMIGA, MACINTOSH, ATARI XL/XE/ST Amateur Radio PD software $4.00 disk. Two-stamp SASE brings catalog. Specify computer! Kinetic Designs Hamware, Box 1646, Orange Park, FL 32067-1646.

QSL CARDS: Fast, quality service. Samples $1.00 (refundable with order). WordWise Services, 16 Kent Drive, Foxmeadow, Hockessin, DE 19707.

VIDEOCIPHER II: THEORY OF OPERATION. Volume 1 (Hardware) $36.45, Volume 2 (Software) $36.45, Volume 3 (Projects/Software) $46.45, Volume 4 (Repair/Software) $99.45, Volume 5 (Documentation) $46.45, Volume 6 (Experimentation) $46.45, Volume 7 (032/Hacking) $56.45, Volume 8 (Exotic) $73.45. The VideoCipher Video $43.45; CLONE HACKERS BIBLE $36.45. SATELLITE HACKERS BIBLE $53.45/software. CABLE HACKERS BIBLE Volume 1 $34.95. CABLE HACKERS BIBLE Volume 2 $44.95. OAK ORION $36.45. SATELLITE EXPERIMENTERS HANDBOOK $28.45. SATELLITE ANTENNA CONSTRUCTION $28.45. BLACK BOX BIBLE $34.95. SATELLITE RECEIVERS SCHEMATICS Vol. 1 $39.95. SCANNER HACKERS BIBLE $33.95. **CODs** 1-602-782-2316 or **FAX** 1-602-343-2141. 755+ file 010-032 Software Library. Catalog $3.00. **TELECODE,** Box 6426-NV, Yuma, AZ 85366-6426.

---

10 METER ANTENNAS FROM $19.95. Free flyer. RT Electronics, P.O. Box 2123, Warren, OH 44484.

TEN-TEC, New Factory Boxed Latest 1992 Production Models, USA Made, 535 Argonaut, 536 Delta, 562 Omni V, 585 Paragon Transceivers, 420 Hercules, 422 Centurion, 425 Titan Linear Amplifiers, 238, 253, 254 Antenna Tuners, 239, 240 Dummy Loads, Mobile HF Antennas, Cabinets, Filters, Keyers. Visa/MC or check. For best mail-order deal, write/phone Bill Slep 704-524-7519, Slep Electronics Company, Box 100, Otto, NC 28763.

COBRA, ICOM, K40, RANGER, UNIDEN, WILSON: Call C/N Electronics, 703-978-6268, Fairfax, Virginia.

The *World Ham Net Directory* lists special interest ham nets for DXers, missionaries, weather watchers, retired persons, and many other interests. $9.95 plus $2 shipping ($3 foreign) US funds from Tiare Publications, P.O. Box 493, Lake Geneva, WI 53147. Catalog $1.00, free with order.

Ready to explore VHF/UHF operating? Get Ed Noll's *Basic Guide to VHF/UHF Ham Radio*. Covers equipment, antennas, propagation, repeaters, contesting, band plans, and more. All the basics you need! Just $6.95 plus $2 shipping ($3 foreign) US funds from Tiare Publications, P.O. Box 493, Lake Geneva, WI 53147. Catalog $1.00, free with order.

HAVE AM CAPABILITY? Join SPAM (Society for the Promotion of AM). For information and membership, send $1 and SASE to SPAM, WB6TRQ, Box 62, Potrero, CA 92063.

CB-TO-10M CONVERSIONS: FM kits, frequency modification hardware, books, plans, high-performance CB accessories. Catalog $2. CBCI, Box 31500CQ, Phoenix, AZ 85046.

RTTY JOURNAL: Published ten times per year. Covering the digital modes of RTTY, AMTOR, FAX, PACKET, plus technical and other interesting articles about this fascinating phase of Ham radio. $15.00 per year USA, foreign slightly higher. RTTY JOURNAL, 9085 La Casita Ave., Fountain Valley, CA 92708.

WANTED: HAM EQUIPMENT AND OTHER PROPERTY. The Radio Club of Junior High School 22, NYC, Inc. is a nonprofit organization granted 501(C)(3) status by the IRS, incorporated with the goal of using the theme of Ham Radio to further and enhance the education of young people nationwide. Your property donation or financial support would be greatly appreciated and acknowledged with a receipt for your tax deductible contribution. Please look over whatever unwanted equipment you may have, and call us. We will pick up or arrange shipping. You will receive the tax deduction, but most important, the privilege of knowing that your gift really made a difference in the education and upbringing of a child. You are invited to check into the WB2JKJ CLASSROOM NET, 1200 UTC on 7.238 MHz or on 21.395 throughout the day. Hope to meet all of our PA friends at the AARG Hamfest on February 29 in Lebanon, PA. Write to us at: The RC of JHS 22, P.O. Box 1052, New York, NY 10002. Round-the-clock hotlines: Voice (516) 674-4072, FAX (516) 674-9600.

WANTED: Yaesu FT-23R-HT and pre 1980 micro computers for museum. KK4WW, 703-231-6478/763-3311.

TEN-TEC AND RADIO BUFFS A WINNING TEAM: America's best amateur radio equipment. Monthly specials, best price, fast shipment. All new, sealed box, latest production run: Paragon or Omni V $1799.00, Argonaut II QRP $1179.00, Delta II $1379.00, Titan $2599.00, Centurion $1620.00, Hercules $1149.00, Auto Antenna Tuner $929.00, All Crystal Filters $65.00, 705 Desk Mic $75.00. Special price on all other Ten-Tec Accessories. If you want the best, then buy American; buy a Ten-Tec. Call Henry, N4EDQ, at Radio Buffs Amateur Radio Sales, 1-800-828-6433 or mail order to: Radio Buffs, 4400 HWY 19A, Mount Dora, FL 32757. Remember RADIO BUFFS HAM HELPING HAMS.

CUSTOM QSLS: We'll help you design and print your QSLs. One or two color offset printing. Black-and-white photographs. Various colors of ink and paper available. Please send SASE for more information to: 2738 N. Bennett, Tacoma, WA 98407.

FOR SALE: New Harvey-Wells 2-match antenna coupler with copy of manual, $120. National 190 RCVR, $75. Plus shipping. K1LVO, Bernie Walkowiak, 508-764-8121.

ROSS'$$$$ USED February SPECIALS: KENWOOD TH-75 $369.90, TM-701A $399.90, TR-851A $529.90, TS-180S/DFC $549.90. ICOM IC-211 $389.90, 2KL SOLID $1495.00, IC–735 $729.90. YAESU E-72L $32.00, FT-One $1099.90, PA-3 $25.90, PA-6 $14.90. COLLINS 30L-1 $899.90, 312B-4 $299.90, AC-3805 $79.90, GD-6C $259.90. ETO 77 $3899.90. TEN-TEC 961 $179.90, 229B $249.90, 562 $1499.90. Looking for something not listed? Call or send 2 stamps. We have over 140 USED ITEMS in stock. MENTION AD. Prices cash, FOB Preston. Hours Tuesday to Friday 9:00 to 6:00, 9:00 to 2:00 P.M. Mondays. Closed Saturday & Sunday. ROSS DISTRIBUTING COMPANY, 78 South State, Preston, Idaho 83263 (208-852-0830).

THE DX MAGAZINE is your monthly DX reference: DXpedition reports, equipment and software reviews, six meters, awards, QSL information, and more. Sample only $1.00. Box 50-C, Fulton, CA 95439 (707-523-1001).

USE AIRMAIL POSTAGE for successful QSLing! Many countries, monthly bargains. Plus **EUROPEAN AIRMAIL ENVELOPES!** Samples, prices: William Plum, 12 Glenn Road, Flemington, NJ 08822.

VHF-UHF-SHF: Try the VHFer in its 11th year. Large SASE: VHFer, Box 685, Holbrook, AZ 86025.

JUST IMAGINE your own Blue Ridge Mountaintop 25 acre QTH in the cool, green mountains, only $975 per acre. Wonderful view, wild game, privacy, road frontage, small stream, ideal for hamming, retirement, or summer home. Financing available. KK4WW, Floyd, Virginia.

FOR SALE New, Unused, in original cartons: Commodore C-64, CP/M s.s software, Compucover, Joystick. $135.00. K2EEK, CQ Magazine, 76 N. Broadway, Hicksville, NY 11801.

SCANNER HACKERS BIBLE 112 scanner modifications covering: Pro-2004/5, Yaesu, Kenwood, Bearcat, Icom. Frequency Fixes, Modifications (scan rates, Interfaces, Programmable Channels, Improving Operation), Antennas, Laws, Cellular Telephone Operation and Frequencies and more! $33.45. **CODs** 1-602-782-2316. **TELECODE,** Box 6426-CQ, Yuma, AZ 85366-6426.

COAX, GROUND RADIAL WIRE, lowest cost, top quality, MilSpec RG213 $.38/ft.; RG8X $.19; RG58 $.18; Mini Hardline low loss 10m. to UHF Belden equiv. RG 9913 $.39; any lengths. Radial wire #16 $38/1000 ft. includes shipping! Immediate shipment. Catalog $1.00. DAVIS RF Co., P.O. Box 230-C, Carlisle, MA 01741; 508-369-1738 (orders) or 1-800-484-4002, ext. 1356.

CLASSIC QSL'S, World famous designs. $1.00 brings samples and a $2.00 coupon. Also rubber stamps and engraving. ROBINSON'S, P.O. Box 341-C, Hinkley, OH 44233.

USSR CALLBOOK: First edition of the USSR callsign directory is here! Copyrighted information not available elsewhere! Over 52,000 Soviet callsigns with addresses in both English and Russian. The Soviet Regional QSL bureaus, prefixes, and much much more. A must for DXer! $21.95 plus $2 s/h. (NY residents add sales tax.) US funds only. Foreign orders $4 s/h. Check/MO to: EVM World Trading, Dept CQ, 8023 19 Ave. #5B, Brooklyn, NY 11214. Allow 4–6 weeks for delivery.

QSL CARDS, OVER 50 DESIGNS to choose from. Samples 52¢ business SASE. Charlie Hansen, NØTT, RT 1, Box 108-B, Napoleon, MO 64074.

ATHEISTS forming net. SASE for details. Beckett, W9OE, 2003 Logan Apt. 2, Hamilton, OH 45015.

P40V's ARUBA COTTAGE with BIG Antennas, 2bdr & Radio room. $550 per week. Brochure from AI6V.

DIGITAL SWR and **POWER METER**, assembled, kit or plans, with Alarm and Set Points. **FREE** information. Rupp Electronics, 5403 Westbreeze, Fort Wayne, IN 46804 (219-432-3049).

MAUI, HAWAII: B&B with a Ham, KH6SQ. For brochure send 75 cents for postage to P.O. Box 351, Pukalani, HI 96788.

ONV SAFETY BELT CO.

P.O. Box 404 • Ramsey, NJ 07446

800-345-5634

Phone & FAX 201-327-2462

ONV Safety Belt With Seat Harness

$89.95

OSHA

We Ship Worldwide

Order Desk Open 7 Days/Week

ONV Tool Pouch $15.95

Add $4.00 For Handling VISA M/C CHECK

ONV Belt W/O Seat Harness

$74.95

CIRCLE 92 ON READER SERVICE CARD

AIR MAIL POSTAGE DX SUPPLIES

- ☐ **Air Mail Postage**—Now Offering Return Air Mail Postage From Over 100 Countries.
- ☐ **Air Mail Envelopes**—No Folding A Style Envelopes-Security Type-Red And Blue Border—Sizes In Inches
- ☐ **4¾ × 6½ European Cover**
- ☐ **4½ × 6¼ European Return**
- ☐ **3⅞ × 6¾ Normal Cover**
- ☐ **3⅝ × 6½ Normal Return**
- ☐ **DX Log Books**—Specially Designed For DX And QSL Records.
- ☐ **Rubber Stamps**—Two Styles Of Address Stamps Currently Available.
- ☐ **Radio Stamps**—Current Ham Radio Related New Issues.

Orders Processed Promptly
For Details And Pricing Information
Please Send Me A #10 Size SASE.

JAMES E. MACKEY
P.O. Box 270569
West Hartford, CT 06127-0569

CIRCLE 130 ON READER SERVICE CARD

"The Epitome of Excellence"

Elevate the status of your repeater with the RC-850 Repeater Controller.

Ever heard a really great repeater? One that sounds superb? Is fun to use? And benefits its users through its wealth of interactive features? Chances are, it's controlled by an ACC RC-850 Repeater Controller. Because more discriminating repeater owners choose ACC controllers for their systems than any other. And the 850 leads the industry in performance.

The '850 is extensively programmable, using interactive Touch-Tone entry and voice response, or a computer terminal. All *remotely!* From access codes to its operating schedule, nearly everything can be easily changed.

The patch supports local and radio-linked phone lines. A three-tiered system offers flexibility in call routing, assignment of privileges and control. The 250 autodial slots support even the largest groups.

The Touch-Tone activated mailbox lets users leave messages for each other. The *system* will leave you messages if you miss a reverse patch or alarm. Paging support includes all popular tone formats so users can always be available without having to listen.

Multi-band linking extends your repeater's range, ties your repeater to others for emergency and public service activities, and lets you benefit from the elevation of your repeater site for working all bands. Individual user codes offer secure access to selected functions to bar unauthorized use.

The top-of-the-line '850 distinguishes itself as a stellar performer on hundreds of repeaters. And it can do the same for you. Learn more about how to enrich your repeater system by contacting us directly.

acc advanced computer controls, inc.

2356 Walsh Avenue, Santa Clara, CA 95051 (408) 727-3330

CIRCLE 118 ON READER SERVICE CARD

BUILD A UNIVERSAL COIL WINDING MACHINE, Plan book $8.95 plus $1.00 s. & h. GINGERY TOOL, P.O. Box 75, Fordland, MO 65652-0075.

BUILD YOUR OWN WIRE ANTENNAS, parts, GROUND RADIAL WIRE, feedlines, various wire, insulators, vertical phasing, coax, Dacron rope, baluns, etc. LOWEST PRICES. Catalog: $1.00. DAVIS RF Co., P.O. Box 230-C, Carlisle, MA 01741 (1-800-484-4002, ext. 1356).

JUST ANTENNAS. NEW! Broadband off center coaxial current fed high power single wire beam antenna. Low VSWR 80 through 10 meters. No tuner required in most installations. Excellent for auto-tune transceivers. Model HF-DX8010, $139.95. Just Antennas, 4 Deer Tract Drive, Little Mountain, SC 29075.

SATELLITE AND AERIAL PHOTOS your state, county, or town. Maps all states, over 500 cities, and over 100 countries. Reply: World Image, 6348 W. 95th St., Suite 104, Oak Lawn, IL 60453 (708-233-0208).

ROTOR PARTS ROTOR service, ROTOR accessories: Brak-D-Lays, Quik-Connects, Pre-Set mods. NEW models for sale. Free catalog. C.A.T.S., 7368 SR 105, Pemberville OH 43450.

THE ALC100A AUTOMATIC VOLUME CONTROLLER keeps the audio output level of transceivers, scanners, and audio amplifiers nearly constant whether the incoming signal is a whisper or a shout. Size: 3/4″ × 3/4″ × 1/4″. Price $19.95. Add $3. 00 shipping and handling. Also Digital Voice Recorder and Crystal Controlled FM Transmitter Chips. C & S Electronics, P.O. Box 2142, Norwalk, CT 06852-2142 (203-866-3208).

SOFTWARE +: QSL record, Calculate + Antennas + Utility, Turbo Pascal Training "by the Other Guy" (Excellent), learn the easy way, Pet Music and computer products (diskettes, etc.). Send $2.00 for INFO on all products to Namlulu Communications, 1120 Meadowview Rd., Willard, OH 44890.

AMATEUR RADIO REPAIR: FCC licensed, 17 years experience, lab-quality NBS traceable test equipment, reasonable rates. G.B. Communications, Inc., 963 Birch Bay Lynden Road, Lynden, WA 98264 (206-354-5884).

FM RADIO TRANSMITTER. Plus the Antenna. Output Power: 10 to 100 watts, 88–108 MHz broadcasting band. Complete plan and layout, easy to build because the PC board is supplied. $200. Address: Claude Val, VE2VAL, 11920 Rodolphe Forget, 8, Montreal, Canada, H1E 4Y1 (Phone: 7–10 PM 514-648-7361).

KENWOOD R2000 new $525.00, Alinco DJ-160 new $235.00, postpaid. Ernest Odeneal, 2710 Lee, Greenville, TX 75401 (903-455-2113 or 5788).

QSL CARDS. Many styles. Guaranteed good quality and service. RGB in Shelby, NC says, "You guys do excellent work and provide really good service!" **Plastic Cardholders** to display your cards. Other Ham Shack goodies. Information, card samples. Business SASE 75¢ postage. **Rusprint,** Rt. 3, Box 192CQ, Springhill, Kansas 66083.

HAVE ONE OF THE BEST generic echo boxes for your radio. Plans $5.00, no checks. Mike, P.O. Box 761247, LA, CA 90076.

MATCHED FINALS/DRIVER TUBE PACKS: Factory fresh GE 6146B matched pair w/12BY7A or 6CL6 driver $56.00. Set of (3) w/driver $79.00. Shipping/handling any size order $3.00 anywhere USA. VISA/MASTERCARD accepted. Other combinations/types of matched tube packs also available. **PAR ELECTRONICS,** 8980 J Route 108, Columbia, MD 21045 or toll-free 1-800-447-9008.

FREE complete file of *Ham Radio* magazines from January 1970 to June 1990 (last issue). You pick up at W6ALF, tel. 714-526-1779.

TELEPHONE Home Study Course. Professional Certification. Association of Certified Telephone Technicians, Route 3, Box 98, Ellington, MO 63638.

MORSE SYSTEM computer interface. Send and receive code through your computer. Translate code to text and/or text to code. **Excellent Tutor.** Apple II, IIe, IIc, IIgs. $25.00 (demo disk $12.00). DATAWARE, Suite 15, 1425 W. Wade Hampton Blvd., Greer, SC 29650.

EMERGENCY SUPPLIES: Disaster preparedness packs for your shack, auto, office, etc. Be prepared NOW for emergency communications. Free catalog. Slates Products, P.O. Box 4375C, Walnut Creek, CA 94596.

QUALITY QSL DESIGNS BY N4ZCX, superb custom artwork. Must see! $1 samples, satisfaction guaranteed. 11395 Strickland Road, Roswell, GA 30076-1226.

50% DISCOUNT. Stainless Steel Screws and Bolts. Small quantities, free catalog. Elwick, 230 Woods Lane, Somerdale, NJ 08083.

DIGITAL AUTOMATIC DISPLAYS. Kenwood, Yaesu, Collins, Drake, Atlas, etc. No bandswitching required. Business 52¢ SASE. Be specific. GRAND SYSTEMS, POB 2171, Blaine, WA 98230. Voice/FAX 604-530-4551.

AA1A SIDEKICK ANTENNAS 1-800-874-2880.

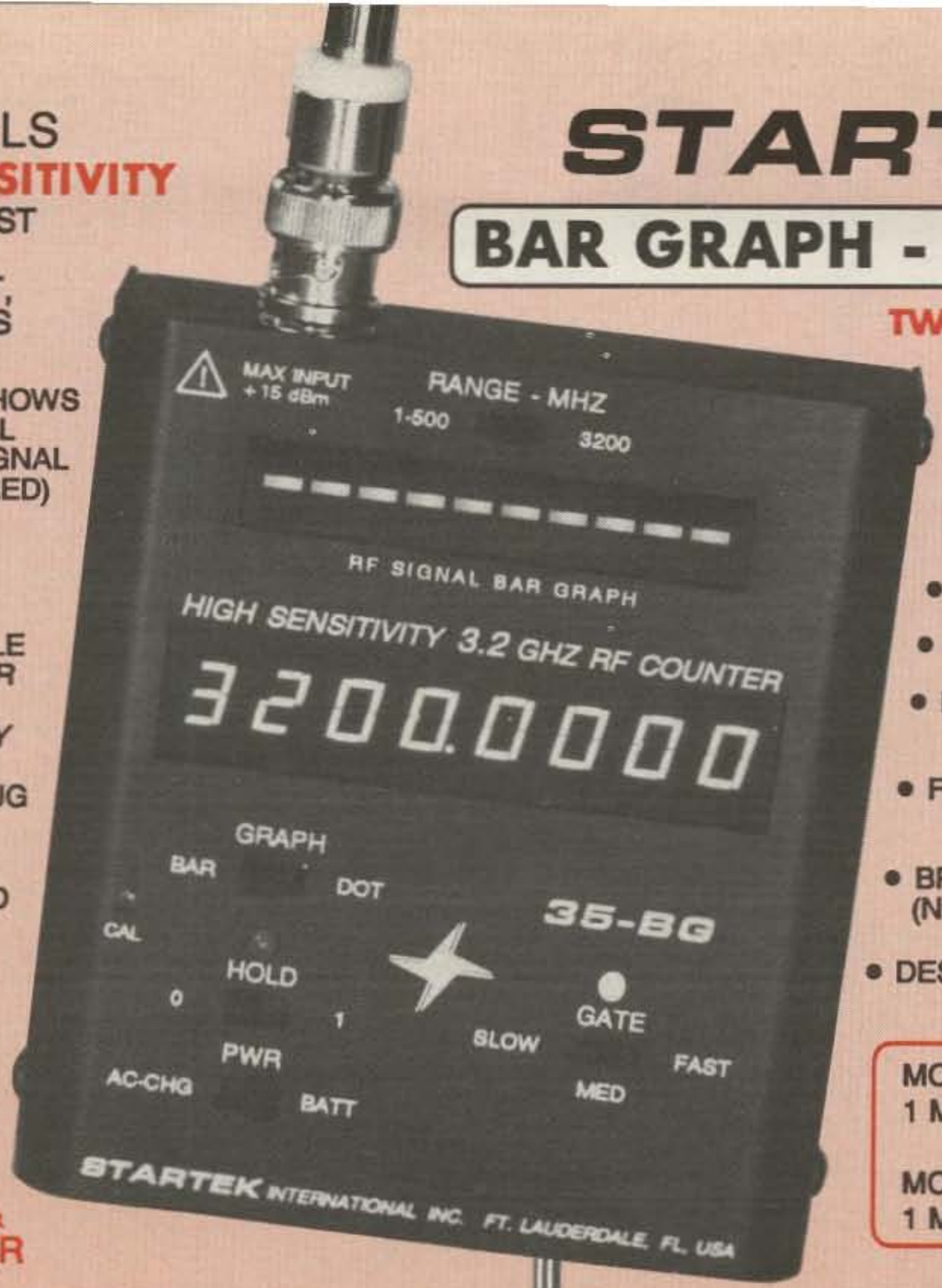
STARTEK

BAR GRAPH - COUNTERS

TWO NEW MODELS
ULTRA HIGH SENSITIVITY
FIND FREQUENCIES FAST
LOCATE RF SOURCES
CALIBRATE EQUIPMENT,
ANTENNAS, CIRCUITS

- 2 INCH LED BAR GRAPH *BRIGHT RED DISPLAY* SHOWS THE RELATIVE RF SIGNAL STRENGTH OF INPUT SIGNAL (NO BACK LIGHT REQUIRED)
- SWITCH SELECTABLE *DOT* OR *BAR* GRAPH
- ALL MODELS COMPATIBLE WITH *MFJ ANT ANALYZER*
- 9-12 VDC *AUTO-POLARITY* POWER INPUT - WILL ACCEPT DC POWER PLUG CENTER NEG. OR POS.
- WHILE CHARGING NI-CAD BATTERIES- COUNTER CAN BE USED OR SWITCHED OFF
- StarCab™ ALUMINUM CABINET

ALL PRICES INCLUDE FACTORY INSTALLED NI-CADs & 110VAC ADP/CHARGER



TWO NEW MODELS
1-1500 MHZ &
1-3200 MHZ

- 3-5 HOUR PORTABLE OPERATION WITH STANDARD FACTORY INSTALLED NI-CAD"s
- 3 GATE TIMES
- 1PPM TCXO TIMEBASE
- DISPLAY *HOLD* SWITCH WITH INDICATOR
- FULL YEAR LIMITED WARRANTY
- BRIGHT RED LED DIGITS (NO BACK LIGHT REQ'D)
- DESIGNED & 100% ASSEMBLED IN USA

MODEL **15-BG**
1 MHZ - 1.5 GHZ. . . .$220.

MODEL **35-BG**
1 MHZ - 3.2 GHZ. . . .$265.

#1500A
1-1500MHZ
$118.

#1500HS
1-1500MHZ
$159.

#15-BG $220.

#35-BG $265.

#3500
10HZ - 3.5GHZ
$250.

#2500
10HZ - 2.4GHZ
$210.

FREE CARYING CASE & TELESCOPING ANTENNA WITH PURCHASE OF MODEL 35-BG, 15-BG OR 3500
FREE CARRYING CASE WITH PURCHASE OF MODEL 1500HS OR 2500
LIMITED TIME OFFER - YOU MUST MENTION THIS AD WHEN ORDER IS PLACED

■ ANTENNAS

#TA-90	Telescoping BNC antenna	12.00
#TA-90-L	Telescoping-elbow BNC	15.00
#RD-150	150 MHZ Rubber Duck BNC	16.00
#RD-2750	27 & 50 MHZ 11" RD-BNC	28.00
#RD-450	450 MHZ Rubber Duck-BNC	18.00
#RD-800	800 MHZ Rubber Duck-BNC	29.00

■ MISC

#CC-90	Black vinyl zipper carry case	12.00
#DC-690	12VDC Auto adaptor/charger	9.00

■ PROBES

#LP-22	Probe, Low Pass/Audio. use with 2500 & 3500. Attenuates RF noise.	$22.00
#P-110	Probe, freq counter or. scope use, 1X, 10X. 200 MHZ scope use.	39.00

■ BNC INTERFACE CABLE

#BNC-18	18" 50 Ohm cable. male BNC ea. end	6.50
#BNC-RCA	Adaptor, F-BNC to M-PHONO	2.00

STARTEK INTERNATIONAL INC
398 NE 38th ST., FT. LAUDERDALE, FL 33334
PHONE (305) 561-2211 FAX (305) 561-9133

ORDERS & INFORMATION
305-561-2211

ORDERS ONLY - TOLL FREE
800-638-8050

TERMS: Shipping-handling charges for Florida add $4 + tax, US & Canada add 5% ($4 min, $10 max), all others add 15% of total. COD fee $4. Payment by VISA, MC, DISCOVER, COD for CASH or M.O. Prices & specifications subject to change without notice or obligation.

MasterCard
VISA
DISCOVER

Enjoy NEVER CLIMBING YOUR TOWER AGAIN

Are you too scared or too old to climb? Never climb again with this tower and elevator tram system. Voyager towers are 13 and 18 inch triangular structures stackable to any height in 7 1/2', 8 3/4' or 10' section lengths. Easy to install hinge base, walk up erection. Next plumb tower with leveling bolts in base. Mount rotor and large heavy beams on Hazer tram and with one hand winch to top of tower for normal operating position. Safety lock system operates while raising or lowering. At last a cheap, convenient and safe way to install and maintain your beam. This is a deluxe tower system that you can enjoy today.

SPECIAL TOWER PACKAGE: 50 ft. high by 18" face tower kit, concrete footing section, hinged base, HAZER kit, Phillystran guy wires, turnbuckles, earth screw anchors, 10' mast, thrust bearing, tool kit, ground rod and clamp, rated at 15 sq. ft. antenna load @ 100 MPH, **$1974.95.**

50' by 13" wide tower, same pkg as above	**$1670.95**
HAZER 2 for Rohn 25-hvy duty alum 12 sq ft wind ld	**324.95**
HAZER 3 for Rohn 25-std alum 8 sq ft wind load	**232.95**
HAZER 4 for Rohn 25-hvy galv stl 16 sq ft wind ld	**303.95**
TB-25 Ball thrust bearing, 2½" max mast dia	**74.95**
NEW NEW NEW NEW NEW NEW	
HAZER VH-8 Transit System for Rohn 45, 22 sq ft wind load	**860.00**
HAZER VH-9 Transit System for Rohn 55, 22 sq ft wind load	**895.00**

Satisfaction guaranteed. Call today and order by Visa, M/C or mail check. Immediate delivery.

Glen Martin Engineering, Inc.
Dept. C
RR 3, Box 322,
Boonville, MO 65233
816-882-2734
FAX: 816-882-7200

CIRCLE 125 ON READER SERVICE CARD

HEIGHTS TOWER SYSTEMS

Light, strong, permanently beautiful Aluminum towers.

Self-supporting up to 144 ft.; guyed at higher heights

Rated at more than 75 MPH wind

Easy to assemble and erect.

Complete tapered and telescoping models.

Full range of manually or electrically operated Fold-Over-Kits

HEIGHTS
TOWER SYSTEMS
1721 Indian Rd., Lapeer, MI 48446
Phone or FAX (313) 667-1700

CIRCLE 133 ON READER SERVICE CARD

CT by K1EA

The World's Most Popular Contest Logging Software

- Scores and dupes 11 contests
- 4,500 QSO's in 640K
- Sends perfect CW
- Prints QSL labels
- Controls Kenwood and ICOM radios
- Reliable - used by most top 10 stations

The CT landline BBS is now operational! Registered users download the latest version. 603/465-2161 2400 N81

Send US $40, DX $42.50. MC/Visa accepted.
CT c/o Bill McGowan,
33 Truell Road, Hollis, NH 03049.
Tel 603/465-2392

CIRCLE 112 ON READER SERVICE CARD

REVOLUTIONARY HYBRID AERIAL WIRE: 168 strand copper **FLEX-WEAVE™**, #14, strong, Ultra Flexible, ties in knots, non-stretch, won't rust/kink like copper weld, $34 first 275 feet (minimum), $.12/ft. thereafter, includes shipping! Catalog $1.00. DAVIS RF Co., P.O. Box 230-C, Carlisle, MA 01741; 508-369-1738 (orders) or 1-800-484-4002, ext. 1356.

Wanted: **E.H. Scott Radios** from 1925–1948. Early Scott Radios before 1930 were often copper shielded and used the names **"World Record," "Scott Transformer Co."** and **"Selectone"** brand coils. Later Scott Radios were chrome plated. Radios and amplifiers in any condition wanted. Literature also pursued. I am attempting to preserve the history of this company. Your help is appreciated. John Meredith, 1792 Nemoke Trail, Haslett, MI 48840 (517-349-4348).

VIDEOCIPHER II: THEORY OF OPERATION. Volume 8 Covers: **DETEC** Liberty 1 (BlackCipher) Schematics, Data Sheets, Software Tools, Test Software, Theory, Tier Level Information, SUPERCHIP Plans/Software, 68705P3 Programmer, 018-9 Seedkey Puller Plans. $73.45. CODs 1-602-782-2316 or FAX 1-602-343-2141. **TELECODE,** Box 6426-RSH, Yuma, AZ 85366-6426.

HAM TRADER YELLOW SHEETS. Buy, sell, trade ham radio gear. Published twice a month—ads quickly circulate. No long wait for results. In our 30th year of business. For sample copy send #10 SASE (2 stamps). ONE YEAR SUBSCRIPTION (24 issues) $16.50. P.O.B. 2057, Glen Ellyn, IL 60138-2057, or P.O.B. 15142, Seattle, WA 98115.

TENNATEST * ANTENNA NOISE BRIDGE *** NOTHING ELSE LIKE IT * OUTPERFORMS OTHERS * Costs less. Compare 1–40 MHz $48, 1–150 MHz $72. Satisfaction guaranteed *** ASK THE HAM WHO OWNS ONE *** Send stamp for details to TENNATEST, W8URR, 1025 Wildwood Road, Quincy, MI 49082.

COMMODORE 64 HAM PROGRAMS: 8 disk sides, over 200 Ham programs, $16.95. 29¢ stamp gets unusual software catalog of Utilities, Games, Adult and British Disks. HomeSpun Software, Box 1064-AR, Estero, FL 33928.

MINI QSL's! Business card sized QSL's, with raised ink. Beautiful one and two color cards. $20.00 and up. Send SASE for free samples. Perfect Pages, Box 34396, Mpls, MN 55434 (612-754-5311).

BOOK SALE—FANTASTIC SAVINGS!!! (35–75%): "Self-Help," Hobby, Educational, Electronics & Computer Titles. Write for Free List! JACOMM-C, Box 1014, Dover, NJ 07802.

NEWS BULLETIN

CALL US NOW!

YOUR HAM DOLLAR GOES FURTHER AT . . .

CALL OR WRITE FOR SPECIAL QUOTE

When it comes to
FAST DELIVERY, HONEST DEALING and
PROMPT/DEPENDABLE S-E-R-V-I-C-E back-up
We don't just advertise it—WE GIVE IT!

Burghardt AMATEUR CENTER INC.

"AMERICA'S MOST RELIABLE AMATEUR RADIO DEALER"

SELL-TRADE
New & Reconditioned
HAM EQUIPMENT

Call or Write Us Today For a Quote!
You'll Find Us to be Courteous, Knowledgeable and Honest

PHONE (605) 886-7314
FAX (605) 886-3444

we'll treat you

SELECTION
S-E-R-V-I-C-E
and
SATISFACTION!

In 1937, Stan Burghardt (WØIT), because of his intense interest in amateur radio, began selling and servicing amateur radio equipment in conjunction with his radio parts business. We stand proud of this long-lasting tradition of ***Honest Dealing, Quality Products and Dependable "S-E-R-V-i-C-E"!***

Above all, we fully intend to carry on this proud tradition with even more new product lines plus the same ***"fair"*** treatment you've come to rely on. Our reconditioned equipment is of the finest quality with ***30, 60*** and even ***90-day*** parts and labor warranties on selected pieces. ***And always remember:***

— WE SERVICE WHAT WE SELL —

AEA	B & W	Daiwa	Palomar
Alinco	Belden	Hustler	Radio Callbook
Ameritron	Bencher	ICOM	Ritron
Amphenol	Bird	Kantronics	Rohn
Ampire	Butternut	Kenwood	Telex/Hygain
Antenna Specialists	Centurion	Larsen	Ten-Tec
Astron	CES	MFJ	Unadilla/Reyco
	Cushcraft	Mirage/KLM	Yaesu

Write today for our latest Bulletin Used Equipment List.

STORE HOURS:
9-5 P.M. (CST)
MONDAY thru FRIDAY
OPEN SATURDAYS
from 9-1 P.M. (CST)
CLOSED
SUNDAYS/HOLIDAYS

VISA DISCOVER MasterCard

182 N. Maple
P.O. Box 73
Watertown, SD 57201

YAESU

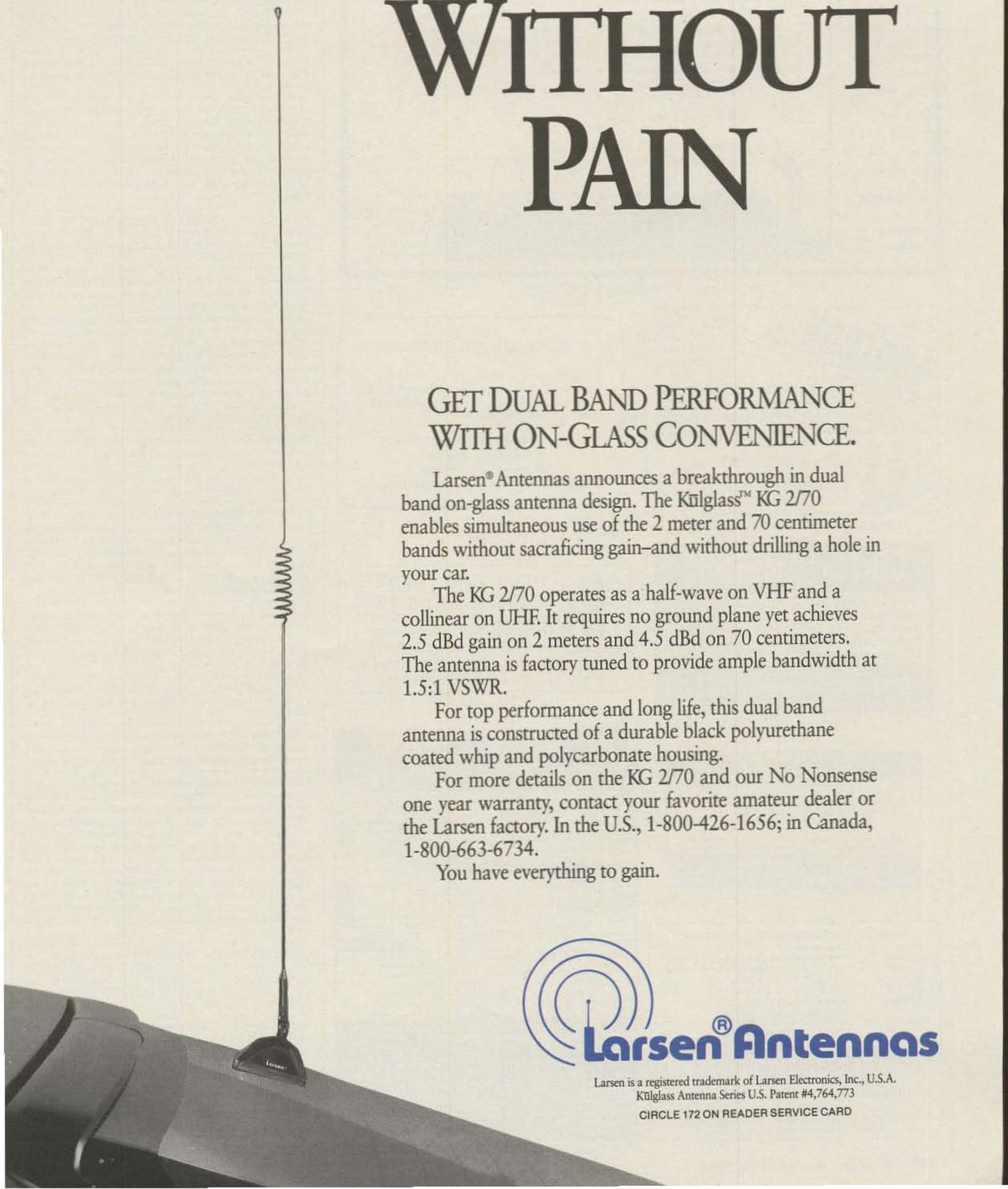
FT-26

Feature heavy, light weight, mini 2 meter handheld. Extended receive capability, 53 memories, four power levels. Built-in DTMF calling and automatic repeater shift.

CALL, WRITE OR FAX

CIRCLE 142 ON READER SERVICE CARD

DUAL BAND GAIN WITHOUT PAIN



GET DUAL BAND PERFORMANCE WITH ON-GLASS CONVENIENCE.

Larsen® Antennas announces a breakthrough in dual band on-glass antenna design. The Kūlglass™ KG 2/70 enables simultaneous use of the 2 meter and 70 centimeter bands without sacraficing gain–and without drilling a hole in your car.

The KG 2/70 operates as a half-wave on VHF and a collinear on UHF. It requires no ground plane yet achieves 2.5 dBd gain on 2 meters and 4.5 dBd on 70 centimeters. The antenna is factory tuned to provide ample bandwidth at 1.5:1 VSWR.

For top performance and long life, this dual band antenna is constructed of a durable black polyurethane coated whip and polycarbonate housing.

For more details on the KG 2/70 and our No Nonsense one year warranty, contact your favorite amateur dealer or the Larsen factory. In the U.S., 1-800-426-1656; in Canada, 1-800-663-6734.

You have everything to gain.

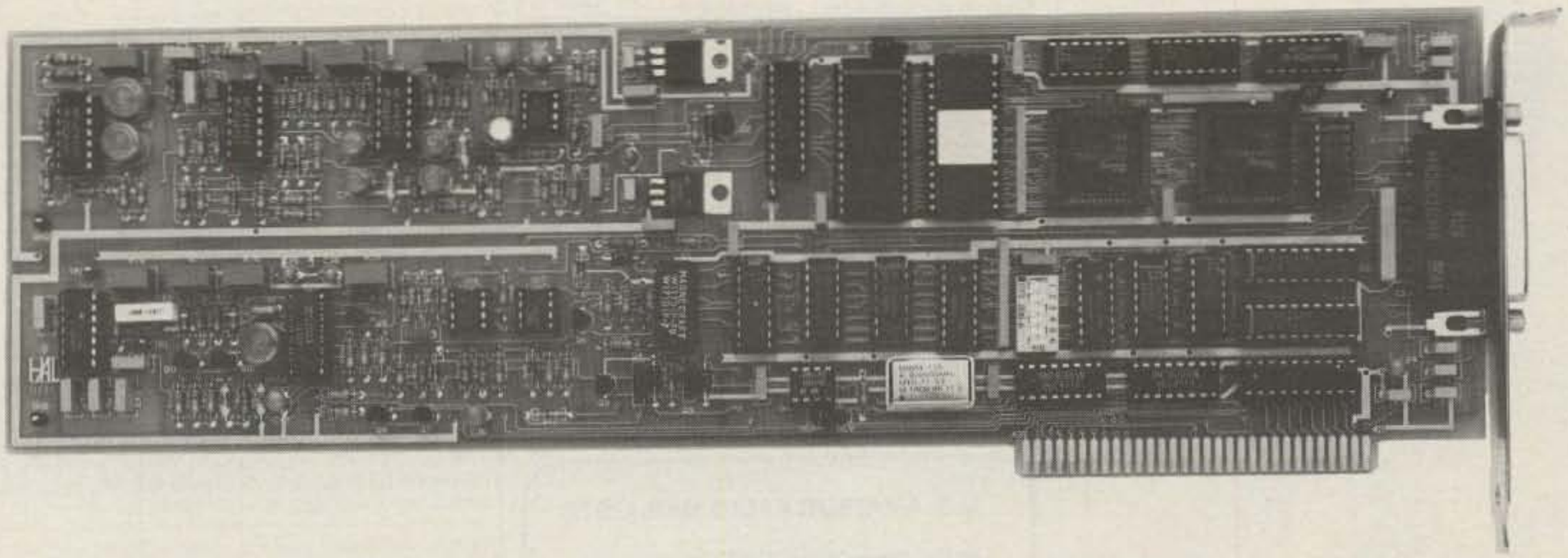
Larsen® Antennas

CIRCLE 172 ON READER SERVICE CARD

For Serious HF Work

Get the card that makes copying weak and fading signals possible!

The HAL PCI-3000 PC-AMTOR System



The PCI-3000 PC-AMTOR system gives you excellent HF performance on AMTOR, RTTY, and CW at a reasonable price. The PCI-3000 card plugs into a full size PC card slot. Filter circuits are optimized for 170 Hz shift - the RTTY and AMTOR standard. CW is optimized for an 800 Hz receive tone. Outstanding features of the PCI-3000 PC-AMTOR system are:

- Installs in your PC
- AMTOR, RTTY and CW modes
- High performance at a low price
- Split Screen operation
- Continuous receive storage
- Message transmission from disk
- APLink compatible
- HELP pages
- Search Mode
- Xmit & Rcv buffer storage
- Complete with software
- Optional SPT-2 & FIL-1

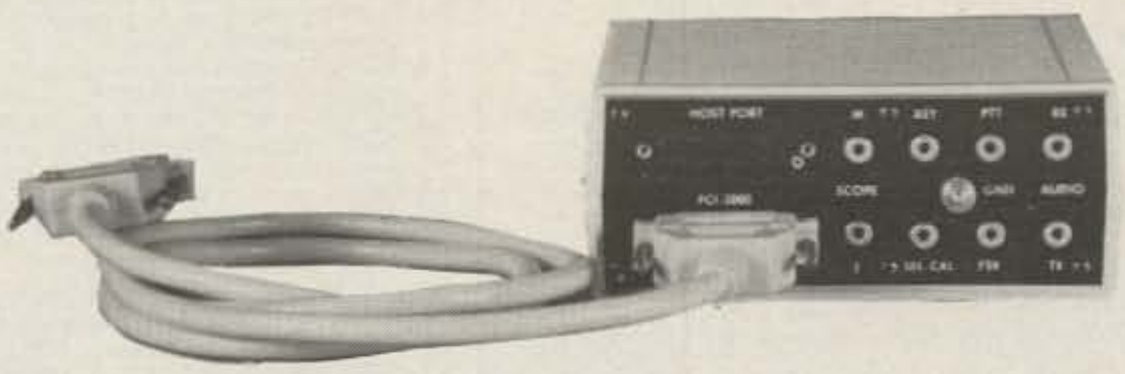
Don't wait any longer to experience what a true HF data interface can do for your station. Put your PC on the HF bands with high performance at a low price. Order the PCI-3000 PC-AMTOR system from HAL today!

SPT-2 Spectra-Tune

The SPT-2 makes tuning AMTOR, RTTY, and CW signals a breeze. It connects to the PCI-3000 via the supplied cable. The radio connections for the PCI-3000 are then made to the phono connectors on the SPT-2 rear panel. The tuning indicator is a 30-segment LED bar graph representing a 600 Hz range of the audio spectrum. The RTTY and AMTOR tuning range is centered at 2210 Hz. In CW mode the range is centered at 800 Hz. Simply tune the receiver until the signal is centered on the proper calibration marks.

FIL-1 AMTOR/RTTY Filter

If your transceiver doesn't have good RTTY filters, install the FIL-1 in your Spectra-Tune. The FIL-1 is a 500 Hz wide filter centered at 2210 Hz to optimize AMTOR and RTTY copy. The FIL-1 greatly reduces the noise input to the PCI-3000. This can mean the difference in barely detecting a signal and solid copy.



HAL Communications Corp.
P.O. Box 365
Urbana, IL 61801
Phone (217) 367-7373
FAX (217) 367-1701

PCI-3000 PC AMTOR with software **$395.**
SPT-2 Spectra Tune with cable **$169.**
FIL-1 Filter (installs in SPT-2) **$69.**
Complete System Price **$595.**

VISA and Mastercard Welcome

CIRCLE 171 ON READER SERVICE CARD

1992 CALLBOOKS

THE QSL BOOK!

Continuing over a 70 year tradition, we bring you two new Callbooks for 1992 with more features than ever before.

The 1992 North American Callbook lists the calls, names, and addresses for more than 500,000 licensed amateurs in all countries of North America from Panama through Canada, including Greenland, Bermuda, and the Caribbean islands, plus Hawaii and the U.S. possessions. 1,632 pages.
Item # 087123. (paper) $29.95

The 1992 International Callbook lists more than 500,000 licensed amateurs in countries outside North America. Its coverage includes South America, Europe, Africa, Asia, and the Pacific area (exclusive of Hawaii and the U.S. possessions). 1,888 pages.
Item # 087115. (paper) $29.95

Every active amateur needs the Callbook! Fully updated and loaded with extra features, the 1992 Callbooks will be published in December 1991. Order now from your dealer or send in the coupon below.

Please send me _____ copy(ies) of ***The 1992 North American Callbook*** (Item # 087123, $29.95) and _____ copy(ies) of ***The 1992 International Callbook*** (Item # 087115, $29.95).

I have enclosed my check/money order for $_____. (Please add sales tax in CA, DC, IL, MA, NJ, NY & TN, and $3.00 per book for postage and handling for U.S. shipments and $7.00 for all shipments outside the U.S.) Or call and charge on your credit card. MasterCard, VISA and American Express cards accepted.

Please be sure to include shipping instructions. Prepayment required and must be in U.S. funds. DRZI 0991

RADIO AMATEUR **callbook**
P.O. Box 2013 Lakewood, NJ 08701
1-908-905-2961 (Phone) 1-908-363-0338 (Fax)

CIRCLE 97 ON READER SERVICE CARD

TR100 Digital SWR & PWR Meter

- Large .7" 4 Digit L.C.D. •Freq (1.8 to 30mhz.)
- Auto Calculates SWR
- Peak Pwr 1625 Watts.
- SWR Sens. < 1 Watt
- Seperate Ferrite Toroid Bridge Unit.
- Reads SWR During Modulation AM, SSB, CW, FM.
- Has ALARM Function For SWR, Sixteen Set Points. Free INFO

Kits $124.00-$159.95
Assembled $210.00
219-432-3049 or Write:

RUPP ELECTRONICS
5403 Westbreeze Tr.
Fort Wayne, In. 46804

TNT *Today's No-Tune Multiband Antenna*

No pruning. No tuning. No knobs to twist.
TNT is No-Tune on 80 cw, 40, 20, 17, 12, 10. TNT/2 is No-tune on 40, 20, 10. Work other bands w/ tuner. DX &Gain rise w/ frequency.

Ready to Use
Includes isolation balun & 99 ft RG8x
The modern coax-fed version of the classic off-center fed windom.

Kink-Proof
Wx-Sealed
Low Noise

No Traps or Resistors
Insulated to 3000 V
Rated 500 Watts

TNT Windom $89.95 135 ft. long +$8 P&H
TNT/2 Windom $79.95 67 ft. long +$7 P&H

Technote 126--$6.95 ppd
AntennasWest
Box 50062C, Provo, UT 84605
Order Hotline 800-926-7373

CIRCLE 11 ON READER SERVICE CARD

U.S. AMATEUR RADIO MAIL LISTS

Labels, floppy disks, CD-ROM, mag tape.
- Newly licensed hams
- All upgrades
- Updated each week

BUCKMASTER PUBLISHING
Route 3, Box 56
Mineral, Virginia 23117
703/894-5777 visa/mc 800/282-5628

Quality Microwave TV Antennas

WIRELESS CABLE - IFTS - MMDS - Amateur TV
Ultra High Gain 50db(+) • Tuneable 1.9 to 2.7 Ghz.
- 36-Channel System Complete $149.95
- 12-Channel System Complete $114.95
- Call or write (SASE) for "FREE" Catalog

PHILLIPS-TECH ELECTRONICS
P.O. Box 8533 • Scottsdale, AZ 85252
(602) 947-7700 ($3.00 Credit all phone orders)
MasterCard • Visa • COD's • Quantity Pricing

LIFETIME WARRANTY

CIRCLE 88 ON READER SERVICE CARD

HIGH-ACCURACY ANTENNA SOFTWARE

MN 4.0 is the fastest, most powerful, and most accurate MININEC antenna-analysis program available. MN corrects fundamental problems in the MININEC algorithm for improved accuracy. MN features 3-D views of antenna geometry and wire currents, presentation-quality polar and rectangular plots, automatic wire segmentation, automatic frequency sweep, symbolic dimensions, skin-effect modeling, near-field calculation for TVI and RF-hazard analysis, up to 254 pulses for complex models, simple definition of sources and loads, and pop-up menus. MN 4.0, $85. MNC 4.0 (1.6-2.4 times faster, coprocessor required), $110. MNH 4.0 (huge-model option), $25.

YO 4.0 automatically optimizes Yagi antennas for maximum forward gain, best pattern, and minimum SWR. YO handles designs from HF to microwave. YO models stacked Yagis, Yagis over ground, skin-effect, dual driven-elements, element tapering, mounting plates, and matching networks. YO runs hundreds of times faster than MININEC. YO is calibrated to NEC for high accuracy and has been extensively validated against real antennas. YO is intuitive, highly graphical, and fun to use. YO 4.0, $100. YOC 4.0 (1.7-2.7 times faster, coprocessor required), $130.

NEC For Yagis 1.0 provides highest-accuracy analysis of Yagi designs with the professional-standard Numerical Electromagnetics Code. NEC For Yagis 1.0, $50. Coprocessor, hard disk, and 640K memory required.

MN and YO come with comprehensive antenna-design libraries and include both coprocessor and extra-fast no-coprocessor versions. All programs include extensive documentation and an easy-to-use, full-screen text editor. Add 6% CA, $5 overseas. VISA, MasterCard, U.S. check, cash, or money order. For IBM PC, 3.5" or 5.25" disk.

Brian Beezley, K6STI, 507-1/2 Taylor, Vista, CA 92084
(619) 945-9824, 0700-1800 Pacific Time

FOR SALE or TRADE: CQ/HR/QST/73 Magazines and Handbooks. SASE or call 508-947-4444, KA1VY, E. Guimares, 401 Bedford St., Lakeville, MA 02347.

9Y4VU is in need of a donation of a 6 meter transverter. Any-I.F., OK 28, 14MHz, etc. Mark package gift and ship directly to 9Y4VU.

SELL: Uniden BC 100 XLT (New List $199.95) Scanner $180. Wilson T-1402 SM, Charger, remote mike, leather case $100. W3CJI, 215-433-4485.

IBM XT COMPATIBLE: 512K, Mono monitor, 2 FDD, RS232, Para, like new, 6 mo warranty, FOB $495. Call 408-739-1833. Mike Bae, Box 4808, Santa Clara, CA 95056.

WANTED: 5 and 7 level TTY tape winders and Teletype LCXD T/D. Charles T. Huth, 229 Melmore St., Tiffin, Ohio 44883 (419-448-0007).

WANTED: Manual for DENTRON GLA 1000. Thanks! WB4CBU, 22 Greentree Drive, Scarsdale, NY 10583.

WANTED: Rohn 45 Tower sections. AA1K, Jon Zaimes, 107 Mullin Rd., Hilton Manor, Wilmington, DE 19809.

SONY ICF 2010 shortwave receiver. Like new. Box and manuals included, $250. Call Ellis, 215-642-0477.

SELL OR TRADE: Wilson T-1402 SM handheld, leather case, remote mike, keyboard, charger, 12 crystals. W3CJI, 215-433-4485.

YAESU FT DX 401 with mods $400, FV-401 remote VFO $125. Drake W4 wattmeter $50, D104 mike $25. All in excellent condition. Jerry, WA2KDB, 904-597-1399.

SELL: 4-element Yagi. Cushcraft ATB-34, Wt 42 lbs., 10-15-20M at 2KW. Good condition. $150 incl. ship to cont. USA. Call 606-236-6510. WQ4Z, George Griebe, 650 Chestnut, Parksville, KY 40464-9624.

FOR SALE: Drake T4XB/R4B/AC4/MS4 in mint condition. Includes D-104 microphone and speech processor, $400. Barry Kutner, W2UP, 207 Winding Lane, Newtown, PA 18940 (215-579-1487).

RAMSEY QRP-20 20 meter transmitter and HR-20 20 meter receiver, both assembled in Ramsey cases, $50 for both; Knight T-60 transmitter $25. Charles Bright, 4115 Buckley Ridge Ct., St., Louis, MO 63125 (314-544-5584).

ATTENTION JOHNSON, HAMMARLUND and COLLINS OWNERS. I am looking for several units for my collection. If you are interested in selling your old rig or station, please send a QSL stating price and condition to: KD4AJ, 1968 Huntington Hall Ct., Atlanta, GA 30338. All inquires will be answered.

FOR SALE: 10 meter transceiver $125. For info send SASE to P.O. Box 518, Whitehouse, FL 32220.

WANTED TO BUY: Hallicrafters radios. Send list, condition, and prices to: WB5UIA, 903 Madison, Minden, Louisiana 71055.

KENWOOD TM-2550A 45 watt 2M FM Transceiver. Complete with mike, bracket, cable with PL added. Mint, $300. Call KB9DD eves. at 619-459-4401 or Callbook address.

TRANSCEIVER, AMP, REPAIR, tube or transistors or IC. Please write or call Douglas Taylor, 1114 Westminster Ln., Garland, TX 75040 (214-495-7731).

IBM AT COMPATIBLE: New, by Tatung in slim case, 640K, 40MB HD, 1.2MB FDD, para, 2 ser. EGA monitor. FOB $995. Call 408-739-1833. Mike Bae, Box 4808, Santa Clara, CA 95054.

CRYSTALS: SASE for my list. K8LJQ, 2023 Lannen Rd., Howell, MI 48843.

FOR SALE: Bencher chrome paddle BY-2 $50. Vibrokeyer standard paddle $50. N2YY, 21 Rolling Hills Dr., Ridge, NY 11961 (516-924-6294).

WANTED: Copies of Yaesu FT-101 newsletters. Call Dave, WD4NSF, 904-475-5828.

RADIO BOYS books, Borland and Microsoft software for IBM PC, cordless Infra-Red headphones, more. SASE for list. Ed Kalin, K1RT, 255 Banks Road, Easton, CT 06612.

YAESU FL2100B Amplifier with 3 tubes, non-working, 1200 watts, $200. Dave, WD4NSF, 904-475-5828 or 904-328-2788.

ALUMINUM HEAVY WALL TUBING: Type 6061-T6, 2"OD × .25" wall. Great for masts, booms, projects. Discount priced. SASE: WS9W/Doug, Box 384, Stoughton, WI 53589.

WE HELP YOU to find friends among Russian radio amateurs who collect post stamps, badges, color post cards, little models of ships, cars, airplanes, etc. We'll publish bulletins with lists of collectors. Our bulletins will be sent to all who need our information or help. For inclusion in bulletin please send the following info: Name, Callsign, Address, Kind of collecting. PSE SASE to Val Sushkov, P.O. Box 3, LIPETSK 398000, RUSSIA.

Now, You Can Eavesdrop On The World. Introducing the new Drake R8 Communications Receiver. It's world class, world band radio, made in the U.S.A. From Perth to the Persian Gulf, Moscow to Mozambique, local or global, you hear events *as they happen* with amazing clarity. Since 1943, Drake

has been setting the standards in electronic communications. . .and then raising them. Today, there's no better shortwave receiver than the Drake R8. **Out-Of-This-World Performance.** The new Drake R8 has more standard features than other shortwave radios. You get wide frequency range (100 KHz to 30,000 KHz), coverage of all world and local bands, and excellent dynamic range. But you also get important features you won't find on receivers costing hundreds of dollars more. A multi-voltage power supply. Pre-amp and attenuator. Five filter bandwidths and synchronous detector. Dual mode noise blanker and passband offset. Non-volatile 100 channel memory. All designed to give you the best reception with the least distortion. **Down-To-Earth Design.** The ergonomic design of the R8 gives you real ease of operation. You have convenient keypad entry, with large, legible controls. The face is bold. Uncluttered. And the liquid crystal display (LCD) is backlighted for easy reading. **Try The R8. . . At Our Risk.** If you're not impressed by Drake's quality, performance and ease of operation, return the R8 Receiver within 15 days and we'll refund your money in full, less our original shipping charge.For more information, or to order, call **TOLL-FREE, 1-800-937-2530.** Telephone orders may be placed on a major credit card. $979.00 (Shipping and handling $10 in continental U.S. Ohio residents add 6½% tax.) Call **TOLL-FREE, 1-800-937-2530** today. You can't lose.

DRAKE

In touch with the world.

R.L. Drake Company • P.O. Box 3006 • Miamisburg, Ohio 45342 U.S.A.

FOR SALE: Realistic HTX-100 10 meter transceiver with 7 amp power supply. $200. Call Tom 803-579-4199.

WANTED: Collins 55G1 preselector, National HRO-500 Rcvr. Alan, N4LUS, 6001 Goldsboro Rd., Bethesda, MD 20817 (301-229-7069 before 0200 UTC).

WANTED: Swan 117C power supply for Swan 240, 350, 400. Please state price & condition. WB2WZE, 54 Willow St., Glen Ridge, NJ 07028.

WANTED: DAIWA CNW-319II Antenna Tuner, or any tuner that will tune both 6 and 10 meters. N5TSF, 501-329-3233.

WANTED: Plate meter for Heath SB-220 amp, 0 to 1 amp, can use substitute. George Bombria, W1WRN, 74 Quercus Ave., Willimantic, CT 06226.

PARTS—30 YEAR COLLECTION. All kinds of tubes, resistors, capacitors, chokes, xfmrs, tube sockets, plugs, xtals, etc. Will send a few small parts free for postage. K9ALD, 217-586-4958.

FOREIGN TELEGRAPH KEYS WANTED. Dick Randall, K6ARE, 1263 Lakehurst Rd., Livermore, CA 94550-1851.

WANTED: FL-2100-F Amplifier for the FT-902-DM Yaesu transceiver. Must be in cream-puff condition. Write Mac, WR5A, 1701 Westside Dr., Sherman, TX 75090.

LOW COST Ham equipment! Send stamp for list. WA4DSO, 3037 Audrey Dr., Gastonia, NC 28054.

FOR SALE: ATARI 800 computer system, 2 PERCOM floppies, AMDEK Color 1 + monitor, SEIKOSHA printer, 2 modems, 100s of disks, extra 800 for parts, 512K ram, supplies, books, more. Make an offer. 802-447-3330, Micky, N1JIF.

WANTED: NON-WORKING 440 FM mobile, dual band 2mtr/440, or 440 base. WB2GLW, Callbook address.

WANTED: Operating Manual for Swan Mark II Linear. Also need pair of 3-500-Z Tubes. Jim Lowe, W6JVK, 1521 Scenic Drive, Pasadena, CA 91103, (818-793-7374).

FOR SALE: IC751, FL52A, SM6 and RC10, just back from ICOM, $875. HTX100 10 mtr w/service manual, only two hours usage, $175. Butternut HF6VX vertical, $100. Hy-Gain TH6DXX and Ham II Rotor, $585. Pick up only on Hy-Gain. WJ8C, 419-447-9515 before 1900Z.

YAESU FT-211RH 45 watt 2 meter transceiver. Reversible squelch sloped front, tone squelch $250. AOR scanner AR2002, $300. Both perfect. Gerard, N2BFL, 212-873-9659 weekdays, after 7 pm EST.

GAINESVILLE, FL OTH, 3 BR, 2 BA house with garage on acre. Tribander, Tower, 160 inverted-v, TVRO Dish, $60,000. W4OMG, 904-495-2169.

LOWER MAST SUPPORT KIT for Ham 1, 2, 3, 4, and Tail-Twister rotor, $15.00. Walt Grosch, KZ9F, 1735 Stoneway Court, Richfield, WI 53076.

NEW HUSTLER 10M beam, 4 el. $100. I ship. Call 407-461-4093.

VAN GORDEN PD4010 parallel dipole, 10 through 40 meters with balun, approx. 67 feet overall, assembled, but not used (too long for my location), $30. Charles Bright, 4115 Buckley Ridge Ct., St. Louis, MO 63125 (314-544-5584).

BENCHER IAMBIC KEYER paddle w/black base and MFJ 422X keyer w/6 volt P/S. Mint cond., $95. Sal, NX2R, 201-768-7776 after 7 PM.

WANTED: Help from anyone who has experience with the power relay circuit in a Hallicrafters Model FPM200 transceiver. Tad, N3JZQ.

1992 CALLBOOKS. "Flying Horse." North American, $25.95; International, $25.95. Both $49.95. 1992 ARRL HANDBOOK, $23.95. Postpaid USA. California residents add 7%. Duane Heise, AA6EE, 16832 Whirlwind, Ramona, CA 92065-9679 (619-789-3674, eves.).

ELIMINATE MULTIPLE NOISE TONES in your receiver audio output. The revolutionary new JPS noise filter, Mod # NF-60, Digital Signal Processing, simple hook up to speaker jack. Unlike other NF's, notches out multiple varying tones. DEEP DISCOUNTED: $138.50 delivered cont. US! (Elsewhere, $150 plus shipping). Authorized dealer: DAVIS RF Co., P.O. Box 230-C, Carlisle, MA 01741. 24 HOUR ORDERS: 1-800-484-4002, ext. 1356.

REPLAY MODEL 3 by Analog Technology Digital Voice Message System. Three messages with max. of 32 or 64 seconds. Mint. See QST June 1988. $150 air post paid. A.F. Sephton, G3IJL, 16 Bloemfontein Avenue, Shepherds Bush, London, W127BL, England (081-749-1454).

FOR SALE: Yaesu linear FL-2100B $350.00, spare tubes 572B brand new $35.00 ea, Commodore 128 & 1541 disk drive plus accessories $350.00. K8SCA 313-373-5873.

WANTED: Drake R4-C, SPR-4, SW-4 or similar general-coverage receiver; Drake FS-4, VLF receiver, loop antenna, Bird wattmeter and slugs. Joe Holstein, N8EA, 1515 Sashabaw Rd., Ortonville, MI 48462.

COLLINS/HEATH/TEKTRONIX/BIRD radio/test equipment. Cleaning house. Sell/swap/trade. SASE for list/condition/price. WB5YLT, 6103 Royal Point Dr., San Antonio, TX 78239-1540.

SELL: Amateur radio equipment (and bought). List/$1 and SASE. Joe Bedlovies, P.O. Box 139, Stratford, CT 06497.

WANTED: Microdec Decoder or Code Star. 908-899-2005.

WANTED: Dead, dying, inexpensive ICOM 720 or 720A for parts. Mark Sihlanick, WB2NQT, 804-525-2921 evenings.

RADIO CLUB WANTS HEATHKIT EQUIPMENT. Dr. Fuzhou Tian, Chengdu Gen. Hospital, Tianhuitown, Chengdu P.R. China 610083.

IBM XT COMPATIBLE: 512K, mono monitor, 2 FDD, RS232, para, like new, 6 mo. warranty, FOB $495. Call 408-739-1833, Mike Bae, Box 4808, Santa Clara, CA 95054.

NEED POSTAGE HELP? I'll send you old mint U.S. postage for 90% of face value. 29¢ or 50¢ combinations. Great for QSL results! SASE and check to KN4OD, Box 766, St. Marys, GA 31558.

WANTED: Ham Radio Equipment Good/Bad. List/$1 and SASE. Drake MN-4 $150. Joe Bedlovies, P.O. Box 139, Stratford, CT 06497.

CRYSTALS: SASE for my list. K8LJQ, 2023 Lannen Rd., Howell, MI 48843.

WANTED: Fidelity/Riteway 4 x 5 film holders, modern metal field camera 4 x 5, flash bulbs #22, 50. Colbert, Burton, OH 44021.

FOR SALE or TRADE: CQ/HR/QST/73 Magazines and Handbooks. SASE or CALL (508-947-4444), KA1VY, E. Guimares, 401 Bedford St., Lakeville, MA 02347.

SELL: Heathkit DX40 as is, best offer plus shipping UPS. W3CJI, 2705 Andrea Dr., Allentown, PA 18103 (215-433-4485).

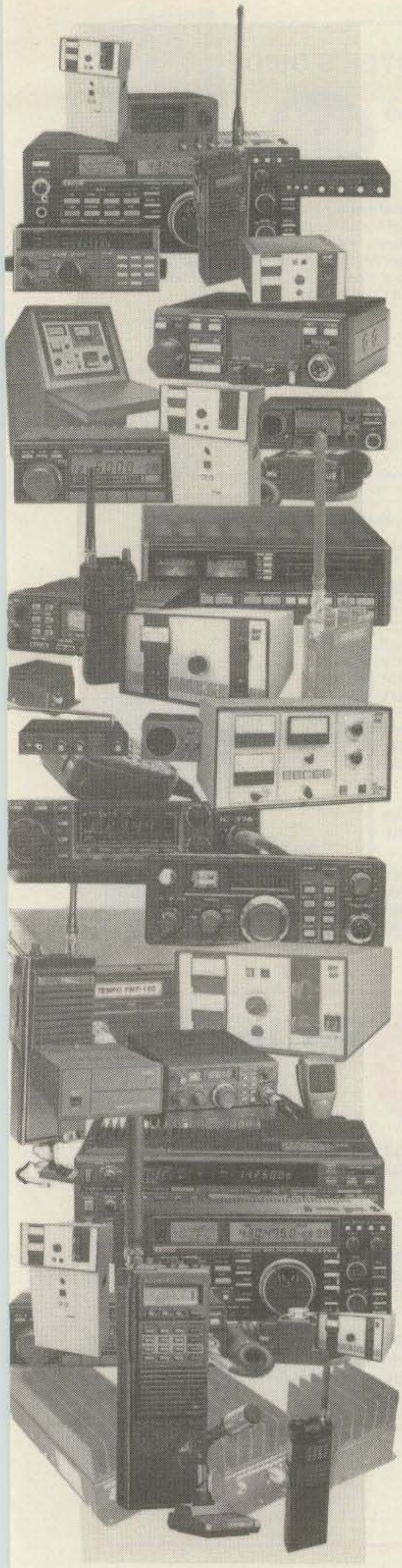
KENWOOD TM-241A Brand New, still in box with warranty card, $310.00. ASTRON RS-20M Brand New, $100.00. LARSON MAG-MOUNT Brand new, $40.00. U ship. K8TBW, 419-435-4127.

SELL: Unmodified, clean HQ110 receiver with manual, $75.00. Sever, 1701 Harcourt Drive, Leesburg, FL 34748.

ATLAS RX-110, TX-110 and matching power supply, schematics wanted please. Blair Shaw, VE6AGH, Box 445, Sweet Grass, MT 59484.

WANTED: Kenwood Phone Patch PC 1A. NA2Z.

(2) B&W coax switch $15, (1) D-104w/G-stand $20, (2) 829B tube w/sockets $2. RESISTORS: (2) 1M 200 watt $3, (5) 50K 50 watt $1, (5) .82 ohm 2 watt for L4-B $1. (1) Motorola mobile mike $2. (4) 813 sockets $2. U SHIP! K8TBW 419-435-4127.



HENRY RADIO. . .

65 years of providing the amateurs of 50 states and 100 countries with the honest, reliable service they deserve. Through good times and bad the Henry family never wavered from this commitment.

There are a lot of good reasons. We know that we have provided the kind of equipment and service that thousands of amateurs have come to expect. They keep coming back. We'll do our best to see to it that they, and you have every reason for coming back.

☆ A large inventory of fine equipment from the world's leading manufacturers ☆ A knowledgeable staff dedicated to amateur radio ☆ A complete line of accessories ☆ A well stocked repair shop staffed by experienced technicians ☆ We take trade-ins and sell used equipment ☆ Generous discounts on cash purchases ☆ We carry our own financing & accept most credit cards

Some of the names we stock include:

HENRY • TEMPO • KENWOOD • ICOM • YAESU • ACE • ADVANCED RECEIVER RESEARCH • AEA • AIM • ALEXANDER • ALINCO • ALPHA DELTA • AMECO • ANTRONIC • ARRL • ASTRON • B&K • B&W • BECKMAN • BENCHER • BIRD • BUDWIG • BUTTERNUT • CAL CHASSIS • CALRAD • CALTRONICS • CES • CENTURION • COMET • COMMUNICATIONS SPECIALISTS • CONNECT SYSTEMS • CREATE • CUSHCRAFT • DAIWA • DIAMOND • DIGIMAX • DIGITAR • DOW KEY • DURACELL • EASCO • EAVESDROPPER • EIMAC • ELENCO • FANON • GC • GORDON WEST • GRUNDIG • HAL • HEIL • HOXAN • HUSTLER • HY GAIN • ICOM • JABRO • JAPAN RADIO • KANTRONICS • LANDWEHR • LARSEN • LITTELFUSE • LMB • MAG INSTRUMENTS • MARK • MAXON • MFJ • MIDIAN • MILLEN • MIRAGE/KLM • MOTOROLA RADIUS • MULTICORE • MULTIPLIER • WM. M. NYE • OUTBACKER • PALOMAR • PANAVISE • PHILMORE • PIPO • PORTASOL • RADIO AMAT CALLBOOKS • RAWN • RF CONCEPTS • ROHN • SANGEAN • SELECTONE • SGC • SHURE • SIMPSON • SONY • STANDARD • SWITCHCRAFT • TEN TEC • TRI-EX • TRIPPLITE • TUBES • UNADILLA • UNIDEN • VAN GORDEN • VIBROPLEX • WACOM • X-10

Henry Radio

2050 S. BUNDY DR. LOS ANGELES, CA 90025 (310) 820-1234

Toll free order number: (800) 877-7979 TELEX: 67-3625(Henradio) FAX(213) 826-7790

CIRCLE 4 ON READER SERVICE CARD

Advertiser's Index

(continued on page 145)

any HF mode **and** Packet...

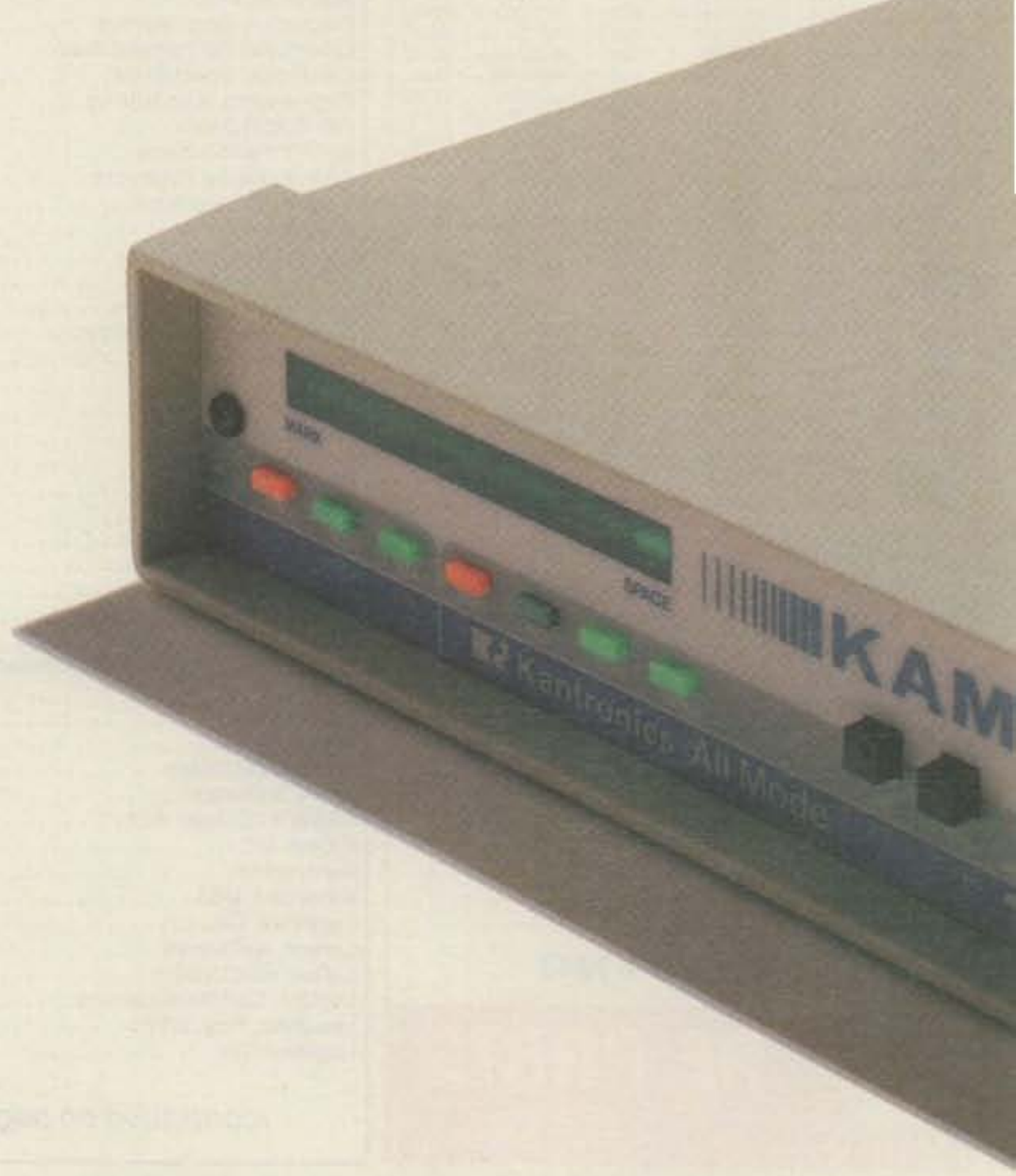
...at the same time

Kantronics Hostmaster II terminal software makes the multi-mode single keyboard system a reality. With a PC compatible computer, Kantronics All Mode (KAM ver. 4.0), your own HF\VHF transceivers and just a few keystrokes, you can work any mode on HF and packet on VHF at the same time.

Now with KAM version 4.0 firmware, you can operate CW, RTTY, FEC, ARQ, packet or copy NAVTEX on HF and packet on VHF/UHF simultaneously. Toggle back and forth between any HF mode and packet, view monitored and connected packets and HF data at the same time, or output text to your printer.

Additional features like scroll back for monitor/receive windows, built in text editor and multiple user programmable buffers which can be sent with a single keystroke enable you to easily run multi-channel and multi-mode whether you are a beginner or an expert.

The Host Master II /KAM all mode combination. The next step in the state of the art from Kantronics.



Kantronics 1202 E. 23rd St., Lawrence, KS 66046 913.842.7745 TELCO BBS 913.842.4678 FAX 913.842.2021

R-X NOISE BRIDGE

- **Learn the truth about your antenna.**

The Palomar R-X Noise Bridge tells you if your antenna is resonant or not, and, if it is not, whether it is too long or too short. It gives resistance and reactance readings on dipoles, inverted Vees, quads, beams, multiband trap dipoles and verticals from 1 to 100 MHz.

Why work in the dark? Get the instrument that really works, the Palomar R-X Noise Bridge. Model RX-100 **$79.95** + $4 shipping/handling in U.S. and Canada. California residents add sales tax.

SC FILTER

- **New switched capacitor audio filter.**
- **Twice as sharp as transceiver IF filters.**
- **For SSB, CW, Packet, all digital modes.**

16 pole filter! Lowpass for SSB. Bandpass for CW and digital modes. Lowpass cutoff and bandpass frequency continuously variable from 300 to 3000 Hz. Extremely sharp skirt selectivity cuts interference dramatically. Selectable bandpass 250, 100, or 45 Hz. Bass switch cuts out hum and rumble.
Connect between receiver and speaker or 'phones. 5 watts audio drive.

Model PF-300 $159.95 + $4 shipping U.S. & Canada. For 13.8v DC. **Model PS-95 AC adapter $15.** Calif. residents add sales tax.

VISA

Send for FREE catalog that shows our complete line of noise bridges, SWR meters, preamplifiers, loop antennas, VLF converters, baluns, SWL equipment, toroids and more.

PALOMAR ENGINEERS
BOX 462222, ESCONDIDO, CA 92046
Phone: (619) 747-3343
FAX: (619) 747-3346

Advertiser's Index (cont'd)

We'd like to see your company listed here too. Contact Arnie Sposato, N2IQO, at 516-681-2922 or FAX 516-681-2926 to work out an advertising program tailored to suit your needs.

KEYS

PK-100 Dual Paddle Key $109.95

PK-103 Single Paddle Key $99.95

PK-105 Hand Key $99.95

Machined brass by Kent of England. Assembled by Palomar in California. Rotary ball bearings. Smooth, effortless action. The greatest improvement in keys in 20 years. Add $4 shipping. Tax in Calif.

KEYERS

PK-44 Keyer $119.95

Iambic keying with dot and dash memories. Monitor speaker. Fully adjustable speed, volume, weight, and pitch. Keys any rig old or new.

PK-50 Message Memory Keyer $189.95

New! Easy to learn and easy to use. Four memories. Monitor with variable pitch and volume. Contest serial numbering, pause, etc. ***THE*** contest keyer. Add $4 shipping. Tax in Calif.

VISA

Send for free catalog. Has full details on our Keys, Keyers, Noise Bridge, SWR Meters, Preamplifiers, Loop Antennas, Toroid Cores, and more.

PALOMAR ENGINEERS
Box 462222, ESCONDIDO, CA 92046
Phone: (619) 747-3343
FAX: (619) 747-3346

VISA MasterCard COD

RADIO CENTER USA

EAST/MIDWEST TOLL FREE
1-800-821-7323

Kansas City, MO 64150
102 N.W. Business Park Lane
(816) 741-8118 • M-F 8-5, Sat 9-2

WEST TOLL FREE
1-800-345-5686

Sparks, NV 89431
12 Glen Carran Circle
(702) 331-7373 • M-F 8-5, Sat 9-1

AEA • ALINCO • ALLIANCE • ASTRON • ALPHA-DELTA • AMERITRON • BENCHER • BUTTERNUT • CUSHCRAFT • DIAMOND • HUSTLER • HYGAIN • ICOM

KENWOOD

TS-950SD SALE

TRANSMIT THE ULTIMATE SIGNAL
- Digital Signal Processing
- Dual Frequency Receive
- Digital AF Filter
- 100 Memories

SPECIAL PRICE—CALL NOW!

KENWOOD

TS-850S

ALL BAND, ALL MODE, HF
- Dual VFO's
- Multi-Mode Scanning
- 100 Memories
- Optional Digital TX and RX

CALL NOW!

KENWOOD

TS-450S

FEATURE LOADED, COMPACT HF
- SSB, CW, AM, FM, FSK Modes
- All Amateur Bands
- 100 Watts Output
- Receive 500 kHz-30 MHz
- Automatic Antenna Tuner

CALL AND ORDER TODAY!

KENWOOD

TS-140S

AFFORDABLE DX-ING!
- HF With Gen. Coverage Receiver
- All HF Bands • 100 W Output
- USB, LSB, CW, AM, FM
- Compact and Lightweight
- 81 Memory Channels

CALL NOW!

KENWOOD

TS-711A

2 METER ALL-MODE BASE STATION
- Frequency Range 144-148 MHz
- FM, USB, LSB, CW
- 40 Memory Channels
- Built-In Power Supply
- Microprocessor Controller Operation

CALL TODAY!

WINTER SALE

TM-241A

COMPACT 2 METER, FM, MOBILE
- Receives 118-174 MHz
- Big 50 Watt Output
- 20 Full-Function Memories
- CTCSS Encode Built-In
- Automatic Repeater Offset
- Easy To Read Display

CALL AND ORDER TODAY!

KENWOOD

TM-741A

FULL FEATURED, FM, MULTIBANDER
- 144 & 440 MHz Operation With Expansion To Include 28, 50, 220 or 1200 MHz
- Detachable Front Panel
- 303 Available Memory Channels

CALL AND ORDER TODAY!

KENWOOD

TH-77A

COMPACT, FM, DUAL-BAND HANDHELD
- Receive 136-165 MHz 438-450 MHz
- Dual Receive Function
- Built-In DTSS
- 2-5 Watts Available
- Full Duplex-Cross Band Operation

CALL NOW!

KENWOOD

TH-27A

COMPACT 2 METER HANDHELD
- Extended Receive Coverage
- 40 Memory Channels
- Multi-Function Scanning
- Optional 5 Watts Output
- Direct Keyboard Frequency Selection

CALL NOW!

AEA PK-232 MULTI-MODE TNC

- AMTOR, ASCII, BAUDOT, CW, WEFAX, NAVTEX, Packet
- PAKMAIL™ Mailbox With Third Party Traffic

PK-88
- Advanced Packet Controller
- Maildrop, Personal Mailbox Systems

GET DETAILS, CALL TODAY!

Kantronics

KAM

ALL-MODE TNC
- Operate HF and VHF Digital Modes
- RTTY, AMTOR, WEFAX, CW, Packet

CALL NOW!

rfconcepts

VHF/UHF AMPLIFIERS

FAST SWITCHING, AUTO KEYING, GaAsFeT Preamps, All Component PC Board Mount Design

2-23, 2M,	2 In/30W Out
2-117, 2M,	10 In/170W Out
2-317, 2M,	30 In/170W Out
2-417 2M,	45 In/170W Out
4-110, 440,	10 In/100W Out
4-310, 440,	30 In/100W Out

2/70 G, 2M/440, 3/30, 5/20

CALL TODAY!

uniden

MR8100
PROFESSIONAL TURBO SCANNER

- 12 Bands, 29-956 MHz
- 100 Channel Programming
- Large LCD Display
- 2 Scanner Speeds

Sale Priced **$269.00** **CALL NOW!**

QUALITY SERVICE WITH "LOW" RADIO CENTER PRICES

CASH FOR QUALITY USED GEAR—SEND SASE FOR USED LIST

VISA MasterCard DISCOVER COD

RADIO CENTER USA

EAST/MIDWEST TOLL FREE
1-800-821-7323
Kansas City, MO 64150
102 N.W. Business Park Lane
(816) 741-8118 • M-F 8-5, Sat 9-2

WEST TOLL FREE
1-800-345-5686
Sparks, NV 89431
12 Glen Carran Circle
(702) 331-7373 • M-F 8-5, Sat 9-1

ICOM **IC-765**

DX HUNTERS DELIGHT
- Direct Digital Synthesizer
- Built-in Auto Antenna Tuner & P/S
- Built-in IF Shift, Notch Filter and Narrow Filter

CALL NOW!

ICOM **IC-751A**

ADVANCED HF TRANSCEIVER
- All Mode, 100W Output
- 32 Memories
- Built-in Electronic Keyer and Full and Semi Break-in

GET ALL THE DETAILS!

ICOM **IC-735**

PROVEN HF WINNER
- Compact and Lightweight
- 100 Watts Output
- 12 Memory Channels
- General Coverage Receiver
- Programmed and Memory Scan Functions

CALL TODAY!

ICOM **IC-725**

COMPACT POWER PERFORMER
- Easy to Operate HF Transceiver
- General Coverage Receiver
- 100W Output, 26 Memories
- Dual VFOs with Split Capability

CALL NOW!

ICOM **IC-2410H**

DUAL BAND PERFECTION
- 2 Meter/440 MHz
- Receive 2 Frequencies Simultaneously Within Same Band
- 45 Watts/2M; 35 Watts/440 MHz
- 36 Memories; Compact Size

CALL TODAY!

ICOM **IC-3220H**

2 METER/440 MHz MOBILE
- Dual Band Receive and Transmit
- 36 Memories • Compact Size
- 45W/2 Meters; 35W/440 MHz
- Built-in Duplexer

CALL TODAY!

WINTER SALE

IC-229H STATE OF THE ART MOBILE
- Ultra Compact 2 Meter Operation
- 20 Memory Channels Store Operating Offset and Subaudible Tone Frequencies
- Big 50 Watts Output
- Auto Dialing For Autopatching and Repeater Control
- Big Rig Performance with Maximum Frequency Coverage

DON'T DELAY - CALL EARLY!

ICOM **IC-R72**

NEW BASE RECEIVER
- Receives 100 kHz-30 MHz
- SSB, AM, CW
- Five Scanning Modes
- 101 Memory Channels
- Internal Backup Battery and Built-in Clock

CALL FOR DETAILS!

ICOM **IC-R1**
HANDHELD RECEIVER

- Covers 100 kHz-1300 MHz with AM, FM, and Wide-Band FM
- Measures 1.9"W × 4.0"H × 1.4"D
- Direct Keyboard Entry and Rotary Tuning
- 100 Memories

CALL NOW!

ICOM **IC-W2A**
DUALBAND HANDHELD

- 2 Meter/440 MHz
- Simultaneous Receive on Both Bands
- Three Tuning Systems
- 60 Memory Channels
- 5 Watts Output
- Extra Wideband Receive

.L TODAY!

ICOM **IC-24AT**
COMPACT V/UHF DUALBANDER

- Crossband Full Duplex Operation
- Receive 140-150 MHz 440-450 MHz
- Versatile Scan Functions
- 40 Memory Channels
- Dual Band Display

CALL NOW!

ICOM **IC-2SAT**
MINI 2 METER HANDHELD

- Built-in NiCd Batteries
- Convenient Keyboard
- 48 Memory Channels
- Versatile Scan Functions
- 24 Hour Clock With Timer Function

CALL FOR DETAILS!

ICOM **IC-2SRA**
EXPANDED 2 METER HT

- Operate 2 Meters and Receive 25-905 MHz
- Simultaneously Listens to 2 Frequencies
- Receive AM, FM and Wide-FM
- Up to 5 Watts Output
- 3 Tuning Systems

CALL FOR DETAILS!

QUALITY SERVICE WITH "LOW" RADIO CENTER PRICES

CASH FOR QUALITY USED GEAR—SEND SASE FOR USED LIST

• KANTRONICS • KENWOOD • LARSEN • MFJ • MIDLAND • MIRAGE/KLM • M² • RFCONCEPTS • STANDARD • UNIDEN • VECTRONICS • YAESU

AEA • ALINCO • ALLIANCE • ASTRON • ALPHA-DELTA • AMERITRON • BENCHER • BUTTERNUT • CUSHCRAFT • DIAMOND • HUSTLER • HYGAIN • ICOM

VISA MasterCard DISCOVER COD

RADIO CENTER USA

EAST/MIDWEST TOLL FREE
1-800-821-7323

Kansas City, MO 64150
102 N.W. Business Park Lane
(816) 741-8118 • M-F 8-5, Sat 9-2

WEST TOLL FREE
1-800-345-5686

Sparks, NV 89431
12 Glen Carran Circle
(702) 331-7373 • M-F 8-5, Sat 9-1

YAESU

FT-990
HF PERFORMANCE WITHOUT COMPROMISE
- Built-In P/S And Antenna Tuner
- Dual VFO's With DDS
- Superior SCF Filter
- Multi-Mode And 50 Memories

CALL FOR ALL DETAILS!

YAESU FT-5200

NEW!

HIGH POWER DUAL BANDER
- Trunk Mountable, Removable Front Panel
- 144-148 MHz-50W HI, 5W LO 430-450 MHz-35W HI, 5W LO
- Independent TX/RX Frequencies
- FT-6200, 440MHz/1.2 GHz

CALL FOR ALL DETAILS!

ALINCO

DR-112
COMPACT FULL FEATURED 2M MOBILE
- 45 Watts Of "True FM"
- Multiple Scanning Modes
- 14 Memory Channels
- DTMF Encoder Built-In

CALL TODAY!

ALINCO

DR-599
2 METER/440 MOBILE
NEW!
- 45 W/2 Meter 35 W/UHF
- Cross Band Repeater Function
- Receiving and Scanning On Both Bands
- Detachable Front Control Panel

CALL FOR DETAILS!

YAESU

FT-411
MAXIMUM 2 METER HT PERFORMANCE

- Dual VFO's
- 40 Memories
- Extended Receive
- Built-In PL Encode/Decode
- Auto Repeater Shift

CALL FOR ALL THE DETAILS!

YAESU

FT-470
2 METER/70CM PERFECTED

- Simultaneous Receive On Both Bands
- Built-In PL Encode/Decode
- 10 Memories Each Band
- 2.3 Watts with 5W Optional

CALL FOR ALL THE DETAILS!

ALINCO

DJ-560
TWIN BAND HANDHELD

- Rx 130-173.995 MHz 400-519.995 MHz
- Up to 5 Watt Output
- Multiple Scanning Modes
- Direct Freq. Selection
- 40 Memory Channels
- Cross Band Full Duplex

CALL TODAY!

ALINCO

DJ-160T
DELUXE 2 METER HANDHELD

- Receive 137-173.995 MHz
- 20 Memories
- 3 Watts Standard
- 3 Scan Modes
- Store Duplex/ Simplex Pairs, Call Channel, 38 Encoding Subtones

CALL TODAY

MFJ MFJ

WINTER SALE

1278	Multimode Contl...	$239.95
1270B	Packet TNC2.....	$119.95
989C	3KW Deluxe Tuner..	$288.00
986	3KW Diff. Tuner....	$239.95
949D	300W Deluxe HF...	$129.95
948	300W HF Tuner....	$109.95
817	VHF SWR Cross/NDL.	$69.95
815B	HF SWR Cross/NDL..	$59.95
486	Deluxe Mem. Keyer.	$159.95
422B	Keyer W/Paddle....	$119.95
250X	2KW Dummy Load...	$27.95
208	VHF SWR Analyzer..	$79.95
207	HF SWR Analyzer...	$89.95
110	Deluxe World Clock.	$22.95
108	Dual 24Hr Clock.....	$18.95

CALL TODAY!

CAROL CABLE
(Columbia Cable)

4080 Rotor Cable	22¢/foot
4090 H.D. Rotor Cable	34¢
1108 RG8, Mini	21¢
1198 RG8, Super Flex	30¢
1180 9913 Type	41¢
1176 RG213, Mil Spec	36¢

10% DISCOUNT ON FULL ROLLS

STANDARD

C228A
TWIN BAND HANDHELD

- 2 Meters and 220 MHz
- 40 Memories
- DTMF Encoded Code Squelch and Paging Modes
- Multiple Scan Modes
- Frequency Entry Via Rotary or Keyboard

CALL FOR THE DETAILS!

STANDARD

C168A
DELUXE SUBMINI HT

- 2 Meter Handheld with Extended Receive
- 2.5, 2.8 or 5 Watts Output
- DTMF Paging and DTMF Coded Squelch
- CTCSS En/Decoder

CALL FOR ALL THE DETAILS!

ASTRON

• SL-11A	$69	• RS35M	$162
• RS12A	$73	• VS35M	$179
• RS20A	$90	• RS50A	$205
• RS20M	$112	• RS50M	$225
• VS20M	$128	• RM50M	$259
• RS35A	$144	• VS50M	$237

CALL TODAY!

ALLIANCE

HD-73
REPUTATION EARNED FROM QUALITY

ONLY $144 UPS PAID
- Dual-Speed Rotation
- Lifetime Factory Lubrication
- Aluminum Casings and Hardened Steel Drive Gears
- Easy to Install

Hy-Gain Rotors In Stock

Vectronics

HFT-1500
ANTENNA TUNER
- 3kW Peak SSB Power
- Digital Bar Graph
- Dual Balanced Directional Wattmeter
- 5 Kv Variable Capacitors

CALL TODAY!

QUALITY SERVICE WITH "LOW" RADIO CENTER PRICES

CASH FOR QUALITY USED GEAR—SEND SASE FOR USED LIST

NEW!

Ahead of the Competition...
...Again.

Yaesu give you what the competition can only dream about: powerful tures, simple operation and streamlined styling in one amazing package.

e new compact FT-415/815 handheld radio deliver more than a dozen v features, including backlit keypad and display, louder audio output d large, easy-access buttons. Both the FT-415 and FT-815 offer 41 mories, built-in DTMF calling and paging, and four power levels via the B-27 battery. As if that's not enough, you can customize your -415/815 handheld with an array of optional accessories.

e competition is still working on a radio that's as powerful and easy to as the FT-415/815 handheld. But why wait? Visit your Yaesu dealer ay and leap ahead of the competition.

own Actual Size

cifications subject to change without notice
cifications guaranteed only within amateur bands
Year Limited Warranty on all Amateur Products

FT-415/815

2M/UHF Handheld Transceivers

FT-415: 130-174 MHz Rx 140-150 MHz Tx

FT-815: 430-450 MHz Rx/Tx

41 Memories (All memories store separate transmit and receive frequencies for "odd splits")

2 VFOS

① DTMF Calling and paging built-in

Built-in VOX

② Back-lit Keypad and Display (with time delay)

③ DC Direct Operation (Automatically Charges Battery with 12 Volts, FNB-25 only)

④ Four Power Levels (With FNB-27 Battery)

Direct Keyboard Entry for All Functions

Programmable and Automatic Battery Saver (ABS)

⑤ CTCSS Encode/Decode Built-In

5 Watts Output With FNB-27 or DC Direct

⑥ Rugged Case Construction

Automatic Power-Off (APO) Turns Radio Off Automatically After 30 Minutes

DTMF 10 Memory Autodialer, Built-In

Selectable Frequency Steps (5,10, 12.5,15,20 or 25 KHz)

Four Ways to Scan (Band Scan, Memory Scan, Memory Skip, Programmable Scan)

Optional Accessories:

NC-42 1-Hour SMART Desk Charger

E-DC-5 DC Adaptor With Noise Filter

MMB-49 Mobile Mounting Bracket

YH-2 Headset for VOX Operation

FBA-12 AA 6-Cell Holder

Some accessories and options are standard in certain areas. Check with your Yaesu Dealer for details.

YAESU

Performance without compromise.

IC-725 HF TRANSCEIVER

Your First Step

If you've been looking for an entry-level HF and assumed an ICOM was out of your price range, read on.

The ICOM IC-725 is surprisingly low priced, while offering features and performance found on radios costing much, much more.

Band Stacking Register enables you to store frequency and mode for automatic return.

Ultra Quiet Operation. The IC-725's super-sensitive low noise receiver, with ICOM's Direct Feed Mixer (DFM) provides clear, fatigue free reception. It's specially designed cooling system with quiet fan reduces operational noise to a whisper.

ICOM's **DDS** (Direct Digital Synthesizer) generates ultra-clean waveforms, resulting in clear crisp reception and low distortion transmission.

Durable ICOM Construction means higher performance and reliability for years to come (i.e. sturdy aluminum die-cast frame and integral, efficient heat sink).

System Design. Rather than buying a radio you will soon outgrow, the IC-725 is designed to become an integral part of a high performance ICOM System.

The IC-725. Priced to be your first. Built to be your last. For more information, see your ICOM dealer or call the ICOM Brochure Hotline 1-800-999-9877.

...toward a First Class System

IC-725 HF Transceiver, PS-55 AC Power Supply, IC-2KL 500 watt fully solid state Linear Amplifier, IC-475 UHF Transceiver, IC-275 VHF Transceiver. All units can be computer controlled.

ICOM

Simply the Best©

CIRCLE 151 ON READER SERVICE CARD