

ICD 08241

# Amateur Radio

# CQ

SERVING AMATEUR RADIO SINCE 1945

Including

## HAM RADIO

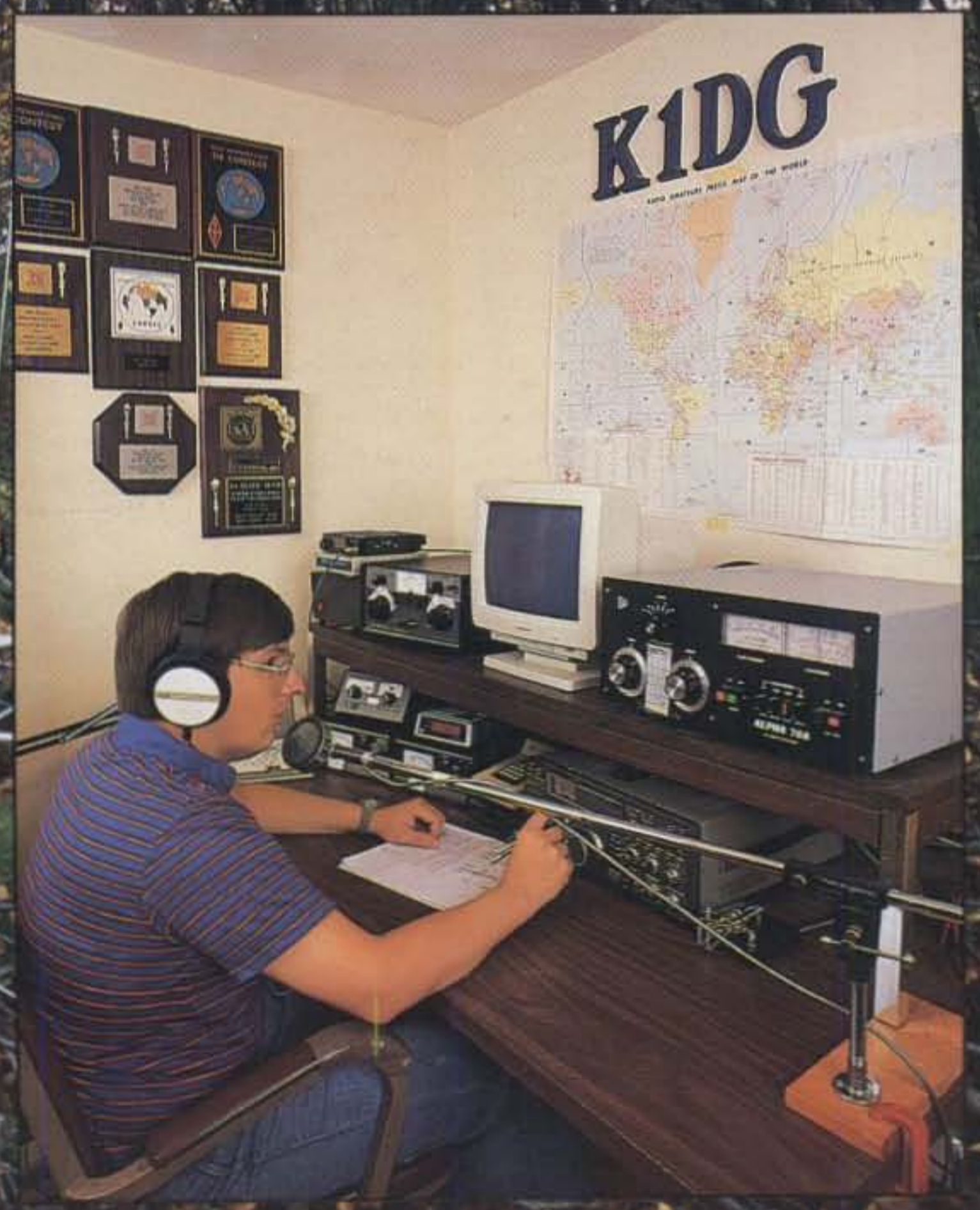
FEBRUARY 1991 \$2.95

CANADA \$3.95

### CQ Reviews:

- Kenwood's TM-941A Triband Transceiver ... page 18
- Bird's 4410 Wattmeter ... page 44
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On The Cover: K1DG, Windham, NH



IO AMATEUR'S JOURNAL

# KENWOOD

## Triple Play!



## TM-941A

### TRI-BAND FM Transceiver

Kenwood brings you yet another breakthrough—the TM-941A TRI-BAND FM TRANSCEIVER. Now you can operate on *three* bands—144, 450, or 1200 MHz—with one radio! This rig even gives you full duplex, cross-band, triple-band repeat!

- **High power output.**  
50 W on 144 MHz, 35 W on 450 MHz, and 10 W on 1200 MHz. (Selectable low power: 5 and 10 W, 1 W on 1200 MHz.)
- **Wide band receiver coverage.**  
118-174, 438-450, 1240-1300 MHz. TX on Amateur bands only. Modifiable for MARS/CAP. Permits required.
- **CTCSS encode built-in.**  
38 sub-tones selectable from the front panel.
- **Cross-band repeat function.**  
Selectable single or dual input! Off-set function on output, allows simplex to repeater repeat!
- **Simultaneous tri-band receive.**  
Individual volume and squelch controls help you "sort out" the signals.
- **Detachable front panel.**  
Use the optional PG-4K or PG-4L to mount the front panel remotely.
- **Selective calling option (DTU-2).**  
Selectively call a single station, or call a group with DTMF tones.
- **303 memory channels.**  
Store everything you need for efficient operation. All channels allow you to store "odd split" repeaters.
- **Versatile scanning functions.**  
Band scan, memory scan and programmed scan with carrier or time operated stop.
- **NEW! Auto memory scan.**  
Automatically memorizes a busy frequency while scanning the band!
- **Automatic repeater offset on 2 m.**  
Plus or minus 600 kHz for 144 MHz,  $\pm 5$  MHz on 450MHz, and  $\pm 12$  or 20 MHz for 1200 MHz. (Manual offset for 450 and 1200 MHz.)
- **Fixed detect output.**  
For packet operators!
- **Multi-function DTMF mic supplied.**
- **Auto power off and time-out timer.**

- **4-step dimmer control.**  
Selectable 4-step dimmer control.
- **Three separate antenna and speaker connectors.**  
For maximum performance.

#### Optional Accessories:

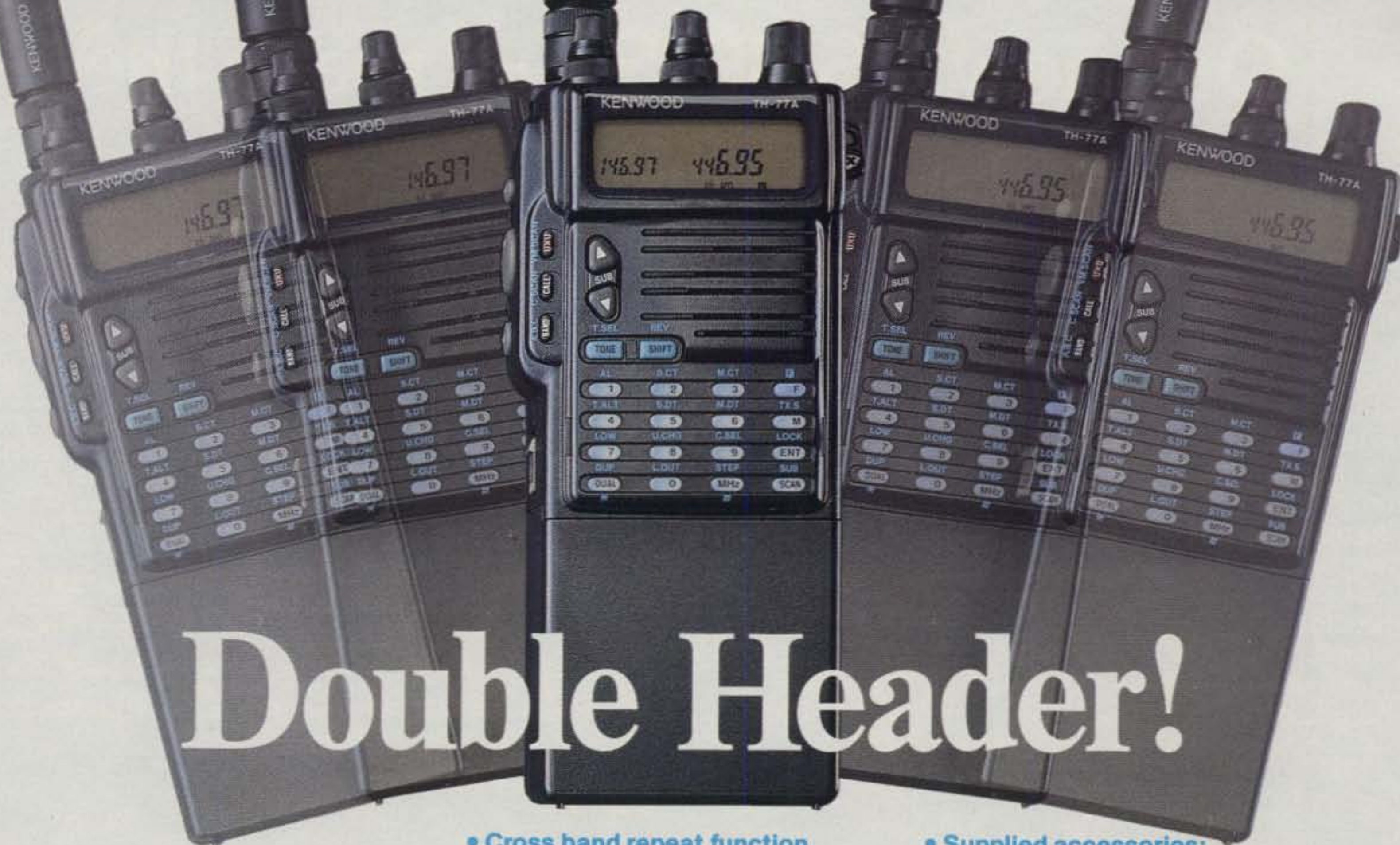
- DTU-2 Digital paging (DTMF) unit
- PG-4K, PG-4L Front panel cable kits
- MC-45 Multi function mic.
- MB-11 Extra mounting bracket
- SP-41, SP-50B External mobile speakers
- PG-3B DC line noise filter
- PS-430 Power supply
- PG-2N DC power cable
- TUS-7 CTCSS decode unit.

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

KENWOOD U.S.A. CORPORATION  
COMMUNICATIONS & TEST EQUIPMENT GROUP  
P.O. BOX 22745, 2201 E. Dominguez Street  
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P.O. BOX 1075, 959 Gana Court  
Mississauga, Ontario, Canada L4T 4C2

**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  
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P.O. BOX 22745, 2201 E. Dominguez Street  
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P.O. BOX 1075, 959 Gana Court  
Mississauga, Ontario, Canada L4T 4C2

# KENWOOD

...pacesetter in Amateur Radio

# KENWOOD

## Our new TS-850S just made the competition obsolete

No competition class transceiver is even in the same ball park as the TS-850S.

You'll find a superior inter-modulation dynamic range of 108 dB throughout the entire 100 kHz to 30 MHz range.

Kenwood's TS-850S is the only transceiver to feature Digital Signal Processing (DSP) – in both transmit and receive modes (with the optional DSP-100). This feature provides such greatly enhanced signal purity and richness that you'll want to experience it, to fully appreciate it.

Other advanced technology in the TS-850S includes 10 Hz step dual VFOs, multi-mode scanning, full and semi break-in CW, superior interference reduction, keyer, dual noise blanker, and RIT/XIT. 100 memory channels store, transmit, and receive frequencies independently. High boost for SSB signal "punch." Microphone supplied.

The Kenwood TS-850S. All band. All mode. One year warranty. In a class by itself!

Key options  
DSP-100 Digital Signal Processor.

AT-300 160 - 10 m external antenna tuner.  
AT-850 160 - 10 m internal antenna tuner.  
DRU-2 Internal digital recording unit.  
IF-232C Computer interface. PG-2X DC cable. PS-52 Power supply. SO-2 TCXO. SP-31 Matching external speaker.  
VS-2 Voice synthesizer. YG-455C-1 500 Hz CW filter for 455 kHz IF. YG-455CN-1 250 Hz CW filter for 455 kHz IF. YK-88C-1 500 Hz CW filter for 8.83 MHz IF. YK-88CN-1 270 Hz CW filter for 8.83 MHz IF. YK-88SN-1 1.8 kHz SSB filter for 8.83 MHz IF.

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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

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# MASTHEAD

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# The Radio Amateur's Journal



**ON THE COVER:** Doug Grant, K1DG asks "Why me?" as he surveys nature's handiwork following a big blow in Windham, NH. The inset photo shows Doug at the rig. (Photo by Larry Mulvehill, WB2ZPI)

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# ALINCO ELECTRONICS INC.



## DR-590T(NEW)

### VHF/UHF Twin Band Mobile

144-147.995Mhz(RX137—173.995Mhz)

440-449.995Mhz(RX410—469.995Mhz)

45W Hi, 10W Mid., 5W Low on VHF

35W Hi, 8W Mid., 5W Low on UHF

Cross Band Repeater Function Simultaneous Receiving and Scanning on both Band

Front Control Panel is detachable. Remote Control will be available (Option)

MAFS and CAP Modifiable (permit required)



## DR-570T

### Set your sights for dual!

The Alinco DR-570T "Twin Bander" has dual LCD readout, volume, squelch and tuning controls. Double barreled power with 45W on 2M and 35W on 70 cm, plus simultaneous receive on both bands or intermix with four modes of scan. The DR-570T will win the "battle" with its illuminated front function panel and LCD readout, readable in any lighting conditions. Don't let the "Tiny" DR-570T fool you! It's fast, and leaves the competition in the dust with many standard features you expect. Cross band repeat with the flick of a switch. Full duplex, 20 memory channels, call channels, 16-key DTMF Microphone, and subtones are just a few. "Reach" for the DR-570T today!



## DR-110T & DR-410T

### Tiny 2M Power From Alinco!

DR-110T, this 2M Alinco, enters the nineties a proven winner with the "reputation" of best value. The DR-110T packs a powerful 45W on 2M and sports all the features you expect in today's transceivers. Tuning is a snap with the multi-functioned easy-to-see keyboard, 14 memory channels, subtones, scan, multi-colored LCD readout, reverse, are a few of the many features of the DR-110T. The mobile of the future-today! DR-410T available for 70 cm.



## DR-510T

### Best Dual Value on the Market!

The Alinco DR-510T has most of the outstanding features of its sister the DR-570T, including 14 memory channels, cross band duplex and cross band repeat. The multi color LCD display, and simple tune control panel makes simplicity the key word. The DR-510T with 45/35 watts is the best, featurepacked dual bander on the Amateur market today. See the DR-510T along with the other Alinco "Magnificent" ones at your favorite dealer today!

## DR-112T (NEW)

### Full Featured 2M Power Pack.

The DR-112T is a "True FM" full-power (45 watts) transceiver. The backlit LCD display is ideal for bright or dim lit conditions. And, as with most Alinco products, the control panel is engineered to be "User friendly" and still offer a full range of features.



# ALINCO ELECTRONICS INC.

## DJ-560T (NEW)

### Full Featured Twin Band Handy

We packed almost all of the features you would find in a full sized mobile Twin Bander into this compact HT. The DJ-560T has key board entry, CTCSS encode built in, several scanning modes, 40 memories, fully programmable, Autodialer, Dual Display (2 Meter & 70 Cm). The DJ-560T is sitting on top of the mountain.



## DJ-100T & DJ-120T & DJ-200T

### Best 2M Micro Value

The Alinco DJ-100T/DJ-120T is "Magnificent" for its tiny size, but stands up to the competition with power and capability. 10 memory channels store offsets and subtones. Has LCD readout with call channels and reverse at your fingertips. 500 mah battery with direct DC to DC is standard. 3W on standard battery, 6W on optional battery leaves the competition in the dust! DJ-200T for 220 MHz.

## DJ-500T

### Power-Packed Dual Handil

20 Memory channels, subtones, built-in DC to DC, 700 mah nicad battery, LCD readout with 6W on 2M and 5W on 70cm (with optional battery) call channels, DTMF Touchtone, and direct keyboard entry, are just the few winning features of the Alinco DJ-500T Dual Band Handheld. Easy to use, and Value Priced at your Alinco Dealer.

## DJ-160T & DJ-460T

### 2M H/T is here! And wow!

"Bells & Whistles" is a tame word to use for the new DJ-160T, newest "Magnificent" one from Alinco. Keyboard entry is just one of four ways to enter a frequency in the extended receiver (137-173.995 Mhz) of the DJ-160T. You can store duplex /simplex pairs in any of 20 Memories, or Call Channel, with offsets, and any of 38 encoding subtones. Choose one of 3 scan modes, "Band" "Program" or "Memory" and one of five step ranges in VFO. Priority mode can be used in VFO, Memory or Call. "Dual Watch" allows the DJ-160T to scan 3 seconds alternately on CALL, VFO or one MEMORY. "Pager" is for group or single person alert. Other features include: Auto "Battery Save", Auto "Power Off", and 2-Memory Autodialer. Get 3-watts on standard 700 mah battery, or increased power from built-in DC to DC, or optional 12V battery. The Alinco DJ-160T, now the "Top Gun" with the competition today! DJ-460T for 70 cm.



CIRCLE 1 ON READER SERVICE CARD

**ALINCO ELECTRONICS INC.**

438 AMAPOLA AVE., LOT 130, TORRANCE, CALIFORNIA 90501  
TEL: (213) 618-8616 • FAX: (213) 618-8758

**NEW  
DUAL BAND RINGO**

# Cushcraft

## AR-270 (2m/70cm)

*The engineering hams at Cushcraft bring to you an all new computer aided design.*

AR-270 uses the latest technology to give excellent gain and low angle radiation in a durable all aluminum antenna. It is a perfect choice for FM simplex, repeater or packet radio. Enjoy the full performance of your dual band radio with this exciting new antenna.

- Excellent gain
- Broadband, minimum VSWR
- All aluminum - reduces static build-up
- No painted surface to chip peel or crack
- UV stabilized insulators
- Precision wound coils won't detune
- SO-239 connector
- Less than 4 feet high
- DC ground for lightning protection
- Mounting flexibility
- Rust free stainless steel hardware
- RF de-coupling eliminates TVI
- Amazing performance

AR-270 144-148 MHz  
435-450 MHz

ARX-450B

AR-270

ARX-2B

## RINGO RANGERS

*The world's most popular 2 meter, 1 1/4 meter and 70 cm antennas.*

They stand tall to give you more performance and wider area coverage. Ringo Rangers are your best single band antenna choice for FM repeaters, simplex or packet radio. There are many imitations, but none equal the value of a Ringo Ranger.

- Excellent gain and bandwidth
- Optimum low angle radiation
- Broadband with low VSWR
- Highest power rating
- Built in lightning arrester
- RF de-coupling radials
- All weather performance
- SO-239 connector
- Rust free stainless steel hardware
- Slim profile for better appearance
- Durable static free aluminum
- Traditional Cushcraft value

ARX-2B 135-160 MHz  
ARX-220B 220-225 MHz  
ARX-450B 435-450 MHz  
ARX-450BN\* 435-450 MHz

\* N connector

AVAILABLE THROUGH  
DEALERS WORLDWIDE

 **Cushcraft**  
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TEL: 603-627-7877 • FAX: 603-627-1764

CIRCLE 69 ON READER SERVICE CARD



# ANNOUNCEMENTS

•**The 8575 Repeater Group Net** - This Long Island, New York UHF net is held every Tuesday at 8 PM on 448.575, WB2CPE/R, for gathering and exchanging information about ham radio, introducing newcomers to the group, and promoting activity on the repeater. Net control operator is Joe, KB2IPL.

•**Dayton Hamvention, All Aboard** - Bus tour from southeast Pennsylvania, \$143, includes motel three nights and bus fare. Reservations by February 28. TRIAC ARC, P.O. Box 304, Coatesville, PA 19320 (215-269-4844).

•**K3YTL from Wilkes-Barre, Pennsylvania** - The Murgas ARC will operate K3YTL celebrating the 85th anniversary of Father Joseph Murgas's first public transmission over land. Operation will be on February 2nd and 3rd 25 kHz up from the General phone band and the Novice 10 meter band. For QSL send your QSL and SASE to K3YTL, P.O. Box 1094, Wilkes-Barre, PA 18703-1094.

•**N5OWD from Austin, TX** - N5OWD will operate from 1400-2300Z on February 9 to commemorate the tenth anniversary of The Armadillo BBS. Operation is the Novice/Tech phone portion of 10 meters. For certificate, send SASE (legal size or 9 x 12) with QSL to Ron Hawkins, N5OWD, 1459 South Meadows, Austin, TX 78758.

•**KH6HU from Waimea, Kauai, Hawaii** - The Kauai ARC will operate KH6HU from 2200Z February 22 to 0600Z February 24 to commemorate the landing of Captain James Cook. Operation will be 25 kHz up on the General 80, 40, 20, 15, and Novice 10 meter phone bands. For certificate, send QSL and SASE to KH6HU, c/o KARC, P.O. Box 548, Kalaheo, Kauai, Hawaii 96714.

•**N6RTV from Official Center of the World** - The Yuma, Arizona ARES will sponsor special event station N6RTV from the center of the world, near Yuma, Arizona to celebrate Amateur Radio Day 1991. N6RTV will be on the following bands: 10 meter Novice SSB 28.418 MHz, 15 meter General SSB 21.318 MHz, and 20 meter General CW 14.034 MHz. For certificate send QSL and 9 x 12 SASE to Yuma ARES, c/o U.S. Post Office, Felicity, CA 92283.

•**KB7FZC from Phoenix, Arizona** - The Motorola Radio Club of Arizona will operate KB7FZC from Papago Park, Phoenix, to commemorate Arizona Statehood Day. Operation will be from 1500Z February 9 to 0200Z February 10. Suggested frequencies: CW 7.130, 14.050, 28.050; SSB 7.150, 14.280, 18.155, 21.380, 28.450 MHz. For certificate send large SASE with QSL to John Tucker, KB7FZC, 2802 N. 34th St., Phoenix, AZ 85008.

•**KL7KC from Fairbanks, Alaska** - Special event station KL7KC will operate between February 22 and March 10 during the running of the 8th annual Yukon Quest International Sled Dog Race in the General portion of the 80, 40, 20, 15 meter bands and Novice portion of 10 meters. CW on or near 7.050, 14.050, 21.50, 28.200. QSL via KL7KC, P.O. Box 81389, Fairbanks, AK 99708.

•**NQ7Q from Laramie, Wyoming** - The University ARC will operate NQ7Q from 0001-2400Z on February 9 in commemoration of the renovation of Wyoming Territorial Prison. Operation on CW 7.050 and 7.110; SSB 3.925, 7.250, 14.275, 21.325, and 28.325. For QSL

send QSL and SASE to University ARC, NQ7Q, P.O. Box 3625, University Station, Laramie, WY 82071.

•**WB7TJD from Apache Junction, Arizona** - The Superstition ARC will operate WB7TJD to celebrate Lost Dutchman Days on February 16-17. Operation on 20, 15, and Novice portion of 10 meters. Local contacts via 147.12 MHz. For certificate and club QSL send 2 units of postage on 8½ x 11 SASE to WB7TJD, P.O. Box 1551, Apache Junction, AZ 85217.

•**VE7NOR from Vernon, BC, Canada** - The North Okanagan RAC will operate VE7NOR from the 31st Annual Vernon Winter Carnival from February 1-10 on 28.575, 14.275, 7.175, and 3.775. For award send QSL or log information of a QSO with VE7NOR (contacts can be made with VE7NOR at any time of the year to qualify for the award), plus \$1.00 or 2 IRCs to Winter Carnival Award—VE7NOR, Box 1706, Vernon, BC, V1T 8C3 Canada.

•**The following hamfests, etc., are slated for February:**

Feb. 9, **Orange County, New York ARC Winter Hamfest**, John S. Burke High School, Goshen, New York. Contact Greg, KB2AUQ, RD 3 Box 349, Wallkill, NY 12589, or call 914-895-2113. (VE exams.)

Feb. 9, **Midwinter Madness Ham Radio & Hobby Electronics Show**, National Sports Center, Blaine, Minnesota. Contact Robbinsdale ARC, P.O. Box 22613, Robbinsdale, MN 55422.

Feb. 10, **Mansfield Mid-Winter Hamfest/Computer Show**, Richland County Fairgrounds, Mansfield, Ohio. Contact Dean Wrasse, KB8MG, 1094 Beal Road, Mansfield, OH 44905, or call 419-589-2415 after 4 PM EST.

Feb. 16, **Cherryland ARC Hamfest**, Immaculate Conception School, Traverse City, Michigan. Contact Ken Musson, W8QKP, 9680 Peninsula Drive, Traverse City, MI 49684 (616-947-1372).

Feb. 16, **Algonquin ARC Electronics Fleamarket**, Marlboro Middle School, Marlboro, Massachusetts. Contact Ann, KA1PON, 508-481-4988, or write to AARC, Box 258, Marlboro, MA 01752. (VE exams at 9 AM pre-registration required, wheelchair accessible.)

Feb. 16, **Salem & Oregon Coast Emergency Repeater Assns. 1991 Ham Fair**, Polk County Fairgrounds, Salem, Oregon. Contact 1991 Ham Fair, P.O. Box 784, Salem, OR 97308, or call 503-585-9554.

Feb. 16-17, **Sarasota ARA Hamfest & Computer Show**, Roberts Sports Arena, Sarasota, Florida. Contact John Bates, 5604 Antoinette St., Sarasota, FL 34232 (813-371-6104). (VE exams Sunday 10 AM.)

Feb. 17, **Aurora Repeater Assn. Swapfest**, Jefferson County Fairgrounds, Golden, Colorado. Contact Judi, WD0HNP, 303-450-6910, or write to Aurora Repeater Assn., P.O. Box 39666, Denver, CO 80239.

Feb. 17, **LIMARC Hamfest**, Electrician's Hall, Melville, New York. Contact Neil Hartman, WE2V, 516-462-5549, or Mark Nadel, NK2T, 516-796-2366.

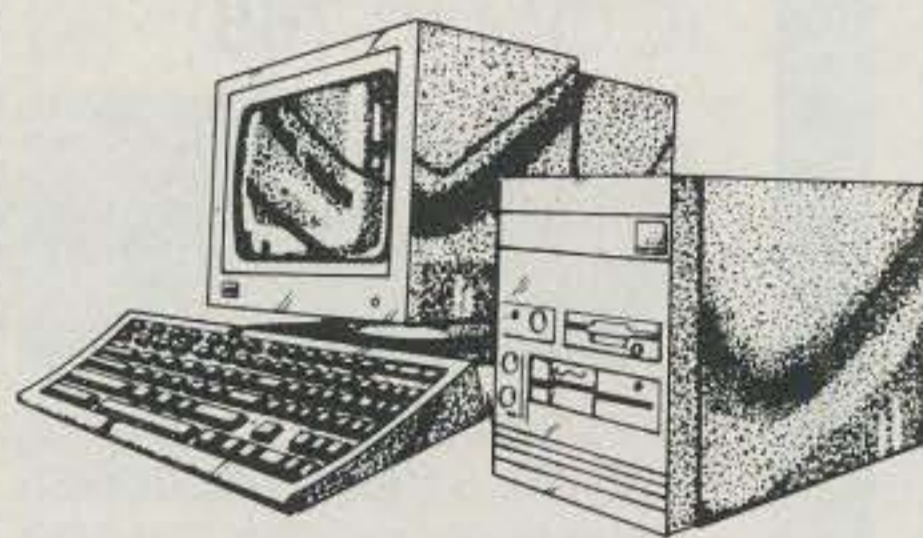
Feb. 23, **Hernando County ARA Hamfest**, Hernando County Fairgrounds, south of

(continued on p. 118)



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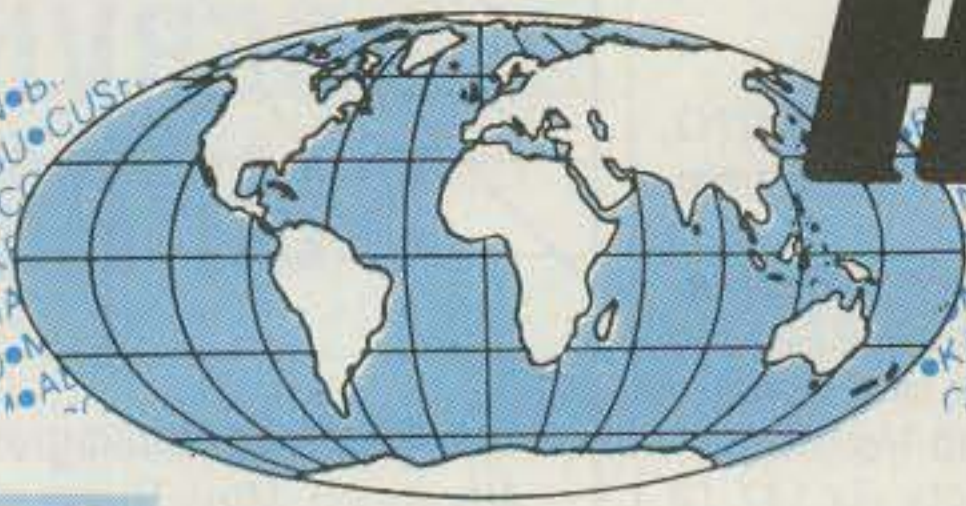
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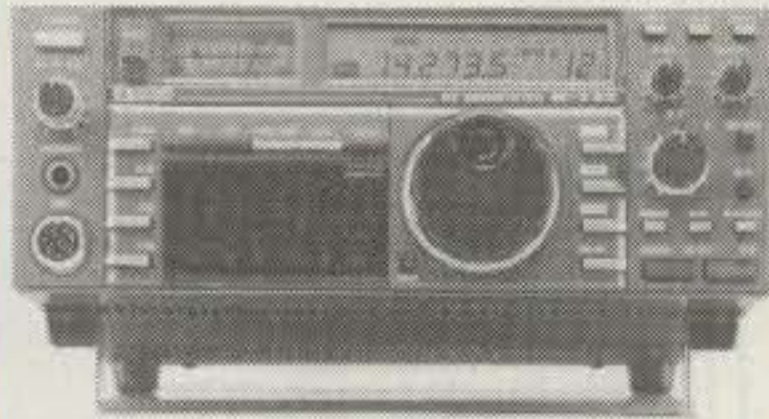


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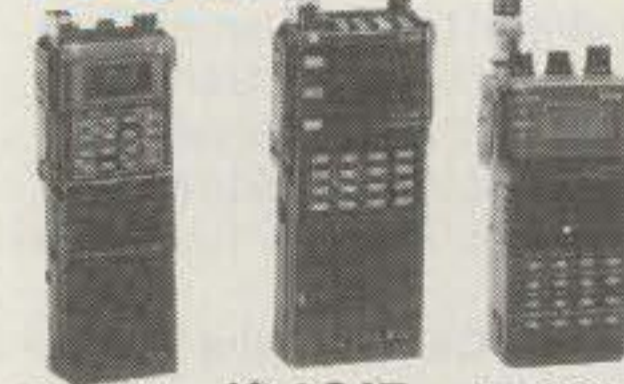
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**Last November over 40,000 amateurs had reason to rejoice at adding a new one to their list. Here's the story behind the HKØTU operation.**

## **DXpedition To Malpelo Island, HKØTU**

**BY RAUL GONZALEZ\*, HK1LDG**

**A**t the June 1, 1990 National Convention of the Colombian Amateur Radio League (Liga Colombiana de Radioaficionados) a committee was formed to put together a DXpedition to Malpelo Island later in the year. As one of the members of this committee, I didn't hesitate to call on amateurs worldwide to help make this operation a success. People such as John, TG9VT, Gin, JA1ACB, and ICOM's KF7GH came through with expertise and equipment. Many groups and associations also came forward with their help. What you are about to read was made possible by the help of many amateurs, and our group extends our gratitude to all of them.

The point of departure for the DXpedition was the city of Cali, and our transportation to the island was provided by the Colombian Navy. On October 28, 1990 Peter, HK1HHX, Dave, KH1KXA, and I flew to Cali where we met up with the other fifteen DXpeditioners (including two TV cameramen). We packed our equipment and provisions in metal and plastic containers for the journey, and then loaded the containers on military vehicles for the trip to the seaport. The next day, while our gear rode a military convoy, the band of DXpeditioners took a bus to the seaport of Buenaventura. We arrived at night and checked into an English-style hotel, the Hotel Estacion, where we also had our first official meeting with the Naval Commander and some of his officers. They advised us what we would be doing for the next several days and specifically about our individual safety on this trip.

Daybreak, October 30 found us gathered in the hotel lobby eager to start our amateur radio adventure. Our ship, a Colombian Navy vessel called the *Sebastian de Belalcazar*, was a refurbished



*Our host ship, the Colombian Navy vessel MV Sebastian De Belalcazar, brought us safely to and from Malpelo.*

U.S. Navy vessel built in 1943. It was built in New Jersey and originally commissioned as the *SS Jicarilla*, which we were told was the name of an Indian tribe. We left port about noon, and that evening we reached the Navy Base at Malaga. The next morning we were out on the Pacific Ocean, sailing for Malpelo. We were allowed to operate from the ship, so we kept in contact with our relatives, friends, and fellow amateurs via an IC-765 and a dipole. Some of us, however, preferred to stay in bed, nursing our developing seasickness.

Midnight, November 1st. It was very dark, and most of us were sleeping when the vessel stopped. The noises from the deck crew accompanied by the clanging of the anchor chain signaled our arrival at Malpelo Island. We all were up by then staring through the dark at the vague

shape of Malpelo and a couple of small lights from a fishing vessel whose captain sought a snug anchorage in the lea of the island for the night.

---

### **Malpelo Island**

---

In the early light of day the island looks like a volcano, which actually is its heritage. It is 1½ miles long by ½ mile wide. The highest point on the island, "La Mona," is 1300 feet above the ocean. There are numerous rocks around the island, plainly visible, and they were being buffeted by large waves and strong winds. As we found out, it is hot and humid during the day and very cold at night. The island itself seems to just rise out of the ocean with steep sides, and there are no sandy beaches as one would expect.

\*Apartado Aero 6060, Barranquilla, Colombia, South America

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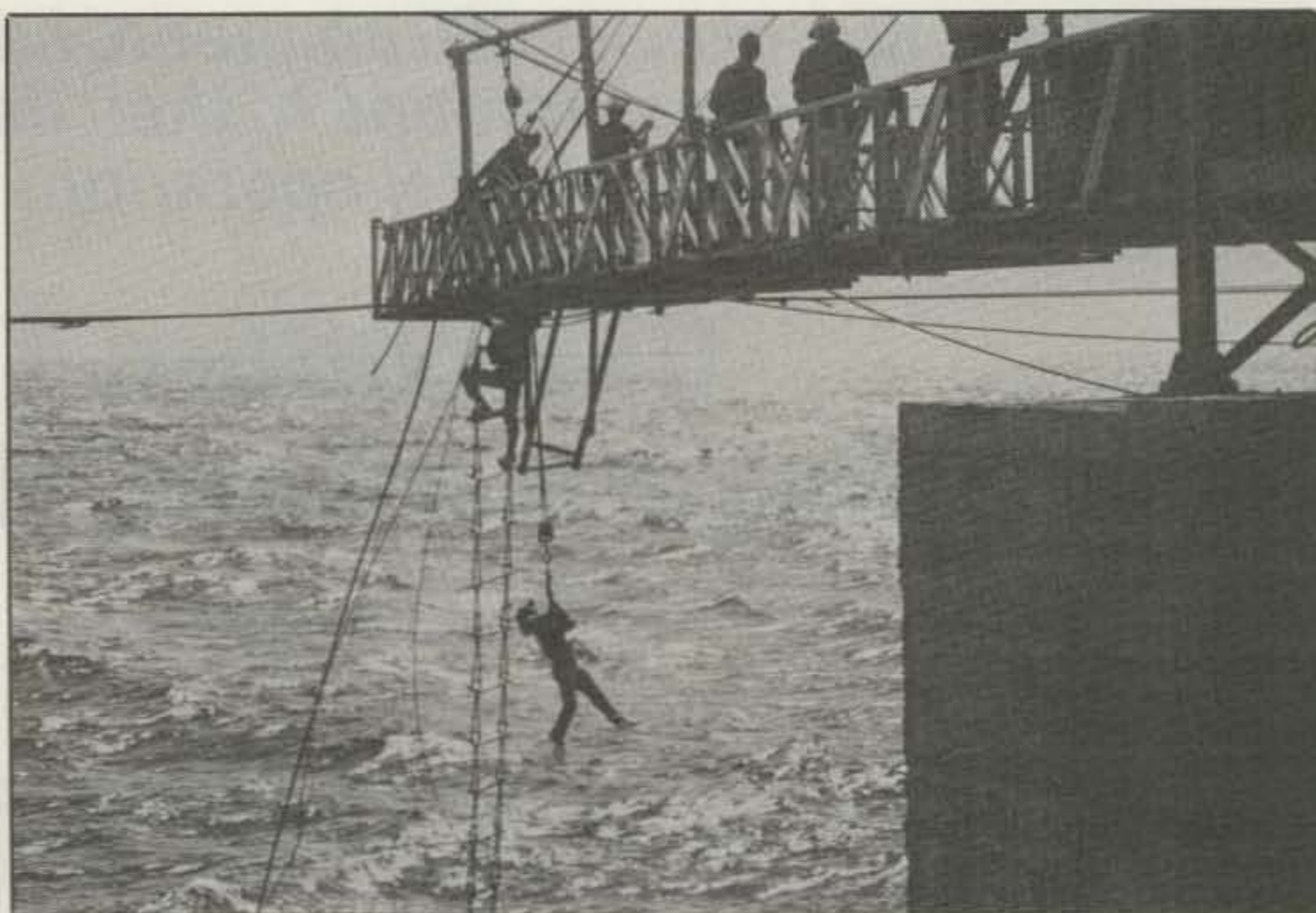
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*Landing Method One. This method is also used when departing the island and is something that we would have preferred to avoid.*

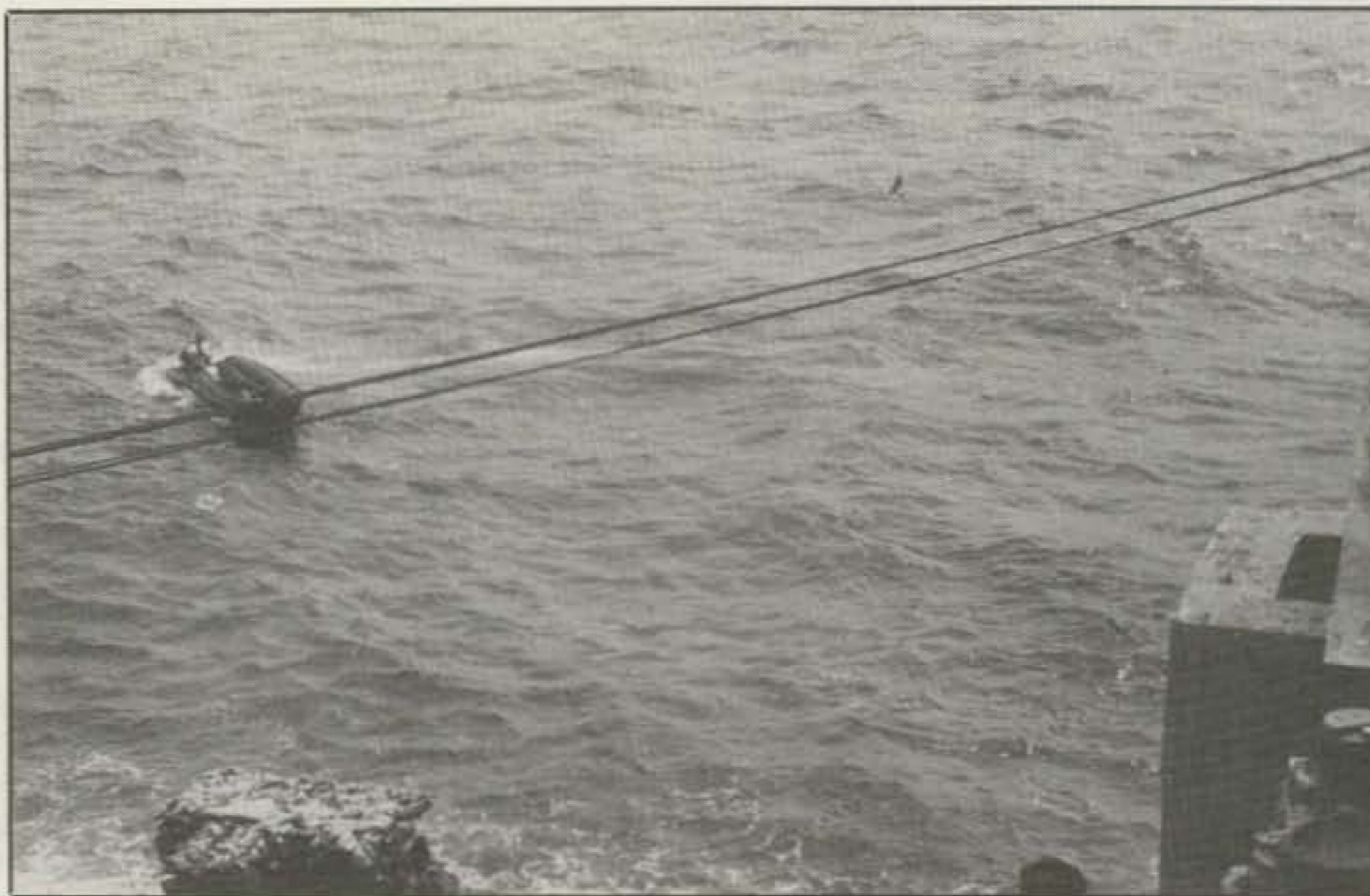
The island is home to seabirds, several species of lizards, crabs, and a few varieties of insects, none of which are poisonous. The southern end of the island has patches of fern which smell like pine.

**An Interesting  
 Landing Procedure**

You didn't have to be an "old salt" to appreciate the advice we got from the ship's crew. The weather was bad and the waves were breaking at about 15 feet. They wisely advised that we not try to

land at this time. Since we really didn't have much time to spend on the island anyway and we were all committed to the success of the trip, we decided to go ahead and attempt a landing anyway. Landing on Malpelo is a dangerous proposition at any time due to the two methods of getting onto the island. The first method requires the agility of a commando, which is why we opted for the second method.

With the first method you approach the island in a rubber boat and try to position the rubber boat under a bridge-like structure suspended over the water. Hanging



*Both landing methods make use of the Zodiac rubber boats.*



Here we are off-loading gear, including drums of fuel for the generator.

from this structure is a rope and a rope ladder swinging in the wind. The object is to leap for either the rope or the ladder and pull yourself up. The second method is to position the rubber boat near a flat-surface rock ashore and time the wave action to place you about even in height with the rock as you leap across. Visions of what would happen if we fell made us very careful.

It took all day and part of the night to transfer the gear and the hearty band of DXpeditioners onto Malpelo. Another one hour's climb to the top of the hill found a flat surface suitable for an operating position. It normally is used for a meteorological and naval installation. At this point we

decided to get some sleep and get a fresh start in the morning. We went to sleep that first night to the singing of thousands of seabirds and to the noises made by the island's crabs searching out our provisions.

### Installing The Station (November 2)

It took several trips up and down the hill to secure all of our equipment and provisions on top. With all that we brought, we could have stayed comfortably for about a month. We unpacked everything and bid farewell to our host ship, which was



"Here's looking at you." One of the Malpelo Island crabs took a fancy to my shoe.

returning to the mainland. By late afternoon we were settled in. We had set up two phone stations to cover HF and VHF, one CW station, and my combined RTTY and phone station. We were aware that our group's director, HK3BED, had issued notices to all the amateur radio publications that we would be fully operational and on the air at 0000 UTC, November 3. We actually made it with an hour to spare. By 2300 UTC on November 2 all tents were up, all gear was ready to go, generators and operators were primed and set, and snacks were set out for the crew to share with our host crabs.

### On The Air

At exactly 0000 UTC, November 3 HK0TU came on the air, contest style. The sounds of dits and dahs from the CW station to my right and the voices of the two phone stations to my left joined a stream of RYRYRYs out of my RTTY station to create beautiful music. The seabirds and the freshening wind added the chorus. My first QSO was with AA5HP on 21.085 MHz. At 0135 UTC I worked JR1CFD. We all enjoyed good propagation conditions through the night and could work Japan via long path between 1400 and 1900 UTC. I worked another RTTY station (ZL3GQ) in the Pacific at 0322.

We noticed later on Saturday that the only way we were going to work Japan was via long path. The last four DXpeditions to Malpelo had worked only a few Pacific stations, as well as only a few West Coast US stations. Obviously, the problem was the 1300 foot rock wall of "La Mona." If we couldn't get through or around it, we would have to put a station on top of one of the peaks.

It wasn't easy to get a Mosley TA33,



This is a shot of the CW team: Dave, HK1KXA, Peter, HK1HHX, and James, HK1AHM.

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From left to right: Raul, HK1LDG; Beto, HK3DDD; Hora, HK6KKK; Jaime, HK3AHM; and Rod, HK5LEX.



This is a view of the author at the base camp. In back of him is the rocky crag called "La Mona." All of the gear for the top station had to be carried up the steep sides of La Mona.

IC-765, cables, generator, fuel, wire antennas, and other provisions up to the top, but we did. The mountain group consisted of HK3DD, HK4HHG, and HK6BDX. Tibi, HK4HHG, managed to break his knee during this operation. Did the change in locale make a difference? Yes, indeed. Signals from the Pacific jumped to 5/9 plus. The first QSO from this location was with JA8FCB at 0500 UTC on November 4 on 40 meters. Then we picked our way through rare DX such

as D68, TL, T30, VS6, ST5, 7W, FR5, 5V, 3X1, 3C1, etc.

Sunday we had five stations on the air. We all were working hard and filling log pages at a rapid rate. Anyone trying to contact Malpelo could work us with ease on many bands that day.

## Malpelo Via Satellite (November 5)

At dawn I enjoyed a beautiful sunrise and heard the first QSO made by Nacho, HK3CC, via OSCAR 12. He contacted a W5 station at 1000 UTC, making it the first satellite contact ever from Malpelo. This was a second first, as this was also the first time RTTY was used on a DXpedition here. For the next few days more than 500 CW and phone satellite contacts were made by HK3CC, HK1KXA, HK1HHX, and HK4BHA. In fact, OSCAR 12 was being controlled by the HK0TU pile-up.

It was now my chance to operate RTTY from the top station on top of "La Mona." I packed my gear and climbed the rocky, perpendicular wall. As soon as I became operational, I noticed the big difference in location. I could copy stations here that I couldn't down below. My first contact was with Gin, JA1ACB, followed by several hundred JAs, W6, W9, and W0 stations. In one night I worked more stations (600) from here than in the previous two days below.

## Happy Birthday (November 6)

I didn't sleep the previous night. It was very cold, and the crabs had gotten brazen enough by now to walk over my legs



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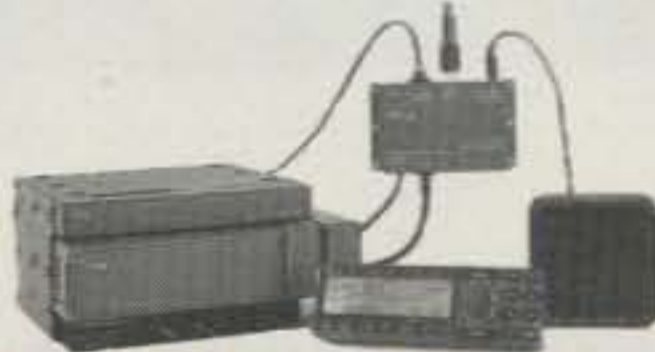
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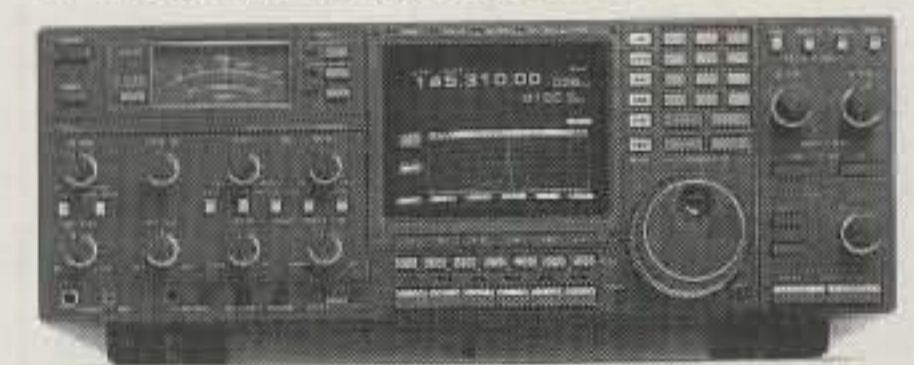
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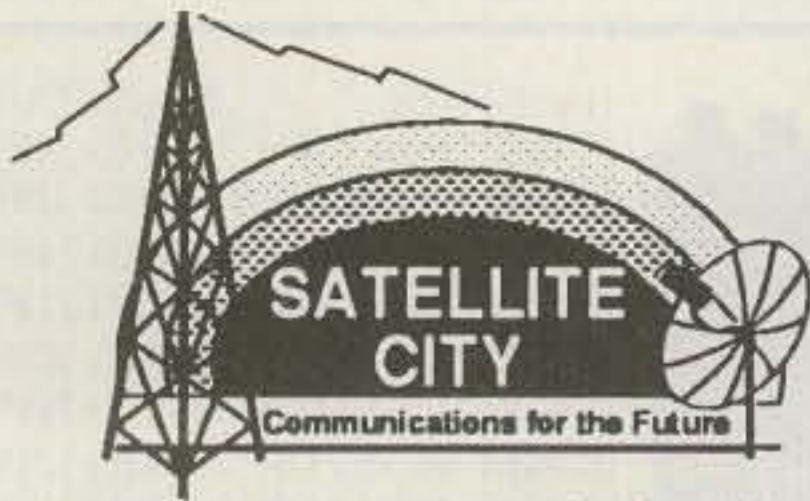
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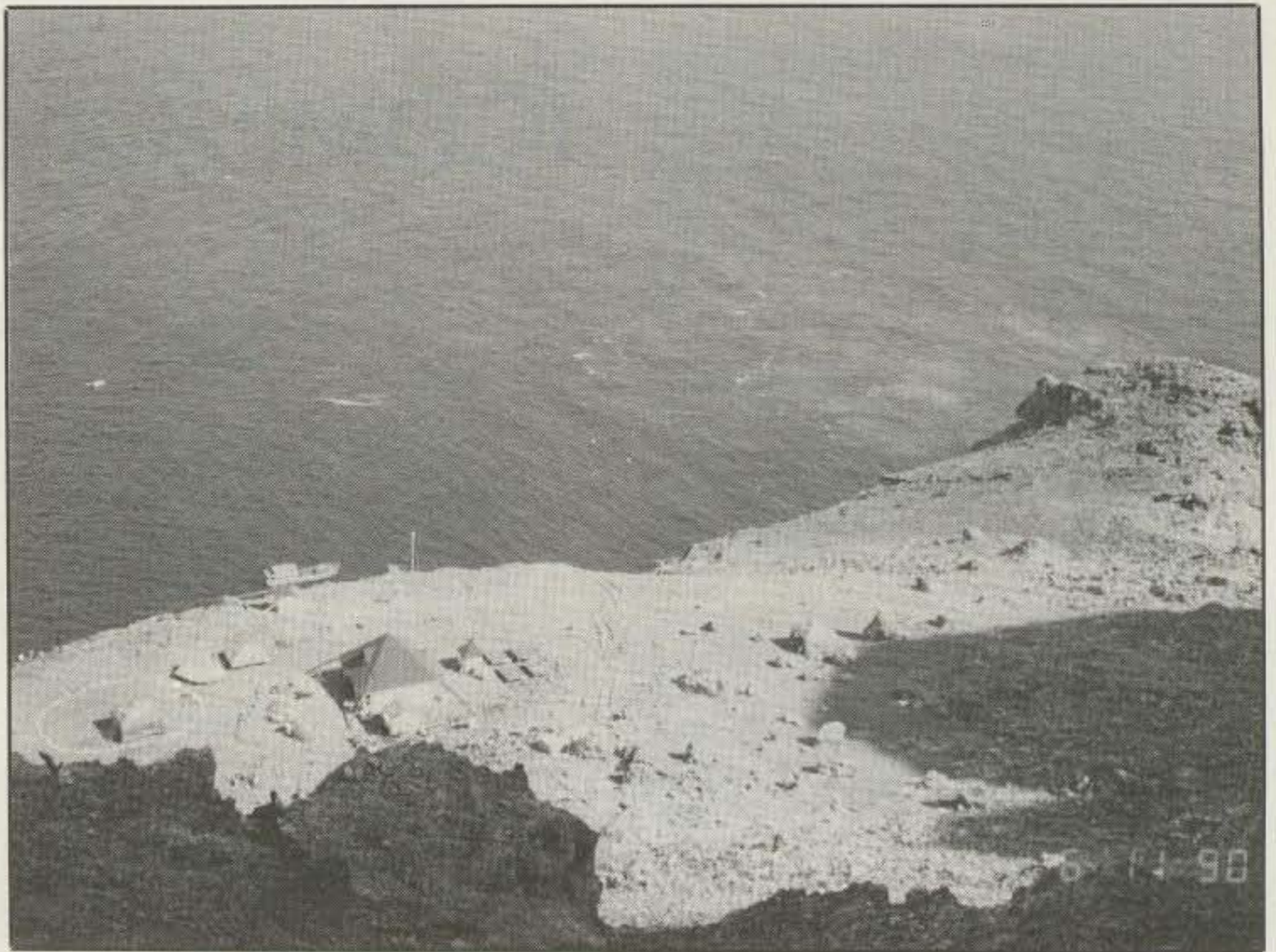
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From the top station the base looks quite small.

and try to carry off my pencils and watch back to their caves. It was still dark, just before dawn, when I heard a voice say to me, "Good morning, Raul. Happy birthday." It was Arturo, HK3BED, who had just woken up. He was the first to wish me well as I celebrated my birthday on Malpelo. I continued to alternate working RTTY and phone from the top station and logged another 1000 contacts before the afternoon.

Most amateurs tried to be courteous

and follow our instructions. The only spots where we needed amplifiers to maintain some control were on 80 and 160 meters. It really is much easier for all concerned to follow the DXers' instructions on how they want the stations to call, what order, and with what information.

Later in the afternoon I went down below and kept working US and European stations on phone. Because of the experience of previous DXpeditions, we did



Tibi, HK4HHG, rests his injured knee.





This was our satellite antenna.

make a special effort to work as many JAs and western US stations as possible.

### More DX (November 7)

Time was drawing close. We were informed that the ship was on its way back to Malpelo to pick us up. We went on rotating shifts during the last hours so as to keep stations on the air at all times. At night we fired up the amplifiers on 80 and 160 to maximize the number of phone and CW contacts from the island.

### The Last Day (November 8)

At daybreak we were concentrating on the low bands, 40 meters from the top station and 80 and 160 meters from the base station. The plan was to cease operation at 1100 UTC. I made my last contact with Bill, VS6CT. Betto, HK3DDD (our QSL Manager), made his last contact with JA1AFR. Peter, HK1HHX, ended his operation with a CW contact with HK1LDA, and Richard closed down his station with JA2KUD. The satellite antenna at this time was being used to provide communication to the ship. Promptly at 1100 UTC in fine contest style we all said, "It's over."

We began to congregate around the base camp in a sort of breakfast meeting, where we started checking our final scores. We had made more than 40,000 contacts. Most of the contacts were on phone, but we did make some 12,000 contacts on CW, 1200 on RTTY, and about 700 via the satellite. We knew from all that we were hearing that it was a success for all.

By this time the ship was off shore waiting for us. We packed all of the containers and brought them down to the bridge-like structure. From this point it was a sort of reversal of method one. We used ropes and pulleys to lower the containers to the rubber boats for transport to the ship. It took most of the afternoon to transfer all of the containers back to the ship. The hard part came when we had to lower our team the same way. We were afraid of either hitting the water or swinging into the jagged rocks. We thanked God that the Navy personnel were all experts at these maneuvers and that we all were safely aboard the ship by evening.

### Back To The Continent (November 10)

It took 40 hours to return to the seaport of Buenaventura. We were greeted at the dock by music and a large contingent of amateurs to welcome us home. That night we were invited to enjoy a delicious dinner and partake of a few cold beers, something we all missed during the trip.

There is not enough space here to thank individually everyone who helped to make this DXpedition a success. There were a tremendous number of people and organizations who worked together to make it possible. To all our many friends, we thank you and truly appreciate your efforts.



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CIRCLE 18 ON READER SERVICE CARD

# CQ REVIEWS:

## The Kenwood TM-941A 144/440/1200 MHz FM Tribander Transceiver

BY JOHN J. SCHULTZ\*, W4FA

**T**he TM-941A is a diminutive transceiver designed for those who desire full-coverage, relatively high-power FM operation on the 144, 440, and 1200 MHz bands. It is designed mainly for mobile operation, but it just as easily can be used for fixed or portable station operation.

In reality the TM-941A is three transceivers in one package, and an incredible piece of micro-technology. Can you imagine that in a 5¾ inch wide, 2 inch high, and 6¾ inch deep package you are going to get a triband transceiver that has a normal, maximum power *output* of 50 watts on the 144 MHz band, 35 watts on the 440 MHz band, and 10 watts on the 1200 MHz band? You can *simultaneously* receive on the three bands using separate volume/squelch controls. Separate external speaker outputs are provided in case you don't prefer the mixed audio output into the built-in speaker. Separate antenna inputs are provided for each band. Full duplex, cross-band operation or repeat is possible between two or three bands, and there is an enormous menu of special features (303 memories, for example, all of which store regular and odd repeater splits)!

### General Overview

Before becoming too overwhelmed by the features of the TM-941A, it might be a good idea to see just a simple overview of the unit. Fig. 1 presents a block diagram.

As can be seen from fig. 1, there are three completely separate transceiver boards for the 144, 440, and 1200 MHz bands. Each board has its separate signal generation, filtering, and processing chains. None of the RF signal chains are shared. Each board has a separate antenna input and external speaker output.

The control board contains the micro-processor heart of the unit, and it of course commands the operation of the



*The TM-941A is an extremely small unit for its power class, but the frequency displays for each of the three bands are quite clear. The three concentric controls to the lower right are separate volume/squelch controls for each transceiver. The larger knob to the lower left performs VFO tuning, memory channel selection, and several other ancillary functions.*

RF boards in accordance with commands received from the panel/display board. The single microphone input goes to the control board. The control board also drives a common loudspeaker which is disabled from any given RF board when the external speaker jack for that RF board is utilized. The DTU-2 and TSU-7 options shown connected to the control board refer to the DTU-2 selective calling option and the TSU-7 CTCSS sub-audible tone *decoder* option. Some early Kenwood advertisements for the TM-941A were a bit unclear. CTCSS *encode* is built into the TM-941A, but for decode you need the TSU-7 option.

The panel/display unit contains all of the controls and indicators. There is a separate digital frequency readout, "S" meter, on-air and memory channel number indicator for each band—all displayed simultaneously! Then there are numerous smaller displays to indicate the status of each RF section, CTCSS

tones, etc. The panel/display unit is really a separate unit also in a physical sense. It normally fits into the main housing, but it can be detached and remotely mounted via several remote mounting kits available from Kenwood. Only a four-conductor cable connects the panel/display unit to the main housing. By itself the unit measures only about 5¾" x 2" x ¾"!

### Specifications

Specifications tend to be a bit boring to read and seem to be becoming less rather than more detailed these days. Nonetheless, they remain a fairly succinct summary of the features of a piece of equipment and present many hard figures. Table I presents the specifications for the TM-941A. The current-drain and power-output figures might be of particular interest if you are considering using the TM-941A as a combination portable/fixed station unit, an application for which it is

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PURCHASED FROM: SGC

DATE PURCHASED: 1 MAY 89 DATE INSTALLED: 1 DEC 89

INSTALLED BY: J. MARTINO (OPERATOR)

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INSTALLATION:  Simple  Difficult

TUNING:  Simple  Difficult

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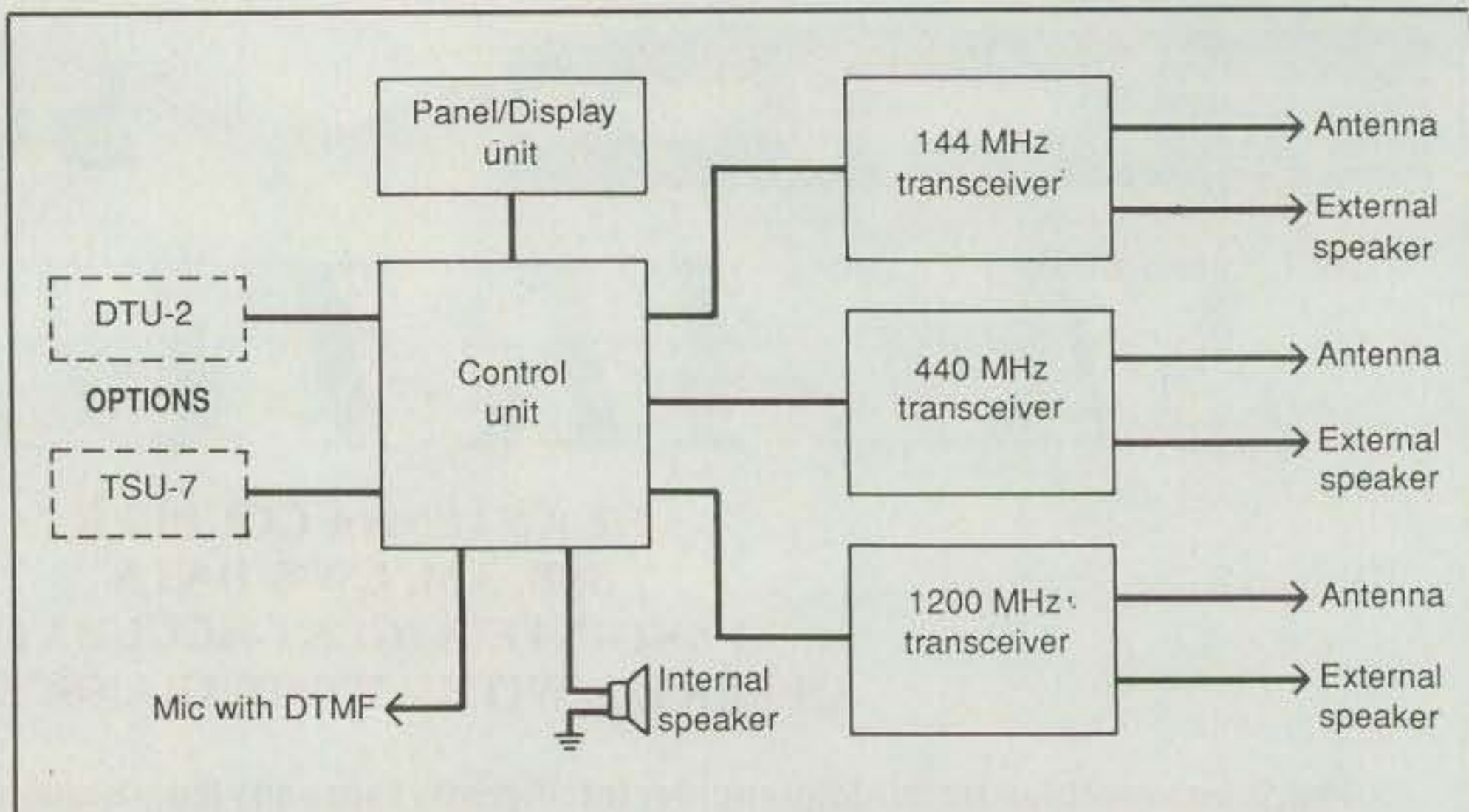


Fig. 1—A simplified block diagram of the TM-941A. It mainly highlights the three separate transceivers in the unit.

particularly well suited. The current-drain figures are for maximum power output and can be scaled down for the medium- or low-power output possibilities for each band. Also, by front-panel commands, any band can be turned off.

The frequency-range figures only give the standard receive/transmit range. The total range for receive is 118–174 MHz, 400–475 MHz (after modification), and 1210–1330 MHz (after modification). No modification is needed for the expand receive coverage on 2 meters. Some extended ranges can also be released for transmit. The frequency readout, as can be seen from the front-panel photograph, is down to 1 kHz on each band.

There is one VFO per band plus one instantaneously recallable **CALL** channel and 100 memory channels per band. Each memory is capable of storing quite a bit of information, as shown in Table II. Some of the notations in Table II are a bit confusing because the TM-941A has automatic repeater offsets unless you choose not to use them. Each of the 101 memory channels per band will store whatever receive/transmit frequencies you desire, be they simplex frequencies, standard offsets, or any odd-split.

Frequency steps are noted in Table II but are fully shown in Table III, except for 2 meters. It turns out that the TM-941A also has 12.5 and 25 kHz steps on that band. There was an error in the original manual. So if you want to take the radio on a trip abroad (e.g., to Europe) you're all set as far as the frequency-step possibilities are concerned.

### The Display

The display during normal operation is quite uncluttered and pretty much as shown in the front-view photograph. A

bar-graph "S" meter below each frequency display shows relative received signal strength. A PTT arrow at the left top of *one* frequency display indicates that is the band you will be transmitting on if you use the PTT on the microphone. You are always receiving on three bands, although of course the volume can be turned off or the entire transceiver turned off for any undesired receive band.

The display also indicates numerous other operating parameters as shown in fig. 2. It looks rather confusing, but you normally would never have all of the indicators on. However, a look at one field of indicators, say for the 144 MHz band, presents a good idea of what parameters can be indicated and the features inside the TM-941A.

Taking a look at the left field (144 MHz band) in fig. 2, you quickly can scan the indicators from left to right. The PTT arrow was just mentioned. The  $- +$  indicators show the transmit offset *direction* from the displayed receive frequency. The **REV** indicator shows the receive/transmit frequencies have been temporarily reversed. The **CTCSS** and **DTSS** indicators show if those modes are active using the required options. The **CO** indicates carrier operated scan is on. The bell indicates a tone alert function is active (an audible alarm to signal when a transmission takes place on a monitored frequency). The frequency display normally indicates the received frequency in 8 digits (down to 1 kHz). However, it also indicates tone frequencies and selectable frequency steps during certain set-up adjustments. The **F** indicates a function key has been depressed, which serves as an initiator for various set-up adjustments. The two small digits next to the **F** show the last memory channel number selected, and the star indicates if the memory channel number displayed has been pro-

		144 MHz Band	440 MHz Band	1200 MHz Band	
GENERAL	Frequency range MHz	144 ~ 148	438 ~ 450	1240 ~ 1300	
	Mode	F3E(FM)			
	Antenna impedance	50Ω			
	Operating temperature	-20°C ~ +60°C (-4°F ~ +140°F)			
	Power requirements	13.8VDC ± 15% (11.7 ~ 15.8V)			
	Ground	Negative			
	Current drain	Transmit mode	Less than 11.5A	Less than 10.0A	Less than 6.0A
		Receiver mode	Less than 1.2A	Less than 1.2A	Less than 1.2A
	Frequency stability	± 10ppm			
	Dimensions (W×H×D)	150 × 50 × 175 mm			
Weight	1.9kg				
TRANSMITTER	Output power	HI	50W	35W	10W
		MID	10W	10W	
		LOW	Approx. 5W	Approx. 5W	1W
	Modulation	Reactance modulation			
	Spurious radiation	Less than -60dB		Less than -50dB	
	Maximum frequency deviation	± 5kHz			
	Audio distortion (at 60% modulation)	Less than 3%			
	Microphone impedance	600Ω			
			144 MHz Band	440 MHz Band	1200 MHz Band
	RECEIVER	Circuitry	Double conversion superheterodyne		
Intermediate frequency 1st/2nd		10.7 MHz/455 kHz	21.6 MHz/455 kHz	59.7 MHz/455 kHz	
Sensitivity (12 dB SINAD)		Less than 0.16μV (-10 dBμ) *			
Selectivity -6 dB		More than 12 kHz			
Selectivity -60 dB		Less than 24 kHz		Less than 36 kHz	
Squelch sensitivity		Less than 0.1 μV (-14 dBμ)			
Output (5% distortion)		More than 2 W (8Ω load) (5% distortion)			
External speaker impedance		8Ω			

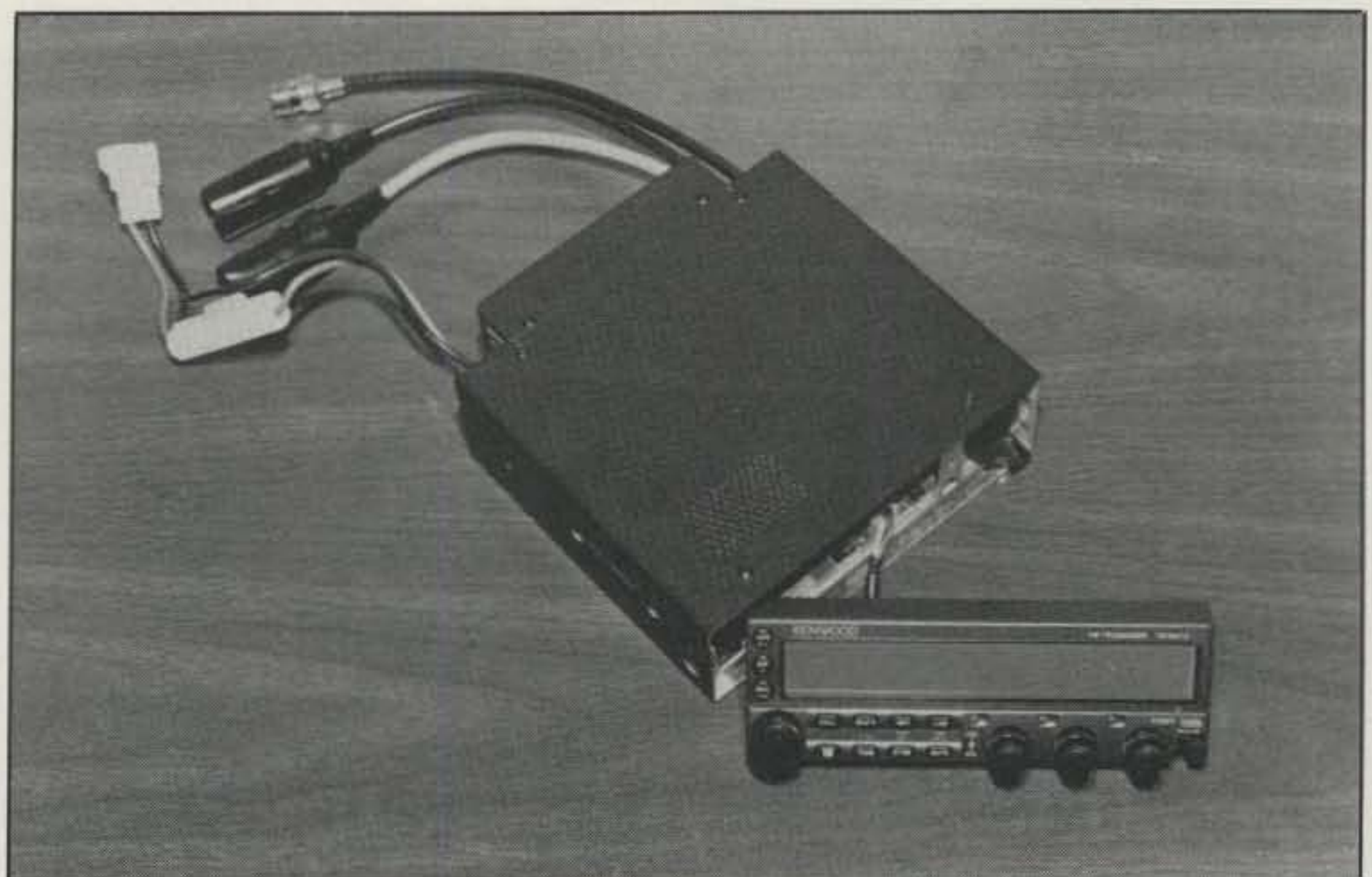
\* 1240 MHz to 1260 MHz: Less than 0.22μV (-7dBμ)

NOTE: 1. Circuit and ratings are subject to change without notice, due to developments in technology.  
2. Recommended duty cycle: 1 minute Transmission, 3 minutes Reception.

Table I—Basic specifications for the TM-941A. See the text or additional notes, particularly regarding frequency coverages.

grammed to be skipped during memory channel scan. The **BUSY** part of the "S" meter bargraph comes on when an incoming signal overrides the squelch threshold or if you manually open the squelch. The **L** and **M** indicators show if low or medium power output has been selected for the RF band involved. The **ON AIR** indicator is obvious.

Basically, the DTSS function opens the squelch when a three-digit tone code is received which corresponds to the code group to which a radio is set up to respond. It can be set up to access individual stations or groups of stations for net alerts. The display will indicate the individual or group code of a calling station for identification purposes. Memories are available to store the code of a calling station in case you cannot immediately respond. Selected calling codes can be locked out in case you don't want a 0100 call for a DX alert, etc. The system has all sorts of possibilities that many clubs or special-interest groups might like to explore.



The front panel can be detached and mounted remotely, if desired. Only a plain four-conductor cable connects it to the body of the radio. Kenwood supplies several extension kits. The three leads in the upper center of the photograph are separate antenna inputs for each band.

	Normal channel	Odd Split channel
RX Frequency	○	○
TX Frequency(*)	NA	○
Tone (CTCSS) Frequency (With the optional CTCSS unit TSU-7)	○	○
Tone (CTCSS) status	○	○
Frequency step	○	○
Shift status (*)	○	NA
REV status (*)	○	NA
DTSS code ,DTSS status	○	○
Last operation paging memory number (With the optional unit DTU-2)	○	○

○: Can be stored in Memory.

NA: Cannot be stored in Memory.

(\*) When a separate TX frequency is entered in a memory, the shift state and reverse on/off programming is removed from the memory.

Table II— Information-storage possibilities for each memory channel. Each channel can store complete simplex, standard split, or odd split frequencies.

The CTCSS and DTSS features can even be combined when a scanning mode is used. Scanning will stop when a signal with the correct CTCSS tone is detected, but the squelch will open only if the proper DTSS signal is also received!

A tone alert system, which is standard, is perhaps a more mundane but very useful feature. It sounds a beeper-type alarm when a signal is detected on a selected frequency on any RF band. The beep alarm lasts for 5 seconds, and the elapsed time is counted on the main display, after the alert ends, in minutes up to 59 hours, 59 minutes. Up to 15 tone alert functions are accepted and counted on the memory channel display. Each tone alert resets the time display. This function can be combined with the CTCSS feature to pro-

vide what amounts to a private pager system, although then the TSU-7 option is necessary for CTCSS tone decode.

The microphone supplied with the TM-941A has a complete DTMF keypad. Therefore, autopatch can easily be accomplished over any repeater so equipped. A nice feature is that the radio remains keyed for 2 seconds after each entry on the DTMF pad is made in case you "let up" too soon on the PTT switch. The microphone has various additional features such as being able to switch to a call channel, up/down for VFO tuning or memory channel selection, and a "programmable" function key. The programmable key can be set up to perform any one of eight functions such as band select, frequency reverse, tone alert on/off,

etc. Finally, a "lock" switch on the back of the microphone disables all functions except PTT.

## And More . . .

It seems the features go on and on, and I doubt if I have yet understood all of them. Automatic power off, when activated, shuts the complete radio off after 3 hours. The illumination intensity of the panel display and the confirming beep volume (a beep occurs whenever a control is activated) can be varied. Besides the "lock" switch on the microphone there are several other "lock" modes culminating in a lock mode such that only the power switch, volume, squelch, and PTT on the microphone are active.

To the far right of all the indicator fields are several indicators applicable to overall operation. They relate to various lock-out, time-out, or other special features which may have been chosen.

## Having Fun

I'm always afraid that descriptions such as the foregoing, although intended to be informative, may make some readers feel that they need a degree to operate a radio. Well, you may need a crib-sheet, but not the degree.

The TM-941A is a very sophisticated radio with a vast menu of features. I'll try to summarize the main ones as we go along. However, you should not overlook the fact that the radio is there to be enjoyed, and you can delve into all of its special features as time and interest allow.

To basically use the radio just turn it on, choose the transmit band, tune the VFO to a desired receive/transmit frequency, and that's it for simplex operation. For operating through a repeater with a standard split on any band ( $\pm 600$  kHz on the 144 MHz band,  $\pm 5$  MHz on the 440 MHz band, and  $\pm 12$  or  $-20$  MHz on the 1200 MHz band) you can toggle a **SPLIT** key to set the + or - offset. An exception is for 2 meters. The radio is pro-

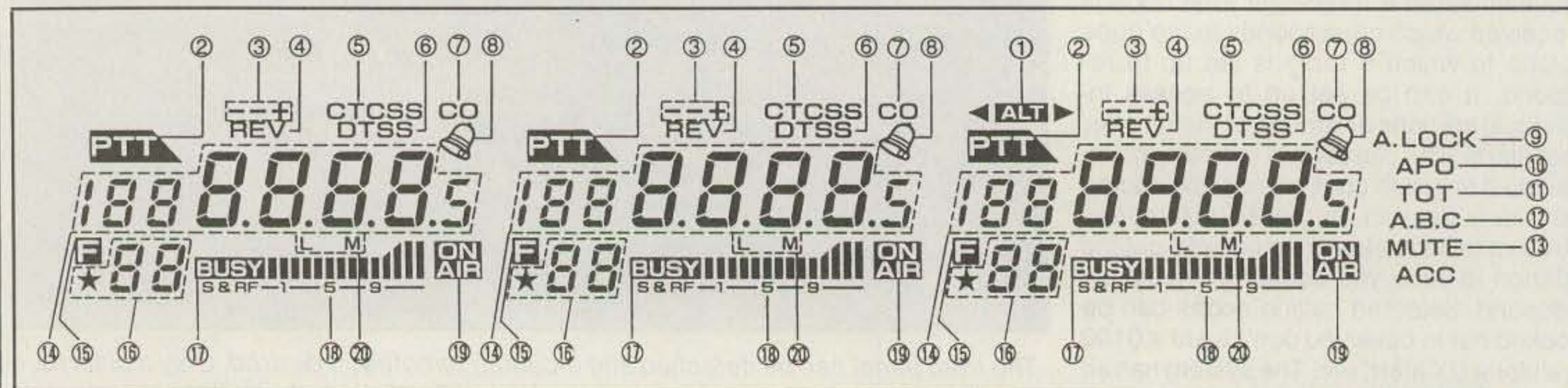
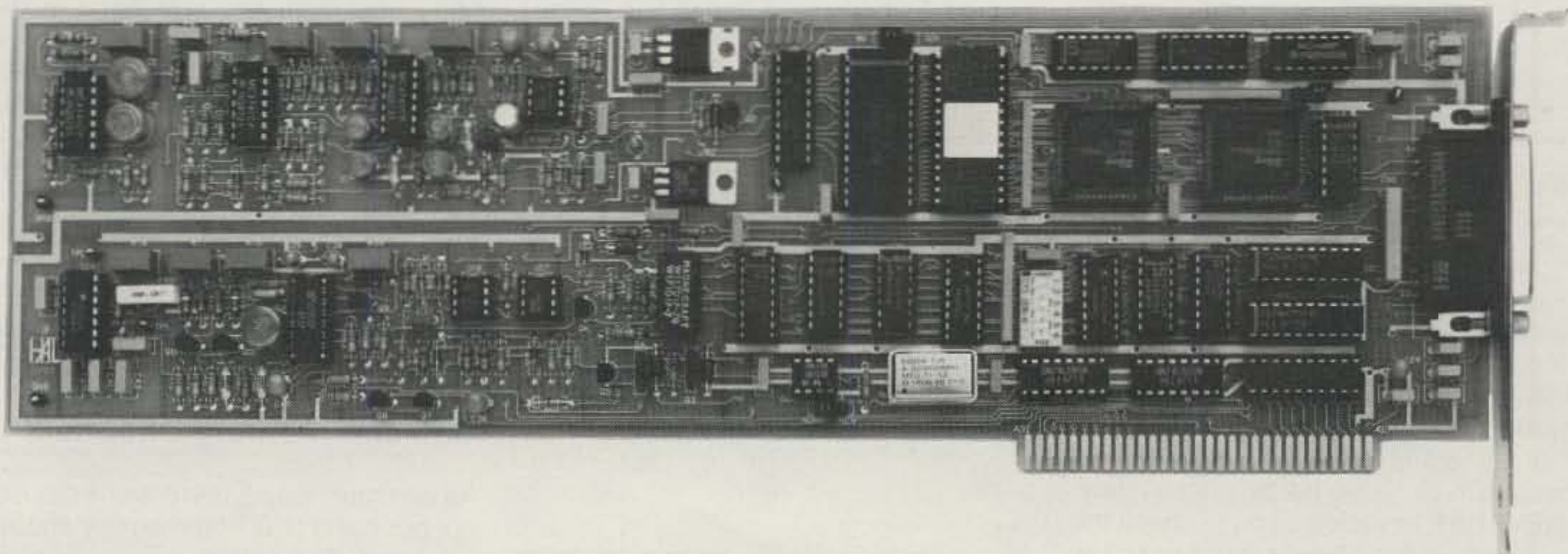


Fig. 2— The total front-panel display. You normally only see parts of the display in operation. Highlights of the display are covered in the text.

# A Winning Combination . . . The PCI-3000 and SPT-2 from HAL!



The HAL PCI-3000/PC-AMTOR system is designed to put your PC on the HF bands with outstanding performance at an affordable price. Amtor allows you to get through when other methods fail. If you've ever been DX-ing with someone on Amtor when 20 meters dies out in the evening, you know what we mean. Things may slow down, but you can usually keep up the QSO!

The PCI-3000 doesn't limit you to Amtor. You also get high-performance Baudot and ASCII RTTY, CW, and Search Mode. Search Mode lets you simply tune in the signal—we take it from there. The PCI-3000 automatically finds the correct code, speed, and polarity. No more guessing!

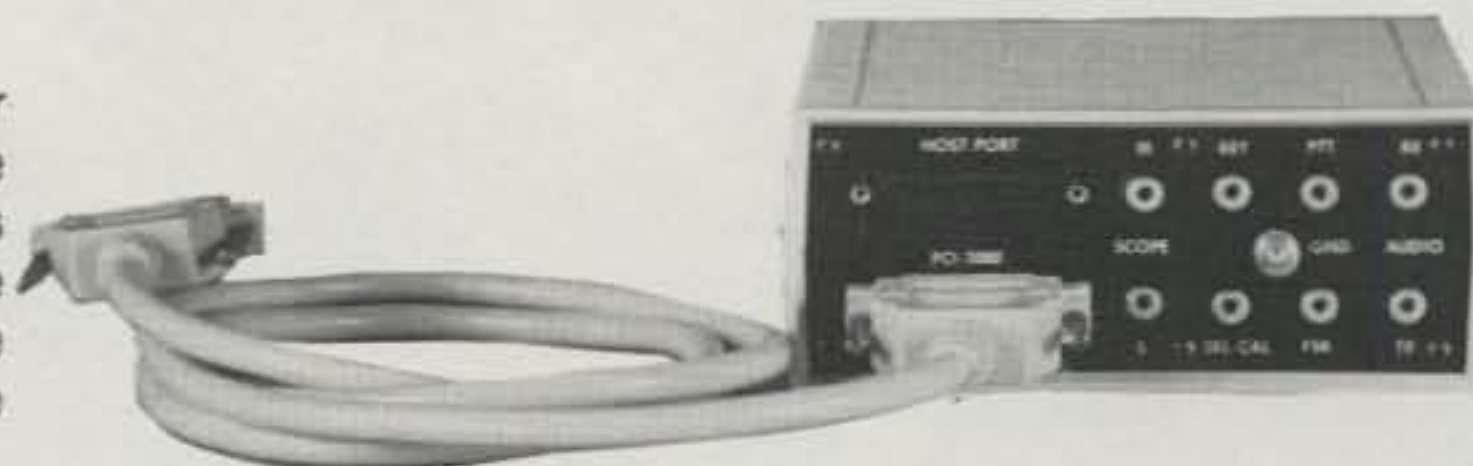
If you want to communicate on HF, do it right with the PCI-3000! Call HAL Communications—your AMTOR source—and put your PC on the air today!



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For ease of tuning your PCI-3000, add the SPT-2 Spectra-Tune. The Spectra-Tune lets you tune in CW and RTTY signals quickly and accurately with a calibrated linear 30-segment bar graph. The bar graph represents a 600 Hz range of the audio spectrum, centered at 2210 Hz for RTTY and AMTOR, and 800 Hz for CW. Calibrated marks indicate the proper frequency for AMTOR, RTTY, and CW tuning.

A cable is included with the SPT-2 for providing power and control from the PCI-3000. The rear panel of the SPT-2 provides convenient "RCA" phono connectors for all radio connections. This avoids having to make radio connections directly to the PCI-3000. Enhance your PCI-3000 system with the SPT-2 Spectra-Tune Today!



**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 Amtor/RTTY filter (installs in SPT-2) **\$69.**

(Low tone export models available.)

○=YES, X=NO.

Step Size [kHz]	5⇄	10⇄	15⇄	20⇄	12.5⇄	25⇄
144MHz band	○	○	○	○	X	X
440MHz band	○	○	○	○	○	○
1200MHz band	X	○	X	○	○	○

Table III—Frequency steps. A little error crept into this table. All the steps are correct, but the 12.5 and 25 kHz steps are also active on 2 meters.

grammed with the standard  $\pm 600$  kHz offsets according to the ARRL band plan. In that case you have to use the **SPLIT** key to obtain no offset or a reverse offset. When transmitting, the frequency display changes to show the transmit frequency. A **REVERSE** key allows you to check the input frequency to a repeater. For cross-band duplex one more button has to be depressed so that VFO control (or the up/down buttons on the microphone) can be used in turn to set up the receive frequency on one band and the transmit frequency on another band. You keep the PTT on the microphone depressed and you are operating full duplex. The microphone has a full DTMF keypad so you can access autopatch or whatever functions a given repeater provides.

Basically, that's all there is to operating the TM-941A, and I found it extremely easy to start having a bit of fun with the radio after just a short learning period. The fun increased tremendously, of course,

after I really learned how to manipulate the radio a bit more. But again, I'd like to emphasize the "menu" aspect of the radio's features. The "menu" is there to be enjoyed, but you can utilize it at your own pace.

### Band and Control Selection

Although the TM-941A contains three transceivers and there are three separate volume/squelch control sets, there is only one control of every other kind. If every control were duplicated for every band, the confusion would be enormous. The radio therefore uses a simple scheme. If the concentric volume/squelch control for a given band is depressed, that band becomes the transmit band and a PTT flag illuminates on its frequency display. That band also gains control of the controls.

However, if what appears to be an

LED, but is really a switch, above each band's volume/squelch control is depressed, that band gains control of the controls. The transmit band remains set as before. You therefore can perform whatever manipulative or search functions you wish on any band without changing what was set up as the transmit band. This feature has to be kept in mind or else you might think the original transmit band setup is being disturbed as you "exercise" various features of the radio on other bands. In reality there is hardly any confusion factor. The LED switch changes color from red to green to indicate that band is in control, but the PTT flag remains by the display of the transmit band.

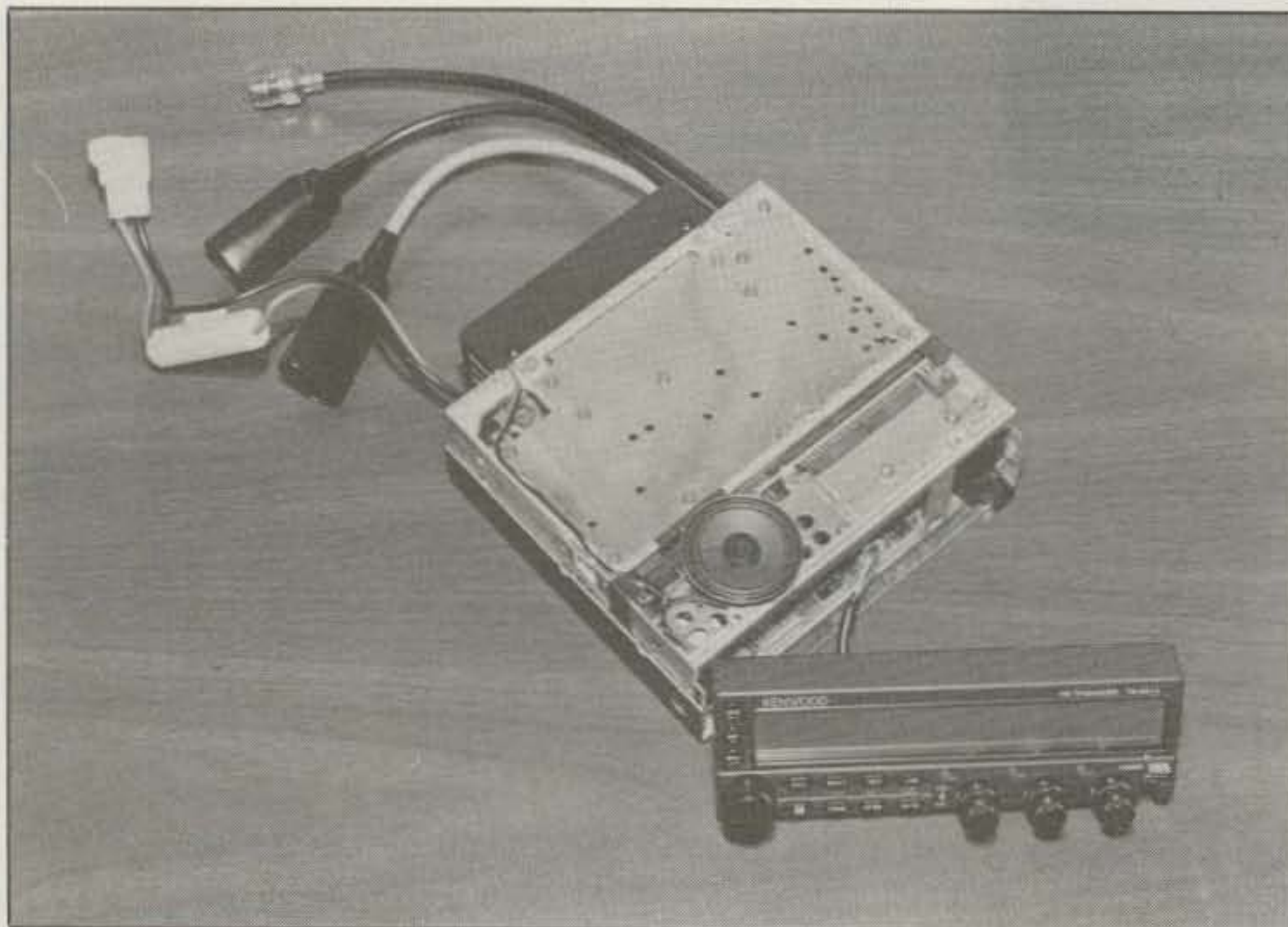
### Call and Memory Channels

As was mentioned, there is one call channel per band plus 100 memory channels per band. The call channel is accessed immediately using the **CALL** key. The memory channels have to be accessed by a simple key procedure which sets up the **VFO** control as a memory channel selector switch. Once a memory channel is recalled, it is immediately available for use and the frequency display follows the recalled memory channel frequency. You can "scroll" manually through the memorized channel frequencies on any given band by using the **VFO** control.

Receive/transmit frequencies are entered into the call or memory channels by tuning the VFO to the desired receive frequency, entering it into memory, retuning the VFO to the transmit frequency, and entering it into memory. If you accept the standard splits built into the TM-941A, you do not have to enter the transmit frequency; you simply enter the direction of the split, except on 2 meters where it is automatic unless overridden. It's a very straightforward system that is easy to learn. The tuning rate of the VFO can be changed to make things easier if large frequency excursions are involved. Obviously, since the receive/transmit frequencies can be totally separately entered into memories, any split is possible. You can't get a cross-band split into one memory channel, but since the radio can operate full duplex, any transmit or receive frequency can be stored in memory on one band and the corresponding receive or transmit frequency stored into memory on another band. With so many memory channels available, it's hardly likely that you are going to run out of frequency storage possibilities.

### Scanning

There are numerous scanning possibilities ranging from the very simple to the very sophisticated.



Taking the top cover off of the radio reveals shielded compartments within shielded compartments. I didn't feel comfortable going any further with disassembly of the unit and so I left it at that. The small loudspeaker provides amazingly good audio, but a separate, external loudspeaker can be used for any or all bands.



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MFJ-422B

\$134.95

The best of all CW world's -- a deluxe MFJ Keyer using a Curtis 8044ABM chip in a compact package that fits right on the Bencher iambic paddle!

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The keyer mounts on a Bencher paddle to form a small (4-1/8 x 2-5/8 x 5 1/2 inches) attractive combination that is a pleasure to look at and use.

The Bencher paddle has adjustable gold plated silver contacts, lucite paddles, chrome plated brass and a heavy steel base with non-skid feet.

You can buy just the keyer assembly, MFJ-422BX, for only \$79.95 to mount on your Bencher paddle.

## Deluxe 300 W Tuner



MFJ-949D

\$149.95

MFJ-949D is the world's most popular 300 watt PEP tuner. It covers 1.8-30 MHz, gives you a new peak and average reading Cross-Needle SWR/Wattmeter, built-in dummy load, 6 position antenna switch and 4:1 balun -- in a compact 10 x 3 x 7 inch cabinet. Meter lamp uses 12 VDC or 110 VAC with MFJ-1312, \$12.95.

## Antenna Bridge

MFJ-204B

\$79.95

Now you can quickly optimize your antenna for peak performance with this portable, totally self-contained antenna bridge.

No other equipment needed -- take it to your antenna site. Determine if your antenna is too long or too short, measure its resonate frequency and antenna resistance to 500 ohms. It's the easiest, most convenient way to determine antenna performance. Built in resistance bridge, null meter, tunable oscillator-driver (1.8-30 MHz). Use 9 V battery or 110 VAC with AC adapter, \$12.95.



## Super Active Antenna

"World Radio TV Handbook" says MFJ-1024 is a "first rate easy-to-operate active antenna ... quiet ... excellent dynamic range ... good gain ... very low noise ... broad frequency coverage ... excellent choice."

Mount it outdoors away from electrical noise for maximum signal, minimum noise. Covers 50 KHz to 30 MHz.

Receives strong, clear signals from all over the world. 20 dB attenuator, gain control, ON LED. Switch two receivers and aux. or active antenna. 6x3x5 in. Remote unit has 54 inch whip, 50 ft. coax and connector. 3x2x4 in. Use 12 VDC or 110 VAC with MFJ-1312, \$12.95.

## VHF SWR/Wattmeter

MFJ-812B

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Covers 2 Meters and 220 MHz. 30 or 300 Watt scales. Also reads relative field strength 1-170 MHz and SWR above 14 MHz. 4 1/2 x 2 1/4 x 3 in.



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\$34.95 MFJ-1701



\$21.95 MFJ-1702B



\$59.95 MFJ-1704

Select any of several antennas from your operating desk with these MFJ Coax Switches. They feature mounting holes and automatic grounding of unused terminals. They come with MFJ's one year unconditional guarantee. MFJ-1701, \$34.95. Six position antenna switch. SO-239 connectors. 50-75 ohm loads. 2 KW PEP, 1 KW CW. Black alum. cabinet. 10x3x1 1/2 inches. MFJ-1702B, \$21.95. 2 positions plus new Center Ground. 2.5 KW PEP, 1 KW CW. Insertion loss below .2 dB. 50 dB isolation at 450 MHz. 50 ohm. 3x2x2 in. MFJ-1704, \$59.95. 4 position cavity switch with lightning/surge protection device. Center ground. 2.5 KW PEP, 1 KW CW. Low SWR. Isolation better than 50 dB at 500 MHz. Negligible loss. 50 ohm. 6 1/4 x 4 1/4 x 1 1/4 in.

## "Dry" Dummy Loads for HF/VHF/UHF



\$28.95 MFJ-260B



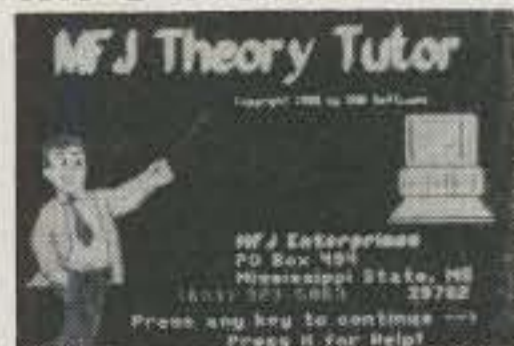
\$69.95 MFJ-262



\$89.95 MFJ-264

MFJ has a full line of dummy loads to suit your needs. Use a dummy load for tuning to reduce needless (and illegal) QRM and save your finals. MFJ-260B, \$28.95. VHF/HF. Air cooled, non-inductive 50 ohm resistor. SO-239 connector. Handles 300 Watts. Run full load for 30 seconds, derating curve to 5 minutes. SWR less than 1.3:1 to 30 MHz, 1.5:1 to 150 MHz. 2 1/2 x 2 1/2 x 7 in. MFJ-262, \$69.95. HF. 1 KW. SWR less than 1.5:1 to 30 MHz. 3x3x13 in. MFJ-264, \$109.95. Versatile UHF/VHF/HF 1.5 KW load. Low SWR to 650 MHz, usable to 750 MHz. Run 100 watts for 10 minutes, 1500 watts for 10 seconds. SWR is 1.1:1 to 30 MHz, below 1.3:1 to 650 MHz. 3x3x7 inches.

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MFJ's compact Speaker/Mics let you carry your HT on your belt and never have to remove it to monitor calls or talk.

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MFJ-1278 Use computer to transmit/receive in all 9 digital modes: Packet, AMTOR, ASCII, CW, RTTY, FAX, SSTV, Contest Memory Keyer and Navtex receive. Easy-Mail™ Personal Mailbox, Built-in printer port, 20 LED tuning indicator, AC power supply, Host/KISS, 32K RAM, Multi-gray level FAX/SSTV modem, CW key paddle jack and tons more. Options include 2400 baud modem (MFJ-2400, \$79.95) and software starter packs with computer cables, \$24.95 each, for IBM compatible, Commodore 64/128, Macintosh and VIC-20.



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\$19.95 MFJ-108B



\$9.95 MFJ-107B

Huge 5/8 inch bold LCD digits let you see the time from anywhere in your shack. Choose from the dual clock that has separate UTC/local time display or the single 24 hour ham clock.

Mounted in a brushed aluminum frame. Easy to set. The world's most popular ham clocks for accurate logs. MFJ-108B 4 1/2 x 1 x 2; MFJ-107B 2 1/4 x 1 x 2 in.

## Cross-Needle SWR/Wattmeter

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Mechanical zero adjusts for movement. SO-239 connectors. Lamp uses 12 VDC or 110 VAC with MFJ-1312, \$12.95.

## Deluxe Code Practice Oscillator

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MFJ-557 Deluxe Code Practice Oscillator has a Morse key and oscillator unit mounted together on a heavy steel base so it stays put on your table. Portable because it runs on a 9-volt battery (not included) or an AC adapter (\$12.95) that plugs into a jack on the side.

Earphone jack for private practice, Tone and Volume controls for a wide range of sound. Speaker. Key has adjustable contacts and can be hooked to your transmitter. Sturdy. 8 1/2 x 2 1/4 x 3 3/4 in.

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First of all, it should be noted that for scanning purposes the memories for each band can be left linked together or they can be divided into 5 banks of 20 memories each and a scanning function directed to a particular bank. There is even a handy consolidation mode. If for some reason over a period of time you have entered data into diverse memory channels separated by random blank channels, the consolidation mode will neatly rewrite the data sequentially into memory channels 1, 2, 3, etc., with no blank channels in between.

The simplest type of scan is band scan. The radio will scan a desired band from top to bottom until a signal strong enough to open the squelch is found. At that point scanning temporarily stops long enough (about 5 seconds) so you can stop the scanning manually by a quick touch on the PTT switch. If scanning is not stopped, it continues endlessly. If stopped, it can be resumed by another quick touch on the PTT switch. A selectable variation on this scanning mode is "carrier operated scan." The only difference is that the scanning action will stop as long as a carrier is present and will not resume for two seconds after the carrier drops out, unless manually resumed by the PTT switch.

Programmable band scan is a variation of the foregoing, but the operator can set the lower and upper frequency scan limits.

Memory scan goes through the memory channels for each band. Any channel can be "locked out" or skipped from memory scan, if desired.

**CALL/VFO** scan is a mode where the radio will alternate between scanning of only the **CALL** and **VFO** frequencies.

**CTCSS** tone scanning is a mode where scanning stops only on a signal transmitting a proper CTCSS signal. There is even a variation where scanning stops on a signal with proper CTCSS tones but the squelch opens only if a DTSS signal is detected. These two modes are briefly discussed later.

Perhaps the ultimate scanning mode is something called **Auto Memory Scan**. It's rather unique. In this mode the radio scans a band, and if a carrier is detected for longer than a second on any frequency, that frequency is written into the blank memory channels from 81 to 100 for any given band. The radio "beeps" each time it enters a frequency, and scanning stops after all the memory channels have had data entered. I suppose you could call it a "fishing mode."

All of the various scanning modes can be set up by using the front-panel controls and can be changed at will. None of the control manipulations are difficult. I doubt, however, you could keep them all easily in mind. Hence, the need for a "crib sheet."



*Here's an interesting contrast in technology—the diminutive TM-941A with all of its advanced features snugly mounted in a mobile installation below a radio utilizing mechanical station "memories." Once the TM-941A has been set up on various bands with memory channel information, almost all switching functions can be controlled from the microphone keypad. Normally you only have to reach to the radio to adjust the volume control on a given band.*

### Cross-Band Repeat

Since there are three complete transceivers in the TM-941A, it can provide cross-band and repeat with one transceiver acting as a transmitter and accepting received audio from one or both of the other transceivers.

The manual for the TM-941A did not explain how to set up this mode, but Kenwood did issue a small supplement partially explaining how it works. To activate this mode, a small chip resistor must be removed from the control board. It's a simple procedure and a diagram is supplied. To set up operation you have to go through a series of front-panel-control manipulations, none of which are particularly complicated. As Kenwood suggests, it's probably a good idea to activate the time-out function (minimum 3 minutes) for the transceiver performing the re-transmit function.

Anyone who might want to use this mode in a sophisticated way involving tones and offsets should probably contact Kenwood for their latest bulletin on the subject.

### Additional Features

Most of the additional features involve tone frequencies.

CTCSS tone encode is standard. Each RF band can be preset with any of the 38 sub-audible tones from 67.0 to 250.3 Hz. The actual tone frequency can be dis-

played temporarily in place of the frequency readout for set-up or confirmation purposes. Tone decode, which will open the squelch when the proper one is present on a received signal, requires the installation of the TSU-7 option. The option is just a small PC board which plugs directly into the TM-941A. In fact, to install it you just release the front panel and plug the board into the radio.

The DTSS feature (Dual Tone Squelch System) requires the DTU-2 option, which again is a small PC board which plugs into the radio in a manner similar to the TSU-7 option. The DTSS feature allows for a wide variety of selective calling operations using a three-digit tone code system. The DTU-2 option allows for both the generation and detection of the DTSS tones. It even has an adjustable delay feature when sending the tones in a burst mode over a repeater to allow for the response time of the repeater.

A demonstration, or "Las Vegas," mode goes through all the possible control-panel displays in turn and ends up displaying "Enjoy Your Hobby." If it had ended up displaying something like "My Name's Jack. What's Yours?" I think I would have ended up talking to the radio!

### Field Results

I used the TM-941A primarily as a mobile station. I found the audio quality of the built-in speaker to be amazingly good for

# MFJ gives you *all 9* digital modes and keeps on bringing you state-of-the-art advances . . . while others offer you *some* digital modes using 3 year old technology!

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

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You don't need to buy a silly \$40 cable just to plug in your printer.

**20 LED Precision Tuning Indicator**

MFJ's unequalled tuning indicator makes it really easy to work HF packet. Unlike others, you use it the same for all modes -- not different for each mode. Just tune your radio to center a single LED and *you're precisely tuned in to within 10 Hz* -- and it shows you which way to tune!

**New Easy Mail™ Personal Mailbox**

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MFJ-1270B

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You can double your fun by operating VHF and HF because you get *high performance* switchable VHF/HF modems.

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In MFJ's new WeFAX mode you can print full-fledged weather maps to screen or printer and save to disk using most computers.

A new KISS interface lets you run TCP/IP and MSYS. NET ROM compatible.

You also get 32K RAM and a free 110 VAC power supply (or use 12 VDC).

For dependable HF packet tuning, the MFJ-1274 gives you a high resolution tuning indicator -- and it's only \$20 more.

New 2400 baud Turbo models available: MFJ-1270BT, \$209.95; MFJ-1274T, \$229.95.

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 identification!* MFJ's new ASA automatically identifies HF packet, RTTY, ASCII and AMTOR signals. A

## New MFJ-1278T Turbo with fast 2400 baud modem

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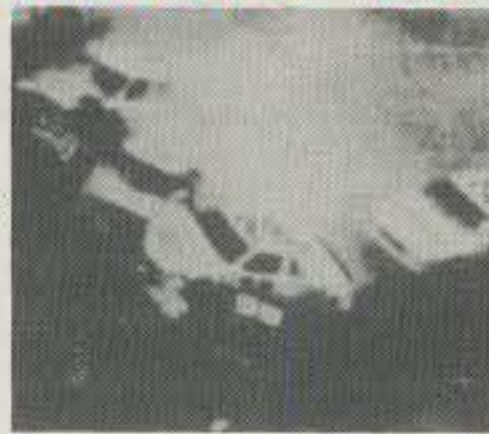
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its size, although eventually I did install a dedicated speaker for 2 meters. The audio quality on receive was excellent, and I always received excellent reports on the transmitted audio.

Going up and down a bit on I-95 on the East Coast here I was surprised as to how many repeaters I could access. The above-average high power output of the TM-941A on all bands was certainly a great help. The scanning features produced some interesting results, especially the scan mode which put into mem-

ory a busy frequency. Not only did I discover a few repeaters I didn't know were active, but it uncovered a few repeaters with odd but perfectly legal splits. I had no desire, of course, to disturb the closed repeater groups. However, the capabilities of the TM-941A did sort of remind me of the military electronics warfare equipment I dealt with many years ago and which required very large relay rack setups for frequency search functions as compared to the miniature size of the TM-941A!

Overall I found the TM-941A a very easy and "fun" radio to operate in spite of its sophisticated features. Its band coverage is, of course, most applicable at present to the larger city areas in the U.S., but there is no question that 440 and 1200 MHz band repeaters are going to expand significantly in coming years in all areas of the U.S.

If you are interested in an extremely good FM-only VHF/UHF transceiver that should remain up to date for quite some years to come, I'd rate the TM-941A as a most interesting unit to consider. That's especially true if local repeaters are changing or updating or if you plan to travel about a bit and wish to access a diverse variety of repeaters with diverse access frequencies, tone functions, etc. The TM-941A pretty much has it all "built-in"!

## Manual

I don't envy anyone who has to write, much less translate into English, a manual for a radio such as the TM-941A. The radio is a delight to operate and "user friendly," but getting the "user friendly" aspect into clear, clean explanations can be a real challenge.

The manual for the TM-941A doesn't do a bad job. All of the information you need is there, but some of the translations are "stiff" and a few of the tables contain minor errors. A summary sheet or card of the various control functions which one could take along for mobile/portable operation would have been most helpful. I ended up making photocopies of key pages of the manual which explained the less frequently used functions.

Surprisingly enough, the manual does contain separate block diagrams and schematic wiring diagrams for the entire radio. The diagrams are quite useful if you wish to understand a bit of the inner workings of the radio or to correct/modify extremely minor external wiring details. I would not suggest, however, that any repair work be done on the radio on the basis of the diagrams unless you are an extremely experienced technician. You should take advantage of the full warranty provided with the radio and communicate with Kenwood if any difficulties are encountered. I personally did not have any problems with the TM-941A, but I did call Kenwood several times to request some additional technical information and received prompt, courteous service. Tom Burke, KC6BBT, is their customer service person, and he can be reached at 213-639-7141.

List price of the TM-941A is \$1199.95. The TSU-7 option is \$49.95; DTU-2 is \$23.95. For more information contact Kenwood U.S.A., P.O. Box 22745, Long Beach, CA 90801-5745.

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BY W. MAX ADAMS\*, W5PFG

**S**imultaneous measurement of 13.6 VDC power-supply current and voltage is rather difficult when you only have one VOM in the ham shack! I therefore closed my mouth and engaged my brain in an attempt to overcome this problem.

Remembering Ohm's Law ( $I = E/R$ ), Mr. Kirchoff's remark "... the algebraic sum of all IR drops ...," and a good 0-1 milliammeter in the "good-stuff" junk box, I cleared a small work space by pushing several unfinished thoughts out of the way. Mentally I commenced the schematic shown in fig. 1.

The power supply is a plain-vanilla Astron RS-12A located about 7 feet from a 2 watt, 2 meter repeater and a 2 watt in/30 watt out linear amplifier. Two #16 AWG stranded wires, used for the repeater and linear amplifier DC power cable, are worst-case rated to carry 13 amperes of current—about twice the cable's *normal* current load. By referring to a table of copper-wire specifications, I found that #16 wire exhibits 4.094 ohms (DC) resistance per thousand feet. Therefore, about 1 foot of #16 should make a good 0.004094 ohm meter shunt; 2 feet a 0.008188 ohm shunt, and so on.

I attached the #16 wire to the meter terminals and labeled the positive lead with two wraps of 3/4 inch wide red plastic tape. A short piece of black shrink tubing can be used to label the negative lead. Strip about 1/8 inch insulation and lightly tin each center conductor to a slight point.

Notice in fig. 1 that when the *positive* power-cable conductor is used, the *positive* meter lead connects toward the power supply. When the *negative* power-cable conductor is used, connect the positive meter lead toward the load end. Pierce one power cable conductor about 20 inches from either end. I selected the positive lead near the repeater end since this is where current and voltage go to work. Carefully enlarge the opening using

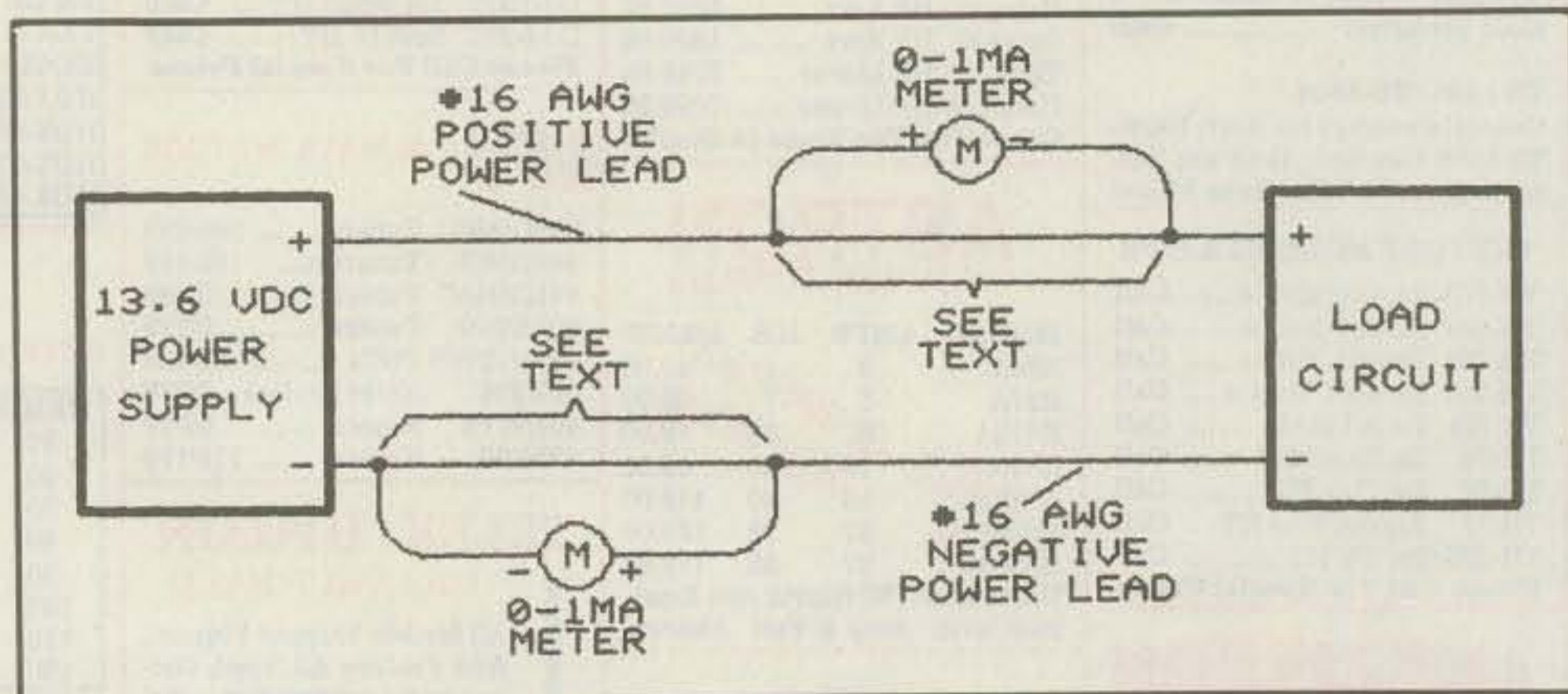


Fig. 1—The power lead meter shunt. Note the meter polarity.

any sharp pointed tool; try not to cut or break the individual strands of wire. Insert the tinned portion of a meter lead into the power-cable lead. Work the connection, between two fingers, thereby tightening and reforming the power-cable wire. Trim any excess meter-lead bare wire and insulate the partially insulated joint. A small, self-locking cable tie works nicely for insulation and adds mechanical strength to the assembly. Temporarily install the *negative* meter lead in the same power cable conductor about 16 inches from the positive meter lead, according to fig. 1.

The 10 ohm, 10 watt meter calibration resistor, retrieved from my junk box, measured 9.5 ohms. When connected to 13.6 VDC, Ohm's Law dictates that 1.4315789 amps of "test" (calibration) current will be drawn from the power source. Considering all circuit tolerances, I rounded off the calculated current value to 1.4 amps,  $\pm 1$  meter, indicating "needle width." Since 13.6 volts and 1.4 amps produce 19.04 watts of heat, a 10 watt resistor quickly becomes too hot to handle. However, a more suitable 10 ohm, 20 or 50 watt resistor was not in my junk box.

The meter, also retrieved from my junk

box, originally came from the neighborhood parts warehouse with the big red sign. The meter scale is divided to three major parts labeled 5, 10, and 15. There are also 15 minor divisions and 30 subdivisions on its scale. Depending on your individual needs, this scale can be interpreted as 15 amps (X1) or 30 amps (X2). When using #16 wire, 16 inch meter lead separation shunts the meter to provide a full-scale indication of approximately 15 amps. Thirty-two inch lead separation will provide a full-scale meter indication of approximately 30 amps. When considering 15 amp scaling, 1 meter "needle width" represents approximately 0.1 amp, meter scale subdivisions represent 0.5 amp, and minor divisions represent 1.0 amp.

Meter calibration takes a bit of time, mainly dependent on the degree of meter-indication accuracy you require. Do not forget to "zero" the meter movement *before* attempting the following calibration procedure. Turn the power supply OFF and let any residual power-supply charge "drain off" before making any meter-lead connection changes.

Arrange the 10 ohm resistor leads to permit their insertion in the load-end power connector; polarity is not important. In-

\*P.O. Box 504, Fairfield, TX 75840

sert one resistor lead first, making good electrical contact to the cable connector, turn the power supply ON, and then *momentarily* touch the other resistor lead to its associated cable connector contact. Quickly note the ammeter scale indication and be prepared to safely drop the 10 watt resistor with 20 watts of heat! Should you add "clip-leads" to the resistor, make sure the additional lead resistance, and its connector (such as alligator clip) resistance, is measured and included in the load "test" current calculation mentioned earlier.

Assume that the ammeter indicated 1.6 divisions during the first calibration test. Measure 1 inch, from the first temporary connection point, and move the negative lead 1 inch *toward* the positive lead. This reduces the meter lead separation, thereby reducing meter "sensitivity" to current flow. Repeat the test-load procedure and obtain a new meter indication—for example, 1.3 divisions. Since 1.4 divisions is desired, the meter circuit contains a 0.1 division calibration error. Also notice that a 1 inch change of meter-lead separation caused a 0.3 meter indication change. Ohm's Law ( $I = E/R$ ) is a "directly proportional" equation; therefore, a 1/2 inch meter-lead separation change should provide a 0.15 meter indication change.

Move the temporary connection about 3/8 inch toward the positive lead and repeat the test. When the meter indication is within one needle width of the calculated (desired) amount, the ammeter circuit is well within all other cumulative tolerance errors and other "tradeoffs" such as meter accuracy, eyeball calibration, etc.

Notice that 2 feet of #16 stranded wire is mentioned in this application. Any reasonable wire size and length can be used for the meter leads. Additional "shunt" connections may be installed, and with suitable switching, will provide multi-range current indications. Meter (current circuit) isolation can be included to provide voltage measurement; use 1000 ohms of resistance per volt, connected in series with the meter, for each voltage range included in such a switching arrangement.

Power-cable wire size is not critical, provided it will satisfy load-circuit current requirements. Since there is "some" voltage (IR) drop along all current-carrying electrical conductors, simply adjust meter-lead spacing according to power-cable conductor size—the larger the wire size (smaller AWG number), the greater the meter-lead spacing required to achieve the desired meter sensitivity and vice-versa.

When constructing a practical amp-meter circuit, do not worry about six decimal place mathematics, unless you want "Buffalo Chip" (a local pun meaning

"near perfect") accuracy! Simply "visualize" Ohm's Law and its practical algebraic variations, such as  $I = E/R$ . For example, since  $I$  is constant (due to the fixed 10 ohm calibration "load"), changing the shunt resistance,  $R$ , causes  $E$  (in this instance, meter movement) to change accordingly. Make only one meter lead change at a time, so that the effects of one change will not be masked or offset by another change made at the same time.

Incidentally, this application technique is not limited to a repeater power cable!

Mount the meter in a suitable mini-box, add two pairs of binding posts, and stuff the other meter shunt stuff in the mini-box—a handy addition to any homebrew work bench or whistle-and-bell operating position.

"Kick" this application around during your next QSO, when all the world's problems have been resolved! Who knows? Maybe, just maybe, someone may be within "hear shot" and may learn a little more about what is behind the knobs of their latest "bells-and-whistles" equipment.

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# How To Build A New Operating Position

BY LARRY HILL\*, AA4DJ

**W**hen I renewed my interest in amateur radio I had been inactive for about twenty-five years—since well before I married. It was quickly obvious that the world was different for an amateur who shares a house with a non-ham spouse and kids. This situation is acceptable when the shack is not inside the regularly inhabited areas of the house, but if you plan to install your rig where it will be seen by casual visitors, then to keep peace and harmony in the home some effort is necessary to make the area as neat and orderly as possible.

Usually the most visible feature of a typical ham shack is the wire and cable clutter. Remember the pictures of some of these shacks which *CQ* published a few years ago? Some installations almost certainly have wiring in place that was part of the initial station and has never been removed during the dozens of years, modifications, and upgrades. I knew that my spouse, gentle soul that she is, would never allow such an installation near our living room. She even mentioned this fact in a calm and reasonable discussion concerning the shack's configuration. "Not in my living room you won't!" What follows is an explanation of my attempt to maintain an acceptable living environment at my QTH (i.e., one in which I would be allowed to live). At the same time I wanted to avoid large outlays of money, since it wasn't available, and like most amateurs I have a wish-list which overwhelms the accessible cash.

After some thought (easier than actual work—but not by much), I reached the conclusion that the best (easiest) approach would be to obtain (as opposed to build) a table, then add to it as necessary.

\*3306 Panorama Drive, Huntsville, AL 35801

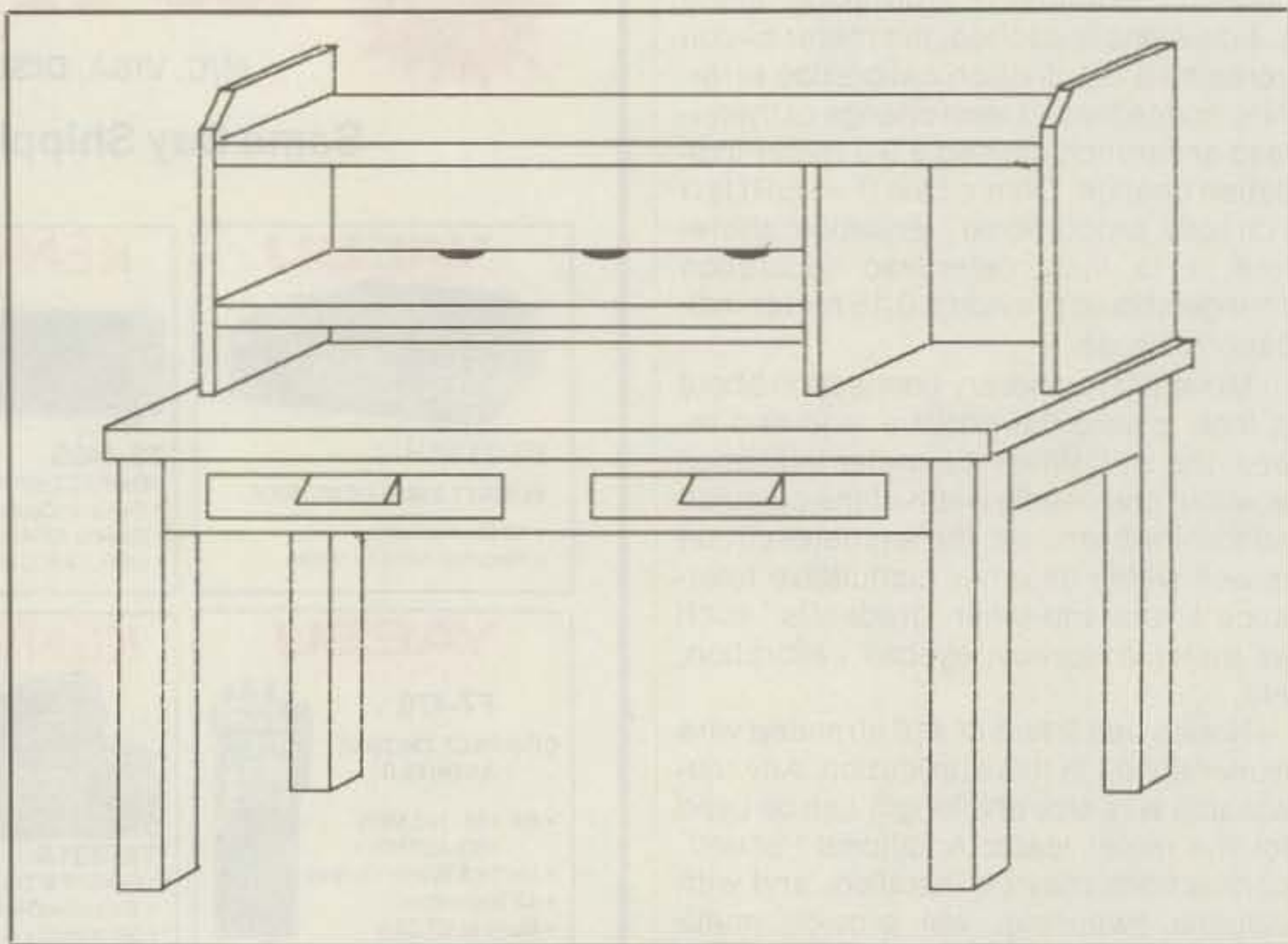


Fig. 1—Overall drawing of the completed operating position.

This avoids the typical door-with-legs table (marginal for the living room). Look in used office furniture stores and ask for something called a work or library table. If the first answer you get from the sales clerk is negative (or involves too much money), ask if they have warehoused furniture which is not suitable for display—it is cheaper and may well be good enough for you (it was for me). Also try want ads, auctions, and word of mouth. I found several 30 by 60 inch tables which were stored in an attic warehouse and, after some negotiation, were priced at about 50 dollars each. This saves much construction time and aggravation and usual-

ly gives you a couple of drawers which you wouldn't have otherwise.

If your station consists of a single transceiver, an unmodified table will be sufficient for a while (a short while)—about two weeks. Inevitably you will acquire more equipment, accessories, and books and need more room. It's amazing how quickly table space can be covered by this material. The stuff seems to breed, or at least expand. I started out with a transceiver and a few books, then "Honey, let's move the computer into the ham shack. You can use it and it gets it out of the way in here," which obviously put it "in the way" on the table. "Real es-



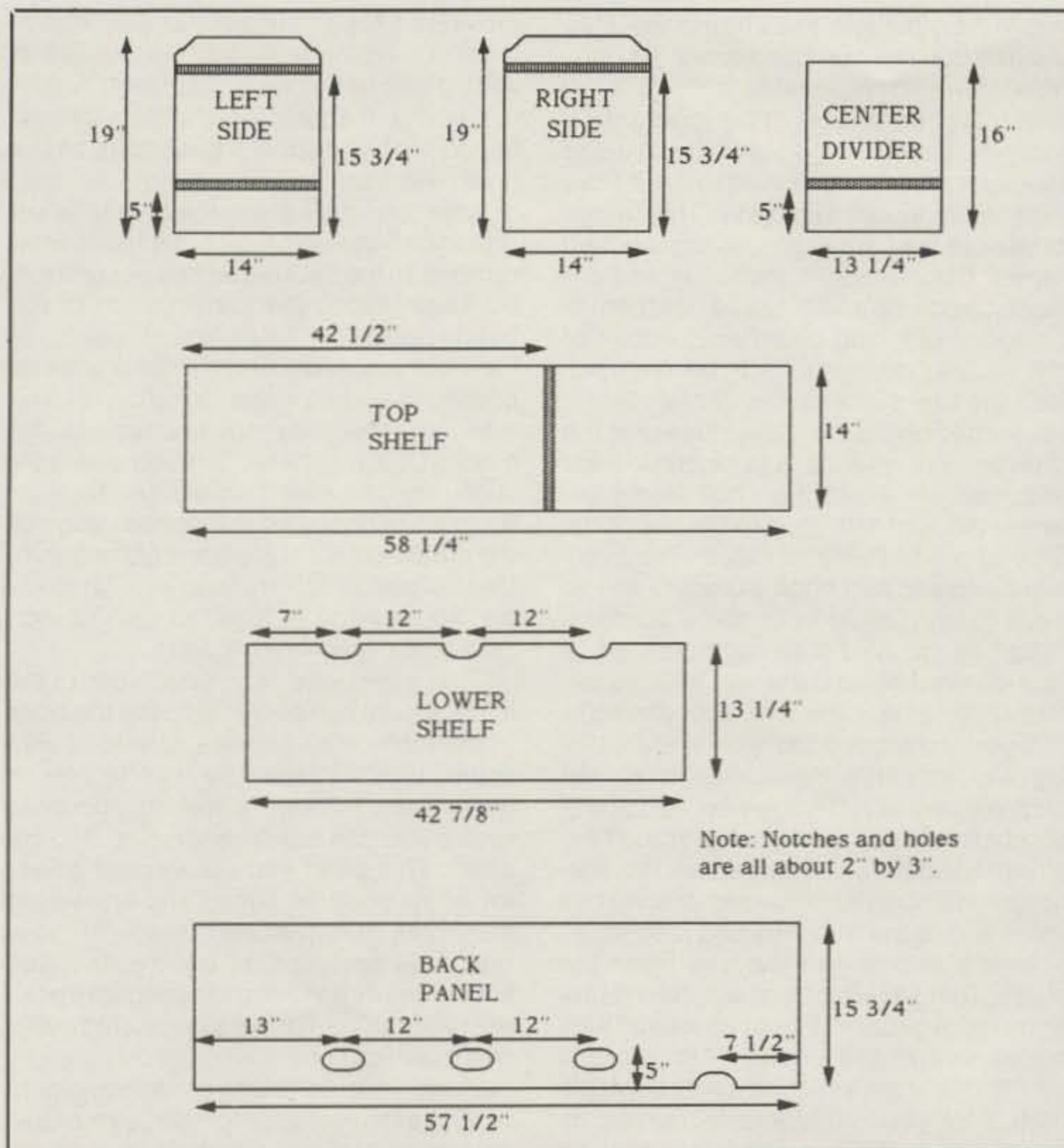


Fig. 2— You can cut all of these parts from a single sheet of plywood and still have some scraps left over. Assembly details are given in the text.

tate" on the table top rapidly became valuable. I found it necessary to do what city architects and most amateurs do when faced with this problem—go up. The idea is to provide shelf space for a rig, lamp, antenna tuner, amplifier, switches, etc., without allowing this equipment to completely cover the space needed for the log, key, microphone, scratch paper, iced tea, elbows, etc.

This addition to the table (see fig. 1) is not significantly different from others that you will occasionally see. I did try to hide the wiring a little better. Use 3/4 inch birch plywood (a single 4' x 8' panel is plenty) for the shelves, supports, and back and solid birch for trim (you will not need much). Birch is a sturdy, relatively inexpensive material which can easily be stained and finished to match the table. This shelf assembly (sometimes called a hutch) can be built completely with hand tools (saw, hammer, chisel), although it's considerably easier with a circular saw and a router, or a table saw with a dado blade (it's even easier if you have a friend who's handy with these tools).

Since I needed a place for a computer monitor, the bottom shelf does not extend completely across the table. If a complete shelf in this location better suits your purposes, start planning for it now. You'll need to lengthen the bottom shelf (to 58 1/4 inches) and eliminate the divider. The instructions that follow are, generally, directed toward the original project.

Now that we've separated into two groups (with and without monitors) let's charge on. Cut the plywood panel into the pieces shown in fig. 2. Notice that the lower shelf and the center support are 3/4 inch narrower than the upper shelf and end supports. This allows space for the back panel to fit inside the sides and top without forcing the lower shelf forward. You should finish this effort with six useful pieces (five if you're one of the monitorless crowd) and some oddly shaped scrap.

The next step is to finish shaping the vertical supports and upper shelf and to cut the holes and notches in the back and lower shelf, respectively. Carefully cut 3/4 inch by 3/8 inch deep dados (these are the

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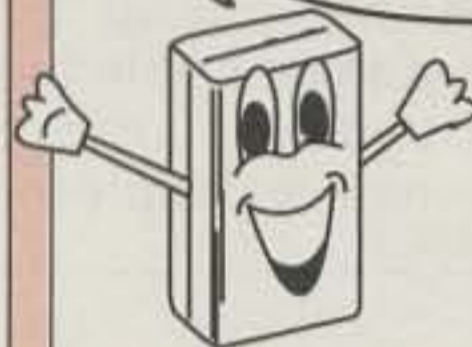
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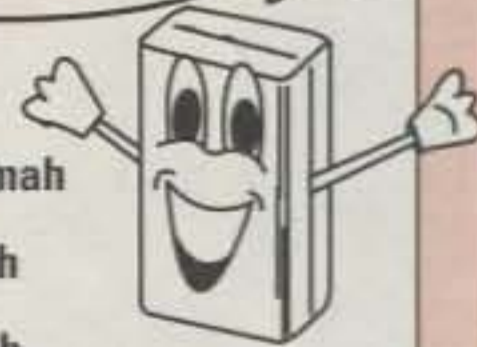
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grooves into which the shelves will fit) and chamfer the top corners of the outside supports. This last operation is for aesthetics only, not structure, but it does make the final product look a little more professional. Notch the back of the lower shelf and cut holes in the back panel as shown in fig. 2. If you've thought much about this assembly, you have probably noticed that the holes and notches are not aligned. This is by design and addresses another problem. Have patience and all will become clear (I hope). Now is a good time to sand these pieces. If you wait until after assembly, it will be much more difficult. Sand each piece twice, once with about 120 grit paper then with 240 grit paper (or medium and fine). This hutch should be a functional piece of equipment, not fine furniture, but still be good enough to avoid aggravating your spouse. Don't think you're through sanding. There will be more to do before staining and finishing.

Now it's time to put the big pieces together (there are still some small pieces we haven't yet considered). For each joint spread a moderate amount of carpenter's glue (yellow, not white) into the grooves—enough to cover the groove surfaces but not so much that it squeezes out onto the visible areas—then secure the joint with 2 inch finishing nails every 4 to 6 inches. Use a nail set to recess these nail heads about  $\frac{1}{8}$  inch. Treat the back edges of the lower shelf and the edges of the back panel similarly during installation of the back. Don't forget to align all pieces evenly along the front of the hutch. It's a good idea to complete this part of the project once you've started so that the back panel is installed before the

glue in the other joints has hardened. This ensures that the hutch is square (i.e., not skewed) within reasonable limits.

At this point the assembly looks pretty good. However, the edges of the plywood are exposed, and if you tried to use it now, the shelves would sag badly. This brings us back to the "small pieces" mentioned earlier. Cut pieces  $\frac{3}{4}$  inches wide from the birch boards and glue and nail them to the top, front, and chamfered edges of the vertical supports (not the shelves). Stop the trim piece on the center divider  $1\frac{1}{4}$  inches below the top surface. For the shelves, cut pieces  $1\frac{1}{4}$  inches wide which will fit along the shelf fronts between the trim attached to the supports. Glue and nail these in place. The problems with sag and edge exposure are no more (wish I could treat some personal "sag" as easily). Fill all nail holes with a light-colored wood putty and let it dry before continuing. Look's nice, doesn't it?

If you did a good job with initial sanding and with trim installation, this next step will be easy. If not—well, sanding is good exercise and it will keep you off the street. Sand the assembly again. Pay particular attention to the areas around nail holes and to the trim/plywood junctions.

Now it is time to stain and finish the hutch. These instructions will, necessarily, be more general. Haunt your local lumber yards and do-it-yourself centers until you find a stain which is an acceptable match for your table and follow the instructions on the can. Don't overlook the need to stain the edges of the holes and notches in the lower shelf and back. Follow the stain (after it has dried) with a polyurethane finish. This finish can be satisfactorily applied with a brush and

provides a tough surface for your equipment. It is typically available in glossy and semi-gloss (my choice) varieties. Again, follow the manufacturer's instructions, but do not try to apply a thick coat, as the finish will "run" and look awful.

After the finish dries, the only task left is to install the hutch onto the table. First remove all the debris that has accumulated there during the construction of the hutch. Center the hutch along the width of the table and as close to the back edge as practicable. Mark the location of the sides with masking tape and remove the hutch. Drill two holes through the table such that screws pushed up through them will encounter the bottom edge of the outside vertical supports of the hutch. Use screws which are long enough to enter the plywood at least an inch (3 inch "dry wall" screws work well).

That's the basic assembly. Now for the icing. Mount two power strips to the back of the table in convenient locations. Run power directly from the wall to one of these then through a switch (mounted where you can easily reach it) and to the other. This gives you unswitched power for items such as lamps and answering machines and switched power for your rigs. This assumes, of course, that you have already provided for adequate power in your shack (I have a dedicated outlet on its own circuit).

Place your rig(s) and other equipment wherever seems appropriate to you. I use the top for my printer, disk storage, books and an answering machine. My rig, two lamps, antenna tuner, and some more books roost on the lower shelf. Under this shelf are a 2 meter mobile rig (used as a base station) and its power supply, a TNC, keyer and paddles, a coax switch (mounted to the underside of the lower shelf), scratch pad, and more disk storage. Run all wiring and cables down through one of the notches in the shelf and sideways to a hole in the back panel. This makes it slightly harder to run cables but hides them quickly. If these two openings coincide, plywood edges, wiring, and the wall behind the table show. Secure excess wiring, neatly bundled out of sight, to the back of the hutch.

That's it. All your equipment is neatly positioned, conveniently within reach, and you still have about half the table space for use. Enjoy it. I do have one caveat—if your family is anything like mine, any flat surface looks like a shelf to them. Try to train them early that the space you worked so hard for is not for storage. Be vigilant and definite or you will find your work space shrinking again.

One last comment. Earlier I mentioned sharing a house with a non-ham family. Well, that particular problem cured itself—my wife, daughter, and son are all General class hams now. Yeah, I think it's great!

MI

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*Here's an interesting item you can take with you on your next vacation or business trip.*

# A "Bedsheet" Beam For Two Meters

BY PAUL M. DANZER\*, N1II

**H**ow many times have you been on a trip and fired up your handi-talkie on a local repeater from a hotel room only to hear "Sorry, old man, but you are not quite strong enough to make this repeater. . . . 73s"

After traveling with a host of duckies, dipoles, coax dipoles, and J-poles, I finally decided to try something big—about 6 inches by 3 inches by 1 inch when packed for travel.

Step one is to take a piece of 4 mil thick plastic and cut it to about 70 inches long by 40 inches wide. You could also use an old plastic crib sheet as I did, and then truly claim to have made a bedsheet beam. Tape the sheet or plastic securely to the floor, and then use an indelible pen to mark out the element positions as shown in fig. 1. Be careful and accurate, but don't worry about an eighth of an inch. As you will see later, high accuracy is nice but not necessary.

The elements are made by using strips of window burglar-alarm foil, such as Radio Shack 49-502. Cut them to the sizes shown in the figure, and then fold them gently in half to find the center. Peel the paper backing from the metal foil and lay the strips in place with the center of the strip on the marked centerline of the beam. This might be a two-person job. After the beam is tested, you can cover the elements for protection with clear shipping tape such as Radio Shack 64-2339 or any standard stationary-store packaging tape.

The beam consists of three directors, a driven element, and a reflector. After cutting the driven element to size, cut it once more in half and position it on the bedsheet with about an eighth of an inch gap between the two halves.

You might like to design your own mounting arrangements. I chose to fasten some fishing split shot in the positions marked to hold the bottom of the beam

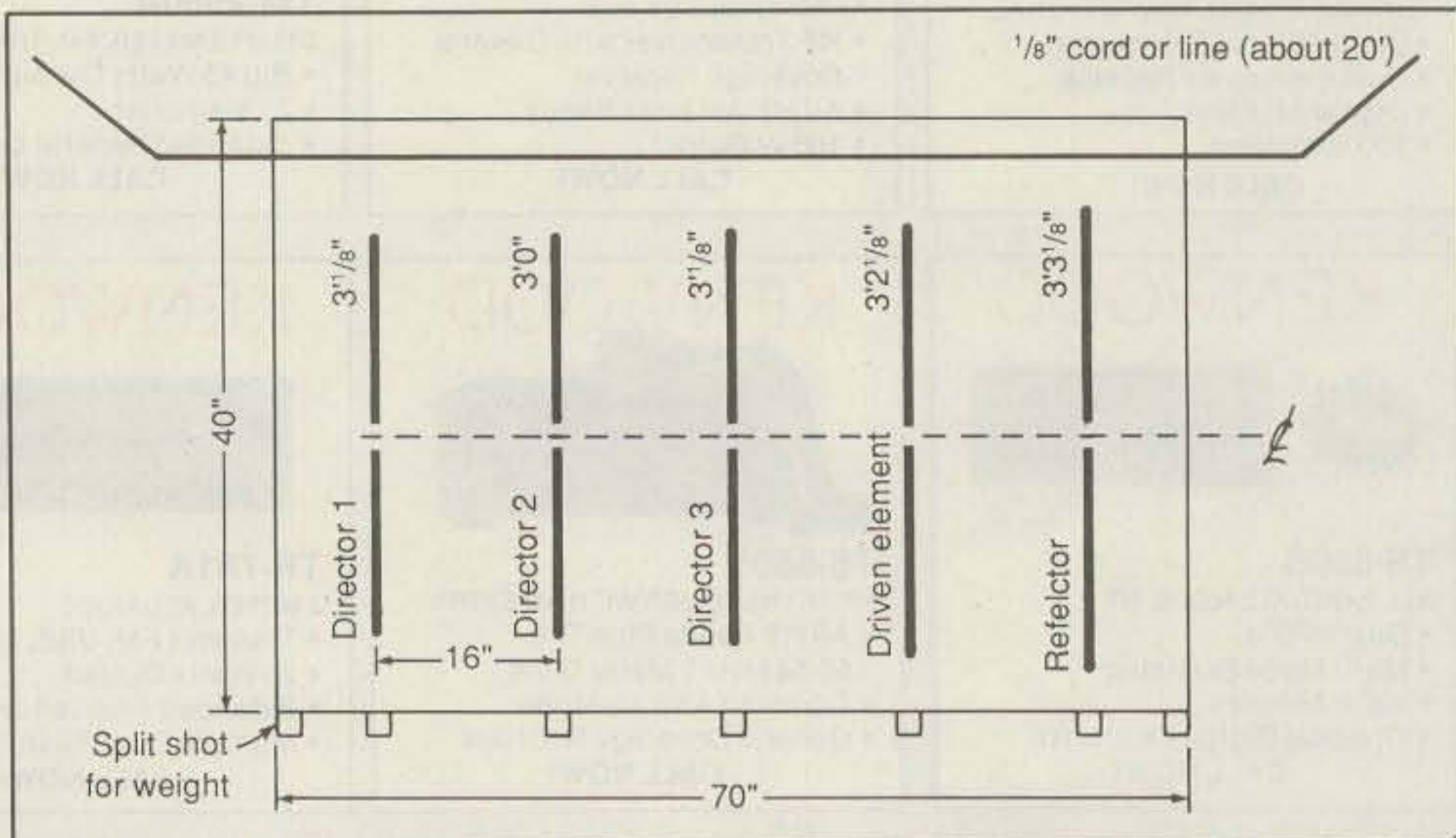


Fig. 1—Overall plan for the portable 5-element beam.

vertically down, and taped the top of the bedsheet to a piece of 1/8 inch cord about 20 feet long. This mounting relieves any stresses from the plastic and assures vertical polarization.

The other possible stress point is the mounting point of the feed line to the driven element. Fig. 2 is an expansion of the area around the center of the driven element. The dotted line is the edges of a 2

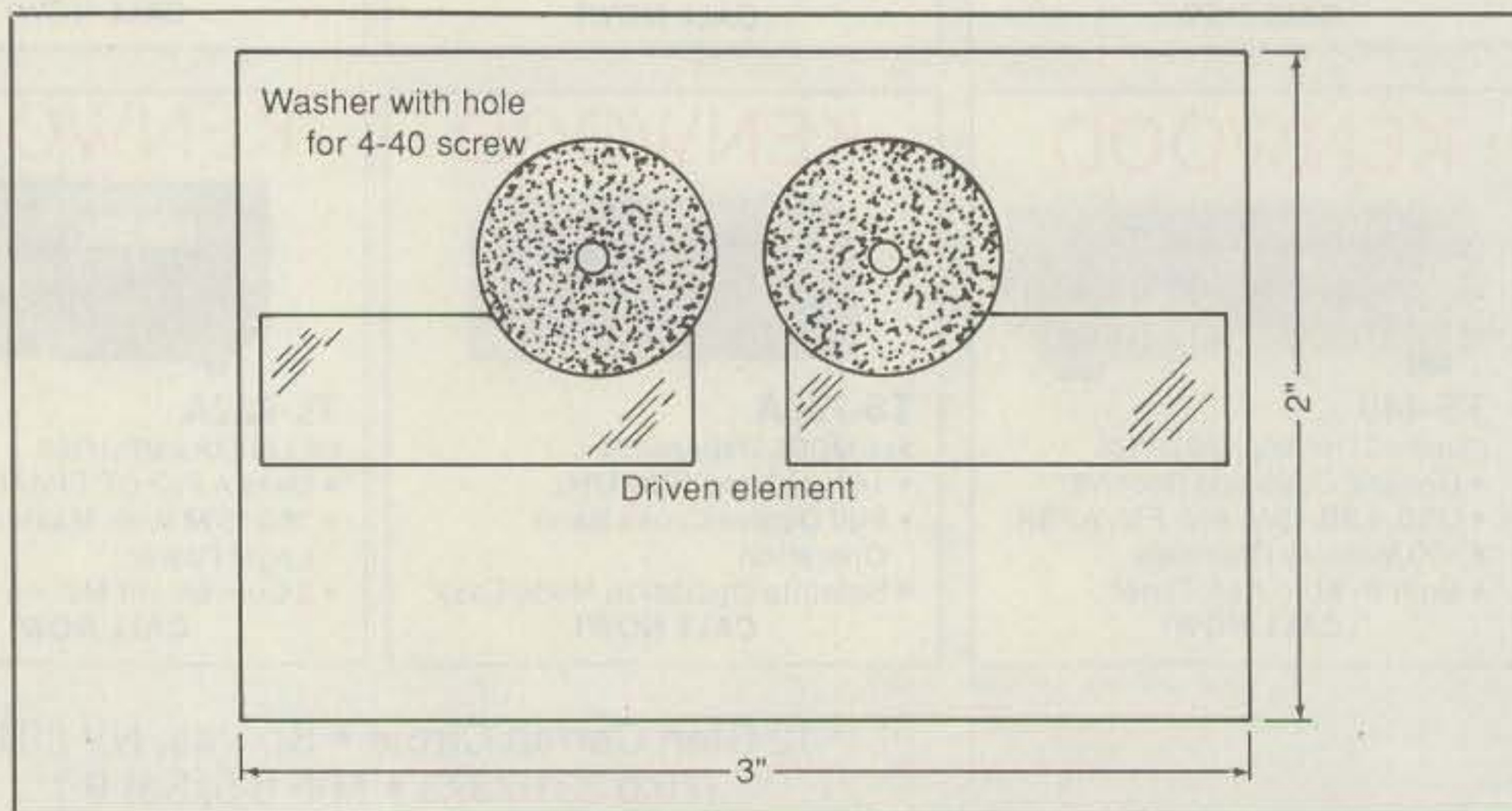


Fig. 2—Details for connecting to the driven element.

\*2 Dawn Road, Norwalk, CT 06851

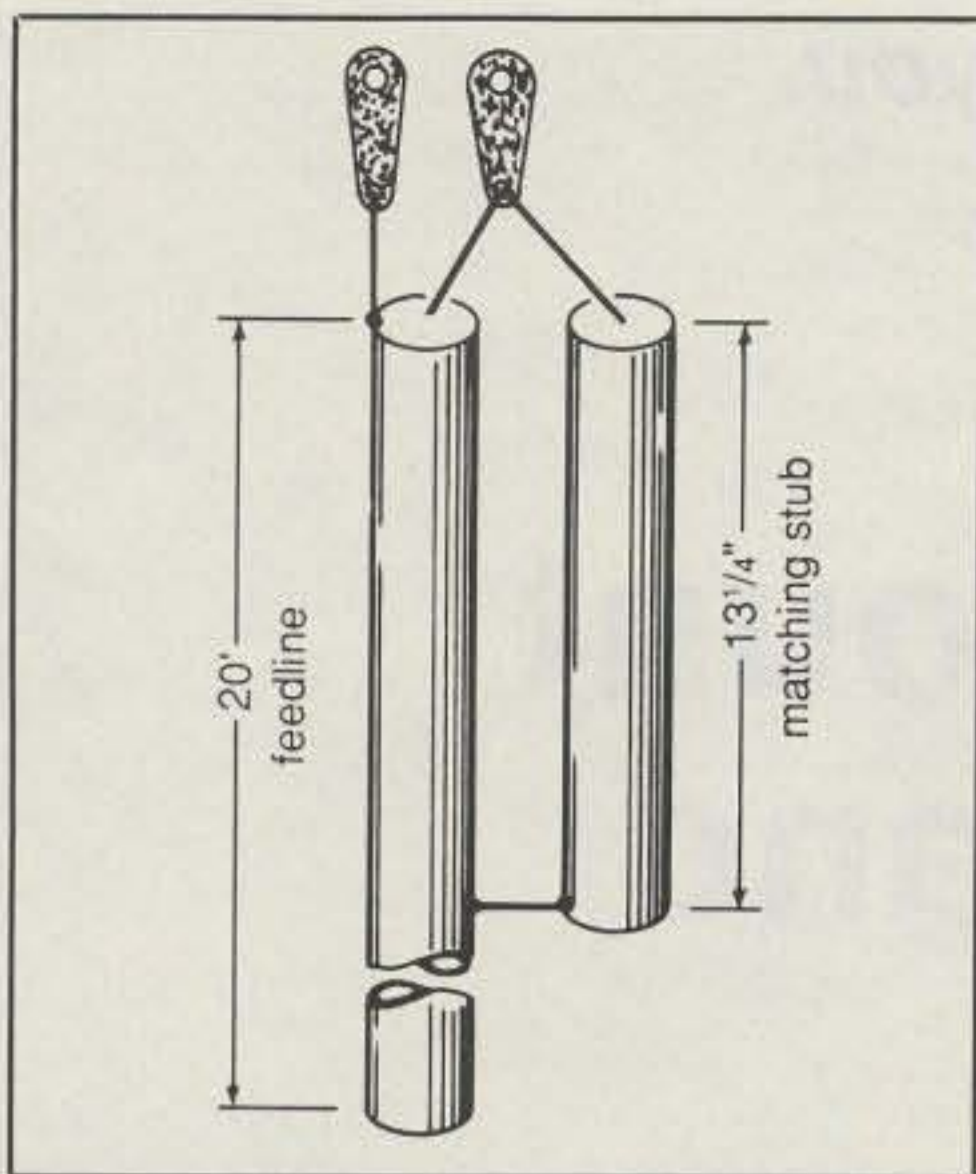


Fig. 3- Feedline and matching stub details.

inch by 3 inch piece of plastic cut from a plastic butter tub and taped to the back side of the beam. Two holes are drilled next to, **but not through**, the ends of the driven element sections. An assembly of a 4-40 screw, nut, and oversize washer is now tightened as shown, with the washer making contact to the metal of the driven element and the backing plastic relieving any strain from the bedsheet.

The feed line, as shown in fig. 3, terminates in two solder lugs which then are placed over the exposed screw bodies and fastened in place with finger-tightened nuts. I remove the feed line for traveling.

The feed line is a 20 foot section of RG-59. At one end is a connector which matches the connector on your rig. The other end is assembled as shown in fig. 3. This is a standard design for a matching stub, and for anyone who has not built it before, the drawing is not in error. The center conductor of the 13 1/4 inch stub is *not* connected.

With plastic tape, tape the stub to the feed line every 2 inches. I suggest covering as much of the exposed wire as possible at each end with a silastic, rubber, or hot glue for protection. The ends of the two solder lugs should be kept bare!

Directions for use are simple. Fasten one end of the cord to anything that is available (I carry a few thumb tacks) and rotate the other end of the cord for maximum signal strength.

If you can, try to dress the feed line so it comes out at right angles from the beam for 2 or 3 feet.

If this was a perfect world and we could design and build a perfect beam and mount it free and clear in the blue sky, we might get 9 or so dB gain from the beam. But this is not a perfect world, and hotel or motel rooms are full of wiring, steel reinforcing rod for the concrete, lamps, and

other fixtures. For this reason the beam SWR will probably run at 2:1 or so in use, and attempts to reduce it are not worthwhile because the room will change its effect on the beam each time you swing its direction. Therefore, it probably does not pay to attempt to trim the beam to reduce the SWR and maximize the gain to the utmost.

A 3 dB gain doubles your effective power, and a 6 dB gain multiplies it by 4. Therefore, if the beam works moderately well, you can probably plan on some gain between these figures with a surprising increase in performance, since most quarter-wave whips on handie-talkies do not perform anywhere as well as a true dipole and all rubber duckies do even worse.

No claims are made for gain in this design. But since the investment is only a few dollars and less than an hour of work, you might be surprised at the results. Between trips you can unfold the beam and

hang it on the wall as a decorative picture or painting.

I would like to thank Dr. Harold Shnitkin, whose prototype wideband TV Yagi, built on a large sheet of drawing paper, suggested this concept to me.

### Materials

Plastic sheet, minimum 70 inches by 40 inches, 4 mil thickness or greater.

RG-59 coax, 20 feet or so.

Coax connector to match your rig antenna connector.

Self-adhesive foil for window burglar alarms, Radio Shack 49-502.

4-40 screw, nut, and oversize washer.

Twenty feet of cord or string.

Roll of clear shipping tape, Radio Shack 64-2339.

Two solder lugs.

Six to 12 medium split shot.

Silastic, liquid rubber, or hot melt glue.

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**Here's an idea that might sound good to you.  
W4FA comes up with a novel method of  
mounting your station microphone.**

# The Magnetic Mount Microphone Stand

BY JOHN J. SCHULTZ\*, W4FA

**E**veryone has heard about magnetic mount antennas, so why not a magnetic mount microphone?

I've experimented over the years with literally dozens of microphone mountings. I can't really say that the magnetic mounting idea, as presented in this article, is suitable for all microphone types, but it does come close to being ideal for small, lightweight microphones. In fact, you can "roll your own" complete microphone assembly using the magnetic mounting idea by placing a suitable microphone cartridge on the basic assembly to be described.

The photographs do show a specific microphone assembly I constructed and I'll mention some specific parts and construction techniques I used. But by far, this article is just meant to present some ideas. I'm sure many readers can find ways to assemble a similar microphone mounting in a more elegant and perhaps less expensive manner. On the other hand, I would hasten to add that the microphone I put together looks "sharp" and performs extremely well.

The magnetic mount microphone I constructed consists of five parts: a replacement type telescoping whip antenna with a swivel base, a BNC male connector, a BNC female chassis mount type connector, and a round magnet. The telescoping whip antenna (Radio Shack 270-1416) allows you to extend or retract the microphone head, which is placed at its end, from about 5 to 16 inches. The fact that the antenna has a swivel base allows almost any placement in the vertical plane. The combination of the BNC male/female connectors (Radio Shack 278-104 and 278-105) provide the inter-



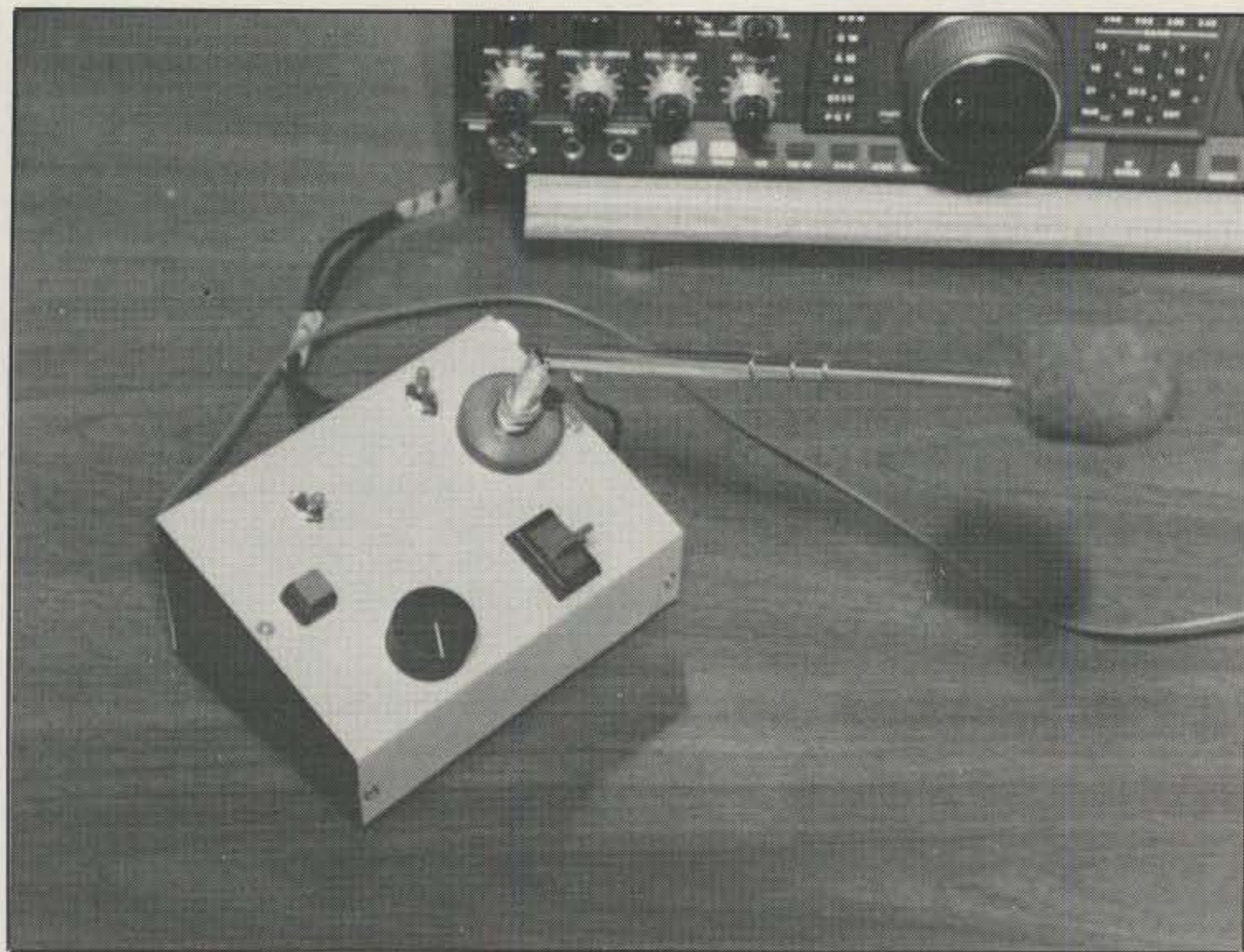
*Here's the microphone sitting quite comfortably on top of a transceiver. If the top over on a transceiver were not made of steel, a small steel plate could be mounted on the cover by double-sided tape.*

face between the whip antenna and a round 1 1/2" o.d. magnet. The use of the connectors allows 180 degree rotation of the whip in the horizontal plane. So, between the extend/retract features of the whip, the swivel base on the whip, and the rotation possibilities at the interface of the BNC connectors, you can move the microphone head to an almost infinite number of positions. The swivel base of the whip, by the way, press-fitted almost perfectly into the end of the male BNC connector with just a bit of filing.

The round 1 1/2" magnet I used was an

odd-ball from my junkbox. It did have a center hole which accommodated the BNC female connector with the use of epoxy cement to hold the connector firmly in place. Radio Shack does sell a 1" diameter magnet with a center hole which would accommodate a BNC connector, but I found the magnet to be too weak. On the other extreme, Radio Shack does sell a horseshoe magnet (64-1887) which could be used but falls into the "overkill" category. I would suggest that if you are interested in this project, a bit of hunting around for a magnet having a 1 1/2 to 2" di-

\*302 Glasgow Lane, Greenville, NC  
27858



Here the microphone is mounted on a small control box which is in a sheet steel enclosure. It's just meant to illustrate the idea that the microphone can be moved around to any surface that will accept the magnetic mount.

ameter would be worthwhile. The magnet from a discarded, small magnetic mount antenna should be perfect. I don't think you would have any difficulty finding a suitable magnet with just a bit of effort.

Mounting and wiring a microphone head at the end of the telescoping whip antenna (now turned into a microphone boom) is not complicated. In my case, I used the "business" end of an electret hand microphone which I simply detached from its body and mounted the head on the microphone boom, again using epoxy cement to secure the mechanical joint. An inexpensive tie-clip or tie-pin electret microphone would be ideal to simply mount at the end of the microphone boom with just a bit of epoxy cement.

I should mention that I did remove the smallest section from the five-section telescoping whip (turned microphone boom) previously mentioned. This was done both to provide more stability to the overall assembly and also to "open up" the whip so a microphone cable could be run through the remaining four sections. The smallest section was simply forced out. The four remaining sections allow the easy passage of any small, shielded microphone cable. You do have to drill a slanted hole near the bottom of the base section of the whip to allow the cable to exit. The hole should be lined, if possible, by a bit of tubing to prevent undue scratching of the jacket of the microphone cable as the whip is extended or retracted.

If you have some sort of small micro-

phone head to mount at the end of the whip, all the better. But a microphone head or enclosure is not absolutely necessary for a microphone that is going to be used only indoors. There is no reason why you cannot mount a microphone cartridge directly on the end of the whip and then cover it with a foam plastic windscreen to prevent "breath blasts." Small electret microphone elements (e.g., RS 270-090) can be used or some of the Heil Sound elements if a sharper audio sound is desired. A small piece of PC board stock can be used as the interface between the whip and the microphone element with everything being fastened together with epoxy cement. The windscreen, by the way, is a "must" and it has to be acoustically transparent. Many foam plastic materials are suitable but if you do not have any suitable material on hand, I would suggest the use of the readily available and inexpensive foam plastic earpads sold for headsets. I found some available at a chain discount store selling for about \$1.00 a pair that fit perfectly over the Heil HC-4 and HC-5 microphone elements. Again, this type of microphone construction is meant only for fixed station usage where the microphone is not going to be subject to rough mechanical handling or moisture entry problems.

If you do try out the magnetic mount microphone idea, I think you'll be surprised at its versatility as I've tried to illustrate in the photographs accompanying this article. You can mount the micro-

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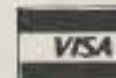
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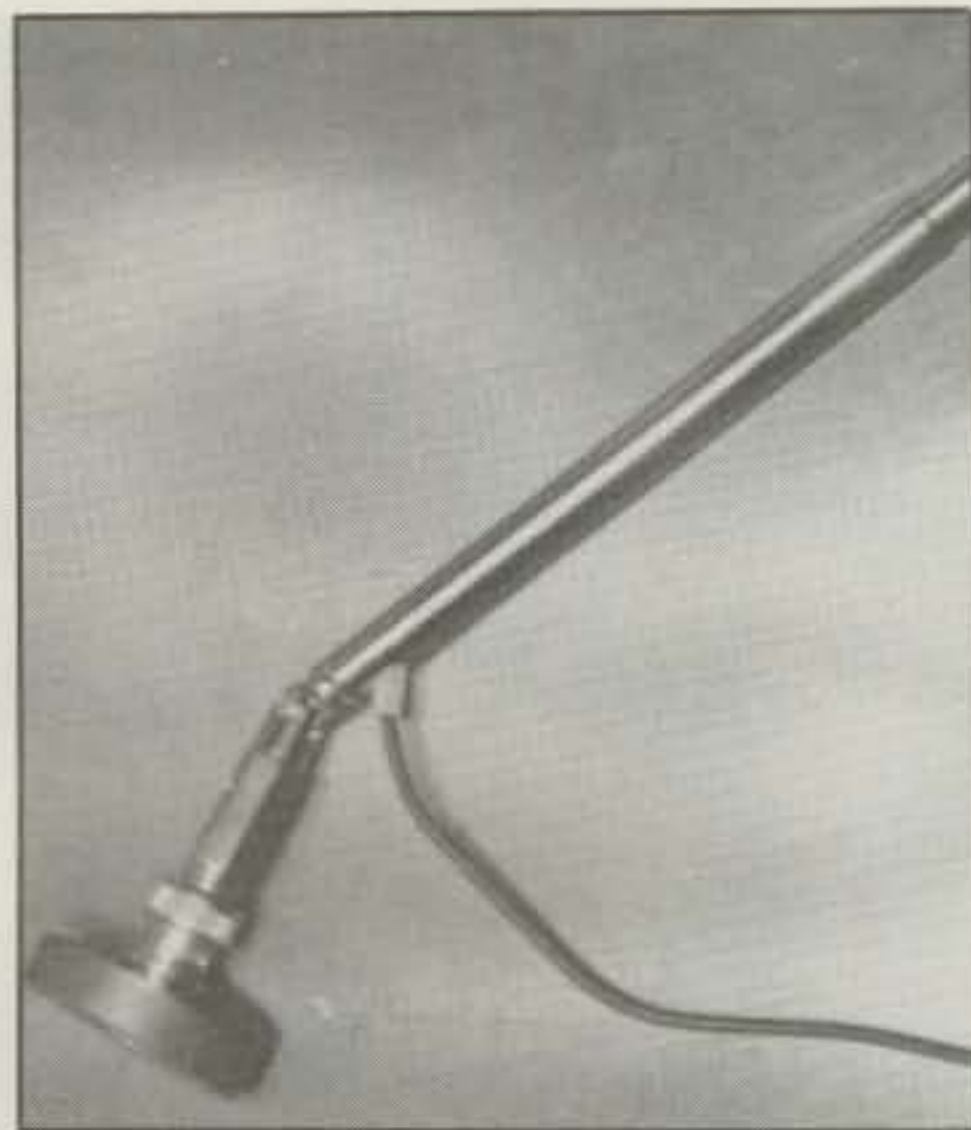
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phone on top of a transceiver when you prefer to work "close-in" and yet have the operating table in front of you completely clear of an annoying microphone stand. The small diameter magnet as used by the microphone assembly will normally not get in the way even if other accessories are placed on top of a transceiver. On the other extreme, if you are really going to settle back in your chair for an extended ragchew, move the magnetic mount microphone to a metal clip or flat stand placed at the edge of an operating table and enjoy operating comfort.

The magnetic mount microphone idea may not be the ultimate idea for a multi-purpose microphone mounting, but I

think it comes pretty close, since the microphone can be placed wherever a surface is available to which a magnet can be attached.

Finally, some readers may ask, why not use a headset type boom microphone instead of the free-standing microphone mounting described in this article? It's a matter of personal preference. I've found headset boom microphones to be quite handy at times, especially under circumstances where there is a rapid exchange of communications such as during contests. But for more relaxed operating periods I found the magnetic mount microphone idea far more comfortable to use, since I would normally spend far more



The base of a telescoping whip fits into the top end of a male BNC connector which mates together with a female BNC connector to allow complete movement of the microphone in all planes.

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A variety of microphone cartridges can be used to "roll your own" microphone assembly. The only requirement is that the cartridge be held firmly in place and that some form of windscreen be used in front of the cartridge. The round cartridge is a Shure MC-11 and the two cartridges to the right of it are Heil Sound elements.

time receiving rather than transmitting. I suppose that during contest periods when you are really engaged and concentrating on operating the slight discomfort of a headset boom microphone goes unnoticed. But I did notice the discomfort during casual operating periods, especially in warm, humid QTHs such as my last one in SV5 land. Again, a matter of personal preference. Give the idea of the magnetic mount microphone a try, especially if you would like the freedom to move a microphone around to various placements.

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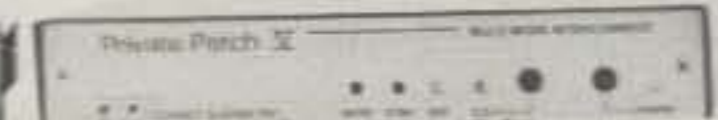


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# CQ REVIEWS:

## The Bird Series 4410 RF Directional Wattmeter

BY LEW MCCOY\*, W1ICP

One of the most popular RF directional wattmeter instruments is the Bird Thru-line™ Wattmeter. One of the most recent models is the 4410. For those readers who are not familiar with the Bird instruments, some basic explanation of the device is in order.

The Bird wattmeter is designed to be inserted in 50 ohm impedance coaxial line, where it measures the RF power in the line. Fig. 1 shows the basic configuration of a Bird wattmeter. The RF transmission line goes through the instrument. The element slug, shown by the directional arrow in the diagram, is inserted into the instrument, and the slug can be rotated 180 degrees. Inside the slug is a pickup line, a diode, and the detector circuit. In one direction the pickup line detects the **Forward** power or RF voltage, and in the other direction, the **Reflected** power.

Back in October 1951 in *QST* I described an instrument called the Monimatch, which was one of the earliest reflectometers using the pickup line and diode principle. The later version, the Monimatch Mark II, which was in February 1952 *QST*, utilized two diodes and two pickup lines so that by switching, both reflected and forward readings were available. The Monimatch was excellent for measuring a 50 ohm match, but fell apart when any wide-frequency excursions and power measurements were involved. The problem of accuracy revolved around the pickup lines and the electrical and mechanical differences in each diode. Bird more than solved such problems with the single rotatable diode plus other circuitry.

The Bird Thru-line™ wattmeter is a very accurate instrument in that it reads to better than plus or minus 5 percent of the power in the line. Not only that, the frequencies that can be covered with this accuracy are very extensive, as we shall see.

Various plug-in elements are available. Each element covers a specific fre-



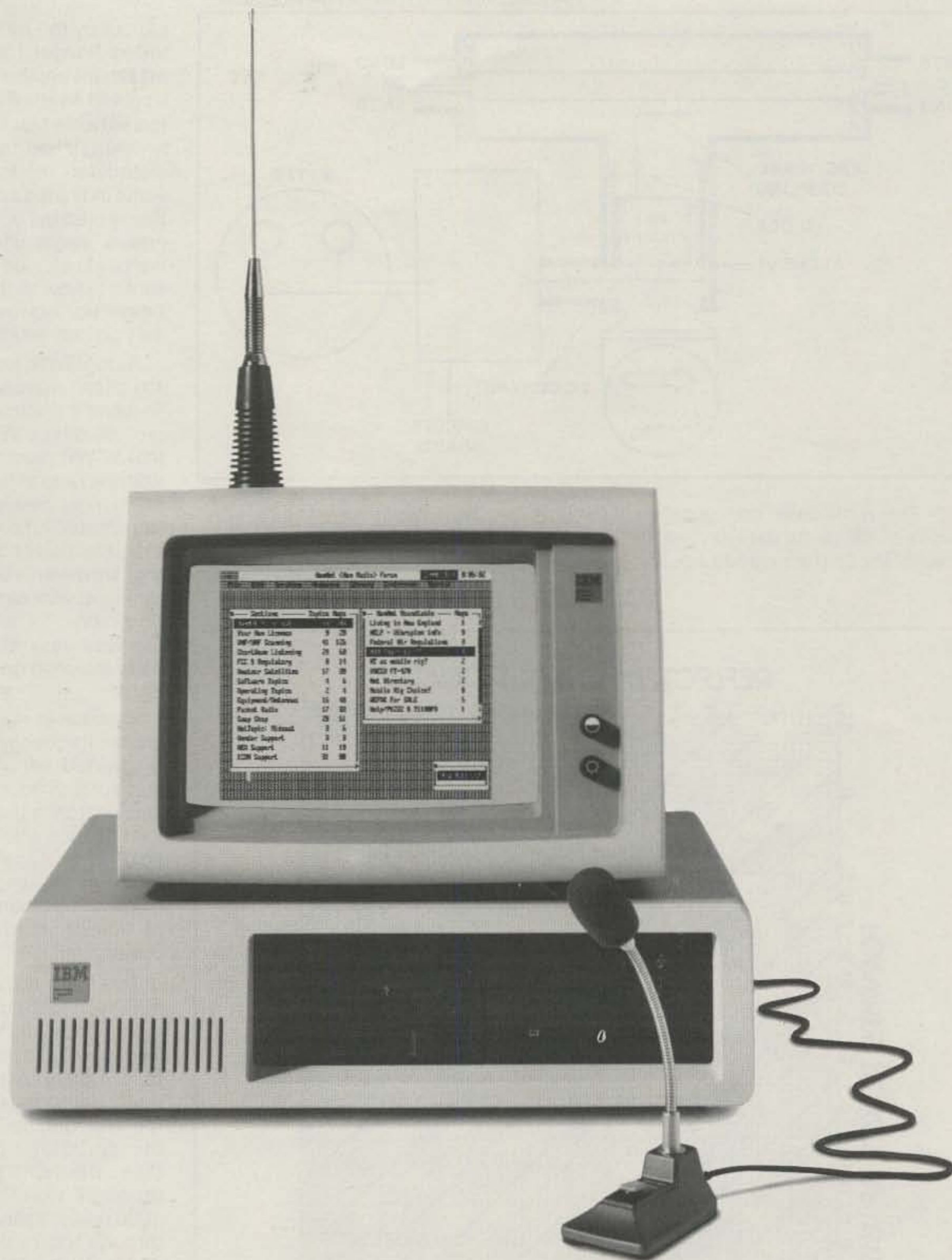
A front and side view of the 4410A. The compartment at the upper rear is for a 9 volt battery. The multiplying factor switch is to the right, between the meter and element.

quency range and power level. The beauty of the 4410 is that a single element can be switched through several power ranges. The switch positions are marked with element multiplying factor numbers 0.1, 0.3, 1.0, 3.0, 10, 30, 100, BATT, and off. The designations are for use with the multiplying factor of the power rating of the particular element. Each element is marked with its maximum power range capability—10 W, 100 W, 1000 W, or 10,000 W (and frequency range). For example, if the element factor is 10 and a switch setting of 30 is used, this would provide a full-scale reading of 300 watts, assuming you were using a 1000 watt element. As you can see, a single element can be used for a wide range of power measurements. There is a very wide range of element types and powers available permitting measurements from as low as 10 milliwatts to as much as 10,000 watts. Therefore, the 4410 can handle from QRP to very high power.

One interesting point that is brought out in the very excellent instruction manual is the subject of "load" power. As one who has designed and described many SWR and power indicators, I have always been concerned by the misinterpretation of power readings by many amateurs. Bird points out in their manual that when an SWR condition exists, it is necessary to subtract the reflected power from the forward power to get the actual load power. It is this load power that is going to the load to be dissipated. Too many amateurs believe it is the sum of the reflected and forward power that exists in the output of an amplifier. It is the *difference* between the two that is the actual load power (disregarding line losses).

I always remember an incident that happened in the technical department when I worked at the ARRL. One of our engineers had insisted that the power shown, the sum of the reflected and forward powers, was the real amount being

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



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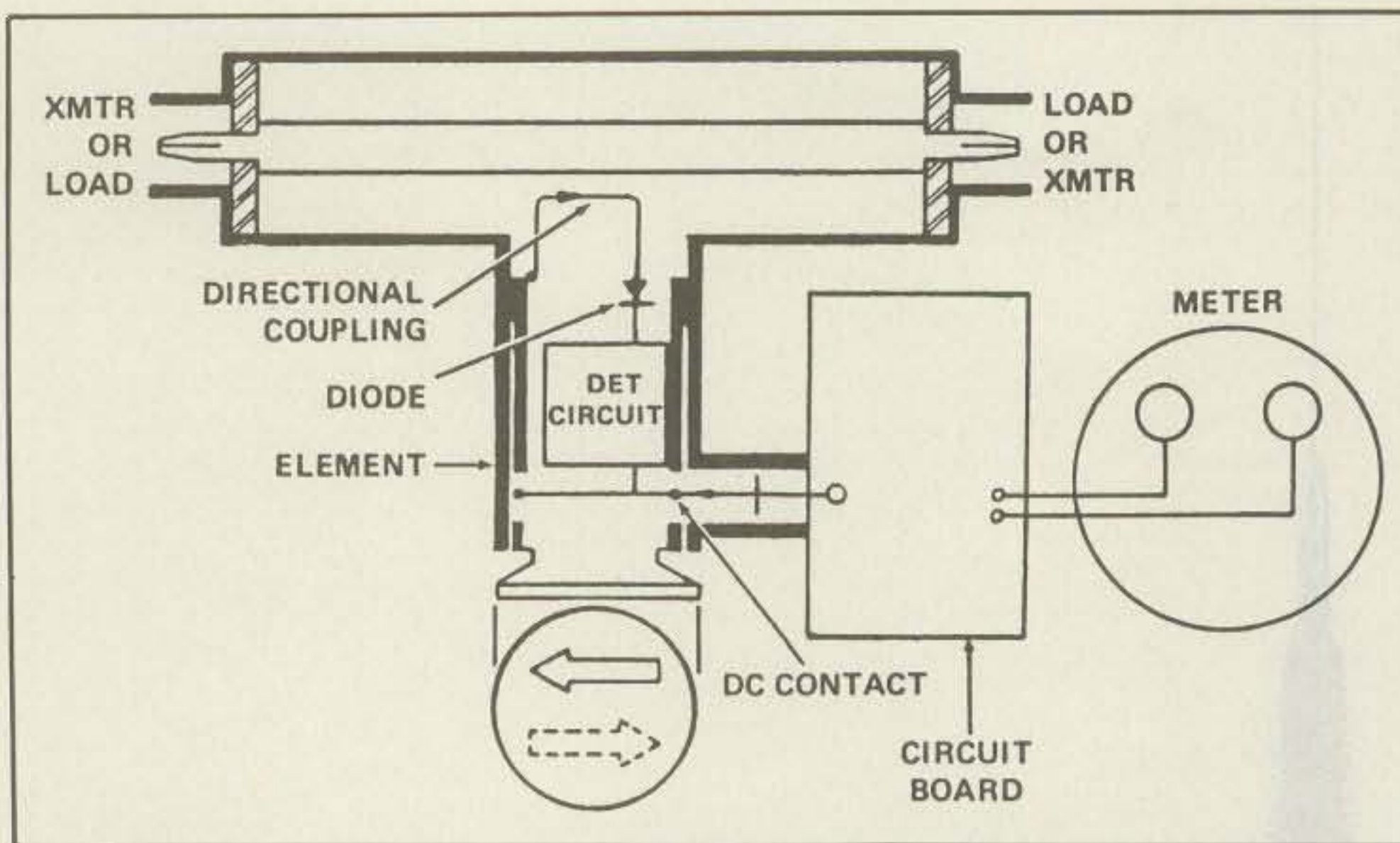


Fig. 1— This is the basic configuration of the Bird ThruLine™ Wattmeter. At either end are coaxial fittings for the line. The center (and outer) conductor runs through the instrument. The plug-in slug has a built-in pickup loop and diode as described in the text.

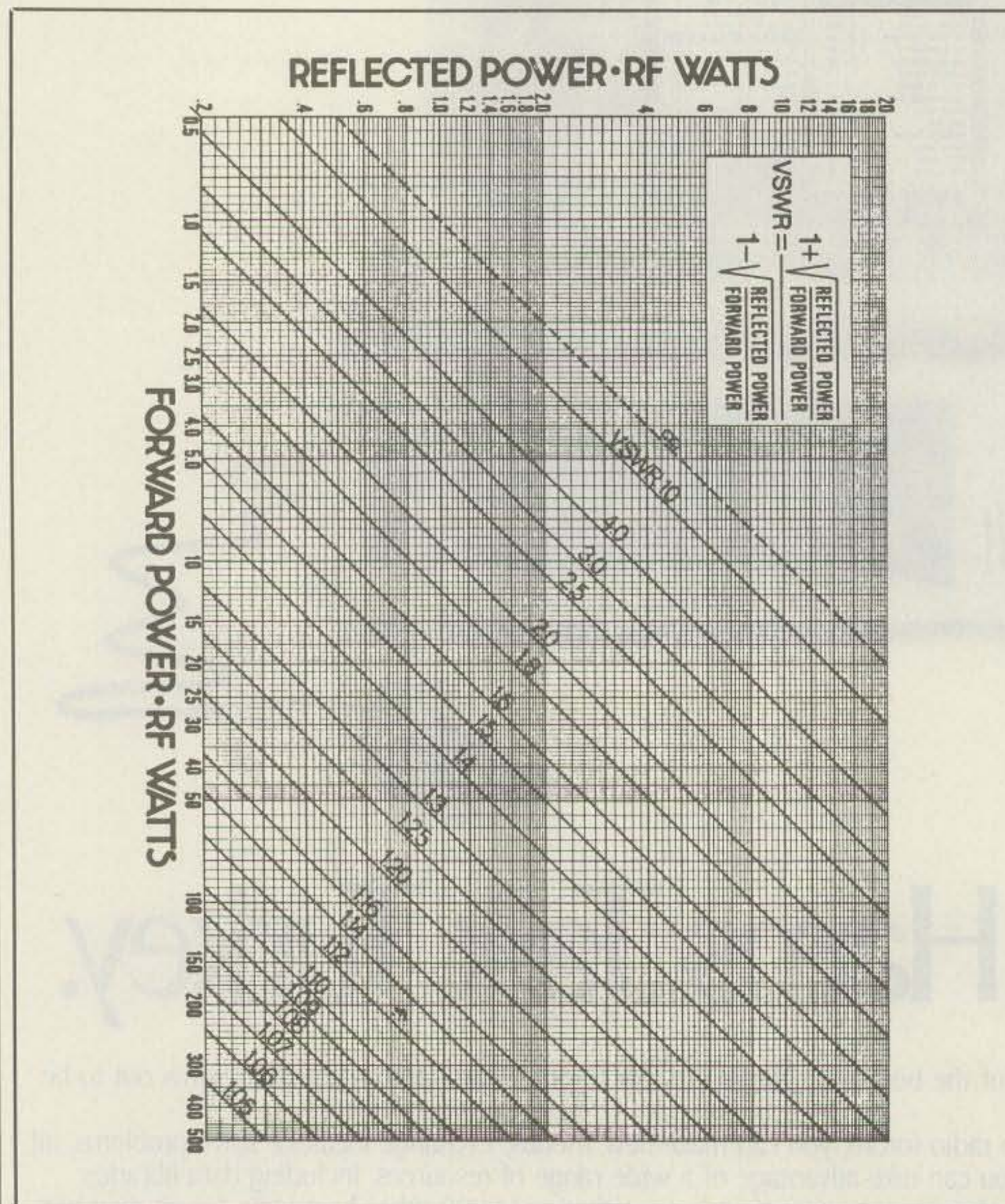


Fig. 2— This is a nomograph for converting power to SWR. It is simple to read. For example, assuming 100 watts forward power with 8 watts reflected the SWR would be 2 to 1.

put out by the transmitter. I hooked up a Viking Ranger transmitter which had a maximum capability of about 80 watts (a single 6146 amplifier tube). I ran the rig into a variable reactive load and deliberately mismatched the load. Using our Bird wattmeter, my forward power was 210 watts indicated and 140 watts reflected. I then asked the engineer to explain to me how a single 6146 could put out 350 watts. He studied for a moment and then said, "I know all that BUT...!" About then I gave up. However, in the Bird manual they go into detail explaining this fact.

As to VSWR, let me quote from their instruction manual: "The series 4410 ThruLine™ Wattmeter is not designed to provide direct VSWR readings. It is felt that VSWR readings are no more useful than the ratio of forward to reflected power. In most cases operators find that for transmitter tune-up, antenna matching, etc., the power ratio is a highly useful tool. However, VSWR readings can be determined very easily by the use of provided graphs." The included nomographs are very easy to use and understand. I have included one of the nomographs in fig. 2.

In order to make measurements, the proper frequency range plug-in element is inserted into the line section socket and rotated to either stop. There is a small catch in the lower left-hand corner casting face where the element is inserted. This assures good contact is made between the unit and the element. The element can then be rotated in either direction to read forward or reflected power.

There are two scales available on the meter. The top scale is divided into increments from 0 to 10 and the bottom scale from 0 to 3. To repeat, there are several plug-in units available for different frequency and maximum power ranges—for example, up to 10,000 watts for 0.2 through 30 MHz. (This one element would take care of QRP through very high power for all HF work!) Also, 200 mW through 1000 watts, 2 through 1000 MHz, 20 mW through 100 watts, 25 through 1000 MHz, and 2 mW through 10 watts for 30 through 900 MHz. The 4410 measures 3 3/8 inches long, 4 inches wide, and 6 7/8 inches high. It weighs 3 pounds.

The instruction manual is superb and as detailed as anyone could ask. This is an extremely high-quality instrument in every respect. As to construction, mechanical features, and accuracy, I would certainly give the Bird a 10-plus on a scale of 0 to 10.

The 4410A lists for \$570 and \$170 for the 10,000 watt 0.2 through 30 MHz unit. The others list for \$145 each. The Bird ThruLine™ Wattmeter is manufactured by Bird Electronic Corp., 30303 Aurora Rd., Cleveland, OH 44139 (216-248-1200).

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# CQ REVIEWS:

## The A&A Engineering Spectrum Analyzer

BY PETER BERTINI\*, K1ZJH

**A** popular spectrum analyzer design by Al Helfrick, K2BLA, ARRL Technical Advisor, has been worked into an inexpensive product by A&A Engineering and is offered both in kit and assembled form. The analyzer has enjoyed good acceptance in the CATV, educational, and amateur markets. The analyzer covers from 2–450 MHz, offers a 50 dB log display range, and shows the center scan frequency in a three-digit display.

K2BLA published his "An Inexpensive Spectrum Analyzer for the Radio Amateur" in the November 1985 issue of *QST*. While not the first (Wayne Ryder, W6URH, published an exceptional spectrum analyzer article in the June 1977 issue of *Ham Radio*), the Helfrick design is unique for several reasons. It is interesting to contrast the technical complexity of Ryder's earlier work with the simple elegance of Helfrick's design.

First, modern ICs and filters have dramatically reduced the parts count, and the growing cable TV industry has made available inexpensive CATV modules that are usable as spectrum analyzer front ends to above 450 MHz. Indeed, the Helfrick design uses only one IC—a Motorola MC3356 wideband FSK VHF receiver chip—and a Jerrold CATV module as the major RF components. Selectivities of 300 kHz and 15 kHz are provided using inexpensive ceramic filters and a two-pole monolithic filter at the 10.7 MHz final IF.

With the RF section taken care of, the last remaining hurdle is the log amplifier. Where Ryder used five transistors in a complex circuit, Helfrick makes use of the signal meter output from the MC3356. Fig. 1 shows the voltage output versus signal input, on a log scale, of the MC3356 chip. Notice that each voltage change of times ten is equal to 20 dB and



Front view of the A&A Engineering Spectrum Analyzer.

the output is very linear for over a 60 dB range.

The remaining circuitry is used for sweep generation, blanking, and center-frequency display. Thanks to high linearity of the hyper-abrupt varactor diode used in the Jerrold module's VCO, only one breakpoint adjustment is needed to correct the tracking of the VCO tuning voltage versus frequency. By contrast, Ryder's design needed ten breakpoint adjustments!

The newer Jerrold modules use a first IF of 551 MHz. The VCO LO operates from about 551 to 1001 MHz. (The second IF is 60 MHz.) The VCO is divided by 256 via an internal prescaler. This prescaled output allows the center frequency of the analyzer to be accurately displayed using a few digital tricks. First, a pulse counting circuit "swallows" the first 551 counts to compensate for the IF, before the display counting takes place, and another circuit monitors the zero-crossing point of the sweep waveform to initialize and enable the count sequence.

Looking at the interior view, you can see the rear PC board for the power sup-

ply; the larger board, front center, for the counter and display drivers (along left edge); analyzer IF RF section (center); and sweep circuits (right edge of board). The Jerrold CATV module mounts neatly underneath this board.

### Using The Analyzer

The analyzer uses an external display. Any scope with DC coupling and XY inputs can be used. The vertical output is 50 mV per division for each 10 dB of signal. Front-panel controls are as follows, left to right (see the front view).

The RF input is at the lower left. Fine and Coarse frequency controls are located directly beneath the display bezel. The "Attenuator" control needs some explanation. This is not a true IF attenuator, but might better be described as a baseband shifter. Calibrated in 1 dB steps, it permits shifting the display to allow accurate measurements of signals that fall between the scope markings. This control is more useful when using scope sensitivities of 10 mv/div, or 2 dB per division.

\*20 Patsun Road, Somers, CT 06071

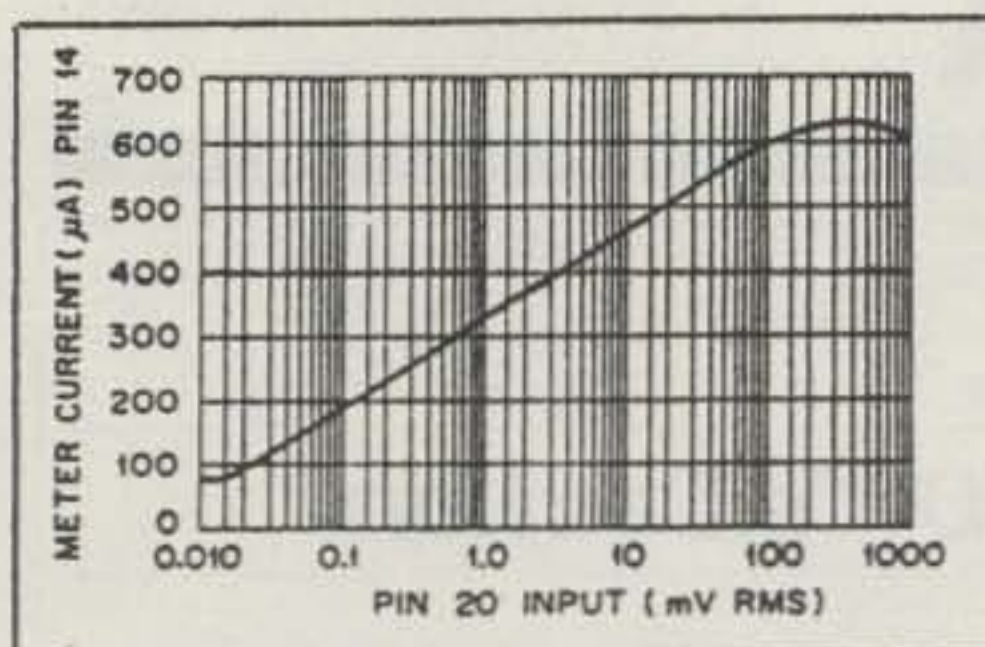


Fig. 1—Signal meter output from pin 15 of the MC3356 wideband FSK receiver chip. Notice the log meter current response for over a 60 dB variation of input signal.

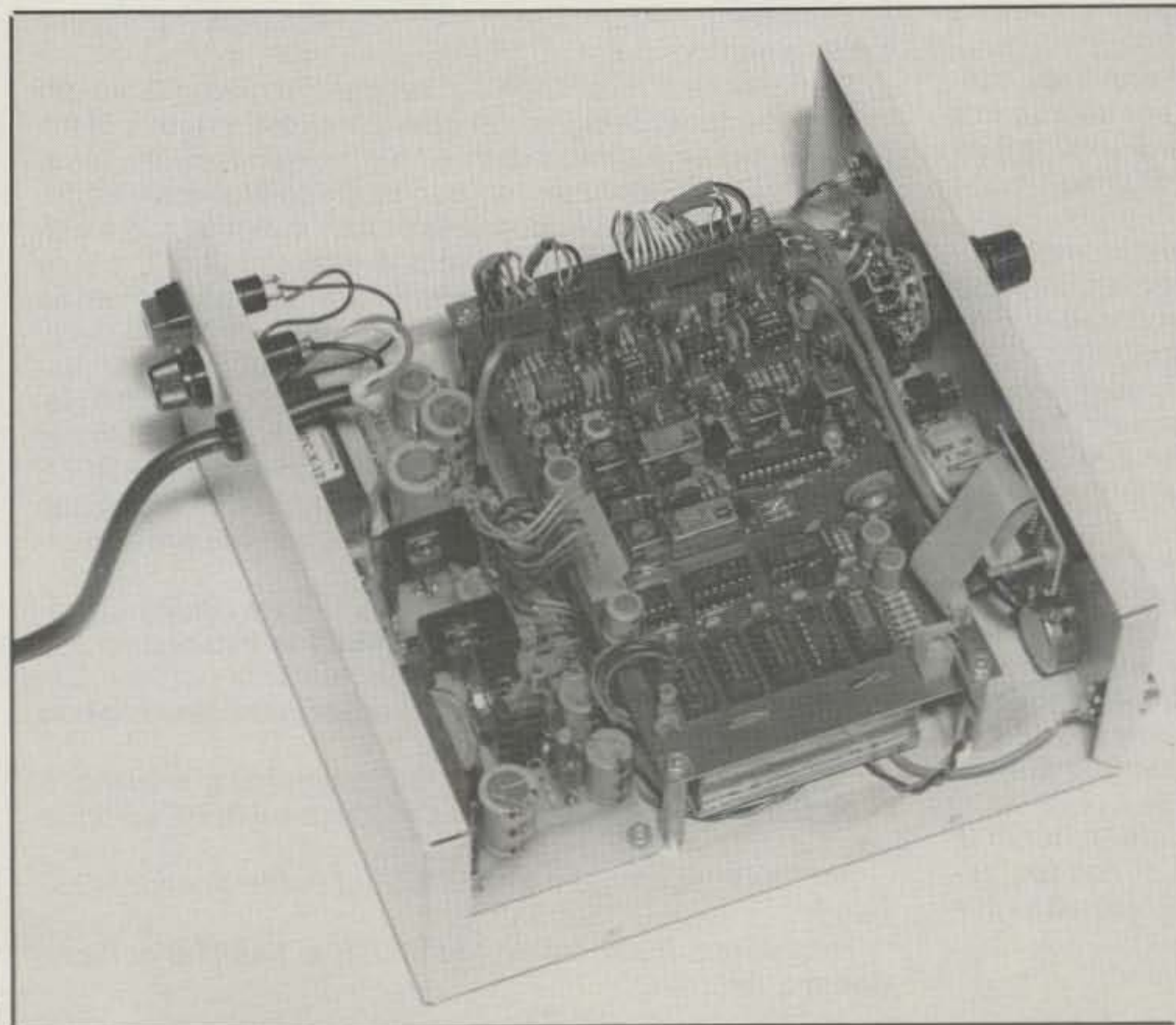
The two toggle switches select the Video Filter (in/out) or the Wide/Narrow (Bandwidth) IF filters. The Sweep Rate control is to the far right. The Scan Width control is switch selectable in 12 ranges from 0 to 50 MHz. I was very impressed and quite pleased with the "feel" of the controls; they work smoothly and accurately. One might wish for an internal RF attenuator (being planned by A&A) or a little more dynamic range. The display is very clean. Few, if any, spurious signals were noted during my review time with this unit. Log accuracy, center frequency readings, and display linearity are also good.

As mentioned earlier, the spectrum analyzer is offered assembled or in kit form (under \$500). Kit assembly is not detailed in "Heath" style. Some technical expertise and understanding of the circuitry is needed to build and calibrate this unit. A steady hand is required to perform the internal CATV module modifications. The kit version is also offered "piece-meal." A detailed price list of all the parts is available from A&A. You may order just the boards or whatever parts you need, including the CATV module, to build this analyzer—a very good deal for the amateur builder! Factory service is available for units bought either as complete kits or assembled, and the folks at A&A are friendly and helpful.

For the educational market this unit offers practical, hands-on experience for students. All too often educational institutions have one or two multi-kilobuck units that are rolled out and demonstrated once during a course. This unit, however, is inexpensive enough to encourage continued lab exposure for each participant.

Amateurs will find the unit well suited for transmitter harmonic, spurious emission, and spectrum monitoring. In fact, coupled to an HF antenna, the unit is a fine way to monitor band activity across the entire HF (or VHF) region!

For more details and pricing contact A&A Engineering, 2521 West LaPalma, Unit K, Anaheim, CA 92801, or phone (714) 952-2114.



A look inside the A&A analyzer shows a clean, uncluttered layout.

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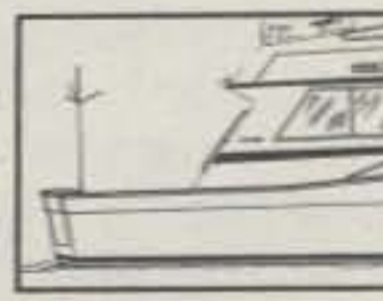
#### On Land

Suitable for use on any motor vehicle from a compact automobile to a motor home or trailer. Work four bands without stopping to change resonators.



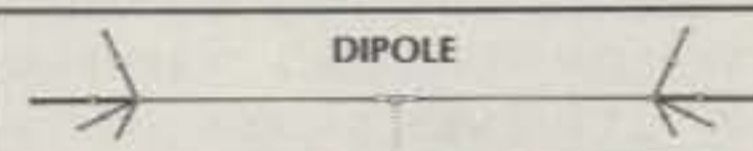
#### Or Sea

The Spider™ Maritimer is for use on or near the ocean. Highly polished stainless steel and nickel-chrome plated brass. Commercial marine frequencies (8, 12, 16 and 22 MHz) are also available.



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CIRCLE 73 ON READER SERVICE CARD

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CONNECTING YOU AND PACKET RADIO IN THE REAL WORLD

## ROSE—A User's Guide and BBS SYSOP's Caution

In November of last year I gave the readers of this column an update on the growth and performance of the ROSE Network. Since then a quantum leap has taken place across the nation and the world. Many Local Area Network (LAN) managers and SYSOPs are moving away from the older methods of networking to this new and radically different networking topography.

Our thanks to Gordon Beattie, N2DSY, Tom Moulton, W2VY, and the many members of the Radio Amateur Telecommunications Society (RATS) for having performed their networking homework well.

The mail that I've received relative to the subject surpasses the quantity of mail I've received about any article I've ever written, and it's coming from all parts of the world. It is evident that the ROSE is not exclusive to this hemisphere. It is in use in South America, Costa Rica, Australia, Germany, Japan, and other nations around the globe. Most of the mail either requests the disk of the ROSE code or asks for a brief user's guide. I assembled a brief user's guide and tried uploading it to the BBS system addressed to **ALLUS**. That idea, I soon discovered, was the wrong thing to do. I received "nasty-grams" from several irate BBS SYSOPs who said I should not send a 6 Kbyte file to **ALLUS**. It became clear to me that the BBSes are reserved for junk mail, for-sale items, and anything *not* related to the advancement of packet radio. I even received messages from some BBS SYSOPs informing me that they were not in favor of changing to the ROSE, and therefore would delete any reference to the ROSE because it would mean changing or rewriting their forwarding files.

Needless to say, I'm not in the best standing with a few egocentric BBS SYSOPs. Most BBS SYSOPs do not fall into this category. There are some very friendly and hard-working BBS SYSOPs out there, but others are giving "SYSOPing" a bad name.

I was having lunch with several of the local packeteers here in Atlanta last week, and the subject of my BBS arose. It became evident that I had "hit a nerve" when I mentioned my misfortune with a few BBS SYSOPs and their threat of killing (deleting) my **to ALLUS** file. Two of the guests at the table, Bob and Kris, retorted almost in concert, "It seems that every time we try to operate lately the frequency has a BBS on it. With every new LAN that is activated, we soon have another BBS to pop up on it."

There is a growing attitude among packeteers that we may soon have some kind of legislation that will provide some relief from the proliferation of so many BBSes. If you think I'm joking, then I would like to draw your attention to the recently proposed (and narrowly defeated) rule making (RM-7248) that would have reduced the HF BBS forwarding frequencies to such a minimum number as to make it necessary to do just that—assign BBSes!

The FCC is becoming particularly fond of using a "lottery" as a means of dispensation for other assignments, so don't be surprised if sometime in the near future we are subjected to this

same method of limiting the number of and assigning of the call/SYSOP and the respective operating frequency for a given BBS.

Personally, I don't want to see any more legislation of our operating privileges. It is for this reason that I hope some formula can be resolved at the local level to circumvent any need for BBS/frequency "assignments"!

Having said all that, we're ready to get into the topic of interest to much of the packet world. Here is the latest easy-to-follow ROSE Network user's guide.

### A User's Guide For The ROSE Network

The ROSE uses area code and the local (telephone prefix) exchange numbering system. The only concern that we users should have is the area code (three digits) and the local exchange (three digits) numbers (total six digits).

In the United States the area code and local telephone prefix numbers are used to address the ROSE system. For instance, the area code for central and south Georgia is 912. One of the three-digit exchange numbers for Macon, Georgia is 781. Thus, the address for the local 1200 baud ROSE switch is 912781.

Where the ROSE switch exists, there are many combinations of routing schemes that can be used to build Virtual Circuits (VC). As the popularity of the ROSE grows, so will its use. For now we are making use of the nodes and digis that are still active along the routes.

To make use of these other packet transfer mediums we can include the nodes or digipeater calls in the routing tables of the ROSE switches. As the nodes and digis are phased out, or replaced by ROSE switches, we can easily configure the ROSE switches so they may recognize the new switches and make use of them in the throughput paths. Simply stated, this means we can program around the network nodes or through them as we wish.

In this month's column I've included the directories of Alabama, Florida, and Georgia ROSE switches. The map in the November 1990 column reflected the ROSE network then. In this issue I've included a new map. You will discover that the ROSE has truly arrived. This sudden increase in the use and implementation of the ROSE network switches should be an indication of its rapidly expanding popularity.

By looking over these directories you may quickly understand the manner in which a **CONNECT** is established and how easy the system is to use.

Here are a few additional hints to assist you in learning how to use the ROSE switch networks.

\* The first entry is the CALL of the station you are calling.

\*\* The second entry is the CALL of your local ROSE switch to you.

\*\*\* The third entry is the ADDRESS of the destination ROSE switch.

The nearest ROSE switch to my QTH is K4ABT-6 at Perry, Georgia. Example:

C KK4DM V K4ABT-6,912272  
\*                   \*\*                   \*\*\*

506 Pheasant Ridge Drive, Warner Robins, GA 31088





### The Alabama Directory

Callsign	Address	Location	User Freq.	Speed
WB4GNA-6	205831	Anniston, AL	145.05 MHz	1200bps
WB4GNA-7	205835	Anniston, AL	145.05 MHz	2400bps
WB4RHO-1	205775	Clayton, AL	145.01 MHz	1200bps
WB4RHO-2	205671	Clayton, AL	145.01 MHz	2400bps
WB4RHO-3	205677	Clayton, AL	145.67 MHz	1200bps
WB4RHO-4	205790	Clayton, AL	433.80 MHz	1200bps
N4TKT-1	205298	Phenix City, AL	145.01 MHz	1200bps
KA4WVO-1	205792	Dothan, AL	145.01 MHz	1200bps
KA4WVO-2	205793	Dothan, AL	145.67 MHz	1200bps
KA4WVO-10	904773	*Chipley, FL	145.01 MHz	1200bps
KA4WVO-11	904638	*Chipley, FL	145.67 MHz	1200bps
KB4FSK-1	205493	OPP, AL	145.01 MHz	1200bps
WD4ROJ-1	205347	Enterprise, AL	145.01 MHz	1200bps
WD4ROJ-2	205393	Enterprise, AL	145.67 MHz	1200bps

### North Florida ROSE Switches

Callsign	Address	Location	Freq.	Baud
KA4WVO-10	904773	Chipley, FL	145.01	1200
KA4WVO-11	904638	Chipley, FL	145.67	1200
WA4FAQ-1	904968	Pensacola, FL	145.01	1200
WA6QKN-1	904235	Panama City, FL	145.01	1200
WR4Z-3	904674	Blontston, FL	145.01	1200
WR4Z-1	904893	Tallahassee, FL	145.01	1200
W5HUQ-5	904356	Jacksonville, FL	145.05	1200
WU4R-9	904246	Jacksonville, FL	144.91	1200
K4UBR-7	904282	Middleburg, FL	144.93	1200
W4WEB-1	904227	Port St. Joe, FL	145.01	1200
AA4QI-2	904630	Jacksonville, FL (non RF) to BBS		
KJ4GP-7	904481	Gainesville, FL	144.93	1200
KJ4GP-9	904480	Gainesville, FL	145.09	1200
N4EEB-5	904677	Daytona Beach, FL	145.05	1200
N4HTU-6	407322	Sanford, FL	145.07	1200
WB4HYP-7	407677	Winter Park, FL	145.07	1200
WB4HYP-2	407671	Winter Park, FL	145.01	1200
WD4HIM-8	407277	Orlando, FL	145.07	1200
WD4HIM-2	407351	Orlando, FL	145.01	1200
WD8IBY-3	813859	Lakeland, FL	145.05	1200
N5AUV-2	407724	Melbourne, FL	145.05	1200
N5AUV-4	407729	Melbourne, FL	145.09	1200
W2VY-9	813989	Tampa, FL	145.05	1200
W1BEL-3	813689	Brandon, FL	145.05	1200

### Georgia Amateur Radio Digital Systems

#### "GARDS" Directory

Callsign	Address	Location	Freq.	Baud
W4KAU-5	404277	Cohutta, GA	***145.09	1200
WA4PQK-5	404460	Fayetteville, GA	145.05	1200
WA4PQK-4	404461	Fayetteville, GA	145.05	2400
AA4UA-5	404592	Blythe, GA	145.05	1200
WD4JKH-2	404648	Thomaston, GA	*145.01	1200
W4KAU-3	404694	Cohutta, GA	145.05	2400
KS4C-5	404832	Bowdon, GA	145.05	1200
KS4C-4	404834	Bowdon, GA	145.05	2400
N4TDL-5	404868	Augusta, GA	145.05	1200
N5BCH-5	912244	Valdosta, GA	145.05	1200
N5BCH-4	912245	Valdosta, GA	145.05	2400
W4NHU-1	912246	Bainbridge, GA	*145.01	1200
KB4ACE-5	912272	Dublin, GA	145.05	1200
W4SDL-4	912264	St Simons, GA	/*145.09	1200
W4SDL-1	912265	St Simons, GA	/*145.01	1200
W4SDL-10	912267	St Simons, GA	145.05	1200
N4IGI-5	912452	Milledgeville, GA	145.05	1200
K4ICT-6	912474	Lizella, GA	**145.65	1200
K4ABT-3	912552	Tennille, GA	145.05	1200
K4ABT-4	912744	Macon, GA	145.05	2400
K4ICT-1	912745	Macon, GA	*145.01	1200
K4ICT-9	912751	Lizella, GA	**145.65	2400
K4ICT-5	912781	Macon, GA	145.05	1200
K4ICT-3	912788	Macon, GA	**145.65	1200
K4ICT-8	912833	McRae, GA	145.05	1200
KF4ZB-5	912863	Sylvania, GA	145.05	1200
K4ABT-8	912868	China Hill/ MacRae, GA	145.05	2400
W4MM-5	912883	Albany, GA	145.05	1200
W4MM-6	912886	Albany, GA	*145.01	1200
W4MM-4	912888	Albany, GA	145.05	2400
K4ABT-7	912929	Warner Robins, GA	145.05	1200
K4ICT-7	912934	Cochran, GA	145.05	1200
K4ABT-6	912987	Perry, GA	145.05	2400
KB4KIN-5	912993	Forsyth, GA	145.05	1200
KB4KIN-4	912994	Forsyth, GA	145.05	2400

#### Key

- \* = Target station being called.
- \*\* = Local ROSE switch.
- \*\*\* = Address of the destination ROSE switch (see directory).
- D = Digipeater or nearby packeteer.
- N = Node (TheNet or NetRom).

Digipeaters or nodes may be used at the beginning or end as indicated in the example below. In this example I will use my friend Al, WD4DKA, as a digipeater. The "D" will indicate a digipeater or node.

C KK4DM V WD4DKA,K4ABT-6,912272  
\*                    D                    \*\*                    \*\*\*

We can combine these digis, nodes, and ROSE switches to build a path to other systems. However, if we use a node, the digi function of that node must be "ON," or enabled, so that we can include it in the connect string.

C N4KMJ V WD4DKA-1,K4ABT-4,205831,JVL05  
\*                    D                    \*\*                    \*\*\*                    N

As an example of how I would connect to the 2400 bps BBS (WB4GNA) in Anniston, Alabama through the ROSE switches, digis, and nodes, I would use this routing:

C WB4GNA V K4ABT-4,205835  
\*                    \*\*                    \*\*\*

### Using The "HEARD" Feature

Here is a way to discover who is on the air at a distant ROSE LAN. Given the address of the distant ROSE switch from one of the directory lists, we can connect to the **HEARD** of a ROSE switch and after receiving the **CALL COMPLETED** prompt, simply press <enter> again. No character entry is needed, only the <enter> key need be pressed. Wait a few moments and the distant ROSE switch will send you a list of the users that can be heard from that distant switch. Following is an example:

C HEARD V K4ABT-6,404694 <enter>

After receiving the **CALL COMPLETED**, etc., press <enter>. Shortly I'll receive a list of the users in the Cohutta, Georgia LAN.

### Using The "INFO" Feature

To obtain a list or directory of the ROSE switches for a given area, try this technique.

Connect to the **INFO** feature of a ROSE switch in the area or state from which you wish to access a directory. Shortly after receiving the **CALL COMPLETED** prompt, the directory will follow, and at the end of the **INFO** directory a message which reads **PLEASE DISCONNECT NOW** will appear. Issue the standard **DISCONNECT**, because no other input or output will take place. If you press <enter> again, all you will receive is another **PLEASE DISCONNECT NOW**. Following is an example:

C INFO V W4KAU-3,404832 <enter>

### A Closer Look

As we develop a better understanding of the ROSE Network switches, we find there is much more to the ROSE than we first thought. We have truly discovered a system that offers many more features than the old node system. As a matter of fact, we can go further with the ROSE Switch Network without all the extra inputs and added overhead that came from the nodes. Now that we are more familiar with the ROSE topography, let's study these practice routing exercises.

Earle, N4MWQ, in Akin, South Carolina can connect to Jack, N4KMJ, near Piedmont, Alabama in this manner:

C N4KMJ V AA4UA-5,205831

Jim, W4HON, in Warner Robins, Georgia can connect to Topsy, N4QLG, at Anniston, Alabama using this ROSE path/address:

C N4QLG V K4ICT-4,205831

Happy Packeting.

73, de Buck4ABT

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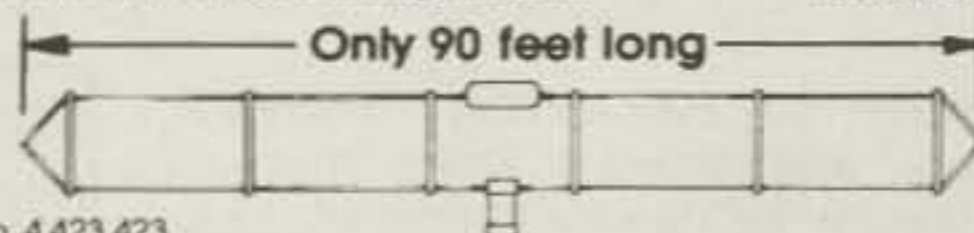
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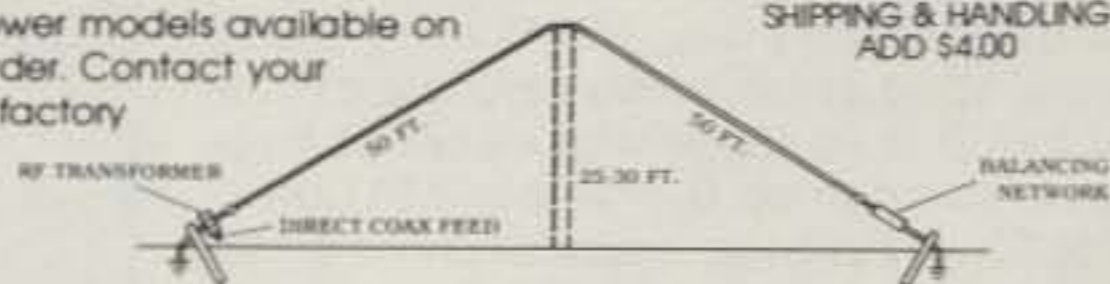
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CIRCLE 54 ON READER SERVICE CARD

# ANTENNAS & ACCESSORIES

A LOOK AT THE SHACK FROM BOTH ENDS OF THE COAX

BY KARL T. THURBER, JR., W8FX

## Of This and That

**T**his month we cover a variety of antenna, accessory, and software topics that you should find interesting and informative.

### From the Antenna Notebook

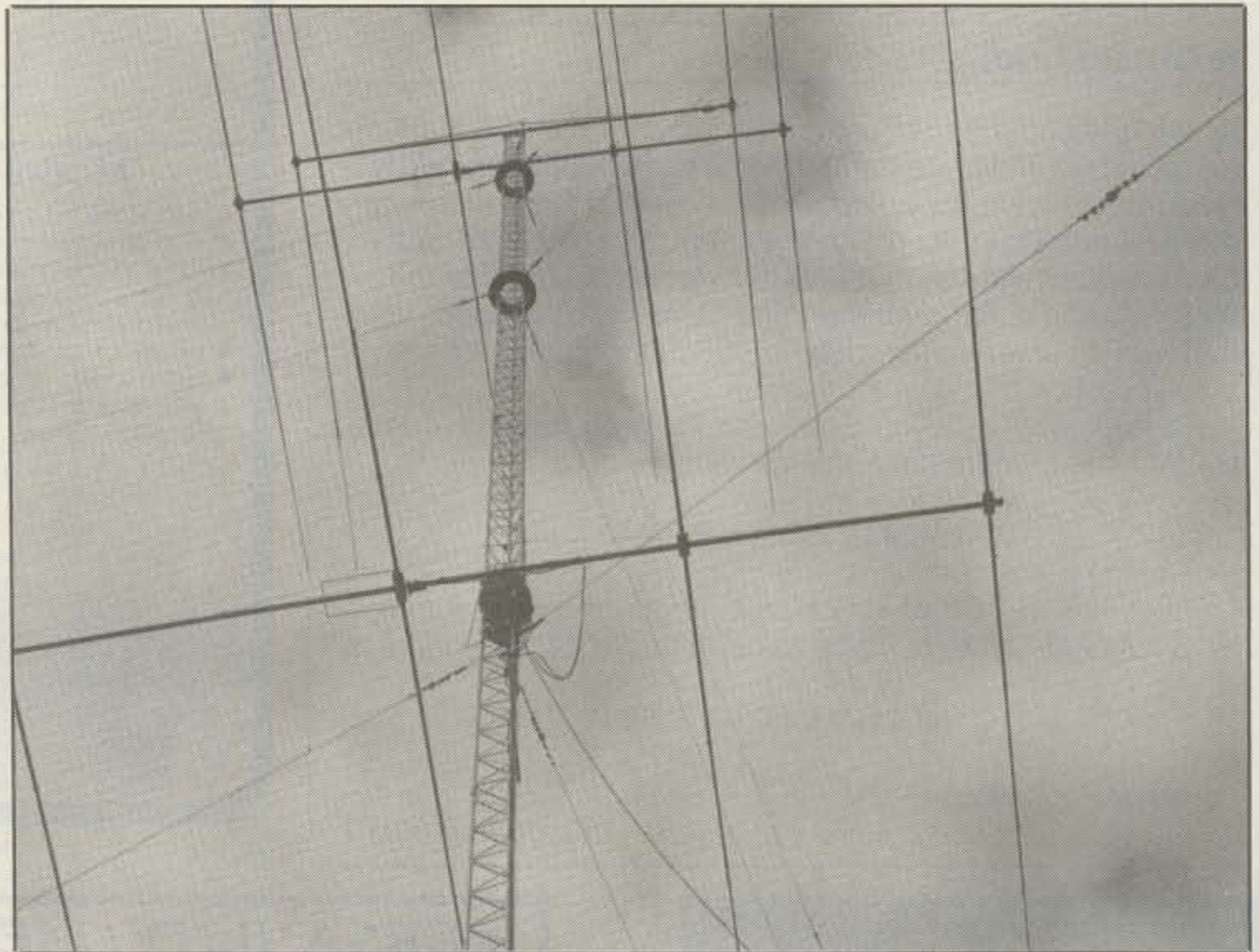
**New from Rotating Tower Systems.** We've mentioned Rotating Tower Systems before in the column, most recently in the February 1987 and August 1988 columns. There we focused on hardware used with Rohn 45 and 55 towers; some of those installations are in the 150 foot and up range with stacks of large monobanders on top. Dick Weber, K5IU, of Rotating Tower Systems, recently sent us a thick package of information on a new tower option he's offering which allows you to build a rotating tower with the popular Rohn 25G. This arrangement provides all of the advantages of a rotating tower without such a large investment being required.

To recall, the rotating tower concept lets you effectively multiply your "tower real estate" to efficiently and flexibly rotate stacked arrays by means of a rotating base that can be installed at practically any height and appropriate sets of guy-wire bearings. According to Dick, the main advantages include easy stacking of antennas, positioning multiple antennas at their optimum heights, and combining various bands (VHF, UHF, and HF) on a common tower having a single means of rotation. Of course, all this means less room being required for the installation.

While the initial cost of a rotating tower is high, the ability to handle multiple antennas with one tower, rotator, guy wires, anchors, and cable set allows the rotating tower to become a competitive option. It's also not as hard to erect a single tower as it is to put up several. For the serious VHF/UHF enthusiast, common rotation of multiple arrays fed from one very low-loss feedline is an attractive option.

The rotating base assembly consists of four parts. The lower part has a commercially available bearing that is used to support the tower and take lateral loads; the upper part sits on top of the bearing and bolts to the drive-shaft assembly. The large (3 inch diameter) portion of the drive shaft goes into the bearing, while the smaller (2 inch) diameter portion goes into the clamps of the rotor mounted below. The two portions of the drive shaft are joined by a "chain coupling" that allows axial and angular misalignment without placing undue stress on the rotor.

The guy-wire bearing is an assembled unit. It consists of three main parts in addition to the 183 balls used to make the bearing. There is



Here's an overall view of the K15U Rotating Tower Systems setup for rotating stacked arrays, as installed at WB2ULI/5. The new hardware for the Rohn 25G promises lower cost installations than does the heavier-duty hardware for Rohn 45 and 55 towers. See the text of this month's column for details.

the inner race, which has the "through stubs"; the outer race, which has the guy-wire lugs; and the cover, which goes over the top of the inner race and holds the assembly together with three bolts. A typical installation has a section of tower above the topmost guy-wire bearing, providing an easy-to-climb "mast" to which you can bolt antennas.

Due to the reduced size of the guy-wire bearing and rotating base assembly required for use with the Rohn 25G, installations can't be as massive as those using the Rohn 45 or 55, but large arrays can be handled. Practical examples include two stacked small 20 meter monobanders; two medium-size 15 meter or two very large 10 meter monobanders; two 2-element 40 meter monobanders with shortened elements; large combined VHF/UHF arrays; and the like.

As we've indicated, all this flexibility doesn't exactly come cheap, but with the 25G system, it's within reason. Prices range from \$1330 for the base assembly with one guy-wire bearing, up to \$2390 with three guy-wire bearings. For more information on this alternative method of antenna rotation, contact Dick Weber, K5IU, at Rotating Tower Systems, Inc., Box 44, Prosper, TX 75078.

**Hy-Gain DX88 Vertical.** Telex Hy-Gain has

introduced the DX88 HF multiband vertical for eight-band HF operation. According to the manufacturer, the DX88 design uses the entire antenna on both 80 and 40 meters for high-efficiency radiation. The new antenna is 25 feet tall and covers 80 through 10 meters, including the 30, 17, and 12 meter WARC bands; an optional add-on coil kit is available for 160 meters, as are ground and roof radial kits.

Without lowering, you can accurately tune the DX88 to any point on the 80 or 40 meter band from the ground for convenience in frequency adjustment. The other six bands adjust to any desired frequency without affecting the tuning of any other band; adjustable capacitors are used to eliminate the need to stretch or compress coils. The antenna also can be used as an SWL receiving antenna, effectively covering 12 bands from 11-90 meters.

The antenna is said to handle maximum legal power on all bands and features low-loss traps. It is a broadband radiator having a VSWR of less than 2:1 on six of the eight bands covered. The traps are enclosed and constructed of No. 12 gauge solid copper wire, wound on specially tooled forms for high accuracy and reduced loading changes due to weather conditions. Stainless steel hardware is used, and wind survival is said to be 80 mph.

317 Poplar Drive, Millbrook, AL 36054



Shown here is the Rotating Tower Systems guy-wire bearing for Rohn 25G towers, installed here at 90 feet. The guy-wire bearing is a three-part assembly that installs as a complete unit and affords a high degree of immunity from ice and snow.

cal discone covers somewhere between 15 and 100 MHz on the low end up to 1.2 or 1.3 GHz on the high end with relatively low SWR and without any tuning being required.

The discone is first and foremost a receiving antenna, where it is quite popular with scanner enthusiasts because of the easy-to-achieve wideband coverage it offers. As such, it's especially convenient to use with scanners that are manufactured with a single antenna jack, without having to use signal splitters. The discone is also suitable for wideband monitoring on a multiband, multimode transceiver.

Most inexpensive discones can be used for transmitting purposes, if you don't try to pump too much RF through them, and if you use high-quality low-loss cable to feed them. We've received several favorable reports on the Radio Shack Model 20-013 discone antenna, which appears to be such an antenna, attractively priced at \$59.95 to boot. I also see that in the 1991 Radio Shack catalog there is a note under the antenna's description that indicates it's also for transmitting on the 144, 220, 440, and 1296 MHz bands. Although the 1991 catalog doesn't say so, the 1990 catalog noted that the antenna's impedance is 50 ohms and it can handle 200 watts RF power.

You might want to check out Michael Steven's review of the Radio Shack discone which appeared in the July 1990 issue of *CQ's* sister publication *Popular Communications*. His review covered both scanner and amateur use of the discone.

**AEA ET-1 Econo-Tuner.** Last spring AEA broadened its antenna-accessory product line by introducing an inexpensive but high-quality all-band HF antenna tuner, the ET-1 Econo-Tuner™. The ET-1 is designed to match virtually any transceiver, transmitter, or receiver from 1.8 to 30 MHz, handling up to 300 watts RF.

Some of the new tuner's features include a built-in 4:1 balun; compatibility with practically any antenna fed with coax, balanced line, or a

single wire; front-panel switching between two coax-fed antennas; a bypass position that allows you to switch to an external dummy load or a direct-connected coax-fed antenna; and a dual-movement meter to allow simultaneous monitoring of RF power and SWR.

The ET-1 is priced at \$149.95 (check with AEA, as the price may have come down since this was written). For more details, contact Advanced Electronic Applications, Inc., 2006 196th St. SW, P.O. Box 2160, Lynnwood, WA 98036.

**Ampire Switchable RF Preamps.** Ampire, Inc., has introduced several made-in-the-USA, low-noise, GaAsFET, RF-switchable VHF/UHF preamplifiers.

One of the new products is the Model 146-OS 2 meter preamp, optimized for OSCAR work and designed for mounting near the antenna. The preamp is enclosed in a sealed iridized aluminum box, and the circuit board has been coated with a special plastic to keep moisture and corrosion away from the circuitry. The preamp automatically switches from receive to transmit, and in the receive mode features a helical filter of very narrow bandwidth to reject potential out-of-band signals that can cause intermodulation distortion (IMD). This feature is quite useful in communications with the OSCAR satellite downlink, in that the helical filter will attenuate most of the unwanted RF to the receiver, yet will enable the satellite signal to be received virtually unattenuated. In case of power loss to the preamp, the relay drops out to the transmit mode, thereby protecting the preamp from RF damage. The unit's claimed gain is 19 dB and noise figure is 0.75 dB; power-handling capacity is 160 watts.

Ampire also offers the similar Model 146 VHF preamp for general-purpose 2 meter use and the Model 440 for UHF work in the ranges 430-440 or 440-450 MHz. The UHF models are similar, with a claimed gain of 16 dB and a noise figure of 0.75 dB. Special custom configurations are available.

Prices range from about \$180 to \$190, depending on model. For more information, contact Ampire, Inc., 10240 Nathan Lane, Maple Grove, MN 55369.

**Spi-Ro Manufacturing Update.** In past columns we've mentioned the Spi-Ro folks as a good source of antenna accessories and parts. Their recent flyers have grown considerably so that they're approaching a "one stop" source of antenna supplies.

The latest Spi-Ro flyer shows several antennas, including all-band and limited-space dipoles, multiband trap dipoles and slopers, several SWL antennas, and a variety of single-band antennas. Most of these are factory assembled, but kit versions are available for those who prefer to assemble their own. The flyer also shows baluns, center connectors, coax, ladderline, insulators, lightning protectors, support rope, surge protectors, antenna traps, and other parts and accessories.

Oh, yes... Spi-Ro has a new address. Contact them at P.O. Box 5500, Lakeland, FL 33807.

**KILO-TEC.** A West Coast outfit selling a variety of antenna parts and accessories, some of which are rather hard to find, is KILO-TEC. The firm offers a 16-page mini-catalog.

KILO-TEC sells several antennas, including a 102 foot G5RV multiband antenna kit; a new 80-10 meter multiband dipole; an all-band 2 kW PEP dipole; and a shortened (51 foot)



This photo shows the Rohn 25G rotating base assembly at the 60 foot level. The assembly consists of two round steel plates with a large bearing installed between them.

G5RV. A variety of antenna accessories are available, including center connectors, weather boot kits, antenna pulleys, Dacron rope, lightning arrestors, stainless eyebolts, baluns, antenna wire, openwire line, transmitting twinlead, and several antenna tuners and RFI filters.

The firm also offers an excellent selection of high-voltage variable capacitors, high-power roller inductors, turns counters, and other useful and difficult-to-find parts. Coming in the future is a new mechanical counter dial, said to be accurate to 1/500th of a turn!

KILO-TEC also has a new address. Write to KILO-TEC at P.O. Box 10, Oakview, CA 93022.

## Software News and Views

**WA7RAI Antenna Designer.** There's one more entrant in the IBM PC antenna design software derby: it's Chuck Smith, WA7RAI's Yagi Antenna Designer.

According to Chuck, his goal in writing this inexpensive program was to provide the user lots of versatility, be easy to use for the non-technical amateur, and be reasonably accurate with a minimum of calculation time. For PC users without a math coprocessor, using mathematically intensive programs can be time consuming. Thus, Chuck separated the performance calculations from the pattern plot calculations, allowing the user to save time by choosing not to plot the pattern until the performance has been adjusted to be within the desired values. Although the program is not intended for use in laboratory applications, Chuck says that the accuracy of the program is entirely satisfactory for amateur radio use.

The program will calculate the forward gain, front-to-back (F/B) ratio, and input impedance of a Yagi antenna with two or more elements, over the range of 1.5 to 500 MHz. The program does not compensate for the boom, though this should only slightly affect antennas above 100 MHz. The program's calculated gain is referenced to a dipole in free space. The impedance is shown as "real" impedance (resistance) and "imaginary" impedance; the accuracy of these figures is said to be within 2.5%. A two-element Yagi design may be calculated using a reflector/driver combination only; other Yagi designs can include up to ten directors.

Three modes of operation are available: automatic director spacing and length factoring; equal director spacing and lengths; and totally manual entries. The antenna plot can be viewed four ways: log, linear, elevation, and azimuth. Several built-in utilities are included, including an option to change program colors, an element taper calculator, and a metric/foot conversion utility. A file menu allows access to file-handling routines to let you save and recall antenna files, although a DOS file editor must be used to modify the files.

The WA7RAI Yagi Antenna Designer requires MS-DOS 2.1 or higher, 300 Kb free RAM, and a CGA, EGA, or VGA graphics board. Although not required, a math coprocessor will allow the program to run 20 to 30 times faster than without using one. The program comes with full documentation and includes a file that provides an overview of Yagi design theory. The package is available either on 3.5 or 5.25 inch disks and is priced at a very reasonable \$30.

For more information, contact RAI Enterprises, P.O. Box 1637, Chino Valley, AZ 86323.

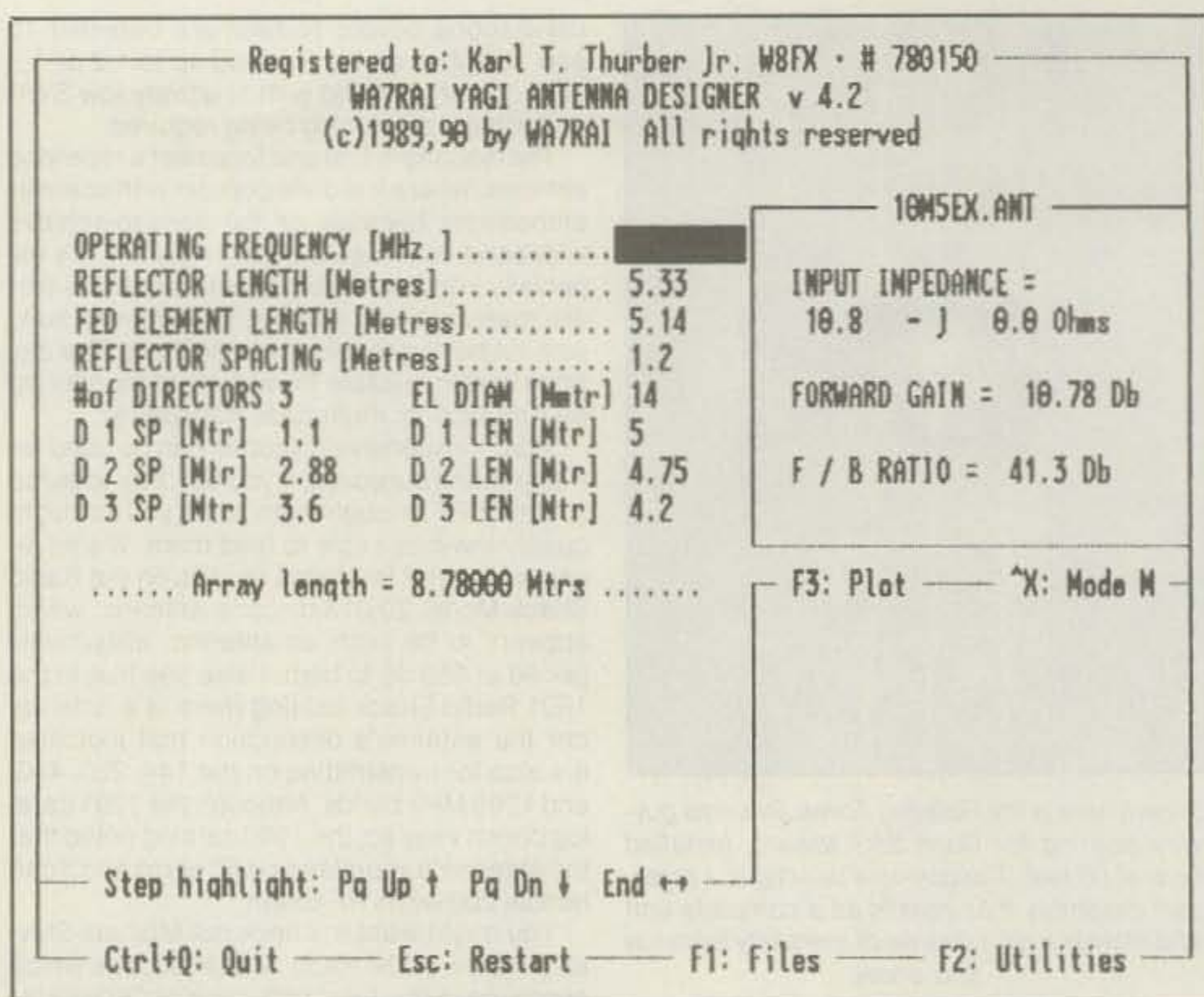


Fig. 1— Shown here is the main screen from Chuck Smith, WA7RAI's Yagi Antenna Designer program for the IBM PC. (Although it's blacked out by the cursor in this sample screen print, the design frequency is 28.6 MHz.)

Fig. 1 shows the WA7RAI Yagi Antenna Designer screen.

**RCSS IC-R7000.** Systems and Software International, Ltd. has announced a demo version of their Remote Computer Scanning System (RCSS) for the ICOM R7000 receiver. The RCSS™ provides fully automated control over all receiver microprocessor-controlled functions including frequency tuning, mode, band selection, intelligent scanning, and memory. Receiver control is provided through a graphic interface on the computer screen and is operated either by a mouse or by the keyboard. The full system is available for either the Macintosh or IBM compatible computers, with control provided through a standard serial communications port. The package includes the software, manual, cables, and interface, and is priced at \$239.

The demo version for the IBM PC runs under Microsoft Windows™, version 2.01 or higher. The demo is intended to demonstrate the "look and feel" of the product. Most of the features are available on the demo, with the exception that the demo does not actually communicate with the radio. Also, some limits have been placed on the functionality of some features. You need 640K RAM and an EGA display to use the demo, which is priced at \$10. (If you don't have Microsoft Windows, you also need a program called Runtime Windows 2.01, available for \$35.)

For more information, contact Systems and Software International, Ltd., 4639 Timber Ridge Drive, Dumfries, VA 22026.

**TRS Event Manager.** Tom Sundstrom, W2XQ, an amateur who I know is a dyed-in-the-wool SWL, dropped us a note to tell us that he's offering this unique product so "you can have your radio and leave it, too."

What Tom offers is an IBM PC compatible program that remotely controls the Kenwood R-5000 shortwave receiver equipped with the IF-232 interface and the IC-10 IC kit. Based on the familiar method of programming a 7- or 14-day video tape recorder (VCR), the new software allows control of multiple events on the same or following days, as well as changing frequencies, modes, and antenna settings.

Using a user-created event file that contains one or more entries, the receiver is turned off until the computer date and time match the day and time of the current event in the event file. The receiver is automatically turned on and receiver settings, such as frequency, mode, and antenna, are loaded from the computer into the receiver. When the time on exceeds the number of minutes specified in the "event record," the receiver is shut off. The cycle repeats until all records in the file are completed. You can turn on and off any device, such as a tape recorder, that is controlled by the receiver's rear-apron relay contacts.

You can save, edit, and reuse the "event files," with the number of files being limited only by disk space. A hard disk, 640 Kb of memory, and a serial port are required.

Tom's software package retails for \$75, plus \$2.50 shipping. Contact TRS Consultants, P.O. Box 2275, Vincentown, NJ 08088-2275.

**GEOCLOCK.** Recently, a reader brought to my attention a very useful and well-executed shareware program, GEOCLOCK. The program is similar to the commercial programs DX EDGE and TERMINATOR, both of which we've discussed in past columns.

The GEOCLOCK program shows the current time, based on the computer's system clock, on a map of the earth. The current sun position is displayed with a crossed circle, and



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2590A shown with 5245L Counter and 5253B Plug-In (sold separately).

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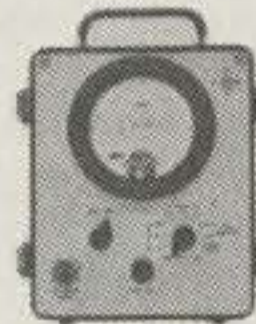
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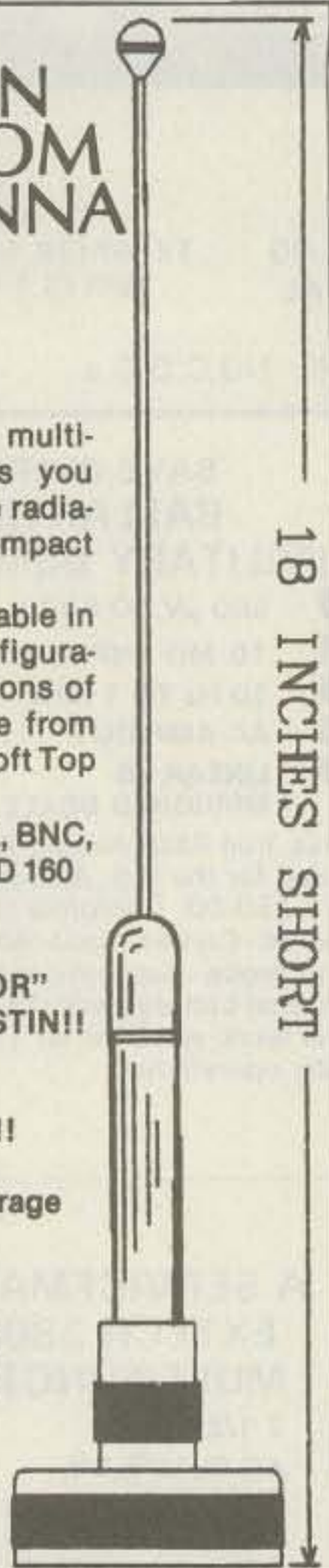
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the part of the earth in sunlight is highlighted. Local sunrise, sunset, and the sun's azimuth and elevation are also displayed.

The shareware version is a very nice program, but the registered version, available for \$25, has a number of excellent features and enhancements. Some of these include support for all graphic modes, including Super VGA; 25 different map displays to choose from; distance calculation between any three cities or points on any map; mouse support; a nifty zoom feature; ability to show time on the map along with any city; automatic compensation for those areas which use Daylight Savings Time; and more.

Different versions of the program are available, depending upon the type of graphic display and disk format your computer uses. For more information, contact Joseph R. Ahlgren, 2218 N. Tuckahoe St., Arlington, VA 22205-1946.

**K1VUT 10 Meter Contest Program.** Dave Clemons, K1VUT, is a serious contesteer who intends to write a variety of contest software and make the programs available to other amateurs at reasonable cost. He's started out by trying to "fill the gap" in the area of mid-sized popular contest programs with the K1VUT 10 Meter Contest Program for the IBM PC.

Dave's program allows you to query it at any time between contacts as to whether a DX country is worked or needed. You can also query the program as to whether a station has or has not been worked. There are constantly updated displays for the time, number of contacts worked on each mode, total multipliers, total score, and the number of stations worked in the last 15 minutes and the last hour. The program takes care of dupe checking and parses the DX calls to try to determine their country. It also parses DX calls that are portable, if the portable location is given following the slash (/) at the end of the call. The program can store up to 4700 different calls. A full complement of printing options is provided, including dupe-sheet printing and the printing of QSL labels.

Dave notes that his program is not freeware and should not be put on bulletin boards. The disk and copy of the manual are available from him for \$10. For more information, contact Dave Clemons, K1VUT, 148 Rocky Meadow St., Middleboro, MA 02346.

**New from L.L. Grace.** Brooks Van Pelt, KB2CST, of L.L. Grace, has introduced a new digital product, the DSP-12 Multi-Mode Controller. It boasts an open architecture and digital signal-processing hardware that let you immediately include new advances as they are made.

The DSP-12 has three ports which allow connection to three radios at the same time without wiring or switching changes to enable instant change-off between HF, VHF and UHF packet, and satellite data communications. The controller uses a single RS-232 port for all control, operational, and software loading functions; an optional parallel printer port is available for WEFAX (weather facsimile). The controller offers packet, RTTY, Morse, WEFAX, FSK and PSK operation through more than 40 "software modems" included in the package.

According to the company, other features include a built-in multi-tasking operating system and RAM that's expandable to 1 megabyte (MB). In keeping with the open architecture, both DSP and terminal programs can be downloaded from bulletin boards.

L.L. Grace has for some time also offered the Kansas City Tracker, a hardware and software package that connects between your rotor's controller and an IBM PC or compatible computer. This package allows your computer to track any satellite or other orbital body. The software interfaces your satellite tracking program with the Tracker board while the board provides the interface with your rotors. The Tracker board can be connected directly to Kenpro and Yaesu rotor controllers and to other rotor assemblies using a rotor interface option.

The Kansas City Tuner is an option for the Tracker that adds hardware to the Tracker board and additional software that controls your radios to adjust their frequency to compensate for Doppler effects; this feature is especially useful for working low-orbit digital satellites such as the Microsats. The Tracker and Tuner include custom serial interfaces that don't tie up your PC's COMM ports. Both software programs are of the "Terminate-and-Stay Resident" (TSR) type which let you run other DOS programs while your antenna tracks its target and your radios are tuned under computer control.

For more details, spec sheets, and pricing, contact L.L. Grace Communications Products, 41 Acadia Drive, Voorhees, NJ 08043.

**Pizazz Plus 2.0.** It's another case of "the best getting better" with the introduction of Pizazz Plus 2.0™ from Application Techniques, Inc. To recall, Pizazz Plus is a sophisticated IBM PC graphics screen capture and print utility program which we first discussed in the March 1988 column when it was simply known as Pizazz. We covered the program again in the August 1989 column when the program was upgraded to Pizazz Plus.

I know, this description may sound like computer doublespeak. What the program does, in effect, is to provide a high-tech screen-dump replacement for the relatively simple screen print program that comes with your computer's DOS. Simply put, Pizazz Plus lets you take practically any image that you can display on your computer's screen, whether graphics or text, from any application program, and faithfully print it out or export it. As a RAM-resident utility, you can capture color or black-and-white graphics, manipulate the images in different ways, and print out the images or send them to a disk file.

The program is a great tool whether or not you own a color printer. Either way, you can, with most any PC video board, faithfully capture in full color or in gray scale the images displayed on your screen, whether graphics or text. The program has various options that let you style and shade outputs to tailor them to your printer. For color adjustment or gray-scale mapping, if you have a VGA board you can control 256 continuous colors or 64 shades of gray. While you can't work conveniently with pages larger than a full screen, and you can't redraw or otherwise edit a screen image, the preview and modify options do give you a great deal of control over hard-copy shading, brightness, contrast, and color.

You also have a wide variety of print features, including cropping the image and adjusting its size, proportion, rotation, and placement on the page. You can also save images in Pizazz's native file format (PZI), or in EPS, PCX, TIFF, and other file formats, including popular desktop publishing formats.

While I'm not yet into the increasingly popu-



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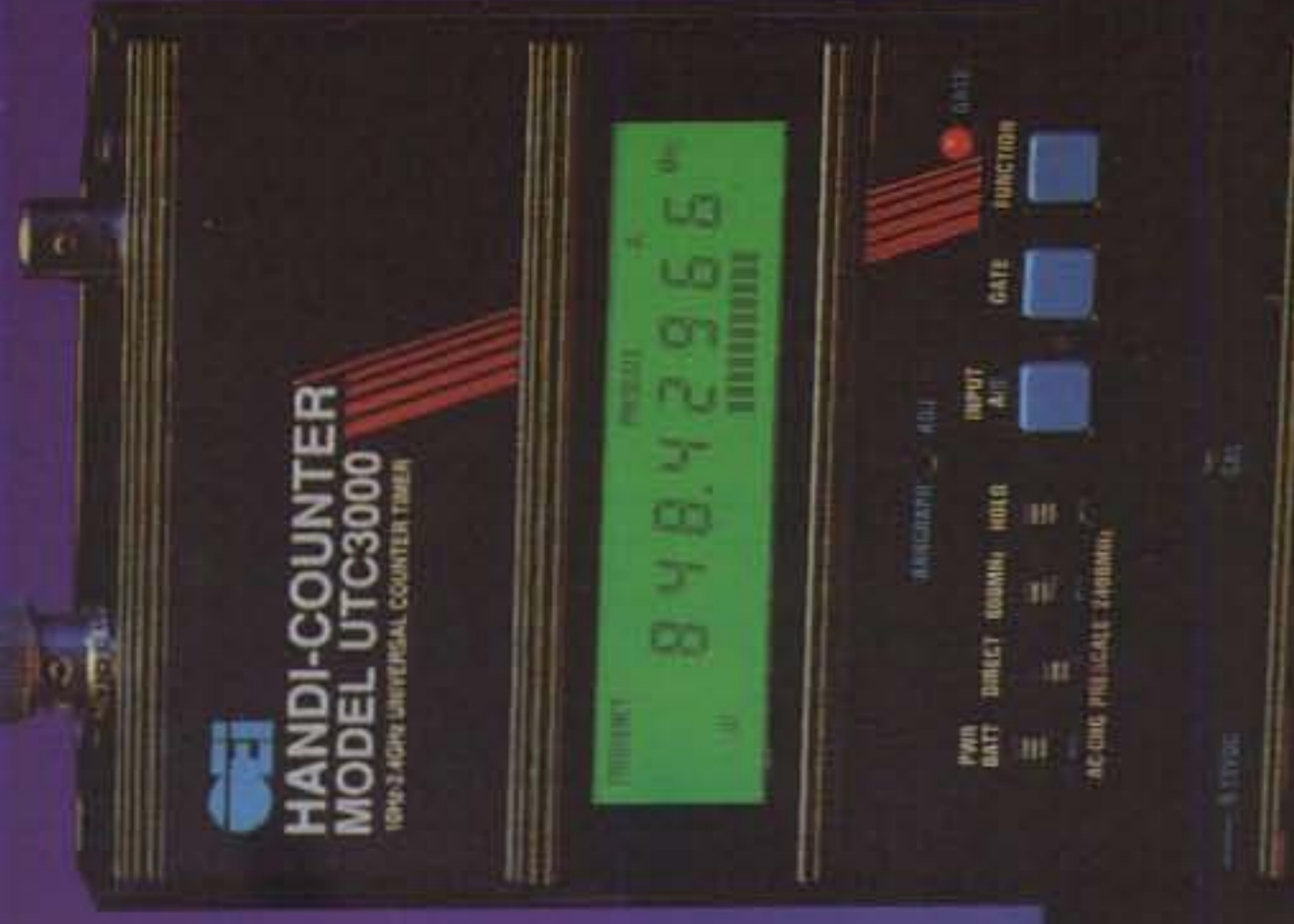
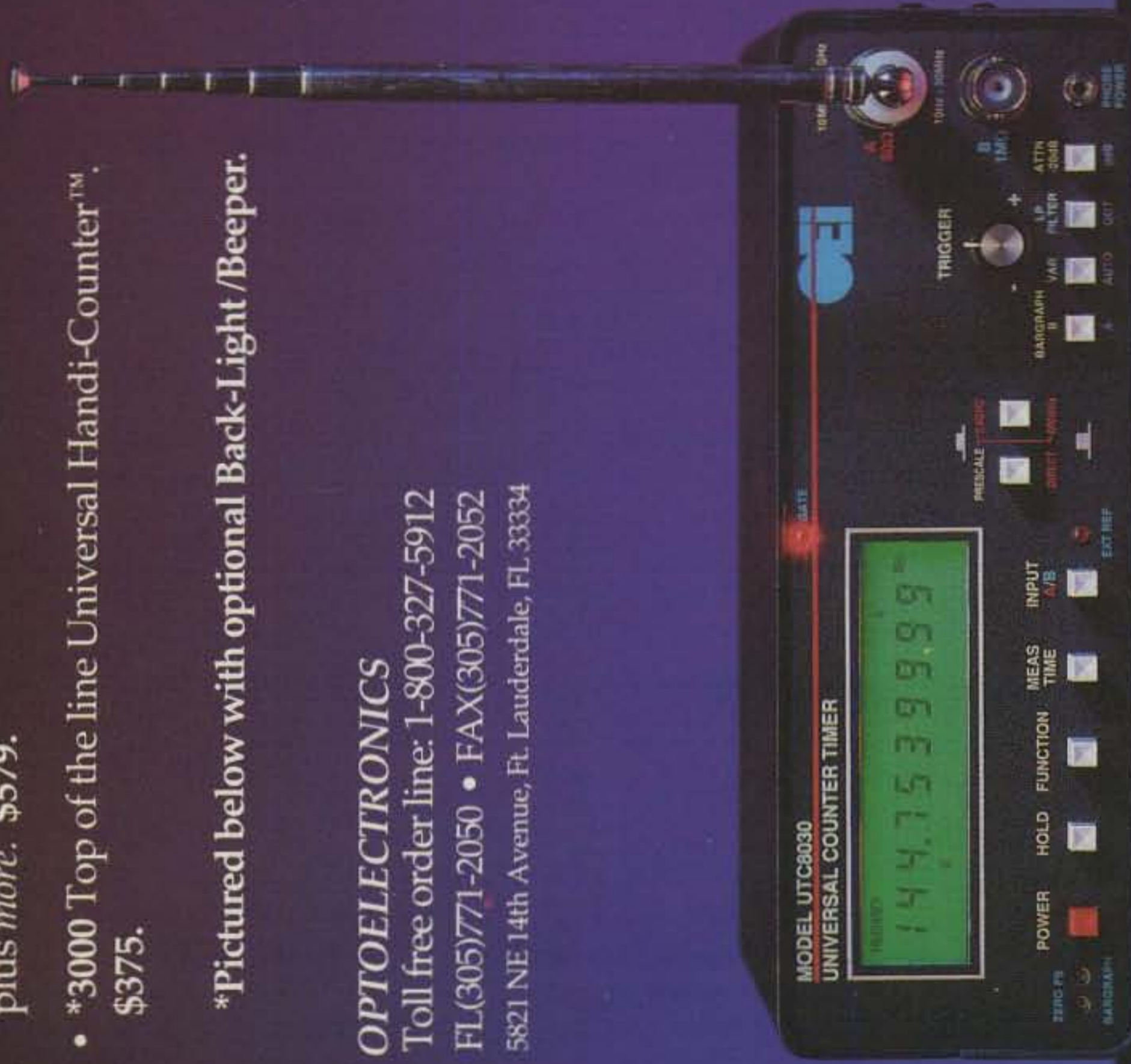
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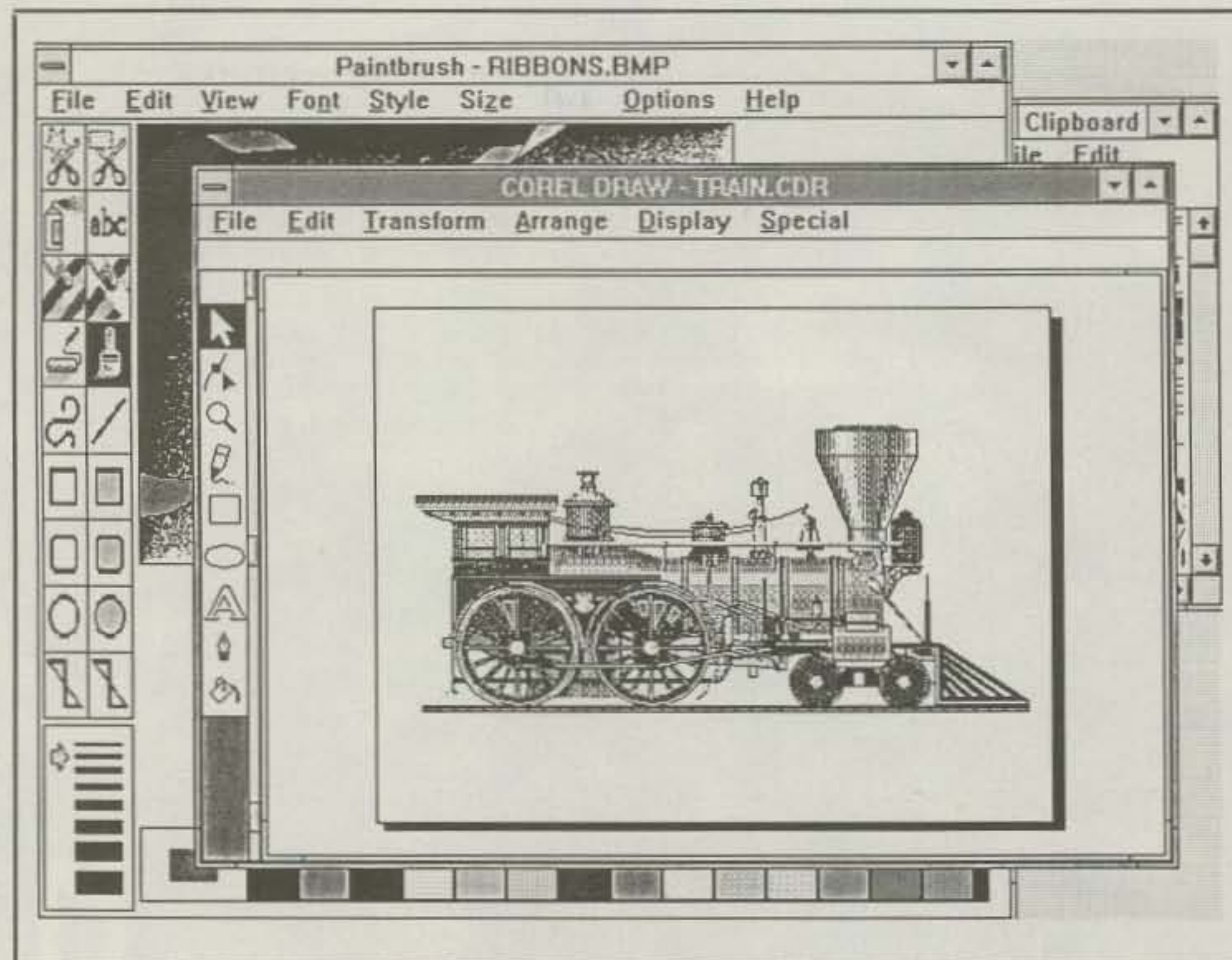


Fig. 2— Pizazz Plus 2.0 print from Windows 3.0. The new version of Pizazz Plus™, an outstanding graphics screen capture, print, and export utility, is one more program that can run from and work within Microsoft Windows 3.0. Shown here is a full gray-scaled print from Windows 3.0, captured by Pizazz Plus on an HP LaserJet Plus printer.

lar "Windows environment," the new version of Pizazz Plus boasts full compatibility with Microsoft Windows 3.0™. Thus, the program can capture, print, and export an entire screen or a portion thereof for printing or exporting within Windows.

Pizazz Plus now supports over 400 printers, including even color laser printers, as well as

most popular PC graphics boards. The product requires as little as 32K free RAM and is list priced at \$149. While the high list price may put Pizazz out of reach of many amateurs for casual work, many SSTV and FSTV users will find the product worth the investment. I find it invaluable myself in preparing this column each month, where I use it as a very flexible

screen dump to capture screens from many of the applications programs I review and present here.

For more information, contact Application Techniques, Inc., 10 Lomar Park Drive, Pepperell, MA 01463.

Fig. 2 is an example showing a Pizazz Plus print from Windows 3.0.

## Short Bursts

**A Brush with Lightning.** We're all aware of the disastrous effects a direct lightning strike would have on your house and hamshack. But what of the "near miss" where lightning strikes somewhere in the neighborhood and your castle is subjected to some of lightning's lesser "induced effects"? These effects can be nasty, as I found.

I had a taste of the power of a nearby lightning strike last summer, when a wayward lightning bolt struck somewhere in the neighborhood (I never located the exact spot). I was not home at the time, but my son was home, and he said that it sounded like a bomb hit the house or close by. While I couldn't find any physical evidence of the strike, its trail of "electronic death and destruction" wasn't hard to find.

The first thing I noticed was that the telephones weren't working. The reason for this, I soon discovered, was that the fancy Radio Shack electronic memory phone had shorted out, apparently due to a high voltage surge on the telephone line. Next, I found that the modems in both of my PCs were zapped. Checking further, I found that one plug-in circuit board on each of the two PCs had gone west, though the computers' motherboards fortunately suffered no damage.

Turning to the hamshack, I found that the meter in my Cushcraft R3 vertical control box had given up the ghost, as had the small, hard-to-replace tuning motor at the base of the antenna. (Anyone know where I can get a now out-of-production AIRPAX K81352-P3-52 motor?) The TV sets around the house went unscathed, although two cable "block converters" that convert cable signals to UHF for reception on non-cable-ready sets also decided to stop working, apparently as the result of a spike coming down the cable coax.

What surge protection did I have installed? The computers and hamshack were AC-line protected against surges, but I didn't have surge protectors on the modems, telephones, or cable TV line. After all, who would realistically expect surges on buried cable TV and telephone utility lines?

The moral: Buckle up your home and hamshack. Lightning got to many of my goodies; don't let it get to yours. While you can't do much about a direct hit, you can do a great deal to reduce the effects of a near-miss. It *can* happen to you!

## Wrapping It Up

That's all the room we're allowed this time, guys and gals. Next month, more Antennas & Accessories topics of current interest. See you then.

*Overheard:* Times really have changed. What used to be considered as failure is now just an alternate lifestyle.

73, Karl, W8FX

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"Morseman Plus is the slickest program to come along in a long time and I highly recommend it to those who want to learn Morse properly", Ike Kerschner, N3IK, May 1990 - **Monitoring Times** magazine

"One of the top Morse Code trainers available", Gordon West, WB6NOA, **West Radio School**

The reviews are in and **Morseman Plus** has scored the highest marks yet! The premier Morse Code trainer for the IBM-PC and compatibles will take the the newcomer from ground level to expert in record time! It is also ideal for the experienced ham trying to get to the 13 or 20 wpm level.

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## Top-rated IBM-PC shareware and public domain software

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**48-49 ImagePrint (2 disks)** - top high resolution printing enhancement for 9 & 24 pin printers. Has 25 various fonts in many sizes. Print is very high quality.

**51 AutoMenu** - THE DOS standard in menuing programs. Set up your system so novices may use it.

**60 XTree** - the best DOS hard drive manager around!

**116 Anti-Virus Utilities** - McAfee's famous virus detection and removal utilities.

**121-123 PC-Write (3 disk set)** - Version 3.03 of the top shareware wordprocessor (hard drive req'd).

**165-166 Q-Modem (two disk set)** - THE modem communications standard for BBSing. Very full featured. Even good for packet radio.

**170-171 Procomm (two disk set)** - One of the best telecommunications programs available (easy to use).

**190-192 PC:File 5.0** - THE shareware star in database systems. Easy to use with an extensive users manual. Customize your own powerful database system.

**211 As Easy As** - A true Lotus 1-2-3 clone. Does about 97% of what 1-2-3 does - and then some! Well supported.

**275-276 DanCAD-3D (2 disk set)** - A very sophisticated 3D frame and drawing program. Good general purpose CAD system.

**278 PC-Key Draw** - Top draw/paint/CAD system with many features, incl. animation. Prints to Epson printers.

**290 Flowdraw** - Full-featured program for drawing schematics, flowcharts, HIPO's and more. (CGA req'd)

**340 Printshop Clipart** - 500 pictures in Printshop/Printmaster format. (requires Printshop/Printmaster)

**683-684 C Tutor (2 disks)** - An excellent way to learn the C programming language. Comes with several source code examples.

**734 PC Tutor** - interactive DOS tutor system for beginners. Covers just about everything you need to know.

**761 Fortran Library** - 142 routines for the Microsoft and Lahey FORTRAN compilers.

**1082 Ham Radio 2** - Packet Terminal Programs - YAPP and Packtalk - both work well with most TNC's.

**1084 Ham Radio 4** - Smith Charting, antenna design, counties listings and more (needs BASIC).

**1085 Ham Radio 5** - AntennaX antenna analysis, RF engineering, antenna design program, Smith Chart matching and more.

**1086 Ham Radio 6** - Sunrise/sunset predictions, circuit analysis and tropospheric path loss prediction

**1087 Ham Radio 7** - QSL Maker, engineering programs, grid square calcs and more (req's BASIC)

**1089 Mapper** - EGA Great world map system. Shows grayline and shortpath, longpath, muf, luf plus much more by entering a prefix (EGA/VGA req'd).

**1090 Miniprop 2** - Great propagation prediction program - the predecessor to Miniprop 3.

**1091 TrakSat** - nice satellite tracking system w/ good graphics & several example tracks

**1092 PC-Track** - The tops in EGA/VGA satellite tracking. Great graphics & easy to use. Easy to add new "birds".

**1093 Telemetry Decoders** - collection of telemetry decoders for the new PACSATS

**1094 Icom Rig Control** - Three programs to control IC735's with your PC.

**1095 Paragon Rig Control** - Control Ten Tec's Paragon HF rig with the PC.

**1096 Radio Mods** - A through listing of several modifications to many popular HT's, scanners and HF rigs.

**1097 SSTV** - View on the air SSTV activity. Hooks between game port and receiver. (CGA req'd).

**1098 Yaesu FT767 Rig Control** - Control FT757 and FT767 HF rigs with your PC.

**1099 Kenwood Rig Control** - Three programs to let you control your TS 140/440/940 with your computer.

**1100 - Icom R7000 rig control** - PC control for the R7000 - even has a logbook function, freq. database, ect.

**1101 CW Decoders** - a collection of on the air CW decoders. Turn your PC into a CW tx/rx unit

**1102 FCC Exams** - Prepares for novice thru general written exams. Cover all aspects of the test.

**1109 DXCC Worldfix** - countries listing, beam headings, sunrise/sunset times for any DXCC country.

**1110 K1EA DX Contest Logger 4.25** - The tops in contest logging for CQ WW DX & WPX, WAE & ARRL DX contests.

**1112 Contest Logging** - An assortment of contest logging programs for Field Day and other contests.

**1118 - QQLS v 3.1** - AA4M's QSL label program. A good program for automating QSL chores.

**1119-1120 Total Ham (2 disks)** - Excellent multipurpose station utility. Logging, awards keeping, counties, countries and much more.

**1121 ARL Logbook** - Fast logbook system. Add, delete, lookup QSO's and more.

**1122 LOG-EQF** - top rated logging program that also allows control of Kenwood HF rigs. Nice!

**1131 Hamfest** - Hamfest mailing list system - keeps track of vendors and attendees with year(s) attended

**1132 - Packet Radio Tutorial** - Very nice intro to the world of packet. 18 Chapters of text. Easy reading!

**1140 WORLI Packet BBS** - The dominant packet BBS system - complete with all information.

**1143 KAM Car** - A dedicated RTTY/ASCII/CW terminal program for the KAM TNC (does packet also!).

**1144 LanLink!** - great multifunction terminal program. Has configurations for all popular TNC's.

**1145 PK232 Terminal** - Dedicated termprog that takes advantage of the features of the AEATNC.

**1146 Multiconnect PBBS** - AA4RE's top notch multiconnect BBS. RLI/MBL compatible..

**1148 K4ABT's PicPro** - Send and receive packet pictures w/ a KAM. Also incl. WEFax pgm (EGA req'd)

**1149 GeoClock** - similar to DX edge - shows full view of Earth and moves light/dark areas real time (Herc/CGA/MCGA/ATT - for EGA/VGA see #1150)

**1150 Geoclock EGA** - the same as # 1149 except for EGA and VGA monitors.

**1151-1152 ACE (2 disks) Astrosoft Computerized Ephemeris** - top notch database of astronomical information. Deep sky & Messier objects, double stars, more.

**1153-1154 Deep Space (2 disks)** - Excellent star map system. Includes stars down to magnitude 2. Displays any skyview from any vantage point (CGA req'd)

**1155 USN Floppy Almanac** - By the US Naval Observatory - good retrieval system with data for Messier & radio objects plus 1536 stars

**1156 Skyglobe** - The best star viewing system we've seen! Many, many features (CGA or EGA req'd)

**1201 Storm** - Hurricane tracking at its finest - includes several sample tracks of past storms.

**1249 World 29** - Nice CGA map system. View the Earth from any vantage point and "zoom" in. Includes "quizzing" function.

**1250 World Atlas** - Online information base - includes data on countries, rivers, cities and much more.

**1311-1317 On Line Bible (7 disks)** - The King James version of both Old and New Testaments. Has an online and browse facility. (hard drive req'd)

**1320 PC Board Layout** - good printed circuit board design and layout program.

**1321 Motorola Database** - good cross-referencing system for Motorola semiconductors (hard drive req'd)

**1322 Core DBMS** - full database for ferrite & toroid cores. Look up via part #, size, ect. Even loss v. freq.!

**1330 ACIRAN** - AC circuit analysis on a PC! Design circuits before you build them.



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## "HOW TO" FOR THE NEWCOMER TO AMATEUR RADIO

### Printed Material—Part IV, Conclusion

Here is the concluding segment of this four-part article. Each segment includes data which is helpful to newer amateurs.

**Ramsey Electronics.** You can request a free catalog from Ramsey Electronics; their address is 793 Canning Parkway, Victor, NY 14564. They offer an extensive variety of electronic kits and accessories.

**Real Goods Trading Company Catalog.** Their current catalog is filled with 104 pages of unusual items. These items include bicycle-driven 12 VDC output generators, solar panels, water-driven generators, wind-driven generators, and inverters. This catalog can be requested by writing to Real Goods Trading Company, 966 Mazzoni Street, Ukiah, CA 95482 (telephone 707-468-9214). If you are interested in survival items and/or recreational-vehicle accessories, you should get a copy of this interesting catalog.

**RTTY Journal.** The *RTTY Journal* is published ten times per year at an annual domestic subscription price of \$12.50. It covers AMTOR, contesting, MSOs, packet, RTTY, and RTTY DX. It includes technical articles about digital modes. The address is *RTTY Journal*, 9085 La Casita Avenue, Fountain Valley, CA 92708.

**Russian Phrases for Amateur Radio.** My October 1989 column included an introduction to the booklet Len Traubman, W6HJK, and his wife, Libby, published to help promote friendship between Russian and English-speaking amateur radio operators. That publication has been updated, and it is now available at \$5 to Americans and \$7 to DX amateurs. This 20-page booklet has information arranged in the sequence in which it is commonly used during a contact. The general call to all stations (CQ) is followed in sequence by thanks for the call/QSO, signal report, name and QTH, language fluency (or lack thereof), station data, antenna data, operator's personal data, QSL information, friendship comments, and end of QSO comments. The booklet also includes code abbreviations, the Russian alphabet (with code characters and phonetic code in Russian), Russian numbers, four pages of



*Manuel Higareda Ochoa, XE1HON, of Mexico holds a Principiante license, which is similar to the U.S.A. Novice license. He has contacted amateurs in 46 states and 65 countries. Manuel operates on the 10, 15, and 40 meter bands using an FT-757-GX transceiver. The fellow pictured with Manuel is his friend Jesus Chavez. Jesus (wearing a cap) is a shortwave listener.*

words and phrases that are commonly used by amateurs, men's first names, women's first names, and tips about addressing mail to Russian amateurs. Phonetic pronunciations accompany Russian words and phrases throughout this contact enhancement aid.

A 90-minute cassette tape is available to help us improve our pronunciation of Russian words. The domestic (USA) price is \$6 and the foreign (DX) price is \$8.

Requests for the booklet and/or tape should be sent to Russian Phrases for Amateur Radio, c/o Len Traubman, W6HJK, 1448 Cedarwood Drive, San Mateo, California 94403 USA. Payments should be to the Beyond War Foundation.

**Shack Solutions.** Bailey Dickinson, KB4UGW, is producing a series of brochures intended to help new amateurs attain top operating capabilities from their radio stations. His 14-page "Grounding the Amateur Radio Station" brochure is now available at \$7 prepaid. I have checked the initial station installations of several hundred ex-students. It is common to note inadequate (or nonexistent) grounds at amateur radio stations. Bailey's brochure should be of interest to many readers. His next three brochures will cover proper installation of a ground-

mounted vertical, mounting a beam on a 6 foot tower, and installation of stations in apartments and multi-story buildings. The address is P.O. Box 581, Leeds, AL 35094-0581.

**Dick Smith Electronics Catalog.** This 168-page catalog is filled with advertisements of amateur radio equipment and accessories. The catalog price is \$2 when sent to USA addresses, and \$4 to other countries. Their address is Dick Smith Electronics, P.O. Box 468, Greenwood, IN 46142 (317-888-7265).

**Some Information About Interference.** Three organizations have cooperated to produce an interference information booklet which is available at no charge to anyone who requests it. The cooperating groups are the Electronic Industries Association (Consumer Electronics Group), the Federal Communications Commission, and the Consumer Information Center (General Services Administration). This booklet can be requested by writing to the EIA, Consumer Electronics Group, 2001 Eye Street N.W., Washington, DC 20006.

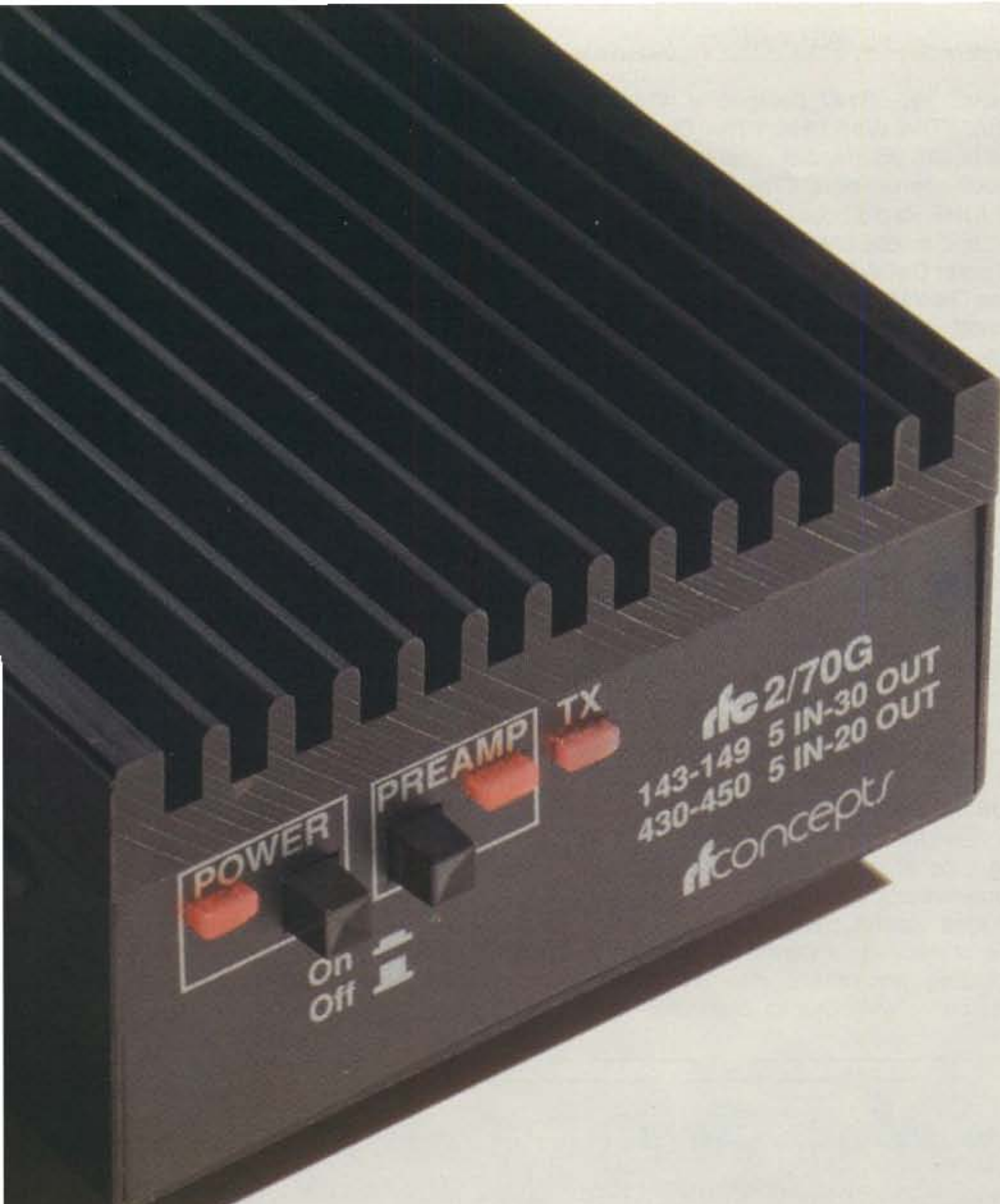
This 4-section brochure folds to approximately 4 by 8 inches. Some of the subjects it covers are possible sources of interference, two-way radio interference, electrical interference, possible causes of interference, isolating interference, FM transmitter interference, TV double images, co-channel interference, fringe-area reception factors, cable TV interference, telephone interference, interference elimination steps, and organizations to contact if interference problems persist. As a former chairman of the Greater Boston TVI Committee, I particularly recommend this brochure to newer amateurs.

**Surveillance Devices.** If you are interested in espionage electronics, you could request a catalog from DSP, P.O. Box 1275, Redondo Beach, CA 90278.

**TAB Books.** TAB Books, Inc. publishes an extensive assortment of books which are both directly and indirectly related to amateur radio. Their catalog can be obtained by sending a request to TAB Books, Blue Ridge Summit, PA 17294-0850.

As an example, TAB Books, Inc. publishes the 243-page *Understanding Telecommunications* reference book written

45527 Third Street East, Lancaster, CA 93535-1802



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by Ronald Thomas, W8QYR. A few of the subjects covered in this book are careers in telecommunications, computer-to-computer communications, radio systems, telephone systems, and television. Charts and diagrams supplement text coverage. The price is \$17.95, plus a shipping and handling fee.

**Tiare Publications.** Tiare Publications offers a free 8-page catalog of amateur radio and SWL publications. The title is "Great Radio Reads." It describes 43 books which vary in price between \$5 and \$42. It also advertises an RF spectrum chart, a world status map, and an international travel briefings service. Ten 8.5 by 11 inch information cards are listed in this catalog to provide users with easy access to frequently used information. The subjects/titles are (101) FCC Addresses and Phone Number, (102) Emission Designators, (103) Vacuum Tube and Receiver Manual Sources; (104) World Call Sign Prefixes, (105) Common Shortwave Abbreviations, (106) Commonly Used "Q" Signals, (107) International Telecommunications Union Country Abbreviations, (108) International Phonetic Alphabet/International Morse Code by Sound, (109) Shortwave Frequency Bands and Users, and (110) Tips on Locating Other Shortwave Listeners in Your Area. The address is Tiare Publications, P.O. Box 493, Lake

Geneva, WI 53147 (telephone 414-248-4845). "The World Ham Net Directory" sells at \$11.95 prepaid. It lists a variety of special-interest nets. "The Basic Guide to VHF/UHF Radio" covers this subject very well, and it sells at \$8.95 prepaid.

**Tower Catalog.** If you want a free copy of the Glen Martin Engineering, Inc. tower catalog, you can request it by writing to Route 3, Box 322, Boonville, MO 65233. If you are new to the subject of towers, I advise you to read Steve Wilson, K0JW's review of the Glen Martin system (Hazer) which can be used to safely and easily raise and lower antennas on towers. His article was printed in the April 1989 issue of CQ. The back cover of the catalog shows a map of the contiguous 48 states, and it provides wind-loading data.

**Unadilla Antennas Catalog.** This 8-page catalog lists baluns, HF antennas, HF antenna traps, in-line coaxial couplers/relays/switches, and interference filters. The address is Unadilla Antennas, P.O. Box 215, Andover, MA 01910-0814.

**Universal Radio Publications.** The 92-page Universal Communications Catalog lists amateur radio, scanner, and shortwave equipment and accessories. It includes useful descriptions of amplifiers, antennas, antenna tuners, books (including equipment instruction manuals), cable/wire, clocks, coaxial RF swit-

ches, code items (keys, paddles, training aids), computer interfaces, connectors, facsimile (FAX), filters, FM hand-held transceivers, headphones, HF transceivers, portable receivers, preamplifiers/tuners, radioteletype (RTTY), scanners, short-wave receivers, SWR/power meters, VHF/UHF all-mode, and wideband receivers. The catalog cover shows a \$2 price. The mailing address is Universal Radio, 1280 Aida Drive, Reynoldsburg, OH 43068 (FAX 614-866-2339, telephone 614-866-4267).

Fred Osterman, N8EKU, is the president of Universal Radio. They publish a series of useful books. Their 64-page *The World Below 500 Kilohertz* should be of interest to people who are interested in longwave listening. Their 104-page *Shortwave Receivers Past and Present* covers more than 200 SWL receivers. Their 270-page *The Aeronautical Communications Handbook* covers all facets of the subject. It is bound in a plastic comb binder which allows the book to be left open without having to hold it open.

Universal Radio offers a series of seven pamphlets which are very helpful to new amateurs and shortwave listeners. Each one is available free to anyone who requests a single copy and provides a self-addressed, stamped envelope. The titles are "Antenna Safety Advisory,"



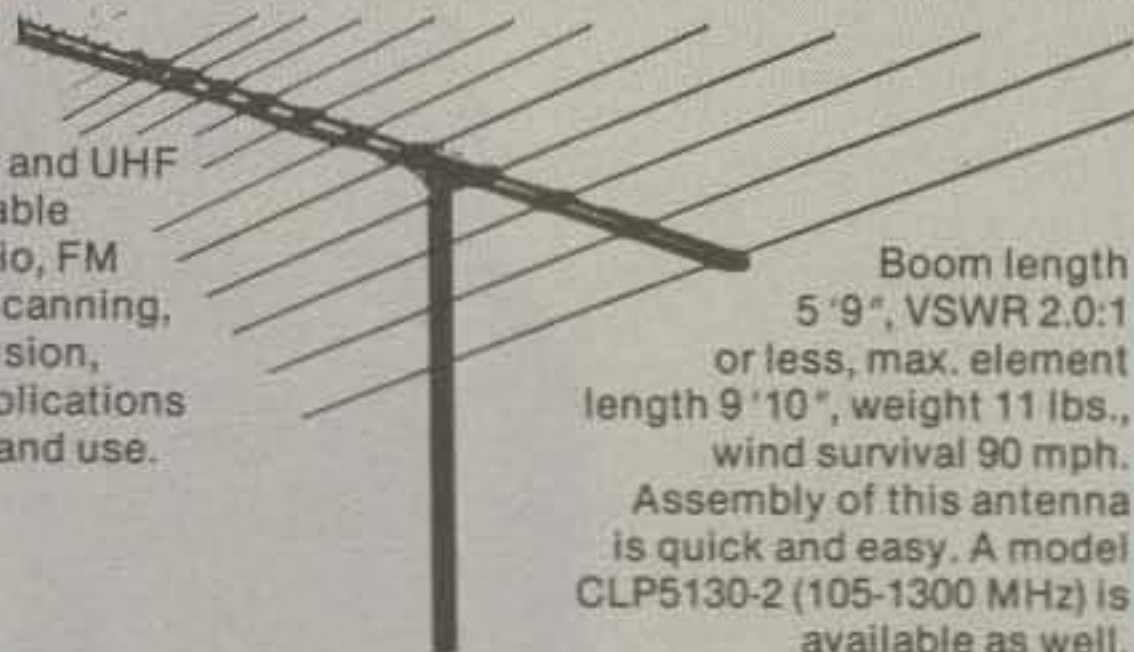
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**CLP5130-1 Log Periodic 50-1300 MHz**

This high gain, wide-band VHF and UHF antenna is suitable for amateur radio, FM broadcasting, scanning, VHF/UHF television, government applications and business band use.



Boom length 5'9", VSWR 2.0:1 or less, max. element length 9'10", weight 11 lbs., wind survival 90 mph. Assembly of this antenna is quick and easy. A model CLP5130-2 (105-1300 MHz) is available as well.

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Model	Height	Base Width	Max. Wind Load FT <sup>2</sup>	Max Vert. Load Lbs.	Weight
CR18	5'10"	31 1/2"	21 @ 90 mph	440	18
CR30	9'10"	39"	27 @ 90 mph	1,322	33
CR45	14'9"	39"	23 @ 90 mph	881	57

CK46 Thrust Bearing—Max. Mast Diameter 2 1/2"



R	Model	Rotation Torque (lbs./inch)	Brake Torque (lbs./inch)	Mast Size
O	RC5-1	520	6075	1 1/2" - 2 1/2"
T	RC5-3	520	6075	1 1/2" - 2 1/2"
O	RC5A-2	1388	13,020	1 1/2" - 2 1/2"
R	RC5A-3	1388	13,020	1 1/2" - 2 1/2"
S				

Model	Vertical Load (lbs.)	Horizontal Load (lbs.)	Preset	Indicator Accuracy	Square Feet	Weight (lbs.) (Rotator Unit)
RC5-1	880	1760	...	±5° Max	10	13
RC5-3	880	1760	Provided	±4° Max	10	13
RC5A-2	1540	2200	...	±4° Max	25	17
RC5A-3	1540	2200	Provided	±4° Max	25	17



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PS140II	14A	11 lbs.
RS40X	40A	22 lbs.
RS3080	30A	continuous w/fan 20 lbs.

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DP810	1.8-150 MHz
DP820	140-525 MHz
DP830	1.8-150 MHz
	140-525 MHz

**SWR/PWR MTRS W/PEP**

CN101	1.8-150 MHz
CN102	140-525 MHz

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The ultimate wide-band omnidirectional antenna for hours of listening pleasure. Not only a great receiving antenna, it can transmit on 50 MHz, 144 MHz, 430 MHz, 900 MHz and 1200 MHz. Stainless steel materials complete with mounting hardware. Type "N" connectors. Only 5'6" tall which enables indoor installations for apartment dwellers.

**WB 1300**

**Frequency:**

Receive—25-1300 MHz  
Transmit—50, 144, 430, 900 & 1200 MHz

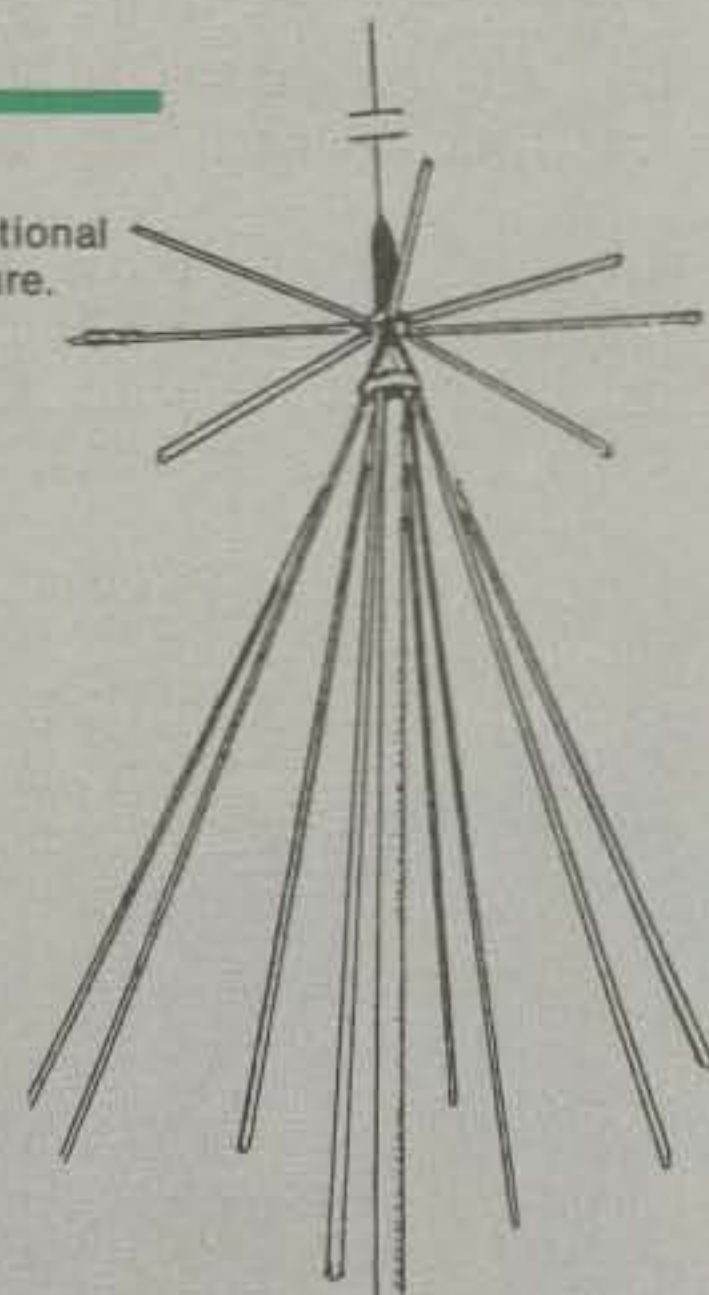
**Max. Pwr: 200 W**

**Length: 5'6"**

**Connector: "N" Type**

**Mast Dia.: .98"-2"**

**Weight: 2.2 lbs.**



"Guide to UBIX" (Universal Bulletin Board and Information Exchange), "How to Install RF Connectors," "Interested in Amateur Radio?," "Interested in Shortwave Listening?," "Listening to Radio-teletype," and "Receiving Facsimile (FAX) on Your Shortwave Radio."

**Vibroplex Collector's Guide.** Tom French, W1IMQ, has published an 87-page soft-cover book about Vibroplex bugs. The history of each bug is included, plus reproductions of associated advertisements. Identification, dating, variations, and adjustment data are in this book. Patents have been reproduced in clear, easily read print in Tom's book. Non-Massachusetts domestic (USA) residents can purchase a copy of this book at \$16.95, including shipping. Massachusetts residents should add the 75 cent sales tax. The DX (foreign) price is \$19.95, including shipping. The address is Artifax Books, P.O. Box 88, Maynard, MA 01754. Tom's book includes 10 photographs, reproductions of 17 old advertisements, and 20 line drawings. Tom continually seeks additional information about handkeys, bugs, and keyer paddles. His book is a treasured keepsake in my amateur radio library.

**W5YI Report.** This report is published twice monthly. It is a superb source of the very latest amateur radio news. The subscription fee is \$21 per year. If you want a free sample issue, send an SASE with your request. The address is Box 565101, Dallas, TX 75207.

**W6DDB Printed Aids.** My previous columns contain information that is useful to new and aspiring amateurs. Many of these items have been reprinted for distribution to students of licensing courses I instruct. For ease of use, these printed aids have been separated into six categories. These categories are introduction, code, theory, station, operating, and miscellaneous. Outdated items are continually replaced with newer material. Fifteen dollars brings a complete set of current printed aids, including shipping costs. A list of these printed aids will be sent to anyone who requests it and sends a business size (#10) self-addressed and stamped envelope to my California address. Any single item is available at no charge to anyone who supplies a self-addressed and stamped envelope. When requesting a single item, it is advisable to supply a large (at least 9 by 12 inch) envelope and to include a couple of extra stamps (loose in your envelope) in case extra postage is required. Some items are long. Licensing-course instructors are welcome to revise and/or duplicate these items to suit their requirements.

**The W6GO/K6HHD QSL Manager List.** Jay and Jan O'Brien publish a list of QSL managers every month. It is the size of a full unfolded newspaper sheet, or four 13.75 by 22.75 inch pages. It lists

more than 5000 unique DX stations and their associated QSL managers. A 12-issue subscription (second-class mail) sells at \$20 to USA addresses, or \$25 to Canadian and Mexican addresses. An annual subscription sells at \$30 airmailed to overseas DX addresses. A single issue sells at \$2, \$2.50, or \$3 to a USA, Canada/Mexico, or overseas address, respectively. Overseas subscriptions are handled by Brian Russell, G1WBI, 163 Halton Road, Runcorn WA7 5RJ, Cheshire, En-

gland. Domestic subscriptions should be mailed to The W6GO/K6HHD List, P.O. Box 700, Rio Linda, CA 95673-0700.

**W8JBU Beam Headings.** You can purchase a set of beam headings, relative to your exact location, at \$9.95 from W8JBU, Box 397, Hinckley, OH 44233.

**WD8SBB Beam Headings.** Wagner offers a set of DX beam headings (relative to your station) at \$8 from 5065 South Kessler-Frederick, Troy, OH 45373.

73, Bill, W6DDB

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HDBX48 48 ft. ....\$Call

(Ratings based on 10 ft. boom.)

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TH5 Mk2: 5-el tribander  
Explorer-14: tribander  
Discoverer: 40 Meter beams  
205CA: 5-el, 20 M. beam  
204BAS: 4-el, 20 M. beam  
155BAS: 5-el, 15 M. beam  
105BAS: 5-el, 10 M. beam  
18HTS & 18ATV/WBS: verticals  
DX-88: **NEW!** HF vertical  
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9913 low loss; 50 ohm.	RG-8X (9258) 50 ohm; foam
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RG-8/U (8237) 50 ohm.	RG-58A/U (8259) 50 ohm.
RG-8/U (8214) 50 ohm. Foam.	RG-59/U (8241) 75 ohm.
RG-214/U (8268) 50 ohm, double shield.	

Don't settle for less than the best. Call us for Belden.

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Solid: 12 ga; Solid; 14 ga.; & Stranded 14 ga. Cut to your specs.

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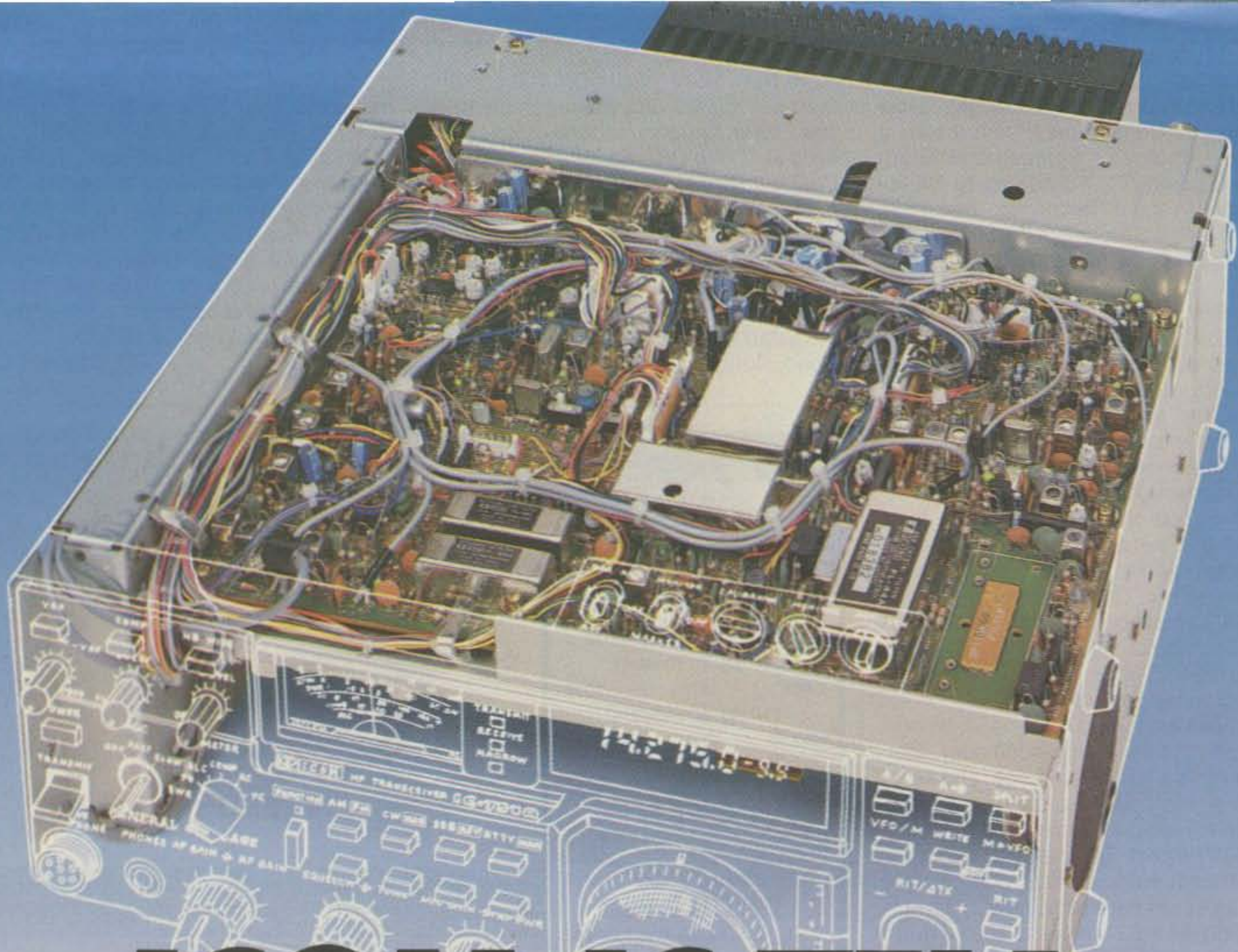
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**Unsurpassed Quality and Reliability.** Quality and Reliability is important to you and it's important to ICOM. ICOM now covers you and your investment with its exclusive



one year warranty. There's more! The IC-751A's receiver boasts 105dB dynamic range for superb listening. The 100% duty cycle transmitter defies abuse and delivers 100 watts of exceptionally stable and clean RF output. Reliability. Quality. One year warranty. That's ICOM.

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THINGS TO LEARN, PROJECTS TO BUILD, AND GEAR TO USE

## The End-Fed Long Wire Revisited

**F**rank Lucas, W3CRA (later W8CRA), was one of the all-time top DXers. He was the first of the pre-WW II American operators to achieve DXCC. At the peak of his career his equipment was modest—a homemade receiver and transmitter (600 watts) and an "end-fed, single-wire Hertz" antenna.

More recently Howy Bradley, W2QHH, the world's top QRP operator, worked over 360 countries with an end-fed long-wire antenna. Unlike Frank, Howy had to compete with 3-element Yagis and quads in order to achieve his impressive record. Other DXers have had luck with a long-wire antenna, and a lot of them are showing up on the 10 meter band.

This leads to an interesting conclusion. If you can't erect a beam, the DX experts suggest that a long-wire antenna has a lot going for it!

How long is a "long wire" antenna? Well, as far as 20, 15, and 10 meters go, a wire over a wavelength long may be considered to be "long." This indicates that a 160 meter Marconi (about 135 feet long) works as a long, end-fed wire antenna on the higher bands, provided it is properly fed. It looks as if an antenna of this type is perhaps the proverbial "all-band" antenna—something often sought but seldom found.

Many amateurs are in the position I was in when I was first licensed. I lived in a two-story house with my station in a corner of my bedroom. The peak of the house roof was about 25 feet above the ground. Somewhat over 100 feet away was a nice tree which I estimated to be about 30 feet tall. I could easily climb the tree to the 25 foot level and string a #14 hard-drawn enamel-coated copper wire from the tree to the peak of my roof without getting anyone excited—except my mother, who watched nervously as I clambered about the roof (fig. 1).

Once I achieved a good ground connection (which wasn't easy), I used the antenna on several bands—160, 80, and 20 meters. I didn't work 40, as there was a big DXer on that band a few blocks away, and when he was on the air, my little receiver folded up. At that point in time

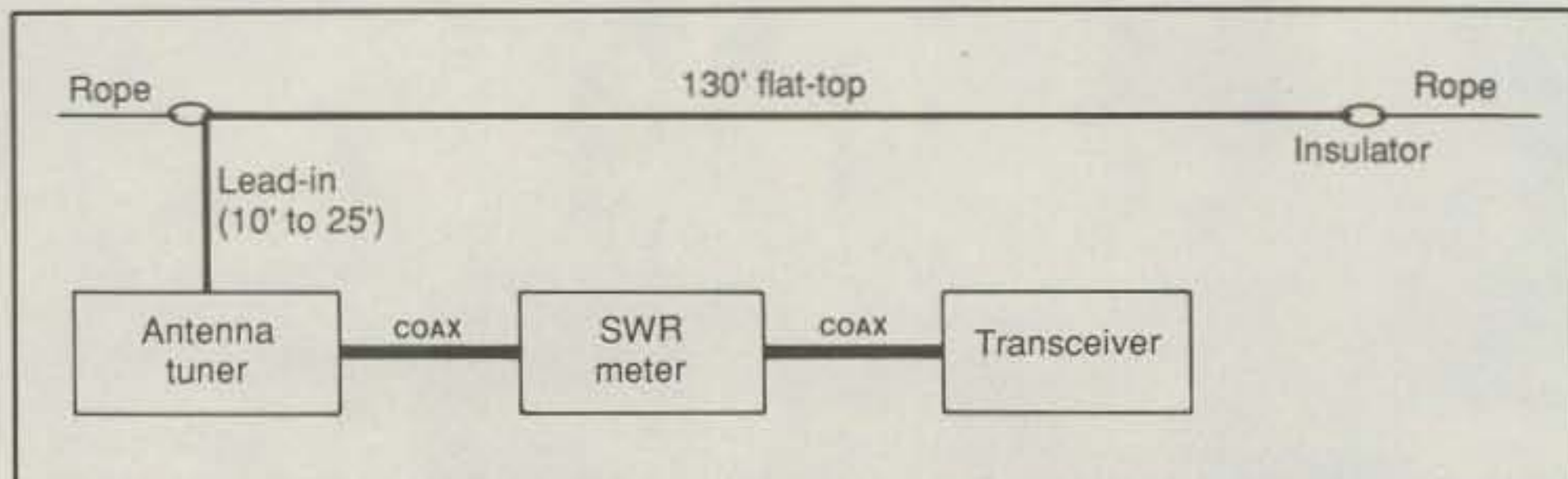


Fig. 1—A practical end-fed, single-wire antenna for coverage of all bands between 160 and 10 meters. Antenna tuner is required, and in all cases a good ground is vital. Quarter-wave radials can be used on the higher bands, as discussed in the text. Antenna is 25 feet above ground.

the 15 meter band didn't exist, and only a few hardy souls were exploring the 10 meter band. However, on the bands I used, the single-wire antenna worked very well.

After a few years I reluctantly took down the wire and put up a tower and a 2-element Yagi. But the long wire did a superlative job during the time it was up, and the cost was right!

I still run across operators using a long wire, and some of the 10 meter signals from this simple antenna are outstanding! It is a fine antenna for an apartment dweller who can run a thin wire out to a nearby tree. If the wire is #20 or smaller, it is very hard to see when it is up in the air! And small-diameter wire is quite rugged. I had an end-fed wire antenna at my beach home for many years, and it remained aloft in spite of heavy storms that blow in from the Pacific along the northern California coast. (My best DX with this wire was to have Father Moran, 9N1MM, answer my CQ one fine, frosty fall morning!)

### A Close Look At The End-Fed Antenna

I think it is worthwhile to take a close look at this inexpensive and effective DX antenna. The old timer built his end-fed antenna by cut-and-try, aided by bits of information gained by the commercial services who often used this antenna for backup to their curtain arrays. Today's amateur is luckier. The modern computer-assisted antenna analysis program of K6STI (Brian Beezley, 507 1/2 Taylor St., Vista, CA 92084) can be used in an in-

vestigation of this antenna.

As shown in fig. 1, this antenna is fed at one end with a short wire that drops down to reach the transmitter. An antenna tuner, SWR meter, and a good ground return are required at the transmitter to make the antenna work properly. Since a good ground is difficult to obtain in the HF region, a single quarter-wave radial ground wire is used for each band. These radials are made up of insulated wire and may be run about the room, near the baseboard. They make sure the equipment is at RF ground potential so that you won't "get bit" when you pick up the mic or key the transmitter! Their real purpose is to establish the feedpoint ground for the antenna. Without them, the ground return is liable to be the power line, and that can cause numerous difficulties, including TVI!

The horizontal portion of the antenna is 130 feet long, and the lead-in portion is from 10 to 25 feet long. The flat top does most of the radiating, but the lead-in contributes its bit.

The radiation pattern is more complex than one would imagine. Generally speaking, the antenna is omnidirectional in nature, with enhanced lobes and minor nulls branching out from the sides of the wire. The pattern changes from band to band, as the computer printouts illustrate.

The long wire picks up a signal over a physical distance of several wavelengths (depending upon the band in use) and seems to boost the average level of the received signal, as compared to a dipole or ground-plane antenna, particularly those DX signals arriving at low angles.

\*48 Campbell Lane, Menlo Park, CA 94025

Band	Gain (dBd)	R	X	Series Reactance
40	0.5	105	-570	100 pF
20	1.4	115	-190	100 pF
15	2.4	150	+ 56	1 $\mu$ H
10	3.3	425	+290	2 $\mu$ H

Table I— Gain for each band using the end-fed, single-wire antenna shown in fig. 1.

One reason for this is that the radiation pattern of the long wire is both horizontally and vertically polarized in a complex mix. The gain over a dipole is achieved in the main lobes; it is not large, but it increases as the frequency of operation is raised. In the case of the antenna shown in fig. 1, the gain for each band is shown in Table I.

### Patterns of the End-Fed Wire

On 160 and 80 meters, operating against a good ground, the antenna pattern is virtually omnidirectional. On 40 meters the pattern resembles a fat figure-8, with the pattern in line with the wire (fig. 2).

On all higher bands nulls exist in the azimuthal pattern, but these should not be taken too seriously. In real life they tend to be obscured and usually show up as a 6 to 10 dB drop in signal strength. Reflection from a rough, imperfect ground and reflections from nearby objects often smooth out the nulls, and the antenna becomes omnidirectional for all practical purposes.

The 20 meter pattern is shown in fig. 3. Note that it is not symmetrical, the lobes radiating from the far end of the antenna being slightly stronger than the lobes at the fed end. Minor lobes are down about 3

dB and six nulls show up, each down about 16 dB. In real life these nulls may not be observable.

The 15 meter pattern shows additional side lobes and nulls, but the nulls are less pronounced (fig. 4). The pattern is becoming more irregular. Finally, on 10 meters many lobes exist and are shown to be about -3 to -8 dB below maximum field strength. On this band the antenna is nearly four wavelengths long, and power gain in the main lobes, as compared to a dipole, is about 3 dB (fig. 5).

As I said before, the pattern is a complex mix of horizontal and vertical radiation. The nulls, in addition, are affected by the positioning of the lead-in wire. But these computer printouts provide a good view of the theoretical pattern of this long-wire antenna design.

### Feeding the End-Fed Antenna

The impedance at the lead-in point falls in the range of 100 to 150 ohms on the 40, 20, and 15 meter bands. It is about 450 ohms on the 10 meter band. It is reactive on all bands unless the lead-in wire is pruned to reduce reactance on one band. Table I gives an idea of the computer-derived input impedances. A real-life antenna which sags a bit and is surrounded

by other objects will depart somewhat from these figures.

In any event, an antenna tuner such as a "Transmatch" should do a satisfactory matching job. To make things a little easier, the reactance of the antenna can be tuned out by placing a variable series reactance of the opposite sign in the lead-in. Suggested values are shown in the table.

The radial quarter-wave ground wire, one for each band, is essential. I didn't know this when I erected my first end-fed antenna many years ago, and I had RF running all over the house. I had the choice of curing the problem or going off the air permanently after my father got "bit" by RF when he turned on his bedside reading light! A single radial cut to 16.5 feet for 20 meters and strung out along the baseboard of my room cured the problem.

### Longer End-Fed Antennas

Do you have space for a longer wire? Good. The limiting factor in a long wire is the height above ground and the allowable sag.

As far as the higher frequency bands go, the exact length of the long wire is not an important factor. Make the wire as long as you can and get it up in the air as high as possible. Sensible rules. Antenna reactance at the feedpoint can be tuned out with either a series inductor or capacitor, and the resistive component can be matched with most popular tuners. An SWR meter and radial ground wire are all-important.

In a future column I'll discuss the V-beam, a simple antenna made up of two long wires in V-configuration, fed at the

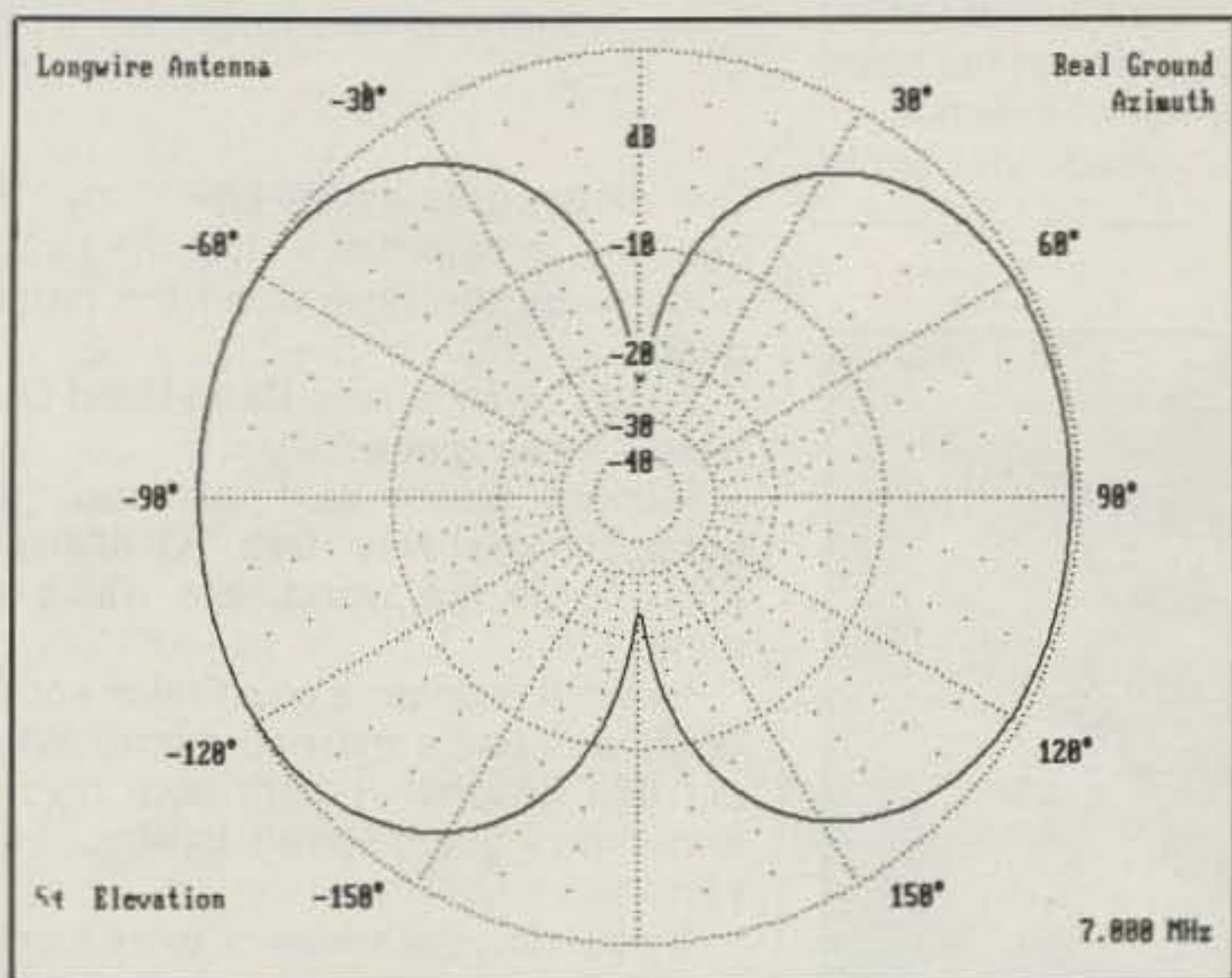


Fig. 2— Computer-derived 7 MHz field pattern of the long-wire antenna of fig. 1. Wire runs from -90 degrees to +90 degrees (right to left) and is fed at the right end. Strong nulls exist at right angles to the wire.

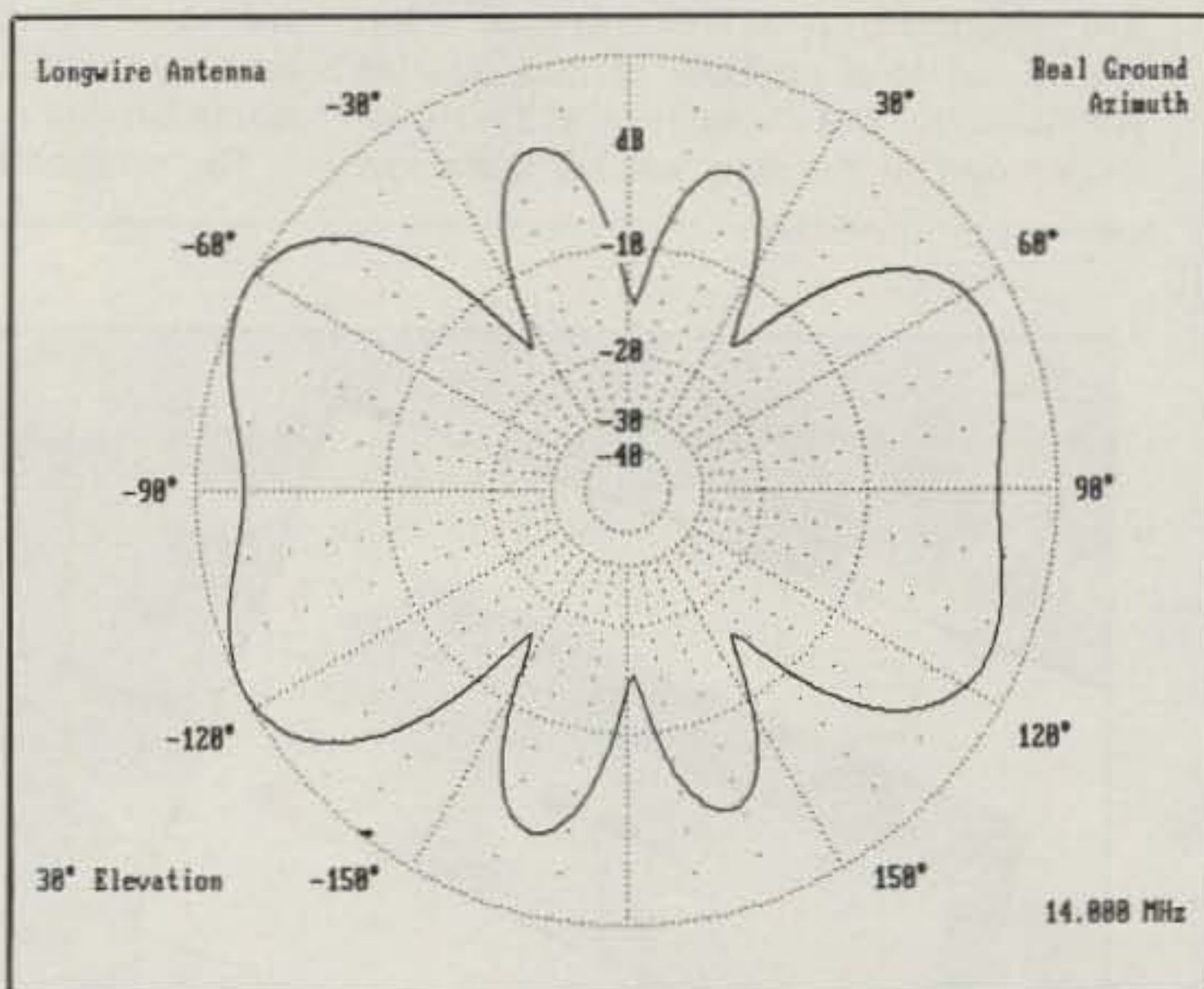


Fig. 3— Fourteen MHz pattern of the long wire. Multiple lobes exist on this band, and pattern is slightly stronger off "free end" of the antenna.

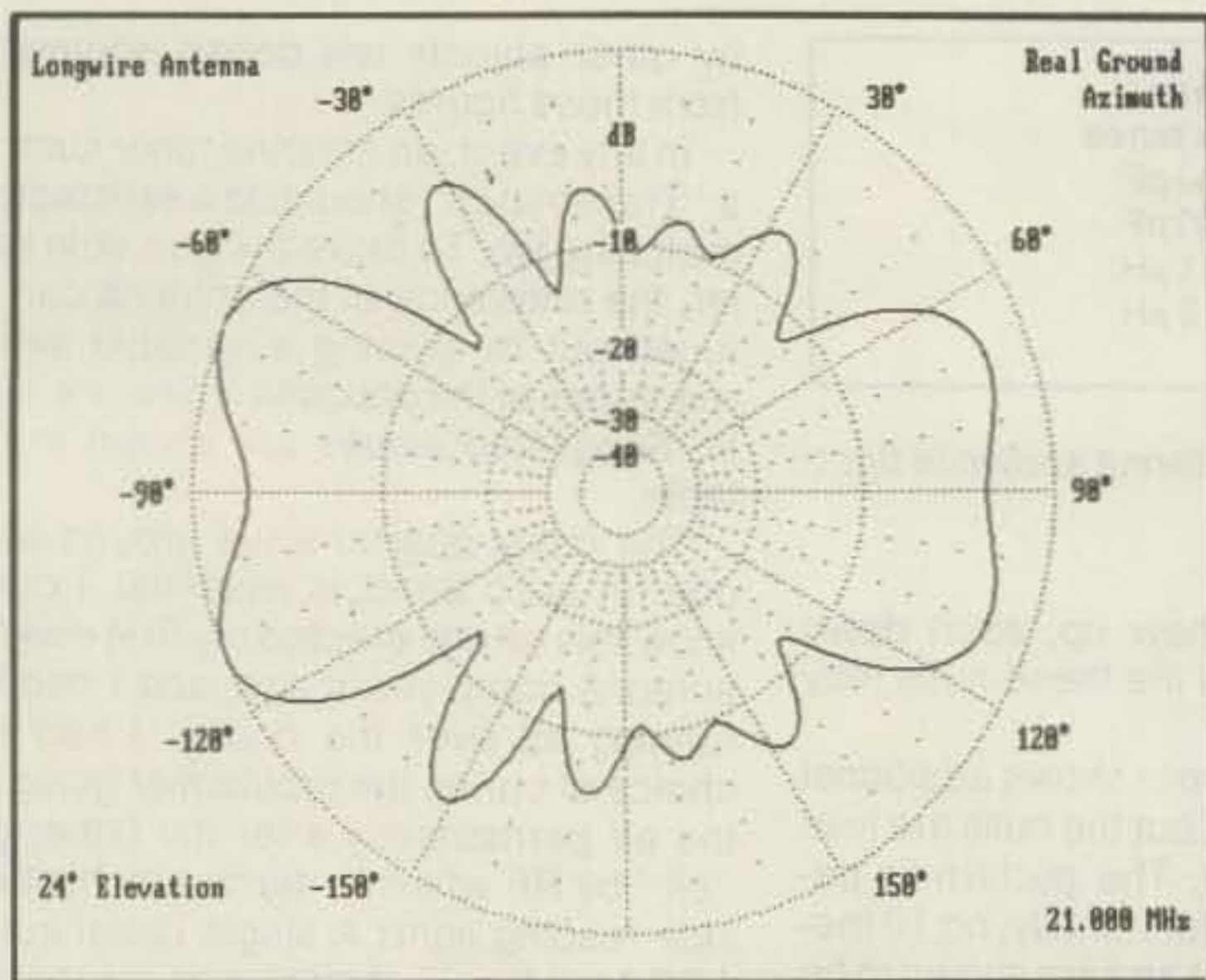


Fig. 4- Lobe splitting grows on 15 meter band. For all practical purposes, however, the user will find the antenna nearly omnidirectional as uneven ground and reflection from nearby objects tend to fill in the nulls.

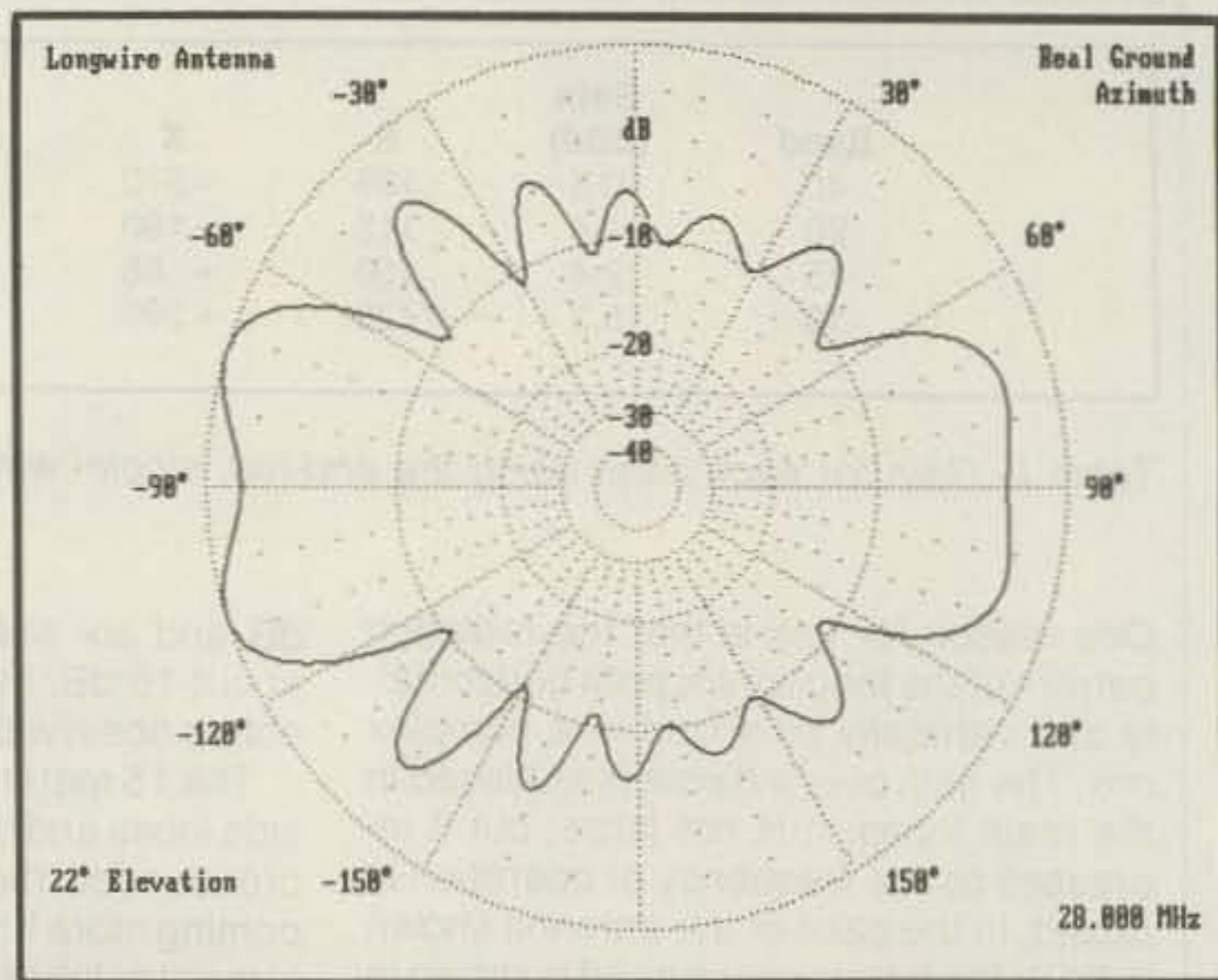


Fig. 5- Maximum lobe splitting is seen on 10 meters. Main lobe is nearly 2 dB stronger off "free end" of the wire as compared to fed-end (right).

apex. This is another inexpensive gain antenna design!

### The Center-Fed Long Wire, Coming Up!

It may be more convenient to feed the long wire in the middle rather than at one end. No problem. However, moving the feedpoint makes a difference in the current distribution in the antenna. As an example, look at a wire one wavelength long. There is a reversal of current as shown by the arrows in fig. 6.

The input impedance at the center of this antenna on 20 and 10 meters is quite high, on the order of 2200 ohms on each band. A balanced line and antenna tuner are required to feed the antenna. If the line is cut to a multiple of odd quarter wavelengths, the impedance at the transmitter end of the line will be quite low

(about 72 ohms for a 400 ohm line).

There are interesting versions of the center-fed antenna which will be discussed in a later column. Until then, see you on the low end.

### The Dead-Band Quiz

The last Dead-Band Quiz gave two quotations about Ann. One quotation was from the book, and the other was from the made-for-TV movie version of the book *Tinker, Taylor, Soldier, Spy*, by John le Carre. Roddy Martindale, who worked "on the fleshy side of the Foreign Office" made the remark. After pumping George Smiley of the "Circus" for hours over an unappetizing dinner and getting nowhere, he flung this verbal dart at Smiley as they parted, jabbing him in his heart about Smiley's unfaithful wife, Ann.

Recommendation: Read the book!

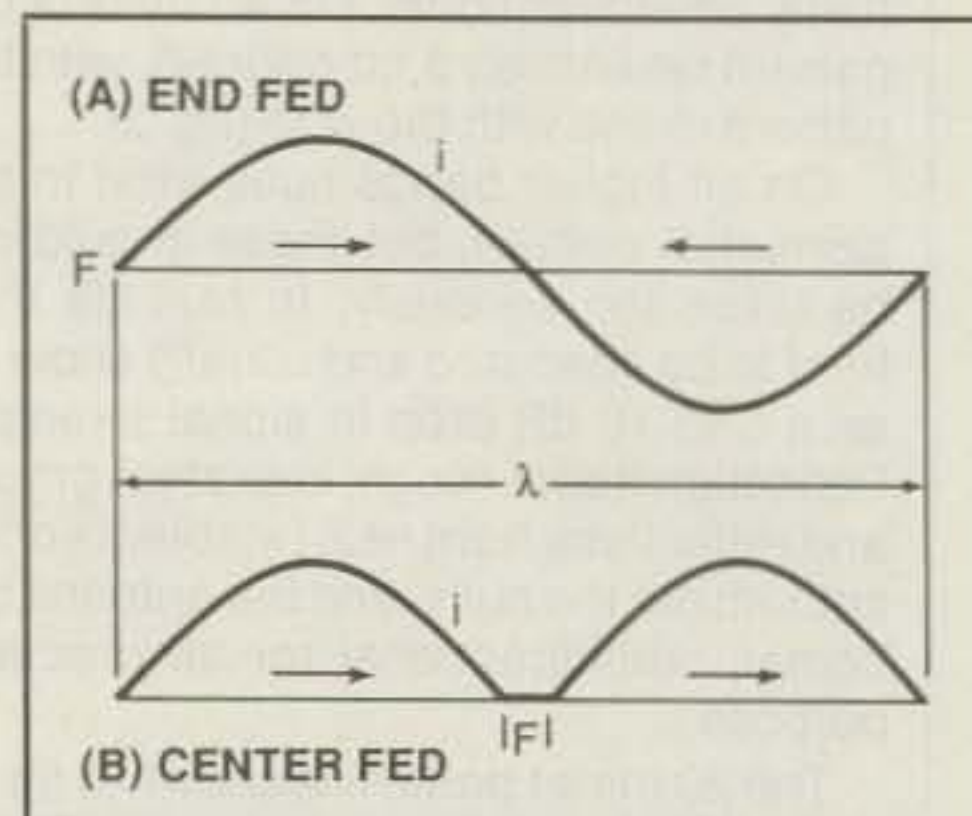


Fig. 6- When long wire is fed at the center (B), a current reversal takes place and half-wave sections shown here are in phase. This is the well-known "two half-waves in phase antenna." Compare currents with end-fed wire shown in (A).

One of the greatest all-time "spy" stories! It is in paperback. Just the thing to while away the time when the band is dead.

Ready to try a new Dead-Band Quiz? Here's an easy one for you:

Richard Blaine said this about Ilsa Lund. The year was 1941: "Of all the gin joints in all the world, she walks into mine!"

By what nickname was Blaine known? What was Ilsa's married name? Where did this fictional remark take place? I know you'll get it. Here's looking at you, kid!

If you know the answers, write them on your QSL and send them to me at my address at the beginning of this column. The calls of the knowledgeable "winners" will be published in this column.

73, Bill, W6SAI

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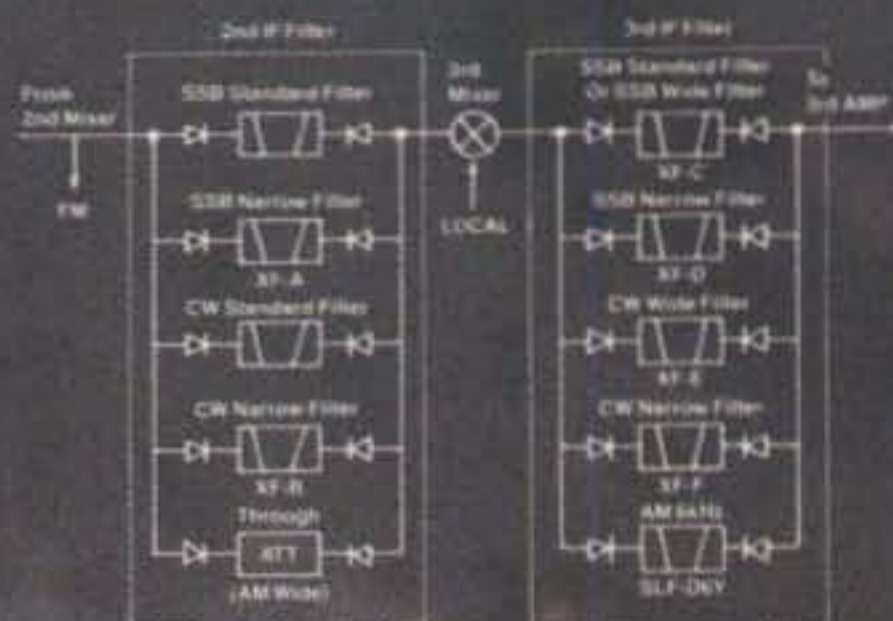
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- Antenna Impedance:** 16.5–150 Ohms Nominal
- Power Consumption:** 95 VA (Receive), 1050 VA (Transmit)
- Sensitivity:** SSB/CW < 0.25 V for 10 dB S/N, 1.8–30 MHz
- Dynamic Range (Typical):** 108 dB (@ 500 Hz BW, Preamp off)
- Maximum Audio Power Output:** 2 Watts into 4 Ohms with < 10% THD
- Audio Output Impedance:** 4–8 Ohms
- Weight:** 56.2 lbs. Standard Version (Deluxe Version slightly more)

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## NEWS OF CERTIFICATE AND AWARD COLLECTING

**T**he Story of the Month for February is:

**Allen R. Carpenter, K1QPV  
USA-CA All Counties #646,  
Mixed 12-11-89**

"I was very happy to receive the beautiful certificate for USA-CA All Counties #646. As has been said, it represents a lot of time on the bands. I have not been one to put a lot of 'wallpaper' in my shack, but this award was prominently displayed as soon as I got the frame built for it. It really is a beautiful award, and I want to thank the Custodian, *CQ* magazine, and all the county hunters for making it possible.



In the shack of Al Carpenter, K1QPV. Note the Mobile, Model USA-CA 646.

"Ruth, K1QWK, and I don't have many hobbies. Radio-wise, we used to run a lot of traffic for the hospital ship *Hope*, and also phone patches for our service families who were overseas. We also spent a lot of time on the YL International Single Side Band system as a control station.

"We have run many counties on vacation trips out west, but recently our travels have been more restricted. However, we expect to be able to go more, with no time limits. We hope to run a lot of back roads and put out some good counties. We have a motor home and like to visit all the national parks and walk the many trails. It's nice to get out into the wilderness and enjoy nature's beauty and quiet-

333 South Lincoln Ave., Mundelein, IL 60060



Al, K1QPV, and Ruth, K1QWK, ready for the square dance. Costumes were hand-crafted by Ruth.

ness. We have been many places and are looking forward to visiting more.

"Working with semi-precious stones—cutting, grinding, polishing, and setting into jewelry—was one of our hobbies, but it took a back seat to county hunting. Ruth is a craft person. One other thing that she does is make baskets, trays, etc., out of pine needles.

"We love to square dance and round dance (a form of ballroom dancing). It's lots of fun, we meet different people, and it's also great exercise.

"Again, many thanks to all who helped to make it possible for me to earn the USA-CA All Counties Award. Best wishes to each of you.— 73, Al, K1QPV."

### Awards Issued

Stuart Johnson, WU4S, submitted his completely filled and properly documented record book and received USA-CA All Counties #679, USA-CA 3000 #705, USA-CA 2500 #783, USA-CA 2000 #851, USA-CA 1500 #938, USA-CA 1000 #1132, and USA-CA 500 #2459, All SSB Mobiles, dated 10-25-90.

Ed Daigre, W5ILR, added a credible enhancement to his good record by qualifying for an All 20M endorsement, dated 10-27-90, to his USA-CA All Counties #543.

Ada "Jan" J. McLernon, NV6L, received USA-CA 2500 #782, Mixed, dated 10-1-90.

J. Archie Hampton, WB4QZD, filed his good application and qualified for USA-CA 1500 #939, Mixed, dated 10-27-90.

### USA-CA Special Honor Roll

Stuart Johnson, WU4S  
USA-CA All Counties #679,  
All SSB Mobiles, 10-25-90

Ed Daigre, W5ILR  
USA-CA All Counties #543, All SSB  
Endorsed All 20M, 10-27-90

USA-CA 500 certificates went to:  
Peter H. Salvage, KC4DUP, USA-CA 500 #2455, All SSB, 10-2-90.

James E. D. Norton, KA8SHZ, USA-CA 500 #2456, All 10M, 10-3-90.

Yoshiharu Horio, JA2DNA, USA-CA 500 #2457, Mixed, 10-19-90.

Carroll Hefelfinger, WA8CFQ, USA-CA 500 #2458, Mixed, 10-20-90.

Stuart Johnson, WU4S, USA-CA 500 #2459, All SSB Mobiles, 10-25-90.

Igor Zelden, UB5LCV, USA-CA 500 #2460, Mixed, 10-27-90.

Milan Drlic, YU2WJ, USA-CA 500 #2461, All CW, 10-29-90.

### Awards Available

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WU4S	783	KA8SHZ	2456	
	2000	JA2DNA	2457	
WU4S	851	WA8CFQ	2458	
	1500	WU4S	2459	
WU4S	938	UB5LCV	2460	
WB4QZD	939	YU2WJ	2461	

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.

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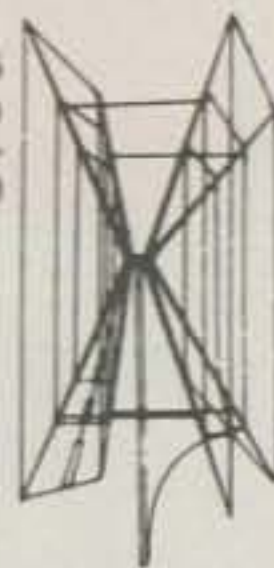
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<b>VHF</b>		
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TH-77A 2m/440 HT	599.95	Call \$
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Joe, I0AOF, at his station in Rome. Joe holds USA-CA 1000, All RTTY. (Photo courtesy Frank, WA2ITU)

Covecrest Drive, Palos Verdes, CA 90274, USA, and he will forward to UW9WW. Certificates and plaques will be mailed from Ufa, the capital of Bashkiria. The funds will be held in the USA for eventual purchase of a transceiver for the club. All contacts since 1945 are eligible for these awards.

**Bashkiria Award.** Requirements: For Europeans, 7 contacts with different stations in Bashkiria (UA9W). For non-Europeans, 5 contacts with different stations in Bashkiria (UA9W).

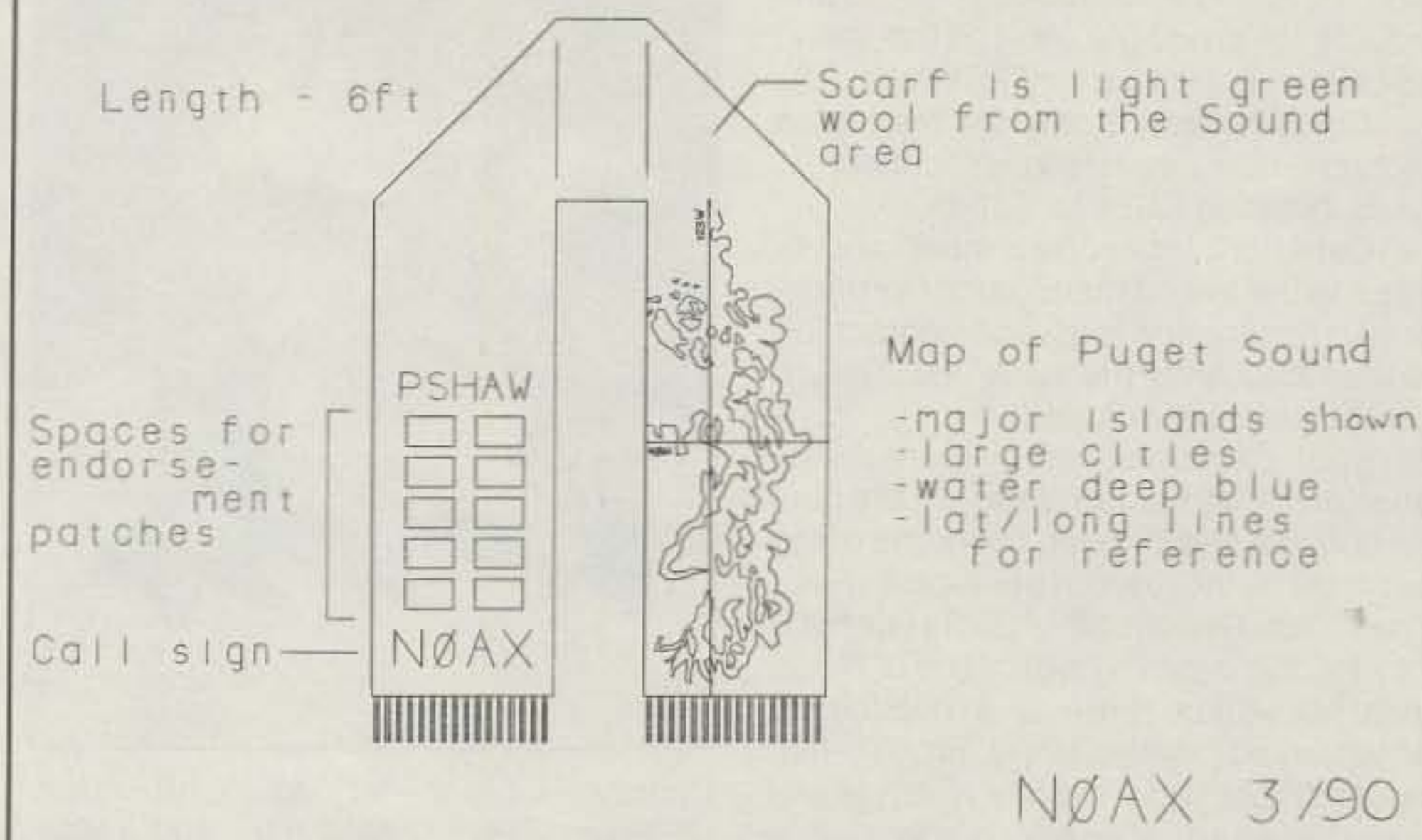
The award is an engraved certificate. The cost is \$3.00, or 6 IRCs. There are approximately 400 amateurs in Bashkiria.

**Bashkiria DX Club Award (BDXC).** Requirements are 5 contacts with different members of the Bashkiria DX Club, anywhere in the world, including DXpeditions. Club members are: UA9WS, UA9WZ, UV9WN, UW9WB, UW9WK, UW9WO, UW9WR, UW9WW, RW9WA, RW9WJ, RV9WB, RV9WZ, RZ9WM (ex-UA9WYL), G3MHV/W6, KA6ZYF, K6SVL. (Note that three members are in the USA.)



Frank, WA2ITU, and Joe, I0AOF, at Joe's QTH in Rome. (Photo courtesy WA2ITU)

## PSHAW Award Scarf



Puget Sound—Heard and Worked Award, courtesy of H. Ward Silver, N0AX.

The award is a beautiful carved wooden plaque. The cost is \$10.00, or 20 IRCs.

**Puget Sound—Heard and Worked (PSHAW).** The PSHAW award program is intended to stimulate interest in the Puget Sound region of the American Pacific Northwest. Contacting the Sound's islands will offer an exciting challenge to amateurs around the world. The reward for fulfilling the Basic Award criteria is a beautiful, knit scarf whose pattern includes a map of the Puget Sound region and the applicant's callsign. Endorsements are handsome patches that can be sewn to the scarf. A detailed reference map is also available from the award manager.

### I. Definitions

1. Two-way contacts or SWL reports may be on any amateur band, but must be made without the assistance of a repeater of any kind. Satellite contacts are acceptable, however. The award is given for contacting (or confirming reception reports of) islands in the Puget Sound region of Washington State. QSOs after 1 January 1990 count toward the award and may be in any mode authorized for use by amateurs.

2. The list of islands which count toward the award is based on Metzger Maps, "Puget Sound Country" map, 1989 edition. The map is available from N\$\$AX or Metsker Maps of Seattle, Washington.

a. "Puget Sound" is defined to include all of the salt water extending from Olympia, Washington to the Canadian border and east of the Strait of Juan de Fuca. Although a strict geographer's definition of Puget Sound does not include the waters north of Whidbey Island, inhabitants of

the region traditionally consider the Sound to include all of the American waters east of Port Townsend.

b. North of Admiralty Inlet and Deception Pass, the borders of Whatcom, San Juan, Island, and Skagit Counties form the Puget Sound boundaries.

3. An "island" is considered to be any dry land surrounded by salt or brackish water, which is labeled "Island," "Isl.," or "I." on the reference map. An island does not need to be completely surrounded by water at all times. This is the case of Day Island near Tacoma. Harbor Island, a man-made island in the mouth of the Duwamish river, is not considered a salt-water island.

4. Land areas labeled "Rocks," "Reefs," "Pinnacles," or by names not specifically containing "Island" will not count toward the award. This includes areas such as "The Sisters," near Sucia Island.

5. Islands may be added to the list if it can be shown that they have been overlooked by the award manager, or if new land areas are created either by man or through natural geologic processes. Whenever a new version of the map is printed, it will be carefully reviewed for changes.

### II. Contact Criteria

1. Contacts with stations on a PSHAW island, portable, permanent, or mobile count for full credit.

2. Because of the difficult land accessibility of many of the islands, PSHAW also accepts contacts made with ships and boats at anchor off an island under the following rules. Vessels underway do not count for any specific island. (See Bonus Contacts, III.12.)

a. The vessel must be anchored, not drifting.

b. A member of the vessel's crew must touch the island at least once prior to any contacts for credit (i.e., row to the island and claim it in the name of PSHAW).

c. Contacts count only for the island touched until a new island is touched.

### 3. Submitting QSLs for Credit.

a. Cards or photocopies must be submitted to the award manager for verification. An application form and contact log are included with the rules list. Return postage must be included.

b. Each card must clearly state the location of the contacted station. If the contact is with a ship or boat, the name of the boat must be included in the location (i.e., "The Candy Dancer off of Sucia Island").

c. If a QSL is submitted for one of the islands for which there is a duplicately named island (James, Hope, Smith), then the card must show exactly which island was contacted. PSHAW number, latitude/longitude, county, grouping designation (Inner, Main, Outer Sound), or other unambiguous notation will be accepted.

d. Credit for cards submitted previously will be given if the previous award application form is copied and included with the current submission.

e. Due to the unusual nature of the award, GCR is not available.

III. Award and Endorsements (*Note: The Basic Award must be obtained prior to applying for any of the endorsements!*)

1. Basic Award—requires the following contacts: One Inner Sound island, Vashon-Maury Island, Bainbridge Island, Whidbey or Camano or Fidalgo Island, One Outer Sound island. (No bonus contacts are allowed for the basic award.)

2. Navigator of the Inner Sound Endorsement—contact five Inner Sound islands, including Anderson, Fox, MacNeil.

3. Navigator of the Main Sound Endorsement—contact ten Main Sound islands, including Vashon-Maury, Bainbridge, Whidbey, Camano, Fidalgo.

4. Navigator of the Outer Sound Endorsement—contact ten Outer Sound islands, including San Juan, Guemes, Orcas, Lopez.

5. Master of the Sound Endorsement—contact a total of 25 islands. (Automatically granted if all three Navigator endorsements are obtained.)

6. Captain of the Sound Endorsement—contact a total of 35 islands.

7. Commander of the Sound Endorsement—contact a total of 45 islands.

8. Admiral of the Sound Endorsement—contact a total of 50 islands.

9. Sheets to the Wind Endorsement—contact ten sailboats, either at anchor or underway (sail power only) in Puget Sound. Contacts can also be used for island credit if the vessel complies with rule II.2.



County Hunters (left to right) Adolf, OE5KE, Steve, HA0DU, and Max, OE5NNN, on the occasion of Steve's recent visit to Austria. Steve says the USA is too far, so they arrange their own mini-conventions.

10. Maritime Highway Endorsement—contact five Washington state ferries; QSO must be with a station on the vessel. Contacts count whether the ferry is underway or docked. The QSL must show the name of the ferry (i.e., "aboard the Klahowya").

11. Opening Day Endorsement—contact two vessels in Puget Sound during the Opening Day of Boating Season festivities, the first full weekend of May, 6 PM Friday (0100 UTC) through 6 PM Sunday (0100 UTC) Pacific Daylight Savings Time.

12. Bonus Contacts—The following special contacts may be substituted for any one island contact when applying for an endorsement to the basic award:

a. A QSO from a Washington State Ferry (the QSL must show the name of the ferry, see end. 10).

b. A QSO with any vessel underway in Puget Sound (the QSL must show the name of the vessel).

c. A QSO with any special event station on a valid island (the QSL must clearly show the special event).

Each of these bonuses may be used on only one application and cannot be used toward the basic award. The Washington State Ferry QSO can also be used toward the Maritime Highway Endorsement.

### IV. References

The Award Manager: H. Ward Silver, N0AX, P.O.B. 927, Vashon, WA 98070.

USA Map Publisher: Metzger Maps, 702 1st Avenue, Seattle, WA 98104, USA, ref. Puget Sound Country Metzger Map.

Reference maps, rules and islands lists, as well as an application and order

form, are available from the award manager. An SASE, with 1 ounce first-class postage, will bring you the rules and islands list.

### Worked All Keys (WAKEY) Award.

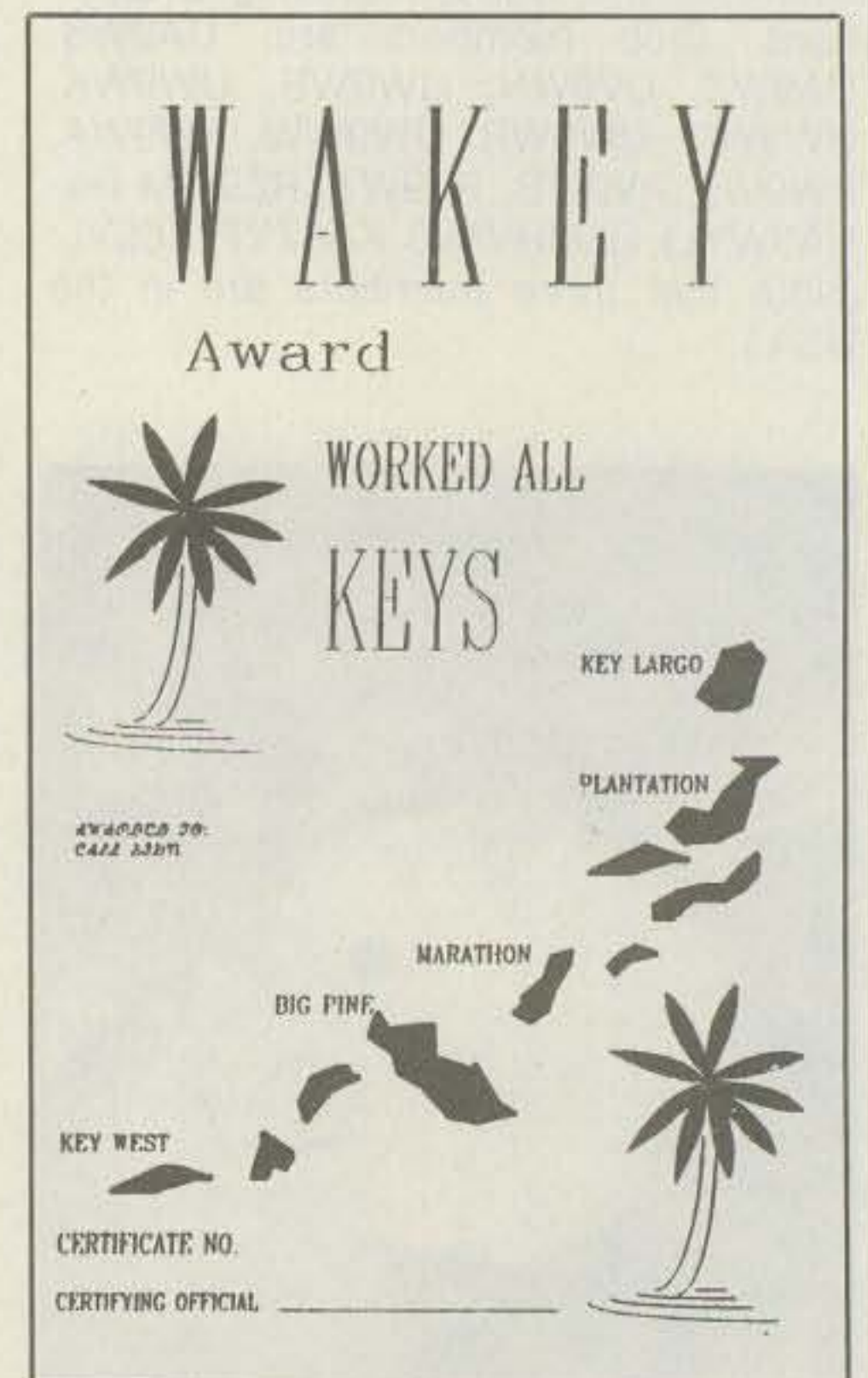
The following is courtesy of Ben Bissman, W8HXT, Chairman, WAKEY Award Committee.

The Florida Keys make up one of the most interesting island groups in North America. The Florida Keys begin just south of Miami and are separated into three sections: the Upper, the Middle, and the Lower Keys.

From Key Largo to Key West there are many Keys and citizens who stay there the entire year. Almost an equal number of people occupy the Keys only in the winter—from November through April. Among all of these inhabitants, amateur radio operators are a vital group, participating in many community activities. Emergency communications are mainly handled by the Florida RACES group, especially during the hurricane season.

When you make contact with one of the amateur operators living there, part time as well as all year, you can learn more about the Keys and their many events and festivities.

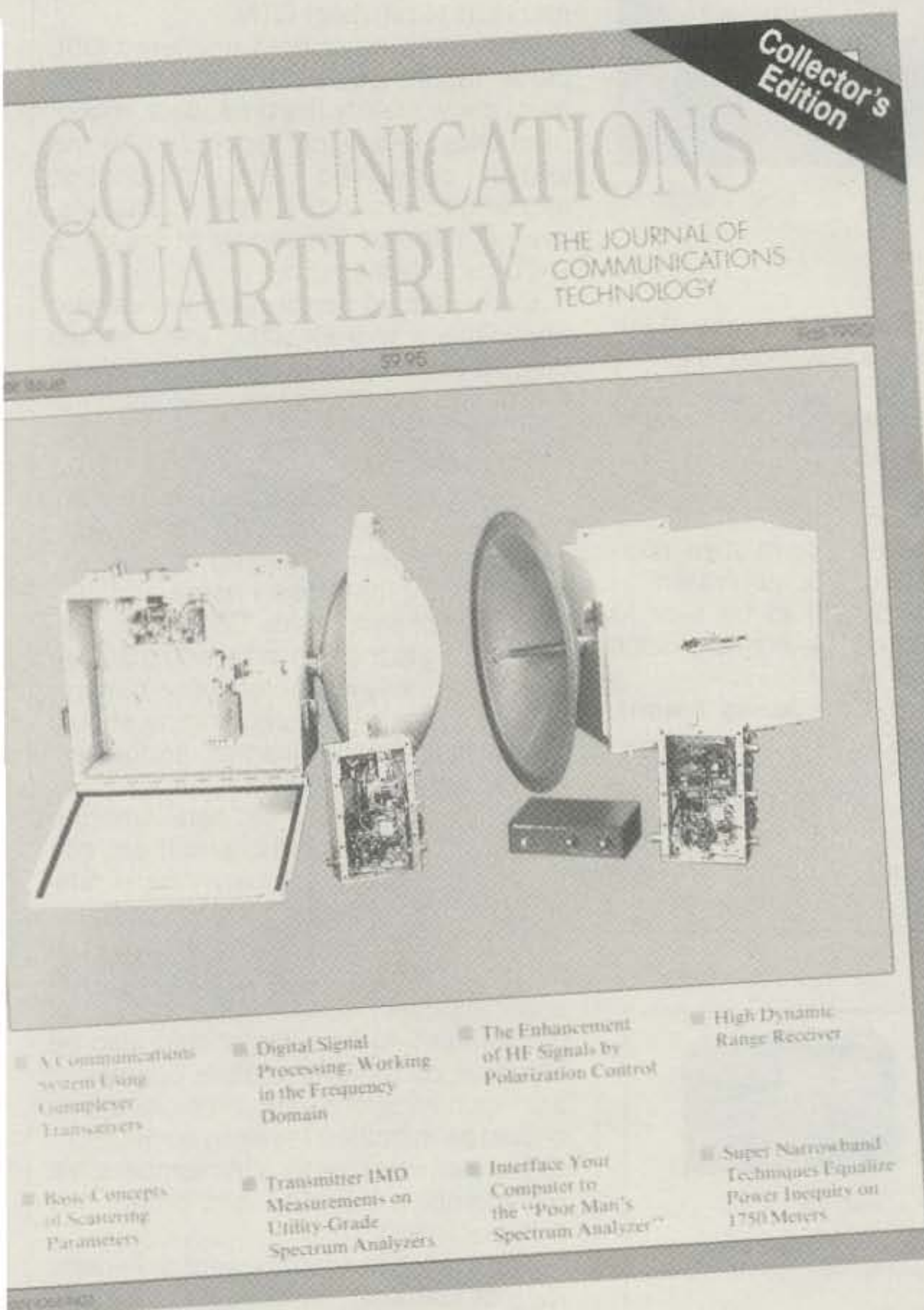
The Florida Keys Amateur Radio Club is sponsoring the Worked All Keys (WAKEY) Award. To earn this prestigious certificate, just work and confirm five different Keys on high frequency (HF) bands or fifteen different Keys on UHF/VHF. Send your QSL cards (or a photocopy of them) to the Florida Keys Amateur Radio



Worked All Keys (WAKEY) Award offered by the Florida Keys Amateur Radio Club.

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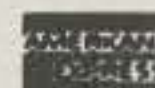
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**COMMUNICATIONS QUARTERLY**

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County Hunters enjoying a convention hosted by Arnie, K9DCJ, and Lorraine, WDX9DCJ, Mt. Horeb, Wisconsin, September, 1990.

Club, P.O. Box 545, Big Pine Key, Florida 33043 USA.

**Panama International Award.** The Panama International award is sponsored by the Panamanian Amateur Radio League. The award is available to all licensed radio amateurs. The rules are as follows:

1. The award will be issued to any amateur who receives QSL cards from at least one HP station in each of the nine (9) different call areas (1, 2, 3, 4, 5, 6, 7, 8, 9) on any band and mode.

2. Up to three (3) call areas may be substituted with any of the official club stations—HP1LR to HP9LR.

3. Contacts after January 1, 1978 are valid.

4. Applicants must send a copy of the log or list of the stations worked to LPR-HP Bureau, P.O. Box 175, Panama 9A.

5. If you are not a member of the radio club, you will have to send the QSL cards, which will be returned.

6. The fee for the Panama International award is US \$3.00 in the form of an International Money Order or equivalent in IRCs (IRC equals \$0.50) to be sent to "Liga Panamena de Radioaficionados Nacional."

**Worked All VK Call Areas Award.** Known as "WAVKCA," this large, colorful certificate is the WIA's most popular award, particularly with overseas amateurs. There are separate requirements for local and overseas amateurs.

Locals require 77 QSOs as follows: VK0, 3 from at least 2 different areas; VK1, 5 on at least 2 different bands; VK2, VK3, VK4, VK5, VK6, VK7, ten each, involving at least 3 different bands; VK8, 5 contacts and 2 bands; VK9, 4 QSOs from at least three areas.

Crossband and mixed-mode contacts are not eligible, nor are those made through terrestrial repeaters, from aircraft or sea-going vessels.

A past rule allowing VK applicants to make repeat contacts with the same station after 24 hours has been rescinded. No repeat contacts made after February 14, 1990 will count.

Overseas amateurs need one QSO with stations in each of VK0, VK1, VK8, and VK9; and three in each of VK2, VK3, VK4, VK5, VK6, and VK7, with no requirements as to bands or QTH.

Applicants must hold unaltered QSL cards for all QSOs claimed and these must show clearly the time, date, mode, frequency, and signal report sent by the station concerned, and its location and/or address at the time. Alterations, even if made by the sender of the card, will disqualify the card.

Cards should not be sent with award applications. In their place, there should be a list of the cards in callsign order with the details set out in the previous paragraph listed in columns.

This list should be accompanied by a declaration signed by an official of a society affiliated with the WIA, or by two licensed amateurs, reading as follows: "I/we certify that (insert name and callsign of applicant) holds QSL cards corresponding to the above list and that I/we have personally inspected these cards."

Signatories of the declaration should clearly indicate their names, addresses, and callsigns.

Applicants should indicate whether they are WIA members, and if so, cite their membership number. Where relevant, changes in callsigns and the dates of such changes should be indicated. If the period of on-air activity covered in the application includes a change of QTH of more than 240 km, this should also be noted. If portable or mobile operations are involved, the station's locations should be indicated for each such QSO.

The award is free to WIA members. VK non-members pay \$A5 and others pay \$US5 or 8 IRCs.

Applications should be sent to Federal Awards Manager, c/o WIA, P.O. Box 300, South Caulfield, VIC. 3162, Australia.

**Heard All VK Call Areas.** This is a "heard only" version of the WAVKCA award, available to SWLs, on the same basis as to amateurs—i.e., confirm reception of 22 stations as specified if overseas, or 77 if resident in VK. The same fees and procedures apply.

See you again next month. 73 & Good Hunting! 73, Dorothy, WB9RCY

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<p><b>RM-A SERIES</b></p> <p><b>MODEL RM-35M</b></p>	<p><b>19" X 5 1/4" RACK MOUNT POWER SUPPLIES</b></p> <table border="1"> <thead> <tr> <th>MODEL</th> <th>Continuous Duty (Amps)</th> <th>ICS* (Amps)</th> <th>Size (IN) H x W x D</th> <th>Shipping Wt. (lbs.)</th> </tr> </thead> <tbody> <tr> <td>RM12A</td> <td>9</td> <td>12</td> <td>5 1/4 x 19 x 8 1/4</td> <td>16</td> </tr> <tr> <td>RM-35A</td> <td>25</td> <td>35</td> <td>5 1/4 x 19 x 12 1/2</td> <td>38</td> </tr> <tr> <td>RM-50A</td> <td>37</td> <td>50</td> <td>5 1/4 x 19 x 12 1/2</td> <td>50</td> </tr> <tr> <td colspan="5">• Separate Volt and Amp Meters</td> </tr> <tr> <td>RM-35 M</td> <td>25</td> <td>35</td> <td>5 1/4 x 19 x 12 1/2</td> <td>38</td> </tr> <tr> <td>RM-50 M</td> <td>37</td> <td>50</td> <td>5 1/4 x 19 x 12 1/2</td> <td>50</td> </tr> </tbody> </table>	MODEL	Continuous Duty (Amps)	ICS* (Amps)	Size (IN) H x W x D	Shipping Wt. (lbs.)	RM12A	9	12	5 1/4 x 19 x 8 1/4	16	RM-35A	25	35	5 1/4 x 19 x 12 1/2	38	RM-50A	37	50	5 1/4 x 19 x 12 1/2	50	• Separate Volt and Amp Meters					RM-35 M	25	35	5 1/4 x 19 x 12 1/2	38	RM-50 M	37	50	5 1/4 x 19 x 12 1/2	50														
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<p><b>RS-M SERIES</b></p> <p><b>MODEL RS-35M</b></p>	<ul style="list-style-type: none"> <li>• Switchable volt and Amp meter</li> <li>RS-12M                      9                      12                      4 1/2 x 8 x 9                      13</li> <li>• Separate volt Amp meters</li> <li>RS-20M                      16                      20                      5 x 9 x 10 1/2                      18</li> <li>RS-35M                      25                      35                      5 x 11 x 11                      27</li> <li>RS-50M                      37                      50                      6 x 13 3/4 x 11                      46</li> </ul>																																																	
<p><b>RS-S SERIES</b></p> <p><b>MODEL RS-12S</b></p>	<ul style="list-style-type: none"> <li>• Built in speaker</li> <li>RS-7S                      5                      7                      4 x 7 1/2 x 10 3/4                      10</li> <li>RS-10S                      7.5                      10                      4 x 7 1/2 x 10 3/4                      12</li> <li>RS-12S                      9                      12                      4 1/2 x 8 x 9                      13</li> <li>RS-20S                      16                      20                      5 x 9 x 10 1/2                      18</li> </ul>																																																	
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\*ICS—Intermittent Communication Service (50% Duty Cycle 5 min. on 5 min. off)

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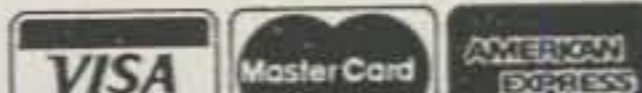
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# OUR READERS SAY

## A Few More Bucks

Editor, CQ:

I am sure that most of us are concerned with the possibility of losing still more frequencies to other factions. I wonder how many of us have taken the time to evaluate the reasons for this loss. Could it be that Uncle Charlie listens to those who help pay his paycheck? If that is the case, then we stand to lose quite a few more frequencies. The next time a proposal is given to collect license fees, don't be so hasty to kill it. There are several hundred thousand of us amateurs here in the USA, and that represents quite a windfall to Uncle Charlie. Don't you think that he would be more willing to listen to the money? You bet he would.

The Old Timers out there can remember when the FCC used to collect license fees from the amateur community, and younger hams, we had one "for real" FCC. More than one ham has had a rather sudden and unpleasant visit from a couple of Uncle Charlie's boys, and his license pulled on the spot.

So the next time you hear some "radio-sickie" giving out some trash-mouthed language on the air, think about what I have said. I am willing to pay for my ticket, if it would mean a more effective FCC. If we can fork out a thousand bucks for a piece of radio gear, then I am certain that we can pay a few more bucks for a license.

Mac Hayes, AA4YJ  
Somerville, AL

## A Clarification

Editor, CQ:

Unfortunately, the letter in CQ, December 1990, from Art Rideout, WA6IPD, contains serious errors with regard to the possible link between electromagnetic radiation and cancer.

(1) The study to which he refers was conducted by Samuel Milham, Jr., MD, MPH, not by Ivan Shulman, MD, WC2S, who wrote the article in QST, October 1989. Dr. Milham is an experienced epidemiologist in the Washington State Dept. of Health Services who is internationally respected for his medical research. His articles in professional journals are "peer reviewed" for accuracy before publication.

(2) The "errors" Rideout lists are, in fact, not errors and had no effect on the results. In Dr. Milham's research, the number of amateurs with certain types of cancer were compared with the rates for the same types of cancer among the U.S. population. This is standard epidemiologic procedure, as the article explains.

(3) Except for one form of leukemia and two forms for lymphoma, the cancer rates among the amateur groups analyzed were either the same as those for the U.S. population, or for some forms of cancer, lower.

Dr. Shulman's careful, accurate article stated that Dr. Milham's data only suggested that a biologic cause and effect was present, that occupational hazards may have influenced results, and that more research is needed. The article's 42 footnotes gave additional data sources, as have hundreds of articles on the same subject.



The operators of radio stations UL8DYL and RL8DWW.

Of particular importance are the 16 prudent preventive measures that Dr. Shulman recommends. One of the most important is the safest position in which to hold handheld transceivers, first recommended by Motorola—vertical, 2-3 inches in front of the mouth, *not against the cheek as many amateurs do*. The VHF and UHF frequencies are more apt to be resonant with the human body.

As Dr. Shulman stated in his article, the experts with whom he communicated said they would not have any hesitation regarding their personal use of currently available amateur equipment provided it was properly installed and operated, and that the recommended precautions were followed.

Stuart D. Cowan, W2LX  
Henniker, NH

## Drop The "T" in RST

Editor, CQ:

The readability, signal, tone (RST) system for CW is becoming outdated. I propose that the tone "T" number be dropped to make CW reports the same as phone or SSB readability, signal (RS) reports. The tone "T" number can be replaced with a ripple "R" suffix. A ripple code letter is compatible with the chirp "C" and click "K" prefixes currently in use.

The tone "T" part of the RST report is rendered obsolete due to the reliability and prevalence of solid-state power supplies. Sixty Hertz ripple is still heard on the bands, but is as infrequent as clicks and chirps.

The rareness of ripple is leading some amateurs to always give a "T" of 9. I have heard CW signals with a tone of 4 given a report of 9. Such reports are evidence that some amateurs make the last number of the RST report an automatic 9 just as an English sentence automatically ends in a period. A ripple "R" suffix that is correctly applied to a signal

could substitute well for a "9" that is sent by habit.

Bryan Lundgren, N8MHZ  
South Haven, MI

## Wanted: Pen Pal

Editor, CQ:

My dad told me about you, and I decided to write you a letter. I want to exchange letters with an American boy. I am 20 years old. My name is Ivan, just as my father. I was born in 1969 in Moscow. I went to school, and after that did my military service. Now I work at the Soviet-Canada joint-venture company, and soon will try to learn in an institute. In my free time I learn English, but only two month (*mid-1990*), and am engaged in sport. I hope to receive a letter. Best wishes . . .

Ivan Kazansky  
G. Panfilovcev Str.  
6-3-427  
123480 Moscow, USSR

## Thanks to KA5YWR

Editor, CQ:

I'm very grateful for your announcement in the magazine, CQ. Thanks to your magazine I could make the acquaintance of a very kind man, captain Henry L. Stewart, KA5YWR, from Louisiana. Now we have new lists of radio amateurs from all over the world. These new books will quicken our steps in QSO exchange of our school's collective radio stations UL8DYL (YL) and RL8DWW (OM). I'm a head of these stations.

Through your popular magazine we want to express our thanks to Mr. Henry Stewart and to his wife, Patti. We wish them to be healthy and wealthy.

Lev Kuznetsov, UL7DA  
Semipalatinsk, U.S.S.R.



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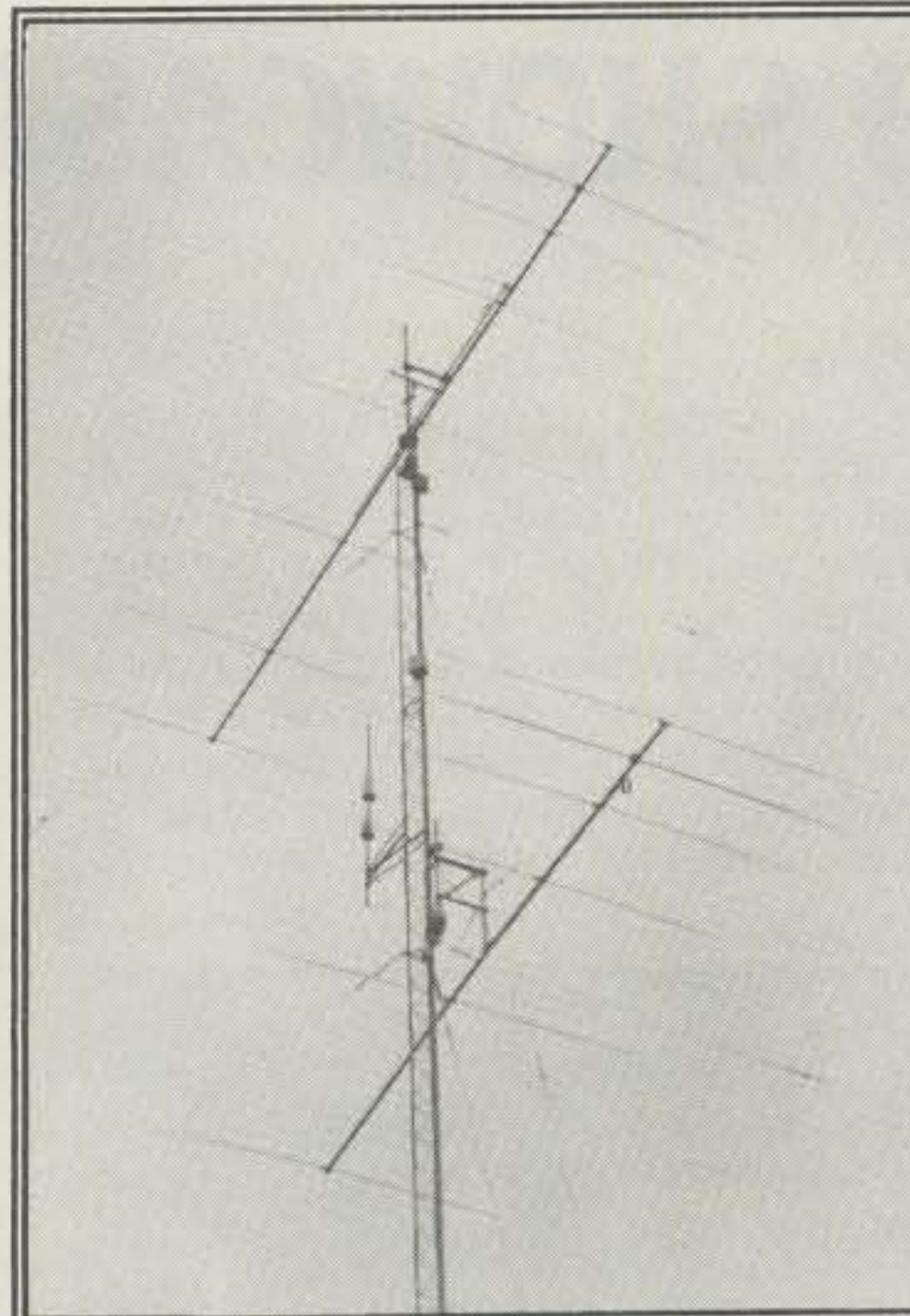
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# CQ SHOWCASE



## Azimuth WeatherStar Master Weather Station

The new Azimuth WeatherStar Master Model ALT6 performs these functions: barometric pressure (inches or mm), altitude, wind speed (MPH/KPH), wind gust record, wind direction (2 and 10 degree increments), daily and yearly rain (0.1 inch increments) with optional self-emptying rain gauge, inside temperature (with alarm), outside temperature (with alarm), min/max temperature record, wind-chill factor, time of day (12/24 hr. with alarm), and programmable scanning of functions. The ALT6 also lets the user set an alarm to warn of excessive wind gusts around antennas and QTH.

The ALT6 can be mounted in an optional stainless desk stand or in a flush mount. It comes with computer, electronic barometer, remote precision wind-direction vane, wind-speed sensor, external temperature sensor (on 25 ft. cable), programmable alarms, mounting hardware, and 40 ft. of cable. The WeatherStar Master ALT6 sells for \$299.95. Optional self-emptying rain gauge RG3 is \$49.95. Several power and mounting options are available. For more information contact Azimuth WeatherStar, 3612-C Alta Vista Ave., Santa Rosa, CA 95409, or circle number 101 on the reader service card.

## Cat Communications Cables

Cat Wire and Cable Corporation has opened a new manufacturing plant for production of electronic wire and cable in Miami, Florida. The 15,000 square foot facility contains equipment for extrusion, cabling, and shielding of cables up to 1.5 inches in diameter. Also in the new plant is a complete quality control and test lab. Cat has begun production of a broad line of communications cables suitable for use in amateur applications plus computer, audio, video, alarm, and general control applications. They will offer UL and CSA approvals on request. Cat also offers extensive engineering assistance in the design of new cable products for specific customer applications. For additional information, contact Cat Wire and Cable Corp., 1139 NW 72nd Street, Miami, Florida 33150, or circle number 102 on the reader service card.

## Austin Antenna's Spectra

Austin's Spectra gives simultaneous four-band mobile performance in a single antenna. Tuned antenna performance covers low-band

VHF, high-band VHF, UHF, and 800 to 1000 MHz. The compact 33 inch length fits all mobile applications. The Spectra is capable of handling 100 watt power levels, and a Quadplexer is available for simultaneous four-band transceiver operation. The Spectra in scanner configuration sells for \$79.95. Land mobile, specifically tuned to the customer's frequency is \$94.50. For more information, contact Austin Antenna, 10 Main Street, Gonic, NH 03839, or circle number 103 on the reader service card.



## Jensen Cable Tie Kit

A Cable Tie Kit in a hip pouch is featured among the new products in Jensen Tools' 1991 Master Catalog. This kit is designed for cabling convenience and hands-free tool portability. It includes a production-quality cable tie tool, a tie cutter, 100 ties (50 large, 50 small), and a durable brown Cordura pouch with slots for each tool plus four compartments to keep ties of different sizes separate and organized. The pouch clips to any belt or waistband.

The kit, including pouch, tools, and ties, is priced at \$115. Replacement parts and other cabling products are also available through the catalog. For more information, or free copy of the Master Catalog, contact Jensen Tools Inc., 7815 S. 46th St., Phoenix, AZ 85044, or circle number 104 on the reader service card.

## "BMKMULTY" for PC Clones By G4BMK

Software for the IBM PC family is now available from England to enable the PC to operate AMTOR, RTTY, and CW with full transceive facilities using a terminal unit or modem such as the ST6 or CP1. The software provides the PC with all the intelligence for each mode. Built in are automatic callsign capture from received text, disk logging and printer options, and comprehensive memory facilities, plus more. In

addition, reception of HF FAX charts and monochrome SSTV pictures is possible using a simple audio interface, or the first "limiter" stage of the ST6.

The software includes the ability to synchronize on any AMTOR FEC text without waiting to hear phasing characters, and both RTTY and CW modes include "autoprint" facilities which prevent rubbish from filling the screen while no signal is heard, but omit no text from the screen once a signal is tuned in. The CW mode can make timed transmissions of repeated text loops at up to 3000 cpm, making the software of interest to meteor scatter enthusiasts. The price of the complete program, comprising 6 modules (including a full-screen tuning aid/audio analyser) is \$209 including post and packing from the UK. For just AMTOR, RTTY, and CW the inclusive price is \$139. For more information or to order the software, write to Grosvenor Software (G4BMK), 2 Beacon Close, Seaford, East Sussex BN25 2JZ England stating your callsign (if any) and 5 1/4 or 3 1/2 inch disk preference.

## Spectrum 1691 MHz Receiving System

Spectrum International is now offering a complete system, including the PC controller, as opposed to only a pre-amplifier and down-converter. The new 1691 MHz design uses a dedicated 1691 MHz receiver. The companion low-noise GaAsFET pre-amplifier has increased gain and better filtering than other systems. Another feature of the new system is the availability of a companion decoder board (IBM-PC VGA compatible, short slot "half-card") and software. The board has two input channels, the second one to receive input from a second (137 MHz) receiver. The board gives VGA 800 x 600 resolution by 256 colors in standard VGA systems and 1024 x 768 by 16 colors (256 colors if your video display board has 1 Mbyte memory) in high-definition video display systems. For more information, contact Spectrum International, Inc., P.O. Box 1084, Concord, MA 01742, or circle number 105 on the reader service card.



## Ameritron AL-811 600 Watt Linear Amplifier

Ameritron has announced the new AL-811 600 watt linear amplifier, which uses three 811A tubes to deliver 600 watts PEP or 500 watts CW from 160-10 meters. (Easy modification instructions for 10/12 meters operation

requires presentation of valid amateur license.) A pi-network tuned input circuit matches the tubes to 50 ohm exciters. A vernier reduction drive on the plate control makes tuning precise and easy, maker says. Dual illuminated meters give a complete picture of operating condition. One meter gives a continuous reading of grid current. A second switchable meter lets you monitor high voltage and plate current. The 811A tubes feature 3 second warm-up time and low replacement cost. An operate/standby switch prevents harmful thermal shock to tube filaments by keeping them lighted while you are operating barefoot. The AL-811 also features a transmit LED. Pressurized ventilation keeps tubes and power-supply components at temperatures that are safely below the manufacturer's ratings, even when operating continuously at 600 watts.

The Ameritron AL-811 weighs 30 pounds. It measures 16" D x 13 3/4" W x 8" H. It runs on 120 volts. The export model (Ameritron AL-811X) runs on 240 volts and covers 10/12 meters. For more information contact Ameritron, 116 Willow Road, Starkville, MS 39759 or circle number 112 on the reader service card.

### Geoclock Version 4.2

Geoclock Version 4.2 is a grayline tool which provides a wide range of full-color, personalized features to help the user work tricky DX band openings. It includes great circle (equidistant azimuthal) map customized for your exact location; over 50 world and regional full color maps, in both rectilinear and polar projections; real-time display of day, twilight (grayline), and night zones, superimposed on all maps; parameterized twilight zone definition; true ephemeris data for accurate results; each map can be annotated with your choice of cities and local times; and operation in non-real time, according to your choice of date/time and update speed. Extensive parameterized options are available to customize Geoclock displays.

A major feature of Geoclock 4.2 is its comprehensive callsign analysis function. The Geoclock package includes free support from an on-line bulletin board system (BBS). The BBS is available for help, and provides regular updates to the callsign database and to new Geoclock releases. Geoclock requires an IBM-compatible PC with at least 512KB RAM, a hard disk, and color EGA, VGA, or SuperVGA display. It is distributed on 5 1/4 inch floppy disks for \$60 (add \$5 for 3.5 inch disks). For more information, contact Geoclock, Dept. CR, P.O. Box 5112, Arlington, VA 22205, or circle number number 107 on the reader service card.

### "Standard" Brand HTs Available in America

By recent agreement with Marantz of Japan, Roger Wayman, W9TYT, has announced the formation of Standard Amateur Radio Products, Inc. The newly formed company will be the exclusive distributor of Standard amateur radio products in North America. Seven years ago Marantz introduced a new line of VHF and UHF hand held transceivers in Japan. Several years ago the same products were introduced in Europe. Standard Amateur Radio Products will be introducing its line of hand-held transceivers and accessories and twin-band mobile transceivers soon. Inquiries from major amateur radio dealers are invited. Contact: Roger



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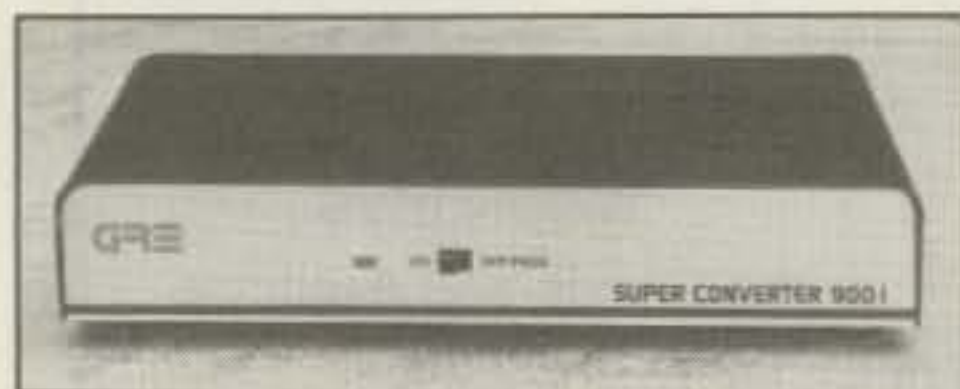
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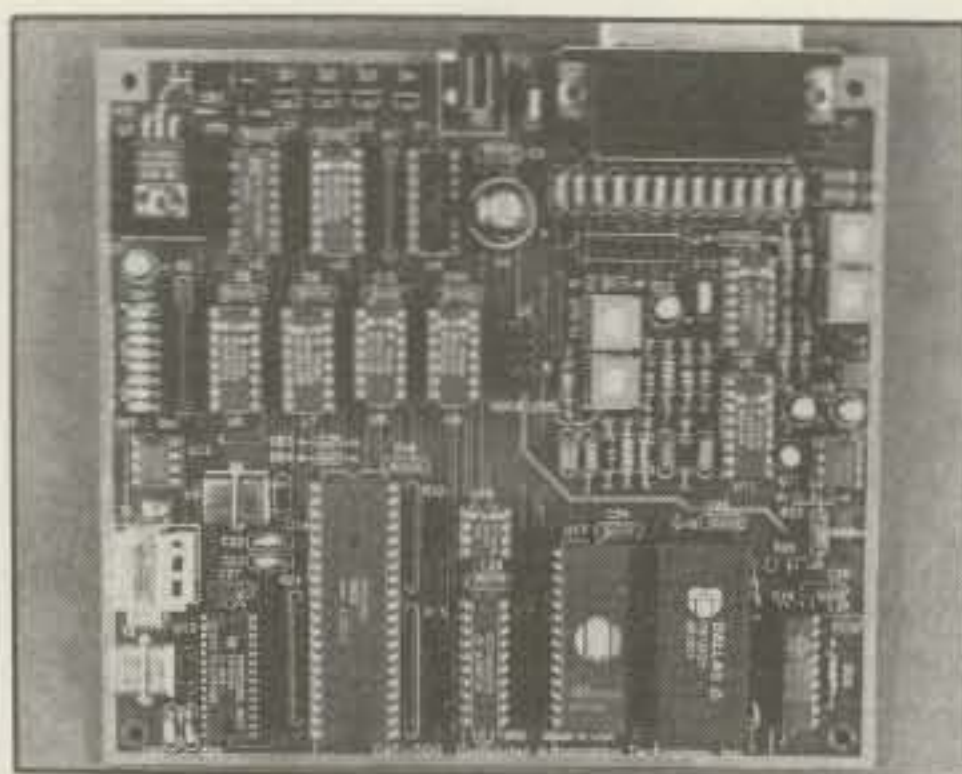
Wayman, W9TYT, Standard Amateur Radio Products, Inc., P.O. Box 48480, Niles, IL 60648, phone (312) 763-0081, FAX (312) 763-3377.



## GRE Scanning Products

GRE America, Inc., the North American arm of General Research of Electronics of Japan, has announced the introduction of two new scanner accessory products, the Super Converter 9001 and the Super Amplifier 3001. The super Converter 9001 is designed for base model scanners and functions by converting 810 MHz to 950 MHz down to the 410 MHz to 550 MHz band. Users must currently receive 410 MHz to 550 MHz for the Super Converter to operate correctly. Users who receive the lower band will experience no frequency blocks in the 810 MHz to 950 MHz band. The Super Converter 9001 uses a 9 volt battery and has BNC input/output connectors. The product also features an On/Pass switch to enable the user to return quickly to the lower scanning frequencies. The Super Converter 9001 includes a 12 inch BNC-to-Motorola type adapter cable.

GRE's Super Amplifier 3001 is an adjustable 20 dB preamplifier designed to help pull in weak signals from 100 MHz to 1 GHz. The Super Amplifier operates with all base model scanners, uses a 9 volt battery, comes with BNC input/output connectors, an On/Pass switch, and includes a 12 inch BNC-to-Motorola type adapter cable. For more information, contact GRE America, Inc., 425 Harbor Blvd., Belmont, CA 94002, or circle number 112 on the reader service card.



## Computer Automation Tech. CAT-500 Repeater Controller

Fully automatic, the CAT-500 Repeater controller is a 60 position scheduler that controls every facet of your repeater's operation. The voice synthesizer IDs your repeater, announces the time, and interacts with you during control and programming operations. Select from

over 300 words chosen for amateur repeater operation. Customize your ID, squelch tail, transmitter drop, and site alarm messages. The grandfather clock feature will announce the time on the hour. An auxiliary input supports a second repeater, control receiver, or serial-tuned link transceiver. The scheduler automatically selects from eight preset frequencies any time you choose. Three remote switches control accessory equipment at your repeater site. Additional features include: DTMF muting and repeater access, keypad test, single or dual courtesy beeps, and a CTCSS tone squelch input. Autopatch and phone-line controlling/programming software is also included.

The CAT-500 is priced at \$329. Contact Computer Automation Technology Inc., 4631 N.W. 31st. Ave., Suite 142, Ft. Lauderdale, FL 33309 or circle number 111 on the reader service card.

## Tube Price List From Richardson

Richardson Electronics has issued its new price list for communications products. Available for both dealers and end users, the price list features part number listings and prices for electron tubes, cathode ray tubes, receiving tubes, camera tubes, 12 volt relays, and more. In the U.S. call (800) 348-5580 to request Richardson's Communications Price List. Canadian inquiries may call (800) 387-2280. International inquiries should contact corporate headquarters: 40W267 Keslinger Road, LaFox, IL 60147 U.S.A. (708) 208-2200; FAX (708) 208-2550; Telex: 283461.

## Pasternack Enterprises 1991 Catalog

Catalog 1991 from Pasternack Enterprises features a complete line of amplifiers, molded breakouts, coaxial cable, coaxial switches, cutting tools, stripping tools, coaxial connectors, coaxial adapters, coaxial detectors, coaxial attenuators, coaxial terminations, patch cords, programmable attenuators, push-button attenuators, coaxial cable assemblies, waveguide adapters, twinaxial adapters, and connectors. In addition, Catalog 1991 contains many new cable assemblies that utilize 3.5 mm, 7 mm, HN, N, SMA, SMB, SMC, BNC, TNC, UHF, SC, SHV, and MHV connectors. Pricing on more than 2,500 standard catalog items as well as technical information is included.

For additional information, contact Pasternack Enterprises, P.O. Box 16759, Irvine, CA 92713-6759, or circle number 109 on the reader service card.

## CW Keyboard Program From Electrosoft

Electrosoft has introduced a CW Keyboard Program and interface kit for IBM compatible computers having a serial port running on MS-DOS. The program and kit provide an alternative to using a keyer if a computer is already in the shack. The program was designed using assembly language. A help key displays all commands on the screen instantly any time help is needed. The speed maybe adjusted

from 5 to 100 words per minute and the dot/dash ratio from 21% to 45%. Messages may be temporarily stored in any one of ten 200 character buffers or may be permanently stored on disk. A repeat function will repeat CQs or beacon messages indefinitely. For contesters, the automatic serial number can be incremented or decremented and inserted into a message. A CW side tone may be turned off or on as needed. The split screen display shows messages as they are typed in the lower window and messages as they are sent in the upper window. A status line at the top of the upper window displays the code speed, dot/dash ratio, transmit/receive status, communication port, tune indication, CW side tone, and serial number. Another status line at the bottom of the lower window displays the number of characters in the transmit buffer and the number of characters in each of the ten user buffers.

The interface kit is easy to build and usually requires about one hour to complete. The circuit board is 1 7/8 inches wide by 2 7/8 inches long and is small enough to be mounted in the computer or transmitter. The circuit is designed to key any transmitter regardless of keying voltage. Program and interface kit are \$50; program only \$25. Specify disk size 5.25 or 3.5 inch. For more information, contact Electrosoft, P.O. Box 1462, Loveland, CO 80539, or circle number 113 on the reader service card.



## Kenwood TS-850S Transceiver

The Kenwood TS-850S transceiver features Digital Signal Processing (DSP) in both transmit and receive modes (with the optional DSP-100). The intermodulation dynamic range is 108 dB throughout the entire 100 kHz to 30 MHz range. The TS-850S also includes 10 Hz step dual VFOs, multi-mode scanning, full and semi break-in CW, interference reduction, keyer, dual noise blanker, 100 memory channels, and RIT/XIT. Microphone is supplied.

Options include the DSP-100, AT-300 160-10 meter external antenna tuner, AT-850 160-10 internal antenna tuner, DRU-2 digital recording unit, and more. The TS-850S is the newest HF transceiver from Kenwood. For more information, contact Kenwood USA Corp., 2201 E. Dominguez St., Long Beach, CA 90801-5745.

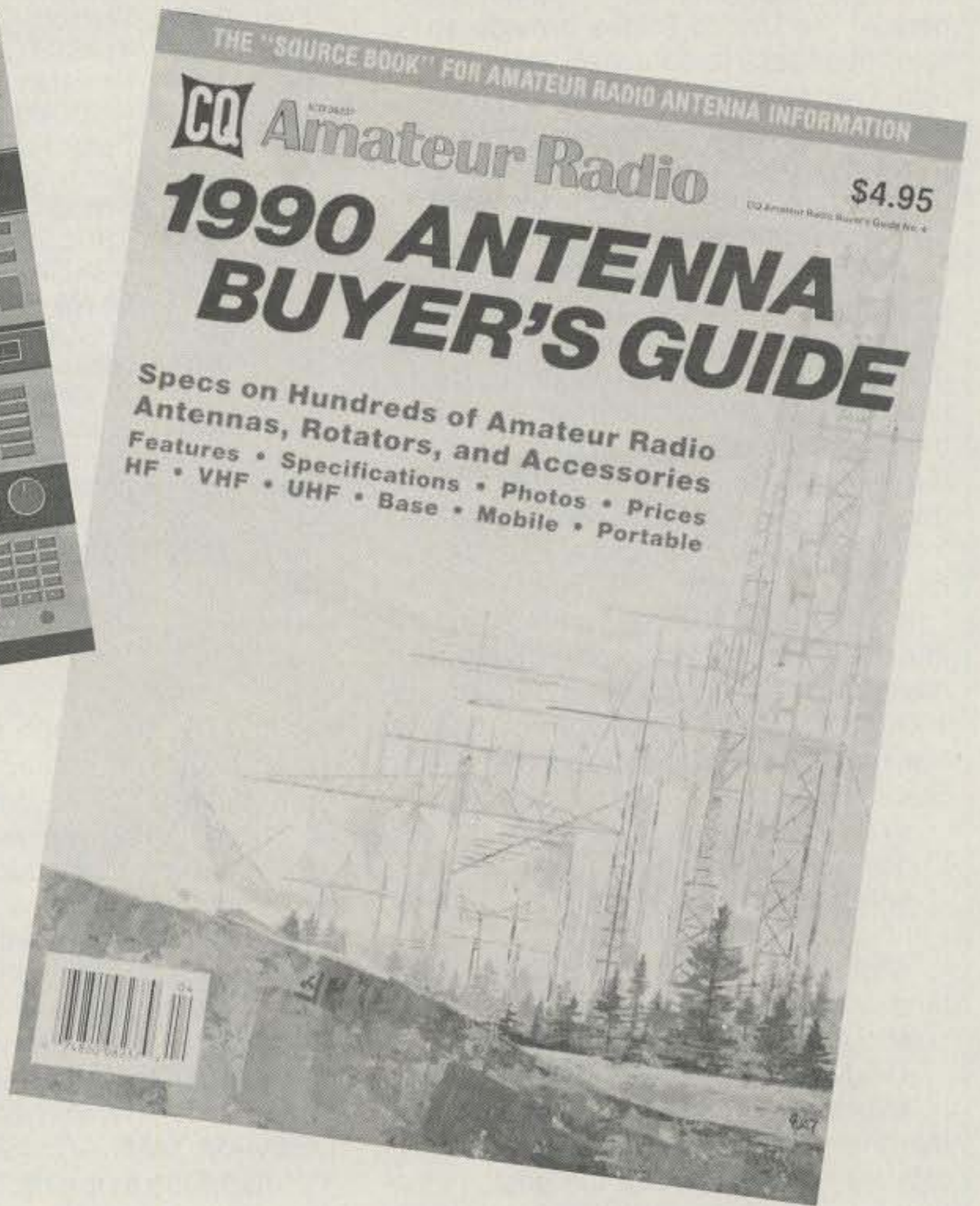
## Tiare Publications Catalog

Tiare's new catalog features a wide variety of books and other items suited for an SWL, ham operator, scanner fan, or CB enthusiast. New books from Tiare include *Coast Guard Radio*, *The Warship Directory*, and the *Radio Communications Software Directory*. For more information, contact Tiare Publications, P.O. Box 493, Lake Geneva, WI 53147 or circle number 114 on the reader service card.



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## NEWS/VIEWS OF ON-THE-AIR COMPETITION

### *The Packet Radio Revolution And The 1990 CQ WW SSB Contest*

**A**s Chod Harris, VP2ML, reported in his *CQ* magazine DX column a few months back, packet radio has had a profound influence on DXing and contesting. Once a novelty, its use has become a strategic necessity as virtually all corners of the United States provide some form of access to a PacketCluster™ system. Overseas use is flourishing as well. For example, as an impressive network is now supporting most of central Europe.

In today's contest climate we now talk about packet pile-ups. In fact, it has become a strategic disadvantage to "spot" a needed multiplier before working it yourself due to the imminent arrival of dozens of local stations responding to the beep on their terminals. If you have ever been on the receiving end of a packet radio pile-up, the instantaneous appearance of large clusters of representatives from various contest clubs is extraordinary.

In an attempt to better understand the impact of packet radio on contesting, I have collected DX spotting data for the 1990 CQ WW SSB Contest from many of the major networks around the United States. In summary they include:

- Yankee Clipper Contest Club (New England, New York)
- Frankford Radio Club (New Jersey, Pennsylvania, Delaware)
- Potomac Valley Radio Club (Maryland, Virginia)
- Southern USA (W4 call area)
- Midwest (W9, eastern W0 call areas)
- Northern California Contest Club (Northern California, Nevada)

After reviewing all of the data, I must admit I wasn't too surprised by the results. For the most part everyone seems to find the good DX multipliers eventually, albeit some groups sooner than others. The east coast focuses on hard-to-work Asian/Pacific stations, while the west coast will post an occasional German on 20 meters. Nonetheless, the impact is striking when you review the overall packet CQ WW scores by area or in total.

The analysis begins with breakdowns of each cluster and scoring according to CQ WW rules (see figs. 1 and 2). You

#### Calendar of Events

Jan.	25-27	<b>CQ WW 160 Meter CW Contest</b>
Jan.	26-27	YL-ISSB CW Contest
Jan.	26-27	UBA SSB Contest
Jn.26	Feb.3	ARRL Novice Roundup
Feb.	2-3	Vermont QSO Party
Feb.	2-3	YL-ISSB CW QSO Party
Feb.	2-4	New Hampshire QSO Party
Feb.	3	North American CW Sprint
Feb.	9-10	Dutch PACC Contest
Feb.	10	North American SSB Sprint
Feb.	11-15	School Club Roundup
Feb.	16-17	ARRL DX CW Contest
Feb.	23-24	UBA CW Contest
Feb.	22-24	<b>CQ WW 160 Meter SSB Contest</b>
Mar.	2-3	ARRL DX SSB Contest
Mar.	8-10	Japan Int'l CW DX Contest
Mar.	9-10	YL-ISSB SSB QSO Party
Mar.	10-11	Wisconsin QSO Party
Mar.	16-17	Bermuda Contest
Mar.	30-31	<b>CQ WW WPX SSB Contest</b>
Apr.	27-28	Swiss Helvetia Contest
May	25-26	<b>CQ WW WPX CW Contest</b>
Jun.	8-10	ARRL June VHF QSO Party

should note that each score has some measure of "bad spots." These originate from typographical errors to outright poor copying of the reported station's callsign. A growing source of error in today's submitted logs is competitors logging callsigns from their packet screens without actually taking the time to listen to the DX station's callsign first hand. Some examples I noted were (busted call/correct call): 4U1UN/4U45UN, 5B4ES/5B30ES, BY4WN/BY4WNG, OH0MAN/OH0MAM, YM4KA/YM5KA, and YV5JPD/YV5JDP. Due to the fact that many packet spots are needed multipliers that possess high score contribution, it's essential that we take the time to get it right ourselves and not depend on the "system" to do it for us.

I've always wondered what it would be like to operate a contest by working only DX packet spots. By reviewing fig. 3, you will see that there are times when you would be a busy person indeed. The YCCC network, for example, exceeded a 40 spots/hour rate 8 times (that's a net number after removing duplicate spots)!

In the world of spotting, there are those who give and those who receive. Figs. 4 and 5 clearly demonstrate that fact. For

the most part, the multi-operator stations dominate the top spotting honors led by W3LPL with nearly 300 DX spots (over 13% of the total cluster volume). On the receiving end, 5W1JJ seemed to catch the fingers of many spotters by an overwhelming majority with a 36% lead over PJ1B.

The details of fig. 6 just begin to tell the story of packet radio spotting's influence as over 800 users logged into just 6 of the many PacketCluster networks around the U.S. during the CQ WW 1990 SSB Contest. I'm sure that a worldwide profile would yield user populations in the thousands. In any event, there were over 15,408 DX spots generated that weekend on just those 6 networks! To give you a different perspective, K1EA converted each of the DX spot files into a combined .BIN file for my use in this analysis. It takes over 7 minutes for my PC-286 to load the file into CT! Congratulations to the Frankford Radio Club for the highest efficiency ratio on their network, beating the second-place W9/0 group by over 38% in DX spots/users.

Finally, as I poured over megabytes of data, I wondered when different clusters were finding DX as it showed up on different bands. To keep the comparison on relatively even terms, I tried to compare examples where there would be limited geographical advantages. In fig. 7 you will note that out of 15 random DX callsigns, there was only one example where a PacketCluster network did not spot the station at any time during the weekend on that band. Although I did not have the time to perform a "uniques" analysis on my data, I suspect that valid unique spotted callsigns would be very low for any given network.

The most interesting aspect of fig. 7 was the occasional example of multiple networks finding a DX station at nearly the same time. For example, 5 networks found FS/KC1F within a 25 minute period and 3 networks within only a 4 minute span. Now you are aware of at least one source of contesting's monster pileups.

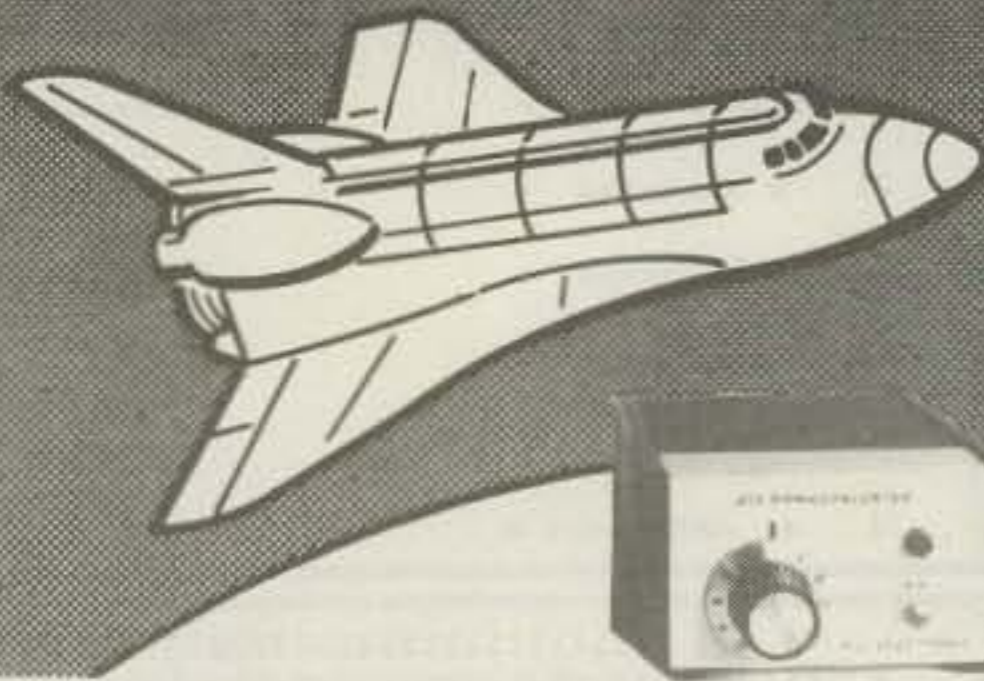
#### Closing Remarks

I want to close this month by thanking Ken, K1EA, for his assistance in helping

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Hour	YCCC	FRC	Atlanta	NCN	Wis	PVRC
00	104	66	78	73	84	90
01	52	51	54	58	56	32
02	48	41	67	35	46	46
03	38	44	36	21	52	42
04	62	39	37	37	54	43
05	43	37	32	51	62	32
06	37	23	12	30	25	22
07	34	13	17	36	11	22
08	19	24	10	25	6	11
09	16	29	5	15	5	27
10	37	25	25	12	7	15
11	39	26	33	14	28	49
12	51	36	51	3	67	53
13	54	28	55	12	80	33
14	52	27	37	26	55	32
15	28	33	20	35	41	25
16	18	17	24	43	26	12
17	33	11	16	30	11	9
18	31	24	34	24	26	23
19	31	21	22	35	16	28
20	24	27	21	17	31	31
21	17	17	12	15	19	16
22	16	19	14	13	19	14
23	12	29	24	19	37	27
00	24	23	31	25	32	12
01	31	19	19	22	35	20
02	24	27	36	26	25	24
03	25	21	27	20	29	12
04	20	18	24	15	22	17
05	12	10	12	17	32	21
06	11	19	6	14	13	12
07	12	12	8	7	10	8
08	8	12	5	1	9	13
09	14	13	10	11	4	19
10	7	10	3	6	5	14
11	14	9	20	8	5	19
12	21	13	17	12	10	16
13	18	6	18	5	8	27
14	13	22	25	16	15	12
15	23	6	12	36	19	6
16	15	7	20	24	40	7
17	12	7	5	25	11	10
18	18	17	13	13	19	20
19	17	10	6	18	19	12
20	28	9	16	24	21	16
21	16	8	15	9	13	33
22	18	12	21	9	21	33
23	16	13	19	10	21	17
TOT.	1313	1030	1124	1052	1302	1134

Fig. 3- Net spotting rates/hours by area.

Callsign	Number of Spots	% Local Cluster Spots
W3LPL	298	13.3%
N4VZ	284	11.3%
AA4LU	282	11.2%
N3RR	278	12.4%
AA1K	243	12.0%
K2TR	219	7.1%
NI4M	206	8.2%
W4MGN	206	8.2%
KY1H	177	5.7%
N3RS	158	7.8%

Fig. 4- Packet radio spotting giants.



Call sign	Number of Times Spotted
5W1JJ	261
PJ1B	192
KH0AM	183
PJ9W	178
CY9CF	149
J37DX	134
AH3C	134
CN0A	131
D68GA	128
HC8A	127

Fig. 5- Some DX stations get all the spots!

me produce the data in this month's column. Next month I'll be featuring the subject "Contesting's Grand Ole Clubs" as we take a trip through the history of the Potomac Valley and Frankford Radio Contest Clubs. And as always, there may be a few surprises as well.

The deadline for the May 1991 Contest Calendar is March 1st. Please don't forget, so I can avoid accidental calendar omissions.

### At Presstime . . .

Contesting lost one of its greatest enthusiasts on December 2, 1990 when George Romyantsev, UA1DZ, died at home from a sudden heart attack. George, 53, was best known as the current Champion of Radiosport in the Soviet Union, which is their highest honor bestowed upon radio amateurs. George held this distinction for a number of years and was revered by contesters around the world.

This past July George was one of the Soviet team members at the World Radio Team Championship (WRTC) in Seattle. His presence was inspiring to all those who had the chance to meet him.

George had particular notoriety for his unique antenna farm, which consisted of a broadband, multi-element phased array made entirely from wires. The antenna was switchable every 15 degrees, and a smaller model was being developed for use in future Soviet Radio Championships. At the time of his death, George was heavily involved in opening Soviet Radio Championships to worldwide participants, mirroring events at the WRTC in Seattle.

Even on his last day, George logged several QSOs, including his final contact with UM0MO. The contributions to contesting made by UA1DZ have been immeasurable, and he will be sorely missed by Soviet hams and contesters around the world. May he rest in peace.

73, John, K1AR

### Vermont QSO Party

0001Z Sat. to 2400Z Sun., Feb. 2-3

The Vermont QSO Party is sponsored by the Central Vermont Amateur Radio Club and offers a great opportunity to snag this rare state.

**Exchange:** RS(T) and QTH. County for VT stations (2-letter designators); state, province, or country for others.

**Scoring:** All stations credit 1 point/SSB QSO, 2 points/CW or RTTY QSO. VT stations multiply QSO points by number of VT counties, states, provinces, and DXCC countries. Others simply use counties. Twenty (20) bonus points may be added to your final score for working the W1BD club station on each band and mode. A station may be worked three times on each band (SSB/CW/RTTY).

**Final Score:** Final score is calculated by multiplying QSO points times total multiplier and adding bonus points.

**Frequencies:** CW—3540, 3720, 7040, 7120, 14040, 21040, 28040; RTTY 3620, and 90 kHz from lower band edge; SSB—25 kHz up from lower edge of General and 10 meter Novice band, 50110, 144200.

**Awards:** Certificates will be awarded to the highest scorer in each state, VE province, and DXCC country. All Vermont participants will receive awards. Other special awards are available including a plaque to the highest scoring VT station. W/VT award is available for those working 13 of 14 Vermont counties.

Logs must be received by March 1, 1991. Be sure to include an SASE for final results. Send logs and comments to: D. Loverin, WA1PDN, 50 Liberty Street, Montpelier, VT 05602.

### North American "Sprint"

CW: Feb. 3 SSB: Feb. 10  
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).

Cluster Name	Total # Users in CQ WW Weekend	Total # DX Spots (inc. dupes)	DX Spot to User Ratio
YCCC	184	3084	16.8
FRC	64	2023	31.6
Atlanta	161	2517	15.6
No. Calif./Nevada	136	2232	16.4
Wisconsin	145	3312	22.8
PVRC	128	2240	17.5
Totals	818	15408	18.8

Fig. 6- PacketCluster user population.

Station	Spotted Band	YCCC	FRC	Atlanta	NCN	Wis	PVRC
5W1JJ	10M	0032-1	0008-1	0050-1	0140-1	0153-1	0012-1
7Z1AB	15M	0401-1	0405-1	0759-1	1503-1	1407-1	1353-1
9J2FR	10M	1121-1	1119-1	1134-1	1954-1	1229-1	1411-1
AH3C	40M	0940-1	0932-1	0931-1	1153-1	0945-1	0939-1
BY4SZ	10M	0020-1	2310-2	0039-1	0001-1	0019-1	2306-2
C9QL	20M	0519-2	0428-1	0345-1	0402-1	0347-1	0455-2
D68GA	15M	0004-1	0428-1	0419-1	0402-1	0347-1	0455-1
FS/KC1F	40M	0728-1	1025-1	0745-1	0727-1	0730-1	0753-1
KH0AM	40M	1120-1	1134-1	0946-1	0752-1	0837-1	0840-1
PJ9W	160M	0009-1	0507-1	0145-1	0511-1	0005-1	0033-1
T77C	10M	1328-1	1413-1	1244-1	1529-1	1356-1	1541-1
TZ6VV	10M	1312-1	1808-1	1318-1	1718-1	1308-1	2039-1
V73AZ	15M	0129-2	0151-2	0126-2	0444-1	0143-2	-----
VQ9CQ	20M	1132-1	1216-1	1130-1	2210-1	1121-1	1124-1
YM5KA	20M	0133-1	0031-1	0434-2	0037-1	0145-1	0417-1

Fig. 7- Now we know who finds the good spots first (example: 0345-1 = 0345Z on day 1 of the contest).

**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. Pre-contest 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, Rt. 1, Box 99, Thrall, TX 76578.

SSB go to: Rick Niswander, K7GM, Box 2857, College Str., TX 77841.

### Dutch "PACC" Contest

1200Z Sat. to 1200Z Sun., Feb. 9-10

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 12th to: PACC Contest, Att: F. Th. Oosthoek, PA0INA, P.O. Box 499, 4600 AL Bergen op Zoom, The Netherlands.

### School Club Roundup

1300Z Mon. to 0100Z Fri., Feb. 11-15

The School Club Roundup (formerly Operation SEARCH) is sponsored by the Council for the Advancement of Amateur Radio in the New York City Schools and the ARRL. The object of the event is to exchange QSO information between amateurs, especially school radio club stations.

**Operating Period:** 1300-0100Z, Monday-Friday. Operation is limited to 24 of the 60 total hours. Logs must clearly indicate on/off times. Off times must be at least 30 minutes.

**Exchange:** Your callsign, RS(T), station class (individual, club, school), and U.S. State/DXCC Country.

**Classes:** Individual/single operator (non-club), club or group (non-school), school club/group (grades K-12).

**Scoring:** Stations may be contacted once on each mode. Count SSB QSOs for one point; CW for 2 points. Final score is total QSOs times multiplier. Multipliers are defined as U.S. States plus DX countries. Multiply club QSOs by 2 and school stations by 5.

**Awards:** Certificates will be awarded to the top three entries in each class. A special certificate is available to anyone working 10 or more school club stations.

The mailing deadline is March 19, 1991. Logs should be sent to School Club Roundup, Lew Malchick, N2RQ, Brooklyn Technical High School, 29 Fort Greene Place, Brooklyn, NY 11217. Be sure to include a large SASE or sufficient IRCs for complete results.

### ARRL International DX Contest

CW: Feb. 16-17 Phone: March 2-3  
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 one and two transmitter stations must remain on a band at least 10 minutes once a contact is made. Multi-transmitter stations no limit, but only one signal per band.

**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 5 1/4 " 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 4th, 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. 22-24

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.)

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CIRCLE 43 ON READER SERVICE CARD 93

## REGULATORY HAPPENINGS FROM THE WORLD OF AMATEUR RADIO

### *The Road To No-Code*

**E**xactly two years ago our "Washington Readout" column was entitled "Entry into the Amateur Radio Service—Is It Time For A Change?" We told how licensing came to the Amateur Service as a result of the Radio Act of 1912. Up until that time amateur operators could use any frequency they wanted. There were no regulations to the contrary! Bedlam resulted, and the commercial station entered into many battles with the amateur operator.

The purpose of the Alexander Bill was to eradicate private, meaning amateur radio. Amateurs were simply herded to all spectrum above 1500 kHz. The choice lower frequencies became the domain of the commercial station, since it was thought all frequencies above 200 meters were useless for communications purposes. Little did they know!

In 1912 the Titanic's Radio Operator, Jack Phillips, tapped out CQD, the international distress call, and later for the first time SOS, after it collided with an iceberg in the North Atlantic. While over 1500 lives were lost, wireless did save the lives of 712 persons as nearby liners sped to their aid. Back in those days the primary means of wireless communication was by Morse code signaling so it became a licensing requirement, as well it should.

Today, with communications technology bearing little resemblance to that of yesteryear, little has changed with respect to how we become an amateur radio operator. We still do it the old-fashioned way—by first learning the code. We have now reached the point whereby retaining the telegraphy examination requirement is doing more harm than good to our nation—and to the Amateur Radio Service.

Ham radio is an worldwide radio service. Since radio waves do not respect international borders, amateur radio "reservations" exist in nearly every country in the world. I say *reservations* because our plight is similar to that of the native American Indian. They too were herded into sanctuaries as need for their land unfolded. Spectrum, like land, is a limited natur-

al resource in great demand. If you don't use it all, you lose it, and those who need it get it. It is that simple.

The United States is perhaps the last nation in the world to require all of its amateur operators to be code proficient! One by one nations have eliminated the code testing requirement for VHF and higher frequency amateur operation. Canada just went "code-free" this past fall!

#### **Amateur Radio in the US**

A coalition of amateurs and other interested individuals decided two years ago it was time to bring the entry level amateur radio requirements more in line with the technology, interests, and operating habits of today. The primary concern was that the average US amateur radio operator now approached age 50 and growth in the service was stagnating. And this was at a time when the privileges for beginners had been recently expanded.

The objective of "Novice Enhancement" was to bring in new blood to the Amateur Service. It didn't work, even though there were more examination opportunities than ever before. As a result, two megaHertz of our incredibly valuable frequencies was reallocated to the commercial service. Our spectrum "reservation"—our most valuable asset—was once again shrinking.

There is a close parallel between the 1955 loss of the 11 meter amateur band to the Citizens Radio Service and the 220-222 MHz reallocation to narrow-band Land Mobile interests. Both were shared bands; both were reassigned to business interests when the government believed the frequencies could be better used by others. Of the more than 100 MHz of spectrum the Amateur Service utilizes between 50 MHz and 24 gigaHertz, only a scant 8 megaHertz can not be reallocated—at least not until 1992, when the next general World Administrative Radio Conference takes place in Spain.

The 6 meter and 2 meter bands are the only VHF/UHF bands that are ITU allocated worldwide as "amateur exclusive." All other ham spectrum above 220 MHz is shared with other services. These are all prime satellite, repeater, and short-range communications frequencies, and you can be certain that well-funded invasions of our real estate will continue.

#### **Morse Code Signs Off At Sea**

The Cairo WARC-1938 agreed to require Morse telegraphy skills for all stations operating in the amateur service. The Atlantic City WARC-1947 allowed administrations "... to waive this requirement in the case of stations making use exclusively above 1000 Mc/s [MHz]" Geneva WARC-1959 kept this same wording but reduced the frequency above which the Morse code requirement may be waived to 144 MHz.

The last General WARC (Geneva 1979) further reduced the cutoff point to 30 MHz, where it stands today. It is entirely possible that the code prerequisite could be totally abolished at WARC '92 as a requirement for any Amateur Radio Service operation, and there is an international movement underway right now toward that end.

The last commercial Morse stronghold, the Maritime Radio Service, will shortly no longer require any code proficiency at all. The International Maritime Organization (which controls 97% of the world's shipping) has agreed to implement an automatic satellite-based emergency plan called the Global Maritime Distress and Safety System in the early 1990s.

The gallant radio operator sending off Morse distress calls as the ship slowly sinks will thus become a memento of a bygone era. WARC '92 is scheduled to consider totally dispensing with shipboard radio officers—even to repair radio equipment. Airborne radio operators became obsolete in the 1950s. It appears the shipboard radio officer will shortly follow.

The bottom line is that it is also time to move on to high-tech amateur radio. Ham radio is the only internationally recognized electronic hobby, and its entry requirements must be updated to reflect the technology changes that are taking place.

#### **Letter Sent To Amateurs, Groups, Industry**

Now in private communications law practice, Ray Kowalski was an FCC official in the Private Radio Bureau for nearly two decades. We wrote to him in the fall of

National Volunteer Examiner Coordinator,  
P.O. Box 565101, Dallas, TX 75356-5101

1988 seeking information on what he thought it would take to get the requirements changed for entry into the Amateur Radio Service at the VHF and higher frequency level to reflect current technology and operation. He wrote us a four-page letter.

We sent his response to various prominent amateurs, hobby radio groups, and members of the amateur radio industry along with a cover letter to ascertain whether it was felt the time was appropriate to consider wider use of our valuable frequencies.

I said, "I believe our nation, as well as our hobby, would benefit if we had more participation—particularly by our nation's youth—in the world's greatest educational pastime." I asked for the views of the recipient, and whether they would lend their organizational and financial support to an all-out professionally orchestrated effort for a codeless entry-level license. The reaction was immediate—and positive. We also received pledges of financial support.

On December 2, 1988 Ray Kowalski made a formal presentation to the FCC Bureau on our behalf. He filed the following report on his presentation to Ralph Haller, N4RH, Chief of the Private Radio Bureau, with us afterward.

*The Objective:* Growth of the Amateur Radio Service as a number one priority for the next decade.

*The Premise:* That the population of amateur radio licensees has not grown significantly, despite measures such as convenience of examination opportunities and voice privileges for entry level licensees.

*Argument:* That unless the Amateur Radio Service attracts new licensees from all walks of life, but especially the young, the Service will shrivel to a mere remnant of its present scope in the face of continuing pressure for spectrum from all sides.

*The Evidence:* General Docket 87-14, the loss of operating privileges in 2 MHz of the 220-225 MHz band.

*Proposal:* To amend §Part 97 of the Commission's rules to create an operator license structure, modeled after that which has been developed in Canada, which is more in tune with the modern use of manufactured equipment to transmit an unlimited variety of telecommunication modes.

*Constraints:* That no presently licensed U.S. amateur should lose operating privileges and that new licensees should be integrated into the mainstream, to preserve courtesy and good operating practices.

*Observation:* The present license structure is exactly the reverse of what it should be: Instead of drawing in vast numbers of technically inclined enthusiasts and letting them follow their inter-

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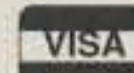
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ests to those aspects of amateur radio that most attract them, the Service forces prospective licensees through the tiniest of filters and only then offers them the vast opportunities to be found in the Service.

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## ARRL Loosens Up On No-Code Hamming

The week after the Kowalski presentation was made to the FCC, the Executive Committee of the American Radio Relay League, meeting in Baltimore, directed the ARRL president appoint a six-member committee to explore the implications of a no-code license and make recommendations to the League's Board. The committee would be drawn from the amateur radio industry and community at large.

The effort toward code-free entry into the U.S. Amateur Service took on renewed significance when ARRL Executive Vice President Dave Sumner, K1ZZ, and President Larry Price, W4RA, asked in their January 1989 "It Seems to Us" QST editorial, "Should basic Morse code ability be a requisite for each and every radio amateur, irrespective of their interests? Do Morse requirements separate the sheep from the goats, or do they simply let in fewer of each?"

While the ARRL's No-Code Study Committee originally was to consist of six members, it eventually swelled to nine. Initially selected were two members each from the League, the amateur industry, and the amateur community. They were George S. Wilson, W4OYI (League VP, Chairman); Rod Stafford, KB6ZV (Pacific Division Director), from the ARRL; Ed Juge, W5TOO (Radio Shack/Tandy Corp.); and Mike Lamb, N7ML (AEA, Advanced Electronic Applications, Inc.) from industry; and amateurs at large John Crovelli, W2GD, and Ken Kopp, K0PP.

Three additional members were appointed as "Amateur Organizational Liaisons": the ARRL's Dave Sumner, K1ZZ; Canadian Radio Relay League President Tom Atkins, VE3CDM; and Quarter Century Wireless Association President Leland Smith, W5KL.

Actually, this committee only had one official meeting. It was held outside of Evansville, Indiana on March 10th. There was, however, an unofficial meeting on February 3rd at Miami's Tropical Hamboree. Nearly all of the ARRL No-Code Committee members were in attendance at the Amateur Industry meeting, and presentations were made by attorney Ray Kowalski, Wayne Green, W2NSD, and myself supporting "no-code."

A video was also produced featuring

an interview by Roy Neal, K6DUE (NBC broadcaster), with ex-Senator Barry Goldwater, K7UGA, supporting a code-free amateur license. The production team consisted of broadcast professionals, Bill Pasternak, WA6ITF, Frosty Oden, N6ENV, and Roy Neal, K6DUE. The presentation was filmed at the Goldwater home in Arizona with Barry sitting in front of his K7UGA amateur radio station.

## ARRL Code-Free Panel Submits Report

The No-Code Committee Report was presented to the ARRL Executive Committee on April 1, 1989. They directed that it be referred to the ARRL Board of Directors to be considered at its July 21-22, 1989 meeting. The Committee Report, drafted by Chairman George Wilson, W4OYI, ran to some nine single-spaced, typewritten pages. It suggested two classes of Technician license, one with and one without Morse code proficiency with all testing falling under the three-member VEC examination system.

The report also recommended distinctive two-by-three callsigns beginning with NE, such as NE1AAA. The N would be changed to a K when the licensee upgraded. (The NA through ND prefixes would not be used, since the new upgraded callsigns would conflict with KA through KD prefixes already issued.) Privileges would be all amateur spectrum above 30 MHz, except in the 2 meter band.

On 2 meters the "new" no-code Technician would only be allowed 144.9-145.1 MHz digital privileges. No existing amateur would lose privileges. "New" Techs could upgrade to "Tech Plus" simply by passing 5 WPM code. The report concluded with the observation "... there is much evidence that the code is filtering far too many desirable and technically qualified operators."

## ARRL Petitions For Code-Free Ham Class

Directors of the ARRL agreed at their July 22, 1989 Board meeting that the time had indeed come to support a class of amateur radio operator license which did not require knowledge of Morse code.

The directors were in basic but not total agreement with their blue-ribbon No-Code Study Committee. Since the FCC had already programmed their license/callsign issuing computers with a sixth class, the directors decided to request a sixth license class. The new "Communicator" class requirements would consist of the current written Novice/Element 2 and a beefed-up Technician/Element 3A theory examination. The ARRL said Communicator applicants should be asked

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LENGTH: 15'11"  
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POWER: 200 watts  
LENGTH: 5'11"  
CONNECTOR: UHF type

### CA-2x4MB

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GAIN: 146MHz 4.5dB 446MHz 7.0dB  
POWER: 150 watts  
LENGTH: 5'  
CONNECTOR: UHF type

### CA-2x4SR

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GAIN: 146MHz 3.0dB 446MHz 6.2dB  
POWER: 150 watts FM  
LENGTH: 3'4"  
CONNECTOR: UHF type

### CHL-23J

Mobile Antenna  
GAIN: 146MHz 2.15dB 446MHz 3.8dB  
POWER: 100 watts  
LENGTH: 20"  
CONNECTOR: UHF type

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446MHz 500 watts  
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### CF-4160I CF-4160K

Duplexer w/o Coax  
POWER: Same as CF-416  
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questions relating to Morse code to instill in them that it is indeed a basic part and tradition of amateur radio.

The League said callsigns should be assigned from the Group "D" (current 2x3) callsign blocks now assigned to new Novice licensees without distinction. Privileges would be all amateur modes/emissions above 220 MHz at a maximum 250 watt PEP output. A 25 watt power limit was considered and rejected as not being adequate for satellite communication.

No directors supported the Technician/Technician-Plus concept of their study committee. There was wide speculation the reason why the ARRL wanted no-code licensees placed above 222 MHz was to "protect" these bands from being invaded by commercial interests or other services. The 6 and 2 meter bands are "Amateur Exclusive" under international law and cannot be reallocated to other services.

## League Files For No-Code Ticket

As expected, the ARRL submitted their petition seeking "Establishment of a Class of Amateur Radio Operator License Not Requiring a Demonstration of Proficiency in the International Morse Code" on August 31, 1989. The filing came a little more than a month after League officials voted to seek a code-free Communicator ham class. The ARRL vote of the directors to seek a code-free class was not overwhelming. Nine directors were in favor; six opposed.

The ARRL strangely maintained the Communicator class ticket is not an entry-level license in the same sense as the Novice class license. Indeed it would be more difficult to obtain than the current Technician license since five more questions would have to be answered by applicants.

The League demanded that all Communicators and Novice licensees be tested (or retested) under the three VE/VEC System to upgrade to the Technician level. No 5 WPM telegraphy credit was to be allowed to Novices who had already passed Element 1(A) under the two VE Novice testing program.

## FCC Agrees To Consider Ham Restructuring

On September 14, 1989 the FCC's Private Radio Bureau forwarded twelve Petitions for Rule Making to the Office of the Secretary with instructions they be assigned RM (Rule Making) file numbers.

Included with the ARRL petition were eleven others that suggested various ways to improve the U.S. amateur ser-

vice. There was one common denominator among all of the petitions. All proposed relaxed code requirements ranging from dot/dash recognition to total code elimination at the 30 MHz and higher frequency level. Each had their own idea how this should be accomplished.

On February 8 the FCC dramatically issued the long-awaited Notice of Proposed Rule Making proposing to adopt a code-free Communicator class amateur radio license. Privileges would include all amateur frequencies 222 MHz and the power level set at 200 instead of 250 watts PEP. Thus, the Communicator class power level would match that of the current Novice. Group "D" 2x3 callsigns would be issued.

The FCC said the Communicator class proposal was tailored to achieve three objectives: "... first, to establish an entry-level license for persons who find telegraphy a barrier.... Second, to design a new license that would fit into the existing computer-assisted license processing system [and] third, to avoid any adverse effect upon current licensees, upon volunteers who prepare and administer the examinations, and upon our workload." Many amateurs felt the FCC was more concerned with their dwindling resources than with amateur radio.

## Five Plus One . . . Equals Four

The big bombshell was the FCC's stated intention to discontinue the issuance of new Novice and Technician licenses and to substitute a code-free Communicator class instead. Existing Novices and Technicians would still be able to renew their licenses indefinitely, however. No petitioner had suggested that approach, and the amateur community, and especially the ARRL, was almost universal in their opposition to this strategy.

The FCC, by discontinuing issuing new Novice and Technician licenses, would free up some 40,000 licenses that could now be issued to code-free Communicator applicants. The Commission's 1991 fiscal year budget had already been "nailed down," and they simply don't have the license processing capability to issue more amateur licenses than is now the case. They simply transferred their Novice and Technician license-processing capability to the Communicator class.

Another surprise was the provision that Communicators who pass 5 WPM code would be allowed full Technician privileges, but no new license. The new privileges would be granted by the upgrade certificate issued by the VE team when the applicant passes the 5 WPM telegraphy requirement. The Communicator "Plus 5 WPM" licensee would also have to add "/AC" to his callsign when working in the Technician part of the band.

The FCC proposed that the Communi-



cator exam consist of 30 Novice, 25 Technician, and 5 new questions for a total of 60. All examinations would be given under the three-examiner VEC system. The FCC specifically asked the amateur community about the effect of excluding Communicator licensees from the 2 and 6 meter band. The six-month public comment period closed on August 6, 1990, with reply comments due by September 7.

## No-Code Comments By The Public

The Volunteer Examiner Coordinators hold an annual conference. A VEC questionnaire was prepared and sent out to the testing community. Hundreds were returned and formed the basis for the VEC comments.

The VECs pointed out there is ample evidence that the Morse telegraphy license qualification requirement is no longer essential to an entry-level amateur license. In fact, this requirement, which once was perceived as the protective wall around amateur radio, is now perceived as a tourniquet that is slowly choking off the life blood of amateur radio.

The VECs believe the Communicator class should not be excluded from the 2 meter and 6 meter bands. "The Novice class, if it continues to exist, should be brought under the VEC system," they said. The operating privileges should include all amateur privileges above 30 MHz with full power. The examination requirements for the Communicator should be the Novice and Technician written examinations only.

APCO, the Associated Public Safety Communications Officers, supported no-code on all bands above 30 MHz except the 2 meter and 70 cm amateur bands. They suggested employing a user group to process Communicator licenses if the FCC did not have the capability.

The Quarter Century Wireless Association is an organization of nearly 11,000 amateur radio operators who have been licensed more than 25 years. They recognize that "... many contemporary Americans have neither the time nor the inclination to become even marginally proficient in a communications technique which they perceive to be archaic."

QCWA believes "... that a blanket Morse code requirement for entry into the Amateur Service can no longer be justified." They suggest removing the Morse code requirement in the present Technician class license and modifying its privileges to restrict operation to assigned frequencies above 30 MHz. They contend limiting code-free operation to above 222 MHz "... would place the codeless licensee out of the mainstream of Amateur Radio Service operations."

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believes the modern radio amateur is a communicator, not a technician. "Today's technical pursuits involve communicating via satellites, moonbounce, amateur television or packet technology, not workbench construction projects. How fitting it is, then, that the Commission should now be proposing a Communicator class license." The Amateur Industry Group said, "The Amateur Radio Service can expect to see more spectrum erosion unless something is done to reverse the [growth] trend."

TAPR, Tucson Amateur Packet Radio, says "Code proficiency is no more relevant to operation on the 50 and 144 MHz bands than it is on the frequencies above 220 MHz. . . . access to the 144 MHz band in particular is absolutely essential if the Communicator license is to attract newcomers and integrate them into the mainstream of amateur radio."

The Radio Amateur Satellite Corporation, AMSAT, said its board " . . . voted unanimously to support a code-free license . . . based on meeting two principal objectives." These are increasing population on the higher bands especially above 1 GHz and bringing more talented technically-minded people into amateur radio. "A majority of the board believes that the problem is not with these people's inability to learn the code, but rather their conviction that it is irrelevant to today's communications techniques." AM-

SAT wants the new no-code license called the Experimenter class.

Tandy/Radio Shack commented, "Many young people today are attracted to the personal computer before and in lieu of amateur radio because, among other things, the personal computer does not require an operator license. Others may perceive the code requirement simply as unnecessary and are unwilling to invest their time in learning what they perceive to be an irrelevant, outmoded skill."

The American Radio Relay League's formal comments basically followed their petition. That is, the Communicator class should have privileges only above 220 MHz. "Most urgent in connection with this proceeding is that no changes be made in the Novice and Technician class licenses." They said Communicators should be eligible to be control operators of repeaters and operate at power levels up to 200 watts PEP. The League also acknowledged that six classes of amateur licenses is " . . . perhaps an overly complex scheme that can be revisited in the future."

### So There You Have It!

No-code from start to (almost) finish. The FCC staff has now completed their deliberations of the comments and their decision is expected any day now! In fact, we

would be willing to bet that we will know when, if, and how the no-code Communicator amateur class will be implemented by the time you read this column. Hopefully, we will have full details for our next issue. Stay tuned! What started as an idea a couple of years ago is about to become a reality.

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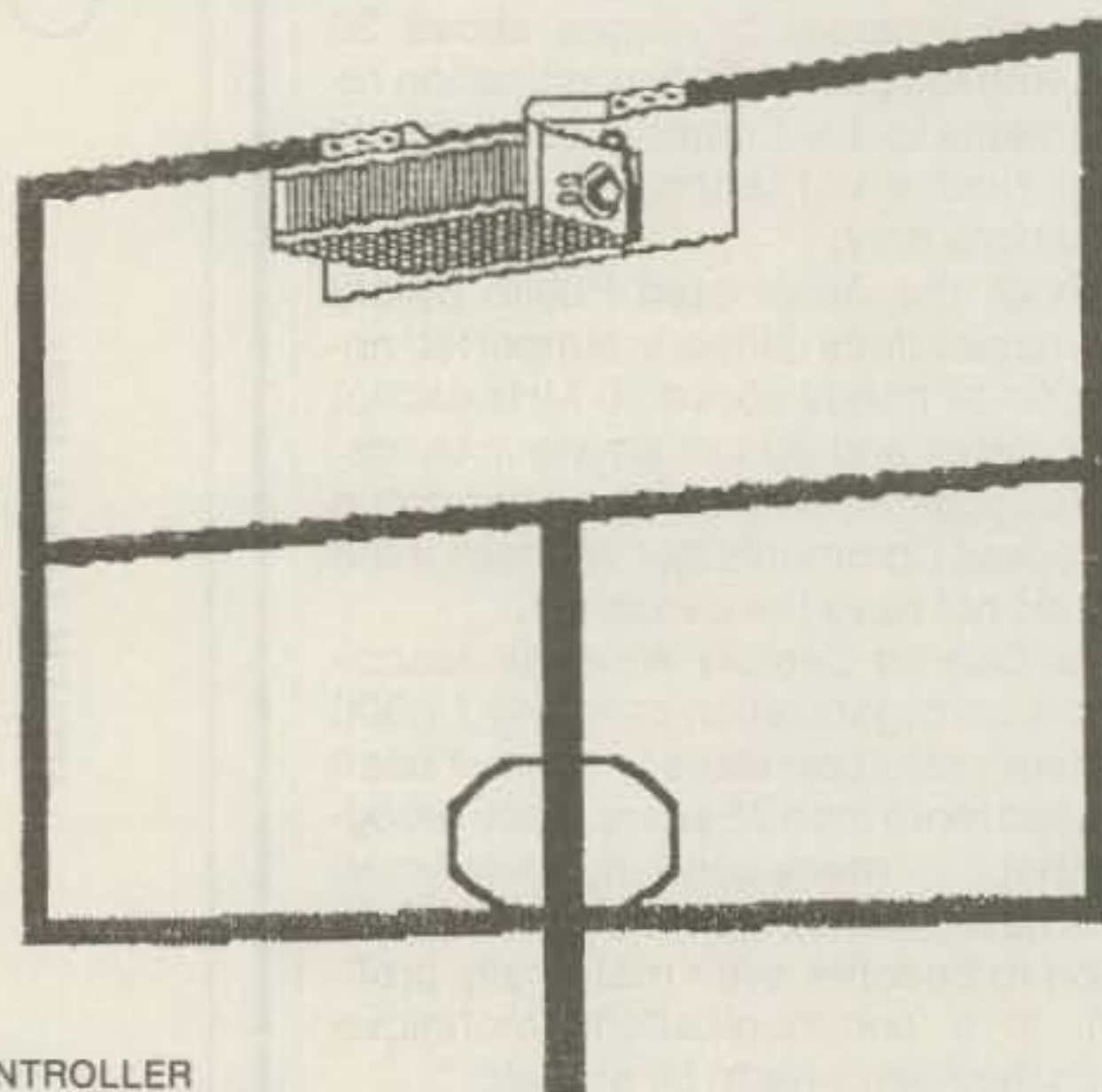
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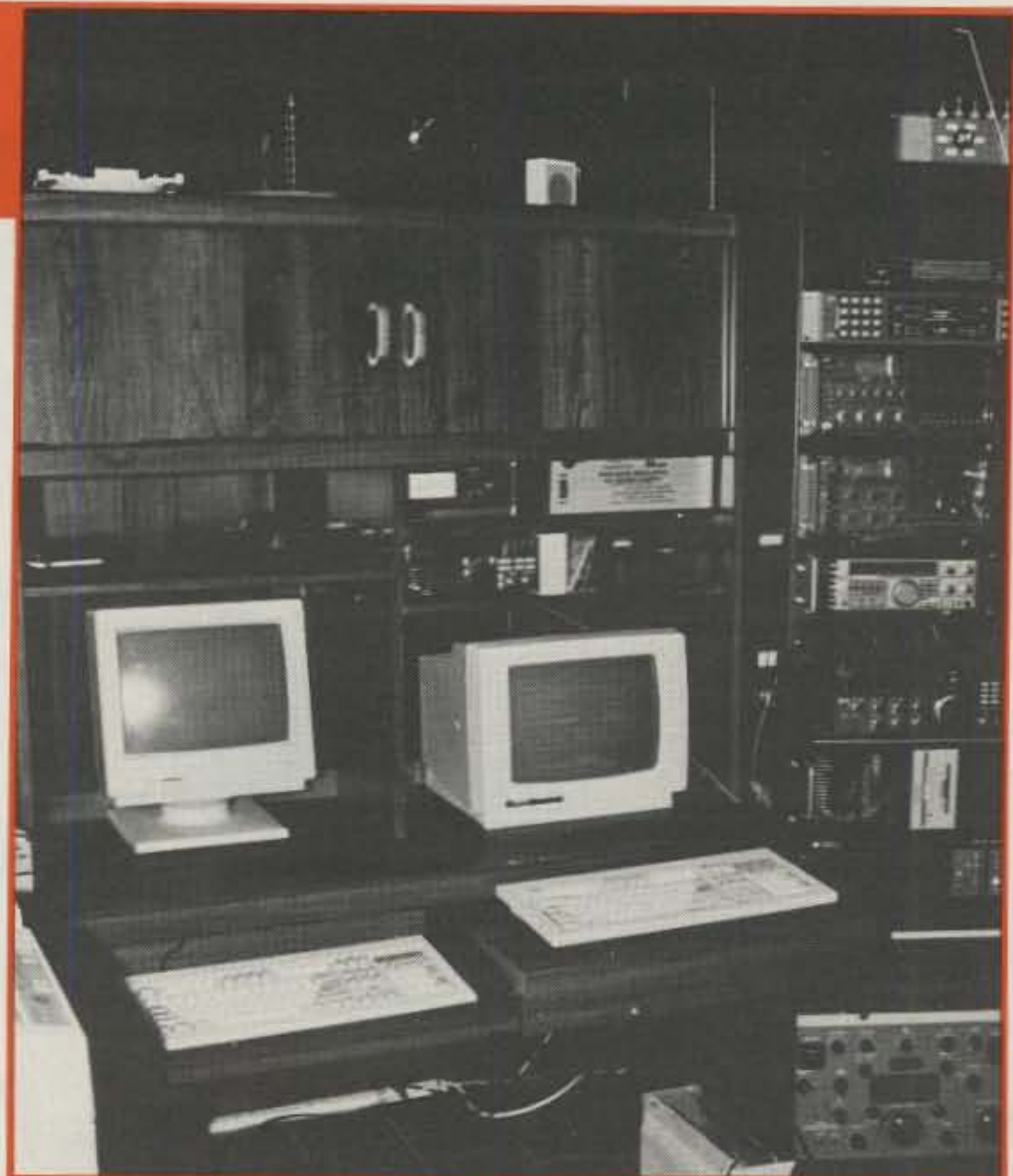
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3. 500 KHZ. UP	9. UTILITY MENU	
4. 500 KHZ DOWN	ALT-P. CHANGE MENU PAGE	
5. ACTIVATE/DEACTIVATE CLARIFIER	ALT-Z. DISPLAY OR PRINT LOG	
6. SWEEP BETWEEN 2 LIMITS	ALT-Q. END	
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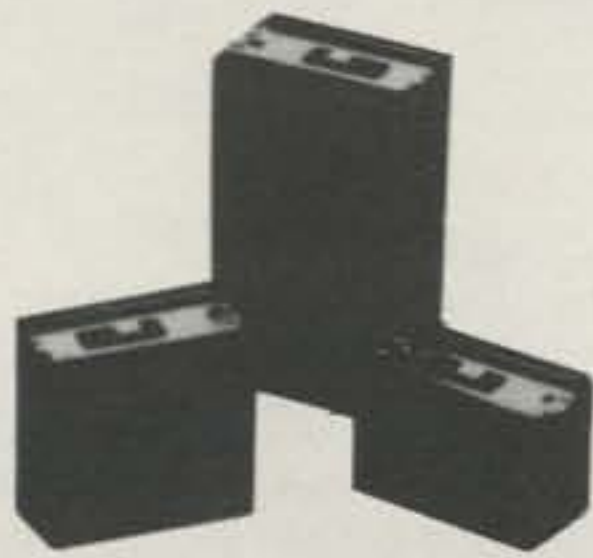
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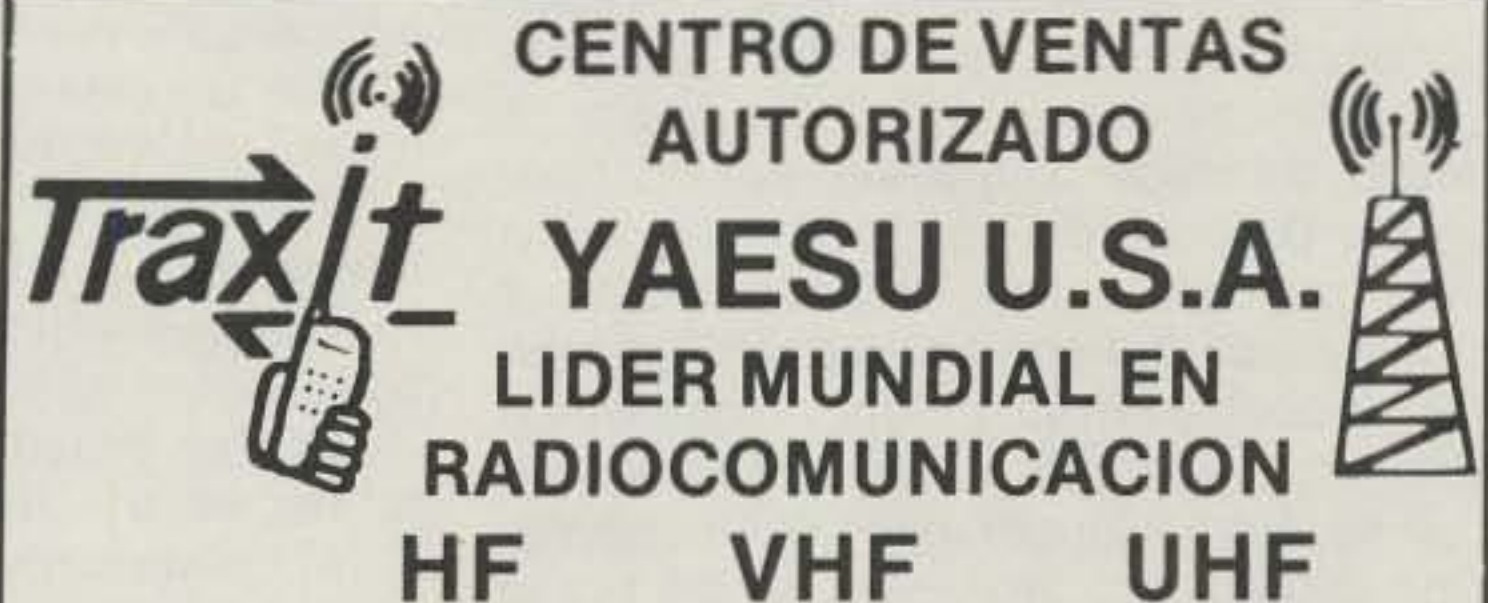
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## NEWS OF COMMUNICATION AROUND THE WORLD

## Minimum Power Necessary

**W**hat FCC regulation do most DXers ignore almost all the time? My bet would be 97.313 (a): "An amateur station must use the minimum transmitter power necessary to carry out the desired communication." How often do DXers actually use the "minimum power necessary" to work a station? With the exception of contacts made by dedicated QRP enthusiasts, most DX QSOs are conducted with the *maximum* power available (in a few cases, even in excess of maximum *legal* power, unfortunately).

Are full-legal-limit amplifiers "necessary" to make DX contacts? In all but a handful of cases, the DXer need not turn on the "after-burner" to make the contact. Legal-limit power is very helpful in some long-haul contacts, when signal strengths are very low. And full power helps to make contacts more quickly, especially in large pile-ups. But is such power "necessary"?

The FCC rule is very clear. Amateurs *must* (not should) use the minimum power necessary. This means that if the contact can be made with lower power, it *must* be made with lower power. How many DX contacts have you made when you can honestly say that you could not have made the contact without full power? Probably not very many. Yes, it would have taken longer to make the contact, perhaps days longer in the case of a major DXpedition. However, in all but a handful of cases you could have made the contact with lower power. You violated 97.313 (a).

What is the minimum power necessary? Far less than you might think. A handful of amateurs have been experimenting with very low power. Bill Smith, WA6YPE, in Glendora, California, reported on a series of tests he conducted with Bob Moddy, K7IRK, 1300 miles away in Palestine, Texas. K7IRK transmits with a rock-bound rig only a tenth of a cubic inch in size! They conducted their experiments on 28,636 kHz, timing the tests to take advantage of the collapse of the D-layer around local sunset. Their initial tests showed good communication at the 2 milliwatt level. Bob continued to reduce power until the signal faded into the noise. When he connected an oscillo-



*Bill Smith, WA6YPE, demonstrates that DXers don't need full legal power to make contacts, with his 200,000,000 miles per watt reception of K7IRK's 6 microwatt signal.*

scope to the rig to measure output power, he found that they had been communicating successfully at 35 microwatts. Encouraged by this achievement, they met a couple of days later and continued their efforts. Bill clearly copied Bob's signal at a level of 6 microwatts!

The station at WA6YPE is nothing special: a Yaesu FT-767 and a Mini Products HQ-10 quad with two 6 foot elements on a 5 foot boom, all just 12 feet high.

Another indication of how little power is "necessary" is the Northern California DX Foundation's beacon network on 14,100 kHz. The nine beacons transmit in sequence at various power levels, starting at 100 watts output, and dropping in 10x steps to a mere 100 milliwatts. Listen on 14,100 and see how many beacons you can copy at the 100 milliwatt level. Worldwide communication is indeed possible at extremely low power levels.

Finally, the numerous QRP DXers will attest that the power levels used by most DXers are not necessary. Although the ARRL's DX Century Club program does not include a QRP certificate, the CQ DX Awards Program does offer a QRPp endorsement. Many DXers have worked 100 or more countries using less than 5 watts output.

So how much power is "necessary" for your DX contacts? Probably far less than you usually use. Obviously, DXers aren't going to throw away their amplifiers and instantly convert to QRP DXing. But if even a few DXers would try to make

some normal DX contacts *without* first reaching for the amplifier switch, the worldwide levels of QRM would drop, more DXers would have an even shot at the DX, and more DXers would develop the extra skills required to work a New One in the absence of raw power.

### Postage Increase

Once you have worked the New One, whether by QRP or QRO, you will want a QSL card to confirm the contact. The increase in US postage rates scheduled for this month will affect all DXers. The increase in the regular first-class domestic rates will make it more expensive to confirm contacts via stateside managers, adding \$0.10 to the round-trip costs. The cost of International Reply Coupons (IRCs) increases to more than US\$1, which will encourage DXers to send US currency rather than IRCs. (This will boost the "resale" value of IRCs to the \$0.65-.75 range.) The increase in international rates will boost the cost of sending the minimum 1/2 ounce overseas.

The DX should keep several points in mind as the postage rates increase. First, the F stamps without a specific value can be used only within the US. They cannot be used for postage outside the US, even to Canada or Mexico. Second, DXers sending self-addressed, stamped envelopes (SASEs) to stateside managers should keep the timing of the postage increase in mind. Remember, it may be weeks or months after the card is mailed before the manager receives the DX station's logs and is able to verify the con-



*Mike Parker, G4IUF, recently received his 5-Band Worked All Zones award. His last contact was with Zone 2 on 10 meters, but his biggest problem was getting a 40 meter card out of Zone 23.*

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### Mixed

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1475 ..... KA1NCN 1477 ..... N5MIV

### SSB

2204 ..... JA3PJM/VE3

### CW

2656 ..... JG2IGY 2657 ..... VE6BMX

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266 ..... 11-50156

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SSB: 350 N1GRM, JA3PJM/VE3, GM0GMI, DU1DZA. 400 N1GRM, NY1V, DU1DZA. 450 KB1HC, DU1DZA. 500 KA5TQF, KB1HC, DU1DZA. 550 SV0FC, KA5TQF, KB1HC, IK0JMS. 600 SV0FC, KA5TQF, KB1HC, IK0JMS, HP6AYV. 650 KA5TQF, KB1HC, HP6AYV, K2EEK. 700 KA5TQF, KB1HC, HP6AYV. 750 KA5TQF, KB1HC, HP6AYV. 800 KA5TQF, KB1HC, HP6AYV, IK2AEQ. 850 KB1HC, W3FDU, KP6AYV. 900 NE6I, HP6AYV. 950 VK3SM, EA3AAY, HP6AYV. 1000 VK3SM, EA3AAY. 1050 JR4NUN, KS3F. 1150 IBWYD. 1200 IBWYD. 1500 KL7AF.

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20 Meters: VE6BMX  
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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, P.O. Box 1351, Torrance, CA 90505-0351 U.S.A.

tact. Meanwhile, the cost of the return postage may have increased. If in doubt, include the additional \$0.05 postage, so that the manager isn't out the money. (Usually the post office will deliver mail postage due if the envelope has \$0.25, for a few months, but don't count on this.)

Finally, DXers should up-date their ARRL incoming QSL bureau account. Any incoming bureau that sells envelope credits will simply adjust the number of credits on your account. But if you have supplied envelopes and stamps to your incoming bureau, take a moment to send them some additional \$0.05 and F or \$0.30 stamps. The volunteers at the incoming bureaus have enough thankless tasks to handle without having to deal with insufficient postage on your envelopes.

By the way, Maylon Harvey, WA2UUK, of the Salt City DX Association estimated his costs of collecting the 500 confirmations necessary for 5-Band DXCC from 1984 to 1990. He sent out about 3500 cards, about half via the bureau. Total postage costs including IRCs was about \$1600. Overall costs were close to \$1900. The complete breakdown of costs is in the December issue of *The DX Magazine*.

## Notes From All Over

**South Sandwich/South Georgia DXpedition Postponed.** The planned South Sandwich/South Georgia DXpedition was postponed only weeks before the November start date. According to DXpedition organizer Tony DeParto, WA4JQS, the shipping company put a hold on ship traffic in the area because of the problems in the Middle East. Also, the increase in cost of the fuel for the ship, again thanks to the problems in the Middle East, added more than \$30,000 to the already high cost of the trip. The group is hanging on to the donated funds, none of which have yet been spent, with the idea to try again late this year.

**DX Club Formed in Thailand.** On October 11, 1990 the Siam International DX Club was formed by a group of DX and contest-minded hams in Thailand. The club would like to hear from DXers worldwide. Among topics that might be of interest are:

- Schedules for those needing Zone 26 on one or more bands.
- Assisting people who plan to visit Thailand in meeting HS amateurs while in the country, and in arranging to operate from Thailand.
- Requesting help in obtaining missing HS QSLs.
- Making schedules for up-coming contests.
- Exchange of information with other DX clubs worldwide.

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#### 15 Meter SSB

362 ..... AE1Q 364 ..... N4PYD

363 ..... KZ5Q

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824 ..... AE1Q 825 ..... KZ5Q

#### 10 Meter CW

96 ..... AA4KT 97 ..... KZ5Q

#### 15 Meter CW

194 ..... K4MF 196 ..... OH3FP

195 ..... KZ5Q

#### 20 Meter CW

385 ..... KP4P 387 ..... KZ5Q

386 ..... K7WA

#### 40 Meter CW

130 ..... I7ALE

### All Phone

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### WNZ

33-10M SSB KA1UQU

### 160 Meters

68 ..... K1IU

### RTTY

56 ..... KR90

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6891 ..... VE1CCB 6903 ..... YT2SM (CW)

6892 ..... DL5QV 6904 ..... W7KQU

6893 ..... K2QE 6905 ..... EA3FAG (CW)

6894 ..... F6ISP 6906 ..... IK3HHL

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6896 ..... K6FG 6908 ..... K1IN

6897 ..... WS2O 6909 ..... AC3D

6898 ..... IK0FUX

Applications and reprints of the latest rules may be obtained by sending a self-addressed stamped envelope (65 cents) size 4 1/2 x 9 1/2 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).

Thailand now has some 13,000 licensed amateurs, almost all of them no-code licensees operating only on 2 meter FM. However, about 30 Thais have now passed the Intermediate Class license examination allowing HF privileges. It is these latter amateurs who are interested in DX and wishing to hear from DXers worldwide in order to improve their DX operating skills. The Siam International DX Club can be reached at GPO Box 155,



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CIRCLE 36 ON READER SERVICE CARD

The following list indicates which prefixes are deleted as of January 1, 1991 for credit towards CQ's WPX Honor Roll. These prefixes also can no longer be used in new applications for the CQ WPX Award and new applications for endorsements.

### Honor Roll Removals

(effective January 1991)

3Z50	9Y25	LZ13
4S83	CN29	LZ30
4U50	CT50	LZ42
4X50	DF60	LZ43
4X77	DL60	LZ90
4X85	FC's	LZ92
4Z30	GK0	OE13
4Z40	GV's	OK30
5N20	HA100	PA24
5N21	HA104	PA25
5N22	HA117	R40
5N23	HA12	SP30
5N24	HA30	SP40
5N25	HD80	SP50
5N26	HG10	TE25
5N27	HG100	TE30
5T23	HG19	TE87
6C35	HG25	TI87
6U25	HG40	TU25
6K24	HG60	TU73
6K25	HG79	TY88
6V100	HG85	U28
6W100	HI60	U29
6W83	HL88	U50
6Y25	I50	UD26
8P21	I60	VU40
8P25	I88	200's USA (all)
9I20	JT60	YU30
9J60	JY25	ZP450
9K25	LX150	ZP88
9N38	LX75	ZS75
9N88	LZ100	

Bangkok 10501, Thailand. (Thanks to Fred Laun, K3ZO, ex-HS1ABD.)

**Germanys and Yemens.** As expected the ARRL Awards Committee has accepted the recommendation of the ARRL DX Advisory Committee to delete the German Democratic Republic (East Germany) Y2-9 from the DXCC list, effective October 3, 1990. On that date the former East Germany was absorbed by the Federal Republic of Germany (West Germany) DA-DL. Contacts with Y2-9 stations on or after October 3, 1990 will count as contacts with the Federal Republic of Germany.

Likewise, the former DXCC countries of People's Democratic Republic of Yemen (South Yemen) 7O and the Yemen Arab Republic (North Yemen) 4W were deleted from the DXCC countries list as of May 22, 1990. A new country, the Republic of Yemen 7O, is added to the DXCC countries list effective the same day. This means the recent 7O operations will count for the new country. However, the DXCC desk has set March 1, 1991 as the earliest date for submission of 7O cards for credit to the new DXCC country. Please do not send 7O cards to the DXCC before March 1st; they will be returned without action.



This photo of Jacky, F2CW, on Bouvet is one of a set of twelve available from the French DX Foundation.

**The Ultimate Cruise.** Jules Wenglare, W6YO, sends word of a DXer's Dream. After you have contacted most or all of the rare and remote islands around the world, you can now, for the first time, visit these places in style aboard the new cruise ship *Caledonian Star*, of Salen Lindblad Cruising of New York City. Stops include places where DXpeditions have been few, such as uninhabited South Sandwich, Heard, and McDonald Islands. Also on the itinerary are Marion, Crozet, Kerguelen, Amsterdam, St. Paul, Gough, Tristan da Cunha, Falklands, South Georgia, Cocos, and Christmas Islands, plus port visits to Punta Arenas, Jakarta, and Capetown, one of the prettiest cities in the world.

This ship is now visiting Madagascar, Mayotte, Comoro's, Zanzibar, and, of all places, Geysir Reef.

**Bouvet Photographs.** The French DX Foundation is raising funds to support future DXpeditions by offering a set of striking color photographs of Bouvet and the 3Y5X DXpeditioners. The set of twelve 5 x 7 inch glossy photos is available from the FDXF for US\$10, plus US\$2 for postage (or the equivalent in IRCs). No checks, please. Send your order to the FDXF at BP 88, 35170 Bruz, France. (I have a copy of the photos, and they are excellent.—ed.)



Natasha, RA3AP, operates from this perfect shack in Moscow, Oblast 170. Oblast hunters may be interested in KJ8M's new Oblast booklet.

## 5 Band WAZ

As of October 30, 1990, 292 stations have attained the 200 zone level.

New recipients of 5 Band WAZ Award with all 200 zones confirmed:

CT1BH

The top contenders for 5 Band WAZ are:

N4WW, 199	KB8DB, 199
UQ1GXX, 199	AA4KT, 199
W7OM, 199	IK4ALM, 199
SP9PT, 199	NA0Y, 198
K6YRA, 199	K7UR, 198
K5UC, 199	I8IGS, 198
LA4HW, 199	VE7DX, 198
PY7ZZ, 199	W0PGI, 198
DL9WW, 199	VE7AHA, 198
K0CS, 199	SM6AHS, 198
KB0G, 199	K1ST, 198
ZS6BCR, 199	ZS6BCR, 198
HA8XX, 199	VE6OU/6, 198
UA4RZ, 199	WB9Z, 198

688 Stations have attained the 150 zone level as of October 30, 1990.

Applications and reprints of the latest rules may be obtained by sending a self-addressed stamped envelope (65 cents) size 4 1/2 x 9 1/2 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).

**New 160 Meter Publication.** Don, G3XTT, and Roger, G3RBP, are taking over the *Top Band* newsletter covering 160 meter news. Mr. 160 Meters, Stu Perry, W1BB, published an informal 160 meter newsletter for many years. When ill health forced him to give it up, Ivan Payne, VE3DO, began compiling an annual 160 meter *Top Band News Digest*. This chatty publication summed up 160 meter events of the past season, described stations and DXpeditions, etc. Now Don and Roger plan two issues a year, one aimed to arrive before the CQ WW tests in October and November, and the other to arrive before the CQ 160 Meter contests in January and February. The new editors are requesting US\$1 and a self-addressed envelope for each copy. They also ask that anyone with 160 meter news get the information to them in time for publication. You can contact Don at 105 Shiplake Bottom, Peppard, Henley-on-Thames, Oxon RG8 5HJ, England.

**Oblast Chasing.** Another new DX publication is of particular interest to Oblast chasers. R. C. Phillips, KJ8M, has pulled together lots of information from various sources into a single book entitled *In Search of the Elusive Oblast*. He has included a list of over 50 awards available to Oblast chasers (largely extracted from K1BV's comprehensive Awards Directory); Russian phrases for CW (from CW into Foreign Languages, by VE3EIM and

## 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 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 up-date, file will be made inactive. Lifetime Honor Roll fee is \$4.00 (U.S.) for each mode, with no fee for additions.

### MIXED

3958	YU2AA	2302	IT9TQH	1843	KL7AF	1382	W7CB	1095	NX9H
3627	F9RM	2270	SM7TV	1807	W4UW	1379	W9IL	1055	YU1PJ
3509	K2VV	2246	KA5W	1740	N6JM	1364	HA0IT	1035	VE3NUP
2955	YU2TW	2221	IN3ANE	1664	WE2L	1351	YU7DR	1032	IK2FCZ
2947	VE3XN	2218	YT7DX	1660	W8UMR	1338	VE1RJ	998	K9BQL
2915	K6JG	2202	I6SF	1645	W6OUL	1334	DF6EX	990	W9IAL
2887	EA2IA	2181	K9BG	1640	WA1JMP	1284	YU3NU	983	I5ZTC
2783	W4BQY	2178	YU7BPQ	1627	DK5AD	1279	YB0TK	965	YU3PG
2761	PY1APS	2177	4X4FU	1599	K2OLG	1276	I0AOF	901	W5ASP
2752	N6JV	2126	YU2NA	1584	I1ZEU	1268	YU7RU	860	WM0G
2740	N4NO	2115	I1EEW	1558	K9QFR	1230	PY2DBU	848	IK2BHX
2704	K6XP	2052	I2UIY	1557	I1WXY	1214	WB2YOH	823	W4USW
2630	W9DWQ	2034	I2MQP	1550	YT7WW	1195	JA1WJ	816	RB5MP
2626	WA8YTM	2031	K5UR	1536	YU2CQ	1185	VE7EIK	794	F6CDJ
2623	N4MM	2004	KF2O	1507	KB0G	1179	WD9IIC	792	N6IBP
2570	YU1AB	1988	W0SFU	1503	I2EOW	1162	DF4ZL	765	W6LC
2546	K0BLT	1979	YT3AA	1503	SM6CST	1158	LZ2JE	734	YU7FT
2505	N9AF	1955	I1POR	1453	WB8ZRL	1155	K3UA	729	WK0B
2387	PY4OD	1944	HA8XX	1438	4N7ZZ	1140	K13L	656	IK2BLA
2366	SM3EVR	1938	HA0DU	1435	LA7JO	1125	KS0Z	638	DL6UQ
2325	YU7BCD	1887	UA3FT	1392	AC2J	1120	WB3DNA	636	5Z4BH
2317	YU7SF	1886	W2FXA	1390	G4OBK	1114	I2EAY	602	W9GCH
2308	N2AC	1844	SM0AJU						

### SSB

3553	F9RM	1967	NJ0C	1479	XE1OX	1145	PY4VX	888	K9BQL
3481	I0ZV	1959	PA0SNG	1461	I2EOW	1121	IK2AVH	874	HA0IT
3000	K2VV	1942	W9DWQ	1454	SM0AJU	1108	LU7HJM	859	KB0G
2894	ZL3NS	1861	I1EEW	1448	KL7AF	1090	AG2K	844	IT9ONV
2717	VE1YX	1858	YU7BCD	1443	K9QFR	1076	W0ULU	843	KA0ZFX
2647	K2POA	1851	KA5W	1418	4X6DK	1070	I8LEL	805	K3UA
2641	K6JG	1844	WA4QMQ	1385	HR1KAS	1067	IT9JKY	803	KB2DE
2458	I2PJA	1822	HA8XX	1383	LUBESU	1058	KB0C	800	IK2AEQ
2397	WD8MGO	1791	WF4V	1381	CT1BY	1049	WA2FKF	799	K8MDU
2397	K6XP	1770	EA8AKN	1352	KK0L	1046	I2WZK	799	KF7RU
2373	N4MM	1766	I5ZJK	1349	I2TZK	1010	EA1AK	796	NG9L
2329	I0AMU	1746	I2UIY	1318	CT1AWO	999	IK2DUU	773	5Z4BP
2303	CT4NH	1734	K5UR	1303	YU7SF	994	IK7DBB	762	WM0G
2287	W0YDB	1713	KF2O	1294	N6FX	962	W5ILR	749	EA3FHT
2267	ZP5JCY	1690	W3ARK	1278	EA2AOM	944	LU8DY	697	A41JV
2234	I6ZJC	1679	W4UW	1259	KE6KT	944	W5AWT	673	NM5Y
2211	I8YZP	1664	EA3AQC	1233	K9LJN	934	K3IXD	650	K2EEK
2150	I4ZSQ	1653	YU2NA	1217	N2AC	932	I3ZSX	649	I6KYL
2136	W4BQY	1622	K5RPC	1211	CX6BZ	926	K8ZZU	646	KB8DAE
2114	IT9TQH	1572	I1POR	1204	I8WYD	922	G4OBK	627	KA5RNH
2103	OZ5EV	1541	WE2L	1201	YV1CP	914	WB6SRK	611	KA9MOM
2096	N4NO	1537	PY4OD	1190	AB9O	908	CT1DIZ	610	JH6WMJ
2072	EA2IA	1515	I8KCI	1179	IK8GCS	907	N6CGB	609	VK5NVW
2068	WA8YTM	1515	PY4OY	1178	F1HWB	899	KC2FC	607	YU1PJ
2005	I4ZCP	1493	KD9OT	1162	WB8ZRL	891	NE6I	605	TU2UI
1979	I2MQP								

### CW

2865	K2VV	1852	YU7BCD	1321	KF2O	1124	N2AIF	874	N4IR
2814	WA2HZR	1830	LZ1XL	1307	VE1ACK	1121	G3EZZ	867	KA1CLV
2732	N6JV	1736	N4MM	1301	T14SU	1114	HA0IT	859	NJ1T
2714	ON4QX	1667	VO1AW	1301	W8IQ	1088	DL2HBX	853	YU3PG
2497	N4NO	1613	K5UR	1274	W1WAI	1086	OZ5UR	837	NE6I
2340	VE7CNE	1583	IT9VDQ	1269	SM0AJU	1075	AK9Z	837	JJ1FSK
2282	W3ARK	1571	KA5W	1268	G4SSH	1046	NF5Z	808	WE2P
2194	K6JG	1545	KA7T	1259	I7PXV	1043	G4OBK	805	W9IAL
2184	W4BQY	1515	N4YB	1243	G4MVA	1042	W5AWT	793	YU1PJ
2172	EA2IA	1510	DJ4XA	1238	YU3NU	1035	SM5DAC	741	IS0FIC
2166	W9DWQ	1509	VE7DP	1227	G3VQU	1033	KQ8J	729	JA0BSL
2152	YU7SF	1399	YU2NA	1206	W6OUL	999	HA5LZ	712	PY4WS
2074	N2AC	1393	KL7AF	1205	I2IWM	979	A16Z	699	IK2ECP
2063	IT9TQH	1389	N6FX	1192	KB0G	963	I2EAY	695	RB5MP
2025	K6XP	1382	SM6CST	1190	HA8XX	949	VS6UW	689	W4UW
2024	I1YRL	1369	K9LJN	1187	OK1CZ	933	K3UA	661	AH6JF
1963	I6SF	1369	I2UIY	1186	DJ1YH	898	I1EEW	646	JO1QUB
1961	WA8YTM	1342	F6HKD	1183	LA9XG	885	N4RNR	621	WB5MTV
1926	4X4FU	1339	W9PWM	1174	YU2CQ	876	WB8ZRL	603	NU7V
1918	PY4OD	1339	G4UOL	1161	ZS6BCR				

VE3MGY); Russian phrases for SSB; from Len Traubman, W6HJK's compilation, a complete, up-to-date Oblast checkoff list; and sunrise and sunset times for various spots in the USSR. With the increased communication between the US and the

USSR, more DXers will want a booklet that pulls together all this information into a single place. Copies are available for only US\$6.50, including postage, from KJ8M, 159 East Temperance Road, Temperance, MI 48182.

## CQ DX Awards Program

### SSB

1813	N8DAQ	1817	W7ULC
1814	OA4AV	1818	LU7HJM
1815	N4OXR	1819	IK7FFX
1816	KB9LN		

### CW

808	G4MVA	811	K5ALU
809	G3ECS	812	EA6AAK
810	W7ULC		

### RTTY

2	NI4H
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### SSB Endorsements

320	K6WR/324	310	KE4HX/316
320	K2TQC/324	310	WZ4I/316
320	I4LCK/324	310	WE2L/311
320	W4NKI/323	300	W7ULC/304
320	K5OVC/323	300	KB7VD/304
320	OE3WWB/322	300	I2EOW/301
320	IT9TQH/321	300	K5DUT/300
320	VE7DX/321	275	LU7HJM/289
320	IT9TGO/321	275	KB9LN/278
320	K9IW/321	250	WA5HWB/267
310	N2KW/319	200	OA4AV/234
310	W7FP/319	200	K2EEK/221
310	WB3DNA/318	200	DU9DZA/219
310	N4CRU/317	200	N6CFQ/216
310	K8ZZU/317	200	EA3EJI/201
310	K3UA/317	200	E16FR/200
28 MHz	N8DAQ	150	IK7FFX/151
3.5/7 MHz	KB9LN		

### CW Endorsements

320	SM6CST/324	300	IT9QDS/305
320	OK1MP/321	300	DJ2PJ/300
310	W7ULC/318	275	K9DDO/295
310	W0IZ/318	275	VE7DX/290
310	N2KW/317	275	KP4P/284
310	K9IW/316	250	G4MVA/257
310	IT9TQH/312	200	KF5PE/233
310	W0HZ/311	200	IK2ILH/200
300	W1WAI/307		

Total number of active countries is 324. 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.

### British Virgin Islands Operation.

Again in 1991 Ben Pinz, W2GUP, will be active on CW VP2V/. Running barefoot into a dipole, Ben will be in the ARRL CW test, and on all bands 10-80 meters outside the test, until March 7th. He thanks those amateurs generous enough to include a little something extra in their SASEs to help cover the cost of direct QSL return to those without any return postage or envelope. Send your QSL, with SASE, to Ben's home address after his return in March: 44 Murray Hill Terrace, Marlboro, NJ 07746.

### QSL Notes

The Radio Society of Okinawa is holding many unclaimed **KA6 (2x2)** QSL cards from former members dating back to 1975. Inquiries should be addressed to: QSL Manager, Radio Society of Okinawa, P.O. Box 217, Torii Station, APO San Francisco CA 96331.

The Kaunas DX QSL Service offers to help with QSL cards from **LY, YL, and ES**

cards "in the short time. More than 50 WVE amateurs get QSL cards sending via our address." LY2BIM is the manager, at Box 787, Kaunas 233041, Lithuania.

WN5K says he can no longer handle cards for the following: **YS1OD**, **YS1MAE**, **VP5LJ**, **VP5DG**, **VP5HG**, **VP5HL**, and **VP5JD**.

N7RO can confirm some old Angola CR6/D2 calls as follows: **CR6AI** 5 Oct. 66 to 30 Aug. 76; **D2AAI** 1 Aug. 76 to 29 May 77. And the following Mozambique CR7 calls: **CR7FR** 1 Sept. 71 to 30 Jan. 73; **CR7CH** 1 Dec. 77 to 16 Nov. 73, and **CR7IK** 23 May 70 to 14 Dec. 72.

Scotty, **7P8DP**, and Melinda, **7P8DN**, Deffendol have left Lesotho. Ted Drake W8JBI has logs for 1987-90. SASE, please.

Continuing civil war in Lebanon means that **OD5EH** and **OD5RK** seldom receive direct mail. QSL these stations via Vasil Kasyanenko, UW6HS, Box 20, Georgievsk 357800 USSR.

The *Callbook* address for LU5UL (manager of **AZ1ARU/19** and **LP2U**) is wrong. QSL direct to Alex Cozzi, Box 100, 6300 Santa Rosa, La Pampa, Argentina. (As with most South American QSLs, don't put any call signs on the envelopes.)

Preston Smith, N6SS/VQ9SS, notes that the September-October 1990 operation of **VQ9SS** was not him. QSL those operations only to KA6V. QSL other VQ9SS operations to N6SS.

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## QSL Information

**5N30BRC** to Box 13904, Kano, Nigeria

**7X6BL** to P.O. Box 929, Tlemcen, 13000 Algeria

**905PA** to Patrick, Box 23, Matadi, Zaire

**A47RS** to P.O. Box 981, Muscat, Oman

**BV2WA** to Box 61-77, Taipei, Taiwan

**CEBEVG** to Rudy Vasquez V., Casilla 13213, Santiago 21, Chile (Juan Fernandez)

**CE9EVG** to Rudy Vasquez V., Casilla 13213, Santiago 21, Chile (South Shetlands)

**CEBZCO** to P.O. Box 1472, Valparaiso, Chile

**CU3LF** to Mike Lazaroff, KB3RG, PSC Box 1687, APO New York 09406

**DL/K7AEJ** Don Simonsen, Box 1622, Vancouver, WA 98668

**HL9RY** to Harry KG5EG, 3101 Breckenridge Drive West, Colorado Springs, CO 80906

**OD5QX** to Box 597, Tripoli, Lebanon

**OK5SK** to P.O. Box 180, Tripoli, Lebanon

**TA3D** to Box 963, Izmir, Turkey

**TY1CR** to via Fernand Decofour, F6AXD, 4 rue Maurice, Mouche, 60230 Chambly, France

**UG/RV3GJ** to Alex Belousov, RV3GJ, Box 8, Lipetsk 398000, USSR

**UD6K/RA6LFB** to Box 5, Wyselki, 353130 USSR

**UW8CA** to P.O. Box 1927, Khaborusk, 680045 USSR

**ZK3KY** to P.O. Box 3, Tokai-mura, 31911 Japan

**1Z9D** to KA6V

**3C1EA** to EA4CJA

**4K8ADS** to RW3AH

**4S7CF** to 9V1JY

**4S7EF** to N1HBF

**4S7NMR** to KZ8Y

**4U1UN** to NA2K

**4U45UN** to NA2K

**5V7DP** to KA1DE

**5W1AU** to W6KNH

**5W1JJ** to K6VNX

**5W1XD** to W6XD

**7J8AAC** to WD6AKQ

**7Q7JA** to JH8BKL

**7Q7LA** to G0IAS

**7X0NU** to F6FNU

**8P9HR** to K4BAI

**8P9X** to K4FJ

**8Q7JP** to I3EJ

**9H1FBS** to N5APW

**9H3ZJN** to 9H1GI

**9H8C** to PA0VAJ

**9J2FR** to I2ZZU

**9M2ET** to WB2KXA

**9M2HB** to AA6BB

**9M6HF** to WE2K

**9M8ZR** to WA2HZR

**9Q5UN** to OH3GZ

**A35DM** to ON4QM

**A35XK** to WA6ZEF

**A35XV** to VK2BCH

**A41JV** to KJ4GK

**A51JS** to VK9NS

**AH3C** to K9UIY

**BV2A** to K2CM

**C30ACG** to F6BKP

**C53GP** to FD1MXH

**C56/DL7FT** to DL7FT

**C90L** to YASME

**CEBZIG** to NR8J

**CN2CW** to F2CW

**CN2JF** to WA0RJY

**CN2JO** to F6ATQ

**CN2TT** to HB9CUY

**CQ9M** to G3PFS

**CT8D** to CT1DIZ

**CU2DX** to CU2AA

**CV2V** to CX4CB

**CY9CF** to FP5DX

**D68GA** to N6ZV

**D68VT** to K5VT

**DABBY** to DL3MAA

**EA9UA** to EA9IB

**ED4CW** to EA4CW

**EX7M** to UL7MW

**FJ5BL** to F6AJA

**FJ9A** to FJ5AB

**FM5WD** to W3HNC

**F08IGS** to F6EEM

**FR8P** to F6BFH

**FR5OT** to F5QT

**FT5XA** to F6ITD

**FT5XH** to F6GYV

**FY5YE** to W5JLU

**GP6UW** to G3XTT

**GW3YDX/VP9** to GW3YDX

**GX8ING** to G5LP

**H88/DL1EIJ/P** to DL1EIJ

**H88/HB9NL** to HB9NL

**HF8POL** to KB6GWX

**H88BMX** to JA1ELY

**HK8TU** to HK3DDD

**HL9RY** to KG5EG

**HR1LW** to JA1LW

**HZ1HZ** to N7RO

**IO8MMI** to IK0MMI

**IQ3A** to I3MAU

**ISSA** to IK8HVJ

**IT4U** to IK4GNH

**IY2A** to I2UIY

**J28NU** to F6FNU

**J37A** to W3HNC

**J37JH** to KJ4VH

**J37L** to WA8LOW

**J39BS** to WB2LCH

**JW8GB** to WB4ZBI

**L40V** to LU1VV

**L8H** to LU4HH

**LX9DD** to LX1GQ

**LX9DX** to LX1EA

**OM6BCI** to OK2BCI

**OM7CBU** to OK3CED

**PJ7/DH3VV** to OH3VV

**PJ8CW** to AB1U

**PR5T** to PY5TT

**PY8FF** to W9VA

**RF6F/UA3TT** to UA3TT

**RT8U** to W3HNC

**RX9J** to UC2ABA

**RY8B** to RB5BA

**S81A** to EA2JG

**SN60** to SP6PAZ

**ST2YD** to F6AJA

**SV5AZA** to SV5ADM

**T30F** to OH6ZS

**T30WW** to 5W1HM

**T33X** to DJ2SI

**TI75S** to TI4SU

**TJ1MR** to F6FNU

**TJ1RP** to VE2CH

**TM1K** to FD1MXH

**TM5A** to F6IFR

**TQ2X** to F2VX

**TR8RLA** to NV7J

**TU90A** to F6FNU

**TY1DX** to IK6FHG

**TY2FG** to IK6FHG

**TZ5VV** to N0BLD

**UF80/UF6DZ** to UB5PS

**UH3E/VE2WL** to RA3QK

**UH8EA** to W5BWA

**UM3Q/UA90F** to UA90F

**UZ4WWF** to UA4WAD

**V2/KJ4VH** to KJ4VH

**V29A** to W4FRV

**V31AB** to WA4WIP

**V31BH** to G0NFH

**V31KF** to W5ASP

**V31RB** to K5GAI

**V47KTG** to A16M

**V63BC** to VE3JDO

**V63BD** to VE3JDO

**V63WB** to N8HRY

**VP2EC** to N5AU

**VP2MEU** to K8UE

**VP2VE** to WA2NHA

**VP5/K8BIC** to K8BIC

**VP5P** to WN5A

**VP5T** to WB3NDA

**VP5VWB** to WD8RIH

**VP88XK** to W9ARV

**VP8CDJ** to GM4KLO

**VP8CEG** to G1NAN

**VQ9CQ** to KA6V

**VS6CT** to KA6V

**VS6WV** to K0TLM

**VU2GHS** to VU2BGF

**VU2WAP** to K2QEY

**W6TEX/CT3** to W6TEX

**WZ6C/ST4** to W4FRU

**XM1MQ** to VE1BTT

**XM1WF** to VE1WF

**XM3IY** to VE3IY

**XU8DX** to JA1NUT

**Y77V** to W3HNC

**YJ8ARW** to ZL1AMO

**YJ1A** to OH3GZ

**YL3GG** to RQ2GG

**YN1CC** to YN3CC

**YP8A** to YO9HP

**YV5ZZ** to K8EFS

**YW6W** to YV6AX

**Z21CA** to NM7G

**ZD8Z** to VE2CH

**ZD9BV** to W4FRU

**ZK1TW** to K6ZO

**ZK1XX** to TF3CW

**ZS8S** to AK0M

**ZWBJR** to PP5WG

**ZW40D** to PY4OD

**ZX4V** to PY4VD

Hartmut Gumpert, **9X5HG**, has an over-sized QSL card; send a business-sized envelope direct or via his manager, DJ3FW. For direct QSLs to Helmut at Box 420, Kigali, Rwanda, note that return postage to the US is US\$1.12, so US\$1 bills don't cover the cost. Send \$2 or 2 IRCs.

QSL the Gozo Island operation by the member of the Liverpool District ARS as follows: **9H3NS** via G4CVZ, **9H3BT** via G3XSN, **9H3NU** via G4CVZ, and **9H3NW** via GW4AMX.

WJ6Q says that the August 1990 contacts of **ZF2PP** were not him. He was active only in April; QSL these contacts to WB6RSY.

Mike Smedal, the only amateur to earn 5-Band WAZ from two different countries, is back in the US. QSL **5B4TI**, **EP2LI**, **A7XD**, **A71AD**, **JY8AD**, and **5B4WW** direct only to Mike at Box 22186, Ft. Lauderdale, FL 33335.

KY0A has excerpts of the **VU7NRO/ APR** Laccadives operation and can help with the cards.

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9913/PIN	N Male Pin for 9913, 9086, 8214	
	Fits UG-21 D/U & UG-21 B/UN's	1.50
UG-21D/9913	N Male for RG-8 with 9913 Pin	3.95
UG-21B/9913	N Male for RG-8 with 9913 Pin	5.75
UG-146A/U	N Male to SO-239, Teflon USA	6.00
UG-83B/U	N Female to PL-259, Teflon USA	6.00

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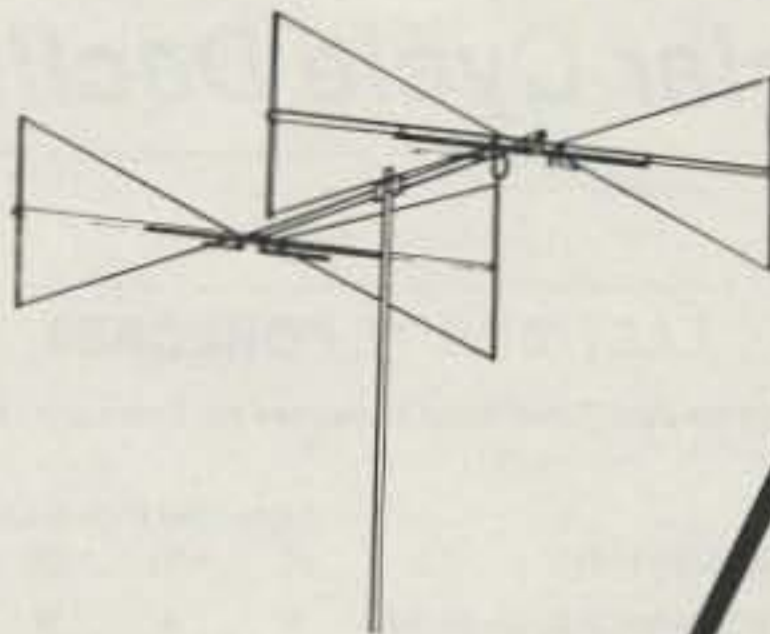
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## THE SCIENCE OF PREDICTING RADIO CONDITIONS

### Solar Cycle Decline

**A**lthough some controversy may remain among the experts, data now seem to support that the peak of Cycle 22 has already occurred, and the cycle is now slowly declining.

The Royal Observatory of Belgium reports a monthly mean sunspot number of 145 for October 1990. Daily values ranged from a high of 227 on the 15th to a low of 77 on the 31st. This results in a smoothed sunspot number of 149 centered on April 1990. The solar cycle is measured by smoothed sunspot numbers, which are derived from monthly mean values averaged over a 12-month period. April's number represents a drop of three points from the previous month's smoothed sunspot level. A smoothed sunspot number of approximately 126 is forecast for February 1991.

During October there was a corresponding decrease in the 10.7 cm solar flux level. The Algonquin Radio Observatory in Ottawa, Ontario reports a monthly mean level of 181. This results in a 12-month smoothed value of 195 centered on April 1990, a drop of 3 points from the previous month's level.

It appears almost certain now that Cycle 22 peaked in intensity during July 1989 with a smoothed count of 158. Except for a short-term increase in solar activity centered on February 1990, the present cycle has been declining slowly since then.

#### New Sunspot Cycle Record

In one respect Cycle 22 has established a new record. It has taken the shortest period of time for any recorded cycle to rise from its beginning (September 1986) to its peak (July 1989). This is a period of only 2.8 years. The previous record of 2.9 years was held by Cycle 3 (1775-1778). The longest period on record was 6.6 years established by Cycle 7 (1823-1829). The mean period for all 22 cycles observed since 1755 is 4.7 years.

Based on the rapid rise of Cycle 22, can the remainder of the cycle be forecast? Perhaps. Cycle 22 bears considerable resemblance to Cycle 3, which rose

11307 Clara Street, Silver Spring, MD 20902

#### LAST MINUTE FORECAST

Day-to-Day Conditions Expected for February 1991

Propagation Index .....	Expected Signal Quality			
	(4)	(3)	(2)	(1)
Above Normal: 2-3, 13, 15, 19	A	A	B	C
High Normal: 4, 8, 11-12, 14, 18, 21, 26	A	B	C	C-D
Low Normal: 1, 6-7, 10, 17, 20, 24	B	C	D	D-E
Below Normal: 5, 9, 16, 22, 25, 28	C	C-D	D-E	E
Disturbed: 23, 27	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.  
 3 dB 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-to-fair (B-C) on February 1, excellent (A) on the 2nd and 3rd, good (B) on the 4th, fair-to-poor (C-D) on the 5th, etc.

from beginning to peak in 2.9 years. Cycle 22's peak was recorded with a smoothed sunspot number of 158.1; Cycle 3 had a peak of 158.5. Cycle 3 was a very short cycle that spanned a period of only 9.2 years. The median period for all previous recorded sunspot cycles is 11 years. If Cycle 22 continues to follow the pattern of Cycle 3, one might expect that it too will be a short cycle of approximately 9 years. This would place its minimum during November or December 1995. Sunspot cycles, however, are full of surprises, and just about anything can still happen with Cycle 22!

#### Flash Report For CQ WW DX Contest CW Weekend

The CQ forecast for the World-Wide CW Contest weekend of November 24-25 was pretty much on the mark. Based on

solar flux levels and geomagnetic conditions reported from observatories throughout the world, and from initial reports received from contest participants, it appears as if great propagation conditions existed.

On Saturday, November 24th the 10.7 cm solar flux level was 171, and the world-wide (planetary) geomagnetic A-figure was 5. This combination defines stable or quiet ionospheric conditions and is well into the Above Normal propagation range. On Sunday, November 25th the solar flux level dropped slightly to 167, but the planetary A-figure remained at the 5 level, with propagation conditions again rated as Above Normal.

#### February Conditions

DX propagation conditions will continue to be excellent on five bands during the daylight hours of February. Fifteen meters is likely to be the best band from shortly after sunrise until just after sunset, with 10, 12, 17, and 20 meters not far behind. The 6 meter band should be an extra DX bonus this month during the hours of daylight. Be sure to check this band for unusual DX openings, particularly when conditions are expected to be High Normal or better. Look for openings towards Europe and the east before noon, towards the South Pacific and the west during the late afternoon, and towards Central and South America throughout most of the daylight hours. The best times to listen for 6 meter DX openings are shown in the DX Propagation Charts by a \*\*.

During the period from sundown to midnight as many as seven bands may be available for DX. Fifteen meters should hold up well past sundown for DX openings towards Central and South America, the Pacific area, and the Far East and Asia. Twenty meters should remain open to most areas of the world during this period, but with signals strongest from southerly and westerly directions. Good DX towards the east and the south should also be possible on 30, 40, and 80 meters, with some openings in the same directions also possible on 160 meters.

Between midnight and the sunrise period it should be a toss-up among 20, 30, and 40 meters for worldwide DX honors.

### 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.

Eastern & Central Africa	09-11 (1)	07-09 (1)	12-14 (1)	19-23 (1)
	11-13 (2)	09-11 (2)	14-16 (2)	23-01 (2)
	13-15 (4)	11-13 (3)	16-18 (3)	01-02 (1)
	15-16 (3)	13-17 (4)	18-23 (4)	23-01 (1)*
	16-17 (2)	17-18 (3)	23-02 (3)	
	17-18 (1)	18-19 (2)	02-03 (2)	
	09-11 (1)**	19-20 (1)	03-05 (1)	

Central & South Asia	08-11 (1)	07-08 (1)	06-07 (1)	19-22 (1)
	19-21 (1)	08-09 (2)	07-09 (2)	04-06 (1)
		09-11 (3)	09-11 (1)	
		11-12 (2)	17-19 (1)	
		12-13 (1)	19-21 (3)	
		19-20 (1)	21-22 (2)	
	20-21 (2)	22-00 (1)		
	21-22 (1)			

Southeast Asia	10-13 (1)	07-08 (1)	05-07 (1)	05-07 (1)
	18-20 (1)	08-10 (2)	07-09 (2)	
		10-12 (1)	09-11 (1)	
		12-14 (2)	14-17 (1)	
		14-18 (1)	19-20 (1)	
		18-21 (2)	20-23 (2)	
	21-22 (1)	23-01 (1)		

Far East	09-11 (1)	07-08 (1)	06-07 (1)	05-08 (1)
	18-20 (1)	08-10 (2)	07-09 (3)	
		10-12 (1)	09-11 (2)	
		15-16 (1)	11-13 (1)	
		16-17 (2)	17-19 (1)	
		17-19 (3)	19-22 (2)	
	19-21 (2)	22-00 (3)		
	21-22 (1)	00-02 (2)		
		02-03 (1)		

South Pacific & New Zealand	08-12 (1)	07-08 (1)	11-19 (1)	00-01 (1)
	12-14 (2)	08-10 (2)	19-21 (2)	01-02 (2)
	14-16 (3)	10-13 (1)	21-23 (3)	02-05 (3)
	16-18 (4)	13-16 (2)	23-03 (4)	05-07 (2)
	18-19 (3)	16-19 (3)	03-05 (3)	07-08 (1)
	19-20 (2)	19-21 (4)	05-07 (2)	01-03 (1)*
20-21 (1)	21-22 (3)	07-09 (3)	03-06 (2)*	
16-18 (1)**	22-23 (2)	09-11 (2)	06-07 (1)*	
	23-00 (1)			

Australasia	09-11 (1)	08-09 (1)	06-08 (2)	02-04 (1)
	14-15 (1)	09-12 (3)	08-10 (4)	04-05 (2)
	15-16 (2)	12-15 (1)	10-12 (2)	05-06 (3)
	16-18 (4)	15-16 (2)	12-15 (1)	06-07 (2)
	18-19 (3)	16-19 (3)	15-17 (2)	02-05 (1)*
	19-20 (2)	19-21 (2)	17-21 (1)	05-06 (2)*
20-21 (1)	21-22 (3)	21-23 (2)	06-07 (1)*	
17-19 (1)**	22-23 (2)	23-02 (3)		
	23-00 (1)	02-03 (2)		
		03-06 (1)		

Caribbean, Central America & Northern Countries of South America	07-08 (1)	05-06 (1)	03-05 (2)	18-19 (1)
	08-09 (2)	06-07 (2)	05-06 (3)	19-20 (2)
	09-16 (4)	07-11 (4)	06-09 (4)	20-03 (4)
	16-18 (3)	11-13 (3)	09-10 (3)	03-05 (3)
	18-19 (2)	13-19 (4)	10-14 (2)	05-06 (2)
	19-20 (1)	19-21 (3)	14-16 (3)	06-07 (1)
09-11 (1)**	21-22 (2)	16-00 (4)	20-22 (1)*	
	22-00 (1)	00-03 (3)	22-03 (2)*	
			03-05 (1)*	

Peru, Bolivia, Paraguay, Brazil, Chile, Argentina & Uruguay	07-08 (1)	06-07 (1)	15-16 (1)	19-21 (1)
	08-10 (3)	07-10 (2)	16-17 (2)	21-00 (2)
	10-13 (2)	10-13 (1)	17-18 (3)	00-03 (3)
	13-15 (3)	13-15 (2)	18-02 (4)	03-04 (2)
	15-17 (4)	15-16 (3)	02-03 (3)	04-06 (1)
	17-18 (2)	16-20 (4)	03-04 (2)	21-05 (1)*
18-19 (1)	20-22 (3)	04-05 (1)		
09-12 (1)**	22-23 (2)	05-07 (2)		
15-17 (1)**	23-00 (1)	07-09 (1)		

McMurdo Sound, Antarctica	16-17 (1)	12-16 (1)	18-20 (1)	23-01 (1)
	17-19 (2)	16-18 (2)	20-22 (2)	01-05 (2)
	19-20 (1)	18-21 (3)	22-00 (3)	05-06 (1)
	21-22 (2)	00-05 (2)		
	22-23 (1)	05-06 (1)		
		06-08 (2)		
		08-09 (1)		

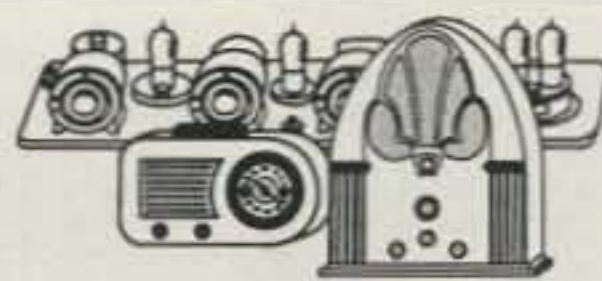
### February 15-April 15, 1991 Time Zone: EST (24-Hour Time) EASTERN USA TO:

	10 Meters	15 Meters	20 Meters	40/80 Meters
Western & Central Europe & North Africa	08-09 (1)	06-07 (1)	00-03 (1)	17-18 (1)
	09-10 (2)	07-08 (2)	03-06 (2)	18-19 (2)
	10-12 (3)	08-11 (3)	06-09 (3)	19-22 (3)
	12-13 (4)	11-15 (4)	09-11 (2)	22-01 (4)
	13-14 (2)	15-16 (3)	11-13 (3)	01-02 (3)
	14-15 (1)	16-17 (2)	13-18 (4)	02-03 (2)
09-11 (1)**	17-18 (1)	18-22 (3)	03-04 (1)	
		22-00 (2)	19-21 (1)*	
			21-00 (2)*	
			00-02 (1)*	
Northern Europe & European USSR	08-09 (1)	07-08 (1)	00-02 (3)	17-19 (1)
	09-10 (2)	08-09 (2)	02-03 (2)	19-22 (2)
	10-11 (3)	09-12 (3)	03-05 (1)	22-01 (3)
	11-12 (2)	12-13 (2)	05-07 (2)	01-02 (2)
	12-13 (1)	13-14 (1)	07-09 (3)	02-03 (1)
			09-14 (2)	20-01 (1)*
		14-18 (3)		
		18-21 (2)		
		21-00 (1)		
Eastern Mediterranean & Middle East	08-09 (1)	07-08 (1)	04-06 (1)	18-20 (1)
	09-11 (2)	08-09 (2)	06-08 (2)	20-23 (2)
	11-12 (3)	09-10 (3)	06-12 (1)	23-00 (1)
	12-13 (1)	10-13 (4)	12-14 (2)	20-23 (1)*
		13-14 (2)	14-15 (3)	
		14-15 (1)	15-17 (4)	
		17-20 (3)		
		20-22 (2)		
		22-02 (3)		
		02-04 (2)		
Western Africa	07-10 (1)	06-09 (1)	02-06 (2)	18-20 (1)
	10-12 (2)	09-11 (2)	06-13 (1)	20-22 (2)
	12-13 (3)	11-14 (3)	13-15 (2)	22-00 (3)
	13-15 (4)	14-17 (4)	15-17 (3)	00-02 (2)
	15-16 (3)	17-18 (3)	17-00 (4)	02-03 (1)
	16-18 (2)	18-19 (2)	00-02 (3)	22-02 (1)*
18-19 (1)	19-21 (1)			
08-12 (1)**				
Southern Africa	07-08 (1)	06-10 (1)	05-07 (2)	18-20 (1)
	08-10 (2)	10-12 (2)	07-14 (1)	20-23 (2)
	10-11 (3)	12-14 (3)	14-15 (2)	23-00 (1)
	11-13 (4)	14-17 (4)	15-17 (3)	21-23 (1)*
	13-14 (2)	17-18 (2)	17-20 (4)	
	14-15 (1)	18-19 (1)	20-21 (2)	
11-13 (1)**		21-23 (1)		
		23-02 (3)		
		02-03 (2)		
		03-05 (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)	07-08 (1)	00-06 (1)	17-19 (1)
	10-12 (2)	08-09 (2)	06-09 (2)	19-22 (2)
	12-13 (1)	09-11 (3)	09-11 (1)	22-00 (3)
		11-13 (4)	11-13 (2)	00-01 (2)
		13-14 (3)	13-15 (3)	01-02 (1)
		14-15 (2)	15-17 (4)	20-22 (1)*
	15-16 (1)	17-20 (3)	22-00 (2)*	
		20-00 (2)	00-01 (1)*	
Northern Europe & European USSR	08-09 (1)	07-08 (1)	07-10 (2)	19-22 (1)
	09-11 (2)	08-09 (2)	10-13 (1)	22-00 (2)
	11-12 (1)	09-12 (3)	13-15 (2)	00-02 (1)
		12-13 (2)	15-18 (3)	22-01 (1)*
		13-14 (1)	18-20 (2)	
			20-22 (1)	
		22-02 (2)		
		02-07 (1)		
Eastern Mediterranean & Middle East	09-10 (1)	07-08 (1)	05-06 (1)	19-22 (1)
	10-11 (2)	08-09 (2)	06-08 (2)	20-22 (1)*
	11-12 (1)	09-12 (3)	08-12 (1)	
		12-13 (2)	12-14 (2)	
		13-14 (1)	14-18 (3)	
			18-20 (2)	
		20-23 (3)		
		23-01 (2)		
		01-02 (1)		

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Western Africa	08-09 (1)	06-08 (1)	04-06 (2)	18-20 (1)
	09-11 (2)	08-10 (2)	06-12 (1)	20-23 (2)
	11-12 (3)	10-13 (3)	12-15 (2)	23-01 (1)
	12-14 (4)	13-16 (4)	15-17 (3)	21-00 (1)*
	14-16 (3)	16-17 (3)	17-23 (4)	
	16-17 (2)	17-19 (2)	23-01 (3)	
	17-18 (1)	19-20 (1)	01-02 (2)	
	08-10 (1)**		02-04 (1)	
Southern Africa	07-08 (1)	07-09 (1)	05-07 (2)	19-20 (1)
	08-10 (2)	09-11 (2)	07-13 (1)	20-21 (2)
	10-11 (3)	11-12 (3)	13-15 (2)	21-22 (1)
	11-12 (4)	12-16 (4)	15-16 (3)	20-21 (1)*
	12-13 (2)	16-17 (2)	16-19 (4)	
	13-14 (1)	17-18 (1)	19-20 (3)	
			20-22 (2)	
			22-00 (3)	
		00-02 (2)		
		02-05 (1)		
Eastern & Central Africa	09-11 (1)	08-09 (1)	12-14 (1)	19-20 (1)
	11-13 (2)	09-12 (2)	14-16 (2)	20-22 (2)
	13-16 (4)	12-16 (3)	16-19 (3)	22-23 (1)
	16-17 (2)	16-18 (4)	19-21 (4)	20-22 (1)*
	17-18 (1)	18-19 (2)	21-22 (3)	
	13-15 (1)**	19-20 (1)	22-23 (2)	
		23-00 (1)		

		20-21 (2)	16-20 (2)	
		21-22 (2)	20-22 (1)	
			22-00 (3)	
			00-02 (2)	
			02-03 (1)	
Central & South Asia	07-09 (1)	07-08 (1)	06-07 (1)	05-07 (1)
	18-20 (1)	08-10 (2)	07-09 (2)	18-20 (1)
		10-11 (1)	09-11 (1)	
		18-19 (1)	16-18 (1)	
		19-21 (2)	18-19 (2)	
		21-22 (1)	19-21 (3)	
			21-23 (2)	
			23-02 (1)	
Southeast Asia	09-10 (1)	08-09 (1)	06-07 (1)	04-07 (1)
	10-12 (2)	09-10 (2)	07-08 (2)	
	12-14 (1)	10-12 (3)	08-10 (3)	
	16-17 (1)	12-13 (2)	10-12 (2)	
	17-19 (3)	13-17 (1)	12-18 (1)	
	19-20 (2)	17-21 (2)	18-21 (2)	
	20-21 (1)	21-22 (1)	21-23 (1)	
Far East	15-16 (1)	09-11 (1)	06-07 (1)	02-04 (1)
	16-17 (2)	14-16 (1)	07-08 (2)	04-06 (2)
	17-18 (3)	16-17 (2)	08-10 (3)	06-08 (1)
	18-19 (2)	17-19 (4)	10-12 (2)	05-07 (1)*
	19-20 (1)	19-20 (3)	12-16 (1)	

South Pacific & New Zealand	10-12 (1)	08-12 (1)	17-19 (1)	22-00 (1)
	12-14 (2)	12-14 (2)	19-21 (2)	00-01 (2)
	14-16 (3)	14-16 (1)	21-23 (3)	01-06 (3)
	16-19 (4)	16-18 (2)	23-04 (4)	06-07 (2)
	19-20 (2)	18-19 (3)	04-05 (3)	07-08 (1)
	20-21 (1)	19-22 (4)	05-07 (2)	00-02 (1)*
	11-14 (1)**	22-23 (3)	07-09 (4)	02-05 (2)*
	17-19 (1)**	23-01 (2)	09-10 (3)	05-07 (1)*
		01-02 (1)	10-11 (2)	
			11-12 (1)	
Australasia	09-11 (1)	07-08 (1)	05-07 (2)	02-04 (1)
	14-15 (1)	08-11 (3)	07-08 (3)	04-06 (3)
	15-16 (2)	11-14 (1)	08-10 (4)	06-07 (2)
	16-18 (4)	14-16 (2)	10-12 (2)	07-08 (1)
	18-19 (3)	16-18 (1)	12-14 (1)	04-05 (1)*
	19-20 (2)	18-19 (2)	14-16 (2)	05-06 (2)*
	20-21 (1)	19-21 (3)	16-21 (1)	06-07 (1)*
	16-18 (1)**	21-23 (2)	21-23 (2)	
		23-00 (1)	23-01 (3)	
			01-04 (4)	
		04-05 (3)		
Caribbean, Central America & Northern Countries of South America	07-08 (1)	06-07 (1)	06-09 (4)	18-19 (1)
	08-09 (2)	07-08 (2)	09-11 (3)	19-20 (2)
	09-10 (3)	08-10 (4)	11-15 (2)	20-00 (3)
	10-16 (4)	10-13 (3)	15-17 (3)	00-02 (4)
	16-18 (3)	13-19 (4)	17-23 (4)	02-03 (3)
	18-19 (2)	19-20 (3)	23-02 (3)	03-04 (2)
	19-20 (1)	20-21 (2)	02-05 (2)	04-06 (1)
	09-11 (1)**	21-23 (1)	05-06 (3)	19-21 (1)*
				21-03 (2)*
				03-05 (1)*
McMurdo Sound, Antarctica	14-16 (1)	13-16 (1)	16-19 (1)	22-02 (1)
	16-19 (2)	16-18 (2)	19-20 (2)	02-04 (2)
	19-20 (1)	18-21 (3)	20-04 (3)	04-06 (1)
		21-22 (2)	04-05 (2)	
		22-23 (1)	05-07 (1)	
			07-08 (2)	
		08-10 (1)		



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**Time Zone: PST (24-Hour Time) WESTERN USA TO:**

	10 Meters	15 Meters	20 Meters	40/80 Meters
Western Europe & North Africa	08-09 (1)	07-08 (1)	00-06 (1)	19-20 (1)
	09-11 (2)	08-10 (2)	06-09 (2)	20-22 (2)
	11-12 (1)	10-12 (3)	09-11 (1)	22-00 (1)*
		11-14 (2)	20-22 (1)*	
		13-14 (1)		
		14-16 (3)		
		16-19 (2)		
		19-22 (1)		
		22-00 (2)		
Central & Northern Europe & European USSR	08-09 (1)	07-08 (1)	05-06 (1)	19-21 (1)
	09-10 (2)	08-09 (2)	06-09 (2)	21-23 (2)
	10-11 (1)	09-11 (3)	09-12 (1)	23-00 (1)
		11-12 (1)	12-14 (2)	21-23 (1)*
		19-21 (1)	14-16 (3)	
		16-17 (2)		
		17-18 (1)		
Eastern Mediterranean & Middle East	08-09 (1)	07-08 (1)	05-06 (1)	18-21 (1)
	09-10 (2)	08-09 (2)	06-09 (2)	
	10-11 (1)	09-11 (3)	09-12 (1)	
		11-12 (1)	12-16 (2)	
		20-22 (1)	16-18 (1)	
		18-22 (2)		
		22-02 (1)		
Western & Central Africa	08-10 (1)	07-10 (1)	01-06 (1)	18-22 (1)
	10-12 (2)	10-12 (2)	06-08 (2)	
	12-14 (3)	12-14 (3)	08-12 (1)	
	14-15 (2)	14-16 (4)	12-15 (2)	
	15-16 (1)	16-17 (3)	15-17 (3)	
		17-18 (2)	17-21 (4)	
		21-00 (3)		
		00-01 (2)		
Eastern Africa	09-12 (1)	08-11 (1)	06-08 (1)	18-20 (1)
	12-14 (2)	11-14 (2)	12-14 (1)	
	14-15 (1)	14-16 (3)	14-16 (2)	
		16-17 (2)	16-20 (3)	
		17-18 (1)	20-22 (2)	
		22-23 (1)		
Southern Africa	07-08 (1)	06-09 (1)	04-06 (1)	18-21 (1)
	08-11 (3)	09-12 (2)	06-08 (2)	
	11-12 (2)	12-15 (3)	08-13 (1)	
	12-13 (1)	15-16 (2)	13-15 (2)	
		16-17 (1)	15-18 (3)	
			18-19 (2)	
		19-21 (1)		
		21-23 (3)		
		23-00 (2)		
		00-02 (1)		
Central & South Asia	07-09 (1)	07-08 (1)	16-18 (1)	05-07 (1)
	17-18 (1)	08-10 (2)	18-21 (2)	18-20 (1)
	18-19 (3)	10-11 (1)	21-23 (1)	
	19-20 (2)	16-17 (1)	02-03 (1)	
	20-21 (1)	17-19 (2)	03-05 (2)	
		19-20 (3)	05-07 (1)	
		20-21 (2)	07-09 (3)	
		21-22 (1)	09-10 (2)	
			10-12 (1)	

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Installation and dismantling of towers is dangerous and temporary guys of sufficient strength and size should be used at all times when individuals are climbing towers during all types of installations or dismantlings. Temporary guys should be used on the first 10' or tower during erection or dismantling. Dismantling can even be more dangerous since the condition of the tower, guys, anchors, and/or roof in many cases is unknown.

The dismantling of some towers should be done with the use of a crane in order to minimize the possibility of member, guy wire, anchor, or base failures. **Used towers in many cases are not as inexpensive as you may think if you are injured or killed.**

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Southeast Asia	08-09 (1)	07-08 (1)	23-01 (1)	00-02 (1)
	09-11 (2)	08-10 (4)	01-03 (2)	02-05 (2)
	11-12 (1)	*9-12 (3)	03-06 (3)	05-07 (1)
	14-15 (1)	12-17 (1)	06-07 (2)	
	15-16 (2)	17-20 (3)	07-09 (3)	
	16-18 (4)	20-21 (2)	09-11 (2)	
	18-19 (2)	21-22 (1)	11-14 (1)	
	19-20 (1)			
	16-18 (1)**			
Far East	14-15 (1)	08-10 (2)	04-06 (2)	00-02 (1)
	15-16 (2)	13-14 (1)	06-07 (1)	02-05 (2)
	16-18 (4)	14-15 (2)	07-08 (3)	05-06 (3)
	18-19 (2)	15-17 (3)	08-09 (4)	06-07 (2)
	19-20 (1)	17-20 (4)	09-10 (3)	07-08 (1)
	15-17 (1)**	20-21 (3)	10-11 (2)	02-04 (1)**
		21-22 (1)	11-19 (1)	04-06 (2)**
			19-21 (2)	06-07 (1)**
			21-23 (4)	
			23-00 (3)	
		00-03 (2)		
		03-04 (3)		
South Pacific & New Zealand	09-10 (1)	07-08 (1)	06-07 (3)	19-21 (1)
	10-12 (3)	08-09 (2)	07-09 (4)	21-22 (2)
	12-16 (2)	09-11 (3)	09-10 (3)	22-23 (3)
	16-20 (4)	11-17 (2)	10-11 (2)	23-05 (4)
	20-21 (3)	17-18 (3)	11-17 (1)	05-06 (3)
	21-22 (1)	18-22 (4)	17-19 (2)	06-07 (2)
	10-12 (1)**	22-23 (3)	19-20 (3)	07-08 (1)
	18-20 (1)**	23-01 (2)	20-01 (4)	22-01 (1)**
		01-02 (1)	01-04 (3)	01-05 (2)**
			04-06 (2)	05-06 (1)**
Australasia	11-13 (1)	06-07 (1)	12-20 (1)	00-01 (1)
	13-14 (2)	07-09 (3)	20-22 (2)	01-02 (2)
	14-16 (3)	09-11 (2)	22-00 (3)	02-06 (3)
	16-19 (4)	11-13 (1)	00-04 (4)	06-07 (2)
	19-20 (3)	13-15 (2)	04-06 (3)	07-08 (1)
	20-21 (1)	15-17 (1)	06-08 (4)	02-04 (1)**
	16-18 (1)**	17-18 (2)	08-10 (3)	04-06 (2)**
		18-21 (4)	10-12 (2)	06-07 (1)**
		21-22 (2)		
		22-23 (1)		
Caribbean, Central America & Northern Countries of South America	07-08 (1)	05-06 (1)	05-07 (4)	18-20 (1)
	08-09 (2)	06-07 (2)	07-09 (3)	20-01 (3)
	09-10 (3)	07-09 (4)	09-14 (2)	01-04 (2)
	10-16 (4)	09-14 (3)	14-16 (3)	04-06 (1)
	16-17 (3)	14-17 (4)	16-22 (4)	19-21 (1)**
	17-18 (1)	17-18 (3)	22-00 (3)	21-03 (2)**
09-11 (1)**	18-20 (2)	00-03 (2)	03-04 (1)**	
	20-21 (1)	03-05 (3)		
Peru, Bolivia, Paraguay, Brazil, Chile, Argentina & Uruguay	07-08 (1)	06-07 (1)	12-14 (1)	19-21 (1)
	08-09 (3)	07-09 (2)	14-16 (2)	21-23 (2)
	09-11 (2)	09-12 (1)	16-18 (3)	23-01 (3)
	11-14 (3)	12-14 (2)	18-01 (4)	01-02 (2)
	14-17 (4)	14-15 (3)	01-02 (3)	02-03 (1)
	17-18 (2)	15-20 (4)	02-06 (2)	22-02 (1)**
	18-19 (1)	20-23 (3)	06-08 (1)	
	09-11 (1)**	23-00 (2)		
	00-01 (1)			
McMurdo Sound, Antarctica	13-14 (1)	14-16 (1)	16-18 (1)	22-02 (1)
	14-18 (2)	16-17 (2)	18-19 (2)	02-04 (2)
	18-19 (1)	17-19 (3)	19-21 (3)	04-06 (1)
		19-21 (4)	21-02 (4)	
		21-22 (3)	02-04 (3)	
		22-23 (2)	04-05 (2)	
	23-00 (1)	05-07 (1)		
		07-08 (2)		
		08-09 (1)		

Africa, Australasia, Antarctica, and parts of Asia. Equinoctial propagation conditions tend to maximize during the sunrise and sunset periods, and over both short- and long-path openings.

This month's Propagation Charts contain band-opening predictions for major DX paths for the period February 15 through April 15, 1991. A short-skip propagation forecast for February appeared in last month's column.

## VHF Ionospheric Openings

As mentioned earlier in this column, expect unusually good DX conditions on the 6 meter band during the hours of daylight, with F-layer openings to many areas of the world from the United States. Another form of 6 meter propagation, *trans-equatorial scatter (TE)*, usually peaks during the equinoctial period. Some TE open-

ings should be possible during February between the southern tier states and South America. The best time to check for such openings is between 7 and 10 PM local time. Some TE openings may also be possible on 2 meters at the same time.

No significant meteor showers are expected during February. Radio storminess expected during the month should produce some widespread auroral activity, with increased chances for short-skip openings on both 6 and 2 meters, for distances up to approximately 1300 miles. Check the Last Minute Forecast at the beginning of this column for those days during February that are expected to be Disturbed or Below Normal. These are the days on which unusual ionospheric short-skip openings on the VHF bands are most likely to occur.

73, George, W3ASK

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CIRCLE 64 ON READER SERVICE CARD

\*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.

Good DX openings to most areas of the world should also be possible on 80 meters. Be sure to also check 160 meters for some unusual Dx openings during this period.

Beginning late in February and continuing through March and early April, expect considerable improvement in DX conditions between the northern and southern hemispheres. This will result from the effects of the spring equinox period, as the sun crosses the equator in its apparent travels toward northern skies. These improved inter-hemispheric conditions should be noticeable on all bands 6 through 160 meters, and on circuits mainly between the United States and South America, southern and central

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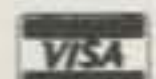
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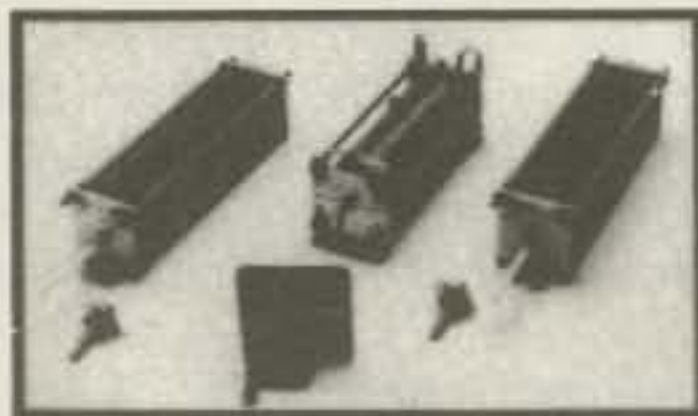
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## Announcing (from p. 9)

Brooksville, Florida. Call 904-796-4840 after 7 PM.

Feb. 23, **Charleston, South Carolina Hamfest**, National Guard Armory, Charleston, South Carolina. Contact Jenny Myers, WA4NGV, 2630 Dellwood Ave., N. Charleston, SC 29405 (803-747-2324). (VE exams at 9 AM, walk-ins okay, preregistration appreciated.)

Feb. 23, **LaPorte Cabin Fever Hamfest**, La Porte Civic Auditorium, La Porte, Indiana. Contact LaPorte ARC, P.O. Box 30, LaPorte, IN 46350 (SASE), or call 219-362-2679.

Feb. 23, **Orange ARC Hamfest/Fleamarket**, VFW, Orange, Texas. Contact Sherwood Buckalew, KA5VOT, 409-883-6111.

Feb. 23, **Northern Vermont Winter Hamfest Committee**, Milton High School, Milton, Vermont. Contact Mitch Stern, WB2JSJ, 802-879-6589.

Feb. 23-24, **ARRL '91 Great Lakes Division Convention**, Cincinnati Gardens Exhibition Center, Cincinnati, Ohio. Contact Stan Cohen, WD8QDQ, 513-531-1011.

Feb. 24, **Vienna Wireless Society 1991 Winterfest**, Vienna Community Center, Vienna, Virginia. Contact Harry Kaklikian, W4ACN, 4941 Andrea Ave., Annandale, VA 22003 (703-978-4402).

Feb. 24, **Livonia ARC Swap 'n Shop**, Dearborn Civic Center, Dearborn, Michigan. Contact Neil Coffin, WA8GWL, Livonia ARC, P.O. Box 2111, Livonia, MI 48151 (SASE). (VE exams.)

Feb. 24, **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.)

March 3, **Two Rivers ARC Swap and Shop**, Rostraver Volunteer Fire Hall, Rostraver Township, Pennsylvania. Contact Michael Kowalcheck, KV3L, 412-751-9657.

March 3, **Mt. Tom Amateur Repeater Assn. Fleamarket**, Smith Vocational School, Northampton, Massachusetts. Contact Marvin Yale, N1CDR, 6 Laurel Terrace, Westfield, MA 01085 (413-562-1027).

March 3, **York Springfest (Ham & Computer)**, Dover Firehall, York, Pennsylvania. Contact York Springfest, P.O. Box 316, New Freedom, PA 17349-0316, or call 301-239-3878. (VE exams.)

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**811A tubes resist premature failure in two ways.**

**First, they're constructed with widely spaced elements that minimize the chance of elements touching and causing a short — even if the plate gets hot enough to melt.**

**Second, they use a directly heated thoriated tungsten filament cathode that prevents the electron emitting layer from instantly stripping off — even if mistuning causes a sudden, severe current overload.**

**Indirectly heated oxide cathode tubes like the \$400 3CX800A7) can be rendered instantly useless if their electron emitting layer is stripped off because of a severe current overload due to mistuning.**

**The Ameritron AL-811 is excellent for the newcomer because it's tough enough to withstand momentary mistuning. And the tubes are so inexpensive that you can replace one for mere pocket change.**

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**The heart of the AL-811 power supply is**

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**Wire wound, 7 watt, 50 K ohm equalizing resistors safely protect each filter capacitor — not 2 watt, 100 K ohm carbon composition resistors that can open and cause your filter capacitors to explode or fail.**

**The Ameritron AL-811 power supply is built tough so you get peak performance year after year.**

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**A Pi-Network tuned input provides a 50 ohm load for your rig. Even fussy solid state rigs can deliver their full drive to AL-811.**

**Low loss slug tuned coils — tunable from the rear panel — let you optimize performance. High quality low drift silver mica capacitors maintain proper tuning.**

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**The low loss pi-network output tank of the AL-811 has been carefully designed for optimum Q on each band and built with quality RF components.**

**The result is peak performance over each band, wide impedance matching range and exceptionally smooth tuning with efficiencies close to 70%. Even a 3:1 SWR load won't damage the tubes or tank components.**

**A ball bearing vernier reduction drive makes plate tuning precise and easy.**

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**A quiet fan pressurizes the cabinet with over 20 cubic feet per minute of cool air.**

**This large volume of air flow keeps the 811A tube temperature safely below the tube manufacturer's rating — even with a key down carrier at 500 watts output.**

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**Two illuminated meters give you a clear picture of your AL-811 operating conditions so you can tell right away if something is wrong.**

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WANTED: Manuals/schematics for Olson RA-48 communications receiver, Paco G-15, and B&W grid dippers, Conar 280 RF sig gen, Heath HR-10B rcvr, and AG-9A audio gen. Al Bernard, NI4Q, P.O. Box 690098, Orlando, FL 32819 (407-351-5536).

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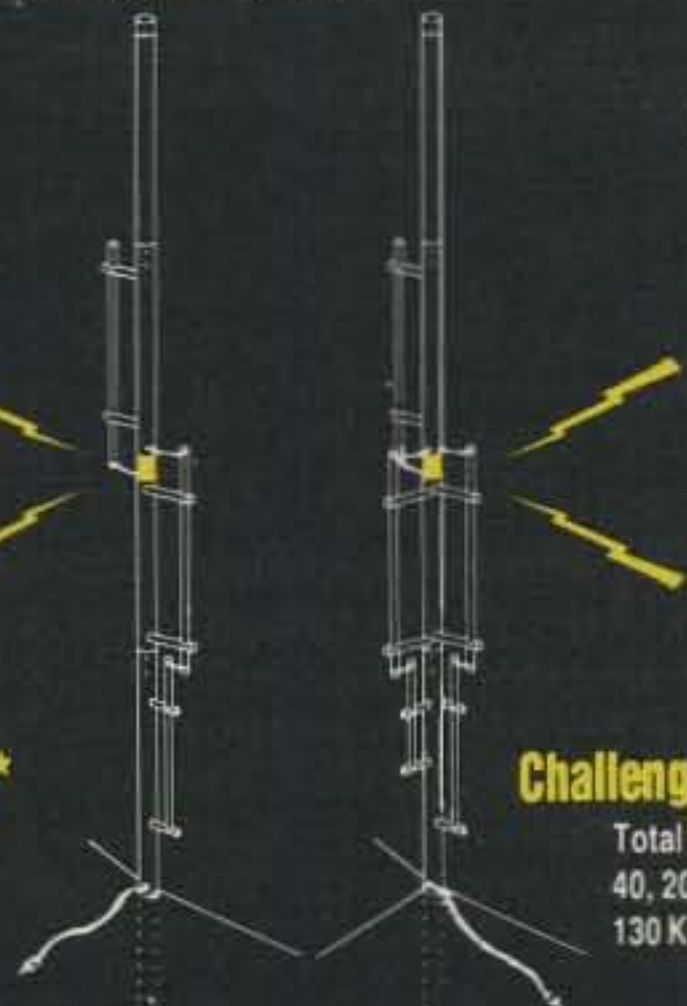
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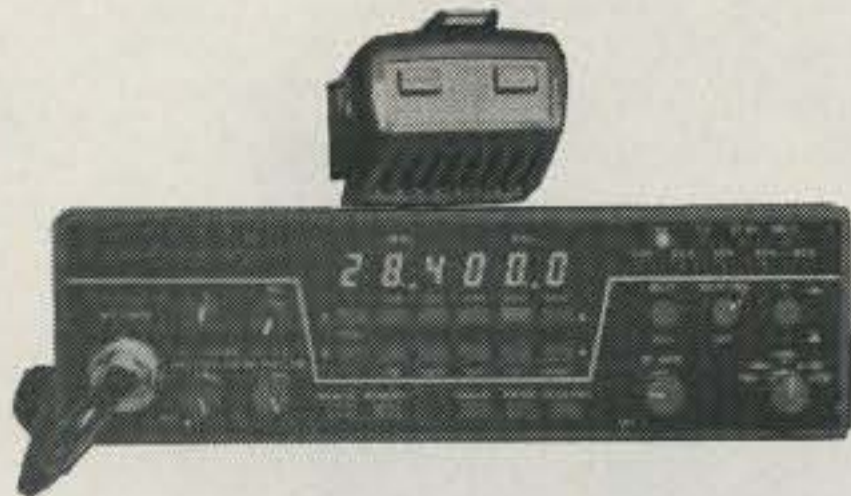
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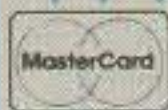
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### Compact FM Handhelds

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- 2 Independent VFOs
- Built-in CTCSS (Encode/Decode)
- Automatic Power Off (APO)
- Programmable Channel Steps
- Backlit Keypad and Display
- 10 Memory Auto-Dialer
- One-Touch Instant Recall of Favorite Channel
- Built-in VOX

- 10 Battery Saving Sampling Rates
- PTT/Keypad Lock
- Includes: CSC-35 Vinyl Case, NC-28B 117 VAC Wall Charger, Belt Clip and FNB-17 Ni-Cad Battery.
- Accessories/Options: FNB-12S (5 Watts) Battery, MH-12A2B Speaker/Mic, MH-19A2B Mini Earpiece/Mic, MH-18A2B Lapel Speaker and LCC-25 Custom Leather Case.

#### Specifications

**Frequency Range:** RX: 130-174 MHz, TX: 144-148 MHz (FT-411E); 430-450 MHz (FT-811); 1240-1300 MHz (FT-911)

**Power Output:** W/ FNB-17: 2.5 Watts (FT-411E); 2.0 Watts (FT-811); 1.0 Watt (FT-911) — W/ FNB-12S: 5.0 Watts (FT-411E); 5.0 Watts (FT-811); 1.0 Watt (FT-911)

**Channel Steps:** 5, 10, 12.5, 20 & 25 kHz

**Case Size:** 2.2(W)x5.0(H)x1.3(D) in.

**Weight (Approx.):** 13.4 oz. (FT-411E); 13.4 oz. (FT-811); 15.2 oz. (FT-911)

## FT-470

### Compact Dual Band 2m/70cm FM Transceiver

Compact... Powerful... Economically Priced. The FT-470 provides "true" Dual Band Operation so you can transmit on one band while monitoring or scanning on the other band.

#### Plus these features:

- 42 Memories
- 2 Independent VFOs
- Built-in CTCSS (Encode/Decode)
- Automatic Power Off (APO)
- Programmable Channel Steps
- Backlit Keypad and Display
- 10 Memory Auto-Dialer
- 10 Battery Saving Sampling Rates
- PTT/Keypad Lock
- Includes: CSC-43 Vinyl Case, NC-28B 117 VAC Wall Charger, Belt Clip and FNB-17 Ni-Cad Battery.
- Accessories/Options: FNB-12S (5 Watts) Battery, MH-12A2B Speaker/Mic, MH-19A2B Mini Earpiece/Mic, MH-18A2B Label Speaker and LCC-27 Custom Leather Case.

#### Specifications

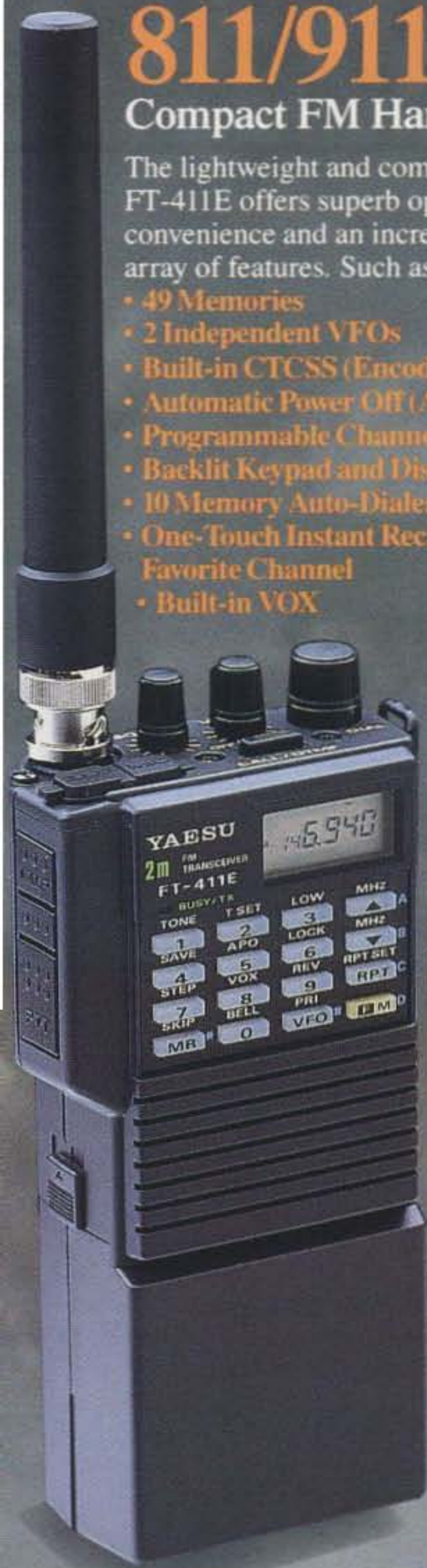
**Frequency Range:** RX: 130-180 MHz, TX: 144-148 MHz (VHF); 430-450 MHz (UHF)

**Power Output:** W/FNB-17: 2.3 Watts (144 & 430 MHz) — W/FNB-12s: 5.0 Watts (144 & 430 MHz)

**Channel Steps:** 5, 10, 12.5, 20 & 25 kHz

**Case Size:** 2.2(W)x6.0(H)x1.3(D) in.

**Weight (Approx.):** 14.8 oz.



# YAESU

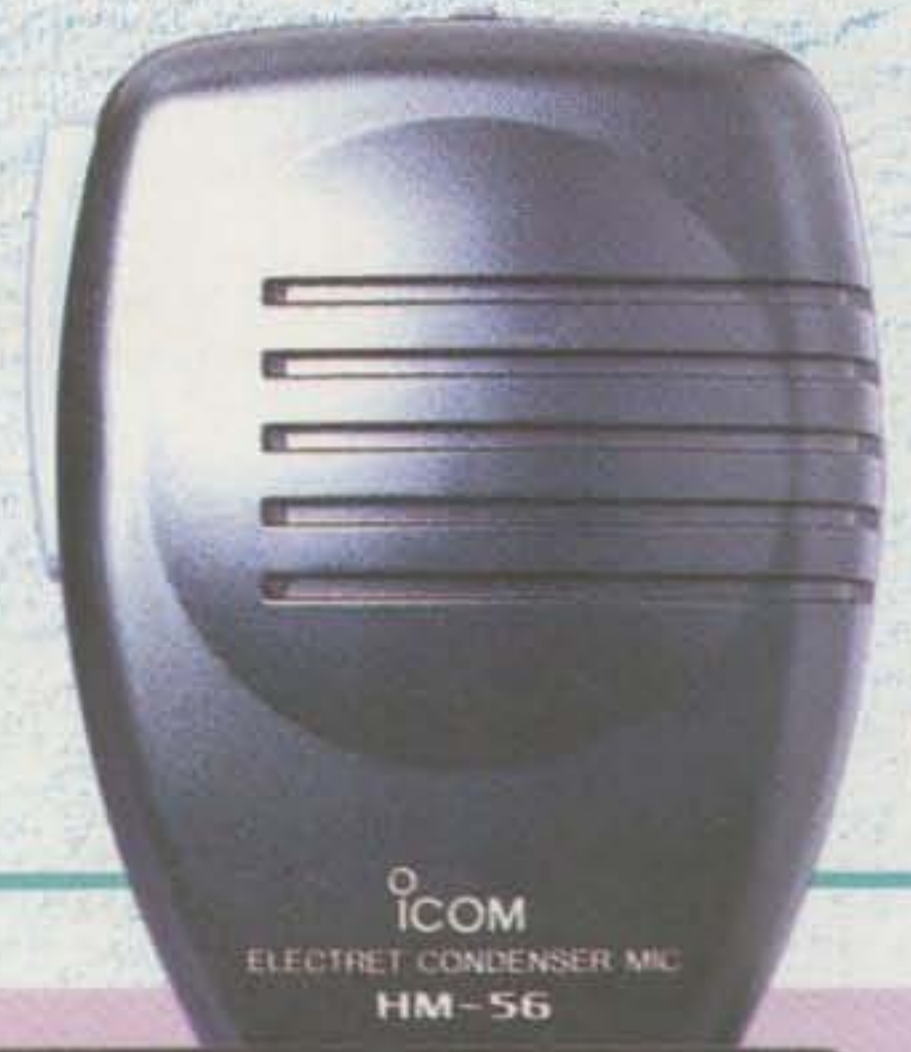
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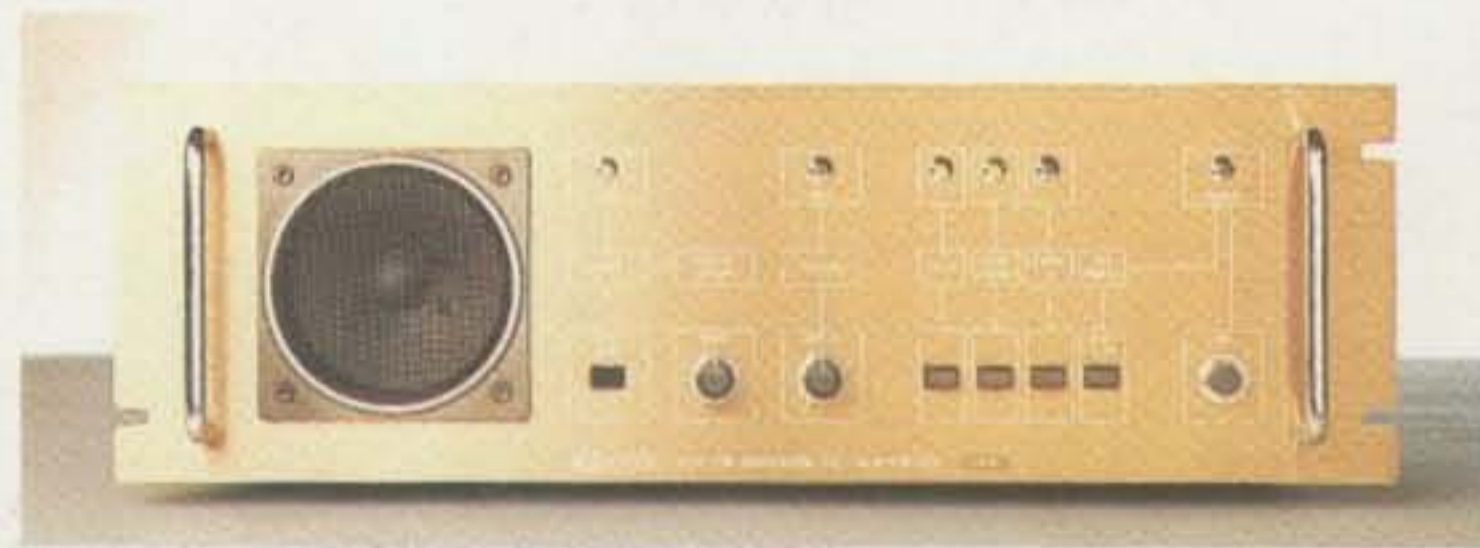
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IC-RP1510 2-Meter Repeater



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