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# CQ VHF Ham Radio Above 50 MHz

February 1998

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On the Cove[illegible] Wilhelm Wallenta, OE7KWT, keeps in to[illegible]uck, Austria. Details on page 28.

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*Big dials, big keys and a big, bright display make for easy operations, day or night!*


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ICOM options required for PC cloning:
**CS-207** Cloning Software
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Front Panel Dimensions: 4 11/32 (w) x 1 17/32 (h) x 1 1/16 (d). Mount it anywhere! ICOM's Next Generation technology keeps the IC-207H's performance and reliability running high while keeping the price affordable for today's ham.

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QUESTIONS? Contact your authorized ICOM dealer or contact ICOM Technical Support on CompuServe's HamNet forum at 75540,525 (internet: 75540.525@compuserve.com). *Optional OPC-600 or OPC-601 separation cable required for remote head operation.  207HC1297Y

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**CH-32**
Miracle Baby
146/446MHz
HT Antenna
Gain: 0dBi
Length: 1.75"
Conn: BNC



THEFT **NEW Z750** • Dual-band 146/446MHz w/fold-over • Includes COMET exclusive theft-resistant lock!
Gain & Wave: 146MHz 2.15dBi 1/2 wave • 446MHz 5.5dBi 5/8 wave x 2 • Length: 39" • Conn: Gold-plated PL-259 • Max Pwr: 200W



THEFT **NEW Z780** • Dual-band 146/446MHz w/fold-over • Includes COMET exclusive theft-resistant lock!
146MHz 6/8 wave 4.5dBi • 446MHz 5/8 wave x 3 7.2dBi • Length: 62" • Conn: Gold-plated PL-259 • Max Pwr: 150W



**NEW SBB-15** • Tri-band 52/146/446MHz w/fold-over **NEW BLACK COLOR**
Gain & Wave: 52MHz 0dBi 1/4 wave • 146MHz 4.5 dBi 6/8 wave • 446MHz 7.2dBi 5/8 wave x 3 • Length: 58" • Conn: PL-259 • Max Pwr: 120W



**NEW SBB-7/SBB-7NMO** • Dual-band 146/446MHz w/fold-over **NEW BLACK COLOR**
Gain & Wave: 146MHz 4.5dBi 6/8 wave • 446MHz 7.2dBi 5/8 wave x 3 • Length: 58" • Conn: SBB-7 PL-259/SBB-7NMO NMO • Max Pwr: 70W



**NEW SBB-5/SBB-5NMO** • Dual-band 146/446MHz w/fold-over **NEW BLACK COLOR**
Gain & Wave: 146MHz 2.5dBi1/2 wave • 446MHz 5.5dBi 5/8 wave x 3 • Length: 39" • Conn: SBB-5 PL-259/SBB-5NMO NMO • Max Pwr: 120W



**CX-224/CX-224NMO** • Tri-band 146/220/446MHz w/fold-over
Gain & Wave: 146MHz 2.15dBi 1/2 wave • 220MHz 3.5dBi 5/8 wave • 446MHz 6.0dBi 5/8 wave x 2 • Length: 36" • Conn: CX-224 PL-259, CX-224NMO NMO • Max Pwr: 100W



**B-20/B-20NMO** • Dual-band 146/446MHz w/fold-over
Gain & Wave: 146MHz 2.15dBi 1/2 wave • 446MHz 5.0dBi 5/8 wave x 2 • Length: 30" • Conn: B-20 PL-259/B-20NMO NMO • Max Pwr: 50W




**SH-55** • Super Flexible 146/446MHz HT Antenna
Gain: 146MHz 1.5dBi • 446MHz 3.2dBi • Length: 15.5" • Conn: BNC • Max Pwr: 10W




**B-10/B-10NMO** • Dual-band 146/446MHz cellular look-a-like • Gain & Wave: 146MHz 0dBi 1/4 wave • 446MHz 2.15dBi 1/2 wave • Length: 12" • Conn: B-10 PL-259/B-10NMO NMO • Max Pwr: 50W

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**Next Month: "Don't Toast Your Battery: An NiMH Charge Warning," by Gordon West, WB6NOA**

# "Beyond Amazing"
# Alinco Presents The Mini HT

**So slim, *it hides in a shirt pocket.* Power to work repeaters many miles away. Clear, clean audio. 20 Memories plus a Call channel. And a Lithium ion battery that can go 100 hours between charges!**

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**Alinco DJ-C4T 70 cm (440 Mhz) Mini HT**

- 420 ~ 449.995 MHz transmit range


*The Alinco DJ-C1T and DJ-C4T represent breakthroughs in mini-radio technology. About the size of a credit card, one can be carried in pocket or purse. With it, you're ready to communicate anytime. Whether you're in business attire or running a marathon, these small, lightweight radios are easy to carry and easier to operate. You'll be amazed at the clean, crisp audio. The lithium ion battery is a revolution in power technology, going as long as 100 hours between charges. Be prepared to answer questions from other hams who see your DJ-C1T or DJ-C4T - even seasoned "veterans" have termed these radios "beyond amazing." The only thing we can add to that, is the low Alinco price!*

**Accessories Available**

EDS-7 Adaptor Cable for use with speaker mics and headsets
EDC-36 Mobile charger
EMS-9Z speaker mic (requires EDS-7)
EMS-41 speaker mic (requires EDS-7)

**Alinco DJ-C1T 2 Meter (144 Mhz) Mini HT**

- 144 ~ 147.995 MHz transmit range
- Extended receive 118 ~174 MHz including air band (AM)

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# The VHF "Specialty Shoppe"

When the department stores don't have what you're looking for, you need to find a specialty store—and sometimes even a SUB-specialty store. Ham radio is much the same.

Welcome to Sears: men's clothing to your left, tools and refrigerators to your right, ham rigs...I don't think so.

Department stores are great...if you want the same things that most other people want. They've certainly got "breadth"—lots of different things for people with lots of different needs (as long as they're not *too* different)—but they don't have "depth." If you're a hard-to-fit size, or want something with limited popular appeal, such as a ham rig, you're out of luck. You need to find a specialty store. But even ham radio superstores like HRO and AES may have a hard time coming up with a 24-GHz transverter for you. For that, you need to go a level deeper, to what we might call a "sub-specialty" store.

The ham radio *information* marketplace is very similar. You have your "department stores" in the form of national-circulation, general-interest magazines such as *CQ*, *QST* and *73*; broad-coverage reference books such as *The ARRL Handbook*, *The ARRL Operating Manual* and the *CQ Amateur Radio Almanac*, and general-interest radio clubs. Next, you have your "specialty stores"—groups or publications with a narrower focus, but which still reach out to a broad base of members/readers. *CQ VHF* is one of these, with its VHF-and-above focus, as are *Communications Quarterly* (technical focus) and *Worldradio* (human-interest focus). Books in this category include the RSGB's *VHF-UHF DX Book* (highly recommended for all serious VHF ops, by the way), the *ARRL Antenna Book* and K4ABT's *Packet Radio Operator's Manual*. But you're still not likely to find that 24-GHz transverter, or plans for building one, in any of these places.

## The Sub-Specialty Shops

On the other hand, you *will* find basic plans for a 24-GHz transverter in *Cheesebits*, the newsletter of the Mt. AiryVHF Radio Club, also known as the Packrats (it's in their September, 1997, issue, following an August article on "Getting Started on 24 GHz"). The August/September ('97) issue of the North Texas Microwave Society's *Feed Point* newsletter featured an article by WB5LUA on "Dual-band Feedhorns for 2304/3456 MHz and 5760/10368 MHz." And last April's *Rocky Mountain VHF+* newsletter included two articles analyzing the performance of dual rhombic antennas on VHF.

You won't find articles like these in the "department stores" or even the "specialty stores," because they simply don't appeal to a wide enough group of readers. As a result, these regional and sub-specialty newsletters fill a vital need in providing highly specialized information to the serious operators who enjoy that particular sub-specialty.

*VHF conferences and specialty newsletters give you the opportunity to learn from experts about a wide variety of activities. Here, Ed Krome, K9EK, talks at the 1997 AMSAT conference about using microwave bands to make the most of the upcoming Phase 3D satellite.*

On the other hand, these newsletters are *not* limited to the arcane and super-technical. Last April's *Rocky Mountain VHF+ (RMVHF+)*, for example, also had an excellent article by NØUGY on a very straightforward way of building a 15-element beam for 23 centimeters (1296 MHz). Anyone who plans to make use of the Phase 3-D satellite when it goes up could benefit from this article.

And do you remember December's *CQ VHF* article on decibels by Ron Hranac, NØIVN ("You Don't Have to be Einstein...to Understand Decibels")? Well, *RMVHF+* readers got the info first, in a four-part series Ron wrote for that newsletter. While the version that appeared here was somewhat different (Ron's written variations on the same article for five different publications now, commercial as well as amateur), you wouldn't have seen it *here* if I hadn't seen it *there* and asked Ron to do a version for us (with the generous cooperation of *RMVHF+* editor Wayne Heinen, NØPOH, who also had forwarded to us Ron's first *CQ VHF* article, on "The Art

By Rich Moseson, W2VU, Editor

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- Compact HF Trans., 100W, Collins Filter
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- Remotable front panel, optional kit req.
- QSK, 100 Mem. Gen Cov. Rx, OMNI-Glow display

**Call Now For Low Price!**

## FT-11R/41R

2M 440mHz

- 150 Mem. Channels
- 1.5W standard
- 5W option
- Alpha-numeric display
- Compact & back lit keypad

**Call For Low Price!**

## VX-1R

2M/440 Sub-Mini HT

- 290 Memory Channels
- .5W output
- Receives 76-999mHz plus AM BCB (Cell Band Blocked)
- Lithium Ion Battery

NEW!

**Call Now For Your Low Price!**

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## FT-50RD

2M/440mHz Compact HT

- DVR, Decode, Paging Built-in
- Alpha numeric display
- Wide Band receive
- Battery Saver
- 112 Memories
- Mil-Spec
- HiSpeed scanning

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VHF/UHF All Mode Transceiver
25W, Built-In Power Supply

## FT-3000M

- 2M 70W Mobile • Wide Band RX
- AM Aircraft RX • Dual Watch
- 9600 Baud Compatible • Alpha Numeric Display

**Call For Low Pricing!**

$100. Coupon

## FT-920 HF+6M Transceiver

- 100w 160-6M, 12VDC
- Built-in DVR, CW Memory Keyer
- DSP, Auto-Notch • 99 Memories
- Computer controllable, CAT System

NEW!

**Call For Intro. Low Pricing!**

$35. Coupon

## FT-8100R 2M/440 Mobile

- Ultra Compact • 50w/35w 2m/440
- 110 memories • Wide Band RX
- Backlit mic • Remotable front panel w/opt. YSK-8100

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## VHF Sub-Specialty Groups, Newsletters & Conferences

Just about every sub-specialty in amateur radio has one or more groups or newsletters dedicated to it. Here's a sampling of VHF-related organizations (all rates listed are for U.S. addresses). Please send us corrections and additions.

**Amateur Satellites**

AMSAT (Radio Amateur Satellite Corp.): Newsletter (*AMSAT Journal*) and annual conference. Dues: $30/year. AMSAT, P.O. Box 27, Washington, DC 20044; Phone: (301) 589-6062; Internet: <http://www.amsat.org>

**Amateur Television**

*ATV Quarterly*: Magazine, subscription: $18/year (U.S.) ATVQ, c/o Harlan Technologies, 5931 Alma Dr., Rockford, IL 61108; Phone: (815) 398-2683 (Orders only: 800-557-9469); Fax: (815) 398-2688; Internet: <http://www.cris.com/~Gharlan>.

International Visual Communications Assn. (IVCA): Newsletter (*Visions*), Dues: $10/ IVCA, c/o Jim Gaither, KA4H, P.O. Box 140336, Nashville, TN 37214; Internet: <http://ns.netmcr.com/~SSTV>.

**Digital Communications**

North East Digital Association (NEDA): Newsletter (*NEDA Quarterly*); subscription: $15/year. NEDA, Box 563, Manchester, NH 03105-0563.

Northern California Packet Association (NCPA): Newsletter (*NCPA Downlink*); Dues: $10/year; NCPA, P.O. Box 61716, Sunnyvale, CA 94088-1761.

Southwest Ohio Packet Conference: Annual, *this year's is Jan 17; hurry and you may still make it!*. Info c/o Hank Greeb, N8XX, 6580 Dry Ridge Rd., Cincinnati, OH 45252-1750; Phone: (513) 385-8363 after 6:00 p.m.; e-mail: <72277.706@compuserve.com>.

Tucson Amateur Packet Radio (TAPR): Newsletter (*Packet Status Register*) & annual Digital Communications Conference (sponsored jointly with ARRL). Dues: $20/year. TAPR, 8987-309 E. Tanque Verde Rd., #337, Tucson, AZ 85749-9339; Phone: (940) 383-0000; Fax: (940) 566-2544; Internet: <http://www.tapr.org>.

**EME (Earth-Moon-Earth)**

*432 and Above EME Newsletter* (e-mail only): By K2UYH. For information, see W6/PAØZN's "EME-SETI Web Page" at <http://www.nitehawk.com/rasmit/>.

*VHF EME Report*: Subscription $16/year. *VHF EME Report,* c/o Doug Allen, WØAH, P.O. Box 5646, Woodland Park, CO 80866.

**Microwave**

*European Microwave News* (e-mail only): E-mail free subscription request to <slewis@pacsat.demon.co.uk>, or visit GM4PLM's Web page at <http://www.pacsat.demon.co.uk>.

North Texas Microwave Society: Newsletter (*Feed Point*) and annual "Microwave Update" conference. Dues: $12/year. North Texas Microwave Society, c/o Wes Atchison, WA5TKU, Treasurer; Rt. 4, Box 565, Sanger, TX 76266.

**Six Meters**

*The Independent Bohemian*: Newsletter, P.O. Box 9657, Riviera Beach, FL 33419-9657; e-mail: kd4vbi@juno.com. (*Editor's Note: This thoroughly irreverent but enjoyable and informative 6-meter newsletter does not print its subscription rates, so you'll have to get in touch for details. It is local (Florida) in focus.*)

SMIRK (Six Meter International Radio Klub): On-air activities. Dues: $6/year; electronic newsletter on Web site, <http://6mt.com> (Note: this is a new Web address for SMIRK and it does not have a "www".)

**Weak-Signal (VHF DXing/Contesting)**

Central States VHF Society: Annual conference (largest in U.S.); 1998 conference will be in Kansas City, Missouri, in July. For information, see the CSVHFS Web page at <http://www.csvhfs.org>

*Great Lakes VHF/UHF Newsletter*: Contact editor Dave Bostedor, N8NQS, at <vhfuhf@voyager.net>

Midwest VHF-UHF Society: Newsletter (*Anomalous Propagation*); Dues: $8/year. Midwest VHF-UHF Society, c/o Gerd Schrick, WB8IFM, 4741 Harlou Dr., Dayton, OH 45432; Phone: (513) 253-3993; e-mail: <G.Schrick@worldnet.att.net>.

Mt. AiryVHF Radio Club (Packrats): Newsletter (*Cheesebits*) and annual Mid Atlantic VHF Conference. Subscription: $10/year. *Cheesebits*, c/o Bob Fischer, W2SJ, 7258 Walnut Ave., Pennsauken, NJ 08110.

North East Weak Signal (NEWS) Group: Annual Eastern VHF/UHF Conference (sponsored jointly with Eastern VHF/UHF Society). For information, see the NEWS Group Web page at <http://www.connix.com/~wz1v/newsvhf.html>.

Rochester (NY) VHF Group: Newsletter; for information, contact group President Ev Tupis, K2IV, via e-mail at <evman@ix.netcom.com>.

*Rocky Mountain VHF+*: Newsletter; subscription: $16/year. *Rocky Mountain VHF+*, P.O. Box 47341, Aurora, CO 80047-3411; e-mail: <nrclog@aol.com>

Southeastern VHF Society: Annual Technical Conference; the 1998 conference will be April 3 & 4, in Atlanta. For information, see the SVHFS Web site at <http://www.akorn.net/~ae6e/svhfs>.

*Upper Midwest VHF/UHF Newsletter*—Subscription: $10/year. *Upper Midwest VHF/UHF Newsletter,* c/o Rich Westerberg, N0HJZ, 17500 Cherry Dr., Eden Prairie, MN 55346; e-mail: n0hjz@aol.com.

Western States Weak Signal Society: Newsletter, annual conference. Dues: $10/year. WSWSS, c/o Wes Printz, W3SE, P.O. Box 4895, Downey, CA 90241; Internet: <http://www.psnw.com/~n7stu>.

of VHF Contesting," which appeared last September. Thank you, Wayne.).

Specialty newsletters such as these are essential to the technical growth of our hobby, as they allow the people on the cutting edge to compare notes, exchange ideas and educate the rest of us who are no longer beginners in a given area, but not yet experts, either. Virtually all of them are non-profit and operate on fiscal shoestrings. If there's a newsletter that covers a topic of interest to you, or provides regional coverage where you live (see listing at the end of this article for some examples), I encourage you to support their efforts to advance the state of the art in amateur radio (*in addition* to your *CQ VHF* subscription, of course!).

## Ham Radio "Power Lunch"

The other "main arena" for advancing the state of the art in ham radio is the various conferences and conventions held around the country and around the world each year. Over the past couple of months, I've reported on several conventions that I've attended recently (the Weinheim VHF Conference in Germany, the AMSAT Space Symposium in Toronto, and several domestic conferences). Last month, Don Rotolo reported in "Digital Data Link" on the ARRL/TAPR Digital Communications Conference in Baltimore, and, this month, Tim Marek reports in "Weak Signal News" on the Western States Weak Signal Society's annual technical conference near Fresno, California.

I call these conferences the ham radio "power lunch." Beyond the formal presentations and the technical papers published in the Proceedings, these conferences give the "movers and shakers" in their aspects of the hobby the opportunity to meet face-to-face, talk over ideas, and brainstorm new projects.

*Another benefit of going to a VHF conference is the ability to have your questions answered directly by the people responsible for making things work. Here, Bdale Garbee, N3EUA, listens to a question at the AMSAT conference regarding the Global Positioning System experiment slated to fly on the Phase 3D satellite.*

Here's a perfect example: When I came down to the banquet at last October's AMSAT symposium, there were three people sitting and talking, off in a corner of the lobby. They were Greg Jones, WD5IVD, the President of Tucson Amateur Packet

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# VHF News

## WRC-97 Ends with Little Impact on Hams

Only a few decisions affecting international amateur radio allocations were made at the 1997 World Radiocommunication Conference (WRC-97), held last October and November in Geneva, Switzerland. And the greatest impact may have come from a decision *not* to consider changes to amateur radio rules at the next WRC, in 1999.

According to an ARRL bulletin, the delegates to the International Telecommunications Union (ITU) policy-setting conference upgraded the Earth Exploration Satellite Service (EESS) from secondary to primary status on 1215 to 1300 MHz, which includes the secondary amateur allocation at 1240 to 1300. The League says the change should have minimal impact on amateur use of the band and may in fact help protect the band from additional sharing by other, less-compatible radio services.

In addition, amateur satellite segments were protected in allocations given to wind profiler radars, which now have a worldwide primary allocation at 1270 to 1295 MHz. In addition, administrations in ITU Region 2 (North and South America) were urged to set up these airport radar systems (to detect wind shear) on 440 to 450 MHz, 904 to 928 MHz, and 1300 to 1375 MHz. They are already operating in some areas in the 449- to 450-MHz range, and there have not been reports of significant conflicts with amateur activity.

The League bulletin said the delegates also approved a resolution encouraging countries to "facilitate the use of ham radio and other 'decentralized means of communications' for disaster mitigation and relief operations."

Finally, and perhaps most significantly, the group decided for budgetary reasons to delay at least until 2001 any consideration of changes to the international amateur radio regulations, including the requirement for Morse code proficiency below 30 MHz. Also delayed was any possible realignment of the 40-meter band to end the ham-broadcast QRM there.

"Little LEO" satellites (low earth orbit digital satellites), which had tried to get shared access to 2 meters and 70 centimeters, came away with only a 3-MHz additional allocation between 454 and 460 MHz (with regional variations within that segment). However, the conference did agree to "urgent studies" in preparation for future discussions at WRC-99. The ARRL quotes some conference participants as calling the resolution "a hunting license" for additional VHF/UHF spectrum, so it's unlikely we've seen the last of Little LEO.

## New RF Exposure Rules in Effect; FCC Issues Long-Awaited Guidebook

The FCC's new RF exposure rules, and the requirements that hams make "routine evaluations" if their power exceeds stated limits on various bands, took effect on January 1, 1998. In late November, the FCC finally released its long-delayed "Supplement B to OET Bulletin 65." This 70-page guidebook was written specifically for hams and provides detailed information on determining whether you need to perform an evaluation and, if so, how to do it. Two amateurs in particular were instrumental in the development of this document: Dr. Wayne Overbeck, N6NB, who first published his computer program for making easy RF exposure evaluations in *CQ VHF* (January, 1997; the program may be downloaded from the *CQ VHF* Web site), and ARRL Laboratory Supervisor Ed Hare, W1RFI.

It appears that most of the procedures are pretty straightforward and only get really complicated for repeaters that share a site with other radio transmitters. In these cases, the licensees of the various transmitters must work together to determine the overall level of RF exposure and to take whatever measures are necessary to stay within the new limits. The most detailed summary to date of Supplement B was in the December 15, 1997, issue of the *W5YI Report*—which devoted the entire issue to this one topic.

Plus, Randy Stegemeyer, W7HR, reports on the Internet that the entire text of the bulletin may be downloaded from the FCC's Web site at <http://www.fcc.gov/Bureaus/Engineering_Technology/bulletins/oet65/oet65b.pdf> or from

*Compiled by the CQ VHF Staff*

<http://www.SignalONE.com/fcc/oet65.pdf>. Randy notes that the Adobe Acrobat Reader will be needed to read or print these files. He says that may be downloaded for free from Adobe at <http://www.adobe.com>.

## New Version of AX.25 Available

Tucson Amateur Packet Radio (TAPR) and the ARRL have unveiled a major upgrade of the AX.25 packet protocol that's been in the works since 1988. According to *The ARRL Letter*, version 2.2 of the amateur packet standard includes added support for FlexNet and TCP/IP and limits digipeating to a maximum of two hops, requiring that users make network connections for longer-distance connections. This is the third revision of the AX.25 protocol since 1984. Both the 1997 and 1984 versions of AX.25 may be downloaded without charge from TAPR's Web site at <http://www.tapr.org/tapr/html/ax25.html>.

## AT&T Investing in Ham Repeaters

Hams in Kentucky and Tennessee are on the receiving end of a $100,000 investment by AT&T to set up VHF and UHF repeaters and antennas at various cellular telephone sites. According to a report on *Newsline*, the investment comes in recognition of the fact that, during the first four days of the "Great Flood of '97," amateur radio provided the only communications out of the area.

But the report says AT&T also has an ulterior motive: gaining permission to build cell sites in previously prohibited areas. It seems that adding amateur repeater equipment to the sites gave them emergency communications status and won AT&T the OK to build them. The phone company is looking to set up similar relationships with amateur repeater groups in southwestern Ohio as well, with an eventual overall investment of more than $300,000.

## Phase 3D Update

There's still no firm launch date or vehicle in sight for AMSAT's Phase 3D satellite, which was bumped from the October 30, 1997, launch of Ariane 502. According to the AMSAT News Service, AMSAT-NA President Bill Tynan, W3XO, says he doesn't expect to get any new information until European Space Agency (ESA) officials figure out what caused a premature engine shutdown on that launch.

The *Orbital Report OnLine* newsletter says ESA has confirmed plans to fly the "Atmospheric Reentry Demonstrator" on the third Ariane 5 qualification flight (A-503), now scheduled for this May. Apparently, it's part of a system intended for use in returning crews to Earth from the International Space Station. The first commercial launch of the Ariane 5 is planned for the second half of this year.

## Mir Troubles, Experiments Continue

At press time, both the 2-meter and 70-centimeter ham stations aboard the Russian Mir space station were off the air as the result of a power outage on November 21. Astronaut David Wolf, KC5VPF, said that powering up the ham gear was "on his list" and that he hoped to get it back on the air soon, according to reports from the AMSAT News Service.

When the station does come back on the air (which, hopefully, will have happened by the time you read this), it will be operating crossband, with uplink on 437.850 MHz and downlink on 145.800 MHz. This is part of a three-month experiment, scheduled to run through March 1, aimed at improving ham operations aboard Mir and determining the best configurations for the ham station planned for the International Space Station. Also by the time you read this, Astronaut Wolf is scheduled to have been replaced on Mir by another ham astronaut, Andy Thomas, KD5CHF. He's supposed to be on Mir from January through May.

## MIREX on the Web

The Mir Amateur Radio Experiment, MIREX, has a new home on the World Wide Web, according to a report in *SpaceNews*. Information on the Mir ham station and amateur activities is available from any one of the following URLs (Web addresses): <http://www.ik1sld.org/mirex.htm>, <http://www.ik1sld.org/mirex>, <http://www.geocities.com/~ik1sld/mirex.htm>, or <http://www.geocities.com/~ik1sld/mirex>.

## Hams Slated for First Space Station Crews

Cosmonaut Sergei Kirkalev, U5MIR, is among the three men named by the U.S. and Russia to the first International Space Station crew. Plus, the expedition commander, Astronaut William Shepherd, is studying for his ham license, according to *The ARRL Letter*. The five-month mission is slated to begin in early 1999, despite a delay in NASA's timetable for completing the station, now scheduled for the end of 2003 (a year and a half behind the June, 2002, date previously announced). The early crews will live in the service module, which will be equipped with a ham antenna.

The second crew also includes two hams: Cosmonaut Yuri Usachev, R3MIR (the mission commander), and Astronaut Susan Helms, KC7NHZ. No hams are currently assigned to the third crew, but Astronaut Carl Walz, KC5TIE, is scheduled to be on the fourth ISS crew.

## RS-16 Frequencies Announced

While still not operational at press time, transponder frequencies for the Russian RS-16 satellite have been released. They are as follows:

Uplink: 145.915–145.948 MHz
Downlink: 29.415–29.448 MHz
10-meter Beacons: 29.408 and 29.451 MHz
70-centimeter Beacons: 435.504 and 435.548 MHz

## Throw Out Your Old 610 Form

The FCC has issued new amateur license application forms designed to certify compliance with the RF safety regulations that took effect January 1. According to an ARRL/VEC bulletin, the new 610 forms are dated September, 1997, and include the following certification, which must be signed by all applicants:

I have READ and WILL COMPLY with Section 97.13(c) of the Commission's Rules regarding RADIOFREQUENCY (RF) RADIATION SAFETY and the amateur service section of OST/OET Bulletin Number 65.

Previous versions of the 610 form will no longer be accepted. The new form may be downloaded from the Web at <http://www.fcc.gov/formpage.html> or <ftp://ftp.fcc.gov/pub/Forms/Form610/>. The forms may also be ordered from the FCC's Forms Distribution Center at 800-418-3676, or may be requested (with a self-addressed stamped envelope) from the ARRL/VEC, 225 Main St., Newington, CT 06111.

*(Continued on page 59)*

# Letters

## Your Spot to Speak Out

CQ VHF *welcomes comments and suggestions from readers. We'll print a representative sampling each month, and we reserve the right to edit letters for length or style. All letters must be signed and show a return mailing address or valid e-mail address. Writers' names will be withheld from publication upon request. Address letters to: Letters,* CQ VHF, *76 N. Broadway, Hicksville, NY 11801; or via e-mail to <CQVHF @aol.com>; <cqcomm@delphi.com> or <72127.745@compuserve.com>. Please specify that it is a letter for* CQ VHF *magazine.*

*VHF in the Mainstream*

Dear *CQ VHF*:

I thought your [October] editorial on the fact that most hams today are in the game for a different reason was right on. I started in the '60s, when ham radio was *the* "high tech" outlet for teenagers. Today, ham radio is no longer perceived in that light. Many people these days get in to support other activities, such as camping, etc. My wife just got her Tech license to support our mutual interests in SAR (search-and-rescue) and backpacking.

I recently gave a Tech class to a parasailing club. Their use of 2-meter ham radio could potentially be lifesaving. Most of my activities these days revolve around VHF and working with the local community. I admit to playing around with DX, but strictly as a sideline. I agree with you that VHF has become mainstream ham radio.

73,

Sam Vigil, WA6NGH
San Luis Obispo, California

*The Last Words (many) on Code*

Dear *CQ VHF*:

This is in reply to the question posed by KW5D in his "Op-Ed" column in the December, 1997, issue of *CQ VHF*, titled, "Does the Code Requirement Help or Hurt Ham Radio?" For the sake of your readers, like myself, who are truly interested in the VHF radio world, it's unfortunate that your magazine has chosen to "take up the cause" and the space regarding the elimination of Morse code telegraphy, also known as just code or CW, as a requirement for obtaining upgrades to amateur radio licenses.

It's the spectrum above 50 MHz, *not HF*, which needs to be more heavily populated with technically competent hams. The Technician class code requirement, perceived by some as a "barrier," *has already been removed* and is an incentive for recruiting new hams to help us accomplish this goal. Unless you have commercial interests like selling ham radio equipment or publishing ham radio magazines, there is little incentive for increasing our numbers below 50 MHz. When the HF bands are "open," they're already crowded, often overcrowded. Considering that you can get a VHF license without even knowing Morse code, when you come right down to it, *this code question isn't even a VHF issue.*

What, then, is the value of Morse code for ham radio? Primarily, its value is its unquestioned ability to provide communication in the extreme, when all else fails. The technical reasons the code can provide this superiority have to do with its narrow signal bandwidth, signal-to-noise ratio, and, most important, the *signal processing skills developed in the brains of trained CW operators.*

Even in today's world with our high-performance multi-mode radios, digital communication, FM repeaters, packet, satellites, and links to the Internet, etc., CW skills still have and will continue to have real value for amateur radio well into the next millennium. I think ham radio magazines in general should put forth the value of CW in a *positive* way and *encourage* learning the code and the use and practice of it to improve CW skills, rather than offering their readers negativity and excuses....Can we get back to talking about VHF radio now?

Mick Sparling, W6LVW
Monument, Colorado

*Mick—I'm sure you noticed that we considerably shortened your letter from its original length of four single-spaced pages. We just didn't have room for the whole thing. But the very fact that you felt the need to devote three pages to defending the value of CW in a letter to a VHF magazine—after saying yourself that it's not really a VHF issue—is the answer to your question of why we regularly devote space to (both sides in) the code debate: it is very important to our readers, yourself included.*

*I would just like to point out two things. We have never "taken up the cause" for the elimination of the code requirement (except in international law), and virtually none of our correspondents who* do *want the code requirement eliminated dispute the code's value to ham radio; they only question its continued relevance as a licensing requirement. And there's a big difference. By the way, be sure to check out the article elsewhere in this issue on ways of learning code, in a positive and encouraging way.*

Dear *CQ VHF*:

While I certainly respect Mr. Hayden's opinion in the November, '97 letters, I take issue with his thinking that anyone who is not busy upgrading is not interested in learning or in higher achievement. He should come up for air long enough to see that most, if not all, of the advancements being made in radio technology are happening well above 50 MHz. For that, I don't need an upgrade. Why would I take the time away from the wonderful learning experience that I enjoy to learn to use obsolete modes? The only enjoyable use I have ever found for my HF receiver is listening to pirates—certainly more interesting than anything I've ever heard on the HF ham bands. I have never been able to interest anyone, especially young people, in amateur radio by letting them hear HF QSOs or Morse code transmissions. It seems all too easy for some hams to forget that amateur radio was a dying entity before the No-Code license became available.

Tony Melton, KD4MRS
Cleveland, Tennessee

Dear *CQ VHF*:

Wow, is the No-Code debate really becoming this important? It seems to be taking on a life of its own. This debate was settled a while back but apparently it still will not die.

The No-Code license was proposed in order to open up the VHF/UHF bands to people who were technically valuable to the hobby but were "turned-off" by the code requirement. If the code barrier wasn't dropped, it would be the end of amateur radio, or so we were told. The

FCC designated certain frequencies and privileges to the No-Code license and thus the license was born.

Now we have people who argue that the code is still a barrier and will kill amateur radio. I was under the impression that the No-Code license was supposed to cure this problem. It was supposed to bring in talented young technical people who weren't interested in HF anyway. In the December issue of *CQ VHF*, editor Rich Moseson, W2VU, writes how Germany (and the European community as a whole) is very innovative and excited about VHF/UHF and how our country doesn't seem to be on the leading edge of this technology anymore. Now let's look at what you gain by passing the code test. Let's see...HF...and...well...that's it! Now, what would a bunch of "go-getters" on the leading edge of technology want with these bands?

I think that there is more to the No-Code debate than barriers. It is about our society continually dropping standards in order to placate those who do not want to strive for them. You can see this by the fact that we aren't utilizing those VHF/UHF frequencies to do anything truly "high-tech." There are some pockets of activity, but nothing on the scale that can be called earth shattering.

Now that the magic of talking to your neighbor on the radio is over with, a lot of people want to talk around the world. Well, it can be done on VHF/UHF via satellites, but that will take work. So much easier to just rally the troops and get that "nasty" code done away with and use HF. All you have to do then is just throw a hunk of wire in the tree and buy a radio. Then you can just sit back and work on getting those Extra phone frequency privileges that will "absolutely kill off amateur radio" unless opened to all.

Patrick Riggins, KA4ZNU
Knoxville, Tennessee

(Yes, I'm one of those dad-blame Extras)

*Patrick—Is the code debate that important? I don't know. You (like many others) seem to think it's important enough to devote the time and effort to writing a lengthy letter to the editor (again, we had to trim it significantly to make it fit). My personal feeling is that, if there's any one thing threatening to "absolutely kill off ham radio" right now, it is the deep divisions within our hobby created by the ongoing code debate. I would love to get past it, but the readers don't seem to want to let me.*

*All of the points in your letter about expanding our use of VHF+ frequencies are right on the mark. There is a world of opportunity out there for* every *ham—regardless of code skills—and among the goals of this magazine are to showcase what's out there and to encourage more development and more activity on VHF/UHF and microwave bands (see "Microwaves: Ham Radio's Final Frontier," elsewhere in this issue; and we'll be starting a new microwave column next month). But there is an attitude prevalent among many hams that you're not a "real ham" until you pass that code test. This month's "Beginner's Corner" addresses that problem, as does the writer of the next letter.*

Dear *CQ VHF*:

I was just sitting down reading the November issue of *CQ VHF*, which I must say I enjoy very much. Finally a magazine with interest above 30 MHz. Thank you, it's about time. But as I read the letters column, I find myself almost feeling ashamed to be a ham. All this bickering about the code is downright crazy.

My two cents, for what it's worth, is that if you're happy punching a bug, then by all means go for it. If your interest lies in other areas of amateur radio, then pursue that. This is a *large* hobby, with lots of areas to keep everyone happy. I personally have opted to not get my code endorsement. Here in Canada our license arrangement differs a bit. I have the top license available to me, just minus the code, so I cannot use frequencies below 30 MHz, and for me that's great.

Does this make me any less of a ham? I am co-owner and builder of four UHF repeaters which are all linked together, covering the better part of southern New Brunswick and parts of Maine. Maybe I should not have been allowed to do this because I never learned code. Gee, maybe since I don't know code I should not have been allowed to hook up an "Iphone" link between the Internet and a local repeater, which has provided many hours of excitement for many hams (code and no-code) here in New Brunswick.

No-Code, Very Technical Ham
Glen Bizeau, VE9GLN

*Glen—It's interesting how similar your views are to those of the previous letter writers. You're on opposite sides of the code "coin," but basically, you all want to get beyond the question of code and get on with being hams and doing what we all do best. So let's all try to do that—the World Radiocommunication Conference decided not to deal with the issue in the near future (see "VHF News")—and maybe we should do the same thing.*

*So here's what we'll do: unless there's an overwhelming outcry among readers (or nobody writes about anything else), we'll take at least a few months off from the code debate in our Letters and Op-Ed columns. Deal? Everybody?*

*On Increasing 6-Meter FM Activity*

*Editor's Note: The following letter was originally posted on the 50-MHz Internet reflector and then sent to us as well.*

Dear *CQ VHF*:

Here are some ideas for increasing activity on 6-meter FM, especially on FM simplex:

As weak-signal operators do, we 6-meter FM guys should select one night a week to either call CQ on 52525-kHz FM simplex, or answer CQ calls. Or, pick one time each day, say 0200 Z, and get on every single night listening for locals, and the rare skip opening.

How about a get-together on one holiday, like the CW fans have "Straight Key Night"? Pick one day, and give a CQ call on 52525- and 52540-kHz FM on the top of every hour to find your local neighbors on the Magic Band?

Try an "FM on Six" Field Day mountaintop setup. Post your activities at the local club and request reception reports from members and non-members alike who have VHF scanners instead of 6-meter FM rigs.

Also, recall that 52525-kHz FM is also one of the "Wilderness Protocol" simplex frequencies. The ARRL has proposed monitoring that, along with 146.52-, 223.50-, and 446.000-MHz simplex for campers and hikers out of repeater range. They recommend listening to any of those simplex channels for priority or distress calls on top of the hour at the following local times: 7:00 a.m., 11:00 a.m., 3:00 p.m., and 7:00 p.m.

Hams monitoring 146.52 MHz have told me they have answered no emergency calls yet, but they *have* logged a number of campers and hikers pleased that someone was listening.

If everyone listens on 52525-kHz simplex and no one calls CQ...how do we know if the band is open? 73,

Robert Homuth, KB7AQD
Phoenix, Arizona, DM33xh

# Product Update

## Yaesu Tower-Mount Shock Absorbers

Two new tower-mounted absorber joints for rotators are now available from Yaesu USA.

The GA-2500 and GA-3000 Tower Mount Absorber Joints are designed to both reduce stress to rotator gears and lessen the chance of binding. Made from high-density polypropylene, the absorber joints increase rotator performance by cushioning and absorbing shock produced by rotation start and stop and by sudden wind gusts. Plus, their unique pivoting design permits the rotator base to compensate for up to 2 degrees of offset from vertical.

The GA-2500 and GA-3000 Tower Mount Absorber Joints easily install inside your tower, between the rotator and tower mounting plate, and come equipped with all mounting hardware.

Use the GA-2500 Tower Mount Absorber with light to medium duty rotators, such as the Yaesu G-400, G-450, G-800S, and G-800DX rotators, and the GA-3000 Tower Mount Absorber Joint with heavy duty installations, such as the G-1000SDX and G-2800DX rotators. They will also work with other models.

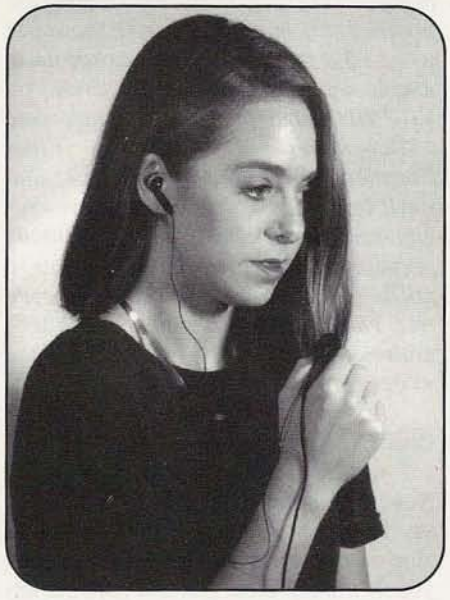
Suggested retail price for the GA-2500 is $79, and the suggested retail price for the GA-3000 is $119.00. Both models are available at authorized Yaesu dealers. For more information, contact Yaesu USA, 17210 Edwards Road, Cerritos, CA 90703; or call (562) 404-2700.

*Circle 100 on reader service card*

## MFJ-292 Featherweight™ Earphone/Microphone

Stop hauling around heavy, bulky speaker/mics that get in your way and blare out everything for all to hear. MFJ's new Featherweights™, Models MFJ-292 (I, K and Y), are ultra-lightweight, comfortable, and have excellent receive and transmit audio.

The Featherweight earphone/microphone has an ear-plug earphone that fits comfortably in your ear, plus a thumb-size microphone with a push-to-talk switch that's built right into the cord. A small lapel/pocket clip secures it to your shirt or coat.



The MFJ-292 allows private, quiet conversations; its sensitive microphone can pick up close whispers for discrete QSOs that won't bother anyone. Its high-quality dynamic earphone and electret microphone give your handheld clear audio. Plus, it is ultra-lightweight, weighing just 30 grams (1.05 oz.).

Made of high-impact plastic, the dynamic earphone is rated at 8 ohms and handles 250 mW. The non-directional electret condenser mic has -64 dB sensitivity and a 1.1K-ohm impedance; the durable four-foot long cord has heavy insulation at the crucial bend points.

Order MFJ-292(I) for ICOM, Yaesu, Alinco, Standard, ADI, and compatibles; MFJ-292(K) for Kenwood and compatibles; MFJ-292(Y) for Yaesu FT-10R, FT-40R, FT-50R, and VX-1R transceivers only. Suggested retail price for the MFJ-292 is $19.95 with a one-year limited warranty.

To find your nearest dealer or to order, call toll-free 1 (800) 647-1800, fax: (601) 323-6551 or write to MFJ Enterprises, Inc., 300 Industrial Park Road, Starkville, MS 39759. Or visit their Web site at: <http://www.mfjenterprises.com>.

*Circle 101 on reader service card*

## Optoelectronics' Techtoyz Micro Counter

Optoelectronics, Inc. announced the second product to be released under its new "Techtoyz" name, the Micro Counter miniature frequency counter.

With a frequency range of 10 MHz to 1.2 GHz, the Micro Counter can lock onto a 5-watt UHF radio signal from as far away as 125 feet, using the optional TMC100 rubber duck antenna. With an initial accuracy of 1 ppm and a sensitivity level of <6 mV, the Micro Counter is ideal for testing radios in the shop or in the field. In addition, there are three selectable gate times for increased resolution of the frequencies captured.

The Micro Counter has four modes of operation: Normal, Filter, Recall, and Optoelectronics' patented Digital Auto Capture. Once a frequency has been captured, it will be logged into one of three internal memories for later recall. In addition, the Micro Counter offers 10 to 12 hours of operation with AA battery and a 12-character LCD display.

Just like the Techtoyz DTMF Decoder released in July of 1997, the Micro Counter is housed in a pager-style case, making portable operation easy and convenient. Just clip the counter on your belt or put it in your pants or jacket pocket.


The suggested retail price for the Techtoyz Micro Counter is $99.00, with another $9.00 for the optional TMC100 antenna. To order your new Techtoyz Micro Counter, call Optoelectronics toll-free at (800) 327-5912 or (954) 771-2050; Fax: (954) 771-2052; e-mail:

*(Continued on page 80)*

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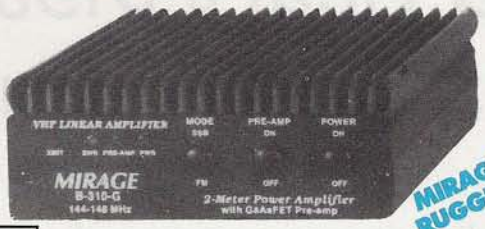


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**This** rugged Mirage B-310-G amplifier operates *all modes*: FM, SSB and CW. It's perfect for *all* handhelds up to 8 watts *and* multi-mode SSB/CW/FM 2 Meter rigs.

*It's great for the ICOM IC-706 -- you'll get 100 blockbuster watts on 2 Meters!*

### *Low noise GaAsFET pre-amp*

**A** built-in *low noise* GaAsFET receive pre-amp gives you 15 dB gain -- lets you dig out weak signals.

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***SWR** Protection* prevents damage from antennas whipping in the wind. *Reverse Polarity Protection* can save your amp if you connect power backwards.

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**Mirage's** integrated *HeatsinkCabinet™* and whisper quiet fan gets heat out fast!

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***Free*** 3 foot handheld to B-310-G coax cable -- just plug and play! ***Free*** mobile bracket! ***Free*** rubber mounting feet for home use!

### *Plus more . . .*

**Automatic** RF sense Transmit/Receive switch. Remote keying jack. LEDs monitor "On Air", high SWR, pre-amp, power. Push buttons select SSB/FM, pre-amp, power. Draws 15 amps at 12-15 VDC.

### *Full one year MIRAGE warranty*

***With*** Mirage's legendary ruggedness, you may never need our superb warranty.

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|---|---|---|---|---|---|---|---|
| *Watts Out (2Meters)* | *30* | *40* | *45* | *45+* | *45+* | *45+* | *45+* |
| *Watts Out (440 MHz)* | *16* | *26* | *32* | *35+* | *35+* | *35+* | *35+* |
| *Watts In* | *1* | *2* | *3* | *4* | *5* | *6* | *7* |

***Add this Mirage dual band amp and boost your handheld to 45 watts on 2 Meters or 35 watts on 440 MHz!***

**Works** with all FM handhelds up to 7 watts. Power Curve chart shows typical output power.

### *Full Duplex Operation*

**Mirage's** exclusive *FullDuplexAmp™* lets you talk on one band and listen on the other band at the same time -- *just like a telephone conversation!* (Requires compatible HT)

### *Mirage is the Best! Here's why . . .*

- ***Automatic frequency band selection*** --you'll never forget to switch bands
- ***Single input connector and single output connector for both bands*** -- easy to use with dual band radios and antennas
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- ***Custom wrap-around heatsink*** -- runs cool
- ***Reverse Polarity Protection*** -- saves your amp if you connect power backward
- ***Automatic RF sense Transmit/Receive switch*** -- makes operation easy
- ***Low input SWR*** -- keeps your handheld safe from overheating
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- ***Small size:*** just 5x1¾x5 inches
- ***Full one year MIRAGE warranty***
- ***Legendary MIRAGE ruggedness***

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# 35 Watts for 2 Meter HTs

B-34-G

**$89.95**

Suggested Retail


| *Power Curve* -- typical B-34-G output power | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| *Watts Out* | *18* | *30* | *33* | *35+* | *35+* | *35+* | *35+* | *35+* |
| *Watts In* | *1* | *2* | *3* | *4* | *5* | *6* | *7* | *8* |

- ***35 Watts Output on 2 Meters***
- ***All modes: FM, SSB, CW***
- ***18 dB GaAsFET preamp***
- ***Reverse polarity protection***
- ***Includes mobile bracket***
- ***Auto RF sense T/R switch***
- ***Custom heatsink, runs cool***
- ***Works with handhelds up to 8 watts***
- ***One year MIRAGE warranty***

MIRAGE RUGGED!

### *35 watts, FM only . . . $69.95*

**B-34, $69.95.** 35 watts out for 2 watts in. Like B-34-G, FM only, less preamp, mobile bracket. 3⅛x1¾x4¼ inches.

# 160 Watts on 2 Meters!

B-5016-G

**$299**

Suggested Retail


MIRAGE RUGGED!

| *Power Curve* -- typical B-5016-G output power | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| *Watts Out* | *130* | *135* | *140* | *145* | *150* | *155* | *160* | *165* |
| *Watts In* | *20* | *25* | *30* | *35* | *40* | *45* | *50* | *55* |

***The MIRAGE B-5016-G gives you 160 watts of brute power for 50 watts input on all modes -- FM, SSB or CW!***

**Ideal** for 20 to 60 watt 2 Meter mobile or base. *Power Curve* chart shows typical output power.

**Hear** weak signals -- low noise GaAsFET preamp gives you excellent 0.6 dB noise figure. Select 15 or 20 dB gain.

**B-5016-G** has legendary ruggedness. *We know of one that has been in constant use since 1979!*

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**Fully** protected from high SWR and excessive input power. Has warning LED.

**Has** smooth adjustable Transmit/Receive switching with remote external keying.

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### *More 160 Watt, 2 Meter Amplifiers . . .*

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**B-1016-G, $379.** MIRAGE's most popular *dual purpose* HT *or* mobile/base amplifier. 160 watts out/10 W in. For 0.2-15 watt transceivers.

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# Hams and Heart Disease: Are You a Sitting Duck?

Are you a sitting duck when it comes to cardiovascular disease? February is "Healthy Heart Month," and a cardiologist-ham has some straightforward facts on lowering your risk of heart attack and stroke.

By Richard L. Benda, M.D., WB2QJA*
RCPKVBenda@aol.com

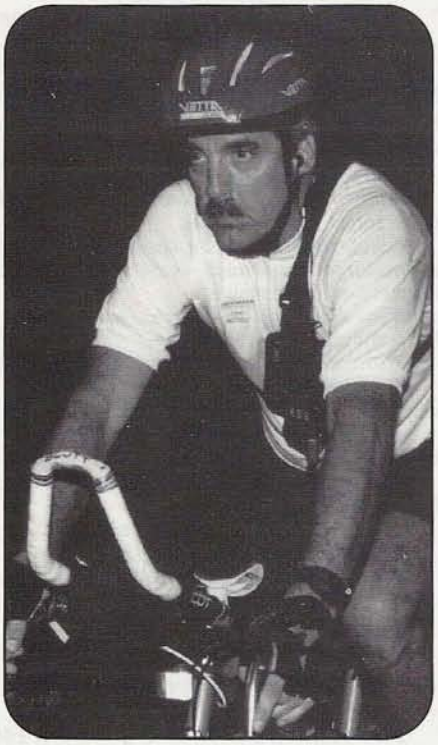
Take a look around—at yourself and your fellow hams at your next club meeting or hamfest. As a group, we are predominately male, overweight, sedentary, fifty-ish, and smokers. These are some of the leading contributors and risk factors for suffering either heart attacks or strokes. But there are ways to minimize those risks, and you should think about them as though your life depended on it...because it does.

## A Look at the Problem

Just what is *cardiovascular disease*, anyway? It's actually a category of diseases related to the heart (cardio) and the network of veins and arteries (the vascular system) that carries blood throughout our bodies. Blood carries oxygen and nutrients to all of our organs, and if the blood can't get through to vital organs, either because the heart can't pump it or because the pathways are blocked, then those organs can't function.

Cardiovascular problems can build up silently for years (as critical arteries get narrowed by cholesterol, for example) until the problem suddenly becomes obvious in the form of a heart attack or stroke. In a heart attack, the heart cannot pump enough blood to the body to keep things going. Severe heart attacks can result in death, and heart disease is the number one cause of death in the U.S. Stroke has been described as a "brain attack." It's the third leading cause of death among Americans (cancer is number 2), and occurs when bloodflow to the brain is severely restricted or cut off, either by a clot that blocks an artery (often one that has been narrowed through years of cholesterol buildup) or by a hemorrhage, bleeding caused by a break in a blood vessel. Stroke survivors often lose basic abilities, such as speech and movement. The degree of recovery can vary from complete to none at all.

The severity of both heart attacks and strokes can often be lessened by prompt recognition and emergency room treatment (see "Warning Signs" for symptoms of these attacks). If you think you or someone you know is having a heart attack or stroke, don't wait "to see if it goes away." Call 911.



*Regular exercise helps combat several risk factors at once, reducing your likelihood of developing heart disease and stroke. But if you've been sedentary, see your doctor before beginning any exercise program. Losing excess weight and reducing fat in your diet are also important to cardiovascular health. (KE6LCS photo)*

## Non-Modifiable Risk Factors

In the past 25 years, there has been some decrease in the incidence of heart attack and stroke by modification of risk factors and new treatments. However, despite the development of new drug therapies and other advances in medicine, heart attack remains a leading cause of death and disability in the U.S. Approximately 900,000 Americans have heart attacks each year. Of these, some 225,000 die, with about one-half dying before they even reach the hospital. Prevention remains the best way to further reduce these numbers.

---

**Richard Benda, WB2QJA, has been a ham for over 30 years. He's active in packet, running a packet BBS for the past 10 years as well as serving as the Digital Modes Director of the Westchester Emergency Communications Association. He is also a practicing cardiologist and is Chief of Cardiology and Director of Internal Medicine at Lawrence Hospital in Bronxville, New York.*


*The American Heart Association and the Red Cross offer CPR classes through their local chapters. Why not sign up as a club?*

Risk factors for cardiovascular disease may be grouped as "non-modifiable" and "modifiable." Examples of non-modifiable risk factors are *age*, *male sex*, and *family history*. As we grow older, the risk of heart attack increases. Middle-age males have a higher incidence of heart attack and stroke than women. This is due to in part the fact that a woman's natural estrogen production seems to have a protective effect. But this protection doesn't last forever.

When a women enters menopause or undergoes the surgical removal of her ovaries, estrogen production falls and the protective effect is lost. In these women, the administration of estrogen hormones may be helpful in extending this period of protection from heart disease. Interestingly, giving older men estrogen compounds does *not* protect them from heart disease and may paradoxically *increase* their risk.

Family history of premature coronary disease is another non-modifiable risk. If you have a family history of heart disease, you are also at risk, and it is important for you to aggressively look for any possible *modifiable* risk factors to adjust.

## Warning Signs

How do you know if you or someone around you is suffering a heart attack or stroke? Only a doctor can tell for sure, but any of the following symptoms should get you to the phone, to call either your doctor or an ambulance. It *is* a matter of life and death!

### Signs of Heart Attack

1. *Chest Pain*: This is the classic symptom. Sufferers usually describe it as a heaviness or weight on the chest. The pain may radiate or travel to the neck, jaw, or left arm. The pain may be as mild as a feeling of indigestion or quite severe. Sometimes, the pain may be felt only in the neck, jaw, or left arm and may not be accompanied by chest pain. Rarely, some people, especially diabetics, may not feel *any* pain.
2. *Sweating*: Usually the person begins to perspire, sometimes quite profusely.
3. *Nausea and Vomiting*: These may be present, especially for heart attacks which involve the inferior wall, or bottom surface, of the heart.
4. *Weakness*.
5. *Shortness of Breath*.

### Signs of Stroke

1. *Weakness or numbness on one side of the body* is a classic symptom.
2. Sudden onset of *lethargy or confusion*
3. *Dizziness or lightheadedness*
4. *Severe unrelenting headache*
5. *Uncontrollable movements or* new onset of *seizures*
6. *Blackout spell*

It's important to remember that *not everyone experiences pain in the same way*. If there is any suspicion that you or someone else is having a heart attack or stroke, the best thing is to *seek immediate medical attention*. This can be done by calling 911 or other emergency number in your area, or getting in touch with your physician or hospital emergency room. It is important to know what to do beforehand so that in the excitement of an emergency, you don't waste time. In heart attack and stroke, every minute counts.

## Risk Factors You CAN Change

Modifiable risk factors are things in your life that you can work on to change your destiny. These risk factors are *hypertension* (high blood pressure), *elevated serum cholesterol levels*, *cigarette smoking*, *diabetes*, *sedentary lifestyle*, *obesity*, and *stress*.

Let's look first at high blood pressure. The level of hypertension is directly related to the risk of heart disease and stroke. The higher the blood pressure, the greater the risk. A leading factor in the lowering of the rates of stroke and heart attack death has been the detection and treatment of mild and moderate hypertension.

Most people with high blood pressure do not know they have it. It is truly the "silent killer." Most cases of high blood pressure are found at blood pressure screenings or on routine physical examinations. Only with severe elevations of blood pressure do people have unrelenting headaches or nosebleeds.

High blood pressure generally runs in families, so this can alert you to keep an eye on it. The first steps in treating hypertension can be changing your diet to reduce salt, losing weight, and getting regular exercise. *The most important thing is to find out if you have it.* There are many medications available to treat high blood pressure and your physician can generally find one that works well for you and that you can tolerate well.

As patients, we must be sure that our blood pressure is controlled and that we follow up on it regularly. Remember that most people don't have symptoms if their blood pressure is high and you can be feeling just great with a serious problem. Regular blood pressure checks are essential if you have hypertension.

## Fighting Cholesterol

The American public has been made well aware of the dangers associated with

***"If you have been sedentary, before you begin any exercise program, it's a good idea to have a physical examination and possibly a stress test. Problems and possible restrictions may then be identified and corrected before you start."***

a high cholesterol level. Cholesterol is the fat that contributes to the clogging of arteries throughout the body. Again, studies have shown that the higher the level of cholesterol, the higher the risk of developing problems.

Reduction of serum cholesterol (meaning cholesterol in the blood) has been shown to lead to a decrease in the number of heart attacks. This has been recently proven in people who never had any history of heart disease. Thus, *we can prevent the first heart attack in some people*. Remember, statistics show that a good percentage of heart attack victims die before reaching the hospital...imagine the impact on families and loved ones. Again, the best way to find out where you stand is to have your cholesterol level checked. Get a blood test. Many companies and community groups sponsor free or inexpensive screenings.

You're much better off to have a cholesterol problem discovered and treated before complications, such as a heart attack, occur. Cholesterol screening and physical examinations are again important. The first steps in treating elevated cholesterol are reducing the amount of fat in your diet, exercise, and weight reduction. In some people, this is not enough, and there are also medications available that are proven to be effective.

## Kick Those Butts!

Cigarette smoking remains a significant health problem in our society. The Framingham Study, which followed a large population in Massachusetts for a long period of time, was helpful in identifying the risk factors I have discussed. The study defined a cigarette smoker as someone who smokes *one* cigarette a day.

The most common health problems related to smoking are heart disease and stroke, not lung cancer. Again, there is a direct correlation between the number of cigarettes per day and the risk of heart disease. In addition, a smoker is more likely than a non-smoker to die from his heart attack. There are nicotine patches and gum available as well as specific drug therapy to help you quit. There are also help groups out there to assist you.

## Other Controllable Risk Factors

If you have diabetes, you are at increased risk for heart disease and stroke. Generally, the better the diabetes is controlled, the lesser the risk of these complications. This disease can sneak up on you, and the way to find out if you have it is by blood sugar testing at a health screening or physical examination.

A sedentary life style can also contribute to health problems. On the other hand, exercise has beneficial effects on blood pressure, blood sugar, cholesterol, and weight. In other words, regular exercise can help reduce a host of risk factors. But don't just jump up and start running. If you have been sedentary, it's a good idea to have a physical examination and possibly a stress test before you begin any exercise program. Problems and possible restrictions may then be identified and corrected before you start.

Likewise, being overweight places you at increased risk for problems. If you're overweight, you're more likely to have high blood pressure, diabetes, and high cholesterol. So the risk factors increase exponentially. The best approach is gradual weight reduction through dieting coupled with exercising. Your physician can guide you here as well.

Stress is harder to quantify, but it's associated with increased risk for heart disease. Instead of screaming your call-sign in some DX pile-up, you would be better off getting out of the shack and taking a walk around the block.

## Steps to Healthy Hamming

As I mentioned at the beginning of this article, the typical ham is a sedentary, overweight, middle-aged male who may also be a smoker and have high blood pressure, diabetes, and high cholesterol. But hams, too, can make choices that can have a positive affect on our health. Here are some suggestions for tying in heart-healthy activities with our ham radio activities (I'm sure you can think of plenty of other ideas, too):

- Go to one of the radio club's walk-a-thons and don't just sit in the car. Do some walking while you're talking.
- Do some hilltop VHF DXing and hike to the hilltop (assuming your doctor has OKd you for strenuous exercise).
- Go on that next club "foxhunt" (hidden transmitter hunt) and, if you're the "fox," try to hide where the folks will have to walk to find you.
- Pass on the jelly doughnuts offered at the club meeting.
- Vow to stop smoking and go for that annual physical that you've have been putting off.

In addition, as a group, we should be looking for CPR (Cardio-Pulmonary Resuscitation) training. These classes are offered all over through local chapters of the American Red Cross or the American Heart Association. This can be a great club activity.

If you enjoy your hobby, these steps can help you help yourself to a longer time in which to enjoy it. ■

### Resources

To learn more about heart disease and stroke, contact the following:

American Heart Association, 7272 Greenville Ave., Dallas, TX 75231; Phone (800) 242-8721; WWW: <http://www.amhrt.org>.

National Institute of Neurological Disorders and Stroke, P.O. Box 5801, Bethesda, MD 20824; Phone: (800) 352-9424 or (301) 496-5751; WWW: <http://www.ninds.nih.gov>.

National Stroke Association, 96 Inverness Dr., East, Suite I, Englewood, CO 80112-5112; Phone: (800) 787-6537; WWW: <http://www.stroke.org>.

CPR courses are available through local chapters of the American Heart Association (see above) and the American Red Cross (check your phone book for the location of a Red Cross chapter near you).

# Picture This! "Phun Photos"

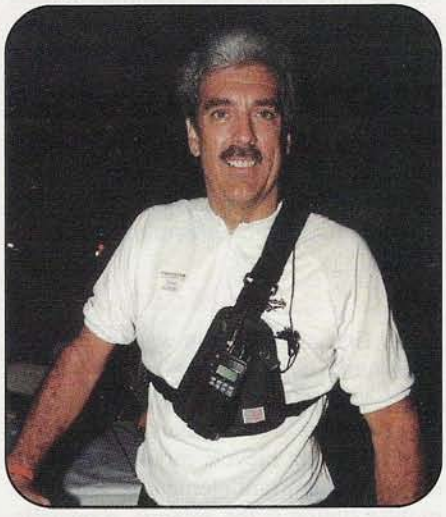
## Have Rig...Will Ride

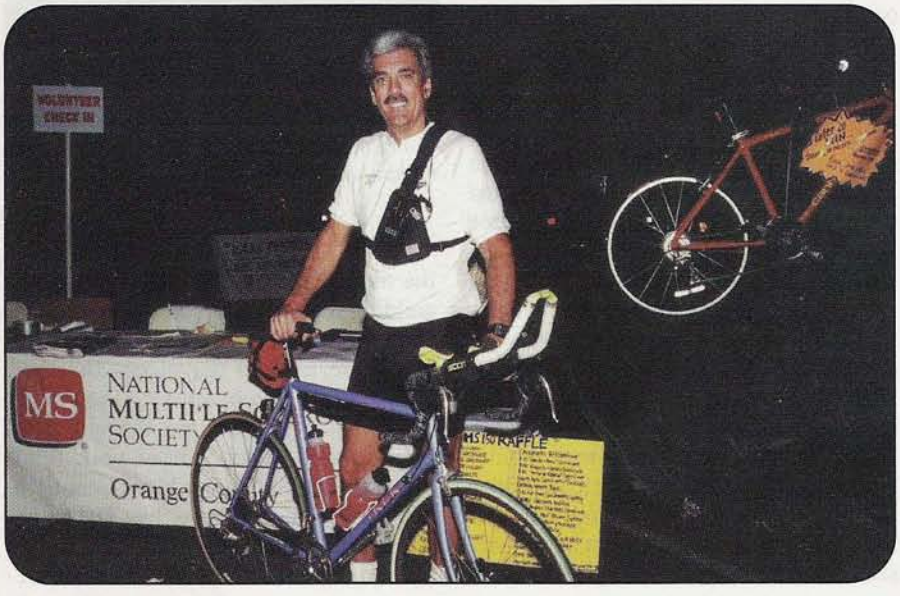
If you've got a cool snapshot to share with us, but don't have a whole article to build around it, send it in to "Picture This," along with a brief description of who and what we're seeing. If we like it, too, and have the space, we'll print it (no pay, just glory). Send your color prints to *CQ VHF*, 76 N. Broadway, Hicksville, NY 11801. Please *don't* write on the front of the photos or use ballpoint pen on the back. If you'd like your photo(s) returned to you, please tell us so and include an SASE (self-addressed, stamped envelope) with sufficient postage. Thanks!

Tom Allen, N7GBJ, took to the road last September for a two-day bike ride to benefit the National Multiple Sclerosis Society. He was one of 800 riders who pedaled some 150 miles from Newport Beach, California, to Mission Bay in San Diego in the annual MS-150, an event for which many hams and ham clubs regularly provide communications.

Tom, who works at Amateur Electronic Supply's Las Vegas store, was sponsored on the ride by Premier Communications, the U.S. distributor of ADI radios. Premier equipped him with an ADI AT-600 dual-band HT and a Premier SPM-500 throat microphone (along with a personalized Premier/ADI shirt). Tom also used an ICOM NCP-1 nylon chest pack to hold the radio as he rode. Tom says he made some 15 to 20 contacts on local repeaters during the two-day ride. This was the second time he'd taken an HT along on the MS-150, but the first time he'd used the chest pack (the previous time, the radio was attached to the bike).

For more about combining bicycling with hamming, see "Riding the Airwaves," by Scott Farrell, KE4WMF, elsewhere in this issue, and watch for additional articles in upcoming issues of *CQ VHF*.





# Riding the Airwaves

Want to get some good exercise, cut down your gas and car repair bills, and have some hamming fun at the same time? Why not try what KE4WMF did?—Mount your ham gear on your bike and ride to work!

By Scott A. Farrell, KE4WMF*
ke4wmf@aol.com

Can bicycling and amateur radio coexist as one activity? Absolutely! Bicyclists often choose to ride their bicycles in order to exercise, seek adventure, save fuel, and avoid stop-and-go traffic. Amateur radio operators often have ham radios in their automobiles for emergencies and so they may operate outside the confines of their homes. There is no reason why you can't enjoy a good bicycle ride while having the benefits of amateur radio. Here is how I integrated my two favorite pastimes:

## 500 Miles a Month

I joined the United States Coast Guard in 1986 and bought my first road racing bicycle in 1987. I was a licensed road racer and I've always been a fast recreational rider, averaging about 500 miles per month. Now I prefer to log my miles doing organized rides, commuting to and from work, and exploring off-road areas. I still have my old racing bike, but I mostly ride my TREK Y5 full-suspension all-terrain bicycle. Also, my wife and I ride a tandem bicycle.

I began amateur radio study while stationed aboard a Coast Guard cutter. Since I'm trained in radar, computer, and digital circuitry repair, studying for the test was not too difficult. I received my Technician class license in March 1995 and bought a Yaesu FT-11R 2-meter handheld transceiver (HT) to use during my morning and afternoon commutes. As spring approached, I started riding my bicycle more often. Soon, I was making the 22-mile round trip commute to and from work, just as I always had when the roads were ice-free. Then the thought occurred to me, "Why should I stop talking on the radio just because I'm on a bicycle?" I began carrying the HT with me, but the rubber duck antenna just wasn't performing well enough. That's when a series of modifications began.

## Makin' Some Mods

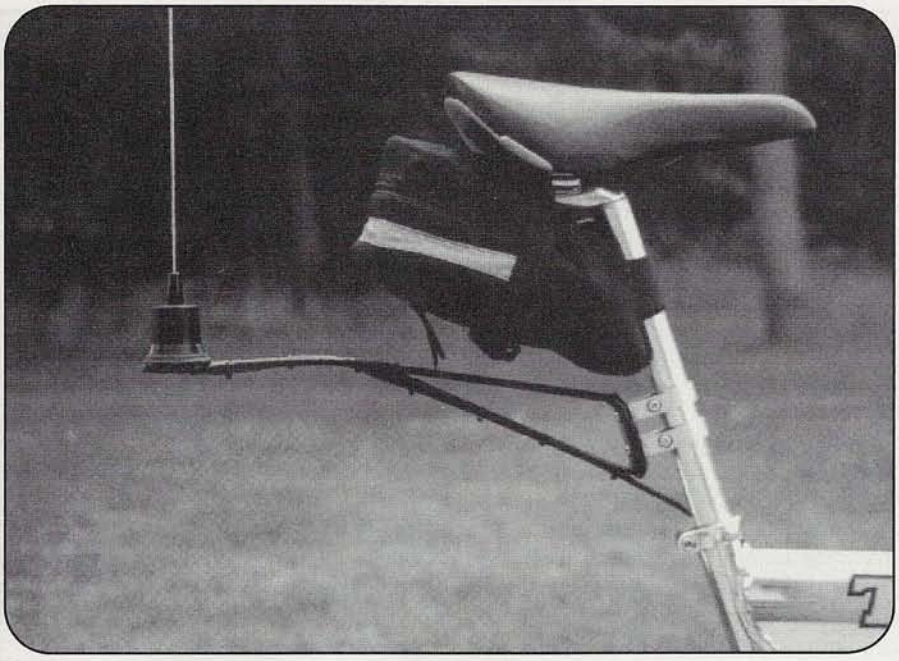
My first modification was to upgrade the antenna. Since about 80% of my hamming is done from a bicycle, I've learned a few things about what is important when working bicycle mobile. I believe the most important element of a bicycle mobile station is the antenna, especially one that does not require a groundplane.

My primary antenna is a Larsen NMO-150 HW 1/2-wave. Copper-wire "J-poles" are great, but they're a little awkward on lightweight bicycles (especially off-road) and they take a real beating in the woods. I find the Larsen to be light and nimble, easily flexing around low tree branches and other obstacles in the woods. The Larsen does not require a groundplane, so the mount was made as small as possible. I used to use a 5/8-wave antenna (since I had one), but the 1/2-wave is far more effective, with SWR readings below 1.3:1 across the band.

The antenna is mounted to a tubular aluminum support that I fabricated from four feet of 3/16-inch solid aluminum rod to fit to the water bottle mount behind my seat. I used a vise and vise-grips to bend the mount into the desired shape. Since welding such small aluminum is very delicate work, I chose to use Goop household glue to hold the pieces together. Unlike superglue or epoxy, Goop is not rigid when dry. Therefore, the mount has held up well under various conditions. Several coats of gloss black paint finished the job and hid the glue. The antenna mount is secured to the seatpost with special aluminum mounts that are de-

*The author with his bike in the woods. His ham gear is mounted for maximum protection from bumps and bounces. (All photos courtesy KE4WMF)*

**Scott Farrell, KE4WMF, serves in the United States Coast Guard and is stationed on Cape Cod, Massachusetts. He lives in Buzzards Bay. This article is adapted from one published in The BMHA Newsletter, the newsletter of the Bicycle Mobile Hams of America.*



*Close-up view of the antenna mount. The antenna is an unmodified Larsen NMO-150HW 1/2-wave vertical, which does not need a ground plane. The mount is "homebrewed" from solid aluminum rod and held together with Goop household glue.*

signed to hold a water bottle bracket behind the seat.

All cables follow the same routes as the brake and shifter cables. The coaxial and power cables are hardly noticeable from more than a few feet away.

## Power Up!

Moving forward, I keep one or more gel-cell batteries under the seat. Currently, I prefer to carry a 6-volt, 4-Amp-hour (Ah) battery so I may operate my HT and the headlights at the same time. Obviously, I don't run the headlights full-time, so I usually have plenty of HT use available. I get 2 watts from my HT this way, and that's usually enough. When I want 5 watts *and* headlights, it's very easy to carry two 6-volt batteries and rig them for both 12-volt and 6-volt operation. When I take an all-day trip, I carry a 12-volt, 6.5-Ah battery (and a RadioShack HTA-20 30-watt amplifier as a standby if I'm riding unsupported).

Normally, though, I prefer to use 6 volts because it's the same voltage used by my headlights. Plus, the 6 volts can be put straight into my HT without using adapters. The problem with adapters on my station is that my HT operates on 9.6 volts instead of 12. Therefore, I have to use adapters which convert 12 to 10 volts. The conversion process uses more current than the HT itself...even if the radio is turned off! For example, the adapter alone draws 30 mA, even with the HT disconnected. The HT and the adapter together draw 60 mA (squelched). And if I don't unplug the HT when it's not in use, the battery will discharge. But by plugging 6 volts directly into the HT, the current drops to 0 mA with the radio off, and only 15 mA with the radio on. There are definite current savings to be had. With 6-volt batteries, I sacrifice a few watts, but I gain the convenience of not dealing with bulky, battery-draining voltage adapters.

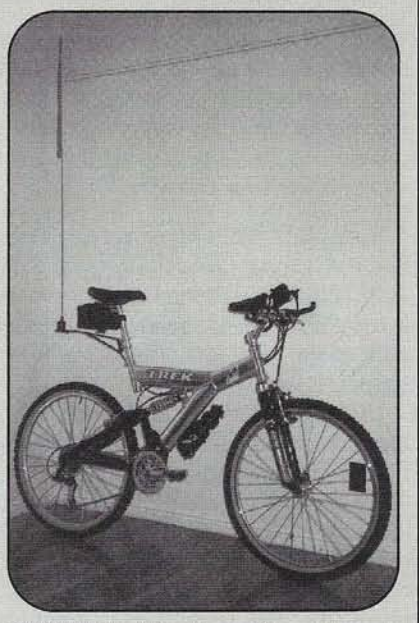
## The HT Mount

The HT is encased by a modified P5 soft case, by The Pouch. The P5 rests in a homemade handlebar mount, created by gluing and screwing the mounting pieces of a Cateye HL-500 headlight to a small carved up RadioShack project box. Actually, any light mount will do, as long as both the piece that mounts to the light and the piece that attaches to the handlebar are available.

I used a project box that best fits my particular radio, then I carved it to fit more precisely. Then I glued and screwed the light mount to the project box. Again, Goop was used to secure the mount to the box. Initial tests revealed that superglue cracked during heavy vibrations off-road. And, as noted above, Goop has not failed yet, even after crashes. The P5 pouch was cut to expose the keypad and display. Since I ride on rocky trails, I have reinforced the P5 by adding thick Velcro straps and special cutouts so the HT won't fall off the mount.

The final part of my ham setup is a hands-free speaker/microphone. I use an LEP-500Y boom mic by Electronic

## The TREK Y5 Bicycle



*KE4WMF's bicycle-mobile station—a TREK mountain bike customized for 2-meter FM operation. That's a gel-cell battery under the seat and the radio is mounted to the handlebars.*

The TREK Y5 is a full-suspension mountain bike. Made from polished aluminum, the "Y" features Shimano STX-RC components (LX drivetrain), clipless pedals, Manitou Pro front shocks with nearly 3 inches of travel, and Fox Vanilla rear suspension with 4 inches of travel. It also has a TREK Radar cyclocomputer with current speed, average speed, maximum speed, stopwatch, trip odometer, overall odometer, clock, thermometer, and workout window functions. The horn, by Delta, is mounted to the handlebars and powered by a plastic bottle air-charged to 100 psi (pounds per square inch) that rests in a bottle mount. At 115 dB, plus the fact that it's mounted high and unobstructed, it's louder than most car horns.

## On the Road with KE4WMF

*Scott shared with us two examples of his bicycle mobile station in use: one an endurance race in which he was a participant, and the other a running event in which he helped provide public service communications.—ed.*

### The 1996 AFCA Tour

In April, 1996, I was one of 10 participants in the Armed Forces Cycling Association's (AFCA) Tour of the Southeast, an 1,100-mile endurance run from Miami, Florida, to Fort Eustis, Virginia. We averaged a little over 100 miles a day, and each of the 10 riders also took a turn driving one of the two support RVs.

I was the only rider using a mountain bike (with "road slicks" instead of mountain tires for easier riding), as well as the only rider with ham radio equipment. The others were all riding sleek, lightweight racing bicycles, while my mobile ham shack weighed in at 47 pounds. They all took bets on when I would start removing the heavy equipment...but they all lost. I never removed a thing! I did, however, suffer a knee injury on the second day of the tour, due to a combination of the extra weight and a seat misalignment. To recover somewhat, I took my turn driving on day three, then returned to the road on day four and rode every mile that the others did.

The only time I had trouble keeping up was on climbs. If the climb was followed by a descent, I sprinted until I caught up (one bridge yielded a 44-mph sprint!). If there was no descent, I rode in the "draft" of an RV until I caught up. (*"Draft" refers to the area of reduced air resistance directly behind another vehicle, allowing the following vehicle to travel more quickly and/or with less effort. Race car drivers often use this technique—but generally at much higher speeds!—ed.*)

The RVs had signs on them reading, "KE4WMF 146.52 MHz." I programmed my scanner to monitor .52 while my HT scanned the repeater band, stopping at active frequencies. I didn't carry a repeater book or anything because I didn't want to fidget too much with lists or radio controls while riding. I simply waited until I heard repeater activity, then dropped in my call, introduced myself, and explained the purpose of the tour. Through this "passive" operating technique, I managed to make 64 contacts along the route, two of which were on simplex with passing motorists. Most of the hams I contacted were quite surprised to learn that I was bicycle-mobile, and that I was able to hit the repeaters from certain distances. Two of them even set up campground reservations for us (using their own credit cards) and came out to visit for a while.

We all had a good time, and one of the other riders finished the race with quite an interest in ham radio! He has since received his license and is working on putting together a bicycle-mobile station of his own. (Due to the deployment of my ship, I was unable to ride in the 1997 AFCA Tour of the Southeast. I'm hoping to be able to ride again this year, and perhaps set a new personal record for contacts made.)

### 1997 Falmouth Road Race

In August, 1997, I took part in the Falmouth Amateur Radio Association's support of the Falmouth Road Race, a seven-mile international running event on Cape Cod, Massachusetts. Thousands of runners participated and approximately 25 hams provided communications support.

One of the least desirable positions in any running race is that of "sweep vehicle." This vehicle follows the slowest runners to make sure that everyone finishes the race safely. Traveling for over two hours at less than idle speed in the summer heat is abusive to automobiles, and actually running the race with the radio is somewhat impractical (*There are hams who have done that in other races, but their primary concentration is on the race, not on communications.—ed.*). But my bicycle-mobile station was perfect for the job.

From my point of view, the race was fairly uneventful; however, I took my job there very seriously. In addition to keeping track of the last runners, the job of the sweep vehicle includes "protecting" them from being struck by other vehicles coming up from behind (they are well behind the main body of runners, and the roads were reopened to traffic after the "sweep vehicle" passed). Being prepared for this, I carried two red flashing beacons to warn vehicles of runners ahead, and I rode in the middle of the lane so drivers wouldn't pass the tired runners too closely.

I spent a little more than two and a half hours on the road for this event. No one was left behind...and no one was hit from behind. I look forward to future occasions where my bicycle-mobile station will be the best station for the job.

Distributors. It rests on my ear, so it does not interfere with my helmet. The PTT (press-to-talk) switch is very small so it can be mounted almost anywhere. This mic is the best I've ever used for bicycle-mobiling. I've tried handhelds, throat mics, and in-ear mics...this is better!

### Putting It All Together

The finished product is a fully adjustable handlebar-mounted HT mount with the quick-release features of the HL-500 headlight system. The combined weight of the bicycle and the ham rig is just under 35 pounds (45 pounds with the 12-volt, 6.5-Ah gel-cell and amplifier). My design's only drawback is the equipment's vulnerability to damage in a crash. Since I usually lay the bike on its side in a crash, the equipment should be adequately protected by the handlebar ends (a recent crash proved that *I'm* more susceptible to broken parts than the radio is).

Other equipment includes a Realistic PRO-39 200-channel programmable handheld scanner, a Cygo Lite 20-watt dual halogen headlight system, a TREK Radar multifunction cyclocomputer, and a Delta pneumatic horn (115 dB). My goal is to take my bicycle-mobile station beyond simple conversation and into some sort of community service, such as search-and-rescue or event coordination. Even without community service, I can still report traffic accidents and other emergencies before most people can get to telephones.

### Hamming On (and Off) the Road

Since being transferred to Massachusetts, I no longer commute to/from work by bicycle on a regular

*Detail of the author's hi-tech handlebars. To the left of the HT is his 115-dB air horn, and over on the right is his "Radar cyclocomputer," which reads out more information than most automobile dashboards.*

basis. However, I do manage to make the 33-mile one-way trip a few times a week by having a shipmate take my bike and me to work, then riding my bike home. I also ride in off-road group rides about three days a week, as well as riding off-road alone a few days a week. My HT is used mostly for entertainment and safety while riding on- or off-road. Occasionally, I'm able to use my station to help my radio club at events such as parades and sporting events where a bicycle has advantages over a car or being on foot.

Overall, I'm very happy with what I have. I'm sure I don't have the greatest station in amateur radio. I've traded some performance for weight and size. Still, I'm able to use just about any 2-meter repeater within 10 to 15 miles (my record is 65 miles with 2 watts).

I think it's interesting that I was able to take two hobbies and combine them into one. Fellow cyclists agree that I am one of the safest cyclists to ride with—less for my riding skills than because help is just a quick call or telephone patch away. One thing is certain: I can't complain about the performance I'm getting from a *bicycle* station! ■

***"I managed to make 64 contacts along the route, two of which were on simplex with passing motorists. [Two] of the hams I contacted...even set up campground reservations for us (using their own credit cards) and came out to visit for a while."***

## Club Spotlight — Ham Clubs in Action

### Bike Mobile? You're Not Alone! Join BMHA.

If you enjoy operating bicycle mobile, you might want to join the more than 450 of your fellow hams who belong to the Bicycle Mobile Hams of America (BMHA). BMHA is a national, non-profit, organization of bicyclists who use pocket-sized ham radios while pedaling. BMHA's 450 members come from 46 states and six countries. Annual dues are $10, which includes *The BMHA Newsletter*. For a sample copy of the newsletter and information about using ham radio on the road or in the wilderness, send a business-sized SASE (self-addressed stamped envelope) to BMHA, Box 4009-R, Boulder, CO 80306.

# The Yaesu All-Mode VHF Portables: A 10-Year Review

Why review a 10-year-old family of radios? Yaesu's FT-290, FT-690, and FT-790 Mark II series is still in production today...and many of today's VHF hams weren't licensed when the rigs first came out. Join us in a celebration of longevity....

By Ken Neubeck, WB2AMU*

Imagine being able to buy a 1988 Ford Mustang off of the production line today in 1998! Well, that is essentially what you can do with the Yaesu all-mode VHF portable transceiver series: the FT-290 (for 2 meters), FT-690 (for 6 meters), and FT-790 (for 70 centimeters) Mark II models.

The original versions of these radios are a throwback to 1970s technology. They are transistor-based rigs with op-amp ICs. The transistor count is over 70, indicating the assembly-intensive nature of the construction design. It's kind of strange to see such a rig still in production by a major ham radio company in this day of microprocessor technology. Yet Yaesu's basic philosophy on this particular line is, "if it ain't broke, don't fix it."

When the Mark II version of the series (the current version) came out in 1987, some of its features, such as the single FM tone unit option that had to be manually set instead of programmed, quickly became obsolete. Also, there were only 10 memories for storing favorite frequencies, a number that may seem tiny compared to the memory offered by many newer radios. But none of that changes the fact that the Mark II models are still among the most reliable and durable radios made today. And they still sell well. Chip Margelli, K7JA, of Yaesu, points out that these radios sell particularly well in Europe, and they still do well in Japan and the U.S. He compares them to Collins radios, in which a simple, easy-to-use, rugged radio is a favorite among operators, even in the face of fancier models existing in the marketplace.

*Photo A. This is not a pretty picture, certainly not the kind you'd see in an advertisement. The FT-290 and FT-690 shown here are two war-horses from WB2AMU's personal collection and they've both seen a lot of mileage from numerous portable and mobile operations, particularly during VHF contests and Field Day. (Photos by the author)*

## Basic Features

All of the radios have the same basic external appearance with different markings and colors to distinguish between them (see Photo A). Each radio can operate on the SSB, CW, and FM modes, at power levels that vary with your power supply and any add-on amplifiers. The radios have a unique two-part design, in which either a matching linear amplifier/power pack or a low-power battery pack (see Photo B) is clipped onto the back end of the radio's front section (see Photo C). This clip-on back end design is a major feature of these radios and is popular among VHF operators who operate using different setups.

The FT-690 is sold with a 10-watt linear amplifier (the FL-6020), and the FT-290 and FT-790 are each sold with 25-

**Ken Neubeck, WB2AMU, is a* CQ VHF *Contributing Editor.*

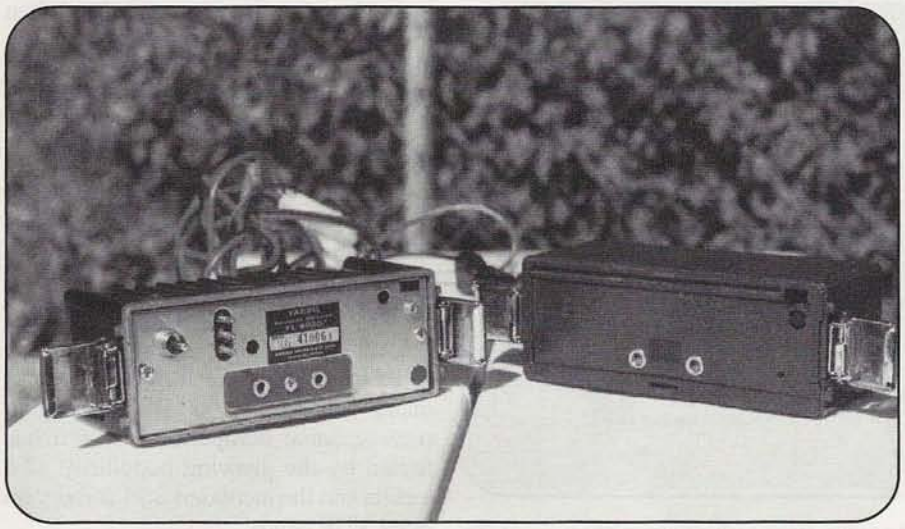


*Photo B. On the left is the10-watt linear amplifier back end for the FT-690; on the right is the 2.5-watt battery pack that can attach to any of the Yaesu VHF portable units. Either assembly clips on easily and quickly to the front end of the unit.*

watt linear amplifiers (the FL-2025 and the FL-7025, respectively). An alternative to the amplifiers is the optional battery pack (the FBA-8) that holds nine rechargeable C-cells with an output power of 2.5 watts.

The front panel layout is exactly the same for all three models. The panel includes a signal strength meter at the top, a digital frequency display that shows the partial frequency (i.e. 0.125 is shown for 50.125), and a 10-button keypad. This keypad has additional functions which are activated through a function key, much like a scientific calculator. Each radio has two VFOs plus a repeater split function. The factory-supplied hand microphone plugs in the front and a CW key can plug into the side of the rig with a mini phone jack.

The radios are all small and lightweight; the total weight of each, with the linear amplifier or battery pack attached, is less than five pounds, making them very easy to carry in an attaché case or similar size container. I've found this to be the best way to carry this radio when traveling (see Photo D).

The feel of the dial may be a bit of an annoyance to active operators. Each frequency position has a detent or friction-like feel in the dial so it's not too easy to spin the dial as you could do with another radio, such as an HF or VHF base radio. However, the detent is desirable when using any of these radios for mobile operation, since you'll stay put on one frequency, such as a calling frequency or repeater pair.

When operating the radio in the battery pack mode, the antenna is attached to a BNC connector in the antenna port on the front face of the radio. The original model used to have a telescoping antenna that came out of the antenna port. The Mark II comes with a detachable loaded whip for 6 meters and a rubber duck for 2 meters, both of which can fit into this port (I've modified my 6-meter antenna to a full quarter-wave for better results). When the linear amplifier is attached to the radio, the front antenna port is inactivated and the SO-239 connector in the back of the amplifier is active.

## A Five-Year Field Test

I've owned an FT-690 Mark II since early 1993. This unit has traveled across the country with me on four occasions and has been operated from over a dozen states. In addition, it's been used for 15 VHF contests (three a year) plus three full Field Days. The unit has not had a major failure yet.

I did, however, encounter a minor problem when the dial got a little funky after being on for 20 hours straight during one Field Day, but the problem disappeared once the rig cooled down and it has not reappeared. Another minor problem was that after much usage, the front antenna port started moving when I installed the portable antenna. This could have caused the internal wiring to twist and put stress on the connectors, so I used

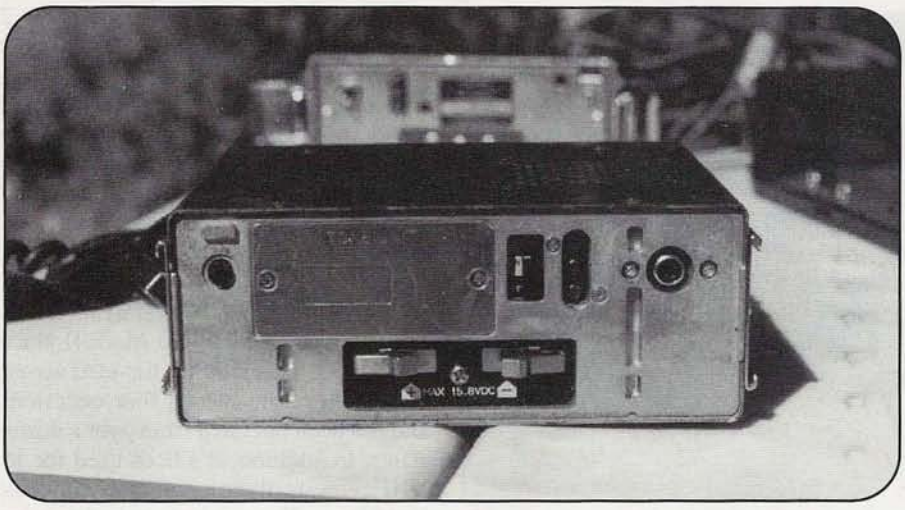


*Photo C. The back end of the front section of the radio. Here's where you connect either the battery pack or the linear amplifier. An optional tone unit can be installed in the compartment on the upper left. Plugging in an amplifier instead of the battery pack also deactivates the antenna jack on the front panel (there's an SO-239 output jack from the amplifier).*

a little bit of Loctite glue to hold the connector in place.

I have literally beaten the hell out of my FT-690 Mark II to the point where the original paint is gone and I had to repaint the chassis. This particular unit has passed the equivalent of several reliability tests (*see "How 'Reliable' Is Your Radio?" in last month's* CQ VHF—*ed.*).

The FT-690 Mark II radio is really great for portable work and is easy to set up using the battery pack for listening to 6 meters. I've used my radio this way to make a number of contacts while operating "pedestrian mobile." One of my more memorable "walking" contacts was a sporadic-*E* QSO with Louisiana in the summer of 1993. I was running (walking?) 2.5 watts with the supplied whip antenna and I received a 5-4 signal report. Another time, using 2.5 watts with a mag-mount vertical on my car, I made a one-hour contact with KC4SUS during a very strong sporadic-*E* opening in the summer of 1994. I have also made some line-of-sight contacts using 2.5 watts and either the mag-mount vertical or the supplied whip antenna. The range of these contacts was typically 10 to 20 miles. Your mileage may vary, however, depending on your relative height above sea level and in relation to the other station.

If more power is required, the FT-690 works very well with linear amplifiers such as the Mirage A1015G. If the 2.5-watt output from the battery pack setup is used, the Mirage delivers around 60 watts; if the 10-watt setup is used, the full 150 watts output is delivered. On the FT-290, the 2.5-watt output can be used with most linear amplifiers, although the 25-watt setup may be too much for the inputs of some linear amplifiers and this should be checked carefully.

You can do some FM repeater work with the FT-290 Mark II using the battery pack, provided you're close enough to the repeater. However, you'll probably do better to replace the supplied rubber duck with a bigger antenna, such as a quarter-wave vertical. Many of the CW and SSB contacts I've made using this radio required a directional antenna, such as a three-element Yagi, for optimal results. The same applies to the 440-MHz radio, the FT-790.

## Follow the Bouncing Price Tag

The prices of the VHF portable series have really varied quite a bit over the past 10 years, mostly in relation to how the U.S. dollar trades against the Japanese yen (it's interesting to track this economic relationship in ham radio magazine advertisements over time).

The Mark II series came on the market in 1987 with a list price of $400. When dollar-yen exchange rates were unfavorable from the U.S. perspective in 1992, the FT-690 listed for $800 and the FT-290 was $659! Compare this with the current price of $500 for the FT-690 and $560 for the FT-290. A definite bargain compared with five years ago...and relatively little change over the 10-year span.

***"The radios are all small and lightweight; the total weight of each, with the linear amplifier or battery pack attached, is less than five pounds, making them very easy to carry in an attaché case or similar size container."***

## Enter Some Competition

The Yaesu VHF portable series has filled a unique niche in the market for many years now, but it's starting to receive some competition, which has fueled by the growing popularity of 6 meters and the increased SSB activity on other VHF bands.

The Kenwood TS 60, for example, will put you on six with 100 watts out—but it has a $1,000 price tag. Actually, this turns out to be about the same amount you'd spend for an FT-690 plus a Mirage amplifier to push your power up to the 100-watt level. More recently, companies like Ten-Tec have introduced low-cost transverters for the VHF bands that work with HF radios by converting VHF frequencies to the HF range. A few other companies have entered the low-cost VHF radio market with new products, such as MFJ's 9406 6-meter SSB transceiver (with a CW option) at $260. MFJ is also working on a similar version for 2 meters.

In addition to dedicated single-band rigs, six and sometimes even 2 meters are being included in a growing number of HF radio packages. Examples include the ICOM IC-706, Kenwood's TS-570S, and the Alinco DX-70. While some of these rigs don't have some of the features that the Yaesu portable radios include (especially their portability), they are providing another path to getting on the weak-signal portion of the VHF bands.

This additional competition, along with the fluctuations in the yen/dollar conversion rate, may account for the recent price drops in the Yaesu series. The radio was overpriced at $800 in 1992, but the current price of around $500 is somewhat more reasonable. It will be interesting to see if prices come down even further. It would make good marketing sense, since the vast majority of hams have VHF privileges!

## Don't Wait for a New Version

A number of hams may have held off buying these rigs because they believe


*Photo D. The small size and light weight of these Yaesu all-mode VHF portables makes them perfect for packing in your carry-on luggage to take with you on business trips...along with some really good reading, of course!*

that a new version will come out soon. Not likely. Yaesu is satisfied with the current design; it hasn't made any changes in the past 10 years and probably will not do so anytime soon. So, if you're holding out in case a new version is coming out soon, you may have a long wait.

Are the current prices of these radios fair in today's market? This is a difficult question because you're not paying for the latest technology but rather for something with proven reliability. It can be a tough call to justify paying a high price for a single-band rig when the band can be purchased as part of an HF radio package. But if you're looking at just the merits of the Yaesu VHF portable series, the price can certainly be justified, particularly if you're planning to use these radios for portable and mobile operations in which durability is a major requirement.

Of course, your specific purchasing decision will be a balance of many factors that only you know. But if you've got a few bucks left in the budget after paying off your Christmas bills, I'd certainly encourage you to look closely at these proven performers. ■

## Resources

For more information on the Yaesu all-mode VHF portables, see your favorite ham dealer or contact Yaesu USA, 17210 Edwards Rd., Cerritos, CA 90703; Phone: (562) 404-2700; Internet: <http://www.yaesu.com>.

# Comet CYA-240 Dual-Band Yagi Antenna

Comet Antennas, best known for its mobile and omnidirectional base models, has introduced a dual-band Yagi (beam) for 2 meters and 70 centimeters...and Gordo gave it a try.

By Gordon West, WB6NOA*

Winter is traditionally time for hams to work on their antennas (based on the theory that, if an antenna survives the winter, it isn't big enough!), or at least to *think about* working on antennas and start planning spring and summer operating fun.

If you're like many hams, you may be planning some "field operation" with your dual-band handheld, and you may decide you're going to need a little bit more antenna performance than what you can get with the very inefficient factory-supplied rubber duck or even a "unity gain" 18-inch telescopic whip (*unity gain means 0 dBd, or the* same *gain as a dipole antenna.—ed.).* Incidentally, those 18-inch telescopic whips work great to boost your range, but you must be careful to not flex the BNC antenna connector at all when using this longer antenna. Flexing the chassis connector could easily break off the connection between the antenna connector and the printed circuit board on the inside.

## How About a Handheld Beam?

The Yagi antenna is an effective way to increase range, and a small three-element Yagi can be broken down into a portable package that you can easily carry as you hike up to your favorite radio DX spot. NCG/Comet, best-known for mobile antennas, mobile mounts, and fiberglass single-, dual-, and tri-band base antennas, has now introduced its Yagi Model CYA-240 ("YA" for Yagi and "240" indicating 2-meter and 440 dual-band capabilities).

*The Comet CYA-240 Yagi antenna goes together in about 20 minutes and weighs less than 5 pounds. Note that the 2-meter elements are at the back of the boom and the 70-centimeter elements are mounted separately at the front end. That's Gordon's wife, Suzy, N6GLF, showing you how light the antenna is. (All photos by the author).*

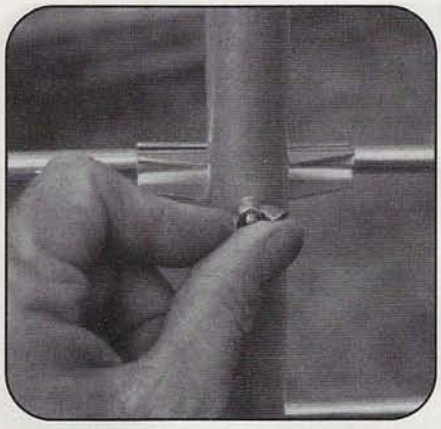
What do you get by using a Yagi? Well, on the 2-meter band, you could expect a three-element Yagi to deliver about 7 dB gain over a quarter wavelength telescopic, which about quadruples your effective radiated power output in the direction of maximum signal. On the 440-MHz band (70 centimeters), a five-element Yagi offers about a 9 dB improvement over a short telescopic quarter-wavelength whip, or eight times the power; this can *really* be heard at the other end of the circuit.

Comet places the five short UHF elements directly in front of the three VHF elements, rather than staggering them in between. "Keeping each Yagi separate from the other provides the absolute best radiation pattern," claims Comet's Mick Stwertnik, KB6JVT. "And for handheld operators, we even include a small power divider assembly that combines the two feedpoints into a single output for the handheld transceiver."

## Building the Comet Beam

I assembled the Comet Yagi in about 20 minutes. During a chilly outside set-up, you'll appreciate the wing nuts supplied for affixing the elements because you won't need a nut driver. The mast mount is at the tail of the antenna, right next to the first three 2-meter elements

**Gordon West, WB6NOA, is Senior Contributing Editor of* CQ VHF.



*Wing nuts make field assembly of the Comet CYA-240 easy since you don't need any tools to mount the elements to the boom.*

(also see "Better Balance for the Comet Yagi" for an alternate mounting idea). The remaining five elements on the 440-MHz band are installed on the front of the antenna.

Each driven element has been pre-assembled and pre-tuned and has its own SO-239 feedpoint. A pre-made coaxial cable harness lets you simply screw on the longer coax section to the 446-MHz feedpoint, and the shorter section to the 146 MHz feedpoint (read the instructions carefully, though; if I hadn't read them, I would have probably hooked it up incorrectly!). Both cables go into a special SO-239 power divider "tee," and, from here, you can run a short section of RG8X down to the top of your handheld or over to a mobile radio with single antenna output.

If you plan to use the antenna with a radio that has separate 2-meter and 440 antenna jacks, you won't need the power divider and you should use individual coax runs to each respective feedpoint.

To further assure that the antenna goes together correctly in the field, each element has a specific listed length (in millimeters) and is color-coded to indicate whether it is a reflector, assembled driven element, or one or more directors. There's even a diagram of the assembled antenna so you can't go wrong.

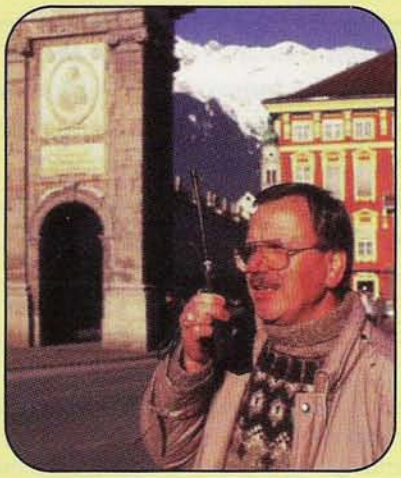
## Add-Ons for Safety

After I had everything set up, I went to a hardware store and located little rubber feet that would just fit over the end of each element. I do this for personal safety. One of my tests would be to use the antenna on a portable ICOM 2-meter SSB transceiver with the antenna's polarization horizontal. To protect anyone from accidentally walking into the sharp elements of the antenna in a portable antenna set-up, I install little rubber caps painted florescent orange. I'd also plan to elevate the antenna well over the heads of anyone walking by or standing near it, even though I would be transmitting only a couple of watts, thus meeting the FCC's new RF safety guidelines.

***"When I switched over to the beam, the improvement was very noticeable on 2 meters; when we went to UHF, the improvement was enormous! We could really see this antenna increasing performance over a selected line-of-sight path."***

## Field Testing

After everything was assembled, I went out on a series of test set-ups and found the antenna to be plenty directive—



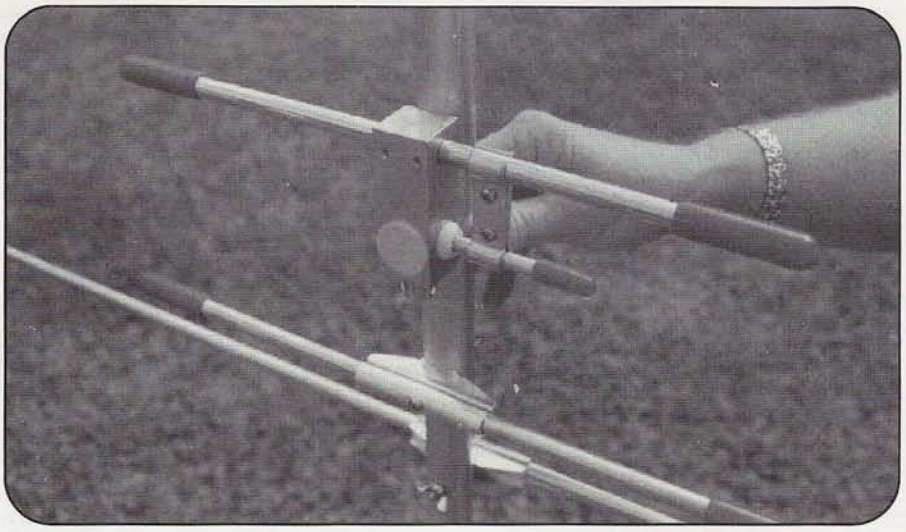
## On the Cover

If you remember the 1964 Winter Olympics, then you also remember Innsbruck—that picturesque Austrian city, smack in the middle of the Alps, and in the middle of a long, thin piece of southwestern Austria that's squeezed between Germany on the north, Switzerland on the west, and Italy on the south. It's no more than 20 miles, line-of-sight, from Innsbruck to either Germany or Italy, and only a 50-mile jaunt to Switzerland. Of course, "line of sight" there depends entirely on how far up in the mountains you happen to be. But just think of all the great possibilities for repeater sites!

Actually, there are probably more mountaintops around Innsbruck than there are 2-meter repeater pairs. Throughout Europe, the 2-meter band is only 2 MHz wide (half the size of the band in the U.S.), and the International Amateur Radio Union (IARU) Region I band plan allocates only eight repeater pairs, along with eight designated simplex frequencies. This may be one reason why FM and repeaters haven't come to dominate the VHF bands in Europe as they have in the U.S.

Nonetheless, there's plenty of activity to be found on European repeaters, as you might guess from our cover photo, showing Wilhelm Wallenta, OE7KWT, talking on his handheld from downtown Innsbruck, his hometown.

Now let's see...it's February, so there *might* be a little snow on some of the mountains around Innsbruck...and there *might* be one or two of them that have good skiing. Wait! Come back! Don't leave without a reciprocal license (call the ARRL for help) and your handheld—and give Wilhelm our regards! (Cover photo by Larry Mulvehill, WB2ZPI)

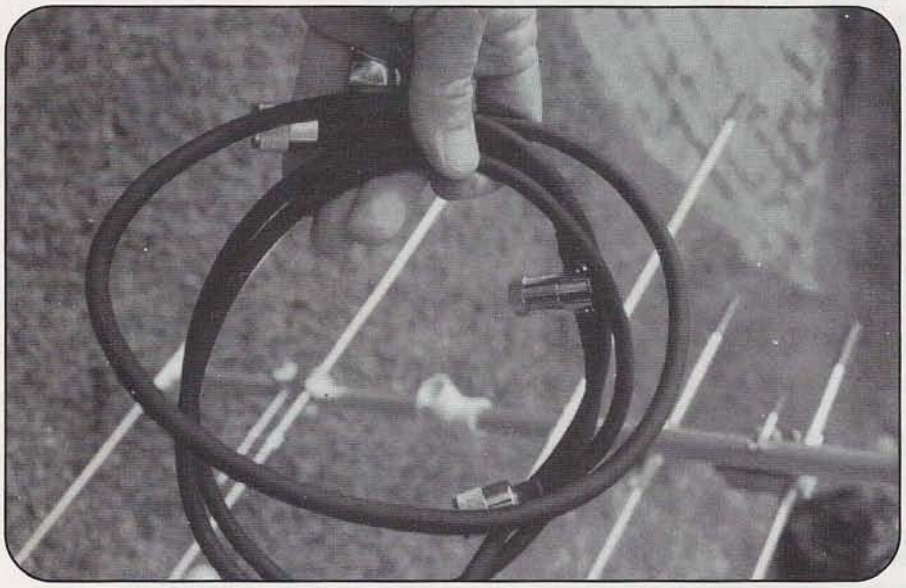


*Brightly-colored plastic end protectors make portable operation safer but don't affect the antenna's performance. These are not supplied by the manufacturer, but should be readily available at a hardware store or home center.*

to the point where some of my ham associates suggested that it would be great for T-hunting (transmitter hunting).

Starting out on a mountaintop with a telescopic whip, I made simplex contact with a ham on another mountaintop, approximately 80 miles away. He was also using a whip antenna, and conditions were marginal at best. When I switched over to the beam, the improvement was very noticeable on 2 meters; when we went to UHF, the improvement was enormous! We could really see this antenna increasing performance over a selected line-of-sight path.

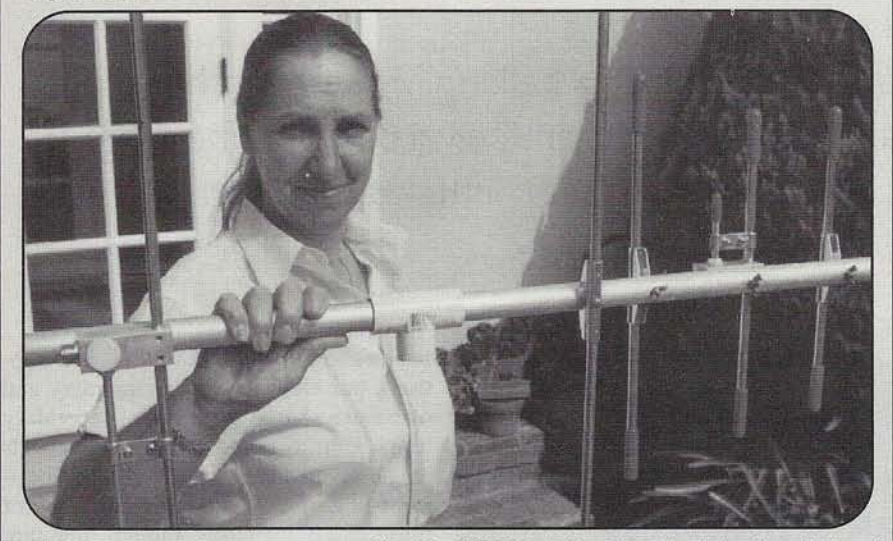
Another ham saw this relatively compact antenna as a way around his "no antenna" condominium problems. The antenna is small enough to fit inside an attic and can be rotated by a small TV antenna rotator. There would be just enough gain to help him work more distant repeaters, and he could also ensure that it never got aimed at the apartment's master television antenna mounted only about 100 feet away. The Comet dual-band antenna provides significant nulls in all directions except for the desired ±30° front main lobe. Mounting an antenna indoors will cost you some gain, but



*Comet supplies a pre-made combiner cable to use the antenna with a dual-band radio that has a single antenna output (there are separate feedpoints on the antenna for 2 meters and 70 centimeters).*

## Better Balance for the Comet Yagi

After several weeks of using the Comet CYA-240 Yagi in different mounting configurations (mobile on my van, base station, field set-up, tripod mount, etc.), it became clear to me that Comet's rear mounting method is cumbersome. Unless you mount the antenna on a serious steel mast, the front end immediately dips down. Plus, all the stainless steel mounting hardware was overkill for this relatively lightweight beam.



*N6GLF holds up the antenna as modified by WB6NOA. The PVC "tee" in the middle of the 2-meter section (see text for exact location) makes field mounting easier than the factory-supplied rear mount with heavy stainless steel hardware.*

I found that an excellent way to set up the Comet beam for rapid mounting was to completely shelve the heavy hardware kit and pass a 3/4-inch PVC "tee" down the boom, midway between the 2-meter driven element and the 2-meter director (see Photo). This is a perfect balance spot, allowing you to then use a short section of PVC pipe as the mast so as not to detune the 2-meter feedpoint or skew the 2-meter radiation pattern. A couple of wraps of electrical tape allows the PVC tee to firmly hold the boom, yet still allows for the elements to be rotated between vertical and horizontal polarization.

Mounting the mast at the antenna's balance point eliminates droop and the entire beam is dramatically more manageable than it was with the heavy stainless steel mounting hardware. It also looks as though there's the potential to add one more element on the 2-meter side, and I'm going to work with some of my antenna programs to see if I can squeeze one more director onto the boom by moving the driven element and reflector all the way back to the end of the boom that originally held the "heavyweight" mounting hardware.

Once again, for field operation with lots of people standing nearby, the rubber end-caps are absolutely necessary for everyone's safety.

it's obviously much better than having no antenna at all.

## Mounting Notes

For outside mounting, all-stainless steel hardware is included with the antenna, along with special notes about making sure that each PL-259 connection is well sealed against water intrusion. The antenna weighs only 2 kilograms (about 4 1/2 pounds) and can work on the lightest of antenna rotators. Plus, it can be mounted either vertically for FM use or horizontally for SSB/CW use by changing the angle of the element assembly at the rear cross mount.

A word of caution: *Anytime you are working with an antenna outside or on a roof, make absolutely sure that you are well clear of power lines. YOU COULD BE KILLED IF THE ANTENNA OR MAST COMES IN CONTACT WITH POWER LINES!* The same warning applies to portable operation—make sure the wind won't blow your antenna or mast into a power line or down onto something or someone.

## Closing Notes

Overall, the Comet CYA-240 dual-band 2-meter/440-MHz Yagi is a solid antenna with good directivity and good forward gain. It's an excellent choice for portable operation or home use if you have antenna restrictions. It's been seen selling for under $110 and is available from most amateur radio dealers. ■

### Resources

For more information on the Comet CYA-240 dual-band Yagi, contact your favorite ham dealer or NCG/Comet, 1275 N. Grove St., Anaheim, CA 92806; Phone: (800) 962-2611; Fax: (714) 630-7024.

## Snapshot!

### Who Was Dr. Yagi?

Hidetsugu Yagi was a professor of electrical engineering at Tohoku Imperial University in Japan in the 1920s and 1930s. He didn't actually invent the antenna that was to bear his name. It was actually invented by a colleague at Tohoku Imperial, Dr. Shiutaro Uda, who published a paper on the design in Japanese in 1926. Yagi's primary role was that he translated Uda's paper into English in 1929, and it carried both of their names when it was published in that language. Dr. Uda continued working on the antenna design for many years, publishing his final work on the antenna, with Y. Mushiake, in 1954.

To learn more about Yagi, Uda, and their antenna, see *Transactions on Antennas and Propagation Studies* (IEEE, 1954); *Antennas*, by John D. Kraus (Ohio State University); and Henry Jasik's *Antenna Engineering Handbook* (MIT). Special thanks to Mandy Wright of West Sussex, England, for this information.

# Microwaves: Ham Radio's Final Frontier

Stop thinking cooking and start thinking talking. After all, those new digital cellphones are really microwave transceivers! We hams have 11 bands above 1,000 MHz, and if we don't use 'em, we'll lose 'em.

By Rich Moseson, W2VU*

Getting tired of crowded bands? Looking for room to stretch out? Well, how about 23 centimeters? Ranging from 1240 to 1300 MHz, it's nearly as big as *all* the ham bands below it put together. Still not big enough? Try 10 GHz. This band is 500 MHz wide, which means you could put the entire spectrum from DC to 450 MHz inside it—both the AM and FM broadcast bands, VHF TV, all the ham bands from 160 meters to 70 centimeters, and everything in between—and still have 50 MHz left over! And don't forget 75.5 to 81 GHz (yes, that's 5.5 *Gigahertz* wide) or 142 to 149 GHz (7,000 MHz of space), or 241 to 250 GHz...well, you get the point.

There are huge, wide-open expanses of spectrum above 1,000 MHz just begging for us to use them (see the Figure for a graphic view). And if we don't use these bands, we will most certainly lose them.

Unlike the early days of radio, when frequencies "below 200 meters" (or above about 1 MHz) were considered useless and were given to hams to get them off of the "important" frequencies, today's commercial radio users are fully aware (more than we are, in fact) of the value of the microwave bands. Telephones have gone wireless...and microwave—the new digital PCS phones being hawked all over TV today operate at around 2 GHz. And the Internet is next: there's already a petition before the FCC for an unlicensed, low-power computer networking band at 5.7 GHz (a band already shared by hams). Moreover, when the FCC was taking comments on relaxing amateur spread-spectrum rules, the only non-amateur comments came from operators of commercial microwave networks who feared we'd be able to use their equipment—plus gain antennas and power amplifiers—to outnetwork their networks on shared frequencies.


*Hams in Europe are experimenting with communications at 411 GHz...it's time for more of us on this side of the Atlantic to start looking at the bands above 450 MHz.*

## Second to None?

While we hams tend to believe that, as radio operators, we're second to none, the reality is that when it comes to our microwave bands, we're second to many and equal to all. In fact, on all amateur bands above 225 MHz (with one exception), our allocations are secondary and often are shared with other secondary users. But, as noted above, these bands are huge and there's room for everyone—right now. As the commercial value of these bands increases, though, pressure will increase on hams to use them or lose them (if you have any doubts, just remember that 220 to 222 MHz used to be an amateur allocation).

Actually, some of this sharing may be beneficial to us, as it increases the availability of equipment and antennas for microwave hamming. This is important because lack of equipment has been one of the major reasons that relatively few hams are active on the microwave bands. Other reasons include misconceptions about how far you can talk on these bands and outdated ideas about the difficulty of building gear for them.

## Why Microwaves?

But let's get real: we don't operate on a particular band because it's "good for ham radio." It has to be "good for me," in terms of the people I can contact, or the places I can reach, or the technology I can tinker with. There's got to be some personal benefit to justify investing time and/or money in equipment for a new band or bands.

So here are just a few possibilities to chew on:

• If you live in an antenna-restricted neighborhood, microwaves can be a good choice; the antennas can be very small and can blend in easily with things like DTV antennas. And if you like DXing but can't put up HF antennas, most of the

*Rich Moseson, W2VU, is Editor of* CQ VHF *magazine.*

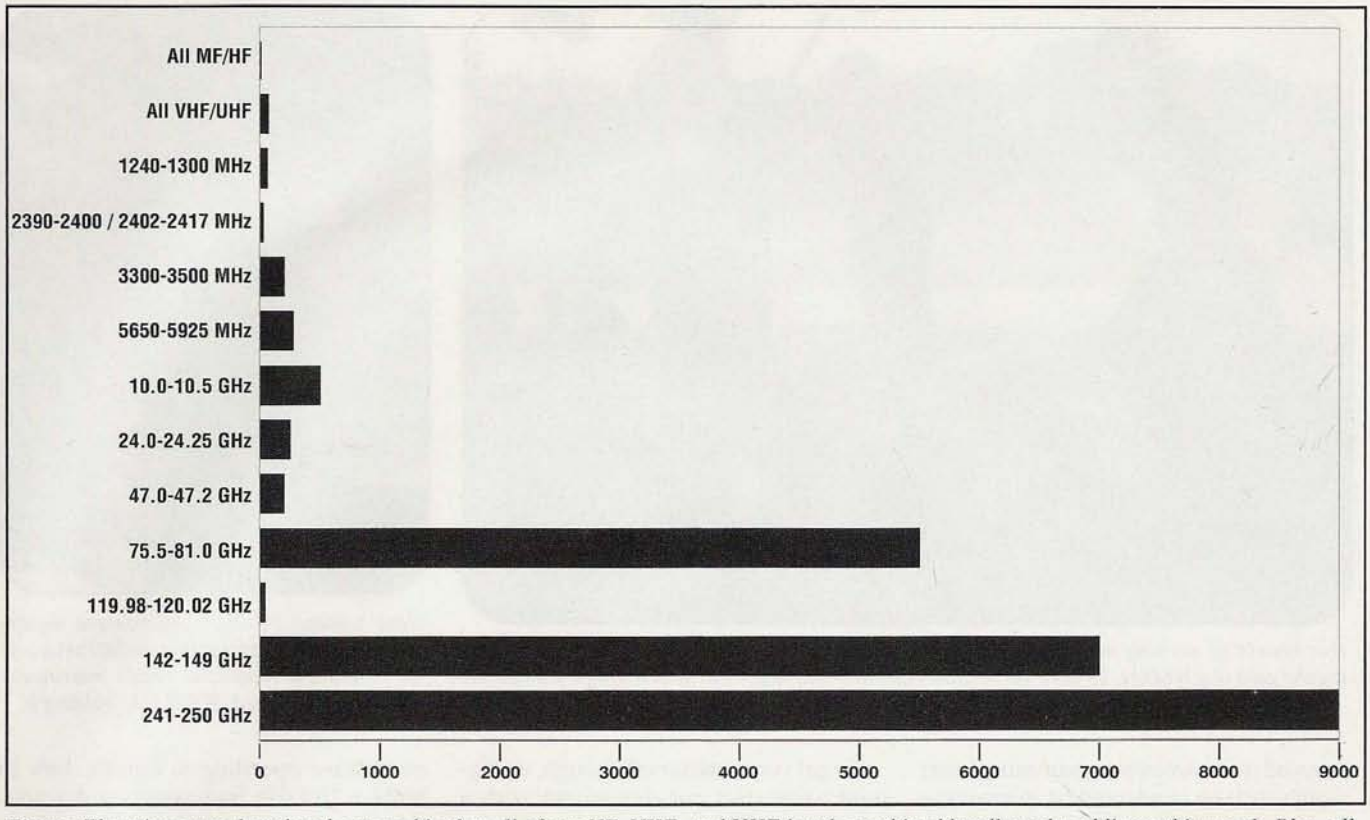



*Figure. The microwave ham bands are so big that all of our HF, VHF, and UHF bands combined hardly make a blip on this graph. Plus, all frequencies above 300 GHz are open to amateur experimentation.*

bandwidth on the Phase 3D satellite will be on the microwave bands. You can even do EME (moonbounce) with a relatively small antenna (see this month's "Weak Signal News" column).

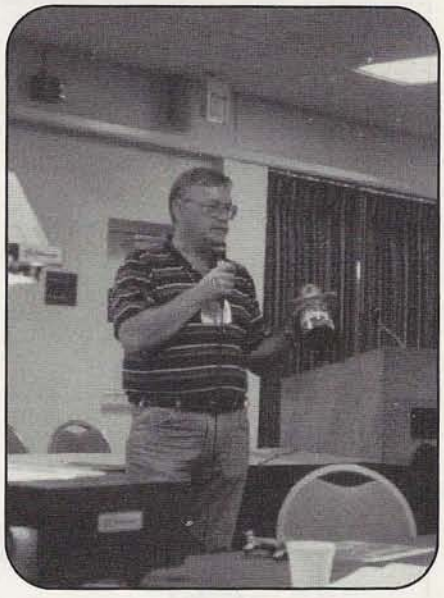
• If you're into digital communications (e.g., packet), the microwave bands provide unparalleled opportunities for building high-speed digital networks, perhaps even supporting digitized voice (via the sound card on your computer, a high-speed TNC, and a microwave network link) and even full-motion video (as in ATV). You can do it now on the Internet; we can make it work better and faster on our microwave bands.

• If you're interested in technical challenges and advancing the state of the radio art, you can follow in the footsteps of your ham radio forebears and help unravel the mysteries of microwave propagation, such as rain scatter and knife-edge diffraction. These are no more exotic than aurora, meteor scatter, and sporadic-*E* were 50 years ago, but there's still much to learn about them.

## A New Column

*CQ VHF* is going to try to help dispel the myths about microwaves—and show you what you *can* do and how easy it is do it—by introducing a new column

*One benefit of working microwaves is small antennas. Here, Kent Britain, WA5VJB, is testing the gain of a W6OAL 15-turn microwave helix antenna. Kent will be bringing a microwave column to* CQ VHF, *starting next month.*



*Here's some "exotic" microwave equipment—an antenna feedhorn made from a coffee can and a soup can! That's microwave authority Al Ward, WB5LUA, holding it.*

devoted to microwave hamming next month. It'll be conducted by microwave authority Kent Britain, WA5VJB, who's also editor of the North Texas Microwave Society's *Feed Point* newsletter. (Actually, Kent will be alternating between two columns for us, one on microwaves and the other on antennas. We look forward to having him join our staff.)

To get you in the mood, though, we figured we'd start out *this month* with a microwave intro by *European Microwave News* Editor Simon Lewis, GM4PLM, which he has kindly allowed us to reprint from his October, 1997, issue. We'll also be hearing more from Simon in the next few months; we've got articles in the hopper from him on microwave operating in Europe, how to build a 10-GHz transverter, and a non-microwave piece on contesting as a "rover" in Scotland.

We hope you'll find enough exciting information here, both this month and in the future, to whet your appetite and get you active on microwaves: Ham Radio's Final Frontier.

# A Beginner's Guide to Amateur Microwaving

## If you've just discovered the world above 1000 MHz but aren't sure how to get started, this should give you a push in the right direction.

**By Simon Lewis, GM4PLM***

*Reprinted with permission from the October, 1997, issue of* European Microwave News.

Firstly, welcome to one of the most gentlemanly portions of amateur radio. You will make some great new friends here, many who selflessly dedicate many hours of their time to the development of the hobby and to get others operational on the microwave bands. Thanks, guys, you know who you are. It's all very much appreciated.

So welcome, read on, and enjoy!

**Simon Lewis, GM4PLM, is Editor of* European Microwave News.

### Where Do I Start?

Difficult question! But I am pretty sure that you have some idea of what you're interested in before you start. There are many different aspects of microwaving but I would suggest that most people start off by utilizing equipment they already have—no point in spending more money if you don't have to! If you have a 2-meter/70-centimeter station in the form of a TS-790 or FT-736R, then you may already have a 23-centimeter (1296 MHz) module fitted. If not, they can be picked up at reasonable cost from others

who have moved on from this band. A small antenna and rotator will give you a good start, and by building (yes, b.u.i.l.d.i.n.g, remember that word!) a preamp, you will have a good station that will perform well. Don't forget that propagation on the higher bands is somewhat different than on the lower bands, and short-lived openings during the passage of weather fronts are not uncommon.

For the higher bands, a small, low-power, 144 MHz portable like an FT-290 or IC-202 makes a good driver for transverters. There are quite a number of designs around and many of them can be built quite easily. They are usually low power output, but don't worry too much about that! A small antenna can be easily carried to the top of a mountain or hill, with the rest of the equipment in a rucksack. So it's low power? So what? Those precious milliwatts of power will go a long way, and guess what? It's fun! Remember that word, too! *FUN!* It will be like your first QSO all over again! You *WILL* be excited, you *WILL* enjoy it! Full refund given if you're not!

## Where Do I Find Information?

Well, unlike other aspects of amateur radio, microwaving is somewhat specialized and does not receive the same coverage as other modes in the general ham press. But there is still a great deal of information about. It's simply a case that you need to hunt for it a little more!

If you have access to the Internet, then you have the perfect search engine! Try looking at the *EMN* (*European Microwave News*) webpages (<http://www.pacsat.demon.co.uk>) and then follow the links onto Peter Day, G3PHO's, webpages. You will have made a good start with this! Beyond that, I'd suggest a free e-mail subscription to *EMN*, and there are also a few printed newsletters available by subscription. Again you will find links to them via the webpages of the *EMN* and G3PHO. (*Also see "Resources" at the end of this article.—ed.*) There are also a number of other microwavers who have pages dedicated to their own stations. Visit them and see what takes your interest. You will soon have some idea of what band you want to operate on and what equipment you'd like to build.

Designs for equipment pop up in all sorts of places and you can do a lot worse than to purchase a copy of the *Microwave Handbooks* (Vols. 1–3) published by the RSGB (Radio Society of Great Britain). Of course, there are lots of other microwave books available, usually published by the ARRL (specifically, *The ARRL UHF/Microwave Experimenter's Manual* and *The ARRL UHF/Microwave Project Manual*), but other sources of information can also be found quite easily on the Internet. Look out for the Microwave FAQs (Frequently Asked Questions) that are carried on a number of sites, including the RSGB and G4KNZ. They offer a newcomer lots of information.

## Building and Components

This is probably the part where most newcomers start getting nervous! Don't panic! There's lots of help out there! Start

by deciding what band you want to get going on. The 10 GHz band is not outside the abilities of anyone who can solder neatly and follow a set of simple instructions. Oh yes, and you don't need to be a plumber either! Most modern designs don't have a waveguide in sight (apart from dish feeds!)! This is the face of modern microwaving. Technology has moved on enough that we can now build high performance transverters on simple pc boards. That's the beauty of it! It's simple, reasonably priced and fun to build!

Components for microwaving are easily purchased. In the UK, Mainline Electronics, RS Components and Maplins all sell surface-mount components that are normally used in modern equipment designs. Specialized components can be purchased from the Microwave Component Service. The MCS is run by Petra Suckling, G4KGC, who does a fantastic job, along with her husband Charlie, G3WDG, who is well known for his microwave designs. Together, they offer a facility whereby you can purchase hard to get components very easily and they also offer a very full catalogue of goodies to build! Take a look at their online catalogue on the EMN webpages.

Aligning your new toy might give you some headaches, as most of us do not have test equipment for these frequencies, but don't despair. Other amateurs have been through the same problems and have arranged regular meetings throughout the year called "roundtables." These meetings are almost ritual gatherings and people travel from far and wide to be there, bringing their latest toys along for perusal by friends and fellow microwavers! The meetings are usually accompanied by a test bench section which offers the facility to test and align equipment using professional test and measuring equipment. All good fun!

## So What's Next?

Well, there's not a lot more to tell! Simply, start by reading a lot and then read some more. Start by building some simple gear and get on air and then build things up from there. You will never be short of ideas or friends to offer support, help and expertise. Have a go. You will rediscover the excitement of amateur radio I promise you!

Good Luck and Welcome! ■

## Resources

For additional information on microwave operating, we suggest the following newsletters:

*European Microwave News* (e-mail only): E-mail free subscription request to <emn@pacsat.demon.co.uk>, or visit GM4PLM's Web page at <http://www.pacsat.demon.co.uk>.

*Feed Point* (newsletter of the North Texas Microwave Society): Society membership includes newsletter. Dues: $12/year, payable to: North Texas Microwave Society, c/o Wes Atchison, WA5TKU, Treasurer; Rt. 4, Box 565, Sanger, TX 76266.

We also suggest that, if possible, you attend one or more of the VHF conferences held around the U.S. each year. One devoted strictly to microwave operating is the annual "Microwave Update" conference sponsored by the North Texas Microwave Society. It moves around the country each year; the 1997 conference was held in Ohio and this year's get-together will be in Longmont, Colorado, on Sept. 25–27. Keep an eye on our new microwave column (starting next month) for details.

All of the ARRL and RSGB books mentioned above are available in the U.S. from the ARRL or from the CQ Bookstore:

ARRL, 225 Main St., Newington, CT 06111; Phone: (888) 277-5289 or (860) 594-0250; Fax: (860) 594-0303; Internet: <http://www.arrl.org/>.

CQ Bookstore, 76 N. Broadway, Hicksville, NY 11801; Phone: (516) 681-2922; Fax: (516) 681-2926.

In the U.S., microwave equipment, antennas, and accessories are available from a variety of sources, including the following:

*Advanced Receiver Research*, Box 1242, Burlington, CT 06013; Phone (860) 485-0310

*C3I Antennas*, 2702 Rodgers Terr., Haymarket, VA 20169; Phone: (800) 445-7747; Fax: (703) 753-2799; Internet: <http://www.c3iusa.com>.

*Directive Systems*, RR #1, Box 282, Dixon Rd., Lebanon, ME 04027; Phone: (207) 658-7758; Fax: (207) 658-4337

*Down East Microwave*, 954 Rt. 519, Frenchtown, NJ 08825; Phone: (908) 996-3584; Fax: (908) 996-3702; Internet: <http://www.downeastmicrowave.com>

*KB6KQ Antennas*, 70 Arrowhead Dr., Carson City, NV 89706; Phone: (702) 885-7885; Fax: (702) 841-1880; e-mail: <kb6kqnorm@aol.com>

*Kenwood Communications Corporation*, 2201 E. Dominguez St., Long Beach, CA 90801-5745; Phone: (310) 639-4200; Internet: <http://www.kenwood.net>

*KLM Antennas*, 14792 172nd Dr., SE#1, Monroe, WA 98272; Phone: (360) 794-2923; Fax: (360) 794-0294; Internet: <http://www.klm-antennas.com>

*M² Antennas*, 7560 N. Del Mar Ave., Fresno, CA 93711; Phone (209) 432-8873; Fax (209) 432-3059.

*NCG (Comet)*, 1275 N. Grove Street, Anaheim, CA 92806-2114; Phone: (714) 630-4541; Fax: (714) 630-7024-7024.

Olde Antenna Lab, 41541 Dublin Dr., Parker, CO 80134; Phone: (303) 841-1735; Fax: (303) 841-1354; e-mail: <w6oal@aol.com>.

SSB Electronic USA, 124 Cherrywood Dr., Mountaintop, PA 18707; Phone: (717) 868-5643; Internet: <http://www.ssbusa.com>

*Tennadyne Corporation*, HC 81, Box 347A, Junction, TX 76849; Phone/Fax: (915) 446-4510

*TTE, Inc.*, 11652 Olympic Blvd., Los Angeles, CA 90064; Phone: (800) 776-7614 or (310) 478-8224; Fax: (800) 473-2791 or (310) 445-2791; Internet: <http://www.tte.com>.

*Yaesu USA*, 17210 Edwards Rd., Cerritos, CA 90703; Phone: (562) 404-2700; Internet: <http://www.yaesu.com>.

# Q & A

## Questions and Answers About Ham Radio Above 50 MHz

*Q:* I am planning a trip to South Carolina and I looked in my repeater directory and found two repeaters that are near where I am staying. One of them has an open autopatch. How do I get the access code for it? This is also a problem with other repeaters that have open autopatches. I have tried getting their e-mail address from Buckmaster and I have done searches to see if they have a Web page but usually they have neither. How should I go about getting the autopatch access code?

Thanks,

Curtis Jones III, KF6NEO
Palos Verdes Estates, California

*A: Most often, when an autopatch is truly "open," there is no real access code. Usually, you press the "*" key on your keypad to bring up the patch, and the "#" key to shut it down. It's always best, though, if you're not sure about a repeater's policy (and policies change, so what may have been right a year ago when the* Repeater Directory *was put together may not be correct anymore), to check with a local user before trying to activate the patch. It's as simple as getting on and saying "This is KF6NEO mobile, looking for autopatch info. Are there any club officers on frequency?" Even if there aren't any officers around, you'll probably get a reply (assuming* anybody's *around) concerning the policy for visitors. Many clubs will encourage members to place calls for visitors (within reason, of course), even if the autopatch is generally restricted to club members only.*

*Q*: I read the article, "Keeping Your Station on the Air," by Don Rotolo, N2IRZ ("Digital Data Link," November, 1997, *CQ VHF*), and was greatly impressed. However, I would like more information on batteries, mostly lead acid...such as sizing?

Also, I would like to know more about painting an antenna. I have built two "J-Pole" type antennas and wonder about painting them. Thanks.

John Morgan, KC7TAV
Ford, Washington

*Don Rotolo, N2IRZ, replies:*

*A:* Thanks for your kind words. I try to keep the column interesting. One unfortunate thing is that I'm limited in how much space I can use each month, and, because of that, I sometimes have to go into less depth than I'd like.

Sizing of Lead-Acid Batteries: Generally, you select the size to meet the load for a specified time. A battery is usually rated in Amp-hours (Ah), which is the number of amps it can deliver multiplied by the number of hours it can deliver them without falling below a certain test voltage, about 8 volts for a 12-volt battery. Car batteries are tested at a 20-hour rate, smaller gel cells are tested at a 10-hour rate. For example, a battery capable of delivering 5 amps for 10 hours would be rated at 50 Amp-hours (5A x 10h = 50 Ah). In addition, some batteries, especially U.S. car batteries, specify a Reserve Capacity (RC), which is the number of minutes a battery can deliver 25 amps without falling below a certain voltage, again about 8 volts.

Sizing for Your Site: First, determine how many amps you need, on average. Add up the current draw of each item you'll be powering (use only 30% of the maximum current draw for transmitters; this assumes about 25% transmitting). You can use 100%, if you want, for critical sites, but we'll add in an extra power margin in a minute.

Second, figure out how many hours you want the site to be able to run. If you need more than about 24 hours, you should consider a generator.

Then, multiply the two together and that's how many Amp-hours of battery you need. I usually then multiply by two, which provides a margin of backup (no radio will work at 7.2 volts!) and comes closer to the right size in a practical sense.

So, if my site needs 6 amps and I want it on the air for 10 hours, I get 60 Amp-hours, so I'd put in a battery of at least 100 Amp-hours, 120 if I can find it. A small car battery is rated at 50 to 60 amp-hours, so two of them in parallel would be good, too. The power supply should be able to handle the whole load, plus 10% for recharging. Don't depend on batteries for the current surges.

On to Painting Antennas: I have painted every antenna I've ever put up (except wire dipoles) and it keeps them corrosion-free. I happen to use Krylon brand clear spray paint, but any brand and color would be fine, except the metallic colors, which might be conductive. However, painting really isn't required and there's probably no performance gain from a pretty antenna. The real purpose is preventing corrosion (*and in some cases, providing camouflage—ed.).* Some of my antennas have been up for 10 years and still look new.

Do YOU have a question about any aspect of "Ham Radio Above 50 MHz"? We'll do our best to give you a clear, concise answer—or if it's not a question that has just one easy answer, then we'll invite readers to offer their solutions. Send your questions to: Q & A, *CQ VHF* magazine, 76 N. Broadway, Hicksville, NY 11801; via e-mail to <CQVHF@aol.com> or <72127.745@compuserve.com>; or via our World Wide Web page at <http://members.aol.com/cqvhf/>. Be sure to specify that it's a question for "Q & A."

### Oops...

Sharp-eyed reader Rick Freeze, N9YOC, caught a boo-boo in last month's "Beginner's Corner" column, in which we incorrectly identified an MFJ-8621 Data Radio as a TNC (Terminal Node Controller). The MFJ-8621 is actually a combination TNC and transceiver.

# Reader Survey—February, 1998

*We'd like to know more about you...about who you are and where you live, about the kind(s) of work you do, and about your ham radio interests and activities. Why? To help us serve you better.*

*Each month, we'll ask a few different questions and ask you to indicate your answers by circling certain numbers on the Reader Service Card and returning it to us (we've already paid the postage).*

*And, as a bit of an incentive, we'll pick one respondent every month and give that person a complimentary one-year subscription (or subscription extension) to* CQ VHF. *This month, we'd like to get a feel for how familiar you are with the various organizations, newsletters, and conferences that serve VHF sub-specialties (if you don't know what we're talking about, see this month's "Line of Sight").*

| | Circle Reader Service # |
|---|---|
| **1. Please indicate the nature of your VHF operating (including UHF & microwave):** | |
| FM & repeaters only | 1 |
| FM plus other modes (e.g., packet, satellite, weak-signal) | 2 |
| Other modes only (no FM) | 3 |
| Not currently active | 4 |
| **2. If you circled #1 above, please indicate whether you are familiar with any organizations, newsletters, or conferences that focus on VHF special interests (including repeaters):** | |
| Yes | 5 |
| No | 6 |
| **3. If you circled 2, 3, or 4 above, please indicate whether you are familiar with any organizations, newsletters, or conferences that focus on *your* area(s) of special interest:** | |
| Yes | 7 |
| No | 8 |
| **4. Please indicate whether or not you belong to one or more VHF specialty organizations:** | |
| Yes, FM/repeater group | 9 |
| Yes, non-FM group | 10 |
| No, but would consider it | 11 |
| No, not interested | 12 |
| **5. Please indicate whether you subscribe to (or regularly read) one or more VHF specialty newsletters:** | |
| Yes, FM Club newsletter | 13 |
| Yes, non-FM newsletter | 14 |
| No, but would consider it | 15 |
| No, not interested | 16 |
| **6. Please indicate whether you have ever been to a VHF specialty conference:** | |
| Yes | 17 |
| No, but would consider it | 18 |
| No, not interested | 19 |
| **7. *If* you indicated above that you *are* familiar with VHF specialty organizations, newsletters, or conferences, but do *not* belong to/read/attend them, please indicate how you got to know about them:** | |
| From other hams (on the air) | 20 |
| From other hams (off the air, e.g., at club meetings) | 21 |
| From *CQ VHF* | 22 |
| From other ham publications | 23 |
| Indicated above that I am *not* familiar with these | 24 |

*Thank you for your responses. We'll have more questions for you next month.*

## What You Told Us...

Our November survey asked about any radio hobbies you may have *other than ham radio*. The answers show that, for most of you, amateur radio is only one part of a wider radio hobby. Of course, hamming is the most popular—87% of you say you're currently active in amateur radio, with 9% previously active, and 3% not yet active. And nearly as many of you enjoy scanning as well—71% currently active, plus 11% previously active, 9% not active (but might be someday), and another 9% with no interest. Half of you (50%) also enjoy shortwave listening; 30% used to be SWLs, 16% might enjoy it someday, and only 4% have no interest.

For all the griping we hams seem to do about CB, a near-majority of us (49%) seem to have come to ham radio *from* CB, and another 22% are still active CBers (that's 71% current or former CBers!). Only 3% said they might like to try it sometime, and 26% have never been interested. The new Family Radio Service (FRS) and General Mobile Radio Service (GMRS) attract more interest than activity, with only 9% currently active and 4% previously active. But 53% say they might want to try it someday (and 35% have no interest).

Radio control (R/C) just doesn't fly with our readers: 45% say no interest, 36% say maybe someday, 12% used to do it but don't anymore, and only 6% are currently active in R/C. Finally, 42% of you say you're active in "other" radio hobbies...so, what did we miss? Please let us know.

This month's winner of a free one-year *CQ VHF* subscription is Don Motley of Los Angeles, CA. As always, thanks for sharing your views with us.

# A Visit to Grid Square DM03

It was a rare treat for a New York ham—a visit to a southern California grid square that's nearly all water—and a chance to experience "the Magic Band" west-coast style!

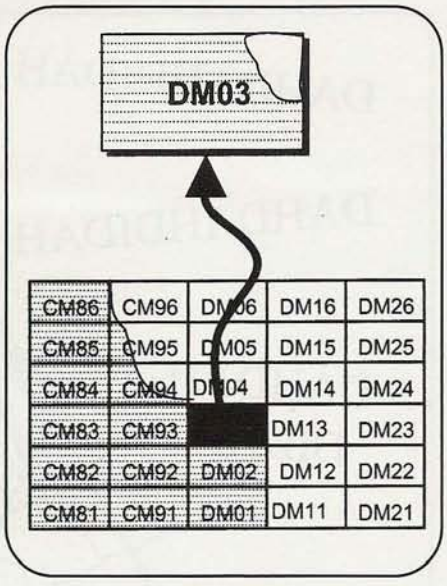
I had the opportunity in 1993 and 1994 to make three separate business trips to the Long Beach, California, area. Long Beach is in grid square DM03, and, although I had worked neighboring grids on 6 meters, I was very anxious to bring my 6-meter rig and experience what was on the band out there compared to what I hear back in New York.

On all three trips, despite traveling in a group with co-workers, I was able to get the rental car assigned to me. This was very important as it allowed me to run a modest station using a mag mount vertical on the car's roof and the car's battery to power my linear amplifier. (*"No, Mr. Avis, I didn't leave the headlights on. The darned thing just won't start!"—ed.*)

## Airports and Tropo

On the first trip, I found a great operating location in the large parking lot behind the hotel. It bordered on an airstrip, giving me plenty of privacy. Running 60 watts, I was able to work a number of hams in the same grid as well as in the neighboring grids of DM13 and DM14. One of the interesting things that I heard on a regular basis was the XE2UZL beacon, located a few hundred miles away in grid DM10, indicating that tropo conditions in this area were very strong. I recently found out from Jack, N6XQ, the ham who set up this beacon, that the antenna was a non-directional loop and the beacon ran about 25 watts.

***"...I found a great operating location in the large parking lot behind the hotel. It bordered on an airstrip, giving me plenty of privacy."***




*Map of the grids surrounding DM03, from which the author operated while in Southern California. The shaded areas are all water and the small amount of land in DM03 makes it relatively rare.*

But it was on my third trip, in January of 1994, that I had the most fun on 6 meters. Prior to this trip, I found out that there was a weekly 6-meter SSB net held every Tuesday on 50.150 MHz and sponsored by the Southern California Six Meter Club. So I made it a point to finish up supper early and get to the rear parking lot at 8:00. I found the net, checked in and quickly added "portable 6" to my callsign, lest the other stations mistakenly think I was coming in from 2-land on double-hop sporadic-*E*!

After checking in, I had an hour conversation with one of the main members, Will, AA6DD, and we compared notes on the propagation that we heard on our respective coasts. Then Will invited me to join him at the Downing ARC meeting that Thursday, where he would talking about 6 meters. I finished up over two hours later and felt like I had as much fun as if I had caught a big sporadic-*E* opening! To my way of thinking, working locals on the Magic Band is just as important as working skip stations, as all levels of activity keep the band from becoming the Silent Band.

***"It was very interesting to hear the west coast operators talk about the joy of working Japan on 6 meters, while we east coast guys talk about going across the pond into Europe on the Magic Band."***

## East Coast, West Coast

Will gave an excellent talk to over 50 hams at the Downing ARC, and I was glad my schedule allowed me to catch this meeting before flying home the next day. It was very interesting to hear the west coast operators talk about the joy of working Japan on 6 meters, while we east coast guys talk about going across the pond into Europe on the Magic Band. I think Will got a lot of hams interested in checking out 6 meters.

Ham radio really can fill in a gap when you're on a business trip. Even if they're to interesting destinations, many vacation-type attractions can only be seen during the day when you're working. So after a hard day, it's nice to do something familiar like get on the radio and make new friends. ■

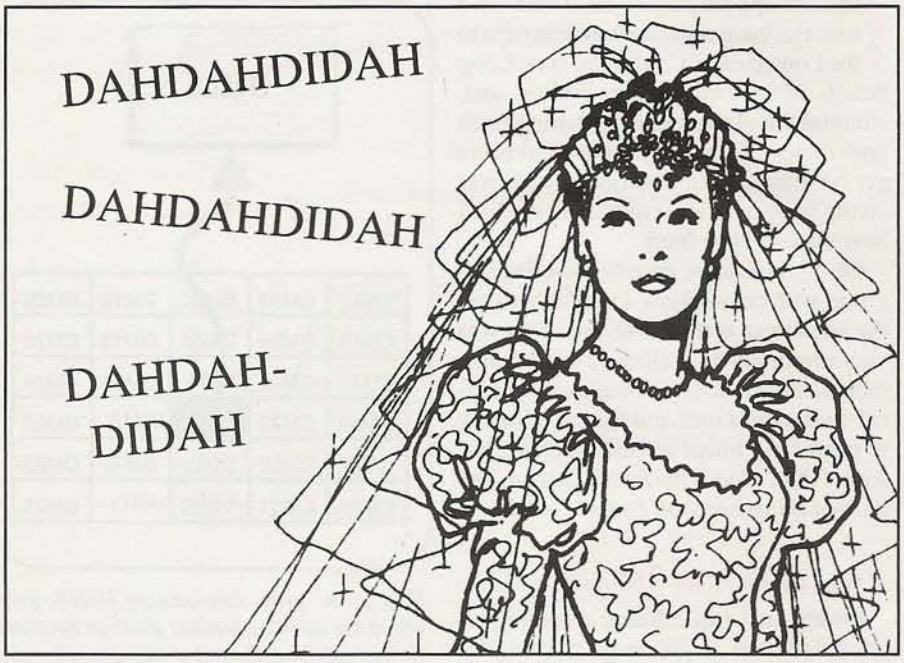
Do *you* have a 6-meter adventure to share? If so, we'd love to hear about it. Just contact us by mail or e-mail.

By Ken Neubeck, WB2AMU

# From "No-Code" to "Know-Code"

Is learning code a **big** problem for you? It was for N2VHV, too—until he learned to look at it as a bunch of **little** problems. And little problems are easier to solve...

By Jeffrey M. Lih, N2VHV*




Is the code holding you back from upgrading? It was for me, too...until I took a new approach to the whole process.

I was a No-Code Tech and wanted to advance so I could enjoy everything ham radio had to offer. I had two choices open to me: I could wait for the code to be dropped as a requirement while asking, "Are you sure 13 wpm (words per minute) is faster than 65 wpm?" (I type at 65 wpm); *or* I could take a positive attitude and learn code.

I really didn't think that code as a requirement would "go away" for a long time, and I have come to see the real ring of truth in the statement that "nothing gets through like the code" (if you doubt it, just listen to the 40- and 80-meter Novice frequencies some evening). So learning code is the road I chose. And I thought I'd share with you the approach to learning it that worked for me.

## Breaking It Down

In the course of my life, I have learned that I am not smart enough to solve really big problems, but I *am* smart enough to solve *little* problems. Learning code is a big problem for many of us, including me. But learning just my name in code is a little problem and is easy to fix. Learning the name of my town...easy... learning my call...easy. Establishing small, easy-to-master steps makes it easier for us to reach our goals. We feel better about the project when we can see and measure our progress, and we actually move along faster.

**Jeffrey Lih, N2VHV, used this technique to pass his five-wpm code test last January, followed by the 13-wpm test for General in July.*

With Morse code, when I talk about breaking this process down into steps, I mean you first learn the alphabet, then the numbers, followed by punctuation and prosigns. Once you get the code characters down pat, you will probably be able to copy at a blazing one or two words per minute—which means you *then* start working on speed.

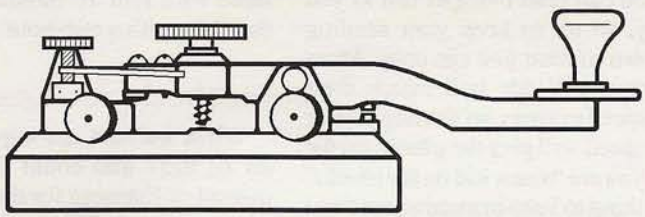
## Getting Started

What's the best way to learn the characters? Using code tapes really sounds like the best way until you hear all of that good advice warning you that you're going to memorize the tapes. You will also get lots of advice to not learn the code by sight; after all, the test requires you to *hear* code, not *see* it. It is all good advice.

I started with the tapes anyway, even though I knew the "risks." Face it—you're going to memorize the tape, but you will be used to hearing good, clean code. I used the zero- to five-wpm ARRL tapes and *did* memorize them.

After the tapes have done their job, you can move on to other sources of code to copy. First and foremost, listen to the radio; many repeater clubs run weekly code practice sessions and they can really help. The ARRL runs daily sessions on

***"Don't expect to be able to copy everything you hear at first—you won't—but as you listen, you will improve. If you miss a letter, leave a space and go on. If you dwell on the missed letter, you can easily miss three or four more."***



## "Super Morse"—A Closer Look

Super Morse is one of many computer programs to help you learn the code and build up your speed. As I worked with the program, I became familiar with some of its lesser-known features and wanted to pass a few of them along to you.

One such feature is in the "Measure" phase which allows you to take a "Keyboard test." Super Morse sends a character and you have to type in that character in order to continue. If you type the wrong character, it shows the correct character and sends it again until you get it right. You end this by hitting the Escape key, which generates your score for the session. The score will show the computer's send rate, your copy speed, and right versus wrong with percentage right.

You can get fooled a little here by looking at your copy speed, which is really an average, and we are all faster on some letters than on others. So to get your feet back down on the ground, try the "solid copy" test. This practice doesn't wait for you to hit a key, it just keeps going like the real world and blows you away on your first mistake—sort of like a video game, but it's great practice for the test. The "solid copy" feature is really an excellent speed builder. You set it for a speed that you feel that you can handle and hammer away. When you see that you're consistently hitting the one-minute mark, change to the next higher speed and continue from there.

Another function within Super Morse that you'll find to be excellent practice is found in the "Build Speed" menu. This is the "QSO" simulator. Here, you get a test that's very much like the real thing. And you can use the "F10" key on your computer to hide and un-hide the text on the screen so you can grade yourself.

You can tailor what you want to practice by hitting the "S" key while using the "ALT" key as a shift. This brings up a menu that gives you the choice of practicing the alphabet, punctuation symbols, numerals, prosigns, or any combination. Starting with just the alphabet and leaving out the other characters lets you home-in on things like differentiating a "V" from a "U."

What's neat here is that if the program sees you are having trouble with certain letters, it will send them more often, giving you additional practice. We all have some problems differentiating some characters (was that a "B" or a "6"? A "V" or a "4"? A "J" or a "1"?) That's normal; it happens to everyone. And all of those short practice sessions will help make it go away.

If you get the impression that I like "Super Morse," you're quite right, but there are other code programs readily available as well. Find what *you* like and use it.

*(Editor's Note: You can find code programs everywhere, and they're often free. Try the file libraries on your favorite online service, Web site, or packet bulletin board. Or check out the "extras" on ham-related CDs, such as callsign directories, etc. Of course, you may need to actually buy something to get all the features you want. Watch the ads in* CQ VHF *and other magazines for these commercial code practice programs.)*

W1AW and the code that they send is about as clean as you can get.

Don't expect to be able to copy everything you hear at first—you won't— but as you listen, you will improve. If you miss a letter, leave a space and go on. If you dwell on the missed letter, you can easily miss three or four more. Don't try too hard to get perfect copy, just copy what you can and notice that, as you go along, you have fewer blank spaces and you actually begin to understand what you have been hearing.

I admit that I was very happy when I was listening to a code session and was able to copy entire words for the first

time. As you progress through learning and get into the speed-building mode, don't be afraid to listen to the higher speed sessions—you'll be surprised at how much you can copy.

## And Then...

Of course, once you've upgraded to Tech Plus and are starting to work for that promotion to General, you have the additional option of *on-the-air* practice via CW QSOs. There's good news here as well. You'll be amazed at the number of upper class operators out there who'll carry on a QSO with you, use a nice slow sending speed, and do things like send their name twice so you can copy. Basically, these hams remember where they've been and they really want to help you succeed.

For your part, you should be aware that most people find it much harder to *copy* code than to *send* it. You'll soon discover that you can send twice as fast as you can copy, so try to keep your sending speed down to what you can copy. More experienced CW ops will match their sending speed to yours, so sending at your copying speed will give the other ham the hint that you are "a new kid on the block." Another thing to keep in mind about "real world QSOs" is that slow, clean code is much easier to copy (even for an experienced CW op) than fast, sloppy code.

The key, though, is practice. The only way to really build your speed is to practice, and then practice some more. There is really no substitute for listening and copying code. But how often should you practice? For how long? And how do you squeeze the extra time into your day? For me, the answer was in using scraps of free time. I used parts of my daily commuting time and, depending on where I was, either listened to tapes or translated signs as though I were sending. Judging from my experience, you'll learn and retain more with four 10-minute sessions in a day than with a one-hour session.

### Table 1. Morse Code in Alphabetical Order

| | | | |
|---|---|---|---|
| **Letters** | | | |
| **A** | DIDAH | **B** | DAHDIDIDI |
| **C** | DAHDIDAHDI | **D** | DAHDIDI |
| **E** | DI | **F** | DIDIDAHDI |
| **G** | DAHDAHDI | **H** | DIDIDIDI |
| **I** | DIDI | **J** | DIDAHDAHDAH |
| **K** | DAHDIDAH | **L** | DIDAHDIDI |
| **M** | DAHDAH | **N** | DAHDI |
| **O** | DAHDAHDAH | **P** | DIDAHDAHDI |
| **Q** | DAHDAHDIDAH | **R** | DIDAHDI |
| **S** | DIDIDI | **T** | DAH |
| **U** | DIDIDAH | **V** | DIDIDIDAH |
| **W** | DIDAHDAH | **X** | DAHDIDIDAH |
| **Y** | DAHDIDAHDAH | **Z** | DAHDAHDIDI |
| **Numbers** | | | |
| **1** | DIDAHDAHDAHDAH | **6** | DAHDIDIDIDI |
| **2** | DIDIDAHDAHDAH | **7** | DAHDAHDIDIDI |
| **3** | DIDIDIDAHDAH | **8** | DAHDAHDAHDIDI |
| **4** | DIDIDIDIDAH | **9** | DAHDAHDAHDAHDI |
| **5** | DIDIDIDIDI | **0** | DAHDAHDAHDAHDAH |
| **Punctuation** | | | |
| , | comma | | DAHDAHDIDIDAHDAH |
| ? | question mark | | DIDIDAHDAHDIDI |
| . | period | | DIDAHDIDAHDIDAH |
| / | slash | | DAHDIDIDAHDI |
| - | dash | | DAHDIDIDIDAH |
| **Prosigns (Procedural signals)** | | | |
| **AR** | -end of message | | DIDAHDIDAHDI |
| **AS** | -wait | | DIDAHDIDIDI |
| **BT** | -break or pause | | DAHDIDIDIDAH |
| **SK** | -end of contact | | DIDIDIDAHDIDAH |
| **KN** | -over to specified station only | | DAHDIDAHDAHDI |

## Methods for Learning

When we start our copy practice, we all sit there and count DIs and DAHs instead of listening for the unique sound of the character being sent. This is why you hear so much about the *Farnsworth method*. With Farnsworth, the characters sound the same at five wpm as they do at 13 wpm; the only difference is the amount of time between the characters. This is the system used by the ARRL code tapes and the on-the-air W1AW code practice sessions.

Computers help too. There are quite a few programs out there that you can use, and most of them are pretty good. I've been using Super Morse and I find it helps. If you found that Farnsworth code worked for you on tapes or on the radio, be sure to set your computer to use it as well. Using a computer program such as Super Morse to build speed has several advantages. You don't have to worry about W1AW schedules or conflicts with your own life's demands. Just fire up the machine when you have the time (see "Super Morse—A Closer Look" for more on this particular program).

## Learning Step by Step

I've included three tables with this article. Table 1 shows the code in alphabetical order, which really isn't the best way to learn it. Table 2 has the code broken down into *element groupings* (Each *DI* or *DAH* is considered an element). This table is designed to help you with the first step: learning the code characters. Make a photocopy of it and carry it with you until you don't need it anymore. Try to think of the *sound* of each letter and not how it looks (no dots and dashes, just DIs and DAHs, which is why the Table is set up that way). Remember, what we are trying to do here is to burn little paths in our brains so that when we hear DAHDIDAH we really hear the letter "K."

As you look at the element groupings in Table 2, you'll see that there are two single element letters: E and T. Next are four two-element letters: A, N, I, and M (they're easy to remember, just remember the word "MAIN"). Then, there the are eight three-element letters: S, U, R, W, O, D, K, and G. This leaves us with only 12 four-element letters: B, C, F, H, J, L, P, Q, V, X, Y and Z. And how hard can it be to learn 12 letters?

## Table 2. Morse Code Letters in Element Groupings

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **One-element letters:** | | | | | | | |
| **E** | DI | **T** | DAH | | | | |
| **Two-element letters:** | | | | | | | |
| **I** | DIDI | **A** | DIDAH | **N** | DAHDI | **M** | DAHDAH |
| **Three-element letters:** | | | | | | | |
| **S** | DIDIDI | **U** | DIDIDAH | **R** | DIDAHDI | **W** | DIDAHDAH |
| **D** | DAHDIDI | **K** | DAHDIDAH | **G** | DAHDAHDI | **O** | DAHDAHDAH |
| **Four-element letters:** | | | | | | | |
| **H** | DIDIDIDI | **V** | DIDIDIDAH | **F** | DIDIDAHDI | invalids: | DIDAHDIDAH |
| **L** | DIDAHDIDI | **P** | DIDAHDAHDI | **J** | DIDAHDAHDAH | | DIDIDAHDAH |
| **Q** | DAHDAHDIDAH | **Z** | DAHDAHDIDI | **Y** | DAHDIDAHDAH | invalids: | DAHDAHDAHDI |
| **C** | DAHDIDAHDI | **X** | DAHDIDIDAH | **B** | DAHDIDIDI | | DAHDAHDAHDAH |

***"Try to think of the sound of each letter and not how it looks (no dots and dashes, just DIs and DAHs....Remember, what we are trying to do here is to burn little paths in our brains so that when we hear DAHDIDAH we really hear the letter 'K.'"***

The table also notes that all one-, two-, and three-element combinations are valid, meaning that you can throw any combination of them at yourself and puzzle it out at any time. This will really help burn in those brain paths.

Table 3 shows some hints to help memorize some of the four-element letters. Please change them to suit your way of thinking. The idea is to get past counting DIs and DAHs but to listen for the sound, the rhythm of the letter, and react. For example, "Here comes the bride" from Mendelssohn's "Wedding March"—DUM DUM DI DUM—sounds like DAHDAHDIDAH which is the letter "Q." DUM DI DUM DUM from the "Dragnet" TV show is a letter "Y."

## Do What Works for You

This approach helped me, but it may not work for everyone. None of this is carved in granite, so adopt what you want, making changes that suit *you*. The important thing is to start—start small and build a little at a time. Ham radio is a hobby, we are doing this for fun, so set realistic, attainable goals, and have fun. You just might surprise yourself! ■

## Table 3. Memory Kickers

Any combination of one, two, or three elements is valid.

| **Four Element Help:** | | |
|---|---|---|
| F = backwards L | DIDIDAHDI | |
| L = backwards F | DIDAHDIDI | |
| P = AN (PAN) | DIDAHDAHDI | |
| X = inside out P | DAHDIDIDAH | |
| J = flipped B | DIDAHDADAH | |
| B = flipped J | DAHDIDIDI | |
| V = Beethoven's 5th | DIDIDIDAH | |
| Q = MA | DAHDAHDIDAH | ("Here comes the bride") |
| Y = "Dragnet" Theme | DAHDIDAHDAH | (DUM DE DUM DUM) |
| C = NN | DAHDIDAHDI | (CNN -Cable News Network) |
| H = (Sorry, none) | DIDIDIDI | |
| Z = (Sorry, none) | DAHDAHDIDI | |

# Internet Notes

## New SMIRK Web Site

The Six Meter International Radio Klub (SMIRK) has a new Web address. According to an announcement from SMIRK Web masters George (NØEOQ) and Lisa (KAØNNO) Lowell, the new site won't be limited to 6-meter material, but will contain technical information in downloadable files about all VHF/UHF/microwave bands. The new SMIRK Web address is <http://6mt.com>.

## High-Speed Meteor Scatter Web Site

Andy Flowers, KØSM, reports that he's started a Web site devoted to high-speed meteor scatter (HSMS) communications. HSMS uses very high-speed CW—up to 200 words per minute—which is recorded and slowed down on playback. It's the most common mode of making meteor scatter contacts in Europe, but has been very slow to catch on in North America. Andy's Web site, including several "RealAudio" and .WAV files of HSMS contacts, is at <http://www.qsl.net/k0xm/ms.htm>. The files may also be downloaded directly from his FTP site at <ftp://ftp.qsl.net/ pub/k0sm>.

# Going Global for Grids

You used to need a good topographic map to be sure of which "grid square" you were in while operating mobile or portable. And if you were near a grid boundary, you still had to guess. Not anymore, thanks to a new generation of GPS receivers.

By Gordon West, WB6NOA*

Last year during the ARRL VHF/UHF sweepstakes, we were operating mobile on 2-meter SSB near Seaside, Oregon—"we" meaning this author and Chip and Janet Margelli, K7JA and WØMF, respectively. But instead of doing the big interstate, we were on a sandy road going for a rare ocean-front grid square.

"About 20 more yards and we'll be in grid CN76," commented Chip, a veteran of grid DXing in locations where signposts just don't exist. The little dash-mounted GPS (Global Positioning System) receiver went beep, and we were now in the nearly-all-water grid with a panoramic view of the Washington coastline and Pacific Ocean.

Operating from rare grid squares during VHF, UHF, and microwave contests adds to the excitement of weak-signal work in remote areas. Having a little GPS receiver, now available for under $99, is also important for you not to get lost. But it's most important for letting other operators know exactly where you are—what "grid" you're occupying—along with the customary contest exchange of callsigns and signal reports. (*Don't know what GPS or a grid square is? Just keep reading.—ed.*)

*You can use the Global Positioning System, or GPS, to find your exact location no matter where you are—including on a boat in the middle of a lake. Here, WB6NOA is checking his grid square during a recent ARRL 10-GHz contest. (WB6NOA photos)*

## What's a GPS?

The Global Positioning System is a fleet of satellites launched by the U.S. government, primarily for military use in keeping track of locations and for more precise targeting. As a host of civilian uses for GPS became apparent, the government made a slightly fuzzy version of the satellites' signals available for public use. GPS signals are transmitted on 1575 MHz from 27 orbiting satellites in six orbital planes, with four and five satellites per plane. This normally results in having seven satellites "in view" anywhere in the world at any given time. Those transmitted signals are synchronized and, depending on your distance from a particular satellite, take more or less time to reach your receiver. Your little GPS receiver compares signal delay times and calculates a position fix on Earth.

These GPS receivers can spot your position down to the radius of a 300-foot circle 98% of the time, and half the time, they can give you a reading down to the radius of a 150-foot circle. The system itself is even more precise, but the military continues to cloud up our civilian 1575-MHz GPS downlink frequency with *selective availability*. We have been *selected* not to be available for the more precise military P-code. But nonetheless, even the little $99 Magellan GPS receiver I was using put me within just a few feet of my actual surveyed position up on a mountaintop, as engraved on the marker placed there by the U.S. Coast and Geodetic Survey.

## What's a Grid Square?

Grid squares are really rectangles, each measuring 1 degree of latitude by 2 degrees of longitude. They're actually smaller divisions of the world's 324

*Gordon West, WB6NOA, is Senior Contributing Editor of* CQ VHF.


*If you're buying a GPS receiver mostly for VHF ham use, be sure to get one that offers a direct readout of Maidenhead grid squares, such as DM13bp, shown here.*

large-grid areas known as "fields," each of which covers 10 degrees of latitude by 20 degrees of longitude. If you chop a "field" into 100 "squares," you now have the common VHF/UHF grid square boundaries, sometimes referred to as "Maidenhead" squares because the idea of doing this came up during a meeting of scientists and geographers in Maidenhead, England.

Maidenhead grid squares are indicated by two letters preceding two numbers, such as EL95 for Miami, Florida, or DM13 for Costa Mesa, California. When you report your grid square, always use international phonetics for the two letters and separate out the two numbers. So you'd say "Echo Lima niner-five" for EL95, and "Delta Mike one three" for DM13. This minimizes confusion at the receiving end.

Microwave enthusiasts need an even more precise grid locator to help with aiming of antennas. They further define their grids into sub-squares, each measuring about four miles by three miles. The sub-squares are two additional letters showing *tenth of a minute boundaries* (degrees of latitude and longitude are broken down into smaller units called *minutes* and *seconds*, 60 each). In print, the sub-square letters are generally in lower case to avoid confusion with the uppercase field letters. So you might be in DM13bp, for example.

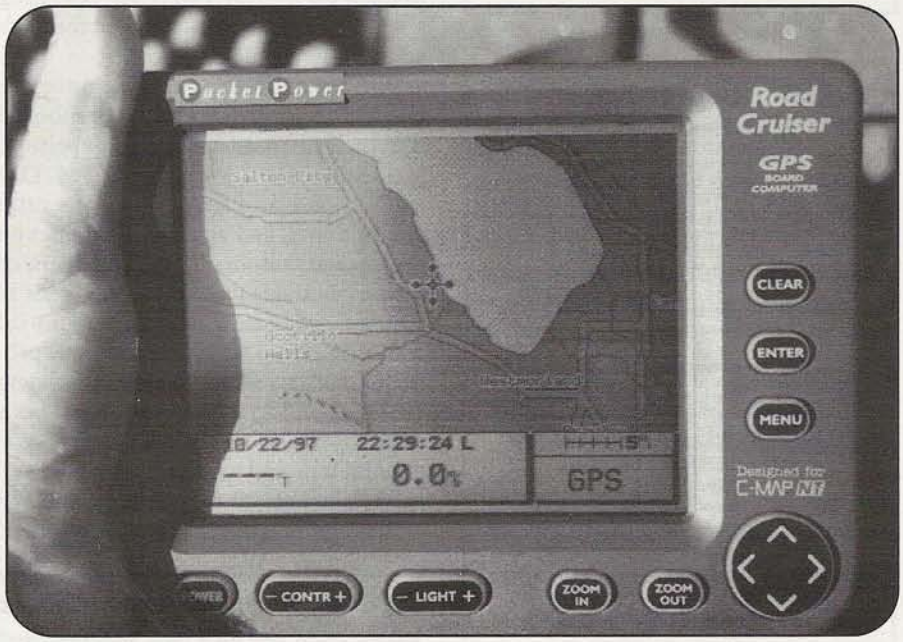
You can figure out your own grid square and sub-grid square by following the instructions in the *ARRL Operating Manual*, and turning to the chapter on VHF/UHF operating. It has several tables on how to determine your grid location, as well as the more precise sub-grid square. CQ's *Amateur Radio Almanac* also tells you how to calculate your grid and sub-grid, and our own "Basics: Grid Squares" article in the back of this issue will take you through figuring out your main grid, but not your sub-grid.

The ARRL also sells a grid-square map of the continental U.S. and most populated areas of Canada for a buck. Plus, ICOM America has printed a very nice gloss-paper grid-square map that is available by sending them a triple-stamped, self-addressed large envelope with "GRID SQUARE MAP" indicated on it. Send it to ICOM America, Box C-90029, Bellevue, WA 98009.

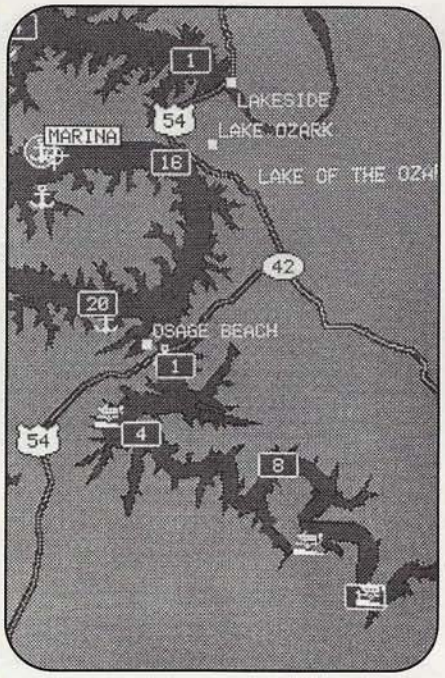
## But Where Am I?

Of course, you have to know where you are in order to figure out your grid square. The old-fashioned way was with a map—and that still works, of course. Now, most road maps don't give you latitude and longitude (some older AAA road maps have 1- and 2-degree latitude and longitude marks near their outside corners, but they seem to have been dropped from most newer ones), so your best bet is to get a topographic, or "topo," map from your local camping and hiking store. Most outdoor equipment retail stores carry a large assortment of USGS (United States Geological Survey) topographical maps. You can also order maps directly from the USGS by phone or on the Internet (see "Resources").

Different sizes of these topo maps are available, some as detailed as 1:62,500 in 7.5-minute and 15-minute quadrangles (again, the "minutes" refer to subdivisions of degrees of latitude and longitude). Also available are state maps in the 1:500,000 scale data; they may take up half your wall, but will show 500-foot elevation contours and are quite useful for eyeballing prospective VHF/UHF radio paths.




*Some GPS receivers today include map cartridges or built-in map data, so you can get a visual "fix" on your location as well as map coordinates. This photo shows Gordon off the road, next to a big lake.*




*Detail of map information on today's generation of GPS receivers. In this view, it looks like Gordon is at the marina on Lake of the Ozarks, Missouri (he sure gets around, doesn't he?).*

In addition, the *DeLorme Atlas and Gazetteer* map books combine topographical projections similar to USGS maps and selected quadrangle boundaries. Many times, you can also spot elevations of peaks that have a road going to them for a great VHF/UHF operating position. Look for DeLorme on the Web at <http://www.delorme.com>.

But none of these maps get close enough for you to calculate your sub-grid square. If you need this level of precision, you really have a job ahead of you. One method of going about this is to get a boater's chart and work off the scales on the top and bottom of that chart. This, of course, assumes that you live or plan to operate near some navigable body of water. There are also some computer programs that may allow you to run mapping software, and, when you spot your approximate location, they'll give you your latitude and longitude. But then you need to go back to the books to come up with the grid square information you need to give out over the air! And some of the callsign databases, available on CD-ROM or on accessible on the Web, give you a grid and subgrid as part of their readout. But these are based on your nine-digit Zip code number and may not be exactly right. In addition, it does you no good if you're tromping off to the middle of the woods someplace.

## The Easy Way...

But it's a very different story if you have a GPS receiver, especially a model that specifically features a menu item called "Maidenhead grid." This means it will give you a direct readout of your ham radio grid square, right down to the subgrid. And you won't have to spend a lot of money, either. GPS receivers that cost several hundred dollars five years ago now sell for as low as $99, and they boast a growing number of features. For example, the $99 Magellan "Pioneer" GPS does latitude and longitude nicely, plus elevation, speed, track, and direction.

But this inexpensive GPS receiver doesn't do instant pre-calculated grid squares. You'll still need to figure out your grid using the formulas. (GPS equipment that *does* do Maidenhead grid squares includes the Garmin 38, the Trimble Scout, and the brand new Garmin GPS III, which also includes roads; see my review of the GPS III elsewhere in this issue. Many current-generation GPS receivers provide road maps as well as map coordinates.)

On the other hand, though, almost all GPS equipment will do the grid system called *UTM*, or *Universal Transverse Mercator*. You may remember Mr. Mercator from geography lessons in school. He's the mapmaker who, many years ago, developed the *Mercator Projection* to portray the round Earth on a flat map. Virtually any map that depicts parallels of latitude as straight, rather than curved, lines (and shows Greenland as a humongous country) is a Mercator Projection. The UTM system is a refinement of the basic Mercator Projection, using a map which features rectangular grids consisting of two sets of straight, parallel lines, uniformly spaced, each set

***"When you report your grid square, always use international phonetics for the two letters and separate out the two numbers. So you'd say 'Echo Lima niner-five' for EL95, and 'Delta Mike one three' for DM13. This minimizes confusion at the receiving end."***

perpendicular to the other. The grid is designed so that any point on the map can be designated by its latitude and longitude, or by its grid coordinates. UTM is widely used by search-and-rescue teams.

The UTM grid system differs from the Maidenhead grids in two ways. First of all, it uses numbers exclusively, rather than a combination of letters and numbers. And UTM readings are reported in terms of distance in meters from a predetermined point on the map. When reporting UTM coordinates, the measurement *north* of the reference point is given first, and is called "northing"; followed by the measurement *east* of the reference point, called "easting." Another way to say this is read up, then right.

If you use a Geological Survey topographical map, you'll probably see UTM coordinates represented by blue grid tics along the sides, top and bottom of the map. Unfortunately, these maps generally do not have the UTM lines drawn in, and you'll need to work out your own UTM lines of position if you don't have a GPS receiver. Luckily, UTM maps are not usually needed in ham radio VHF work, just the Maidenhead grid squares. But if you work with a search and rescue group (see this month's "In the Public Interest"), it may be worth your time to learn UTM as well.

## Time to Get Moving

But if your main interest is exchanging grid squares with other hams (perhaps to collect grids for the ARRL's VUCC, or VHF/UHF Century Club, award), then the easiest way to get around, on the air, is with a GPS receiver that directly reads out your Maidenhead grid square.

Remember, though, that you don't need GPS to know your grid square. As long as you know what your latitude and longitude is, and you're willing to do a little homework with the CQ *Amateur Radio Almanac* or the *ARRL Operating Manual,* you can compute your grid square on your own. And you'll be ready when the next contest or band opening comes along, and someone asks you, "What is your grid square?" ■

## Resources

GPS receivers are available from a wide variety of manufacturers, including the following:

C-MAP/USA, 133 Falmouth Rd., Mashpee, MA 02649; Phone: (800) 424-2627 (U.S. only) or (508) 477-8010; Fax: (508) 477-6168; Internet: <http://www.c-map.com>.

Garmin International, 1200 E. 151 St., Olathe, KS 66062; Phone: (913) 397-8200; Fax: (913) 397-8282; Internet: <http://www.garmin.com>.

Lowrance Electronics, 12000 E. Skelly Dr., Tulsa, OK 74128; Phone: (918) 437-6881; Internet: <http://www.lowrance.com>.

Magellan Systems Corp., 960 Overland Ct., San Dimas, CA 91773; Phone: (909) 394-5000; Fax: (909) 394-7050; Internet: <http://www.magellangps.com>.

Raytheon Marine, 676 Island Pond Rd., Manchester, NH 03109; Phone: (603) 647-7530; Fax: (603) 634-4756; Internet: <http://www.raytheon.com/rmc>.

Trimble Navigation, Ltd., 645 N. Mary Ave., Sunnyvale, CA 94086; Phone: (800) 827-2424 or (408) 481-8000; Fax: (408) 481-2000; Internet: <http://www.trimble.com>.

The *CQ Amateur Radio Almanac* and the *ARRL Operating Manual* are available from many ham dealers or the CQ Bookstore at 76 N. Broadway, Hicksville, NY 11801; Phone: (516) 681-2922; Fax: (516) 681-2922. The *ARRL Operating Manual* is also available directly from the ARRL, 225 Main St., Newington, CT 06111; Phone: (888) 277-5289 or (860) 594-0250; Fax: (860) 594-0303.

USGS topographic maps are available from many outdoor (hiking and camping) supply stores, or may be ordered directly from the U.S. Geological Survey at (800) USA-MAPS (800-872-6277) or on the World Wide Web at <http://www.usgs.gov>.

DeLorme's *Atlas and Gazetteer* map books are available from map stores and some book and stationery stores. You can also contact DeLorme directly at: DeLorme, 2 DeLorme Dr., P.O. Box 298, Yarmouth, ME 04096; Phone: (800) 452-5931 or (207) 846-7000; Fax: (800) 575-2244; 24-hour product information (faxback) line: (207) 846-7058; Internet: <http://www.delorme.com>.

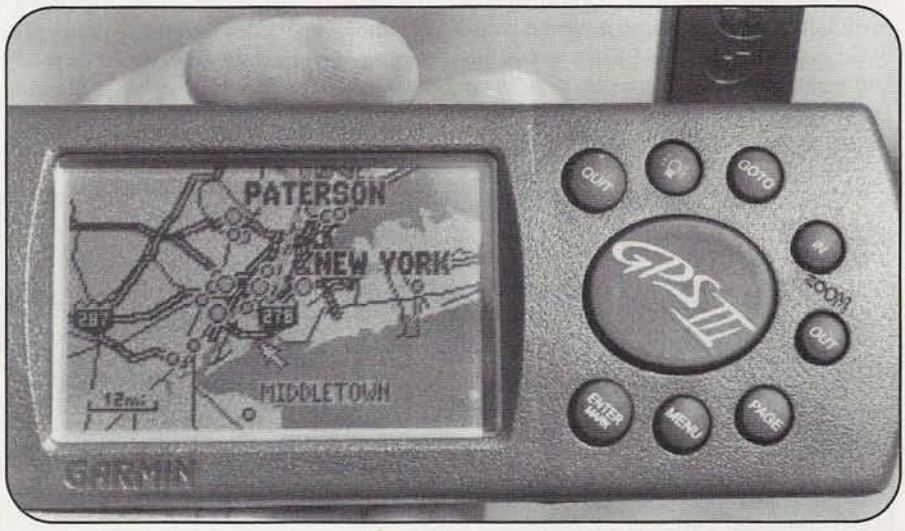
# Garmin GPS-III Global Positioning System Receiver

Here's a handheld GPS receiver that not only gives you latitude and longitude, but also road maps—without plug-in cartridges—and grid square readouts down to the sub-grid.

By Gordon West, WB6NOA*

It's finally here...a handheld GPS set with a powerful 12-channel parallel receiver that finds its position in latitude and longitude within seconds of being turned on. And it provides a host of other features of interest to hams active on VHF and above.

The most innovative feature of Garmin International's new GPS-III Global Positioning System receiver is its built-in road maps of states, cities, highways, interstates, freeways, railroads, rivers, and shorelines. These seamless maps cover the entire U.S., including Alaska and Hawaii, plus Canada and Mexico. There are no chart (map) cartridges to buy, as required for other GPS units, and no lap-top computer to drag along—it's all found in this 9-ounce (with 4 AA batteries!) GPS receiver.




*Built-in map data sets apart Garmin's new GPS-III Global Positioning System receiver from everything else in its price class. You can zoom in and out for varying levels of detail. The handheld unit includes map data for all of North America. (WB6NOA photos)*

## Maps and More

The GPS-III also shows you speed, distance to a specific mark, estimated time (at your present speed) when you'll arrive at that mark, and even the current date and time. Plus, it gives you several different types of mapping options, including Maidenhead ham radio-type grid squares and UTM for topographic maps for our friends in search and rescue. (*UTM stands for Universal Trans Mercator; for explanations of GPS, UTM, and Maidenhead grids, see Gordon's companion article, "Going Global for Grids," elsewhere in this issue.—ed.*).

With the GPS-III, Garmin, a well-known aviation, marine and military GPS equipment provider based in Olathe, Kansas, has outdone what a company called Lowrance did several years ago with "imbedded roadways" in its portable Global Map Sport GPS. The Global Map Sport was designed more for boating than land-based use because it could take marine and lake cartridges for incredible zoom-in detail of the waters. Without any cartridges, the Lowrance unit would also show major expressways, but no greater detail than that, and the maps were 10 years old to start with.

Garmin has improved on this in its new GPS-III with not only a more up-to-date freeway and expressway database, but also with *millions* of additional miles of highways, big roads, railroads, rivers, and the names of big and small cities. You simply turn the portable GPS on and, within a few seconds, a detailed base map that's imbedded in the circuitry jumps up on screen with a blinking icon in the middle that represents you. You can then move a little cursor over to a nearby roadway, and not only see the name of the roadway come up on the screen, but also know your distance from that point. So, if somebody says, "How much further to that favorite DX spot on the mountain road turnout?", you'll be able to give them an answer in just a few seconds. All the while, your current position in Maidenhead letter/letter, number/num-

*Gordon West, WB6NOA, is Senior Contributing Editor of* CQ VHF.

***"[The GPS-III on the dash of our van] sees the satellites through our front window. I've also tried it in several different cars, and I never could get it to not work on the dashboard."***

ber, letter/letter (e.g., DM13bp, see Photo) is constantly shown in the lower left-hand corner of the screen. And you can change that to latitude and longitude if you want.

And more good news! For transmitter hunts, the Garmin GPS-III also gives you a trip odometer, trip timer, average speed, cumulative odometer, and even a double check of your maximum speed. I could see a serious foxhunt group doling out these units to participants to get a real eyeful on where they traveled to find the hidden transmitter. You see, this GPS unit also records a track of your travel!

## On the Road with the GPS-III

My wife Suzy, N6GLF, and I have a GPS-III installed on the dash of our new communications van. From there it *sees* the satellites through our front window. I've also tried it in several different cars, and I never could get it to *not* work on the dashboard. But if you want to run this unit in a motorhome well away from the front window, you can do that, too, by simply remoting the antenna with a short piece of coax cable. But keep your cable runs under 10 feet.

During our road tests of this GPS in our van, Suzy and I were traveling down a small state road, and couldn't figure out whether or not we had missed a small access road to the expressway. We zoomed in on our position and saw that what we thought was the expressway just about a mile away was only a state road, and that we needed to go another eight miles before we would even get close to that expressway junction.

The great benefit of the map feature is that you can see not only where you are in terms of latitude and longitude, but also where you are with relation to everything else around you. We came to a little river. Was it the Wood River or were we passing over the King River? We clicked our icon on the river, and presto, up came the name of the Delta River. Oops, we still had a ways to go before we got to where we thought we originally were!)

Out on the desert, we *really* got turned around giving out grid squares during last year's microwave contest, and we took several wrong turns before finally getting back on track toward our base camp. This new Garmin GPS-III has "track back" navigation, which allows you to easily retrace your path to get back to exactly where you started out from.

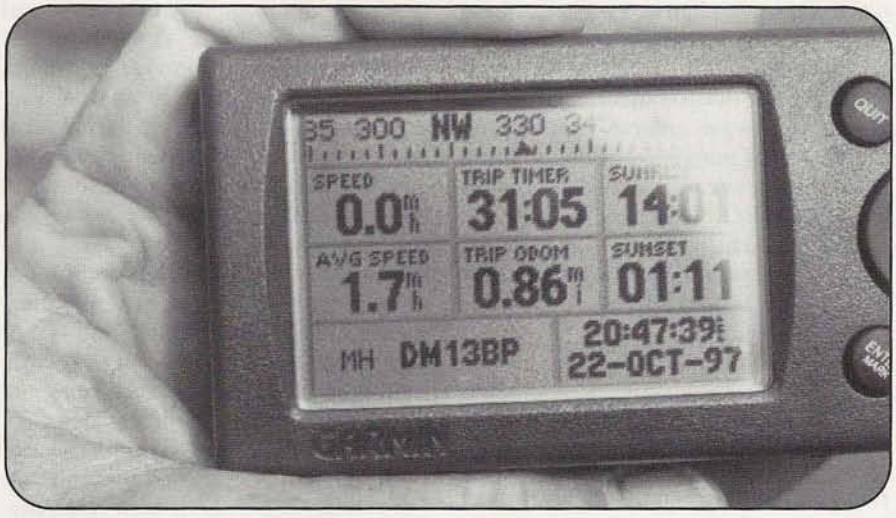
## Finding Yourself

As you zoom in and out of your travels, you'll see that your position is identified as an arrow pointing in the direction you're going and the highways and byways pass beneath you. The map can be oriented with the top of the page always pointing north, along the direction in which you're traveling, or it can automatically rotate to keep your current direction of travel at the top of the screen. When we tested the Garmin GPS-III, the default was "north up," which keeps the top of the page always pointing north, a good way to reference your travel to a U.S. Geological Survey (USGS) topographical map.

Along with the ability to zoom in and out on maps for greater detail or greater range, the GPS-III provides different "layers" of information about what's on the map. For instance, during that microwave contest, we zoomed out to see all of the major roads and where our next big grid square started. Once we were in that new grid square, we zoomed in to take a look at smaller roads and routes, as well as the local cities. We then zoomed in a little bit more, and out of nowhere came off-ramps to get to those little cities. We zoomed in even more, and we could actually tell which side of the road we were traveling on!

If you "over-zoom in," the unit still tracks you, but without map reference.

***"Why would you go with just latitude and longitude when you can have flash memory roads, streets, railroads, and rivers right at your fingertips without any need for an external computer?"***




*If you want more detail than a map can give you, the GPS-III's data screen shows you direction and speed of travel, how long and how far you've traveled so far, current date and time, and—a bonus for VHF hams—a direct readout (in lower left corner) of your grid square right down to the subgrid level needed by microwave operators.*

This is great for you hikers as you head off the road and work your way up to that mountain peak for the ultimate 2-meter contact. And what if you stay up there past sundown? No problem. As you hike back down in the dark, the GPS-III has a backlight so you can view your track— and as you walk back following the track, you'll be retracing your footsteps within just a couple of feet of error most of the time. Some of the time, you'll be exactly on top of your original footprints!

The GPS-III also allows you to create *checkpoints* before you begin your DXpedition. Checkpoints are locations along your route that you pick (midway destinations, etc.) before you begin your trip. By doing this, you always have a running reference of where you are, how long it's going to take you to get to the next checkpoint, and how far away it is. Plus, you can bring up the screen with a data field beside the map, which will let you check speed, distance from the next checkpoint, and how long it's going to be until you get there—and, all the while, you can still see the map plus your exact grid square down to the sub-grid level.

## Other Fun Uses

There are other neat things to do with this under-$400 GPS unit. You can bring up a compass page that shows in big letters your direction of travel, speed, and mileage to the next checkpoint. There's also a "3-D virtual highway page" that shows your position in relation to nearby checkpoints, and signposts on either side of the virtual highway give you a quick view of how much further you need to go, your best or worst speed, your average time to the destination at a specific speed, and even altitude (though this is best judged with a simple altimeter).

Just keep in mind that the military selective availability of GPS signals (again, see "Going Global for Grids") can produce errors as great as 300 feet in any direction, including straight up or straight down. Typical errors that we measured with the Garmin GPS-III were always less than 75 feet, though, thanks to the 12-channel receiver design.

## A Few Limitations

The Garmin GPS-III will show every interstate, most major highways, and some smaller streets. But it won't handle all the little tiny streets in your town—there's just not enough flash memory inside the GPS-III. City side streets, dirt roads, and many two-lane highways are features that can only be "charted" using a massive database, such as what you might get from a CD ROM and a lap-top computer sitting on the front seat (and the GPS-III provides an output port if you want to do just that). But keep in mind that you're still getting the entire U.S., Mexico, and Canada, all imbedded in flash memory without *any* need for a $99 chart cartridge that other map-reading GPS receivers require.

## One of a Kind

There's currently no other portable GPS set that offers such detailed imbedded flash memory mapping and that doesn't require an external chart cartridge. Its going price of $369 is comparable to the cost of a bunch of other GPS sets out there with *no* built-in cartography. So why would you go with just latitude and longitude when you can have flash memory roads, streets, railroads, and rivers right at your fingertips without any need for an external computer? And if you want to use this equipment with APRS (Automatic Position Reporting System), it's all wired up and ready to output the NMEA GPS sentence to your GPS-ready TNC. (*Translation: With the right packet equipment, you can import the GPS data from the GPS-III and transmit your exact location via APRS.—ed.*)

Best of all, Garmin has many hams on staff who helped design this unit specifically for Maidenhead grid square calculations; it wasn't an after-thought. Garmin is one of the few GPS manufacturers that gives us ham-radio-ready Maidenhead grid readouts. And, best of all, when microwave contacts require 3 x 4-mile sub-grids, I push just one button, and presto, here I am in DM13kp. Just that simple. Get GPS with maps. It's the only way to GO! ■

### Resources

For more information about the GPS-III, contact Garmin International, 1200 E. 151 St., Olathe, KS 66062; Phone: (913) 397-8200; Fax: (913) 397-8282; Internet: <http://www.garmin.com>.

I've found the best availability and lowest prices for this unit are through marine electronic mail order houses, including:

West Marine, 500 Westridge Dr., Watsonville, CA 95076; Phone: (800) 538-0775; Internet: <http://www.westmarine.com>.

Boat/U.S., 880 South Pickett St., Alexandria, VA 22304; Phone (800) 937-9307

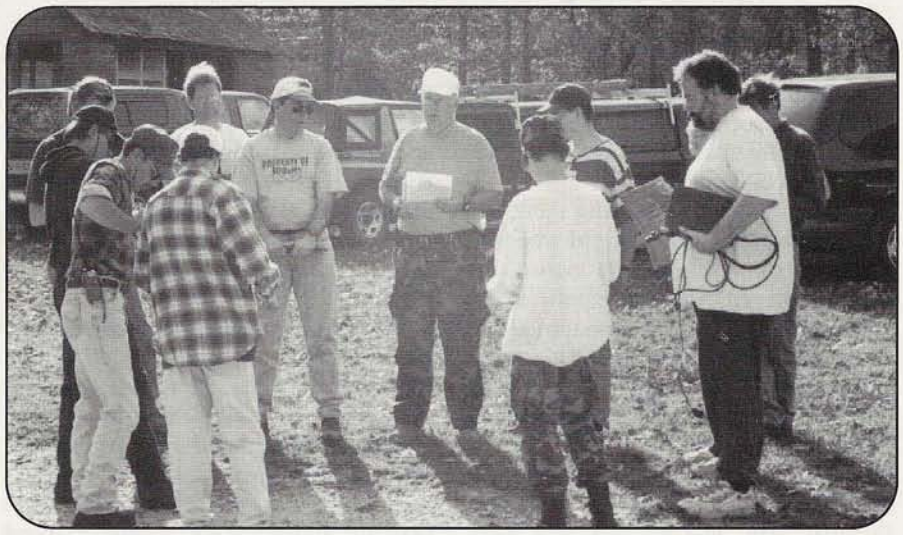
Make sure you ask for pricing and availability of the Garmin GPS-III (not the GPS-II, but the III).

# Operation Goodearth: Minnesota Hams Join Search and Rescue Drill

Planning and practice are the keys to success in emergency communications. Here's an example from Minnesota of hams putting the lessons learned in one drill to the test in the next.

While most of us were snuggling in front of the fire or spending time on our favorite ham band last February, some Minnesota amateurs were participating in a drill—outside—with temperatures near 25 degrees below zero! How did it go? Well, there were problems. They had separate radio frequencies for each unit in the field. There was too much traffic by too many radio operators resulting in intermod problems and, unfortunately, losing track of status of units.

ARRL Minnesota Section Emergency Coordinator, Gary Peterson, NØZOD, says the purpose of any exercise is to learn and determine from the de-briefing how you can do better next time. The basic lesson learned from this drill was to keep things simple. So what did the group do? They planned another exercise with new protocols and tested their planning skills with another drill last October.



*Hams and K-9 Search and Rescue (SAR) team members are briefed on a "missing person" by Minnesota Section Emergency Coordinator Gary Peterson, NØZOD, at a drill last October. (All photos courtesy NØZOD)*

## Operation Goodearth

The October drill was called "Operation Goodearth" because it was held in a camping area known as Goodearth Village. It involved members of the Blufflands Emergency Communications Response Team, the Minnesota Amateur Radio Emergency Service (ARES), and the Southern Minnesota K-9 Search and Rescue (SAR) team.

Blufflands is a group of dedicated amateur radio operators from Minnesota and Iowa who are trained in voice communications, CW, packet, ATV, and operating under emergency conditions with emergency power. They are affiliated with the SAR unit and assist search efforts by providing communications from SAR personnel to a central command post. Minnesota ARES members provided communications at the command post while those who were experienced in search and rescue operations went into the field.

## The Scenario...

As in previous exercises, amateur radio operators worked closely with K-9 SAR, and both agencies were involved in the planning of Operation Goodearth from the beginning. The objective was to establish five search areas, each about 30 acres in size, in which there would be five of "victims." Peterson explained that they wanted to have victims of different ages, occupations, medical conditions, and abilities. The victims included a 70-year-old male suffering from dementia who had wandered off from a senior citizens group during an outing, two 15-year-old

***"...amateur radio operators worked closely with K-9 [Search and Rescue], and both agencies were involved in the planning from the beginning."***

By Bob Josuweit, WA3PZO (bjosuweit@aol.com)

*K-9 SAR team members (from left to right) Steve Rickhardt and Sue Nesbitt, along with ham Steve Wiebke, KBØPSS, plan their search strategy before heading out.*

Boy Scouts who had become separated from their troop during a hike, a 40-year-old female hiker and naturalist, and a 40-year-old deer hunter.

In addition to these victims, there was also a missing 15-year-old girl who ultimately became a homicide victim (her part was played by a mannequin). When she was located, the situation turned into safeguarding a crime scene. This crime scene, along with clues, was set up with the assistance of the Filmier County Sheriff's Office.

The victims were placed in the field at approximately 5:00 p.m. on Saturday, October 11th. The weather was good, with temperatures in the lower 70s. Most of the leaves had started to turn and this resulted in a very beautiful afternoon for the exercise. Rain on Saturday had been forecast all week, but up to this point, it had held off.

Each victim was given two canteens of water, a sleeping bag, and a two-way radio set up on the K-9 SAR frequency. Normally, a real victim would not be equipped so lavishly, but for the purposes of safety and comfort, some "frills" were thrown in. A fire extinguisher was also left with each victim, because there would be campfires at each campsite and the organizers did not want any fires to get out of control. There was also an attempt to keep the campsites close to the river so if there were fire problems the team would have a water source.

## The Drill Begins

Once the command post received confirmation from each of the victims that they were in place, the K-9 teams were dispatched to their search areas. The areas were designated by color: Purple, Pink, Blue, Green, and Yellow. Each team had a dog, a handler, and a radio operator, and they were prepared to spend the night in the woods with their victims. Once they were found, the victims' medical injuries were assessed and treated, and they be-came the responsibility of the K-9 handler and the radio operator until rescue teams arrived.

Normally, you would get the teams out of the woods as soon as you could after the victims were found, but they wanted to test the teams' ability to erect shelters and care for the injured, and they wanted to truly give them the experience of overnight survival camping with minimal equipment. There were no tents. Each team member carried a 10 x 10-foot lightweight tarp and space blankets or light sleeping bags; that was the extent of the overnight accommodations. The tarps were stretched over whatever tree limb was available and the campfires were built using rocks for fire pits.

## Radio Operations

Peterson explained that the multiple frequencies that proved problematic in the earlier drill were reduced to one.

"We used one simplex frequency with base camp located approximately in the center of the search area. Communications, even on low power, were superb despite the terrain. The radio operators erected fold up J-poles and hung them from trees, which greatly improved radio reception. Base camp monitored both the amateur simplex frequency and the K-9 public safety frequency. Once the units were in the field, we called for radio checks every hour, even through the night. This was a safety precaution to check on team status and to track the locations of the teams during the search itself."

Peterson added that this drill relied entirely on voice communications and map-reading to pinpoint locations. "APRS was tried in an earlier drill," he said, "but our operators need more training to depend on it, especially under the forest canopy."

In addition, explained Peterson, the K-9 groups tend to report map positions in UTM (Universal Transverse Mercator, a grid coordinate system), while most radio operators understand latitude and longitude. Again, building on past experience, one operator at base camp dedicated himself to mapping duties, and his calculations were right on the money! "Once the victims were found," Peterson noted, "we were very careful in getting the exact coordinates in case we needed to go in on a rescue mission and bring someone out during the night." (See "What's a UTM Grid?" for more on this system of plotting map coordinates.)

## Making Things Interesting

The 40-year-old female hiker was a key player in the drill. She was "played by" Merry Beckmann of the Association of Minnesota Counties, and plans called for her to be rescued from her site in the morning by the Winona Dive Rescue Team—by being lifted 200 feet straight up a bluff! Merry was truly a good sport as she experienced all phases of amateur radio emergency services as well as K-9 SAR and extraction by a rappelling team!

***"...this drill relied entirely on voice communications and map-reading to pinpoint locations. 'APRS was tried in an earlier drill,' [Peterson] said, 'but our operators need more training to depend on it, especially under the forest canopy.' "***

*"Luxury" overnight accommodations, complete with running water! Searcher Steve Rickhardt and K-9 "Kaya" stand in the rain outside their makeshift tent with Steve Wiebke, KBØPSS (in poncho). Spending a night in the woods was part of the exercise.*

Her map coordinates were extremely important because the dive rescue team would be approaching her location through a cornfield to the east and walking toward the cliff with Merry 200 feet below. GPS is a marvelous tool which can save you time in a rescue operation such as this. When the coordinates were given to the rescue team, they set their GPS units to "Go To," and emerged from the cornfield at the edge of the cliff just over her position. (*Look for more about GPS elsewhere in this issue.—ed.*)

## Gary Picks Up the Story...

At this point, let's hand the keyboard over to Gary Peterson, NØZOD, to explain first-hand how things went:

All of the victims were found—the first within 10 minutes and the last in about two hours. Once the teams checked the victims, treated them, started the fire, and set up the tarp, it was just a matter of spending the night under the stars in Minnesota. Fortunately, the temperature never dropped below 68 degrees and many units let their campfires go out, and they just stretched back and looked at the sky (remember, these were not *real* victims).

The radio checks were conducted on the hour as scheduled, but, as the night wore on, base camp remarked that some operators were a little slow in answering the call. This could have been a serious problem since the plans said that if you did not answer the radio check on the hour we would leave base camp and seek you out.

The problem was one of safety versus sleep. We needed to make the hourly radio checks for safety reasons, but, unless the operator wore an earphone, the call would wake up the other two people. Another problem, especially late at night, was that the operators might be dozing and actually be hearing the other stations responding to the radio checks but not recognizing someone calling them—something about that fine line between sleep and being awake that presented an unusual problem—they could hear everything, but, if dozing, didn't "tune in." Solution: send out DTMF tones along with each call! If you do go to sleep with an earphone in your ear, those tones will rapidly bring you around!

### In the Minnesota Woods

Throughout the night, accounts of the experience came into the base camp. One team reported hearing coyotes howling. Another team had their K-9 alert and growl...at something only the dog could detect. All teams had the pleasure at 0400 of viewing a large flock of Canada geese heading south. At base camp, two operators were kept on duty all night with the responsibility of radio checks. In addition to ensuring the safety of the teams, the hourly activity helped keep an otherwise boring night livable.

Base camp, by the way, was in an old barn with only three sides. It must have been well over 100 years old and it definitely had character! The makeshift communications center was functional and we found the maiden voyage of the newly designed "communications cube" (see four-bay table in photo) extremely successful (*We're trying to persuade Gary to write an article on its design and construction for a future issue.—ed.*). In addition to the VHF links to the field, an HF rig was set up at base camp, providing a good demonstration of our ability to provide long-range communications in the event of a real search or disaster.

***"One team reported hearing coyotes howling. Another team had their K-9 alert and growl...at something only the dog could detect."***

Right after the 0400 radio checks, we began to get reports of light rain from various units. We had access to a weather radio and knew that rain showers would be moving into the area by daybreak. The precipitation continued on and off for a couple hours. As daylight broke, units started packing up and returning from the field, with the exception of Pink team. They had to wait for the arrival of the Winona Dive Rescue unit. By 0730, all other units had returned safely, and, after 0800, the rappelling team was making its way through the cornfield to the designated coordinates.

### Helicopter Support

I had previously made arrangements with the "Mayo One" helicopter to do a fly in and demonstration for us between 0830 and 0900. Mayo One is one of the medivac helicopters owned and operated by the Mayo Clinic, in Rochester, Minnesota. It provides quick emergency response to hundreds of rural communities within 100 miles or so, as well as

## What's a UTM Grid?

UTM stands for the *Universal Transverse Mercator* grid coordinate system. Basically, it divides a 7.5-minute quadrangle map into equal grids in meters, kilometers, etc. A 7.5-minute quadrangle is a rectangle measuring 7.5 minutes of latitude (each degree of latitude and longitude is subdivided into 60 equal units called "minutes" and each minute is subdivided into 60 equal "seconds") by 7.5 minutes of longitude. It is one of the standard dimensional areas used for topographic maps.

In the UTM system, a point that is at 43° 41.54' N latitude and 92° 23.45' W longitude would translate on the UTM grid to 4807.015 by 561.975 UTM. When giving map readings in UTM, the reader would give the location based on the number of grids distant from two predetermined points, specifically the north-south distance from the Equator followed by distance to the east of a designated meridian of longitude. We have found that K-9 folks use UTM almost exclusively, but now the GPS units they carry (as well as ours) will convert on the fly.

—NØZOD

*John Scott, NØHZN, took the overnight watch at the VHF station at "base camp," a three-walled barn which was only slightly more comfortable than the tarps used by the teams in the field.*

*A wider view of the "base camp" at 4:00 a.m. On the left is John Scott, NØHZN, at the VHF operating position, while Pat Cahill, NØADQ, manned the HF station on the right at a four-position table designed and built by NØZOD. Folks in the middle are K-9 SAR coordinators.*

advanced life support for emergencies in and around Rochester itself.

With the low overcast, I was not hopeful that they would be able to land at our location. I had given them GPS coordinates earlier (in latitude and longitude), and, if they did come in, this would be a true test of the accuracy of my beat up handheld GPS unit. All of a sudden, just before 0900, I heard a call on the statewide emergency frequency, "Goodearth Base, this is Mayo One and we are six minutes from your location."

The rain was coming down harder by this time and ceiling was low, but within moments we had another call, "Goodearth Base, Mayo One, just west of your Landing Zone." All I could think of was, please let it be reasonably close to the LZ (landing zone)! I'll settle for half a mile at this point! The sound of the helicopter to the west brought me back to reality and there, coming in out of the clouds, was Mayo One—right on target! They made one pass to check the winds, which had been south at 25 mph, but now we advised them that they had switched to the east.

The copter crew asked about the other teams in the field and I advised them that we had climbers and a simulated victim on the 200-foot wall to the east of our position. They promptly maneuvered in that direction and watched Pink team's ascent up the wall. Merry, the "victim," said it was a very eerie feeling to be that far up a rock wall and to turn around and see a helicopter at eye level looking back at you!

Events happened rather quickly from that point as the ascent up the wall continued and everyone arrived at the top safely. Mayo One remained in the air until that point, and then landed at our LZ. What a great crew they were! They greeted hams, civilians, and K-9s and stood in the rain for 45 minutes, explaining the helicopter and their mission to everyone!

***"You truly have to practice, practice, and practice before you can reasonably say 'I am ready to do what I say our group can do'...."***

## Lessons Learned

A final debriefing was held when we were back at base camp, and everyone was one their way home by 1200 after a tiring but educational 24 hours at Goodearth Village in Fillmore County, Minnesota.

Now, the lessons learned and suggestions for improvement:

• If you're a radio operator who will accompany a K-9 unit, make sure you pack the same items as the other members of the team, and bring more than the minimum if possible. For example, our list says one garbage bag. Take four, because it *will* rain and cameras, sleeping bags, etc. *will* get wet. A note here: In our case, the hams provided their own tarps, sleeping bags, etc., in addition to their radio equipment. Part of training to work with these groups includes learning what non-radio gear to bring.

• Keep the radio frequencies simple: limit yourselves to one if you can. Use low power, and, if you use tactical callsigns (which we did), make sure that you ID every 10 minutes. Also, when you ID, or if you are going to say something regarding victims, make sure that you say, "This is a drill" at the beginning of each transmission.

• Keep a white board and track each team. Color code the areas and color code the tactical callsigns. Know where your teams are within 10 feet. When they set up camp, get the exact coordinates.

• Plan on an emergency extraction of any team member. When planning the exercise, say to yourself; "now if this guy has a heart attack for real, how do we get to him safely?"

All in all, the drill went well and I wouldn't be afraid to approach the same scenario in a real-life situation. We have radio operators who are truly experienced in search and rescue, and we have earned the respect of local officials in our ability to provide communications during an operation of this type. My favorite saying to ARES groups—"be careful of what you wish for, because it just might come true"—applies to all exercises that you *say* you can do. You really have to *practice, practice, and practice* before you can reasonably say "I am ready to do what I say our group can do."

If you've never practiced or trained for an emergency communications operation, don't attempt it because you *will* fail...and if there are lives at stake, that could truly be a disaster.

## Let's Hear from You!

This month, we thank Minnesota SEC Gary Peterson, NØZOD, for another look at hams providing service "In the Public interest." Do *you* have a story to tell? Send your information to "In the Public Interest," c/o *CQ VHF*, 76 N. Broadway, Hicksville, NY 11801 or via e-mail to <bjosuweit@aol.com> or <CQVHF@aol.com>. We want to hear—and share—what you're up to! ■

# The Amateur's Code

If you're new to the hobby, you might be surprised to learn that "The Amateur's Code" has nothing to do with dots and dashes... and everything to do with how we conduct ourselves on the air and in our shacks. Read on...

"I'm gonna quit."

"Good. It's about time. Gini will be happy."

Keith looked puzzled at my response. I was hoping to throw him off balance a bit with my answer.

"I guess I sort of wanted you to talk me out of it," he said dejectedly.

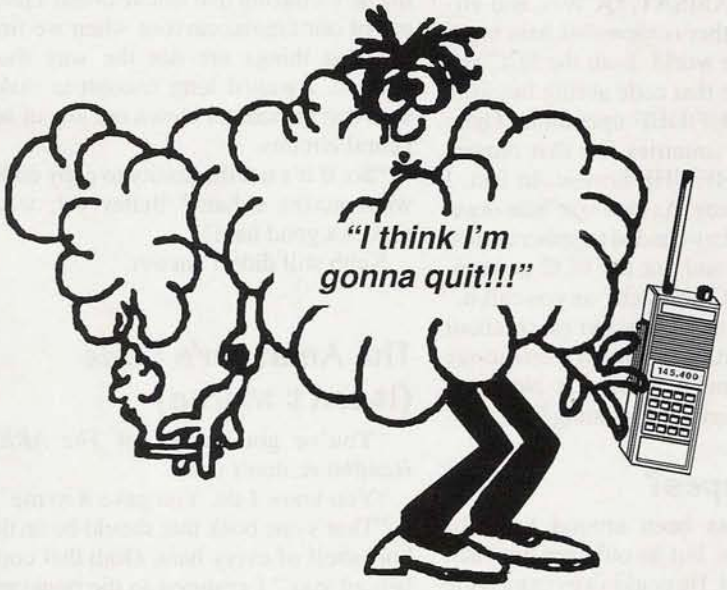
"Why in heaven's name would I try to talk you out of quitting smoking? Sooner or later, it is going to ruin your health, which, I know, is your problem and really none of my business. My problem is that I sort of enjoy your friendship, so I don't want to lose you to some unpleasant disease. That's the long run, but in the short run, you stink. Literally. I can smell the stale smoke a block away. Anyway, just when the conversation is getting good, you have to run outside to smoke. That sure breaks up the train of thought. You would be a lot more fun to be around if you would *just stop it*. Now, why would I want to talk you out of quitting smoking?" I was talking so fast that Keith didn't have a chance to interrupt.

"Ahhhh, that's not really what I was thinking of."

"Oh. What then?"

"I think I'm going to quit ham radio."

"If you really feel like you have to quit something, I would much rather see you quit smoking. What are you talking about? What brought this on?"




## The Kind of Ham the Hobby Needs

Actually, it was just as I suspected when he walked in. I was attempting to hide the twinge of panic at the thought of Keith dropping out of amateur radio. He is the kind of ham we need in this hobby if it's going to survive. He's young, bright, enthusiastic, service oriented, stable—in short, everything that has made this the wonderful hobby that it is. No, I definitely did not and do not want Keith to drop out. Anyway, his wife, Gini, gets along great with my girlfriend Wendy. Besides, he's the only other male that I know in this town who does *not* play golf.

"Well, I don't think that I am a very good ham. Besides, I don't feel like I'm wanted around by all the other hams."

"What are you talking about? That's utter nonsense."

"I think Harvey would disagree with you on that."

"Oh, that." Jim had been listening to the repeater when Harvey had unloaded on Keith. It had been rather ugly, and Keith just simply signed off and hadn't been back on in the last couple of days.

"You heard it?"

"Jim was listening. He called me and told me that Harvey made a monumental fool of himself."

"Everybody else agreed with Harvey. I continued to listen for a couple of minutes after I signed off. Then the repeater went dead."

"The repeater did not go dead—Jim shut it off. Quite frankly, he was embarrassed by Harvey and his friends. He's been on the phone with him and the others. The board is meeting next week to talk about this. But we're not talking about it on the air. And if Harvey or any of those other clowns mentions it on the

By Peter O'Dell, WB2D

repeater, they'll be blackballed immediately. So, obviously, NOT *everybody* agreed with Harvey."

***"The Radio Amateur is: Considerate...Loyal...Progressive... Friendly...Balanced...Patriotic."—from The Amateur's Code***

## What Makes a "Real Ham"?

"I'm not proud of being a No-Code Tech. Harvey is right. I should be able to do the code. I'm not a real ham."

"Keith, as much as I respect you and that bright mind of yours, I have to say that is one of the dumbest things I have heard anyone say."

"Yeah. Sure."

"I'm serious. What makes a ham? The ability to copy code?"

"That's part of it."

"Well, that pits you against the FCC, ITU, ARRL, AMSAT, QCWA, and virtually every other *responsible* ham organization in the world. Both the FCC and ITU recognize that code ability has little to do with VHF/UHF operation. There are very few countries left that require code for a VHF/UHF license. In fact, I can't think of any. As far as the ham organizations go, they banded together almost a decade ago and got the FCC to introduce the 'No-Code Tech,' as you call it."

"Guess I don't know too much about the history of it, but I think it's safe to say that Harvey never wanted a No-Code license. Why are you grinning?"

## Sour Grapes?

"Harvey has been around here for about 25 years, but he only got his Tech license in 1984. He couldn't even pass the five-wpm test. Then, Bill took a liking to him and started coaching him. He got the five-wpm speed in about a month, but it took him three years to get 13. As a matter of fact, I used to listen to Harvey rant and rave on the CB channels about abolishing the code completely. In fact, he wanted to go so far as outlawing its use on the air. He'll be reminded of that at the board meeting. Of course, that was before he passed the five wpm."

"That doesn't make any sense. If he doesn't like code, why would he attack me for being a No-Code Tech?"

"There could be a number of things going on. For starters, just plain old sour grapes. He may think that somehow you had it easier than he did. At a deeper level, though, I think Harvey has some personal problems. Therapists talk about perception being projection. What that boils down to is that when someone sees a "negative" characteristic in somebody else and overreacts, it's because they have that characteristic themselves but don't want to admit it. Harvey failed the 20-wpm test two or three times about two years ago and quit trying."

"What about the others?"

"Not a single one of them has an Extra. Four out of seven are "coded" Techs who passed under the old testing system. Let's just say it was much easier to bend the rules on the five-wpm test in those days."

"Oh." Keith flushed. He was quiet for a long time. I could sense the wheels turning. It's amazing that smoke doesn't pour out of our cranial cavities when we find out that things are not the way they seemed. I waited long enough to make sure that he had not blown out any of his neural circuits.

"So, if it's not the ability to copy code, what makes a ham? Better yet, what makes a good ham?"

Keith still didn't answer.

## The Amateur's Code (It Isn't Morse)

"You've got a copy of *The ARRL Handbook*, don't you?"

"You know I do. You gave it to me."

"That's one book that should be on the bookshelf of every ham. Grab that copy behind you." I gestured to the bookcase in back of him. "Open it up to the front and look at the page opposite the schematic symbols."

Keith fumbled with the *Handbook* and finally found The Amateur's Code.

"Read out loud the words that are set in bold typeface."

"'*The Radio Amateur is: Considerate...Loyal...Progressive...Friendly... Balanced...Patriotic.*'"

"So, who's the better model of those characteristics, you or Harvey?"

"Well, I don't know..."

"Oh, come on. Just read what it says after 'Considerate.'"

"'*Never knowingly operates in such a way as to lessen the pleasure of others.*'"

"You are a gentleman on the air and off. Harvey is an obnoxious bore. Even if he hadn't made a fool of himself the other day, he is crude. That is the most positive thing I can say about his behavior. I always find some excuse to sign off when he's on. I don't need lids like him in my life. I avoid him."

"Well, I never thought that much of him personally, but he seemed to be an important part of the club, so I tried being nice to him."

"Important part of the club? Hardly! He's a loudmouth who only shows up after the work is done. You've been involved in enough club projects to know that. Harvey is good at holding court. I've never seen him actually do any work at a club function. You worked from 6 a.m. to noon at the hamfest. Harvey showed up about 9:30 and got in the way of Bill and Ed, who were selling tickets for the raffle. You helped set up the tables and take them down at the Christmas Dinner. Harvey showed up just as the food was being served, and he left before the clean-up started."

"Well, I guess that is true."

"Doesn't it say something about support and encouragement under 'Loyalty' in The Amateur's Code?"

"'*Offers loyalty, encouragement and support to other amateurs, local clubs and the American Radio Relay League...*'"

"We already know what kind of support Harvey offers other hams and the club. As far as I know, he never joined the League, and he does not subscribe to any of the other ham magazines. He's always asking other hams for copies of their magazines when they finish with them. Cheap slob." (Actually, I didn't say "slob," but this is a family-oriented magazine, after all.)

"I'm getting the idea that you don't like Harvey all that much."

"I don't think much of Harvey's behavior, and I certainly wouldn't shed any tears if he found a new hobby. Just for laughs, look at what it says in the Code under 'Friendly.'"

"'*Slow and patient operating when requested; friendly advice and counsel to the beginner; kindly assistance, cooperation and consideration for the interests of others....*'"

"You really don't want me to go on comparing Harvey to you, do you? Set your modesty aside for a minute. Who is the better ham? You or Harvey?"

"Well, in your eyes, I guess that I would come out on top of that comparison."

"Are you sure you are an engineer? You sound more like a lawyer."

## Why Upgrade?

"Cute. But I still think that I should learn the code and at least get a General."

"Why? Seriously, do you have any interest in setting up an HF station?"

"Not really."

"I didn't think so. Individuals are motivated by different things. What will being a General do for you? What will it give you? Being a General does *not* make you more of a ham. So, what is your motivation for upgrading?"

"Well, I might want to do some HF operating later on. But I guess it's really just an ego thing. But I can't get the code, not even the five wpm. I get confused when I hear all those dots and dashes. And I can't tell if it's three dots I'm hearing or two or even four!"

"So, that makes you a bad person? You are defective?"

"I'm serious. Don't make fun of me."

"You just told me how you continue to fail to learn the code. You're trying to use the wrong part of your mind, a part that is totally incapable of copying code at any significant speed—maybe nine or 10 wpm at the most. In short, as an engineer, you've learned to do a lot of things with your logical, conscious mind, so you're attempting to use it to do something it's incapable of doing. That's about as useless as trying to drive a car with your conscious mind."

***"Slow and patient operating when requested; friendly advice and counsel to the beginner; kindly assistance, cooperation and consideration for the interests of others...."—from The Amateur's Code***

## Unconscious Driving?

"That's crazy. I always drive consciously. What are you talking about?"

"You drive consciously? Okay, how do you drive?"

"I got here, didn't I?"

"Yes, but you didn't answer my question. How do you drive?"

"Well, I just get in the car and drive."

"But what exactly do you do?" My diversionary tactics were working. No more talk about dropping out. Good!

"Well, I don't know exactly."

"You don't know *consciously*. But your *unconscious* mind knows *precisely* how to drive, which is my point. A long time ago, you were smart enough to turn driving over to your unconscious mind and let it do it. If you don't believe me, think back to the very first time you got in a car and tried to drive. You were attempting to do it with your conscious mind. You were a nervous wreck before you got the car out of the driveway, weren't you?"

"I guess I was, but I never thought of it that way."

"You engineers are all alike. You've learned to solve all your problems by counting and organizing and being logical. You simply cannot do code that way. It is like driving. You have to turn it over to your unconscious mind."

"How do you do that?"

"That's the easy part. I have a set of tapes around here somewhere that you can borrow."

"Okay, but first, I really need a cigarette. I'll be back in five."

*"Yuck."* ■

## News *(from page 9)*

### Canada Will NOT Privatize Ham Radio

Industry Canada, which regulates amateur radio in that country, has called an abrupt end to four years of discussions with the Radio Amateurs of Canada (RAC) about putting RAC in charge of administering the amateur service there. According to an RAC bulletin, Industry Canada announced the termination of the initiative at a November 28 meeting of the Amateur Delegation Working Group, but gave no reasons for the decision.

### ARRL Ends "OSCARLocator" Support

The ARRL has terminated its "OSCAR Calendar," a monthly listing of orbital positions for amateur satellites, due to a lack of demand. The calendar was de-signed to be used with the manual "OSCARLocator" that once was the only way the average ham could locate and track satellites. Today, the use of computer tracking programs has become prevalent, and the ARRL says it has recently received less than a half dozen requests for the monthly listing, according to an AMSAT News Service report. AMSAT and the ARRL will continue distributing Keplerian elements to "feed" satellite location and motion data to those computer tracking programs.

### New S. Africa VHF Band

The South African Radio League (SARL) has been granted a secondary allocation for the purpose of conducting propagation studies on a slice of the 4-meter band from 70.000 to 70.01875 MHz. Several countries in Europe and Africa have amateur allocations in this part of the spectrum. According to a bulletin, the SARL is seeking applications from South African amateurs to set up beacons on this new band. When operational, they may provide hams in various parts of the world with valuable alerts to enhanced propagation.

### ARRL, Dayton, Join Forces for 2000

The ARRL, finally recognizing the reality that the Dayton Hamvention is *the* national ham radio convention each year, has agreed on terms with the Dayton Amateur Radio Association (DARA) for the Hamvention to host the ARRL National Convention in the year 2000. According to a joint announcement made at the 1997 Hamvention, ARRL Executive Vice President Dave Sumner, K1ZZ, called Dayton "the natural site for our national convention," and said he was delighted to be working with DARA "in this combined effort to launch amateur radio into the 21st century."

### Tower Leases in Trouble?

Finally, *Newsline* reports that amateur repeater antennas on commercial towers may be endangered as broadcasters scramble to install digital TV (DTV) transmitters, along with their analog transmitters, in time to meet an FCC mandate to convert to digital broadcasting by the year 2006. Referring to an article entitled "The DTV Push Is on for 1998" in *Broadcasting and Cable* magazine, the report quotes a high-ranking official of Tribune Broadcasting as saying that his company will make room for DTV antennas by "lighten[ing] tower loads as lessees run out." This means that amateur repeater owners and other leasees of space on commercial towers may find themselves squeezed out at renewal time.

Op-Ed

One Reader's Opinion

# Is There QSL Above 50 MHz?

At first this may seem to be a ridiculous question, but if you look at the difference between QSLing practices on HF and VHF/UHF, you begin to wonder.

The history of QSLing has been the subject of several articles in more than one magazine, so I will not repeat what has already been done. Instead, I will address what I feel is a breakdown of tradition sprinkled with a generous lack of courtesy.

As I see it, the QSL card is primarily a verification of contact between stations. It is a simple matter, or it used to be—one simply sent out a card to the station contacted. Then that station responded and everyone was happy, each had a card that showed they had contacted the other's station on such and such date at such and such time, frequency, and signal report. What more could one ask?

A secondary function of QSL cards is that of proof of contacts required for various operating awards. If you had a card from each state, for example, you could show them to, say, the ARRL and get a Worked All States (WAS) certificate. Some people simply collected them as sort of trophies of the airwaves, and a few were used to confirm bragging rights among fellow hams.

***"Those who complain about the high cost of time and money when they receive lots of requests for QSL cards are forgetting the pleasure they derived from attracting all of those contacts (why else would they do it to begin with?)."***

## Enter Economics

Somewhere along the way, folks started operating from hard to reach (read rare) spots or grids, which generated a lot of contacts. This is where economics entered the picture. If your chosen spot was wanted badly enough, you might receive dozens, hundreds, even thousands of QSL cards. The cost to answer all of these, both in terms of time and money, began to mount.


By Carl Steckler, KB2SGX*

*Carl Steckler, KB2SGX, lives in Dryden, New York, where he combines ham radio with his other hobbies of hiking and high-powered rocketry. Professionally, Carl works in the Physics Dept. at Cornell University, but says his background is actually in wildlife biology, with a special interest in wolves. He's been a ham for three years.*

One solution was to use a QSL bureau to handle all of the cards and make it economically easier. This still did not ease the burden on one's time; after all, you still had to fill out the card. Another way to ease the burden was to request that a self-addressed stamped envelope (SASE) accompany each request. Foreign requests would use IRCs (International Reply Coupons) in lieu of stamps or "green stamps" (U.S. dollars) to cover return postage. Still another solution was to simply ignore any and all QSLs one might receive, while others answered every single one.

## A Matter of Courtesy

My opinion is that, if you receive a QSL, you should return one of yours (assuming, of course, that is it is for a valid contact). Those who complain about the high cost of time and money when they receive lots of requests for QSL cards are forgetting the pleasure they derived from attracting all of those contacts (why else would they do it to begin with?). And they have all of the QSL cards and in many cases the SASE that came with them. (I also don't feel that you should necessarily have to provide for return postage. You gave the contact and the card, now it is their turn to make things even. While there is no rule that says you must QSL, there is an implied courtesy of answering QSLs that you receive).

This is where it seems to me that HF QSLs tend to follow the tradition of answering any QSLs received, and VHF/UHF QSLing seems to fall short. From my own experience, though admittedly limited, I receive a higher percentage of returns on 10 meters than I do on 2 meters. Six meters seems to be better than two, but again falls short of 10 meters. I feel that we VHF/UHF (yes, I consider myself to be primarily a VHF person) hams do not share the same love of tradition that HFers do. I also think that some of us do not see the consequences of our blasé attitude on this subject. Do we really consider the implications to those whose cards we do not return? Let me explain.

## A Special Experience

I had a rather special experience during last September's VHF contest. I made contact with a YL (in this case a *very* YL) who seemed to be very excited with my contact. I will not mention her callsign so that more of you might wonder if you had also contacted her. Her enthusiasm during that brief exchange of callsign and grid seemed to me to be a couple notches higher than the rest of the contacts I made, so it stuck in my mind.

***"We need to think past the hassle of how much it costs us in terms of money and time to reply, to how much will it cost this hobby* not *to reply."***

Hours later, when things had slowed down, I was spinning the dial in hopes of finding some contacts on the lower edge of 2 meters when I happened upon a QSO between two hams who were not participating in the contest. They were simply rag chewing. I listened with the intent of pouncing upon them when they finished, but it soon became clear to me that one of the operators was the grandfather of the YL I had contacted earlier. He was telling his friend about his granddaughter's experiences working her first contest all by herself. He mentioned that the first contact she made got her so excited that it was a half an hour before she calmed down enough to make a second. Now several hours later, he remarked that she was down to five minutes of excitement between contacts, and that he didn't know how long it would take to calm her down if she ever received a QSL from the contest. Well, then and there, I resolved to send that YL a QSL card, which I did the following Monday.

Eight days later, I received a card back from her. Most cards simply say how nice it was to contact me and 73 with a signature (sort of like the ones I send out), but every open space on this card had writing on it. She told me how much fun the contest had been, and that she had received six other cards, what her score was, and how much she appreciated my answering her call of "CQ Contest." She told me about her granddad setting up the station for her and how he helped her get her license. There was more on that card than any three dozen other cards I have. It got me thinking—what if she had mailed out cards and no one returned one? How would her enthusiasm be affected by that?

## The Cost of NOT QSLing

While not every decision about returning a card will have the impact on another young ham that mine had for this YL, can we afford to take that chance? After all, these kids are the future of our hobby. We need to think past the hassle of how much it costs us in terms of money and time to reply, to how much will it cost this hobby *not* to reply. In a time when there are many forces vying for our attention (*not to mention our bands—ed.*), we need to look at the traditions of this hobby and look at them in terms of the enjoyment they bring ourselves and others. We spend hundreds (if not thousands) of dollars on radios, antennas, coax, amplifiers, and other equipment, but overlook the amount of pleasure $0.32 will bring us and the ham on the other end of that QSO.

***"We spend hundreds (if not thousands) of dollars on radios, antennas, coax, amplifiers and other equipment, but overlook the amount of pleasure $0.32 will bring us and the ham on the other end of that QSO."***

So how about rethinking your position on QSLing? As for me, well, I will answer any QSL cards I receive, and I hope that you will answer mine when I send it to you. And, as another amateur tradition says, "73 and I hope to work you further on down the log."

DE KB2SGX

P.S. If you received my card, please send one of yours back. I guess I am not so old that I don't still get excited myself.

*The opinions expressed in this column are those of the author and do not necessarily reflect the views of* CQ VHF *or its publisher, CQ Communications, Inc.*

*If you have an opinion on this issue or another matter of importance to the VHF ham community, we'd like to hear from you. Well-reasoned, well-written commentaries will be considered for our Op-Ed page. If we publish your Op-Ed article, we'll give you a complimentary one-year subscription (or extension of your current subscription) to* CQ VHF. *Submissions not accepted for the Op-Ed page may also be considered for Letters to the Editor.* CQ VHF *reserves the right to edit all submissions for length and style.*

# Making the Most of the Current Amateur Satellites

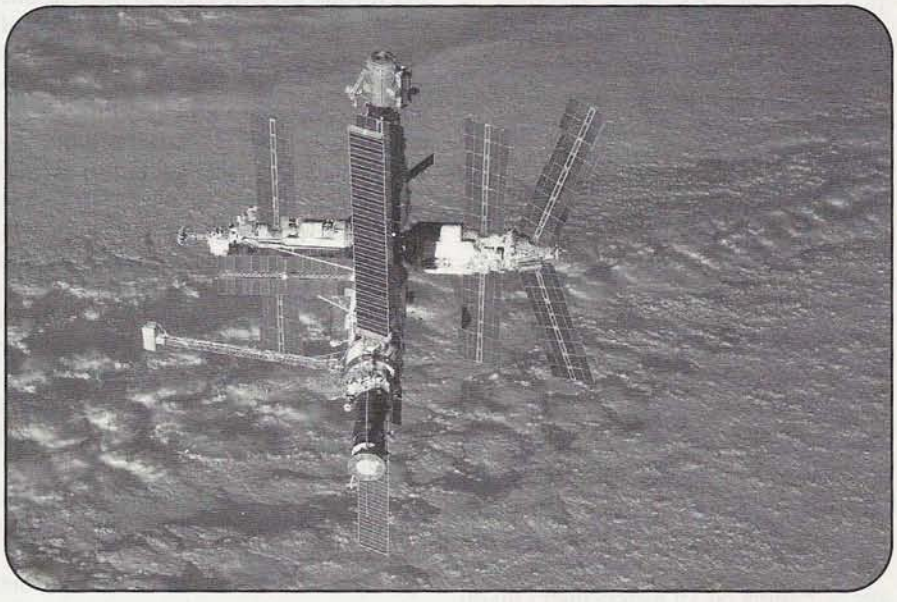
AMSAT's Phase 3D spacecraft offers a promising future for amateur satellite communications. But today's satellites also offer a lot of enjoyable operation, and the equipment you use to work them will give you a head start on building a station for P3D.

## Introducing Ken Ernandes, N2WWD

*Beginning this month, the "Orbital Elements" column will be conducted by Ken Ernandes, N2WWD. Ken has been a ham since 1993, and holds an Extra class license. An expert in orbital mechanics, Ken calculated interim "Keplerian elements" to locate and track the RS-15, RS-16, and FO-29 satellites when they were first launched. He is also one of three volunteers who provide daily space shuttle "Keps" to a NASA Internet mailing list.*

*Ken's education in orbital mechanics began in the U.S. Air Force as an Orbital Analyst, and later as Chief Orbital Analyst Instructor for NORAD/Space Command. Ken has worked for several civilian contractors since leaving the Air Force, including his current employer, Lockheed Martin.*

*On the ham bands, Ken is active on HF through UHF, and satellite voice operating is his favorite mode. We welcome Ken to our staff.—W2VU*



*The Russian Mir space station carries an FM repeater on 70 centimeters, plus a 2-meter FM voice and packet station. There are also FM opportunities using the AO-27 satellite, the U.S. space shuttle (when a ham station is aboard) and—in the future—the International Space Station. (NASA photo)*

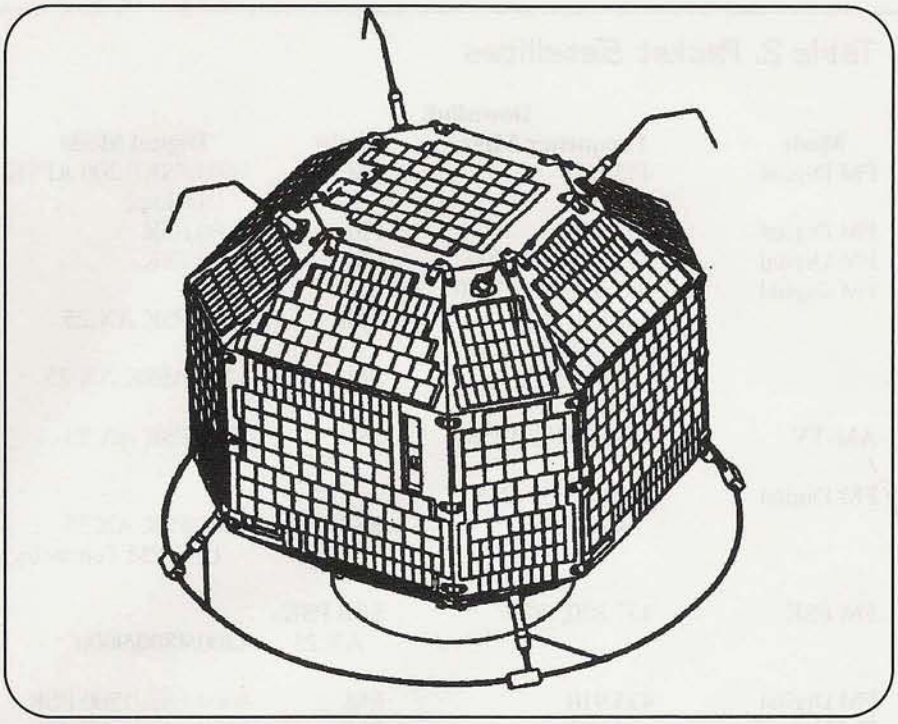
AMSAT-OSCAR 13 (AO-13), the one-time "flagship" of the amateur satellite fleet, re-entered the atmosphere and burned up in December, 1996. Since then, we have also lost the services of Radio Sputnik 10 (RS-10) and various crises aboard the Russian Mir space station have made its ham stations subject to unplanned, although temporary, shutdowns. This chain of events may have led you to put plans for satellite operation "on hold" until the successful launch of Phase 3D (P3D), AMSAT's next "flagship." However, there are still good opportunities with current satellites if you want to explore this unique aspect of the amateur radio hobby.

## Starting at the Beginning

Satellites offer the most predictable means of long distance (DX) communications at VHF and above. Low-altitude satellites offer communications over several hundred miles with relatively strong signals. High-altitude satellites require high gain antennas to compensate for weak signals, but offer the advantage of world-wide communications.

Fortunately, you don't have to compromise on equipment if you're just beginning to assemble a satellite station. Most of the equipment usable on today's satellites will also work for P3D once it is launched, hopefully sometime this year. This article will guide you in determining what modes of satellite operation you may find interesting and in identify-

By Ken Ernandes, N2WWD (n2wwd@amsat.org)



*There are five analog satellites currently available for hams to operate using SSB or CW: Japan's FO-20 (pictured here) and FO-29, AMSAT-OSCAR-10 (AO-10) and two Russian satellites, RS-12 and RS-15. RS-16 is in orbit but was not fully operational at press time.*

ing current amateur satellites operating in those modes. Finally, it will present equipment alternatives for operating the current satellites that can also be part of a P3D station.

## Satellite Operating Modes

The choice of satellite operating modes often parallels the operator's favorite terrestrial operating modes. Those who enjoy conventional DX communications are generally also attracted to satellite DXing. If packet is your favorite mode, you should know that more amateur satellites accommodate packet operations than any other single mode. And those of you primarily interested in Frequency Modulation (FM) repeater operation also have some satellite opportunities.

Of the three major categories, the FM repeater is the one mode that P3D will *not* be using. This was not an arbitrary decision by the designers. A satellite's single most limiting resource tends to be electrical power. FM is *full duty cycle* modulation—full power is consumed at all times during transmission. FM signals transmitted over a long distance are also much more difficult to receive clearly than SSB signals of equal transmit power and propagation distance. Hence, amateur satellites transmitting FM are somewhat rare and are generally limited to those at low altitudes with a surplus of electrical power and/or a single downlink frequency (*SSB/CW satellites usually retransmit many signals at once on a range of frequencies.—ed.*).

## Which Satellites Offer Which Modes?

This section summarizes the capabilities of the current amateur satellites. The data is in table format for quick reference (see Tables 1 through 3). This information might change between the time of this writing and when this issue of *CQ VHF* is published. However, I make every effort to keep the information current in the Amateur Radio Satellites section of my Web page, which is located at <http://www.mindspring.com/~n2wwd>.

## Analog Satellites

The analog satellites are popular for both SSB phone and CW communications. These satellites provide reliable amateur communications at greater distances than are normally achievable for VHF and UHF. Table 1 lists the frequencies and modulation modes for the analog satellite uplinks and downlinks.

When you look at Table 1, you might notice that the downlink frequencies are in reverse numerical order from the uplink frequencies for AO-10, Fuji OSCAR 20 (FO-20), and Fuji OSCAR 29 (FO-29). These satellites use what are known as *inverting transponders*. This means that the *high* end of the uplink passband (frequencies on which you transmit up to the satellite) is repeated at the corresponding *low* end of the downlink passband (frequencies on which the satellite transmits down to you) and vice-versa. When transmitting in SSB on the *lower sideband* (LSB), as is conventional for an inverting transponder, the satellite repeats your signal on the *upper sideband* (USB). Therefore, an inverting transponder acts much like a mirror, repeating your signal at the opposite end of the downlink frequency range and with the opposite sideband.

Now, to confuse you a bit, RS-12 and RS-15 use *non-inverting transponders*. The lowest frequency of the uplink passband corresponds to the lowest frequency of the downlink passband and vice-versa. Put simply, there is constant frequency offset between the uplink and the downlink frequencies. When operat-

### Table 1. Analog Satellites

| Satellite ID | Uplink Passband Freq. Range (MHz) | Mode | Downlink Passband Freq. Range (MHz) | Mode |
|---|---|---|---|---|
| AO-10 | 435.030–435.180 | LSB/CW | 145.975–145.825 | USB/CW |
| FO-20 | 145.900–146.000 | LSB/CW | 435.900–435.800 | USB/CW |
| FO-29 | 145.900–146.000 | LSB/CW | 435.900–435.800 | USB/CW |
| RS-12 | 145.910–145.950 | USB/CW | 29.410–29.450 | USB/CW |
| RS-15 | 145.858–145.898 | USB/CW | 29.354–29.394 | USB/CW |

## Table 2. Packet Satellites

| Satellite ID | Uplink Frequency MHz | Downlink Mode | Downlink Frequency MHz | Mode | Digital Mode |
|---|---|---|---|---|---|
| UO-22 | 145.900 | FM Digital | 435.120 | FM | 9600 FSK/1200 AFSK (Backup) |
| KO-23 | 145.850, .900 | FM Digital | 435.175 | FM | 9600 FSK |
| KO-25 | 145.870, .980 | FM Digital | 435.175, 436.500 | FM | 9600 FSK |
| AO-16 | 145.900, .920, .960 | FM Digital | 437.02625, .05130 2401.1428 | SSB | 1200 PSK AX.25 |
| DO-17 | - | - | 145.82516, .82438 2401.2205 | FM | 1200 AFSK AX.25 |
| 1200 PSK | | | | | |
| WO-18 | 1265.0000 | AM-TV | 437.07510, .12580 | SSB | 1200 PSK AX.25 |
| LO-19 | 145.840, .860, .880, .900 | FM Digital | 437.15355, 12580 437.125 | SSB CW | 1200 PSK AX.25 12 WPM Telemetry |
| IO-26 | 145.875, .900, .925, .950 | FM FSK | 437.870, .820 | SSB PSK AX.25 | 1200/4800/9600 |
| FO-29 | 145.850, .870, .890, .910 | FM Digital | 435.910 | FM | 9600 FSK/1200 PSK |
| Mir* | 145.200 | FM Voice/Digital | 145.800 | FM | 1200 AFSK AX.25 |
| SAREX | 144.490 | FM Voice/Digital | 145.550 | FM | 1200 AFSK AX.25] |

* Until March 1, 1998, Mir will be experimenting with an uplink on 437.850 MHz (only) and a downlink on 145.800 MHz. Full 2-meter operation will resume on March 1.

ing these satellites, you transmit *and* receive on USB.

## Packet Satellites

Packet satellites offer a store-and-forward messaging capability. Users on one side of the Earth can upload messages to the satellite for users on the other side of the Earth. These satellites also have onboard bulletin boards (BBSs) and some even have the ability to take pictures of the Earth that you can download.

The amateur packet satellites use different modulation combinations (FM and SSB) for the uplinks and downlinks. The digital data is usually encoded and decoded using *Frequency Shift Keying (FSK)* or *Phase Shift Keying (PSK)*, each of which is somewhat different from the *Audio Frequency Shift Keying (AFSK)* normally used for terrestrial packet and requires some special equipment. Most packet satellites require you to connect a special modem to your *Terminal Node Controller (TNC)* to translate the FSK or PSK encoding, or you need a TNC equipped internally with such a modem. However, there is software being developed to allow this mode of operation with a Pentium PC and a sound card (see Reference 1). Table 2 summarizes packet satellite frequencies, modulation modes, and digital encoding modes.

You can communicate with a few packet satellites using AFSK for both the uplink and downlink with a standard FM radio and a regular TNC. These satellites include the Mir Space Station, the Shuttle Amateur Radio EXperiment (SAREX), and (downlink only) the Digital Orbiting Voice Encoder or DOVE (DO-17).

## FM Satellites

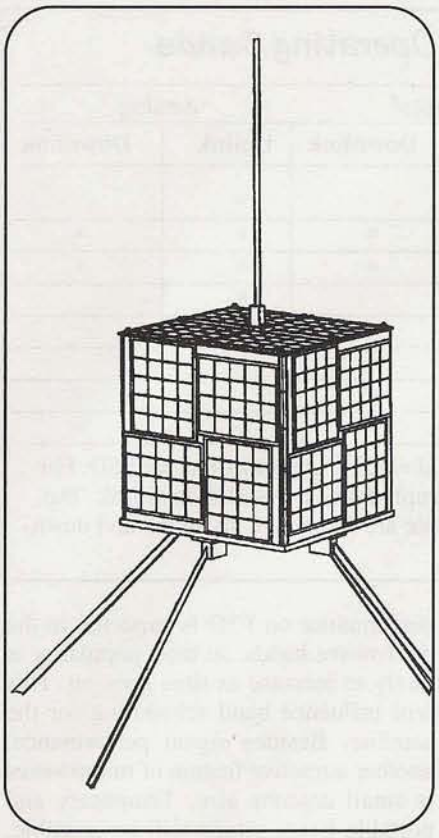
There are currently three satellites with FM voice amateur communications equipment: AMRAD OSCAR 27 (AO-27), the Russian Mir space station, and the U.S. Space Shuttle (when SAREX is flying). Table 3 lists the uplink and downlink frequencies for these satellites. An amateur station with FM voice capability is also scheduled to be on board the International Space Station (ISS) when it goes into operation.

AO-27 is a part-time FM repeater on the "Eyesat" spacecraft, whose primary transponder is commercial. The AO-27 amateur radio repeater operates only when the spacecraft has enough electrical power, which means that it generally operates only when in sunlight and mainly on weekends, when commercial use is at a minimum.

The other full-time orbiting FM repeater is the SAFEX repeater aboard Mir. It uses the 70-centimeter band for both uplink and downlink and requires a 141.3 Hz Continuous Tone-Coded Squelch System (CTCSS) sub-audible tone (a.k.a. 4A PL) for access. See Table 3 for frequencies. SAFEX was deactivated when the Progress supply ship collided with Mir in the summer of 1996, but was re-activated late last year.

The Space Shuttle's SAREX equipment allows 2-meter amateur communications between the astronauts and the ground, but it's aboard only selected flights and very few SAREX missions are planned for 1998. SAREX is different from conventional amateur satellites that act as a relay between ground stations. However, a common 2-meter FM rig and an ordinary antenna are sufficient to contact an astronaut in orbit. There is a similar 2-meter FM capability for communicating with the crew of the Mir, as well as a packet mailbox for messages to/from the crew (it is *not* a BBS or digipeater).

At press time, Mir's packet mailbox was off the air due to damage suffered by



*There are more amateur digital (packet) satellites on the air right now than any other type, including the "microsat" series (pictured here). Except for the packet stations aboard manned space vehicles (shuttle & Mir), using these satellites requires special equipment beyond a TNC and computer.*

**Table 3. FM Voice Satellites**

| Satellite ID | Uplink Freq (MHz) | Downlink Freq (MHz) |
|---|---|---|
| AO-27 | 145.850 | 436.792 |
| Mir SAFEX | 435.750 | 437.950 |
| Mir* | 145.200 | 145.800 |
| Mir Simplex* | 145.985 | 145.985 |
| SAREX | 144.910, .930, .950, .970, .990 | 145.550 |

* See Mir frequency note in Table 2.

the antenna feedline, apparently during a November spacewalk. A repair attempt was scheduled for December. (*See Table 2 for a late Mir frequency note.—ed.*)

## Transceiver Options

Well, now that you know what's up there for you to work, what sort of gear will you need to work it? Most new satellite operators need to acquire SSB radios and the ability to receive on one band while transmitting on another. Most satellite communications are full duplex, which allows you to hear your own signal return from the satellite in real time. (You use this to correct for Doppler frequency shift caused by the fast speeds at which the satellites travel. *Doppler shift is the apparent change in frequency that results from the movement of the sender in relation to the receiver. The classic example is the apparent change in pitch of a train whistle or a siren as it moves closer to you or further away.—ed.*) To operate in full duplex, you need either a separate transmitter and receiver operating in parallel or a dual-band all-mode transceiver set up for full-duplex satellite operation. The most popular VHF/UHF dual band satellite radios include the ICOM IC-821H, the Kenwood TS-790A, and the Yaesu FT-736R.

These dual-band all-mode VHF/UHF radios are expensive, though, and one lower-priced alternative is getting two separate radios: a transmitter for the uplink and a receiver for the downlink. While new transceivers are available, they are also expensive (two new ones are probably more expensive than a new dual-bander). But *used* 2-meter all-mode rigs are available and there are bargains to be found. (My first satellite radio was an ICOM IC-211 bought used for $275.) Used 70-centimeter all-mode transceivers may also be available, but they're less common and more expensive than their 2-meter counterparts.

You may also consider *making* a UHF or VHF radio by combining a 10-meter radio with an *up-converter*, a *down-converter*, or a *transverter*. To operate OSCAR-10, for example, you'd need an up-converter to change your transmitted 10-meter signal to a 70-centimeter signal and a down-converter (on a separate 10-meter receiver) to change the received 2-meter signal to a 10-meter signal that your rig can "hear." Alternately, a transverter, which is a combination of an up-converter and a down-converter, may be connected to the feed point of a 10-meter radio, such as a Uniden HR 2600, changing it to a 2-meter radio (you'd still need a second radio for the 70-centimeter uplink). An example of an inexpensive 2-meter transverter is the Ten-Tec 1210, which is available in kit form for $139. Other sources of transverters and converters include Hamtronics, Down East Microwave, and SSB Electronic USA. See "Resources" for contact information.

If you want to operate on RS-12 or RS-15, you'll need only one converter if you're using two 10-meter rigs as the foundation of your station. These satellites listen on 2 meters (you'll need an up-converter), but transmit on 10-meter CW or SSB. Therefore, a 10-meter transmitter and a 2-meter up-converter will give you the uplink; the other 10-meter radio will receive the downlink. Because of the popularity of HF, there are some good bargains on used radios. Buying a new all-band HF transceiver is a costly option. However, a used multi-band or a single-band 10-meter radio offers an economical alternative. I had excellent success on 10-meter satellite downlinks with a RadioShack HTX-100 that I bought used for $100.

## Antennas

You can work low altitude satellites quite effectively with terrestrial antennas including verticals, dipoles, discones, etc. But *circularly polarized* antennas are preferred for satellite work, since satellites tend to rotate in orbit and the polarization of their signals may change. Excellent commercially built circularly polarized antennas include the $M^2$ "Eggbeaters," available for both 2 meters and 70 centimeters. Satellite antennas are available from other manufacturers as well, and Reference 2 has plans for homebrew satellite antennas.

AO-10 requires beam antennas because of the long distances between you and the satellite. (Directional antennas will also be required for the high-altitude portion of P3D's orbit.) There are many commercially available beams as well as some plans for high gain satellite antennas in Reference 2.

To keep beam antennas pointed at the satellite, you need to be able to follow it across the sky. This is generally done with a *2-axis* rotor, also known as an *az-el* rotor, since you can control both the

*azimuth* and *elevation* of the antenna. The Yaesu G-5400B is probably the most popular 2-axis rotor, but many satellite operators have improvised by combining two different rotors or even manually pointing the antennas. Because of the potential expense of beams and rotors, you may choose to defer high-altitude satellite operation until P3D is launched and operating.

## What Will P3D Have?

The P3D satellite will have a unique transponder arrangement called an *Intermediate Frequency (IF) matrix*, allowing (in theory, at least) more than one simultaneous uplink and downlink. Table 4 lists P3D's six uplink and four downlink frequency bands. The satellite controllers will be able to schedule various combinations of these bands as long as the same band is not used for both uplink and downlink.

Looking at Table 4, you'll probably notice Phase 3D's extensive use of microwave frequency bands. Two questions may come to mind: First, why should I care about microwaves since P3D will have uplinks and downlinks for VHF and UHF? Second, if I *do* care about microwaves, why should I waste time and money building a satellite station with UHF and VHF transceivers?

The answer to the first question is that you might not care about the microwave frequencies *at first*. However, best signal performance on P3D is expected in the microwave bands, so their popularity is likely to increase as time goes on. This will influence band scheduling for the satellite. Besides signal performance, another attractive feature of microwaves is small antenna size. Temporary and portable beam setups will be possible,

### Table 4. Phase 3D Operating Bands

| Band | | Digital | | Analog | |
|---|---|---|---|---|---|
| Freq. (MHz) | Code | Uplink | Downlink | Uplink | Downlink |
| 21.2 | H | | | * | |
| 145 | V | * | * | * | * |
| 435 | U | * | * | * | * |
| 1269 | L | * | | * | |
| 2400 | S | * | | * | |
| 5668 | C | * | | * | |
| 10450 | X | | * | | * |
| 24048 | K | | * | | * |

Note: Asterisks indicate possible uplink/downlink combinations for P3D. For example, mode LX will have a 1.2-GHz uplink and a 10-GHz downlink. The only combinations that will not be possible are those with an uplink and downlink on the same band.

opening satellite DX to apartment dwellers and others with antenna restrictions. For these and other reasons, microwaves are probably the bands of the future for amateur satellites.

If you believe microwave satellite frequencies are the future, then what about the second question? At first it might seem imprudent to invest in a VHF/UHF satellite station. However, VHF and UHF radios are the preferred building blocks for microwave stations. Extremely high coax losses at microwave frequencies (even with the best quality cable) make long separations between the radios and the antennas impractical. This is overcome by mounting the microwave up- or down-converter on or near the antenna. The coax then carries the lower-loss VHF/UHF signals between the radios and the converters.

That said, one more question may come to mind: If I build my VHF/UHF station starting with HF radios, can I "chain" more than one up- or down-converter all the way to microwaves? The answer here is yes (see Reference 1). This means whatever you choose for today's satellite station will be upgradeable for P3D when it's launched.

## Closing Thoughts

To wrap up, I'd like to review three major points. First, with just a little planning, you can build a satellite station starting with fairly ordinary amateur equipment. Second, a station usable on today's low-altitude satellites can be assembled relatively inexpensively. Finally, the satellite station you build for today's satellites is upgradeable. You can add a rotor, beam antennas, and microwave up- and down-converters, and make it a fully functional station for P3D.

The bottom line: today's VHF/UHF station is the beginning of tomorrow's microwave satellite station. ■

## Resources

Selected Equipment Vendors

*Down East Microwave*, 954 Rt. 519, Frenchtown, NJ 08825; Phone: (908) 996-3584; Fax: (908) 996-3702; WWW: <http:/www.downeastmicrowave.com>

*Hamtronics*, 65-V Moul Rd., Hilton, NY 14468; Phone: (716) 392-9430; Fax: (716) 392-9420; WWW: <http://www.hamtronics.com>

SSB Electronic USA, 124 Cherrywood Dr., Mountaintop, PA 18707; Phone: (717) 868-5643; WWW: <http://www.ssbusa.com>

*Ten-Tec*, 1185 Dolly Parton Parkway, Sevierville, TN 37862; Phone (423) 453-7172; Fax: (423) 428-4483; WWW: <http://www.tentec.com>

Selected References

More details on the various satellites and operating modes can be found in the following references. All of these books may be purchased directly from AMSAT, and the ARRL publications are available from the ARRL or the CQ Bookstore (see ordering info below).


1. *Proceedings of the AMSAT-NA 15th Space Symposium and AMSAT-NA Annual Meeting*, 1997, ARRL, $15.

2. *The Satellite Experimenter's Handbook*, 2nd Edition, by Martin Davidoff, K2UBC, 1990, ARRL, $23.

3. *How to Use the Amateur Radio Satellites*, Fifth Edition 1995-1996, by Keith Baker, KB1SF, 1995, AMSAT, $5.


Ordering information:

*AMSAT*: Orders can be made from the AMSAT Web page at <http://www.amsat.org/>, by telephone at (301) 589-6062, by fax at (301) 608-3410, or by mail at AMSAT, 850 Sligo Avenue, Suite 600, Silver Spring, MD 20910.

*ARRL*: ARRL publications may be ordered by mail from ARRL, 225 Main St., Newington, CT 06111; by phone at (888) 277-5289 or (860) 592-0250, or by fax to (860) 594-0303.

*CQ*: Contact the CQ Bookstore by mail at 76 N. Broadway, Hicksville, NY 11801; Phone: (516) 681-2922; Fax: (516) 681-2926.

# APRS on the Move

APRS was designed to track the changing location of moving objects. But now, it's APRS itself that's moving...to a new frequency!

The big news in the packet community is the proposal to change the APRS frequency from 145.79 to 144.39 MHz. Some are calling this a controversial proposal, but I'm calling it a good idea. It makes sense every way you look at it, and it seems kind of like a no-brainer. This month, let's take a look at how we got to where we are now...and where we'll be going real soon.

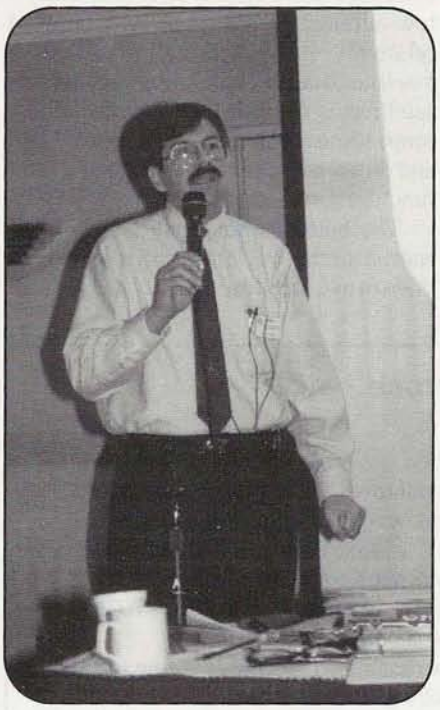
## What Is APRS?

Let's start with the basics: what is APRS? As explained in detail in the August, 1996, issue of the "Digital Data Link," APRS stands for *Automatic Position Reporting System*. It's a protocol for reporting the position of objects, developed by Bob Bruninga, WB4APR, and it is brilliant in its simplicity.

Using the capabilities of the AX.25 packet system, combined with the Global Positioning System (GPS), Bob created a system for sending GPS position data out to the world using a packet TNC. More importantly, he also created some software to let everyone see these position reports in real time. The original APRS software featured a map overlay, colorful graphics, and (since it runs under DOS) a large potential user base.

Since then, other software developers have jumped on the APRS bandwagon, creating feature-rich versions for Macintosh and Windows, and there's even a Java version. Through all this, Bob hasn't exactly stood still. He's been constantly improving his DOS APRS program, adding features and figuring out new ways of doing things—for example, his technique for sending images via APRS, presented at the Digital Communications Conference last October in Baltimore, Maryland.

***"[Astronauts and cosmonauts] generally are not 'dyed-in-the-wool' hams; they won't tolerate interference, especially packet racket, to 'get the QSO'...."***



*Frank Bauer, KA3HDO, presents the APRS QSY pool concept at the 1997 Digital Communications Conference. (Photo by, and courtesy of, Greg Jones, WD5IVD)*

## How It Works

When Bob came up with the original APRS scheme, he found that the easiest way of sharing the APRS position reports was to use a simple digipeating scheme. The technique was sufficiently flexible to allow for moving stations, and the urgency of the data (or lack thereof) was such that even a digipeating success rate of 50% was just fine. Also, packet networks at that time could not perform routing to a specific destination, or to multiple destinations, for Unnumbered Information (UI) frames.

Remember, there were no advantages to establishing a point-to-point connection with APRS, but there were many disadvantages: The information couldn't be shared easily, maintaining a connection while in motion was difficult, and you'd have to know the local network well to even get started. So it was decided that APRS must use a "dumb" digipeating scheme for anything to work. This was a good decision at that time, and remains valid even today in most cases.

## Where to Go?

Once the technique was decided, it now fell upon Bob to decide exactly where all this activity would take place. It made sense to choose a quiet channel; lots of activity only meant more lost packets, something to be avoided. Networkers were adamantly against anything that didn't use the network, since everyone "knew" that digipeating doesn't work (see page 71 of the June, 1996 issue of *CQ VHF* for the reason). Looking around the 2-meter spectrum, he decided upon 145.79 MHz. Why that frequency? Mainly, because nobody else was there. And so it came to be.

So, as APRS exploded in popularity, so did the amount of traffic on 145.79. It didn't interfere with anybody and the channel wasn't overfull, so it stuck. That's where we are today.

## An "Overhead" Problem

Then, space happened. That is, the quantity of amateur operations from space increased dramatically. The Shuttle seemed to have a SAREX (an acronym for Shuttle Amateur Radio EXperiment)

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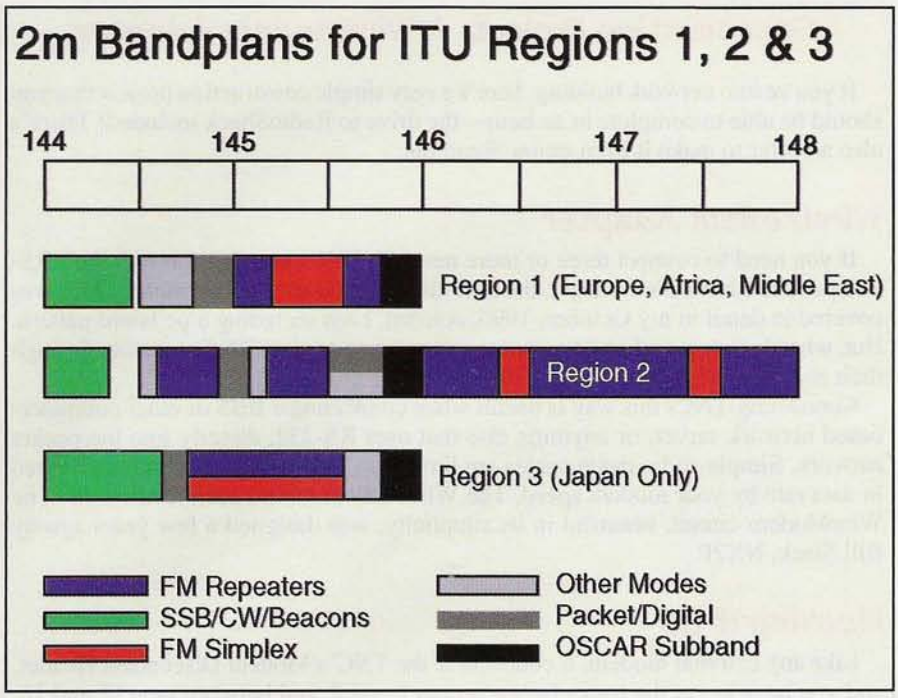



*Figure 1. The 2-meter band for all three ITU regions. Note that only Region 2 (Western Hemisphere) has 4 MHz, the rest of the world has only 2 MHz. The only place where all three regions come even close to lining up is just below 144.50 MHz.*

mission on every other flight. The ham station on the Mir space station became more and more active (it's been dubbed *MIREX,* for the Mir Amateur Radio EXperiment). Now, we all should know that the 145.80- to 146.00-MHz subband is reserved internationally for space operations, and when we notice that 145.79 is right on the lower edge of the 2-meter "OSCAR Subband," it's easy to imagine a potential for interference.

One part of the problem is that anything in space is basically line-of-sight to everything on Earth within its "footprint," that is, the area of the Earth that the satellite can "see" at any given time. It can be as large as half the planet. This means that even a relatively weak signal on the ground can be heard in space, even if it's a signal meant for other stations on the ground.

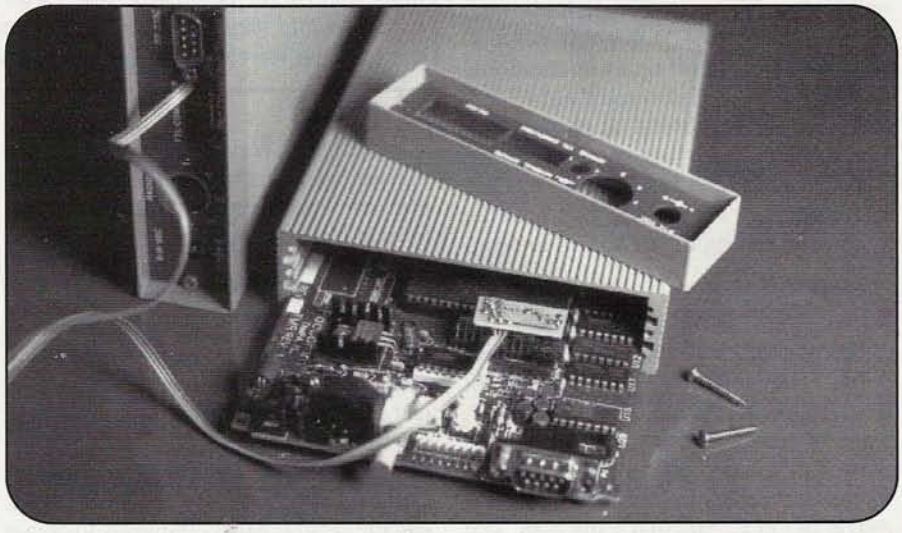
The next problem is that spacecraft in orbit move very rapidly—fast enough to cause a *Doppler effect** on any transmitted signals. This means that the signal from a spacecraft transmitting on 145.80 MHz will seem to someone on the ground to vary in frequency from 145.804 when the craft is approaching, to 145.796 as the spacecraft departs. Of course, this effect is the same for any terrestrial transmissions being received by the spacecraft. To reliably receive these signals without constantly changing frequencies, the receiver in space must have a wider than usual bandwidth, about 25 kHz, and that makes it more susceptible to interference from adjacent frequencies.

The last significant problem is that, while Mir might be only 300 miles away when it's directly overhead, it's over 2,000 miles away at the beginning and end of its pass. Even with line of sight, such long distances are definitely considered "weak-signal" work, in which receive preamplifiers are routinely used. As anyone who has ever used a receive preamp will tell you, any adjacent signals will trash your reception in a wink.

So, we have these astronauts and cosmonauts up in space, trying to have a little fun on 2 meters. They hear everything; Doppler and preamps combine to move terrestrial signals into their passband, and we need them more than they need us. They can't change frequencies as they travel across different countries (they'd spend their lives twiddling dials). Plus, they generally are not "dyed-in-the-wool" hams; they won't tolerate interference, especially packet racket, to "get the QSO," and they quickly grow weary of straining to hear through the noise. When that happens, they just shut off the radio and read a book or something.

## What They Need

The bottom line is that space operations have some definite and unalterable requirements: clear uplink channels with wide guard bands and planet-wide frequencies for both uplink and downlink, since they can't be jumping around the band every 90 minutes (the time for a single orbit). And these frequencies must be



*An assembled WireModem, installed into a TNC on the Modem Disconnect Header. On the left, we see the three wires entering another TNC. See "Construction Project" for details.*

* Doppler effect is the apparent change in frequency that results from the movement of the sender in relation to the receiver. The classic example is the apparent change in pitch of a train whistle or a siren as it moves closer to you or farther away.

***"The new APRS frequency will, as of the first weekend in April, 1998, be 144.39 MHz."***

available to amateurs worldwide, not just in the U.S. (in Europe, Asia, and Africa, the 2-meter band extends only from 144 to 146 MHz, so any frequency above 146 is out of the question).

Complicating all these space communication requirements is the recent announcement that a ham station is definitely going to go up on the International Space Station (ISS), ensuring a long-term presence of amateur radio on manned space vehicles. If the amateur community wants to ensure the viability of space communications, we all must agree to meet the requirements of space communications. If we don't, not only will we all look like idiots, we could lose all space operations as a result.

## A Possible Solution

OK, realizing all this, some people from AMSAT (the ham radio satellite folks) got together and gave the problem considerable thought. It's beyond the scope of this column to get into all of the issues and why this or that frequency isn't a good choice. What I'll do is just cut to the chase: The apparent best choices for manned space frequencies on 2 meters are a primary uplink on 144.490 MHz (with backup channels on 144.470 and .450), and a primary downlink on 145.800 (with backups on 145.8125 and 145.990). These channels would be used for SAREX, MIREX, and ISS operations only. What this means is that, in the next year or two, 144.420 through 144.500 should be cleared off on an international basis for space uplinks, and that 145.790 through 146.000 should be reserved for space downlinks (as noted earlier, 145.800 through 146.000 is already internationally recognized as a satellite subband), leaving only 145.790 to clear.

## Back to APRS

But what does all this have to do with APRS? (Bet you thought I forgot!) Well, if we're all "brapping" away on 145.79, we'll be causing significant interference with the primary downlink; so, in the interest of the hobby, we should all just move, or QSY. And that's the plan. The new APRS frequency will, as of the first weekend in April, 1998, be 144.39 MHz.

Why there? Well, the frequency has a number of advantages. The greatest is that many people already use it, particularly in Canada, and moving U.S. operations there would allow for better coordination across our border. Another advantage is that, after everyone agrees, 144.39 will essentially be a coordinated channel for APRS. Remember, 145.79 is just another frequency, not officially recognized by anyone. Not so with 144.39. AMSAT and TAPR (Tucson Amateur Packet Radio) will work with the ARRL and the general ham community to obtain a single, nationwide APRS frequency, along with the space up/downlinks mentioned above. The final consideration is, why not? It's fairly painless for just about everyone to simply turn the dial this April and be done with it.

## Easing Any Pain

Well, some may say, not everyone has a synthesized rig on 144.79; some are rockbound (crystal-controlled), some won't re-tune that far down, "my antenna will have to be cut longer," and so on. All this means some folks will have to spend money to QSY.

"Who is going to reimburse me for changing my digipeater's frequency?" A

## Construction Project: A WireModem Adapter

If you're into network building, here's a very simple construction project that you should be able to complete in an hour—the drive to RadioShack included! There's also an offer to make it even easier. Read on...

### WireModem Adapter

If you need to connect three or more network TNCs together through their RS-232 ports to form a node cluster, the best thing to do is use a *diode matrix*. This was covered in detail in my October, 1996, column, even including a pc board pattern. But, what do you use when you want to connect two or more TNCs together through their *radio* ports? A *WireModem*, of course.

Connecting TNCs this way is useful when connecting a BBS or other computer-based network server, or anything else that uses RS-232, directly into the packet network. Simple audio patch cables are limited to only two TNCs, and are limited in data rate by your modem speed. The WireModem has no such restrictions. The WireModem circuit, beautiful in its simplicity, was designed a few years ago by Bill Slack, NX2P.

### Hooking It Up

Like any external modem, it connects to the TNC's Modem Disconnect Header, and you have to cut the traces between pins 1 and 2, and between pins 17 and 18, of the header for it to work. You connect each of the three output wires (**Data**, **Flow** and **Ground**) together in parallel: all the **Data** wires together, all the **Flow** wires together, and so on.

When the TNC is in receive mode, the **Flow** wire signal (CD, Carrier Detect) keeps the TNC from transmitting while Receive Data (RD) comes in on the **Data** wire. In transmit, the TNC sends RTS (Request To Send) through the diode to the **Flow** wire (sending the other TNCs into receive mode), and turns the transistor on, allowing Transmit Data (TD) to be sent out onto the **Data** wire. Even if you didn't understand all that, trust me, it works.

You can build the whole thing onto a 20-pin header socket, so it can be removed easily, or I'll send you a tiny pc board. This circuit was originally sold by Amateur Networking Supply, but after it closed up shop last December, I got a largish pile of WireModem pc boards. If you'd like a set of four boards, already etched and drilled, along with a copy of the original A.N.S. assembly and operating instructions, just send a self-addressed envelope (business size, please) and one dollar ($1) to me at the following address: Don Rotolo, N2IRZ, c/o RATS, PO Box 93, Park Ridge, NJ 07656. The dollar will pay for the return postage, for copying the instructions. and for the pc boards, along with some of the transistors, diodes, and resistors, all *while they last*. The instructions also cover the theory and usage instructions for the WireModem Adapter in greater depth.

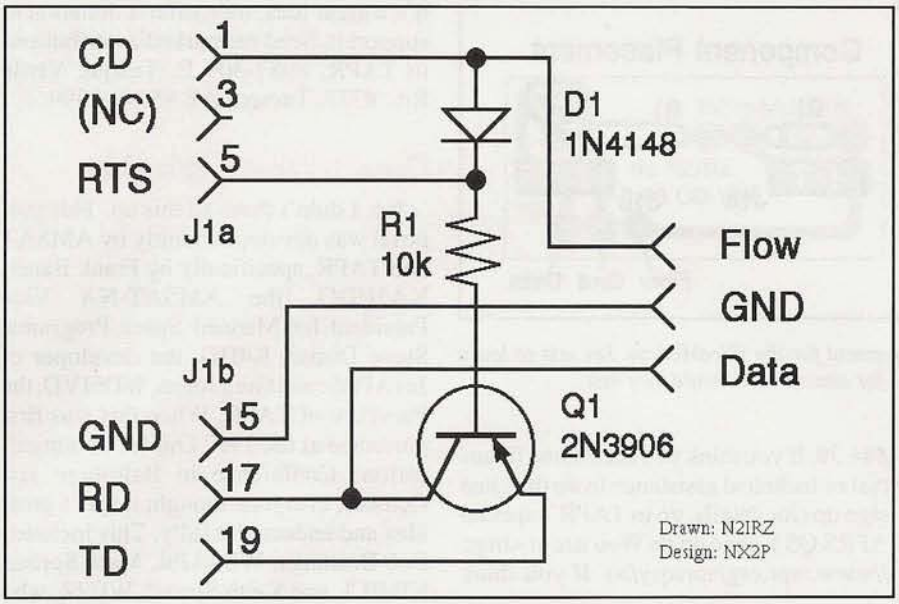


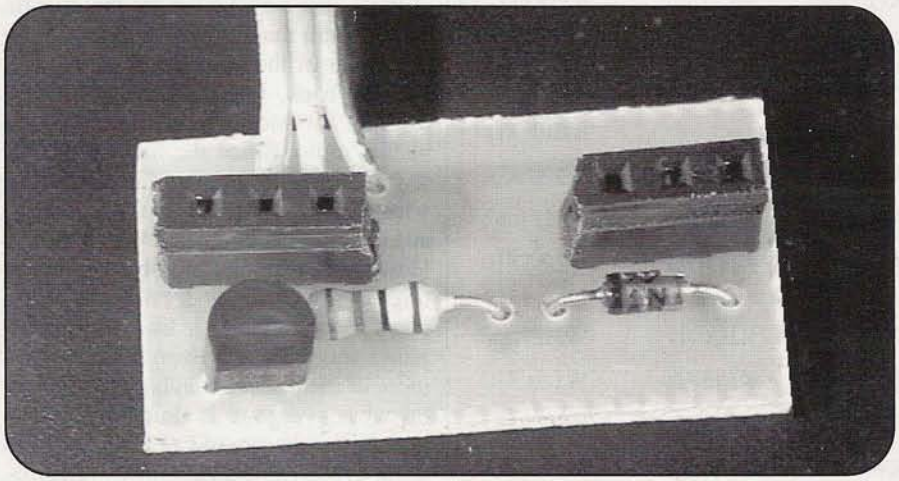

*Figure 2. The WireModem schematic. This beautifully simple circuit was designed by Bill Slack, NX2P, and is used to connect multiple TNCs via their radio ports. See text for details.*

fair question, and there's a good solution: The APRS community, AMSAT, and TAPR are creating something called the *APRS/Manned Space Alliance*. The group is in the process of developing a World Wide Web database of all APRS and related stations that will need financial help to QSY. Anyone who wants to register their station can submit a request for financial assistance, along with the anticipated cost of completing the QSY. A pool of donations would then be distributed to all qualifying stations to help offset the costs, and local APRS users would verify that the funded station actually completed the QSY. The donations will come from groups and individual hams and will be administered by someone in TAPR.

In addition to financial assistance, there will also be a *technical pool*, for technical advice or access to test equipment, for instance. Plus, TAPR is considering a group purchase of crystals, thus lowering the cost for everybody. Some groups are already planning crossband links to bring all the 145.79 traffic down to 144.39 while waiting for the change to become official.

## Unprecedented Cooperation

This is unprecedented in amateur radio history. We are being offered not only a better opportunity, helping both APRS and space communications, but *someone*



*A WireModem ready for installation. There really isn't much to the circuit, but its beauty is in its simplicity. Note the two 3-position headers, which connect to the TNC's Modem Disconnect Header.*

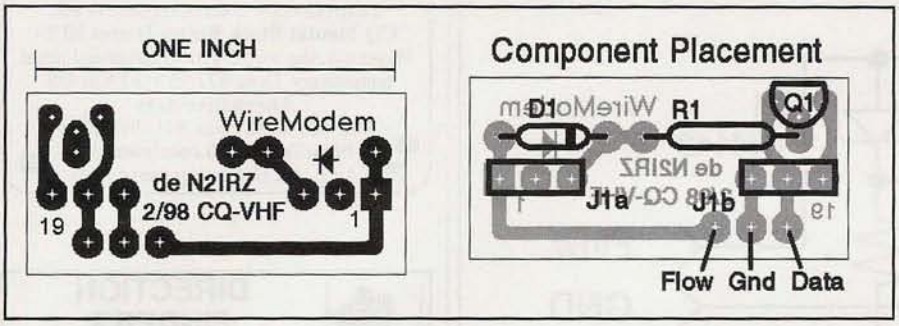



*Figure 3. PC board layout and component placement for the WireModem. See text to learn how you can get pre-made pc boards for almost free, while they last.*

*is willing to pay for it*! It's a radical idea, but it'll work.

So, the bottom line is, on the first weekend in April, everyone active on APRS will simply change their gear over to 144.39. If you think you need some financial or technical assistance to do this, just sign up (for details, go to TAPR's special APRS QSY page on its Web site at <http://www.tapr.org/aprsqsy/>). If you think it's a great idea, then offer a donation to support it. Send earmarked contributions to TAPR, 8987-309 E. Tanque Verde Rd., #337, Tucson, AZ 85749-9399.

## Credit Where It's Due

No, I didn't think all this up. This proposal was developed jointly by AMSAT and TAPR, specifically by Frank Bauer, KA3HDO, the AMSAT-NA Vice President for Manned Space Programs; Steve Dimse, K4HG, the developer of JavAPRS; and Greg Jones, WD5IVD, the President of TAPR. When this was first presented at the 1997 Digital Communications Conference in Baltimore last October, everyone thought it was a great idea and endorsed it fully. This included Bob Bruninga, WB4APR, Mark Sproul, KB4ICI, and Keith Sproul, WU2Z, who all claimed *no* responsibility as the "steering committee" for APRS. While these gentlemen, along with Steve Dimse, wrote all of the APRS software we know and love, they felt that this kind of decision should best be left up to the users. Regardless, they all thought personally that it was a good idea, good for APRS, and good for the hobby.

Finally, I want to thank Frank Bauer, KA3HDO, for his assistance in preparing this part of the column. It was his fine presentation at the DCC that introduced me to this project. I truly believe in this project, and will support it in every way I can. Visit TAPR's Web site (see address above) to hear Frank's presentations in RealAudio, see the slides, and for the very latest information.

## An Invitation

Well, that's all I have for this month. Next month marks the beginning of the third year of the Digital Data Link and, looking back, I seem to have covered most of the more significant topics in packet radio. Since the hardest part of writing a monthly column is coming up with topics, I'm asking you to write in and tell me what you'd like to learn about. How about a detailed step-by-step in setting up a FlexNet node? Maybe something more advanced, like new multiphase modems? Or would you prefer more of the basics? Maybe some reports on what everyone is doing out there? Write to me in care of *CQ VHF* or e-mail me at <73227.2644@compuserve.com>. It would be nice to hear from you.

73, Don N2IRZ

# FCC Callsign Update

The following is a list of FCC sequentially assigned callsigns (*not* including vanity calls) issued as of December 1, 1997 (courtesy FCC/ARRL):

| District | Group A Extra | Group B Advanced | Group C Tech/Gen | Group D Novice |
|---|---|---|---|---|
| 0 | ABØGQ | KIØKU | ++ | KCØCIG |
| 1 | AA1SX | KE1IV | N1ZXA | KB1CFW |
| 2 | AB2EP | KG2ND | ++ | KC2CSQ |
| 3 | AA3QN | KF3AP | ++ | KB3BXZ |
| 4 | AF4GW | KU4MR | ++ | KF4UWW |
| 5 | AC5OG | KM5NI | ++ | KD5CUB |
| 6 | AD6DX | KQ6TM | ++ | KF6OTL |
| 7 | AB7WV | KK7KU | ++ | KC7ZTP |
| 8 | AB8BP | KI8ER | ++ | KC8IWZ |
| 9 | AA9VD | KG9MA | ++ | KB9RTD |
| N. Mariana Is | NHØB | AHØAY | KHØGT | WHØABI |
| Guam | ++ | AH2DF | KH2SR | WH2ANV |
| Hawaii | KH7V | AH6PE | KH7HH | WH6DEL |
| American Samoa | AH8P | AH8AH | KH8DL | WH8ABF |
| Alaska | ALØH | AL7QW | KLØKX | WL7CUO |
| Virgin Islands | ++ | KP2CM | NP2JW | WP2AIJ |
| Puerto Rico | NP3Q | KP3BD | NP3SR | WP4NNM |

++ All callsigns in this group have been issued in this district.

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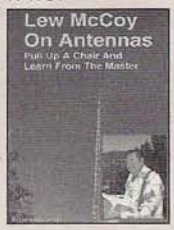


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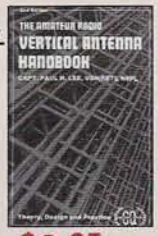


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## The VHF "How-To" Book
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This book is the perfect operating guide for the new and experienced VHF enthusiast.

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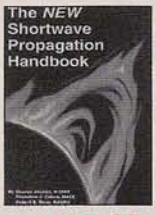


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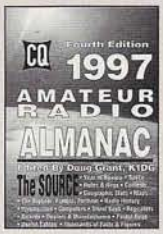


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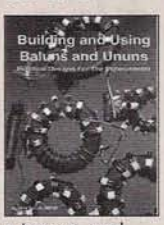


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# Inside the 1997 Western States Conference

VHF conferences offer unparalleled opportunities to learn what's new and different in our part of ham radio and to rub shoulders with the "movers and shakers." The 1997 Western States Weak Signal Society conference was no exception.

The 1997 Western States Weak Signal Society (WSWSS) VHF Conference was held October 3 through 5 at the Montecito-Sequoia Lodge, outside Fresno, California. What a gorgeous place! Seventy-five hundred feet high in the Sierra Nevada mountains, with a private lake, a swimming pool, and an incredible view to the south. It's built around a hunting/cross-country skiing lodge from the 1940s, with a large central lodge, kitchen, and meeting room and surrounded by a dozen or more cabins. The staff went out of their way to accommodate the group. The food was beyond wonderful, and many of us didn't want to go home!


*The 1997 Western States Weak Signal Society (WSWSS) conference was held among towering sequoia trees in the Sierra Nevada mountains. The mountains are visible here from a stop made by Gordon West, WB6NOA, to work some 6-meter sporadic-E en route to the conference. (All photos by & courtesy of WB6NOA)*

## But First, a Tour...

It all began at noon on Friday with an open house by Mike Staal, K6MYC, of $M^2$ Antennas at his manufacturing facility in Fresno. When it comes to antennas, there isn't much he hasn't done. What a wealth of knowledge and practical experience he has amassed.

We were invited up on the roof to survey his antenna test range and several projects in various stages of completion. Before long, more than 20 of us were involved in an impromptu seminar on antenna theory and design, with Mike sharing many of his experiences and travels over the years.

As usual, there were many deals to be had on antennas and equipment. I picked up Mike's old KLM 1296 transverter for my rover station. At around 2:00 p.m., we began to caravan the 65 miles to the conference site. The looks from pedestrians and other drivers as the group of antenna-covered vehicles rolled by were priceless. You'd think they were watching a science fiction movie being filmed or a group of mad scientists on the march, or just maybe they'd spotted the "Energizer Bunny" for real! Once everyone arrived and got checked in, there was time for some socializing and dinner before the WSWSS board meeting Friday evening.

## The Conference

On Saturday, after breakfast, registration, and a swap meet, the first order of business was the induction of new officers and directors for 1997–98. The new WSWSS President is Larry Hogue,

By Tim Marek, K7XC (K7XC@VHF.RENO.NV.US)

*Just in case there were any west coast weak-signal operators who didn't make it to the conference, these hams wanted to be sure they'd be able to work them!*

W6OMF (formerly WB5OMF); the Vice President's job is now held by yours truly, Tim, K7XC (formerly NC7K); the new Secretary is Marcia Bruno, N6ISW; and Wes Printz, W3SE, is assuming the Treasurer's role.

Next came the technical/operating presentations, which lasted all day. Speakers included Mike Staal, K6MYC, on "VHF+ Hints and Kinks"; Bob Magnani, K6QXY, on "6-Meter EME & Large Array Engineering"; yours truly on "VHF Contesting & What It Takes To Win (Regardless of Category)"; and *CQ VHF* Senior Contributing Editor Gordon West, WB6NOA, on "Weather Patterns and the KH6 Duct." The talks were followed by a social hour, the annual banquet, and prize drawing. Noise figure measurements were conducted after the banquet ended and lasted until the wee hours of the morning.

There was a second swap meet after breakfast on Sunday (*so folks could sell what they bought on Saturday?—ed.*), followed by the closing ceremonies. The "50 MHz and Above Group" will host the 1998 conference in the San Francisco Bay area. For more information on the WSWSS and its activities, please visit either <http://www.psnw.com/~n7stu> or <http://www.qsl.net/n7stu> on the World Wide Web. *Proceedings* from the event are available from the ARRL or WSWSS.

## Activity Reports

Activity reports this month run the propagation gamut from transequatorial (TEP), aurora (AU), and meteor scatter (MS), to tropo scatter (Tropo) and sporadic-*E* (*Es*). Sometimes, there were even combinations. Quite a busy time for the usually quiet fall season.

## TEP and Sporadic-E... Together!

From Ron, K5LLL, EL29fq:

10/29/97—I worked PY5CC on 50.100 at 0005 Z with RST 579 signals.

From Javier, EA9AI:

11/8/97—6 m was open to ZS6 (South Africa) and V51 (Namibia). I worked: 1336 Z ZS6WB KG44ce, 1349 Z ZS6AXT KG33, and at 1357 Z ZS6AWK. Heard all the time was V51VHF/B 50018 599, but nobody from V51.

From Smitty, W4UDH:

11/8/97—Had some good TE today into LU land (Argentina). Worked LU1VK FE48 & LU8YYO FF50. I heard several others before it closed.

From Oscar, CO2OJ:

21/10/97, 2320 Z—I worked PY5CC GG54 with a 59 signal. After that, the party started. I worked stations in TN, NJ, OH, and GA for almost an hour. During the QSOs to the north, I ran only 2 watts and nevertheless received 57–59 reports from almost everybody. The conditions were really open this afternoon!!! CO2KK was also on the party, and Kevin, N8ZJN, told me that at about 2300 UTC, he worked a CX station (Uruguay).

From Jordan, WB2QLP EL96:

10/21/97—WOW...What an opening on "The Magic Band" tonight. I guess I got a late start at 2245 Z. Immediately worked CX9DK GF15 on 50.110, 59+ both ways! I heard PY5CC too, but was busy with 2-m FM net. At 2250 Z, WA3GYW MD FM19 called me. I thought it was backscatter as I was beaming to South America! Then W5GG EM12 called; again I was thinking backscatter. Only later, about 2350 Z, when I worked AA2UK in NJ, did I realize 6 was WIDE open on *E*-skip. For the next 2 hours, 50.155 sounded like a 20-meter DX pileup! I ended up working 54 Qs, 17 states (W2, 3, 4, 5, 8, 9 & 0). As someone used to say: v e r r r r r y i n t e r e s t i n g! You can bet that I'll be listening tomorrow, too....This opening was far *better* than any from Spring/Summer '97 from my QTH.

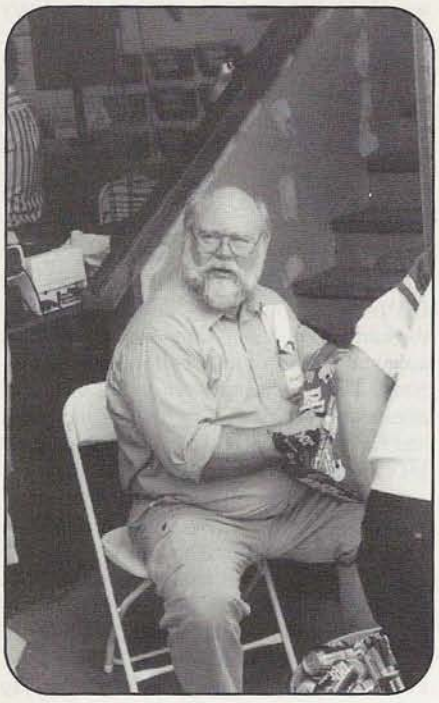
From Peter, PY5CC GG54re:

Nice TEP propagation to Central America and Caribbean. Worked many stations in that area with 59++ signals. Worked 8P6ER on 6 meters with 59+ 40 and we QSYed to 2 meters and made a QSO. 12 October 2320 Z—8P6ER 50110 SSB 59+40, Gary Barbados Is TEP. 12 October 2324 Z—8P6ER 144.300 SSB 51, my first TEP on 2 meters. Also worked EH8BPX at 2102 Z with 59+ 20 dB on 50110. On 13 Oct. 1997 the TEP started at 2240 Z to Africa and moved to the Caribbean and Central America before finishing with an opening to Japan. 2240 Z EH8BPX 50110, 2257z J3EOC/b 50056, 2257 Z PT7BCN/b 50078, 2300 Z WP4LLH 50110, 2308 Z KP4JN 50110, 2320 Z KP3AA 50110, 2325 Z 8P6ER 50100, 2329 Z 8P6ER 144300, 2330 Z PU7AGQ 50100, 0016 Z TI5KD 50110, 0036 Z TI4JHQ 50110, 0057 Z XE1BEF 50110, 0059 Z PY9MP 50110, and 0101 Z JR6HI 50110. No more Japanese stations on the band. Kenji was very strong. On 17 Oct. 1997, I had my first opening to Europe this cycle. Worked CT1AL, EH1YV, and CT1HB. Heard also the CS1ACP beacon. Many weak signals but no conditions to copy.

From Ed, WP4O FK68:

11/21/97 2250 Z—CX9DK worked into USA 50.110. While talking to Fermin, CX9DK, he started to hear *Es* and *possibly* an

***"The looks from pedestrians and other drivers as the group of antenna-covered vehicles rolled by were priceless. You'd think they were watching a science fiction movie being filmed or a group of mad scientists on the march, or just maybe they'd spotted the Energizer bunny for real!"***



*"Gee, these folks are thirsty!" WSWSS founder David Peters, KI6FF, prepares more pop for conference-goers.*

***"For the next 2 hours, 50.155 sounded like a 20-meter DX pileup! I ended up working 54 Qs, 17 states (W2, 3, 4, 5, 8, 9, & 0). As someone used to say: v e r r r r r r y i n t e r e s t i n g! You can bet that I'll be listening tomorrow, too...."—Jordan Mash, WB2QLP***

Ohio station call him. I didn't hear any thing in KP4 land. Some of the stations worked: N8ZJN, WA2LXG, W4CHN, WB2QLP. And many others. 11/27/97—Started to hear stations at 2250 Z, I Worked CX9DK & CX4AAJ. Signals where Q5 but after a while they started to build up. Then I worked LU8DNY & had a long QSO with my old friend LU1DMA.

From Kevin, N8ZJN EM79xk:

10/21/97—I worked CX9DK at 2238 Z & heard PY5CC for over 40 mins., no QSO. Also worked CO2OJ, Oscar only running 2 watts. Still heard TEP after 0000 Z.

From Ron, K5LLL, EL29fq:

10/25/97—I worked PY5CC on 50.100 at 0005 Z with RST 579 signals.

From Doug, ZP6CW:

10/31/97 2300 Z—Experienced short openings from Paraguay, QSO with PP7ZZ (1,800-mile path). 11/01/97 0012 Z—QSO with FG5BG (3,000-mile path) No beacons heard entire evening. 11/02/97—We had the normal 0000 Z–0300 Z opening from Paraguay. Worked or heard YV4/J32/TI4/TI5 and HP3. I was on this same time period all week, calling CQ on CW at 50.100 and scanning constantly. ZP5PT was also active during this time frame.

From Rafael, PY3FF:

11/06/97—WP4O solid 59 at 22:45Z in 50.110 CW 0W and dipole.

## Leonids Meteor Shower

From Jason, N1RWY FN54no:

17/11/97—Worked list for the Leonids shower: KBØVUK EN34, WA8CLT EN80, KE8FD EM89, K2SMN FN20 (the same burn!), W9JN EN54, K4KAE FM02, K8BHZ EN75, NS4W EM76, KF9WM EN70, K4HJE EM96, WF9X EN53, N8LGP EN91, W8OUD EM79, K2TXB FM29 (MS/Tropo mix!). Best Distance: 1177 miles to KBØVUK. Heard list: N3RN FN11 (?), W8HOM EN71, WB4JGG EM75, KB4OG (?), and K4QI FM06.

## Aurora

From Terry, WA3LTB EN92ta:

11/06/97—Worked a few new stations on AU: WØZQ EN34, W1RNA FN34, N9JR EN63 & KOØU/1 FN42. At 9:30 p.m. it was real spotty around the band, only few signals popping in and out. Maybe tomorrow night will be better....

From Mike, VE7SKA CN88:

11/7/97 0319 Z—Just worked KC6IPF CN80 in CA, a new AU state for me!! 6 & 2 were both going nuts. Brief AU *Es* from the north. Both VE8SIX/b & VE8WD/b were in briefly.

From Mike, VE9AA/p FN76:

11/7/97 0229 Z—Copied the VE8BY/B, FP53rs, on 50.048 MHz, using only a horizontal loop at 30'! No beams here at my portable (weekday) QTH. Lots of buzz and multipathing, tones, then no tones, HI!

From Derek, K7XD:

11/7/97—Aurora starting at 1:30 Z in CN85. Good Luck.

From Jay, KØGU DN70mq:

11/07/97—The AU didn't amount to much here. I worked KU8Y EN61 at 0316 Z. He had a very nice signal (55A both ways) but heard little else.

From Dave, N7DB CN85:

11/7/97—Here is a quick summary of the auroral activity from the Pacific Northwest. This was a decent aurora from this operator's perspective. From what I heard (or didn't hear), I would conclude this was a larger aurora than last month's. No VE6s this time around, but some reports of W6s worked on 6. First alert came in around 0200 Z from K7XD. Worked N7ML on 6 @ 0202 Z (52A, DN45). (*For the uninitiated, "52A" is a signal report of 52, via aurora.—ed.*) First 2-m aurora was @ 0215 Z K7IEY 53A in CN88. 6-m signals peaked (of those worked) 56A and 2-m signals 53A (there were stronger AU stations on 2, but I was splitting time between 6 & 2). Here is the 6-m list: 0208 Z CN89 53A, 0221 Z CN96 55A, 0247 Z DN27 53A, 0301 Z CN89 55A, 0310 Z DN36 54A, 0311 Z CN87 54A, 0313 Z CN87 55A, 0355 Z DN09 52A, 0431 Z CN97 41A, 0440 Z DN27 56A. On 2 m: 0230 Z VE7SKA 53A CN88 (finally worked Mike on 2 m!), 0318 Z CN84 53A, 0406 Z DN17 52A, 0412 Z CN89 52A. Heard: NØXX/7 (CN84) was heard on 6-m AU during the 0200 Z hour. W7HAH was heard on 2 m AU at 0234 Z. W7EW (CN84) is strong on 2 m, but still had AU on his signal at 0329 Z. Another local that was pure AU was N7EA at 0322 Z on 2 m. There was an overcast sky with light rain last night, so not sure what the aurora looked like. I woke up around 1130 Z and the clouds did seem a bit bright in the NE direction. N7ML (DN45) was still coming in on 6-m AU at 0610 Z. Left the rig on as I went to bed and noticed the propagation mode changed by the bottom of the hour. I noticed

## Arkansas to Texas on 5.7 GHz—Off the Moon!

The first ever 5.7-GHz EME (Earth-Moon-Earth), or moonbounce, contact from Arkansas was made on November 26, 1997, by Joel Harrison, W5ZN, who successfully linked up with Al Ward, WB5LUA, in Texas. Both stations were running what would be considered amazingly low power for moonbounce on lower bands, putting most of the gain in the antennas.

W5ZN was running 18 watts to a 10-foot dish fed by a 1.5-inch copper pipe feed with a coffee-can scalar ring and a homebrew LuaCom preamp on the receive side. WB5LUA had 28 watts to a 5-meter (16-foot) dish and also used a 1.5-inch copper pipe feed with scalar ring and homebrew LuaCom preamp.

According to Harrison, moon conditions were *not* good at the time of their contact, and the moon was at apogee, the most distant point in its orbit around the Earth. Despite the poor conditions, Joel says the contact was fully completed after about five transmit receive sequences from each station.

Congratulations to Joel and Al from *CQ VHF*!

*One of the best parts of ham radio conferences is the camaraderie and the in-person meetings with people you'd otherwise talk to only on the radio. Here, KC6WLC, KG1BY, and K8BUW chat in the parking lot at the WSWSS conference.*

some *very* strong MS-like bursts from Mike by that time. Not sure if it was MS or some AU-related *E*.

From Paul, N1BUG:

Thanks to those who have sent information, I am keeping busy. (By the way, I'm, still looking for more input on dates/times of aurora openings, especially during 1997)....So far...4 stations reporting aurora openings on 14 different dates. All but one correlated well with high activity in the magnetic field X component measurements by HAARP, Gakona, AK. The remaining one is an oddity, but was midway between outbursts of activity as indicated by the magnetometer at Gakona. I have made no attempt to analyze how many days had significant geomagnetic activity with no reports of aurora...*yet*. I will wait for more reports first, as I feel it likely some critical ones are missing. Also, from past experience on 2 meters, I know some good auroras get missed because they snuck up without warning! Anticipating the next question: Why HAARP data instead of what I'm currently using on the Web page? Because the data was easier to get...technical problems at Kiruna, Sweden, are making archived data temporarily (I hope!!) unavailable. I will keep trying. I will also check into availability of 1997 data from Pinawa, but I do not have high expectations there. Meanwhile, keep the reports coming! *This is fun*!!!

## Sporadic-E

From Lew Sayre, W7EW/W7AT CN84:

10/28/97—Starting around 1900 Z, I worked 1/2 dozen stations in the EL86–87 area as well as another dozen or so in the mid-point, near DM68. It then shortened up and now heard shorter 1X hop into DM26 to DM16. Seems like this year, Halloween is better than 4th of July for the *Es*. Called/listened for DX lower in band, but nothing heard. Strongest station heard in EL87 was Lowell WØVHF with K9HUY & N4RFN close behind. And I thought conditions for the CQWW-SSB contest were a little strange.

From Dave W6OAL DM79

10/29/97 1900 Z—Boy, was that short and sweet. I Worked DM08, heard a couple of CA stations and then it all died. About 15 minutes is all we got here SE of Denver.

From VK3SIX:

11/11/97—50 MHz 0730 Z ZL3SIX beacon RE66 559 to 599 until 0830 Z, 0732 Z ZL2KT Ray Hastings. 59 50.130, 0735 Z VK4ABP Beacon Longreach Queensland QG26 559 until after 0800 Z, 0735 Z ZL2MHB Beacon 51.028 RF80 FSK 559, 0800 Z Video 55.2500, 46.261, 46.172, 45.2396/2397/2500/2604. JA7ZMA 10-m beacon still 559 28.188 MHz QM07.

## Tropo

From Jack, N6XQ DM12:

10/30/97 00:55 Z—Aloha, the 2-meter beacon from Hawaii broke my squelch a little while ago and is currently running a steady S3 signal.

From Bob Earl, KD6UIH:

10/30/97 01:30 Z—As I sat here on the computer answering e-mail, I had the 2-m SSB rig on the omni-directional KB6KQ Miniloops with the squelch on (to allow concentration on typing) and scanning the band. The squelch opened and it was the KH6HME Beacon coming in loud and clear. I turned the beam that way and with the preamp on the signal is S-9.

## And Finally...

I hope everyone enjoyed the January VHF Sweepstakes last month. As I write this in late November, I once again planned to run the "MegaROVER" route in an attempt to surpass NØLRJ's record of 20 grids visited during a contest. With any luck, I made it this time...HI! Ward, WB7VVD, has volunteered to be my second op/driver, so we have a shot. More about our trip in a future issue.

Thanks for all the input! My mailboxes (real and virtual) are kept full. Keep those reports coming to: Tim Marek, K7XC, 360 Prestige Ct, Reno, NV 89506; Phone: (702) 972-4722; Fax: (702) 972-5011; e-mail: K7XC@VHF.RENO.NV.US.

73 from DM09bp de Tim K7XC/R

# Hamfest Calendar

The following hamfests are scheduled for February, 1998:

**Feb. 2, Radio Equipment Auction**, St. Clement of Rome Catholic Church Social Hall, **Sun City, AZ**. Talk-in: 147.30+. For information, contact WVARC, P.O. Box 1573, Sun City, AZ 85327, or call (602) 933-0854; e-mail: <watgl@juno.com>.

**Feb. 7, Fleamarket**, CAW Hall, **St. Catharines, ON.**, Canada. Talk-in: 147.240(+). For information, contact Ron, VE3RGD, (905) 892-5312 or NPARC, P.O. Box 20036, Gratham Postal Outlet, St. Catharines, ON L2M 7W7.

**Feb. 7, 25th Annual and Original Hamfest and Computer Show**, Stall High School, **N. Charleston, SC**. Talk-in: 147.18+, 146.835-, 147.27+, 147.354+, 146.76-, 147.30+, 443.8+, 442.3+, and 444.3+. For information, contact Jenny Myers, WA4NGV, 2630 Dellwood Ave., Charleston, SC 29405-6814, (803) 747-2324 or e-mail: <brycemyers@aol.com>. (exams)

**Feb. 7–8, 38th Annual Tropical Hamboree®**, Dade County Fair/Expo Center, **Miami, FL**. For information, contact Evelyn Gauzens, W4WYR, General Chairman, 2780 NW 3rd St., Miami, FL 33125-5059: Phone: (305) 642-4139; Fax: (305) 642-1648; e-mail: <edg@elink.com>; WWW: <www.hamboree.org>.

**Feb. 8, Mansfield Mid*Winter Hamfest/Computer Show**, Richland County Fairgrounds, **Mansfield, OH**. Talk-in: call W8WE on 146.34/94. For information, send SASE to Pat Ackerman, N8YOB, 63 N. Illinois Ave., Mansfield, OH 44905, or call (419) 589-7133 after 6:00 p.m. EST.

**Feb. 8, Hamfest/Computer Show**, American Legion, **Latrobe, PA**. Talk-in: 145.15 (-600) K3JDU. For information, contact Chris Weiss, K3JDU, (412) 537-6068.

**Feb. 13–14, 17th Annual Midwinter Madness Hobby Electronics Show**, National Sports Center, **Blaine, MN**. For information, call (612) 537-1722. (exams)

**Feb. 13–15, 1998 Orlando HamCation and Computer Show**, Central Florida Fairgrounds, **Orlando, FL**. Talk-in: 146.76. For information, contact HamCation, P.O. Box 547811, Orlando, FL 32854-7811, or call (407) 850-9258; other info: <http://www.oarc.org/hamcat.html>.

**Feb. 14, Flea Market**, Marlborough Middle School, **Marlborough, MA**. For information, contact Ann Weldon, KA1PON, before 9:00 p.m. at (508) 481-4988 or AARC, Box 258, Marlborough, MA 01752.

**Feb. 14, 24th Annaul Swap-n-Shop**, Immaculate Conception Middle School, **Traverse City, MI**. Talk-in: 146.86. For information, call Joe, W8TVT at (616) 947-8555 or Chuck, W8SGR at (616) 946-5312. (exams)

**Feb. 15, Hamfest/Computer Show**, QCCA Expo Center, **Rock Island, IL**. Talk-in: on WØBXR 146.28/.88 and 146.04/.64 repeaters. For information, contact Kent Williams, K9UQI, 4245 10th Street, East Moline, IL 61244-4154, call (309) 796-0718 (4–9 p.m. only); Fax: (309) 796-0629; e-mail: <k9uqi@arcsupport.com>.

**Feb. 15, Annual Swapfest**, Adams County Fairgrounds, **Brighton, CO**. Talk-in: N7PVN/R 147.15(+). For information, call Wayne Heinen, NØPOH, at (303) 699-6335; e-mail: <nrclog@aol.com>; or write to USPS, P.O. Box 473411, Aurora, CO 80047-3411. (exams)

**Feb. 21, Annual Ham Radio Auction**, HMK Auctioneers, **Carrollton, TX**. For information, contact Bob Peters, K1JNN/5 at (972) 288-0484; e-mail: <Soundimp@pobox.com>; or Glen Kitto, KC5WBQ, (972) 383-7507 e-mail: <GKitto@pobox.com>; WWW: <http://www.w5fc.org>.

**Feb. 21, Salem Hamfair**, Polk County Fairgrounds, **Rickreall, OR**. Talk-in: 146.86. For information, contact Evan Burroughs, N7IFJ, at (503) 585-5924; WWW: <http://www.teleport.com/~n7ifj/sraflyer.htm> for flyer and pre-registration form.

**Feb. 22, Annual Hamfest**, Emidio's Party Center, **Cuyahoga Falls, OH**. Talk-in: 147.87/27 W8VPV. For information, contact Dan Adkinson, KC8CFJ, P.O. Box 2222, Stow, oH 44224, (<hamfest@neo.lrun.com>); or call (330) 923-9045. (exams)

**Feb. 22, Annual SHARCfest Hamfest and Computer Show**, Castle Shannon VFD Memorial Hall, **Pittsburgh, PA**. Talk-in: 146.955(-). For information, contact Steve Lane, N3RNY (412) 341-1043; e-mail: <sharcfest@juno.com>; WWW: <http://www.hky.com/~sanfordb/index.htm>

**Feb. 22, Livonia ARC Swap'n Shop**, Dearborn Civic Center, **Dearborn, MI**. Talk-in: 144.75/5.35 AM 146.52 simplex. For information, contact Neil Coffin, WA8GWL, Livonia ARC, P.O. box 51532, Livonia, MI 48151 (SASE), or call (313) 261-5486; WWW: <www.larc.mi.org>.

**Feb. 22, Annual Fayetteville Hamfest**, Fayetteville High School, **Fayetteville, WV**. Talk-in: 146.790-, 443.300+. For information, contact Richard Roy, KB8SMC, P.O. Box 96, Fayetteville, WV 25840, (304) 469-3292 after 6 p.m. (exams)

**Feb. 22, Long Island Indoor Hamfair**, Freeport Armory, **Freeport, NY**. Talk-in: W2VL, 146.85. For information, contact LIMARC, P.O. Box 392, Levittown, NY 11756-0392; 24-hour infoline: (516) 520-9311L; WWW: <http://members.aol.com/RaySk/LIMARC1.HTML>.

**Feb. 28, Winter Hamfest**, Milton High School, **Milton, VT**. Talk-in: 145-15 repeater. For information, contact W1SJ (802) 879-6589; e-mail: <wb2jsj@vbi.champlain.edu>; WWW: <http://www.ranc.together.com>. (exams)

**Feb. 28, Cabin Fever Hamfest**, LaPorte Civic Center, **LaPorte, IN**. Talk-in: K9JSI, 146.610, 146.520 simplex. For information, contact John, N9ROH, LPARC, P.O. Box 30, LaPorte, IN 46352, or call (219) 326-7182 (evenings).

## Operating Notes

For late January, February, and early March, 1998:

**January**

17–19 ARRL January VHF Sweepstakes ( *See rules in January, 1998,* CQ VHF, *p. 66.*)

**February**

1 Good EME conditions

**March**

1 Good EME conditions
7–8 IARU Region 1 (Europe/Africa) VHF Contest
7–8 DUBUS EME Contest (Europe) 144/1296 MHz

*EME data courtesy W5LUU. More contest info is available on the* CQ VHF *Web page at:* <http://members.aol.com/cqvhf/navhfcon.htm>.

# Weak-Signal Modes



*Weak signal* is a general term used to describe Morse code (CW) and single-sideband (SSB) activities on VHF, UHF, and above that rely on *natural phenomena* to extend signal ranges beyond "line of sight." These natural phenomena include Sporadic-E and tropospheric propagation, aurora, meteor scatter, and Earth-Moon-Earth (EME, or "moonbounce") communication. The use of satellites and amateur television (ATV) is not generally considered "weak-signal" work, since no natural phenomena are at work. Even so, a good 70-centimeter/2-meter satellite station generally makes an excellent weak-signal station.

The term, "weak signal," by the way, refers to a station's ability to *receive* and make sense of a very weak signal. Serious weak-signal operators use serious power and serious antennas, but even a strong signal will sound weak by the time it reaches your receiver after, let's say, a round-trip to the moon.

## Station Requirements

Basic needs for operating any of the weak-signal modes include a *multimode* transceiver capable of operating on SSB and CW, a directional antenna, and some education on the characteristics of the various weak-signal modes. When you want to go beyond the basics, you'll probably want a bigger, higher antenna; more power; a bigger, higher antenna; a receiver preamplifier; and—you guessed it—a bigger, higher antenna. You'll also want to learn Morse code, which hams typically abbreviate as *CW*.

## Why CW?

You don't *need* to learn the code to do weak-signal work. So why would you *want* to? The answer is quite simple. Even though there's plenty of weak-signal work done on SSB, when signals are barely audible—and that's the usual state of affairs for such modes as EME and meteor scatter—code will get through when a voice signal won't.

Why? Because your brain only has to interpret simple sequences of dots and dashes from a CW signal, rather than the complex (and often distorted) voice patterns of SSB signals. Because of this, virtually all EME and meteor contacts are made on CW, as well as many other contacts on other weak-signal modes.

## Why SSB?

Single sideband is used instead of FM for voice contacts on weak-signal modes for a variety of reasons. First, it uses less bandwidth. You can pack nearly twice as many SSB signals as FM signals into the same chunk of frequency space. Plus, because narrower-bandwidth receivers pick up less noise to compete with signals, you'll generally get greater range on SSB than on FM (the same applies for CW versus SSB). And finally, SSB doesn't have the *capture effect* that's found on FM. This is the phenomenon

*Carl Ebhardt, W4HJZ, operates weak signal as well as satellites from his well-equipped shack in Raleigh, North Carolina.*

by which the stronger of two FM signals "captures" a frequency, totally wiping out the weaker station. On SSB, it's possible to pull out what a weaker station is saying, even if there's a very strong signal on an adjacent frequency.

## Why Weak Signal?

What is the appeal of weak-signal modes, where signals are normally marginal and you often have to struggle just to exchange signal reports? Why not just use FM?

First of all, FM is easy, and most weak-signal operators aren't looking for "easy." They're looking for challenges.

Second, weak-signal work satisfies the primal DX urge of most hams. SSB and CW signals travel farther than FM signals every day, providing regular contacts on 2 meters, for example, of 200 to 400 miles. *Band openings*, or periods of enhanced propagation, can easily double that range. And when you add in such exotic modes as aurora, meteor scatter, and EME, distances covered can be in the thousands of miles. Try that with your FM rig!

Third, there's a greater technical challenge in assembling and operating an effective weak-signal station than in plugging in and turning on an FM rig for repeater use.

Finally, there are greater opportunities for competitive challenges through awards programs and the variety of VHF/UHF contests held each year. Virtually all of these require "direct" contacts, that is, without the help of repeaters.

## Educational Opportunities

Unlike repeaters, which can be operated by the average 8-year-old with no special training, working weak-signal modes requires that you further your education—whether it's learning about the flow of solar particles to understand aurora, studying astronomy to predict your best paths during a meteor shower, or delving into the mysteries of Sporadic-E propagation. You will be infinitely more successful at these modes if you understand how they work.

You can start your education right here in *CQ VHF*, which regularly presents articles on various weak-signal modes, along with a monthly weak-signal column by Tim Marek, K7XC. But if you can't wait until next month to learn more, we recommend the following references:

*The VHF "How-To" Book*, by *CQ* magazine VHF editor Joe Lynch, N6CL (CQ Communications)
*Getting Started in VHF* video, produced by *CQ VHF* editor Rich Moseson, W2VU (CQ Communications)
*Your VHF Companion*, edited by Steve Ford, WB8IMY (ARRL)
*The ARRL Operating Manual* (ARRL)
*The ARRL Handbook for Radio Amateurs* (ARRL)

A word of warning: If you're bitten by the VHF weak-signal bug, the effects can be life-long. And there is *no cure!*

### Contact Information

ARRL—225 Main St., Newington, CT 06111. Phone: 860-594-0200 (ARRL publications)
CQ Communications, Inc.—76 N. Broadway, Hicksville, NY 11801. Phone: 516-681-2922 (all products and publications listed above).

## Products *(from page 12)*

<sales@optoelectronics.com>; WWW: <www.optoelectronics.com>.

*Circle 102 on reader service card*

## Comet SSB-1 & SSB-1NMO Mobile Antennas

The SSB-1/SSB-1NMO is a unique 2-meter/70-centimeter mobile antenna designed to solve the problems associated with mounting antennas on high profile and sport utility vehicles. The whip is flexible and rubber coated, similar to a "rubber duck" HT antenna. It's rigid enough to stay vertical while driving for the best radiation pattern, but also flexible enough to hit trees, garage doors, etc., without breaking. The SSB-1 comes with a UHF connector (PL-259) standard; the SSB-1NMO comes with a Motorola-style NMO mount and connector.

Both versions are now available from major amateur radio dealers. For more information, contact NCG Company at (800) 962-2611 or visit the Comet Web site at <www.cometantenna.com>.

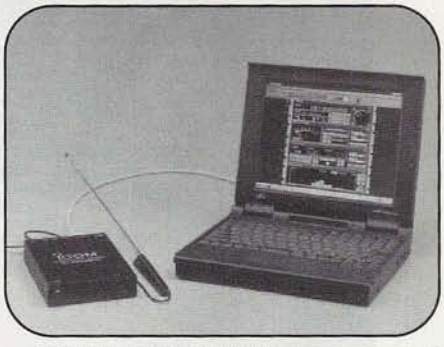
*Circle 103 on reader service card*

## ICOM Computer Radio

ICOM America, Inc., has introduced the IC-PCR1000, a "black box" communications device that transforms a computer screen into a high-quality wideband receiver. The PCR1000 is compatible with many different PC models, even laptops (Windows® 3.1 or higher required), and offers band scope functions and exceptional receiver/scanner performance.

Even though it's only about the size of a small hard-bound novel, ICOM's new "black box" receiver covers a wide frequency range from 10 kHz to 1300 MHz (cellular blocked: unblocked versions available only to FCC approved users) with all-mode receive capability, including WFM, FM, AM, SSB, and CW.

ICOM's PCR1000 features three receiver interface screens, including a typical receiver front panel showing S-meter (signal strength) level, a large frequency readout, and a keypad. Other screen options are a component-type screen with tuning, mode, meter, and band scope functions, and a radio screen that provides simple operation like a typical stereo tuner. The PCR1000 also features an unlimited number of memory channels in banks of 50 and are stored on your computer's hard drive or floppy disk. Each memory can store frequency, receive mode, memory names, tuning step, attenuator, and filter settings.



ICOM's IC-PCR1000 has a suggested retail price of $599.00. A current listing of their local dealers may be obtained from ICOM's Web site at <http://www.icomamerica.com>. For additional information, contact ICOM America, Inc., 2380-116th Ave., NE, Bellevue, WA 98004; Phone: (425) 454-8155.

*Circle 104 on reader service card*

# Grid Squares

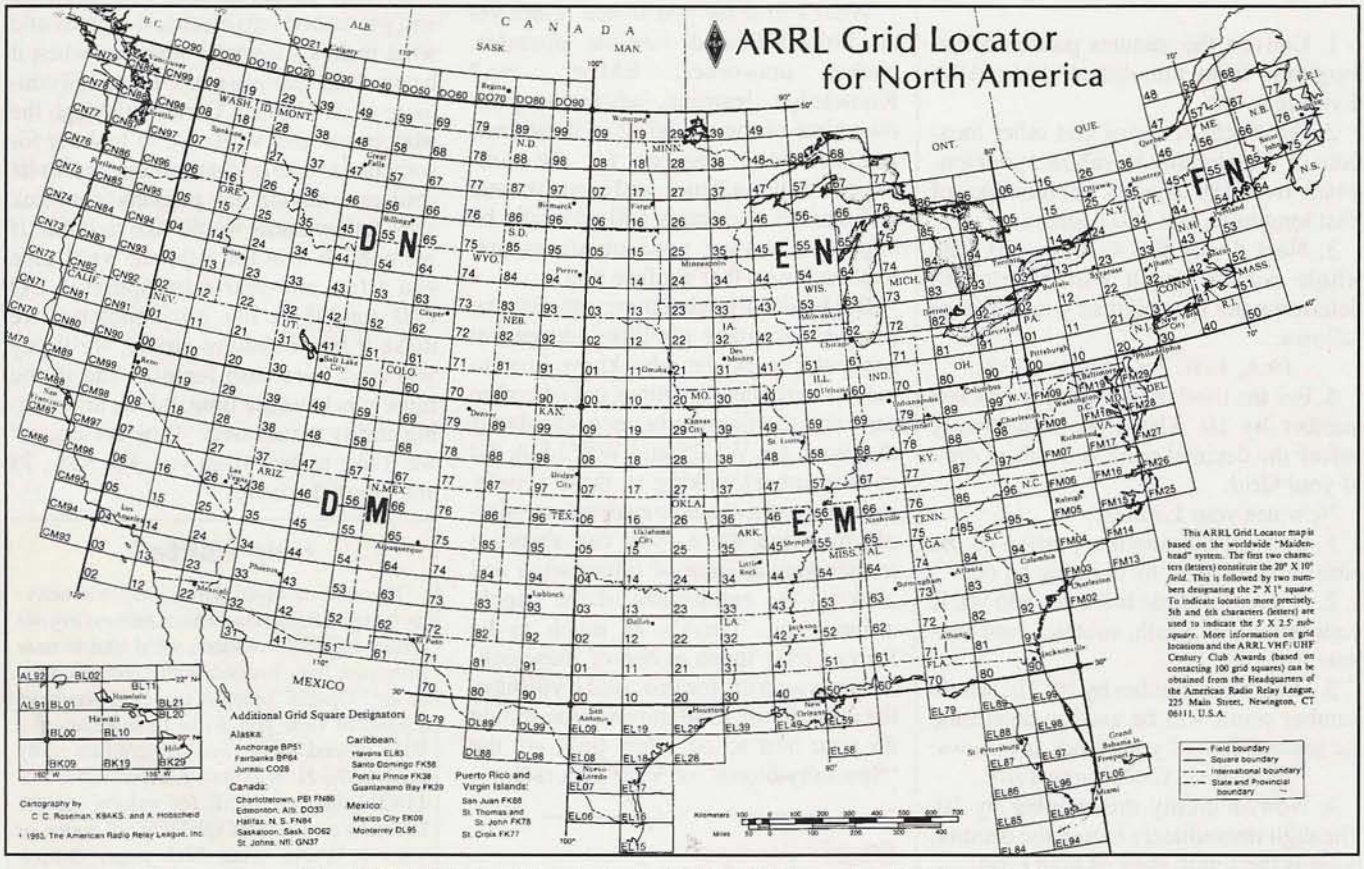
Basics

In almost any article you read about VHF/UHF weak-signal work, VHF contesting, or awards programs, you're bound to run into the phrase "grid square." This is a specialized system that hams active on VHF use to locate each other and to describe their own locations.

A grid square is actually a rectangle, and a rather large one at that. Each rectangle measures 1° of latitude by 2° of longitude and has a unique two-letter, two-number identifier. The CQ offices in Hicksville, New York, for example, are in grid square FN30, and ARRL headquarters in Newington, Connecticut, is in FN31. (To save you the trouble of doing the math, there are 32,400 grid squares covering the planet.)

The system got its start in Europe in 1980 as an update of a system that had been used by European hams for decades. American hams began using it a few years later, in large part to help equalize VHF contest competition between different parts of the country. The problem was that most contests had you determine your score by multiplying the number of contacts you made by the number of states you contacted. But a station in New Jersey, for example, could easily work 10 or more states with a basic 2-meter SSB setup, while an identically equipped ham in Kansas would be lucky to work *two* states. Grid squares, which are all the same size and shape (generally speaking), were supposed to help "level the playing field." They did to some extent, but still can't compensate for differences in population density. So while the ham in Kansas may be able to get his signal into a dozen different grid squares, there's no guarantee that he'll be able to find other hams to contact in each of those grids. On the other hand, our ham in New Jersey should have no trouble at all finding at least one active ham in each of the dozen grid squares that *his* signal can reach. Even so, grid squares today have become the basis for most major VHF contests and awards and provide operators with a quick reference on which direction to point their beams for specific contacts.

How do you determine your grid square? Start by looking at a Grid Locator map. These are available at nominal cost from the ARRL and are also pub-




*The ARRL VUCC Grid Locator Map. (©1995 ARRL, reprinted with permission)*

lished in a variety of references, including CQ's *The VHF "How-To" Book*, the *ARRL Operating Manual*, and the ARRL's *Your VHF Companion*.

If you're clearly within one particular grid square, then look no further. If you're not sure, you can calculate your location with a variety of computer programs or with a mathematical formula (see "Figuring Out Your Grid Square" below). The key to all of them, though, is knowing your latitude and longitude as precisely as possible. If you have a topographic map of your area available, use that. Otherwise, try your public library's reference department or ask local hams who are already active on VHF/UHF weak-signal. Then you can start to have fun "chasing grids."

## Figuring Out Your Grid Square

To determine your Grid Square without a map, you'll need your longitude and latitude rounded to the nearest minute. Save the number obtained from each step, as it will be used in the next.

First use your longitude:

1. Convert the minutes portion of the longitude from minutes to decimal by dividing by 60.

2. For North America and other locations of West longitude, subtract your longitude from 180 degrees. For locations of East longitude, add 180 degrees.

3. Next divide this value by 20. The whole number result will be used to determine the first digit of your Grid, as follows:

0=A, 1=B, 2=C thru to 17=R.

4. For the third digit, multiply this last number by 10. The digit immediately before the decimal point is the third digit of your Grid.

Now use your Latitude:

1. Convert the minutes portion of the latitude to decimal by dividing by 60.

2. If your Latitude is North, add 90. If your latitude is South, subtract your latitude from 90.

3. Divide this number by 10. The whole number result will be used to determine the second digit of your Grid, as follows:

0=A, B=1, C=2 thru to 17=R.

4. Now, multiply this number by 10. The digit immediately before the decimal point is the fourth digit of your Grid.

This completes your four-digit Grid Locator. ■

Radio (TAPR); Ed Krome, K9EK, who literally "wrote the book" on 2400-MHz satellite operating; and Bdale Garbee, N3EUA, who's in charge of the software-writing team for the digital "RUDAK" experiment aboard the Phase 3D satellite. I went over to ask a question about something, but I never got the chance—I was so fascinated by their conversation that I just kept my mouth shut and listened. There in the lobby, waiting for dinner, they were busy designing a new type of radio that would be able to do whatever it was that they'd envisioned (I missed that part of it). Talk about advancing the state of the art...I was watching it happen right in front of my eyes! In a hotel lobby!

This is the great value of conferences and of attending them if you're able to. Now, I don't know if the radio that Greg, Ed, and Bdale were discussing will ever go beyond the talking stage (my bet: it will), but that doesn't really matter. The discussion itself is what was important; they were focusing each other's thinking and setting in motion ideas that, one way or another, will figure in a new generation of amateur radio equipment.

## Up Close and Personal

What's in it for you if you're not yet an ultra-dedicated satellite operator, packet networker, EMEer, etc.? Knowledge, learning, advancing your own state of the art. Most of these conferences have sessions for the non-experts in the audience, and even the most technical of presenters will generally be happy to answer your questions and explain things that confuse you.

But by simply being there, meeting the people who make satellites and packet networks work, or who know how to make microwave antennas out of coffee cans and use them to bounce signals off the moon (as W5ZN and WB5LUA did in November), talking to these people, listening to them talk to each other—simply by being there—you can absorb a tremendous amount of information and soak up the enthusiasm of the people around you. There's as much to be learned over lunch at one of these conferences as in the forums. And if you have the opportunity to attend one, you should do your best to go. They truly are the "Specialty Stores" of VHF ham radio.

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## Staff Notes

Over the next few months, you'll be noticing some changes in both the names on our masthead and the names of some columns. This month, we welcome Ken Ernandes, N2WWD, as our new "Orbital Elements" columnist. Ken is an expert in "orbital mechanics," which is the science of planning and tracking the orbits of spacecraft *(not* what the astronauts will be as they assemble the International Space Station starting this summer).

***"What's in it for you if you're not yet an ultra-dedicated satellite operator, packet networker, EMEer, etc.? Knowledge, learning, advancing your own state of the art."***

Starting next month, Kent Britain, WA5VJB, will be joining the staff with two alternating columns, one on antennas and the other on microwaves. And Dave Ingram, K4TWJ, will be moving over from his "Project Corner" chair to take over Don Stoner's "In Theory" column, but with a new name and a new focus. We'll be calling the column "How It Works," and Dave will be exploring all sorts of things, such as how sound waves from your mouth go into a microphone and get turned into electrical signals and what makes a repeater wake up when it hears a tone that you can't. Dave will continue to do "Project Corner" through the May issue, and, while we're looking for someone to take on that column, we invite readers to submit any projects you think your fellow hams would like to build. If we publish it in the column, we'll give you a free one-year subscription to *CQ VHF* (and if we like it so much that we make it into a feature article, we'll pay you cold, hard cash for it!). And if you think you have the time, talent, and writing ability to take over "Project Corner," we'd like to hear from you. For now, 73 and enjoy the issue.

### Help Wanted

If you're involved with a project or activity that you think would be of interest to your fellow *CQ VHF* readers, we'd like to hear from you. Article submissions are welcome, as are "Op-Ed" opinion pieces if you have a point of view you'd like to share about a VHF-related topic. You can contact us by mail at 76 N. Broadway, Hicksville, NY 11801 (send an SASE for writers' guidelines), by e-mail to <CQVHF@aol.com>, or via our World Wide Web page, <http://members.aol.com/cqvhf/>. We look forward to hearing from you.

# HAM SHOP

**Advertising Rates:** Non-commercial ads are 20 cents per word including abbreviations and addresses. Commercial and organization ads are $1.00 per word. Boldface words are $1.50 each (specify which words). Minimum charge $2.00. No ad will be printed unless accompanied by full remittance. All ads must be typewritten double-spaced.

**Closing Date:** The 1st day in the third month preceding date of publication (example: Jan. 1 for the March issue). Because the advertisers and equipment contained in Ham Shop have not been investigated, the Publisher of *CQ VHF* cannot vouch for the merchandise listed therein. The publisher reserves the right to reject any advertisement. Direct all correspondence and ad copy to: CQ VHF Ham Shop, Attn: Bernadette Schimmel, 76 N. Broadway, Hicksville, NY 11801.

**Orlando HamCation(sm)**... February 13, 14 & 15, 1998. The Orlando Amateur Radio Club will hold the annual Orlando HamCation(sm) at the Central Florida Fairgrounds, 4603 Colonial Drive, Orlando, FL. Satellite workshop Friday and High Speed Code Copying Contest plus Fox Hunt on Saturday. Contact Tim Starr, AE4NJ, P.O. Box 547811, Orlando, FL, or call (407) 850-9258 for info. **http://www.oarc.org/hamcat.html**

Join the **LAMBDA AMATEUR RADIO CLUB** (Larc) since 1975, the only open and visible public service-oriented ham club for gay and lesbian hams. Monthly newsletter, HF skeds, Internet listserv and IRC, hamfest meetings, chapters, DXpeditions. Write LARC, P.O. Box 56069, Phila., PA 19130-6069 or e-mail: <LARC@net-quest.com>.

**FOR SALE OR TRADE:** 126' spool of RG-225 teflon coax (high-power, high-temperature, good for ***indoor*** use up to 450 MHz). Will sell for $200 + shipping (or you pick up in Metro NYC/NJ area). Prefer to trade for 6/2-meter transverter of similar value. Rich Moseson, W2VU, c/o *CQ VHF*, 76 N. Broadway, Hicksville, NY 11801.

**WANTED**: Older model bugs, unusual bugs, and miniature hand keys. State price, condition. Dave Ingram, K4TWJ, 4941 Scenic View Drive, Birmingham, AL 35210

**Learn Code by Hypnosis—http://www.qth.com/cweasy/ or 1-800-425-2552.**

ALUMINUM chassis–cabinet kits, UHF and VHF antenna parts. K3IWK, 5120 HARMONY GROVE RD., DOVER, PA 17315-3016.

If you have a product or service to offer, join us and get your classified message out to all the hams who ply their craft on VHF with *CQ VHF*'s Ham Shop.

Contact: *CQ VHF* Ham Shop
Attn: Bernadette Schimmel, 76 N. Broadway, Hicksville, NY 11801. Call today
(516) 681-2922 or Fax: (516) 681-2926.

## Looking Ahead in CQ VHF Ham Radio Above 50 MHz

Here are some of the articles that we're working on for upcoming issues of *CQ VHF*:

- "Don't Toast That Battery!"—a warning about recharging NiMH power packs, by Gordon West, WB6NOA
- "Magical Moments"—a very memorable ham experience, by Duane Mantick, WB9OMC (do *you* have any "magical moments" to share?)
- " 'Roving' in Scotland," by Simon Lewis, GM4PLM
- "Hiking...and Hamming...on the Appalachian Trail," by Chris Post, N3SIG (watch for info on how you can contact Chris during his hike this spring)

*Plus...*

- Two new columns by Kent Britain, WA5VJB, on:
  - -Microwaves (starting next month), and
  - -Antennas (starting in April, then alternating)
- Two more microwave articles by Simon Lewis, GM4PLM:
  - -"Microwaving in Europe"
  - -"Build a 10-GHz Transverter"

If you'd like to write for *CQ VHF*, you may download our writers' guidelines from the *CQ VHF* World Wide Web site at <http://members.aol.com/cqvhf/> or FTP to <ftp://members.aol.com/cqvhf/General> and look for the file, "writguid.txt." Or, you may send a written request with an SASE (self-addressed stamped envelope) to *CQ VHF* Writers' Guidelines, 76 N. Broadway, Hicksville, NY 11801.

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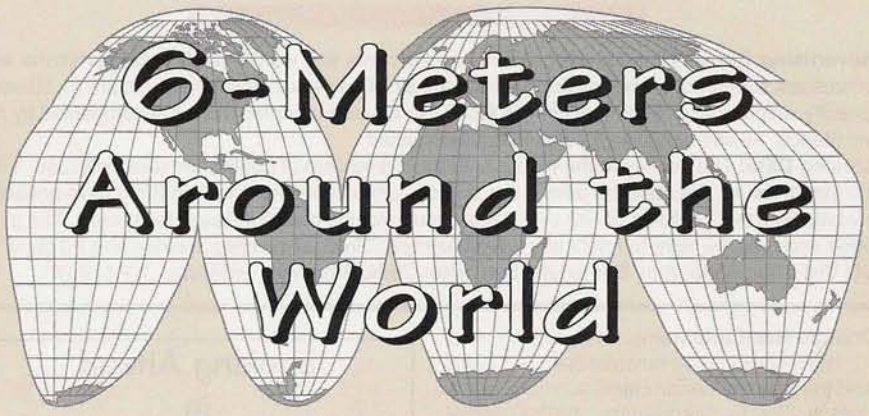



## Middle East

Chris Gare, G3WOS, Chairman of the UK Six Metre Group (UKSMG), reports on two notes of interest that he's received from 6-meter operators in the Middle East:

• In Lebanon, Rami, OD5SB, says he's finished building a Ten-Tec 6-meter transverter and is active with 8 watts, listening for openings on 50.110 MHz (the DX calling frequency). He also reports that the OD5SIX beacon is up and running, also with 8 watts output. Finally, Rami invites anyone seriously interested in planning a VHF DXpedition to Lebanon to contact him via e-mail.

"I am a member of the PKRS Radio society and we can make an excellent team for this activity," says Rami. "Just inform me a few months before and I can give you all information about that in Lebanon; if authorization is not available we can operate with our Radio-club callsign, OD5RAK, without any problem."

Rami's e-mail address is: <od5sb@inco-tr.com.lb>.

• Ezzat, SU1ER, who recently received permission from Egyptian authorities to operate on 6 meters, says he hasn't been too active and that his 10-watt transmitter isn't reaching the DX stations during openings. Ezzat also says he's continuing to fight to get 6-meter operation OKd for all hams in Egypt, not just him. Finally, wearing his hat as President of the Egyptian Radio Amateurs Assembly, Ezzat expressed the organization's "deepest sorrow" over the terrorist attack last year at Luxor. He says the terrorists are not representative of Islam or any religion and hopes that this will not "cause the world to judge the many by the maniacal acts of the few."

## Europe

Moving to Europe, Tom Babut, SP5XMU, reports that the "First Polish 50 MHz Pages" on the World Wide Web have been updated with contest info, Polish awards, an expedition page and more photos. The URL is: <http://www.it.pw.edu.pl/~babut>.

## Australia/New Zealand

Finally, there were reports in late November and early December of extremely good 6-meter openings in Australia and New Zealand, prompting some operators there to wonder if they're seeing the first signs of 6-meter $F_2$ propagation in the new sunspot cycle. Since December is the peak of the sporadic-*E* season in the southern hemisphere, that probably won't be clear for quite a while, until it's known whether these openings were isolated or if they marked the start of a trend. At the same time, there was quite a bit of excellent TEP (Trans-Equatorial Propagation) reported by stations in the southern U.S. and the Caribbean.

*"The VX-1R is smaller than most pagers!"*

*"VHF, UHF, AM, FM, Air Band, Police, Fire–TV" too? Wow"*

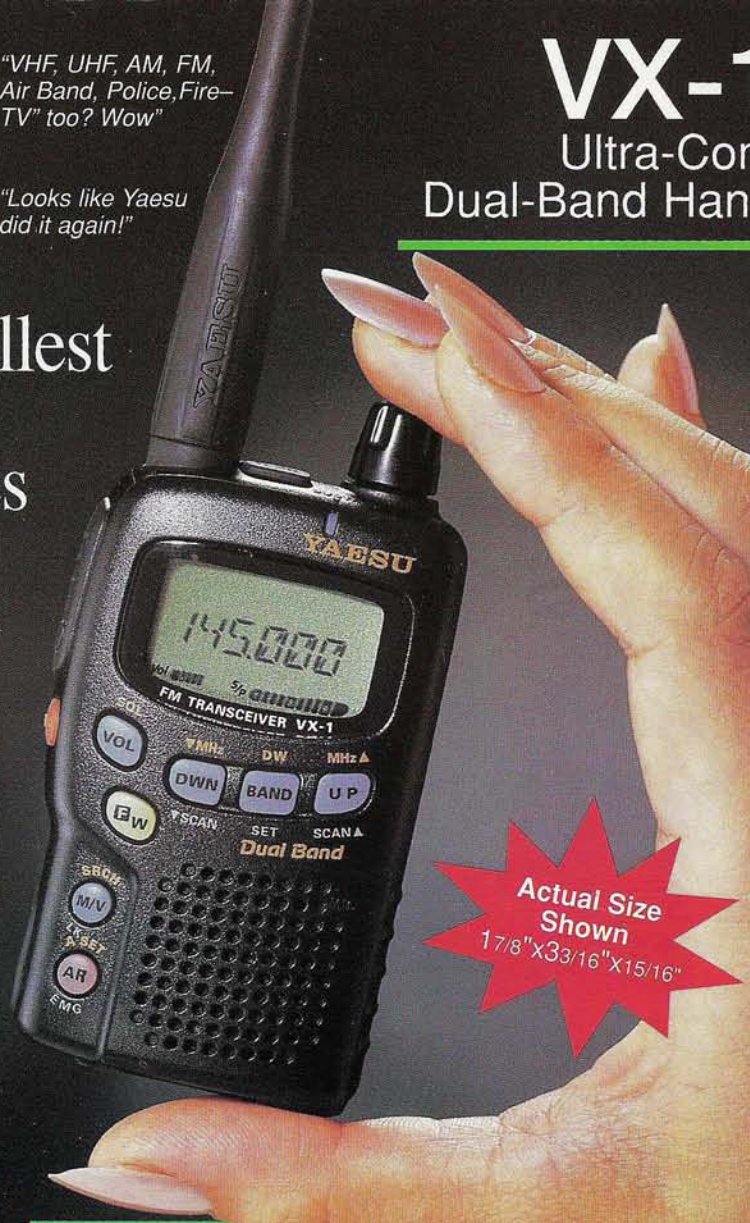
*"Over 19 hours* of use from the rechargable lithium ion battery!"*

*"Looks like Yaesu did it again!"*

# VX-1R
## Ultra-Compact Dual-Band Handheld

# The world's smallest HT with all the high-tech features you'd want in the world!

The ultra-compact size of the VX-1R Dual-Band is the first thing you notice as you cradle it in your palm. But the high-tech features make this radio one you must have now! Simple combinations, using seven buttons and one knob, control this marvel of engineering. One soft key touch, and wide receive VHF/ UHF--76~999 MHz RX (except cellular);144~148, 430~450 MHz TX, or AM/FM Broadcast, Aircraft, Police, Fire--even TV, spring to life! Touch again for Yaesu-exclusives, SmartSearch™ and ARTS™, or Priority Channel Alarm. Built-in CTCSS and DCS Encode/Decode for 2m/440 amateur bands, CTCSS/DCS Tone Search, and Dual Watch, are included along with 291 Memory Channels in 9 banks with 500 mW power output. Backlit LCD Display shows 6-character alphanumeric capability; backlit keypad makes operation easy in dim light. And, although the VX-1R is the world's smallest dual-band HT, you get over 19 hours* of use with just a 1 hour recharge from its long-lasting lithium ion battery! Big features, small size--the most satisfying combination in the world!




## Features

- Frequency Coverage Wide Multi-Band Receive RX: 76~999 MHz** TX:144~148, 430~450 MHz
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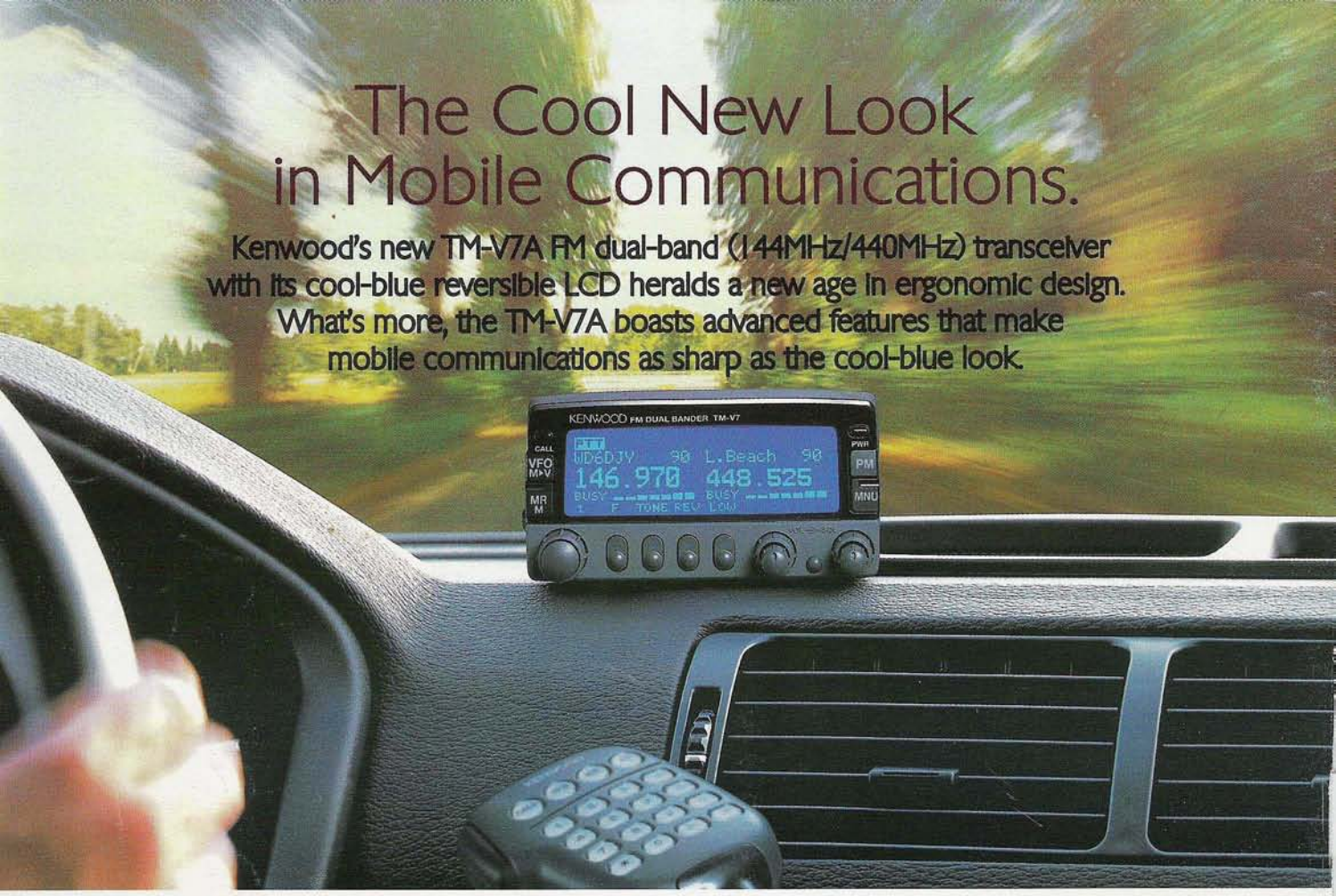
# The Cool New Look in Mobile Communications.

**Kenwood's new TM-V7A FM dual-band (144MHz/440MHz) transceiver with its cool-blue reversible LCD heralds a new age in ergonomic design. What's more, the TM-V7A boasts advanced features that make mobile communications as sharp as the cool-blue look.**




## TM-V7A Dual Band Transceiver

If the TM-V7A could do any more for you as a mobile radio, it would be holding a conversation with you. From the **blue positive/negative display modes** that optimize lighting conditions, to the multi-dimensional **Five-in-one programmable memory system** that stores five different operating profiles, the TM-V7A incorporates a comprehensive intelligence that will bring you an entirely new mobile operating experience.

A world first **blue LCD front panel** utilizes a dot-matrix format for crisp, high-resolution information display in either positive (white background/blue characters) or negative (blue background/white characters) modes to suit ambient lighting conditions.

The 'Five-in-one' user interface memory system allows you to configure five unique 'personalities' into the TM-V7A to suit various operating requirements, and access them at the push of a button. Each 'personality' program includes positive/negative display mode, dimmer level, frequency range and memory mode– great for families who use the same radio.

This user interface provides access to a set of features with extraordinary range and depth. You have up to **280 multi-function memory positions** that each store TX/RX frequencies, frequency step, and DTSS (Dual-Tone Squelch System) or CTCSS (Continuous Tone Coded Squelch System) tone frequency. If you use the **Memory Name function** to store each memory with a full alphanumeric identifier, there are up to 180 channels available. You can receive two frequencies simultaneously on the same band (VxV or UxU) or split across both bands, and cruise the frequencies with a powerful new scanning system that provides a **visual graph** of the frequency band activity. The **Auto-simplex checker** (ASC) function can also automatically sense if you can switch from a repeater to simplex operation.

All of these advanced features are combined with Kenwood's unmatched **AIP (Advanced Intercept Point)** circuitry for excellent selectivity and sensitivity. The **mini-DIN plug** for 1200/9600 bps data transmission will allow you to operate voice and data at the same time, a Kenwood exclusive. The compact, **quick-release front panel** for remote positioning and **commercial-grade design with heavy duty heatsink and rugged construction** make the TM-V7A the ultimate choice for mobile communication.

- **Full band scan, program band scan, memory scan with channel lock-out, MHz scan and call scan with TO (time operated) or CO (carrier operated) resume modes**
- **Automatic band change**
- **Selectable frequency step (5, 6.25, 10, 12.5, 15, 20, 25 or 50 kHz)**
- **Wireless remote control function**
- **Voice synthesizer (requires VS-3 option)**
- **Separate speaker terminals for each band**
- **Supplied MC53DM multi-function backlit microphone with DTMF**
- **Cross band repeater function**
- **Guide functions**
- **Built-in duplexer**
- **Built-in CTCSS encode and decode**
- **CTCSS tone scan**
- **APRS™ ready**
- **10 DTMF memory (16 digits)**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