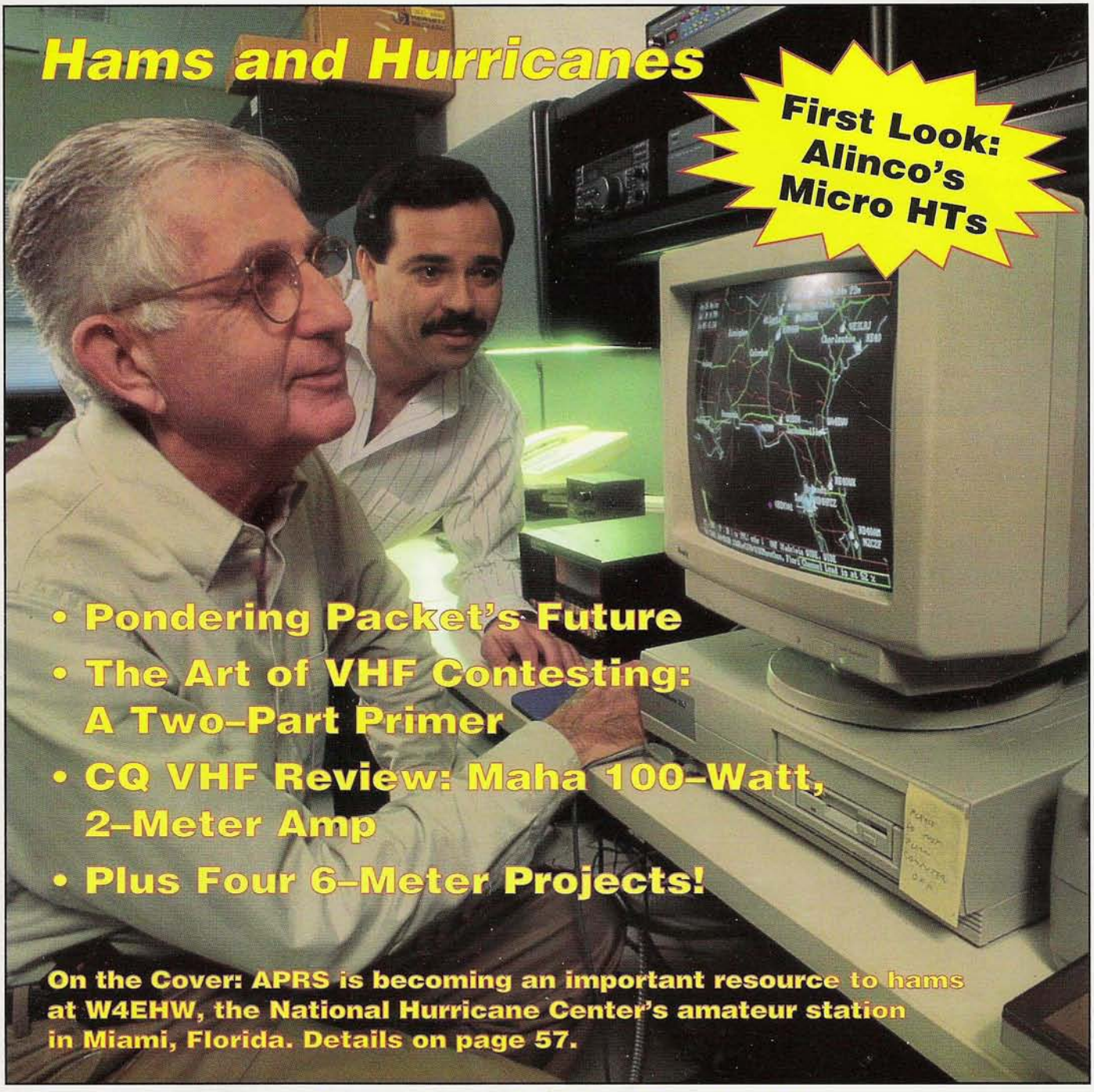
ICD 08237

# CQ VHF

## Ham Radio Above 50 MHz

September 1997



## Hams and Hurricanes

**First Look: Alinco's Micro HTs**

- Pondering Packet's Future
- The Art of VHF Contesting: A Two-Part Primer
- CQ VHF Review: Maha 100-Watt, 2-Meter Amp
- Plus Four 6-Meter Projects!

**On the Cover: APRS is becoming an important resource to hams at W4EHW, the National Hurricane Center's amateur station in Miami, Florida. Details on page 57.**

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■ Repeaters & FM ■ Packet Radio ■ Amateur Satellites ■ Amateur Television ■ VHF/UHF Weak-Signal ■ Plus...Reviews, Upgrade Tips, Product News, VHF Basics, and much more!

# Keep On Movin' with STANDARD's Mobiles

## 3 Bands...2, 70 cm, & 6 Meters! C5900DA! One compact package!

## C1208DA Twin-Band has everything in the Speaker/Mic... and delivers 50 watts, too!

### C5900DA FEATURES...

Tested tough against intermod with Double Balanced Mixer (DBM) and Tracking Front-End
DTMF remote control with HT
Cross-band repeat, 6M, 2M and 70cm with CTCSS encode/decode
Full Duplex cross-band operation with CTCSS encode/decode
7 priority hyper frequencies
1200-9600 packet interface
Antenna Triplexer Built-in one antenna for all bands
Dual-frequency display; left side 6m, 2m and 70cm, right side 2m and 70cm
Frequency Receive Range:
Left band 44.000 - 99.995 MHz
100.000 - 199.000 MHz
240.000 - 530.000 MHz
Right band 100.000 - 200.000 MHz
260.000 - 510.000 MHz
550.000 -1020.000 MHz*
(both including AM aircraft)
45 Watts 6M, 50 Watts 2M and 35 Watts 70cm (3W Low, 10W Medium selectable) transmit ham-bands
*cellular blocked on 800 MHz band
Size: 5.51"W 1.57"H 6.81"D
Weight=2.65 lbs.

### MEMORIES...

- 80 memories (each side); stores frequency, offsets, CTCSS tones and much more
- Expandable 200 memories each side with optional, CMU161
- Frequency steps, 5, 6.25, 10, 12 .5, 15, 20, 25, 30, 50 and 100 kHz.
- Paging\Coded squelch
- DTMF autopatch dialing, 12 memories, 6 per side, 15 digits
- Eight kinds of scan: 1 MHz, entire band, program, memory, block memory, program memory, memory scan memory and tone

### DISPLAY...

- Snap-on front display or remote the radio in the trunk or under the front seat
- Back-lit Keypad and Display
- MY key, store favorite function
- TX Time-Out-Timer 3, 5, 15 mins
- Auto power-off 3, 6, 9 hrs
- Auto mute opposite band -20dB
- Beep-tone off, low or high
- Cooling fan built-in.

Mobile bracket and power cord (2M) included

MARS and CAP modification available; permit required

### C1208DA TWIN-BAND MOBILE FEATURES...

A full featured 2-meter rig that fits anywhere, yet puts out a full 50 watts as well - that's Standards C1208DA!

With all controls and the large liquid crystal display in the speaker/mic, this rig can mount anywhere - no more compact car woes! The rig's under the seat, behind the dash, or in the trunk (with optional extension cable) - all you need is in your hand. All this, plus it's packet ready (up to 9600 baud)!

Frequency range:
Receives 110-199.995 MHz and 250-519.995 MHz plus 800* MHz (including AM aircraft) .
50 Watts, 10W and 3W selectable
Built in Antenna Duplexer for 450 MHz receive
*Cellular blocked on 800 MHz band

### MEMORIES...

- 100; stores frequency, offsets and CTCSS tones.
- CTCSS Encode/Decode standard.
- Frequency steps, 5, 10, 12.5, 15, 20, 25, 50 and 100 Khz.
- Paging/Coded squelch.
- DTMF autopatch dialing, 10 memories, 15 digits.
- Six kinds of scan, including priority and CTCSS.

### DISPLAY...

- Back-lit Keypad and Display
- Auto mute: four settings (-10, -20, -30 and off)
- Semi Duplex cross-band operation with CTCSS tones
- Cooling fan built-in

Size: 5.51"W 1.18"H 5.79"D
Weight 1.65 lbs..

Mobile bracket and power cord (3m) included.

*For more information on this and other STANDARD products, please contact your nearest STANDARD dealer. Specifications, price and features are subject to change without obligation or notice. Standard Amateur Radio Products, Inc. P.O. Box 48480, Niles, Illinois 60714. Tel (773) 763-0081 Fax (773) 763-3377*

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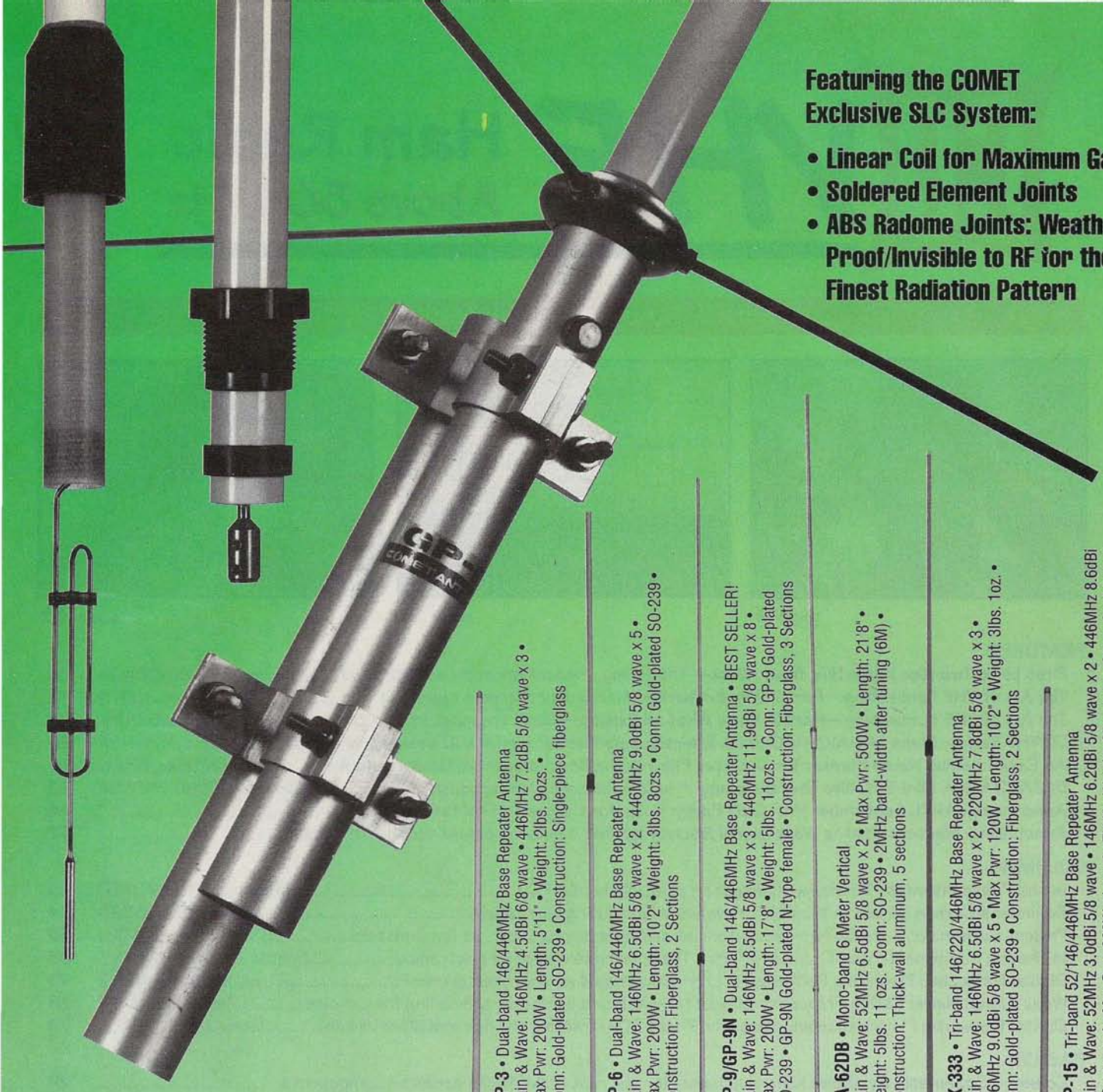

**Featuring the COMET Exclusive SLC System:**

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**GP-3** • Dual-band 146/446MHz Base Repeater Antenna
Gain & Wave: 146MHz 4.5dBi 6/8 wave • 446MHz 7.2dBi 5/8 wave x 3 •
Max Pwr: 200W • Length: 5'11" • Weight: 2lbs. 9ozs. •
Conn: Gold-plated SO-239 • Construction: Single-piece fiberglass

**GP-6** • Dual-band 146/446MHz Base Repeater Antenna
Gain & Wave: 146MHz 6.5dBi 5/8 wave x 2 • 446MHz 9.0dBi 5/8 wave x 5 •
Max Pwr: 200W • Length: 10'2" • Weight: 3lbs. 8ozs. • Conn: Gold-plated SO-239 •
Construction: Fiberglass, 2 Sections

**GP-9/GP-9N** • Dual-band 146/446MHz Base Repeater Antenna • BEST SELLER!
Gain & Wave: 146MHz 8.5dBi 5/8 wave x 3 • 446MHz 11.9dBi 5/8 wave x 8 •
Max Pwr: 200W • Length: 17'8" • Weight: 5lbs. 11ozs. • Conn: GP-9 Gold-plated
SO-239 • GP-9N Gold-plated N-type female • Construction: Fiberglass, 3 Sections

**CA-62DB** • Mono-band 6 Meter Vertical
Gain & Wave: 52MHz 6.5dBi 5/8 wave x 2 • Max Pwr: 500W • Length: 21'8" •
Weight: 5lbs. 11 ozs. • Conn: SO-239 • 2MHz band-width after tuning (6M) •
Construction: Thick-wall aluminum, 5 sections

**CX-333** • Tri-band 146/220/446MHz Base Repeater Antenna
Gain & Wave: 146MHz 6.5dBi 5/8 wave x 2 • 220MHz 7.8dBi 5/8 wave x 3 •
446MHz 9.0dBi 5/8 wave x 5 • Max Pwr: 120W • Length: 10'2" • Weight: 3lbs. 1oz. •
Conn: Gold-plated SO-239 • Construction: Fiberglass, 2 Sections

**GP-15** • Tri-band 52/146/446MHz Base Repeater Antenna
Gain & Wave: 52MHz 3.0dBi 5/8 wave • 146MHz 6.2dBi 5/8 wave x 2 • 446MHz 8.6dBi
5/8 wave x 4 • Max Pwr: 300W • Length: 7'11" • Weight: 3lbs. 1oz. • Conn: Gold-plated
SO-239 • 2MHz band-width after tuning (6M) • Construction: Single-piece fiberglass

**COMET** has an extensive line of Mono-Band/Dual-Band/Tri-Band Antennas for Base Station and Repeater use.

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## FEATURES



## COLUMNS



## BASICS



## DEPARTMENTS



Next Month: "Are You Covered?" by Brad Pioveson, W9FX

# WHAT'S NEW AND EXCITING FROM AMATEUR RADIO'S VALUE LEADER?

*Great new radios that are fun, easy to operate and very affordable!*

## NEW DJ-S11T 2 Meter Pocket Radio

**It's the one you asked for!** Full 2 Meter coverage (144 ~ 148 MHz), 21 memories, CTCSS encode, self-storing telescoping antenna, accepts speaker mic and outside power, runs on 3 AA batteries, even has MARS/CAP capability. Get all this and more at a price under $150!!

## DJ-S41T 70 cm Pocket Radio

Already a "best seller," the DJ-S41T covers 425 ~ 450 MHz, has 21 memories, CTCSS encode, self-storing pivot antenna, accepts a wide range of accessories. Perfect for use with repeaters, simplex or cross band links. At under $150, every ham in the family can own one!

## HF+6 Meter DX-70 TH and DX-70T

Choose your preference in output power on 6 meters. The DX-70TH transmits up to 100 watts on all Amateur Bands, 160 ~ 6 Meters; the economical DX-70T is 100 watts on HF, 10 watts out on 6. With either radio you get General Coverage Receiver (150 KHz ~ 30 MHz and 50 ~ 54 MHz), face plate that can be remote mounted, built in narrow filter and speech processor, full QSK, semi or automatic break-in, multi-function control and more.

## EDX-2 Automatic Antenna Tuner

Connects directly to any Alinco DX-70 model, quickly tunes a wire or mobile whip antenna at the touch of a button. Perfect for mobile, portable, base or marine HF operations. Matches 160 ~ 10 meters (minimum 40 foot wire antenna required for 160 meters, 9.8 foot minimum for others.) Can be mounted outdoors.

### Alinco World Time Alarm Clock

By popular demand, now available at your dealer for only $39.95. It's great for the shack, camping, travel, Field Day or DX-peditions!

## DR-605T(Q) 2 Meter + 70 cm Mobile/Base

The reviews are in and the DR-605T is a winner! Work repeaters, simplex, cross-band, even satellites. 102 memories, CTCSS, built-in antenna duplexer, MARS/CAP capability, clone function, 9600 packet port and more at a price so low, it's hard to believe.

## DR-140T(Q) 2 Meter Mobile/Base

A new full-featured radio with Alphanumeric display (up to 7 characters), 51 memory channels, aircraft (AM) plus extended VHF receive, CTCSS + European Tone Bursts, MARS/CAP capability, clean design, scanning and cloning functions, all at a very low Alinco price.

Prices mentioned are MSRP, dealer prices may vary. Permits required for MARS/CAP use. Performance specifications only apply to amateur bands. Specifications subject to change without notice or obligation.

CIRCLE 117 ON READER SERVICE CARD

**Simple ▪ Clean ▪ Dependable**

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**Ask your dealer about Alinco's 2-year extended warranty program**

# A Ham Radio Revolution

The complete integration of amateur radio and the personal computer may be ham radio's "revolution" for the 1990s—and it's here now.

Last year, during a talk at the Central States VHF Society conference in Minneapolis, I pointed out that the history of amateur radio has been shaped by some sort of revolutionary change about once each decade. As you'll see, there's been a combination of technical and political change that has brought our hobby to where it is today. Here's a quick thumbnail sketch:

• Pre-World War I—Ham operators discover the value of the "useless" bands below 200 meters.

• 1920s—After being shut down during the war, ham radio survives an effort by the military to maintain control of all radio communications; the development of vacuum tubes spurs revolutions in receiver design.

• 1930s—Spark gives way to narrow-band continuous wave (CW) transmission of Morse code; "phone" emerges; the Communications Act of 1934 establishes the FCC and forms the framework of U.S. communication law for the remainder of the century.

• 1940s—Ham radio is again shut down by war, and again it reemerges from the ashes after threats of a permanent shutdown. Hams serving in the military contribute greatly to advancing the art of radio communication.

• 1950s—AM phone eclipses code as the dominant form of ham radio communication; FCC creates Novice and Technician licenses to spur growth.

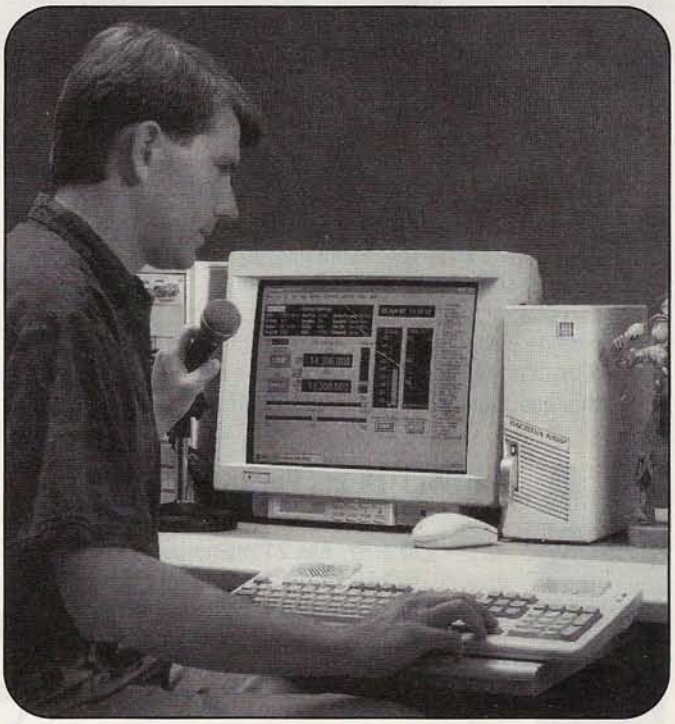
• 1960s—AM phone gives way to SSB; "incentive licensing" creates current licensing system of increased privileges tied to passing more difficult exams.

• 1970s—VHF enters the mainstream of ham radio on the surging popularity of FM and repeaters; transistors begin to replace tubes in ham equipment.

• 1980s—The shift to solid-state transceivers is complete; packet radio establishes personal computers as a means of making ham radio contacts. The FCC tries to spur growth through "novice enhancement," giving Novices HF phone privileges for the first time, and VHF phone privileges for the first time since the 1960s.

• 1990s—The FCC tries to spur growth (and succeeds) by dropping the code requirement for the Technician class license; as for technical revolutions, at this time last year, the only thing you could point to was digital signal processing (DSP), but that didn't change the way people operated. As of then, nothing had happened this decade to really change the way we "do" ham radio.

Well, fasten your seatbelts, folks, because I think our revolution for the '90s has finally arrived. DSP is a part of it, as are many other incremental changes we've been seeing around us and maybe not even noticing. Our technical revolution for this decade—to steal a buzzword from the computer industry—is something called *convergence*.



## Convergence

Convergence is defined as the act of "coming together and uniting in a common interest or focus." And that's exactly what's happening all around us, especially in the world of telecommunication.

A generation ago, every form of communication had its own discrete tools and equipment. If you wanted to write a letter, you used a typewriter (or a pen!). If you wanted to send that letter, you used an envelope and a stamp. No e-mail, no faxes, even overnight delivery was a rarity. Telephone lines, by and large, were used for one purpose—to carry telephone calls. And

By Rich Moseson, W2VU, Editor

CQ VHF Ham Radio Above 50 MHz



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Hicksville, NY 11801-2953 USA.

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***Boost your 2 Meter handheld or multimode (like ICOM 706) to a super powerful 100 watts . . . All modes: FM, SSB, CW . . . 15 dB GaAsFET receive preamp . . . Reverse polarity protection . . . Silent cooling fan . . . Free HT-to-amp coax and mobile bracket***

***In Stock at ham dealers everywhere!***

***Call your dealer for your best price***

**$199**

B-310-G Suggested Retail

NEW!


| *Power Curve* -- typical B-310-G output power | | | | | | | |
|---|---|---|---|---|---|---|---|
| *Watts Out* | *25* | *50* | *75* | *95* | *100* | *100+* | *100+* |
| *Watts In* | *¼* | *½* | *1* | *2* | *4* | *6* | *8* |

***For an incredibly low $199, you can boost your 2 Meter handheld to a super powerful 100 watt mobile or base!***

**Turn** "You're breaking up . . . Can't copy" into "Solid Copy . . . Go ahead."

**Talk** further . . . Reach distant repeaters . . . Log onto faraway packet bulletin boards.

**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.

### *Fully Protected*

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

### *Compact but Powerful*

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

**The** results? An *ultra-compact* 4¾x1¾x7¾ inch 2½ pound amplifier that delivers a *super powerful* 100 watts.

### *Free Accessories*

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

### *Plus more . . .*

**Automatic** RF sense Transmit/Receive switch. Remote keying jack. LEDs monitc "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.

# Dual Band 144/440 MHz Amp


**$159.95** BD-35 Suggested Retail

| *Power Curve* -- typical BD-35 output power | | | | | | | |
|---|---|---|---|---|---|---|---|
| *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
- ***First-class strip-line techniques*** -- superb RF performance and reliability
- ***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
- ***"On Air" LEDs*** -- for each band
- ***Free mobile mounting bracket***
- ***Free 3 foot handheld-to-BD-35 coax cable***
- ***Small size:*** just 5x1¾x5 inches
- ***Full one year MIRAGE warranty***
- ***Legendary MIRAGE ruggedness***

***Call your dealer today for your best price!***

# 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


| *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!*

**Heavy-duty** heatsink spans entire length of cabinet -- prevents overheating. Power transistors protected by MIRAGE's *Therm-O-Guard™*.

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

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

**RC-1, $45,** Remote Control. On/Off, pre-amp On/Off, selects SSB/FM. With 18-ft cable.

**Draws** 17-22 amps at 13.8 VDC. 12x3x5½ in.

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

**B-2516-G, $299.** For 10 to 35 watt mobile or base stations. 160 watts out for 25 watts in.

**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.

**B-215-G, $379.** MIRAGE's most popular *handheld* amp. 150 watts out/2 watts in; 160 watts out/3½ W in. For 0.25 to 5 watt handhelds.



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***http://www.mirageamp.com***

***Technical: 601-323-8287 Fax: 601-323-6551***

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the telephones all had wires and were used for just one thing—talking with other people. No data, no faxes, just phone calls. Likewise, there was just one thing you could do with a television set: watch whatever the local stations in your area chose to put on the air. If you wanted to see a movie, you had to go to the theater. Finally, if you wanted to talk to someone on the radio, you had to use...a radio—a box of electronics dedicated to transmitting and receiving radio signals. Of course, that hasn't changed...or has it?

Today, everything's all mixed up. Your TV set can still tune in whatever the local stations choose to put on the air, but most of us also have access to dozens of additional channels on cable or satellite; plus, we can watch movies we rent at the video store, play video games, and even (in some places) surf the World Wide Web.

And, yes, you can still use your telephone line to make a phone call...if it's not tied up sending or receiving a fax, checking your e-mail, or exploring the Internet. The telephones themselves have been unplugged. Between cellphones and cordless phones, the number of people using two-way radio (most without realizing it) has multiplied exponentially.

But what about "real" two-way radios? They're still pretty much the same as they were a generation ago, right? I mean, they're smaller, they don't have tubes, and you can plug in a computer along with a microphone or code key, but you still need a discrete box with dials and buttons called a radio, right? How can I say this gently? I guess I can't. No. Wrong. Not any more.

## The Radio IN the Computer

Ham radio's revolution for the '90s was unveiled this past May at the Dayton Hamvention. Kachina Communications, a newcomer to the amateur market, introduced what it calls a "computer-controlled HF transceiver." This is somewhat of an understatement, because, if you get one of these radios and look for the box with the dials and switches and frequency readout(s), you won't find it. There isn't one. *There is no discrete radio.* The computer is an integral part of this transceiver, and vice versa. There is a box with RF circuitry, of course, but it has no dials or meters or displays, just a few sockets for plugging in the antenna, computer, etc. All tuning and other adjustments are done from your computer screen, and the mic, key, and speaker all connect to a control head that mounts in one of your computer's empty drive bays. Software is included for control, logging, etc., and it even has a built-in display showing signals on your chosen band—with the ability to QSY (change frequency) by pointing to a spot on the band and clicking your mouse.

I haven't had the opportunity to actually operate one of these radios, but from the literature, it appears to be a full-featured HF rig in about the same price "ballpark" as more traditional radios (list price $1,899).[1] But frankly, what's important here is the concept—the complete integration of PC and ham rig—and the fact that the PC is an integral part of this radio, not just an add-on for operator convenience. The importance of the concept is also why I'm writing about an HF radio in a VHF magazine—after all, it shouldn't take much more than a swap of a few boards to turn this (or a successor) into a VHF rig as well.

## What's Next?

Beyond the physical convergence of computer and radio, we can look toward the ultimate in DSP—totally digital audio—and "smart radios" that use frequency-agile spread spectrum techniques (see two articles in last month's issue on the topic) to automatically select the best frequencies and power levels for a given contact; or a radio that can let you operate on one band while simultaneously monitoring beacons on another band to alert you to openings. The possibilities are endless. But we'll leave the specifics to the revolution of another decade.

## Speaking of Revolutions...

This month's "Op-Ed" column features a call by TAPR (Tucson Amateur Packet Radio) President Greg Jones, WD5IVD, to completely reinvent amateur digital communications, essentially building a whole new, faster, more capable packet network without worrying about compatibility with current users. Kind of a *Field of Dreams* philosophy: "If we build it, they will come." Meanwhile, "Digital Data Link" columnist Don Rotolo, N2IRZ, takes a different perspective—agreeing that the status quo won't last much longer, but arguing to find unique needs that packet can fill, then designing technology to meet those needs, rather than the other way around. Both columns are interesting and worthwhile reading.

This issue also offers up some seasonal articles: a look at ham radio in hurricanes in "Beginner's Corner" and "On the Cover," plus a couple of contesting articles keyed to this month's ARRL September VHF QSO Party.

## And Finally...

There's an update to last month's editorial: Just a week after we sent the August issue off to the printer, *Parade* magazine featured an article on the risks we face in everyday life.[2] High on its list of things that people fear but which pose little or no real danger: RF and magnetic fields from power lines and radio transmitters. According to the article, 40% of Americans "are worried about getting cancer from electrical power lines or cellular phones." But then it quotes the director of Harvard University's Center for Risk Analysis as saying these fears are "absolutely not" realistic and that "their concerns are unproven."

Nonetheless, the depth of public concern over potential, if unproven, danger from RF fields reinforces the need discussed here last month to learn the basics and be able to explain the facts to our neighbors and friends.

73 de W2VU

Notes:

1. For more information on the Kachina 505DP transceiver, contact your dealer or Kachina Communications, Inc., P.O. Box 1949, Cottonwood, AZ 86326; Phone: (520) 634-7828; Fax: (520) 634-8053; Internet: <http://www.kachina-az.com>.

2. "What's *Really* Risky," by Michael Ryan, *Parade* magazine, June 15, 1997, p.12.

### 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.

# VHF News

## Vanity Call Gate 3 Now Open; Cost Rising

The so-called "Gate 3" for vanity callsign availability—making Advanced class hams eligible to apply—opened on August 6. The rules limit you to callsigns available to your license class, so Advanced Class applicants will not be able to request 1 x 2 or 2 x 1 calls reserved for Extra class licensees (unless you're applying for a 1 x 2 call that you previously held).

The FCC says it *plans* to open the remaining gate, allowing all hams to apply for vanity calls appropriate to their license class, before September 15. That's the date on which the fee for all vanity call applications rises from $30 to $50 (even if Gate 4 isn't open by then).

The FCC, in its annual fee review, decided to round off all fees to the nearest $5. And since the vanity callsign fee is actually $3/year (over a 10-year license span), the commission decided to "round up" that figure to $5/year (or $50 over a 10-year period). It turned down an ARRL petition to delay the increase until all gates were open and all amateurs had had an ample opportunity to apply at the $30 rate. (*This logic of this increase makes sense* only *to a Washington bureaucrat. To the rest of us, the fee is $30, not $3, and $30 is* already *rounded off to the nearest $5. But what do we know? We're only citizens.—ed.*)

## President Signs Volunteer Protection Act

Hams who volunteer their time to government agencies and nonprofit organizations are now protected from most lawsuits arising out of their volunteer activities, under provisions of the *Volunteer Protection Act of 1997*, passed by Congress in the spring and signed into law by President Clinton on June 19. The new law, Public Law 105-19, takes effect on September 16.

U.S. Senator Paul Coverdell (R-GA), who sponsored the measure in the Senate, says the new law will shield volunteers from unreasonable and costly lawsuits, noting that, "The Volunteer Protection Act will end the frivolous lawsuits that have discouraged thousands of generous citizens from donating their time and talents to those in need....These volunteers should not have to fear the financial destruction that often results from frivolous lawsuits."

With certain exceptions, the law exempts from liability any volunteer of a non-profit organization or government entity who, in the course of his or her authorized activities, causes unintentional harm through an "honest mistake" or act of omission. The full text of the law is more complex, and we recommend that you get a copy if you're active in volunteer activities.

An online copy of the text may be downloaded from the "Amateur Radio Newsline" Web site, <http://www.arnewsline.org> (*we'll try to add a link from our Web site as well—ed.*). The full text should also be available at most public libraries. Just take the public law number (PL 105-19) and the date it was signed, and ask the reference librarian to help you find it.

## Good News, Bad News, on Six

Radio amateurs in the Ukraine (UR) may now operate on 6 meters. According to a message from Alex, UR4LL, to several prominent European hams (reposted on various internet VHF reflectors), Ukranian amateurs were given access as of July 10 to a 200-kHz chunk of 6 meters, from 50.080 to 50.280 MHz, limited to 10 watts output on CW and SSB only, and only in areas where there is no broadcaster using TV channel 1 (48 to 54 MHz). Alex says he anticipates considerable 6-meter activity by UR hams in the near future.

On the bad news side, we have an *unconfirmed* report from Australia that hams in at least some areas of New Zealand have *lost* the bottom part of the 6-meter band. According to an internet posting, Trevor Benton, VK4AFL, in Australia, reported that "*Auckland (NZ) 6m operators were advised by letter 28-6-97 re loss of bottom part of band which has been sold to a television concern.*" No additional details or confirmation were available at press time.

## RS-10 May Be Permanently QRT

Last month, we reported that satellite controllers in Russia said the RS-10 satellite, which had mysteriously gone off the air in June, was being used for non-amateur experiments by its designer and would most likely be back on the air for its 10th anniversary in late July. That now appears unlikely.

According to a mid-July report from the AMSAT News Service, Leonid Labutin, UA3CR, says that RS-10 designer Alex Papkov now believes there is only a 1 to 2 percent possibility of bringing RS-10 back on the air. Papkov was waiting for the return of "one good expert" from his summer vacation. There was no indication of the nature of the problem with RS-10, which appeared to be operating flawlessly when it was removed from the air.

## Ham Radio Plays Major Role after Mir Accident

Once again, amateur radio has proven its value as a backup communications medium in times of need, this time from space. After a collision June 25 between the Russian Mir space station and an unmanned cargo vessel bringing new supplies to the station, U.S. Astronaut Mike Foale, KB5UAC (a Mir crew member), used the Mir ham station for regular contacts with other ham astronauts at W5RRR, the club station at the Johnson Space Center in Houston, Texas, and with MIREX (Mir Amateur Radio Experiment) volunteers Miles Mann, WF1F, and Dave Larsen, N6CO.

According to an ARRL bulletin quoting a packet message sent from Foale to Larsen, "...it was impossible to get any personal news of our well-being to our families" via official communication channels after the accident. "Ham radio allowed us to fill that gap." Foale also expressed gratitude for himself and the entire Mir crew "for all the good wishes and interest all over the world in our troubles and tribulations."

Amateur radio also provided several opportunities for direct contacts between crew members on Mir and the astronauts on the Shuttle Columbia, which was in

Compiled by the CQ VHF Staff

orbit during July with the SAREX (Shuttle Amateur Radio EXperiment) station aboard.

## Mir Frequency Flip-Flop

Just before we went to press last month, we learned that Mir's 2-meter ham station was making its third frequency change this year, to 145.985 MHz. This was due to complaints from U.S. hams that the "split" operation on 145.200/145.800 was resulting in interference from repeaters with outputs in the vicinity of 145.200. But the new frequency instantly brought another round of complaints from hams in Germany, who found that .985 was interfering with other satellite downlinks. A report on "Newsline" even quoted the Germans as calling the switch "an unfriendly act" by the American MIREX coordinators.

The compromise, for the moment, seems to be that Mir will operate on 145.985 while it's over the U.S., and QSY to the 145.200/.800 split everywhere else. Chances are we haven't seen the final chapter in *The Saga of Mir's Meandering VFO*.

## Ham Antenna Maker Credited In Crucial Mir Contacts

Amateur radio antenna maker M$^2$ Antenna Systems was credited with providing a crucial link between the crippled Mir space station and officials on the ground after February's fire aboard the station. In a July 17 *Fresno Bee* newspaper article entitled, "Fresno, We Have a Problem," the *Bee* said that after February's fire, communications were "virtually limited to waist-strapped hand radios" worn by crew members—and that only the M$^2$ antenna at NASA's Dryden Flight Research Center kept everyone in contact. It quoted a NASA official as saying "We wouldn't be talking to the Mir without [Mike Staal]," the Fresno-based company's co-owner and chief designer.

Staal, who is K6MYC, credited his interest in amateur radio with getting him started in designing antennas (including one made from beer cans!). The article in the widely-read California daily also noted that NASA is becoming more reliant on small companies, such as M$^2$, which are often able to produce exactly what's needed more quickly and much less expensively than many larger companies. Staal says the situation on Mir in midsummer was keeping him in almost daily contact with NASA officials.

## Cosmonaut Gets U.S. Ham License

Cosmonaut Vladimir Titov is now KD5AOS. According to the AMSAT News Service, Titov—who's scheduled to fly this month aboard a U.S. shuttle on a Mir docking mission—passed his U.S. ham license exam in May at a test session in Texas. Titov reportedly told examiners he wanted a U.S. license so he'd be able to operate while aboard the shuttle.

## Space Symposium Set for Toronto

The 1997 AMSAT-NA annual meeting and space symposium will be held in Toronto, Ontario, from October 17 to 19, at the Airport Delta Hotel. AMSAT-NA is the ham radio satellite organization for North America and the primary force behind the amateur satellite program worldwide. According to the AMSAT News Service, there will be presentations on all aspects of amateur satellite design, construction and operation.

## REAL DX on Microwaves

If the Mars Pathfinder is still transmitting by the time you receive this, you'll be able to listen in. According to Phil Karn, KA9Q, in the *ARRL Letter*, the ship's downlink frequency is 8.420 GHz. For more information, check out Phil's "Mars Pathfinder X-Band Downlink Link Budget" page on the Web at <http://people.qualcomm.com/karn/mpf_budget.html>. (*For more on listening for other signals from outer space, watch for the article, "CQ Universe—Is Anyone Out There?" by Denis Jakac, VE3ZXN, in next month's* CQ VHF. *—ed.*)

## Repeater at 100,000 Feet?

If you were anywhere in southwestern Canada or the Northwestern U.S. on August 9—and if everything went according to plan—you might have heard some real good DX on 146.52! The Radio Amateurs of Canada (RAC) reports that the North Okanagan Radio Amateur Club of Vernon, British Columbia, planned to launch a balloon carrying a crossband repeater (446.000 in/146.520 out) from the annual Sky High Hamfest on Silver Star Mt. Similar balloons launched by the Canadian government are reported to have floated as high as 100,000 feet.

If you heard the balloon, contact Vernon Balloon Experiment Coordinators VE7OHM or VE7TFD via e-mail to gwmulder@junction.net or michaeli@junction.net, respectively.

## Industry News

The amateur radio industry continues to retrench and reorganize as the low-sunspot sales doldrums continue. Amateur Electronics Supply (AES) has closed its Clearwater, Florida, store, and is concentrating its Florida retail operations in Orlando.

Advanced Electronic Applications, Inc. (AEA), which closed its doors earlier this year, has been bought out by two other electronics firms. The AEA digital line was purchased by Timewave, Inc., which will continue using the AEA name on those products until 1999; and the AEA name and its antenna products were folded into a new "AEA division" of Tempo Research Corporation. Tempo manufactures and sells electronic test equipment. Former AEA President Mike Lamb, N7ML, is now working for Tempo as the AEA division's Director of Marketing.

In other industry news, *CyberHam* magazine has suspended publication after less than a year in print. *CyberHam* was a bi-monthly magazine aimed at radio amateurs who are also heavily involved in computers. *The ARRL Letter* reports that co-publisher Gene Harlan, WB9MMM, said neither subscriptions nor advertising were strong enough to support continued publication. The "Ham Radio & More" talk show, hosted by Len Winkler, KB7LPW, has been dropped by its originating station, KFNN in Phoenix, for lack of advertiser support. The show will continue on shortwave only, on WWCR (5.070 MHz, live Sundays at 2200 UTC, rebroadcast Sundays at 0500 UTC and Tuesdays at 0800 UTC on 3.210 MHz).

Finally, in the good news file, ADI/Premier Communications has announced that Jim Newcomb, N7MBA, has joined the firm as Vice President of Sales. Jim has 15 years of experience in the amateur industry. He was previously ICOM America's National Sales Manager. ■

# Product Update

## Now You're Talking!—Updated ARRL License Manual

The American Radio Relay League has announced the third edition of *Now You're Talking!* This new Technician and Novice exam study guide has been completely revised and updated to match the newest Novice (Element 2) and Technician (Element 3A) question pools, released by the Volunteer-Examiner Coordinators' Question Pool Committee in December 1996. The questions in this new question pool began being used on Technician and Novice license exams on July 1, 1997, and are expected to be used until June 30, 2001.

The FCC has added five additional questions about RF radiation safety to each of the Novice and Technician written exams. This edition, therefore, also includes a thorough explanation of the RF safety topic written by experts on the ARRL's RF Safety Committee, as well as detailed explanations and examples for the new regulations.

Also offered in the book are operating hints to help students through those frightful moments during their first contacts on the popular modes, including FM repeaters and packet radio as well as Morse code (CW) and single-sided (SSB) phone. Plus, an entire chapter dedicated to the finer points of selecting equipment for a first amateur radio station.

*Now You're Talking!* Third Edition is 448 pages in an 8 3/8 x 10 7/8-inch format, with a lay-flat binding for ease of use, and retails for $19.00. It's available from most dealers or from ARRL, 225 Main Street, Newington, CT 06111-1494; Phone: (888) 277-5289; Fax: (860) 594-0303; e-mail <pubsales@arrl.org>; WWW: <http://www.arrl.org>.

## MFJ-281 ClearTone™ Communication Speaker

MFJ's ClearTone™ Communications Speaker was designed to improve speech intelligibility in the frequency range of 600 to 4000 Hz while reducing noise, static, and hum. It will help improve copy of AM, FM, SSB, and CW signals.

A top-grade, three-inch Mylar cone speaker is mounted in a speaker baffle; a fine mesh metal grille allows sound to radiate without being muffled. A versatile swivel mounting bracket lets you direct the sound where you want it.

The MFJ-281 will handle 8 watts, 8 ohms. It comes with a six-foot cord and 3.5-millimeter mono plug; its speaker measures just 3 3/4 x 3 x 2 1/4 inches. The MFJ-281 is covered by MFJ's "No Matter What" one-year unconditional warranty. List price is $9.95.


For the location of the dealer nearest you or to order, contact MFJ Enterprises, Inc., 300 Industrial Park Road, Starkville, MS 39759; Toll-free: (800) 647-1800; Fax: (601) 323-6551.

*Circle 100 on reader service card*

## Techtoyz® Micro DTMF Decoder

Optoelectronics, Inc. has announced Techtoyz®, its new line of test equipment housed in beeper-style cases with belt clips. The Micro DTMF Decoder is the first product to be released under the Techtoyz name with a Micro Counter and Micro RF Detector to follow this fall.

The Techtoyz Micro DTMF Decoder is ideal for portable, hands-free operation, providing up to 200 hours of performance from a single AA alkaline battery. With its built-in microphone, DTMF tones are automatically decoded from the signal source of tape recorders, receivers, two-way radios, or anything else where touch tone can be heard by the Micro DTMF Decoder. There is also a built-in audio input jack for direct connection to any receiver's speaker output.

The Micro DTMF Decoder can decode up to 12.5 characters per second while


displaying the characters on its 12-digit LCD display. All DTMF characters are automatically stored in a 2,000-character, non-volatile memory and can be recalled by pushing scroll buttons.

The Techtoyz Micro DTMF Decoder is currently available and retails for $89.00.

To order, call the Optoelectronics toll-free order line at (800) 327-5912; (954) 771-2050; Fax: (954) 771-2052.

*Circle 101 on reader service card*

## Repeater Maker plus Model RM-20

CES Wireless Technologies Corp. has developed a new, enhanced version of its Repeater Maker. The new device, called Repeater Maker *plus*, Model RM-20, allows users to make a repeater out of two transceivers or separate transmitter and receiver modules. The RM-20 provides a built-in, four-user CTCSS tone panel, supporting any four of 50 CTCSS tones as well as *cross-tone* encoding. Among its standard features are "Morse code"

CWID with programmable "send" states and an "auxiliary relay" for remote control. It's programmed using a DTMF telephone locally, or remotely "over the air." This unit accepts the optional CES Voice Delay module for customization of application timing.

The Repeater Maker *plus* Model RM-20 features compact size, rugged metal housing, and "plug and play" compatibility with the CES 4700VP telephone interconnect. List price for the Model RM-20 is $310.00 plus shipping. For more information, contact Scott Matics at (407) 679-9440 ext. 202.

*Circle 102 on reader service card*

## Elenco Electronics Frequency Counters

Elenco Electronics, Inc., has introduced two new handheld frequency counters, Models F-2800 and F-2850.

Both counters offer wide input ranges. The F-2800 displays frequencies from 1 MHz to 2.8 GHz, and the F-2850 range is 10 MHz to 2.8 GHz.

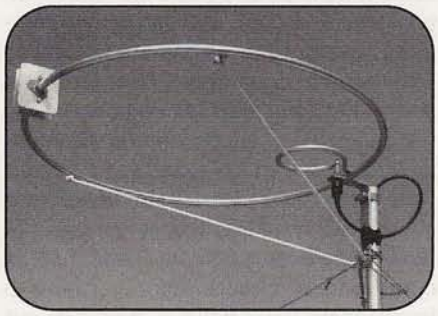
Each unit has a 250-MHz direct count range for high resolution. The F-2850 also reads period and has auto triggering. Both units have data hold and 16-segment signal strength bargraph. Many other features are included.

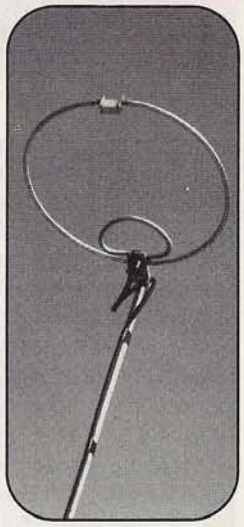
The F-2800 lists for $149.95; the F-2850 for $216.50 (both plus shipping). For complete specifications, contact Elenco Electronics, 150 W. Carpenter Avenue, Wheeling, IL 60090; Phone: (847) 541-3800; Fax: (847) 520-0085.

*Circle 103 on reader service card*

## KB6KQ Loop Antennas

KB6KQ Antennas is offering Halo-type antennas for 6 meters, 2 meters, 22 MHz, and 432 MHz, providing users with horizontal polarization, omnidirectionality, and small size (for example, the 6-meter version is 24 inches in diameter, and the 432 model is 3 1/2 inches). Single antennas have tested at 2.5 dBd and stacked pairs are running 4.5 dBd gain. And antenna applications include net, roundtable, mobile, and rover operation.





List price for the 6-meter version is $95.00; for the 2-meter, 222- and 432-MHz versions, list price is $50.00. A phasing harness, making it possible to stack two antennas is available for $40.00. (All prices postpaid.) For information, contact KB6KQ Antennas, Norm Pedersen, 70 Arrowhead Dr., Carson City, NV 89706; Phone: (702) 885-7885; Fax: (702) 841-1880; e-mail: <KB6KQNORM@aol.com>.

*Circle 104 on reader service card*

# 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.*

*Responses to Our Restructuring Proposals*

(*Editor's Note: In May, 1997,* CQ VHF, *we proposed several ideas for restructuring amateur licensing, among them, a requirement for operating a minimum number of hours with a "certified radio instructor" as a condition for upgrading, and creation of a "Basic Amateur Permit," which would allow teachers to run school ham stations under the general supervision of a licensed amateur, without having to be licensed themselves. The following letters are readers' responses to those proposals.*)

Dear *CQ VHF*:

I believe that Rich Moseson, W2VU, hit the nail on the head in the May 1997 "Line of Sight" ("License Restructuring—A CQ Proposal"). His pointing out the difference between "amateur radio" and "ham radio" is a key point in my opinion. We have entirely too many "amateur radio" operators and not enough "hams."

We have what appear to be larger and larger numbers of amateurs that either don't know or don't care about the FCC rules or even common courtesy. For example, I actually had a discussion with a Tech class who honestly believed that hams providing emergency communication was just an ego trip for them. He was very surprised when I referred him to Part 97.1(a) that not only was emergency communications one of the fundamental purposes of amateur radio, it was the first that the FCC lists. He had never read any of Part 97 other than the little excerpts following specific questions in the study guide that he bought at RadioShack.

To balance this part of the discussion, I will also point out the garbage on 75 meters (clearly in violation of Part 97) produced by Advanced and Extra class licensees who have been licensed for 30 or more years. Indeed, the head of the FCC's Dallas office compliance division recently pointed out at a local club meeting that the majority of major violations policed by the FCC are by Advanced and Extra class people.

Those who have been amateurs for some time need to be like the hams who preceded them and reach out to new amateurs and help them become "hams." They need to remember, however, that it wasn't that long ago that a number of old timers looked down on anyone who used anything but a straight key, and especially an electronic keyer. Likewise, we newer folks need to decide whether or not we want to become "hams," and if so, to *listen* to these Elmers. We can choose to ignore them but, I believe, it will be our loss (not theirs). 73,

Doug Page, KM5HW
McKinney, Texas

Dear *CQ VHF*:

I agree with the license restructuring plan in the May *CQ VHF*. Something that finally makes sense. Why are we the only country that I know of with six license classes? The first three of which are redundant! Why do the Tech Plus and Novice have the same HF privileges? No thought goes into any of this.

The obsession with upgrading is beyond me. Someone with six months in the hobby with an Extra class license. That may be impressive to some until you hear them on the air. Not a clue of how to operate, but they don't hesitate to bust my chops on something. Oh, I'm just a Tech Plus, but I do have WAS and over 100 countries on 10 meters!

I totally agree with you that big changes are needed or else this entire hobby will continue to mutate into some giant CB deal. Yes, I'm only Tech Plus with less than 10 years in the hobby, but I've worked in broadcasting for 21 years. Keep up the good work. 73.

Bill Prather, KC4KMG
Tryon, North Carolina

Dear *CQ VHF*:

I am fairly new at ham radio, so I can pass no judgment on what should be done. But I thought I should reply to the comment (May '97, page 82) on pilots and radios. I am a private pilot. I talk on the radio in the airplane and do not have to have a license; I was flying and talking on the radio before I could be a ham. What I would like to share with you is that a recent study of the pilots in this country (I take from memory the numbers but I hope you will get the point) have dropped in the last few years from 900,000 down to less than 600,000 the last time I saw the article. If you are interested in more hams this may not be a good choice to compare to.

(Name and address withheld)

Dear *CQ VHF*:

Just a quick note on your editorial.

The FCC no longer requires a Restricted Radio Operators Permit (RROP) for radio and television operating personnel. In fact, a licensed operator is not even required at all anymore. The RROP is for International Shortwave Broadcast, Marine, and Satellite services only.

I agree with most of your "proposal." I am, however, beginning to think that if we keep the CW test, a "phone" test should be implemented as well. This test would qualify a candidate based on his/her ability to speak into a microphone without cussing, improper English, CB lingo, VSWR and antenna gain fallacies, etc. coming out of the mouth!

James S. Kaplan, KG7FU
Eugene, Oregon CN83lw

*On Finding Clubs...and Keeping Members*

Dear *CQ VHF*:

The sidebar in June's "Club Spotlight" is, of course, correct in saying that the ARRL is a good source of information on how to contact local radio clubs. But, there is an even better way to access the information: via the World Wide Web.

Go to the ARRL Web site (http://www.arrl.org) and click on "clubs." Then click on "Search for clubs." The next screen you see will give you the option of search-

*(Continued on page 43)*

# New, Cool and Blue!

Kenwood continues its renowned dual-band mobile tradition with the revolutionary TM-V7A. Large, cool-blue reversible LCD, ergonomic control panel, 280 memory channels, and computer programmability are just some of the many exciting features. Kenwood's engineering expertise, advanced design reputation and outstanding quality are amply evident in the fun-to-operate TM-V7A dual-band mobile transceiver.

**FREE**
**KENWOOD TRAVEL MUG**
with the purchase of a new TM-V7A
Limited offer (see your dealer for details)

- **Alphanumeric memory capability allows you to recall up to 180 memory channels by name. Frequency, memory channel number, and name (up to 7 characters) are displayed simultaneously. Store call signs, repeater names, cities, etc.**




## TM-V7A
### FM Dual Bander


Performance, quality, and innovation briefly describe the new TM-V7A dual-band mobile. Look at the easy-to-read large blue LCD display! Storing all of your favorite frequencies is a snap with 280 memory channel capacity (alphanumeric to 180). Unique programmable memory function allows you to store virtually all operating data such as frequency, offset, DTSS code, display setting, and beep function in 5 special channels. Visual scan allows you to graphically see band activity near the current operating frequency. Other features include a user-friendly menu and guidance system, 1200/9600 bps packet, AM aircraft band receive, CTCSS, DTSS, paging, backlit DTMF microphone, detachable control panel (with cable option), and voice synthesizer (VS-3 option). The TM-V7A is truly in a class by itself.

ISO 9001
JQA-1205

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**Kenwood News & Products**
http://www.kenwood.net
**Kenwood Bulletins**
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Customer Support/Brochures (310) 639-5300
KENWOOD ELECTRONICS CANADA INC.
6070 Kestrel Road, Mississauga, Ontario, Canada L5T 1S8

# First Look: Two New Micro HTs From Alinco

So you want "small," do you? Well, if a radio gets much smaller than these two HTs from Alinco, it'd have to be surgically implanted!

By Gordon West, WB6NOA*

Alinco has introduced the undisputed smallest single-band handheld transceiver ever, one each for 2 meters (Model DJ-C1) and 440 MHz (Model DJ-C4). Both units are sized like a shirt-pocket calculator and both operate on rechargeable lithium-ion batteries.

These micro communicators put out about 1/4-watt to a telescoping whip antenna that can receive strong signals even when it is collapsed within the body of the unit. Frequencies read out on a relatively large LCD display that is also back-lit for nighttime viewing.

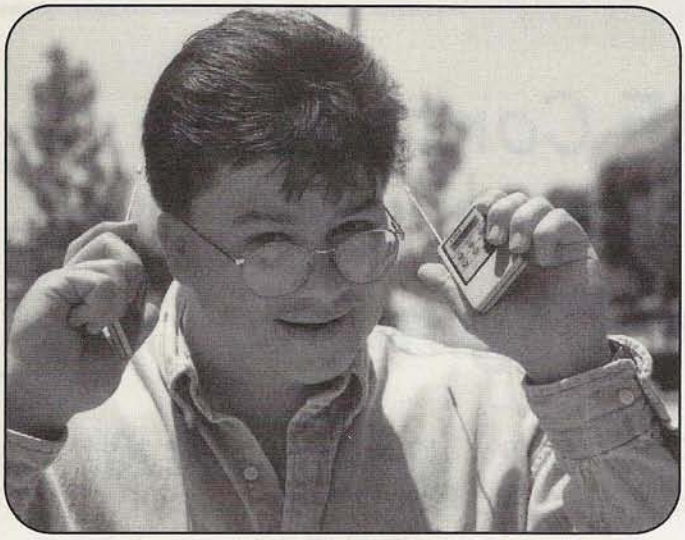
## A Quarter Watt?

What can you do with 1/4 watt? In some areas, that's enough for working into a local repeater. But even if it's not, that's plenty of power for talking with friends and family members on simplex at a shopping mall or if you're out bike riding together.

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


*Alinco's new DJ-C1 palm-sized handheld is just about the smallest amateur HT ever built. Approximately the size of a credit-card calculator, it'll fit right in the palm of your hand, your shirt pocket, or a small purse with ease.*


*The DJ-C1 and its 440-MHz brother, the DJ-C4, are so small and thin they'll fit just about anywhere. The whip antenna collapses into the case when not in use.*



*Now hear this...NOT! Holding these radios up to your ears won't let you hear a thing, since they're too small for speakers! But there's plenty of volume and plenty to hear when you plug in the supplied earphone.*

But Alinco's Doug Wynn says one way to get great range is to use the micro HTs in conjunction with a dualband mobile rig with a crossband repeat feature. So, if you have the 70-centimeter DJ-C4, for example, you can sit in your back yard on a 440-MHz simplex frequency (*not 446.000, please—ed.*) and link to your 50-watt dualbander inside the house to talk full-quieting on 2-meter repeaters. (*Technically, you should add an automatic ID circuit to your dualbander so it'll ID [{your call}/A—for "Auxiliary"] on the 440 link back to your HT. Your voice ID is sufficient on the other side of the loop.—ed.*)

***"These tiny communicators are not large enough to accommodate a built-in speaker. Audio comes up to an earphone jack, and the supplied earphone allows you to monitor everything on the channel."***

## No Speaker...No Room

These tiny communicators are not large enough to accommodate a built-in speaker. Audio comes up to an earphone jack, and the supplied earphone allows you to monitor everything on the channel. Don't worry, though, there's plenty of audio through that earphone.

A more technical review will follow, but if you're looking for the smallest of micros, be sure to check out the new Alinco 2-meter DJ-C1 and 440-MHz DJ-C4. List prices for the models had not been announced at press time, pending FCC type-acceptance. ■

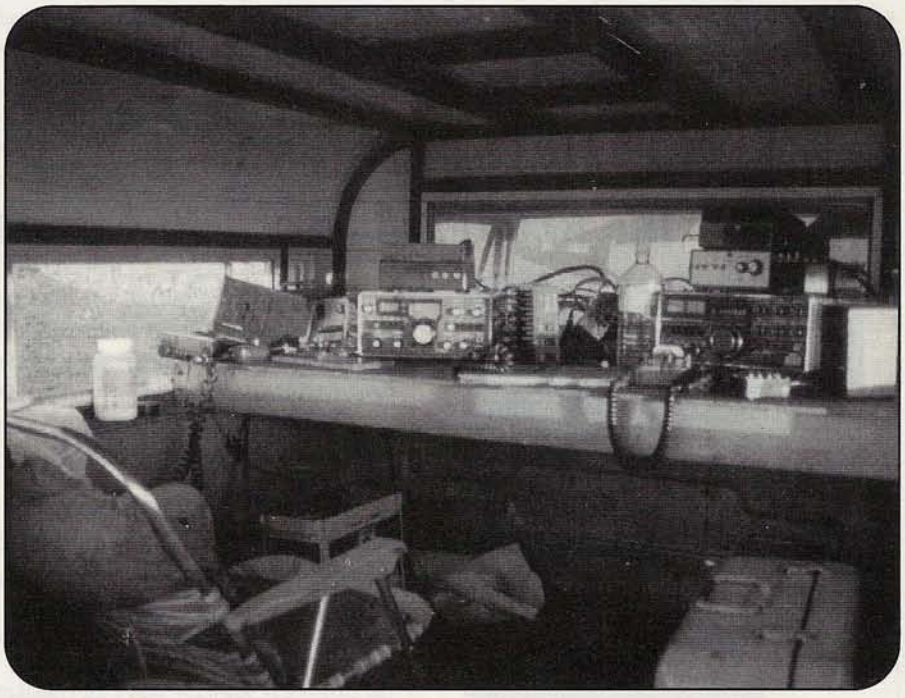
# The Art of VHF Contesting Part 1—Why Bother? Plus Tips for Beginners

So you've never operated a contest before and you're not sure where to begin? With the ARRL September VHF QSO Party around the corner, NØIVN has some basic hints. And, in Part 2, WB2AMU shares tips on what to expect in which contest.

By Ron Hranac, NØIVN*

It wasn't that many years ago that I was among the group that, well, doesn't think too highly of contests and contesters. I can remember tuning through the HF bands on a contest weekend, and thinking, "Oh, great. Another #@&! contest." But somewhere along the way, I became a convert and now enjoy this part of the hobby, especially on VHF and higher frequencies.

I suspect it was a gradual change; I've never really given it much thought. Perhaps it started by passing out an occasional point to a few of the HF contest operators, and getting a polite "Thanks for the contact, Old Man."



*A contest station doesn't have to look pretty to be effective. K7XC's rover station, for example, is assembled inside a truck. (K7XC photos)*

## Combining Camping and Contesting

Several years ago, during the ARRL June VHF QSO Party, I decided to take some portable ham equipment on a camping trip. My kids had a great time doing things kids do on camping trips while Dad operated "QRP portable" on 6 meters, 2 meters, and 70 centimeters. I never sent in my log, but I did have an enjoyable time operating from a remote location.

The following year, I set up a QRP portable station at a local park during one afternoon of the contest, and, with friends NØTPR and AAØCY handed out a few points to the locals. Again, the logs were not sent in, but we all enjoyed operating in the contest.

Over the years, I began to participate a little more regularly in both HF and VHF contests, and began sending in check logs (*check logs are not entered in the competition, but are used to cross-check other contesters' entries—ed.*). It wasn't too long before I decided I might as well enter the contests I was enjoying, even if there was no way I could reasonably compete against the "big guns."

## Skill-Building...and Fun

Why bother to operate in contests? Well, according to the *ARRL Operating Manual*, there are two primary motiva-

*Ron Hranac, NØIVN, is an active VHF contester from Littleton, Colorado.

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Victory Blvd. at Buena Vista
1 mi. west I-5

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**(800) 854-6046**
Mark, KE6OFP, Mgr.
I-880 at 23rd Ave. ramp

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***"My kids had a great time doing things kids do on camping trips while Dad operated 'QRP portable' on 6 meters, 2 meters, and 70 centimeters."***

tions for having radio contests: "advancing the state of the art in radio amateur communications and advancing the expertise level of the Amateur Radio operator." Frankly, I do it because it's fun.

Yes, contesting does help improve your operating abilities, whether it's picking up code speed, communicating during heavy QRM (interference) or even under weak signal conditions, or learning more about propagation and its effects on two-way contacts. Contesting can challenge you to optimize your station and its equipment, too. Still, the main thing is to have a good time.

## Major VHF Contests

The following are some of the major contests held each year for VHF and higher frequency operators in the U.S. and Canada (there are many more in Europe):

- *January*: ARRL January VHF Sweepstakes
- *June*: ARRL June VHF QSO Party
- *July*: CQ World Wide VHF Contest
- *August*: ARRL August UHF Contest
- *August*: ARRL 10 GHz and Up Cumulative Contest (1st wknd)
- *September*: ARRL 10 GHz and Up Cumulative Contest (2nd wknd)
- *September*: ARRL September VHF QSO Party

*(See WB2AMU's companion article for more about the specifics of many of these contests.—ed.)*

In addition, there are EME (Earth-moon-Earth) contests, single-band sprints (sort of mini contest), and even Field Day. While most Field Day activity is on the HF bands, many individuals and groups include VHF and above in their operations to earn bonus points.

## The Nitty-"Griddy" of Contests

The object of most contests is to make as many contacts as possible in a certain amount of time. Contest rules usually require some sort of specific exchange for the contact to be valid. For example, in most VHF contests, the normal exchange is your callsign and *grid square*.

The term "grid square" refers to a combination of letters and digits that describes your approximate location. Under what is called the Maidenhead Grid Locator System, the Earth's surface is divided into 32,400 grid squares (rectangles, actually), each 2 degrees of longitude wide by 1 degree of latitude high. Here in Colorado, where I live, the Denver area is in grid square DM79; Colorado Springs is in DM78; and the Fort Collins area is in DN70. Grid square maps of the U.S. are published in *The ARRL Handbook* and *The ARRL Operating Manual*. ARRL also sells a grid square map of the US and most of Canada for $1.

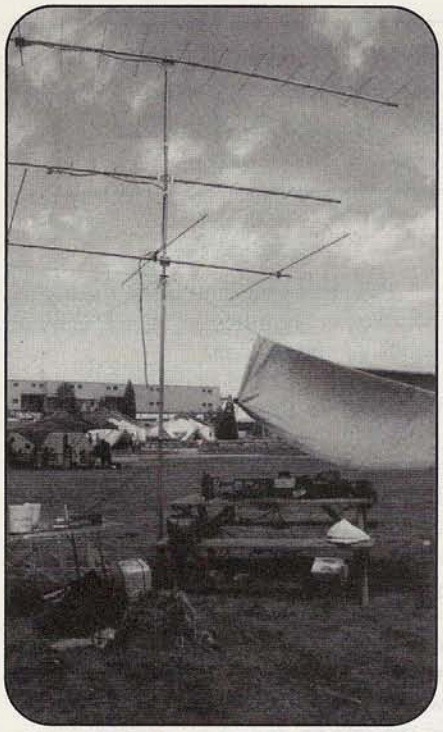
For microwave work, two more letters are often added to the grid square designator, which gives a more precise location down to an area about four by three miles. For instance, my home's six-character grid locator is DM79nn. Note that the second set of letters is lower case (*see this month's "Basics" section for more on grid squares—ed.*).

## Set Your Own Goals, too

If you're a casual contest operator, or have never operated in one before, but would like to get a bit more involved, I suggest that you first set some goals. Here are a few ideas:

- Have fun—First and foremost, the object of contesting should be to have fun.
- Improve upon a previous score—If you've contested before, one goal you might set for yourself is to try to get a higher score than the last time you operated in the same contest. For instance, you might want to try to improve your June VHF QSO Party score by 10% over the previous year.
- Make new contacts—If you're like many hams, you have a group of friends with whom you talk regularly. During a contest, you'll probably find the opportunity to work several stations you haven't heard before, especially those in other grid squares.
- Work a new grid square—A lot of VHF operators like to "collect" grid squares in their logbooks, much like some folks try to work hams in other counties, states, or countries. While it's fairly easy to contact others in the more common grid squares in and around where you live, some grids are considered rare because there are few or no hams living in them. During contests, rovers (mobile or portable operators) may operate in some of those rare grid squares, giving you a chance to add a new one to the log.
- Work a new band—If you just got a new rig for, say, 70 centimeters, a contest weekend is a good time to try out the new band and get an idea of how propagation and general operation on that band compares to other frequencies.
- Work someone in another state—Because of the increased operating activity during contest weekends, there is a good chance you'll have an opportunity to work stations in nearby states. If propagation is right, you might be able to work several states. This is especially true on 6 and 2 meters.
- Work someone in another country—While band openings to other countries are rare on VHF and above compared to HF, it still may be relatively easy under certain conditions to work stations in Canada, Mexico, and several Caribbean countries. Your chances depend, in part, on how close you live to these close-in "DX" countries. But, again, increased activity during contests improves the odds of working stations outside your normal range.
- Challenge and improve your operating skills—There is no question that contest conditions are quite different from most normal operating conditions. During a widespread 6-meter sporadic-*E* opening, the QRM can be intense, especially when it's contest time. And, at the other extreme, trying to work a distant and very weak station on 1296.1 MHz to get a new band and grid in the log can be just as challenging.
- Check out the performance of new or upgraded equipment—Want to see how well that new low-loss feedline or bigger antenna works? A contest is a good time to find out.

***"[The ARRL says] there are two primary motivations for having radio contests: 'advancing the state of the art in radio amateur communications and advancing the expertise level of the Amateur Radio operator.' Frankly, I do it because it's fun."***



*Field Day is good way to get started in VHF contesting. While most of the focus of Field Day is on HF operating, many groups set up VHF stations as well, since they don't "count" as additional stations in the group's operating class.*

• Contribute to your ARRL-affiliated club's score—The ARRL January VHF Sweepstakes is one contest in which individual scores count toward a club's total. If you're a member of an ARRL-affiliated club that gets into contesting, send in your January contest log each year (even if you made only a handful of contacts), if for no other reason than to help the overall club score. Be sure to note the club's name on the summary sheet.

• Earn an award—Contests provide an excellent opportunity to earn various operating awards. You probably won't get DXCC in a VHF contest, but you can get some neat certificates and pins. For example, during the ARRL August UHF Contest, you can get a participation pin for making just five contacts. Who knows? You might even win one or more ARRL band certificates for a given contest, or possibly take the coveted top place in your ARRL section or division.

## Contest Preparation

It's possible to rack up a decent contest score with a modest station and a less-than-ideal operating location. Doing so, however, requires thorough preparation and planning before the contest, and persistence and good operating skills during the contest.

The first thing on your planning list should be to mark on your calendar the dates of the contest in which you plan to operate. Sound silly? You'd be surprised at the number of hams who forget about a contest until it's come and gone (whoops!). Contest dates appear in the major ham magazines, and you'll often hear someone talking on the air about upcoming contests.

The next thing to do is to obtain a copy of the contest rules, and read them thoroughly. *CQ VHF* publishes complete rules for many major VHF contests. In addition, the ARRL publishes a *Contest Yearbook* ($5 from League HQ) that has complete rules and entry forms for ARRL-sponsored contests. Rules and entry forms are also available via the Internet and various BBSs.

Before the contest, it's important to decide how much time you plan to operate: a couple hours, a full day, or the whole weekend (minus time to eat and sleep, of course). Set aside the contest weekend date far in advance, and schedule things around it to minimize conflicts. Trying to do this two days before the contest will get you in big trouble at home, especially if your spouse has made other plans for you for the weekend. Get your "honey-do" list caught up well before the contest.

Next, choose your operating category: single operator, multi-operator, QRP portable, or rover. The last two require additional planning and preparation beyond the scope of this article. Choose your operating band(s) at this time, too. Some prefer single-band operation, while others will operate on every band for which they have equipment. Speaking of equipment, check it out a day or two before the contest. This means antenna rotator operation, transmit and receive operation, antenna system VSWR, power output, etc. It's no fun to spend the first few hours of a contest troubleshooting equipment problems.

I highly recommend that you consider using computerized logging or contesting software. It makes managing contacts a lot easier, minimizes duplicate contacts, and can simplify scoring. With regard to the latter, check to make sure your software scores accurately. I found that the version of "CT" I'm using doesn't score all of the VHF contests correctly and requires some after-the-fact corrections.

Before the contest starts—preferably the day before, but certainly no later than early in the morning of the day of the contest—start your contest logging program and get it ready. This includes doing things like entering your callsign, grid square, name and address, and whatever other information it may require. Make sure that your computer's date and time are set correctly for the version of software you're using. With some programs, for instance, you have to set the computer to local time, and with others you have to set it to UTC time.

## Neighbors, Alarms, etc.

There are also a few miscellaneous things to take care of before the contest: neighbors, alarms, and in-home noise sources. During one VHF contest a couple of years ago, I had an early morning visit from my next door neighbor. She and her husband had been awakened by my 6-meter CQs coming through the loudspeakers of the turned-off stereo in their master bedroom. Now, I let them know a few days before contests start, and they disconnect the speakers (*Wow! What pleasant neighbors!—ed.*).

Because my antennas are mounted on the roof of my house, I have also occasionally triggered our upstairs fire alarm. Now I notify the alarm monitoring company the night before a contest, and they put the system in "standby" while I'm on the air.

For the longest time, I was plagued with broadband noise in the lower end of the 2-meter band. Depending upon where the beam was pointed, the noise sometimes reached S5 or more. I eventually traced the problem to the fax machine in my upstairs home office. An old answering machine in the kitchen was notorious for generating spurs across the 6-meter band. Both the fax and answering machine have since been replaced, but the solution at the time was to turn them off during contests (*sometimes, you have to unplug them—ed.*).

## Round Up Potential Contacts

Don't forget to encourage friends and family members who are also hams to pass out contacts during the contest. Remember, FM simplex (except 146.52 MHz, which is normally not allowed to be used for contest contacts) contacts count just as much as SSB or CW contacts. In fact, FM simplex contacts are a good way for newer hams to experience some of the fun of contesting before investing in multimode equipment.

To get yourself "in the mood," you might try honing your skills a bit before each contest by listening to DX pileups on HF, participating in local VHF nets, and practicing using some of the interference-reducing features of your transceiver (different filter bandwidths, IF shift, notch filter, etc.). Finally, get a good night's sleep the night before the contest, so you'll be well-rested for the next couple days of fun.

***"While band openings to other countries are rare on VHF and above compared to HF, it still may be relatively easy under certain conditions to work stations in Canada, Mexico, and several Caribbean countries."***

## Contest Time

OK, the big day has arrived. In a few more minutes, the contest will start. You're eager and may even have a few butterflies in the old tummy. The equipment has been operating for a couple hours, and perhaps you've talked to a few friends on all of your operating bands to make sure one last time that everything works. The computer is up and running, a fresh cup of coffee sits next to your operating position, and you're ready to go. Bong! The contest is under way. Now what? Here are a few operating tips:

- Work the "regulars" as soon as you can. If your operating time will be limited, try to make it early in the contest if possible. Much of a VHF contest's activity is during the first few hours.
- Look for contacts on other bands/modes (don't forget FM simplex frequencies). A dualband HT or mobile rig will allow you to get on at least two bands). VHF/UHF contest contacts on higher bands are worth more points than contacts on lower frequencies. For example, 70-centimeter contacts may count three points each, while 6-meter contacts are only worth one point each (check the rules for the actual points per contact).
- If you work someone on a lower band (for instance, 6 meters), ask if they have a higher band or bands to work you on after that contact is complete.
- The more grids you work, the higher your score, regardless of which band or bands you operate on.
- Listen for band openings. Some of them can be short-lived, and most sporadic-*E* openings seem to come out of nowhere and can disappear just as quickly. A handful of contacts during a brief 6-meter opening can really make your overall score climb because of the new grids worked.
- Listen for new calls. If you hear someone working a station you haven't worked, it's likely that others haven't worked that station either, so you may be in the pile-up end of an attempted contact. Don't forget to take advantage of FM simplex contacts for new calls. Many simplex contacts will probably be with non-contesters, but a polite request for a contact, along with a brief explanation of the necessary contest exchange (grid square) will usually get you the contact.
- Be aware of rover operating schedules. Rover stations usually have a limited amount of time available in each grid they activate, so be listening on the frequencies and at the times they have previously announced.
- Don't be afraid to call CQ once in a while. If everyone is listening and no one is transmitting, the band may sound dead when it's not.
- Follow these three Ps: patience, persistence, and politeness. They're pretty much self-explanatory.
- Have fun!

## Wrapping up

After the contest is over, review your log and check the accuracy of your score. Be sure to send in your log, summary sheet, and dupe sheet (if required) to the appropriate contest sponsor. Even if you only operated for a couple hours, send in your log anyway. Don't forget to list club affiliation for the ARRL January VHF Sweepstakes (you *are* a club member, right?). And finally, take a look back at the overall operation, and ask yourself what you might be able to do differently next time. Happy contesting! ■

# The Art of VHF Contesting Part 2—Know What to Expect

If NØIVN persuaded you in the previous article to give VHF contesting a try, WB2AMU has some additional tips to help you get the most of your time on the air.

By Ken Neubeck, WB2AMU*

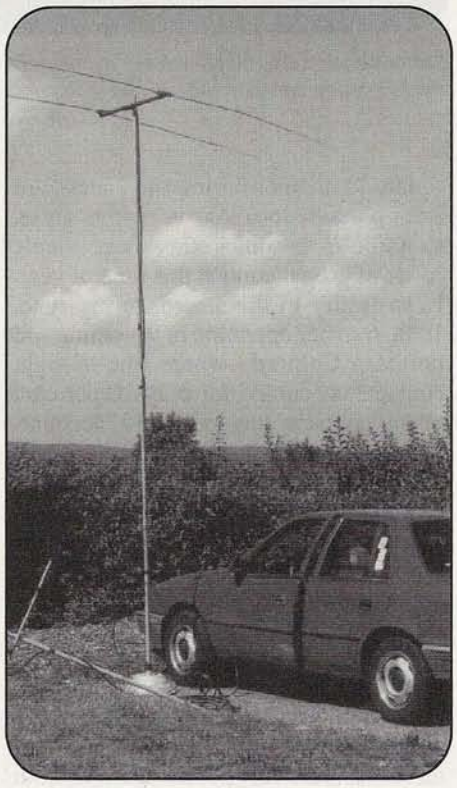
One of the things I like most about VHF contests is that they're often more relaxed than HF competitions. Plus, you don't need a "big gun" station to do well. You can have lots of fun in a VHF contest with a mobile or low power station. But to get the most out of your contesting experience, there are some basic things you need to know about the calendar, band characteristics, and the operating habits of other contesters.

All three of these factors are interrelated. The time of year determines what types of propagation are likely to be available on the various VHF/UHF bands, and therefore the activity levels and operating ranges you can expect. Experienced contesters will tailor their operating habits accordingly. Let's start out with a look at typical band conditions during each of the major North American VHF/UHF contests and what's reasonable to expect in each one. (*Various propagation types are presented here without explanation. If you're not familiar with them, see "VHF Propagation at a Glance."—ed.*)

## Typical Band Conditions for the Major VHF Contests

### Starting with September

*ARRL September VHF QSO Party (second full weekend in September, 33 hours. See rules elsewhere in this issue.)*



*You don't need much to make yourself heard in a VHF contest. This is the author's portable setup on Long Island during last year's September VHF contest. He's on one of the highest spots on the island (in this case, a towering 300 feet above sea level!).*

The majority of the contacts made on all bands during this contest will be line-of-sight, generally meaning the antenna's visual horizon plus about 33%. Band conditions are typically spotty. There is always a possibility of a short sporadic-*E* opening on 6 meters. (Yes, believe it or not, 6-meter sporadic-*E* is possible during this time—a low point in the annual sporadic-*E* cycle—although the openings will generally be very narrow and very brief. One big advantage of having a contest in September is that such sporadic-*E* openings might be missed if it was not for the large number of contesters being on 6 meters at the time.)

Meteor scatter contacts are possible on 2 and 6 meters during the morning hours. And aurora contacts are a definite possibility. People are still talking about the Aurora opening that took place in the northeast during the 1994 event. September is too early in the *F*2 skip season, even during the sunspot peak, for this type of propagation to make itself felt on 6 meters.

Again, line-of-sight contacts on all bands are going to be the most important effort for hams during this time of year with the possibility of some tropospheric enhancement.

### Winter Conditions

*ARRL January VHF Sweepstakes (Third full weekend in January, 35 hours)*

Conditions on all bands are similar to those you'll find during the September VHF contest, except that contacts via aurora are rare in January, and the chances of a sporadic-*E* opening are better than in September. Even so, sporadic-*E* openings will typically be less than an hour in duration. During the sunspot peak, *F*2 skip contacts on six are a real possibility, although it is very hard to predict when and if they will occur. Tropospheric conditions are generally

**Ken Neubeck, WB2AMU, is a regular contributor to CQ VHF.*

***"If your time is limited, try to concentrate your effort during the key times of the contest so you can work more stations."***

present in some form on 2 meters and sometimes on 6 meters during some time periods of this contest. Again, as in September, you'll be relying primarily on line-of-sight contacts.

## The Summer Contests

*ARRL June VHF QSO Party (Second full weekend of June, 33 hours)*

*SMIRK Six-Meter QSO Party (Third full weekend of June, 48 hours)*

*ARRL Field Day (Fourth full weekend of June, 24 to 28 hours)*

*CQ World Wide VHF Contest (Second full weekend of July, 27 hours)*

All of these contests take place during the peak of the summertime sporadic-*E* season in the Northern Hemisphere, often resulting in excellent conditions on 6 meters and occasional long-range openings on two. The ARRL June VHF QSO Party is considered the premier VHF contest of the year because many hams are on the VHF bands looking for the enhanced propagation conditions.

The probability is very high on any of these dates that a sporadic-*E* opening will take place on 6 meters for some period of time, as June and July are the best months for this propagation mode. What becomes tricky is the fact that the timing, duration, and direction of an opening is uncertain (*that's why it's called* sporadic-*E!—ed.*) Thus, a good operator will move around the 6-meter band and make crisp and short contacts to fill up the log book quickly. Hams should be aware that double-hop sporadic-*E* conditions are very possible on six at this time and international contacts to the Caribbean or Europe are conceivable. Field Day of 1994 saw tremendous amounts of double-hop sporadic-*E* activity, including coast-to-coast contacts in the U.S. and a three-hour opening between Europe and the Eastern U.S. There is also the possibility of 2-meter sporadic-*E* contacts at this time, but openings will be very short, typically less than 15 minutes. There is a greater likelihood of making *tropospheric* contacts on two meters and above.

For many hams operating in the "rover" category (moving from one grid square to another during the contest) or from portable locations in remote areas, sporadic-*E* becomes the most viable mode of propagation at this time of year. I can testify to this based on my June, 1996, 6-meter operation in Wyoming and northern Colorado where line-of-sight contacts accounted for only 10 per cent of my contacts and sporadic-*E* accounted for the other 90 per cent (*see "A Tale of Two Rovers - Part 2," in June, 1997,* CQ VHF.*—ed.*).

Aurora contacts at this time of year are rare but not impossible, particularly if a major solar flare occurs during high sunspot activity. Don't count on *F*2 propagation on six meters during these contests, even during the sunspot peak, as it does not occur during the summer months. On the other hand, meteor scatter contacts are very possible now on both six and two. As in any contest, line-of-sight contacts will be very important to build up your contact rate and to make sure you work the close-in grid squares.

*Serious contesters will put a lot of metal in the air to make lots of contacts on many bands. But the beginning contester doesn't have to compete with these "big guns" in order to have fun. (K7XC photo)*

## Basic Operating Strategies

In his companion article, N0IVN explains the basics of preparing yourself and your station (and even your neighbors) for a contest. I'm not going to repeat what he has already told you, but I will try to add some tips about what to expect from other operators, considerations based on whether you're operating at home or on the road, and how the propagation conditions described above may influence your operating choices.

## Who's Your Competition?

We all compete against ourselves in a contest, but we also have choices about who *else* we're going to compete against. Making that choice means first determining the amount of time and effort you want to put into a particular contest. If your time is limited, try to concentrate your effort during the key times of the contest so you can work more stations.

If you want to put on a serious effort, but don't feel you're ready to compete with the "big guns" and their hilltop locations with top-of-the-line radios, amplifiers, and multi-element antennas, you might want to focus on a *single-band* effort. Another nice category to try is the *QRP portable* category, in which operators run 10 watts or less from a remote location (away from the home station). Every contact is a challenge here and the big guns aren't really a factor.

Another fun category is the "rover" category, in which operators travels in a car or boat to different grid squares during the contest period. This category is like being in a car rally in which the driver has

## VHF Propagation at a Glance

One of the most fascinating aspects of operating on VHF and UHF is the wide variety of propagation types that can be used to extend your signal range from its basic "line of sight" to several hundred or even several thousand miles. Here's a quick look at some of the more common types of propagation found on the VHF/UHF bands:

*Aurora*: Enhanced propagation due to the same ionization that causes the lights of the auroras (Aurora Borealis in the northern hemisphere and Aurora Australis in the southern). You literally bounce your signal off the auroral curtain.

*Double-hop Sporadic*-E: Sporadic-*E* contact (see sporadic-*E*, below) in which the radio signal bounces off the ground and is reflected a second time by another *E*-cloud.

F2 *skip:* Propagation by refraction off the *F*2 layer of the ionosphere. This is the most common mode of propagation on HF, but the *F*2 layer is reflective at frequencies as high as 50 MHz only during peaks of the 11-year sunspot cycle.

*Line-of-sight*: Normal means of contact on VHF/UHF, with no enhancements. Typically, "line-of-sight" extends about 33% beyond the visual horizon.

*Meteor scatter*: Propagation by refracting radio signals off the ionized trails left by meteors as they burn up in the atmosphere.

*Sporadic*-E: propagation by refracting radio signals off "clouds" of ionized particles in the *E* layer of the ionosphere. The primary mode of long-distance propagation on 6 meters, it occasionally reaches the 2-meter band as well.

*Transequatorial propagation (TEP)*: North-south propagation in tropical and subtropical latitudes in which the two ends of the path are roughly equidistant from the magnetic equator. On VHF, occurs primarily on 6 meters.

*Tropospheric propagation ("tropo"):* Enhanced propagation due to weather systems and other conditions in the troposphere. Primary mode of propagation on most VHF/UHF bands. In some cases, a *tropospheric duct* will form, generally over water, that can carry signals hundreds or thousands of miles. There is regular ducting between California and Hawaii that allows hams in California to bring up repeaters in Hawaii using only an HT!

Additional terms that may not be familiar if you're not a contester:

*Big gun:* Major contest competitor, usually involving major efforts on multiple bands and modes, often with a large group of operators. The single operator running low or medium power on just one or two bands is known as a *little pistol.*

*Grid square*: A rectangle, actually, measuring one degree of latitude in "height" and two degrees of longitude in "width." Identified by two letters and two digits (e.g., FN20), grid squares are the most common multipliers in VHF contests.

*Multiplier*: A contest scoring criterion by which the number of contacts (QSOs) is multiplied in order to calculate the final score. Most common multiplier in a VHF contest is the *grid square*. Multipliers in other contests may include states, ARRL sections or callsign prefixes.

*QRP:* Low power, generally meaning 10 watts or less. Power levels below 1 watt are sometimes referred to as *QRPp*.

*Rover*: A mobile station which operates from more than one "grid square" during a contest.

to follow a time schedule and road map to the different grid squares. The main idea here is to have fun in trying to activate as many grid squares as possible for others (of course, you pick up lots of points along the way, since you can work each station on each band *again* from each grid square that you stop in). There's a practice in which some VHF contest groups send friends out on the road to activate different grids on the various VHF and UHF bands *just for them* (so-called "captive rovers"), but it's in the interest of fair play that these stations work any station that calls them, and not just the "home" station.

## Who Else Is Out There?

Next, you have to determine which bands and modes you will concentrate on for the type of operation you've decided to run. If you're in a remote area of the country during any of the June and July contests, you're not going to be making many line-of-sight contacts, and your

major propagation mode will have some sort of skip mode such as sporadic-*E*. Thus, you should concentrate primarily on 6 meters and perhaps listen a bit on two. If you're into microwave frequencies, you'll need to make schedules and plan for the time involved in setting up when operating portable.

The most popular modes during VHF contests are the weak-signal modes, in particular SSB, with CW being handy for microwave work or very marginal signal paths. But don't overlook FM. Even though there's not as much FM activity as you might expect considering its overall popularity, there are still contacts to be made there and points to be scored. Just be sure to avoid repeater frequencies and the 2-meter national simplex frequency, 146.520 MHz (most VHF contests prohibit contest contacts on .52; this prohibition does not apply on other bands, so feel free to use 52.525, 223.500, and 446.000 MHz).

One important thing to remember is for everybody to spread out on the bands during a contest! It makes no sense to try to hold on to the SSB calling frequency (be it 50.125, 144.200, or 432.100 MHz), as many stations may be calling there. It gets to be a real traffic jam when some big gun stations are wiping each other out on the same calling frequency. The more experienced stations find a clear spot where they can be heard, and are willing to move a little bit if necessary to accommodate others on the band. They're also willing to change strategy if necessary. You can, too. If you're calling CQ on one frequency for 20 minutes with no response, try tuning around the band for those calls that you don't yet have in your logbook.

## Other Considerations

It's important to be aware that VHF contests are highly dependent on band conditions to determine whether you'll be very busy or calling CQ for hours in order to make a contact. It's not uncommon for activity to drop off completely during the evening hours of the contest on many of the VHF bands if noise levels are high. However, be on guard for any surprise openings during such times. One thing that might help in detecting a surprise sporadic-*E* opening on six is to monitor 10 meters on occasion to see if such an opening is taking place.

Location is also important if you want to do very well. By location, I mean the height of your station above sea level as well as where in the country you're located; both factors affect your potential for making a high score.

It goes without saying that high locations, such as hills and mountains, are important for a VHF contest. Height makes a big different in line-of-sight contacts, particularly if you're a portable station running low power or operating in the UHF range. A high hill can really add to your signal strength. Height is not as much of a factor in skip-type propagation modes, such as *F*2 or sporadic-*E*, as it is in line-of-sight work.

The other aspect of location is where you are with regard to population centers. There tend to be many active hams in much of California, the northeast, and smaller pockets in the south and midwest. In these densely-populated areas, it's possible to make a fair number of contacts even when no skip is present. This is not the case in the more sparsely-populated areas of the country, such as a number of western states in the 7th call area. Here, a few local contacts may be made, but higher numbers of contacts and multipliers become more dependent on skip activity, as well as higher power levels to make sure you can take advantage of any openings that develop. Therefore, a category such as QRP portable is generally not feasible for these rural stations during the September and January contests when there is less skip. Thus, the operating categories to choose are either a high power station at home or a rover.

## VHF Contests Are Fun!

Finally, it's important to realize that VHF contesting should be fun and that it's a good opportunity to meet some other hams whom you may not normally come across. It's also a good opportunity to set up a station in a public area and introduce amateur radio to the public, much like Field Day. And speaking of Field Day, don't forget to include a VHF/UHF station in your planning for next year. It's a "free" station (doesn't change your entry category) and can help build up your point total.

One advantage VHF operating has over HF is that your entire station can be carried in your car and even operated from the car. I've found each contest to be a golden opportunity to say hello to various friends on VHF as well as a chance to observe the various propagation modes associated with VHF. CU in the contest? ■

# Q & A

## Questions and Answers About Ham Radio Above 50 MHz

*Q:* I have a Dodge minivan (1996 vintage) and would like to install a permanent power cable to the battery. But the modern design has got me somewhat stumped. The old minivan (1990) had spare holes in the firewall and feeding the cable through was a breeze. But the new model has an extended front, and, if there are any holes in the firewall that might be useful, they are sure well hidden! Any suggestions—short of trying to pierce the firewall—would be appreciated.

Joel Levis, VE3CJJ
Haliburton, Ontario, Canada

*A: We asked "Digital Data Link" editor Don Rotolo, N2IRZ—who works for an automobile manufacturer in "real life"—to respond to Joel's question. Here's Don's reply:*

My bet is that the wires enter a casing or box of some sort (in our cars, we use the fusebox), and this box has the pass-thru to the interior. If this is the case, then all the cables go into a box and you won't see any cables penetrating the firewall directly. I suggest that you do one of two things:

1. Pick a wire bundle, such as that for the headlights, and follow it relentlessly; it has to end up at the light switch eventually. Keep the "box" mentioned above in mind. Also, be sure to disconnect the battery when opening any "box"; you never know where unfused battery power might be. As a rule of thumb, the harness holes are on the far left and right edges of the firewall, close to the fenders, about a foot to 18 inches from the floor.

2. Stop in at your local dealer, best to do it at lunch time or two hours after, and ask someone in the service department—not the service writer, ask for the shop foreman or service manager. They will have seen enough '96 vans that they'll know where the harness passes through. Be nice and polite, and they'll usually help. If not, try another dealer (and don't buy a car from the first place).

Oh, and read my article from last year! ("Installing a Mobile Rig—the Right Way," April, 1996, *CQ VHF*).

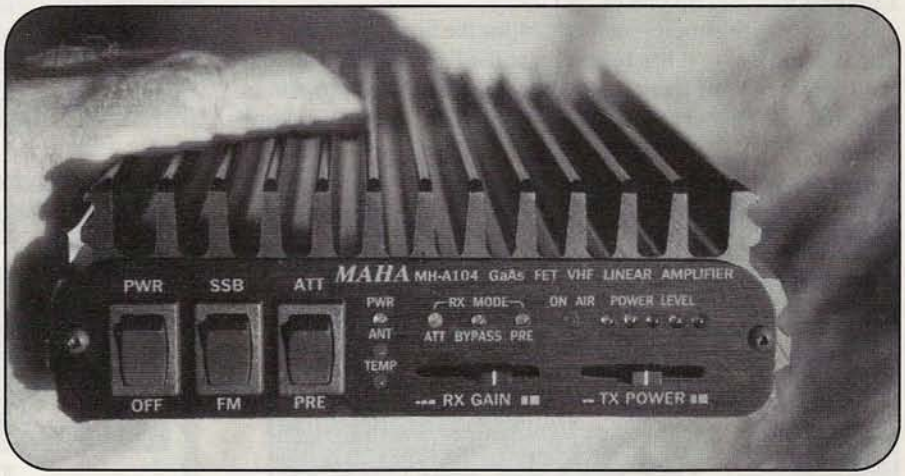
Do YOU have a question about any aspect of "Ham Radio Above 50 MHz"? We'll do our best to give you a clear, concise answer—or if it's not a question that has just one easy answer, then we'll invite readers to offer their solutions. Send your questions to: Q & A, *CQ VHF* magazine, 76 N. Broadway, Hicksville,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

# Maha MH-A104 100-Watt 2-Meter Linear Amplifier

This "brick" amplifier for 2 meters has a unique combination of features that makes it equally attractive to weak-signal operators and FM handheld users.

By Gordon West, WB6NOA

Weak-signal (SSB/CW) VHF operators will always tell you the importance of having a good linear amplifier with a built-in, low-noise GaAsFET pre-amp. While I'm very happy with the three amps I use at various times in my weak-signal station, I always enjoy trying new products from relatively new amateur radio manufacturers. So I was pleased to say yes when Charles Chueh at Maha asked me to review one of his company's new MH-A104 VHF linear power amplifiers.




*Unique features of the Maha MH-A104 2-meter amplifier include variable output power, variable gain on the receive preamplifier, and a switchable receive attenuator for using the amplifier with HTs.*

## A Multifunctional Design

The Maha amp is designed specifically for the VHF weak-signal operator, as well as specifically for base station use with a handheld transceiver for the newcomer. What? An amplifier for both applications? You bet!

The problem with most base station operation with a 2-meter FM handheld is intermodulation and overload to the handheld from nearby commercial paging stations and other high-powered VHF users. A handheld all by itself on a big antenna will sometimes produce nothing but squeaks and squawks on certain 2-meter frequencies. Adding a 10- to 15 dB pre-amplifier to a handheld package will surely lead to increased overload and minimum 2-meter reception. This is why I wondered how this amplifier could be marketed for *both* the weak-signal operator demanding pre-amplification as well as to beginners running handhelds that need absolutely *zero* pre-amplification.

Once I took the amp out of the box, though, I immediately saw that magic switch that allowed for a selectable pre-amplification from +5- to +15-dB gain, a middle position for pre-amplifier bypass, and a third position for a -15-dB attenuator. While you might not think you could ever put an attenuator to good use, believe me, many handhelds operate much better on a big outside antenna with the attenuator turned on!

When the pre-amp is turned on, you can control the amount of added gain with an in-line potentiometer that slides from +5 dB to +15 dB. Most multimode transceivers meet their published .1 microvolt receiver sensitivity specs, but every one of the multimode mobile and base transceivers that I've ever tested could benefit from an increase in receiver gain.

While the ideal pre-amplifier would go up at the antenna feedpoint, second best is a hot GaAsFET low-noise pre-amp built into the power amplifier "brick." It should take a resting noise floor of 1 S-unit and perk it up to a "hotter" noise floor of 2 or 3 S-units where errant static crashes will more easily open up your weak-signal radio's squelch circuit.

## Transmit Options

There's flexibility on the transmit side, too. Most 2-meter amplifiers offer a fixed amount of power output gain that's proportional to input power: less power in,

*"[The amplifier allows] for a selectable pre-amplification from +5- to +15-dB gain, a middle position for pre-amplifier bypass, and a third position for a -15-dB attenuator."*

less power out. This can be a problem for some weak-signal applications, when your transceiver output power can't be varied, but you may need to have output power variations in case the amplifier is driving a tube-type, 1500-watt amplifier.

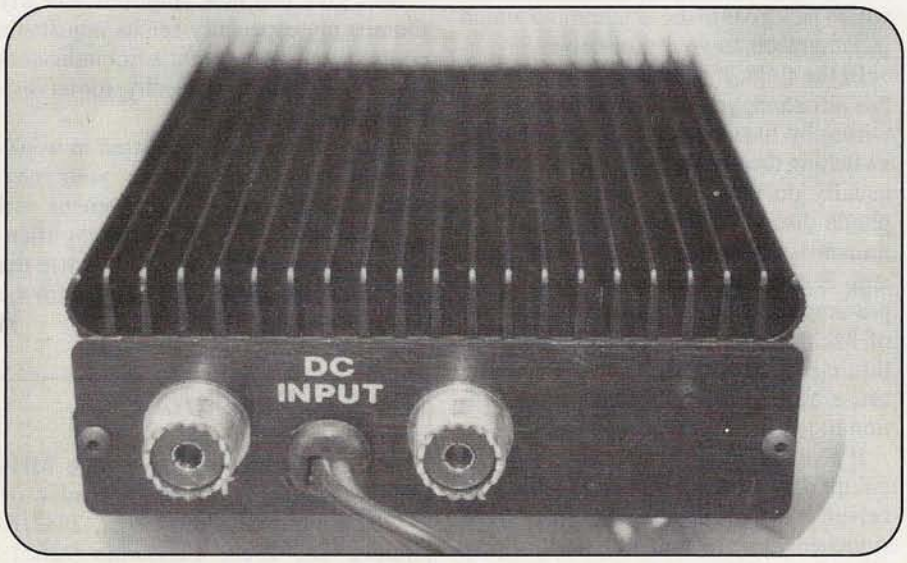
For example, I operate a Henry 2002 tube amplifier capable of putting out 1500 watts for moonbounce operation. The only problem is that it requires a relatively odd 60 watts of drive power. On other solid-state amplifiers, I had to go in and actually de-tune them down from 100 watts to 60 watts to get the right drive level. But the Maha MH-A104 offers variable output power, from 10 watts to 100 watts, with 3 to 10 watts of drive. Just as with the variable gain control on the receive pre-amplifier, you control the output level by sliding an in-line potentiometer from left to right.

## LEDs and "Hang Time"

After I hooked up the Maha amplifier, I flipped on the power button and noticed that a clear green jewel LED comes on to indicate power. There are also three clear LEDs that indicate the pre-amp status (green in the center indicating bypass, orange on the left indicating attenuate, and orange on the right showing that the pre-amp is on). A red LED comes on when the SWR exceeds 2.5:1. If this happens, the amp cycles off. Another red LED will come on if the amplifier's operating temperature exceeds a pre-set value, which I was never able to achieve. Good heat sink design dissipates the heat effectively. On transmit, yet another red LED comes on to tell you that you're on-the-air. It glows continuously on FM, and intermittently on SSB.

The sideband delay has been pre-set to about 2 seconds, which is way too long for fast-paced SSB operation. I was able to go inside the unit and identify the correct trim-pot for reducing the SSB and CW "hang time." Other amplifiers feature an adjustable "hang time" pot on the outside, but not this one. This would be one possible area for improvement when Maha comes up with its next version.

*"...I give this new amplifier a hearty thumbs up, especially for its adjustable controls and...variable power output."*




*Be extra careful with antenna connections! The back of the amp doesn't tell you which SO-239 socket is for the antenna feedline and which is for the patch cable to the radio. The manual, however, does; so check it out and add your own labels. Transmitting into the antenna end will blow the sensitive—and expensive—GaAsFET preamplifier.*

*"...the gain of the pre-amplifier was...usable for the modern base station and mobile multimode transceiver."*

Included with the amplifier is a short jumper cable for handheld operation. It comes with a PL-259 on one end and a BNC connector on the other, eliminating the need for an adapter. This also saves wear and tear on the antenna jack of your small handheld transceiver if you should ever use a big heavy adapter to go from PL-259 to BNC, and it minimizes the chances of mis-soldering a BNC connector when you're trying to make up your own jumper cable.

## On the Air

With 10 watts drive and the power setting at minimum, the amplifier provided a slight increase in transmit power. Sliding the RF power output control to midway caused the transmit power to increase slightly. It didn't surprise me that the real action of controlling the power output is in the last 25% of the potentiometer range. In order to obtain 60 watts output, the adjustment was critical near the very end of its play.

This isn't much different from most modern ham transceiver volume controls. Most usable volume adjustment is done on the first one-third of rotation, with the last two-thirds not having much action at all. In the case of this amplifier's power output adjustment control, action is at the last one-third of the in-line potentiometer setting.

The receive pre-amplifier control was very linear throughout its travel. With the pre-amp turned on and the control all the way to the left, I measured 4.5 dB gain with a noise figure of .2 dB. Mid-scale, receive pre-amplifier gain was 8.8 dB, and, all the way to the right, it was 13.9 dB with a relatively low noise figure of .22 dB, which is characteristic of a well-chosen GaAsFET device. Although the gain of the pre-amplifier was nowhere near the levels that I could achieve with a TE amplifier, it was still usable for the modern base station and mobile multimode transceiver.

I operated an FM handheld through the amplifier into a big 10-dB gain commercial VHF antenna, and the handheld often received a combination of pager tones and the National Weather Service on several local 2-meter repeater frequencies. This was with the pre-amplifier turned off and was due to the antenna simply pulling in too many signals for the handheld to keep them apart.

When I selected the attenuator circuit on the amplifier, reception of the local repeaters immediately cleared up and front-end overload in the handheld was no longer a problem.

## Trying to Break It

In working with this amplifier, as with every piece of gear I review, I looked for things that might cause it to fail if improperly installed. Accidents do happen! I tried the reverse polarity test, and it instantly blew the fuse, but there was no damage to the amp. Remember: red should always go to battery positive and black to battery negative.

I then tried running the amp on insufficient voltage. About the only problem was on single sideband, where other stations indicated my signal no longer sounded crisp. No wonder, at 10 volts!

## One Red Flag

Then I looked at the two SO-239 coaxial cable ports: they were not labeled on the back of the amplifier as input and output, or "to transceiver" and "to antenna." Hooking up the amp backwards and transmitting into the antenna port would probably—and instantly—wipe out the GaAsFET pre-amp. So keep that instruction book handy, which indeed illustrates which jack goes to the antenna and which jack connects to your transceiver.

In the field, if you're ever faced with this situation, you can determine correct wiring by listening to your receiver and switching the pre-amplifier on and off. (I usually do this "test" with the microphone disconnected to avoid accidental transmission in the wrong port.) If the amp is correctly hooked up, turning the pre-amp to ON will increase the amount of background noise on SSB. On FM, turning the pre-amp to ON will generally cause a medium-strength signal indication to get stronger.

If switching the pre-amp in and out of circuit doesn't seem to affect your transceiver at all, chances are you may have switched your antenna ports and are very close to wiping out your pre-amp. Always check your antenna in and out connections *carefully*, and do the pre-amp test as a double-check that everything is hooked up properly.

*"...the Maha MH-A104 offers variable output power, from 10 watts to 100 watts, with 3 to 10 watts of drive...you control the output level by sliding an in-line potentiometer from left to right...."*

*Never* test for proper antenna connection by simply keying the microphone. If you get it wrong, the amplifier's pre-amplifier will surely be damaged and will require a rather expensive GaAsFET transistor change-out.

## A Hearty "Thumbs Up"

I have been running the Maha amplifier for the past 20 days, and everyone says that my signal sounds crisp and clear. I have carefully adjusted the power output to properly drive my big tube amplifier for moonbounce operation, and this very critical adjustment has put me right at the 60-watt mark that is perfect as a pre-driver for the big amplifier.

When connected directly to an antenna, the Maha amplifier easily achieves 100 watts output with the supply voltage of 13.8 VDC. On single sideband, I could even whistle the amplifier up to 130 watts output at 13.8 VDC, well beyond its normal rating but without any significant overheat problems.

So I give this new amplifier a hearty thumbs up, especially for its adjustable controls and very bright LED indicators on the front, and, specifically, for its variable power output.

If you're just getting started in weak-signal work, chances are your new mobile or base station equipment will appreciate added receiver pre-amplification and stronger power output when the amplifier is switched on. List price for the Maha MH-A104 is $229.95. ■

### Resources

For more information on the MH-A104, contact your Maha dealer or Maha Communications, Inc., 2841-B Saturn St., Brea, California 92621; Phone: (800) 376-9992 or (714) 985-9132; Fax: (714) 985-9221; Internet: <http://www.maha-comm.com> (*with the hyphen*).

# Hamfest Calendar

The following hamfests are scheduled for September, 1997:

**Sept. 5–6**, Annual Hamfest, Wilhelmina State Park, Mena, AR. For information, contact Charlotte Lee, KC5DOR, 415 Crosstrails Road, De Queen, AR 71832 or call (870) 642-7656.

**Sept. 6**, Annual Hamfest & Computer Show, Franklin Twp. Firehall, near Edinboro and Albion, PA. Talk-in: 146.01/61. For information, contact Chris Robson, KB3A, 4485 Kell Rd., Fairview, PA 16415 or phone/fax: (814) 474-1211; e-mail: <crobson@erie.net>. (exams)

**Sept. 6**, 45th Annual W9DXCC Convention & Banquet, Holiday Inn, Rolling Meadows, IL. For information, contact Phil Camera KB9CRY, 806 Portsmouth, Westchester, IL 60154, or call (708) 343-1696, Fax: (708) 343-4394; or e-mail: <iphil@megsinet.net>, Web: <http://www.qth.com/w9dxcc>.

**Sept. 6–7**, Greater Louisville Hamfest/ARRL KY State Convention, Kentucky Fair & Exposition Center, Louisville, KY 40232-4444, call (812) 948-0037; or e-mail: <http://www.thepoint.net/~GLHA/>.

**Sept. 6–7**, 3rd Annual Hamfest, Manitoba Agricultural Museum, Austin, Manitoba, Canada. For information, write Manitoba Amateur Radio Museum Inc., 25 Queens Crescent, Brandon, Manitoba R7B 1G1 Canada.

**Sept. 7**, Hamfest and Computer Show, Butler Farm Show Grounds, Butler, PA. For information, contact K3LL, 1080 N Boundry Rd., #C, Cranberry Twp., PA 16066, call (412) 538-9491, or e-mail: <k3ll@nauticom.net>.

**Sept. 7**, Annual Hamfest and Computer Show, Inwood Recreation Center, Joliet, IL. Talk-in: 147.33 +600 KHz; 224.54 -1.6 MHz; 146.82 -600 KHz. For info, write to Ed Weinstein, 7511 Walnut Ave., Woodbridge, IL 60517-2818. (exams)

**Sept. 7**, 55th Findlay Hamfest, Hancock County Fairgrounds, Findlay, OH. Talk-in: 147.15 (+). For information, contact FRC, Box 587, Findlay, OH 45839; Findlay Radio Club answering machine (419) 423-3402; e-mail: <kanga@bright.net>; or <http://www.bright.net/~kanga/w8ft>.

**Sept. 13**, 12th Annual Hamfest, Saratoga County Fairgrounds, Ballston Spa, NY. Talk-in: 146.40/147.00 and 147.84/147.24. For information, contact Darlene Lake, N2XQG, 84 Wilton Mobile Park, Saratoga Springs, NY 12866; phone (518) 587-2384; packet: <n2xqg@wa2umx>; or e-mail: <lake@capital.net>. (exams)

**Sept. 13**, Metropolitan Amateur's Picnic, Red Sunset Park, Gresham, OR. For information, call Gene Buell, KA7KBH, (503) 614-0563.

**Sept. 13**, Hamfest, Shattuck, at the Red Barn. Talk-in: 146.730-. For information, call (405) 921-3676 or e-mail: <donald@brightok.net>. (exams)

**Sept. 14**, Summer WECAFEST '97, Yonkers Raceway, Yonkers, NY. Talk-in: 147.060 repeater PL 114.8. For information, call WECA InfoLine: (914) 741-6606 or write to: Thomas Raffaelli, WB2NHC, 544 Manhattan Avenue, Thornwood, NY 10594.

**Sept. 14**, Hamfest/Computer Show, Wheeling Park, WV. For information, contact TSRAC, 2011 St Hwy 250, Adena OH 43901, call (614) 546-3930; or e-mail: <k8an@aol.com>.

**Sept. 14**, Hamfest, Southeastern Massachusetts Amateur Radio Association, Inc., Clubhouse, S. Dartmouth, MA. Talk-in: 147.00/.60. For information, call Bill Miller, K1IBR (508) 996-2926.

**Sept. 14**, Annual Hamfest and Potluck Dinner, Monett City Park, Monett, MO. Talk-in: 146.97(-) or 145.23(-). For information, call Joe, KBØRVB (417) 235-8359, or e-mail: <nixit@mo-net.com>.

**Sept. 19**, Ham & Electronics Auction, North Stelton Firehouse, Haines Ave., Piscataway, NJ. For information, call Marty (908) 574-2873 between 5:00 and 9:00 p.m. only.

**Sept. 20**, Hamfest & Banquet, Warroad Area Community Center, Warroad, MN. Talk-in: 147.090+ & 147.000-. For information, contact David Landby, KBØHAP (218) 386-1092 or write to Rt. 3. Box 10, Warroad, MN 56763. (exams)

**Sept. 20**, Hamfest, Cave City Convention Center, Cave City, KY. Talk-in: 146.94. For information, contact Larry Brumett, KN4IV, at <lbrumett@glasgow-ky.com>. (exams)

**Sept. 20**, Hamfest, Central Park, Chanute, KS. Talk-in: AIØE, 146.745. For information, call WDØAKU, Charlie, (316) 431-6402.

**Sept. 20**, Annual Swapmeet and Auction, Holy Ghost Hall, Sebastopol, CA. For information, write to Rick Reiner, K6ZWB, 2120 Slater St., Santa Rosa, CA 95404, or call (707) 575-4455.

**Sept. 20–21**, 26th Annual Hamfest, Kincaid Park Rec Center, Anchorage, AK. Talk-in: 146.34/94 (PL 100 or 141.3). For information, contact Lillian Marvin, NL7DL (907) 277-6741; or e-mail: <rlment@alaska.net>. (exams)

*(Continued on page 83)*

## VHF Conference

**Sept. 13–14**, 42nd Weiheim VHF Convention, Weinheim, Germany (Europes largest VHF Conference). For information, contact Weinheim VHF Convention, Linden Str. 29, D-69518, Unterabtsteinach, Germany; Phone: ++49(Ø) 62Ø7/3311; Fax:++49(Ø) 6207/920122; www: <http://home.t-online.de/home/zweiburgenapotheke/amatfun1.htm>.

## Operating Notes

For September 1997:

**September**

| | |
|---|---|
| 6–7 | IARU Region 1 VHF (2 m) Contest (Europe/Africa) |
| 13–14 | ARRL Sept. VHF QSO Party (see rules, this issue) |
| 17 | Moon Perigee (closest to Earth) |
| 20–21 | ARRL 10 GHz Cumulative Contest, 2nd wknd (see rules, last month) |

*More contest info is available on the CQ VHF Web page at:* <http://members.aol.com/cqvhf/navhfcom.htm>.

# An Experimental Noise Blanker for 6-Meter FM

Here's an overview of noise blanker operation and an experimental approach to adding the capability externally to a 6-meter FM receiver.

By Bob Witmer, W3RW*

Six meters is one of the most exciting amateur frequency bands. It has properties of both the higher VHF frequencies, in terms of extended ground wave operation, and of the higher HF frequencies, with respect to *E*-skip and—during peak years of the sunspot cycle—even occasional multi-hop $F_2$ propagation for really long DX!

Six meters also seems to be the "optimal" band for interference from ignition and power line noise! The manufacturers of FM equipment for the commercial two-way communications market have tackled this problem for years and have made a variety of noise reduction circuits available, usually as options. But manufacturers of 6-meter FM amateur equipment have, in most cases, *not* included noise blanking capability. It doesn't take long, when operating on six, to appreciate the limitations that noise creates.

Typically, the after-the-fact addition of an effective noise-blanker is a complex task, requiring a lot of modification of the receiver's circuitry. The experimental approach described here provides a way to add noise blanking capability externally to a 6-meter receiver using circuitry taken from used Motorola commercial FM VHF Low Band transceivers with *essentially no modifications* to the receiver.

It's important to note that this type of blanker only works well with short pulse-type noise. Much of the noise generated by many of today's computers is not effectively processed by such noise reduction circuitry. It's also important to note that I conducted my tests on receive only and did not transmit while conducting them. If you're going to use a system like this for two-way communication, using a shared antenna and feedline, you'll need to bypass the external noise blanker when

***"The experimental approach described here provides a way to add noise blanking capability externally to a 6-meter receiver...with essentially no modifications to the receiver."***

*Bob Witmer, W3RW, has been a ham since 1962. He enjoys homebrewing, writing ham-related technical/construction articles, and operating on 6 meters.

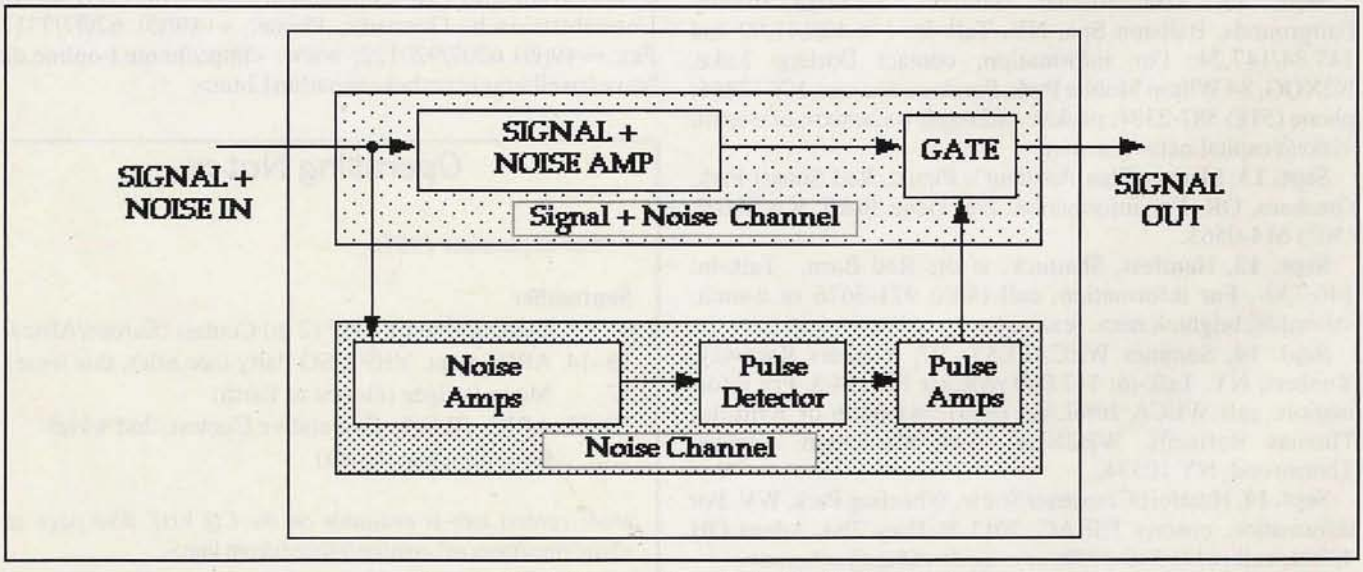



*Figure 1. Block diagram of a typical noise blanker circuit.*

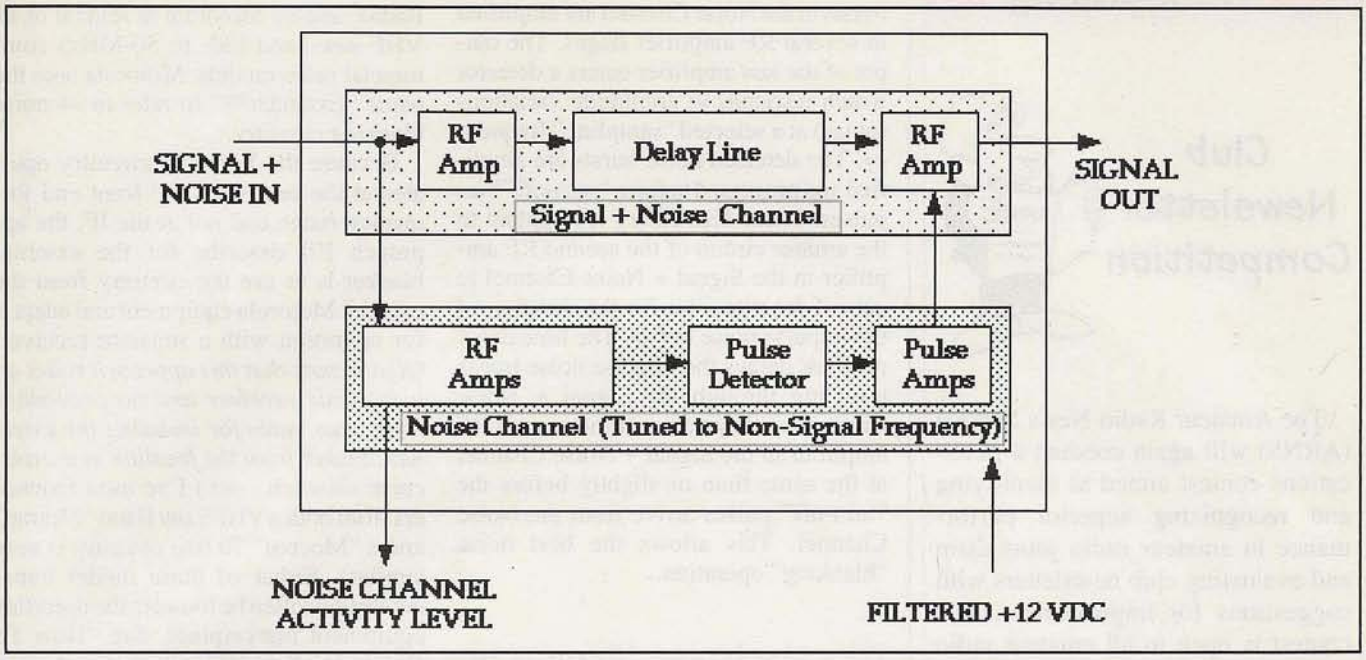



*Figure 2. An external noise blanker employs two parallel receive channels, a Signal + Noise Channel, and a Noise Sampling Channel. Signals on the Noise Channel trigger the blanker.*

transmitting (to avoid likely damage to it). This can be done with relays or diode switches, but it's beyond the scope of this article to describe here (*but perhaps a topic for a future issue of* CQ VHF—*ed.*).

## Typical Noise Blanker Operation

The objective of noise blanking operation is to limit the effect of noise by essentially turning the receiver "off" when noise pulses are present. This is in contrast to the typical noise *limiter,* in which the circuit operates on the resulting "effects" of the noise pulses on the receiver, usually in the audio section. This should not be confused with the limiter *stages* in a typical FM receiver. Figure 1 is the block diagram of a typical noise blanker.

Noise blanking is effective with impulse noise—a good example is ignition noise—because of the narrow time-width characteristics of the pulses. This allows the receiver to be "turned off" during the noise pulses with little effect on the overall intelligibility of the desired signal. Because of the short receiver "off" duration when the noise pulses are blanked, the user will not hear the "holes" in the signal. This is possible because the time required to transmit a single voice syllable can exceed the duration of a noise pulse by a ratio as high as 100,000 to 1.[1]

The noise processing channel senses the occurrence of the noise pulses and uses them to create a "turn-off" pulse, which is applied to an amplifier in the signal + noise channel, thereby eliminating the effects of the noise pulse. It's important to eliminate these noise pulses before the stages responsible for most of a receiver's selectivity because the selectivity will increase the width of the signal, making it more difficult to counter the effects of the noise.

## The External Blanker Approach

The external blanker approach described in this article differs in two areas from the approach just described. The first takes advantage of the broad frequency spectrum characteristic of these short noise impulses, which permits a noise processing channel (the Noise Channel) to be tuned to a frequency several MHz away from the desired listening frequency (Signal + Noise Channel).

This is important because an "in-channel"-type noise blanker can be affected by strong in-band signals which can activate the blanker, causing the receiver to be *desensed* or to create unwanted modulation of the desired signal. Also, to improve performance, a "delay line" is added to slow the desired signal + noise long enough to allow the noise pulses in the noise channel to be processed and to provide "turn off" to the gain stages at the right time to gate the receiver during the noise pulses.

## How the External Blanker Works

If you look at Figure 2 , you'll see that the desired RF signal and the impulse noise burst enter two parallel channels. The Signal + Noise Channel consists of RF amplifiers tuned to cover the desired operating frequency range. These stages are separated by multiple parallel tuned circuits which form a time delay network. The Noise Channel contains RF amplifier stages tuned to a different "noise sampling" frequency, followed by a pulse detector, high pass filter, and pulse amplifier stages.

When the External Blanker switch is in the "On" position, the impulse noise

***"Noise blanking...allows the receiver to be 'turned off' during the noise pulses with little effect on the overall intelligibility of the desired signal."***

## Announcing

## Club Newsletter Competition


The Amateur Radio News Service (ARNS) will again conduct a publications contest aimed at identifying and recognizing superior performance in amateur radio journalism and evaluating club newsletters with suggestions for improvement. The contest is open to all amateur radio organizations. Membership in ARNS is not required. General circulation magazines and professional journals are not eligible.

Newsletters will be evaluated by skilled judges who will award points based upon the following: general format; appearance; content; general interest and attractiveness. Certificates will be awarded in the following categories: Superior; Excellent; Good. Along with the certificate, each club editor will receive copies of the judging sheets as well as a summary of the newsletter's outstanding characteristics and any suggestions for improvement.

To enter the contest, an application form should be obtained from:

Lee Knirko-W9MOL, President, ARNS, 11 S. La Salle St., Suite 2100, Chicago, IL 60603-1302

Each request for an application should include a self-addressed, stamped, business size return envelope. Once an application form is received, one copy of any issue of your newsletter from the period July, 1996, through December, 1997, should be sent with the application. *Applications and newsletter copy should be sent to W9MOL at the above-listed address.* THE DEADLINE FOR RECEIPT OF ENTRIES IS DECEMBER 31, 1997. Early submissions will be appreciated to facilitate the work of the judges.

bursts in the Noise Channel are amplified in several RF amplifier stages. The output of the last amplifier enters a detector which responds to amplitude variations (noise) at a selected "sampling" frequency. The detected noise bursts are amplified and processed to form "turn-off" bias pulses. These bias pulses are applied to the emitter circuit of the second RF amplifier in the Signal + Noise Channel to cut off the transistor for the duration of the impulse noise bursts. The time delay network delays the impulse noise bursts traveling through the Signal + Noise Channel so they arrive at the second RF amplifier in the Signal + Noise Channel at the same time or slightly before the "turn-off" pulses arrive from the Noise Channel. This allows the best noise "blanking" operation.

## Why the Noise Channel Is Tuned to a Separate Frequency

The broad frequency characteristics of impulse noise permit the option of tuning the Noise Channel to a frequency widely separated from the desired RF carrier frequency band. This is an important factor in the operation of the External Blanker and provides an advantage when in-band interfering signals are present. This approach has been used by Collins Radio[2] and by Motorola in several of its VHF low-band (30- to 50-MHz) commercial radio models. Motorola uses the name "Extender™" to refer to its noise blanking circuitry.

Because the Extender circuitry operates at the receiver's RF front end frequency range and *not* at the IF, the approach I'll describe for the external blanker is to use the circuitry from the original Motorola equipment and adapt it for operation with a separate receiver. (*Again, note that this approach relies on a separate receiver and no provisions have been made for isolating the external blanker from the feedline in a transceive situation.—ed.*) I've used Extenders from both a VHF Low Band "Motrac" and a "Mocom" 70 (the circuitry is very similar). Either of these model transceivers can often be found in the used/flea equipment marketplace. See "How To Obtain The Basic Circuitry" elsewhere in this article for advice on obtaining Extender circuitry.

## External Noise Blanker Configuration

Figure 3 shows how the external blanker is configured. The following sections describe this configuration.

The Motorola Extender circuitry is contained on two separate circuit boards/assemblies. To minimize the effort asso-

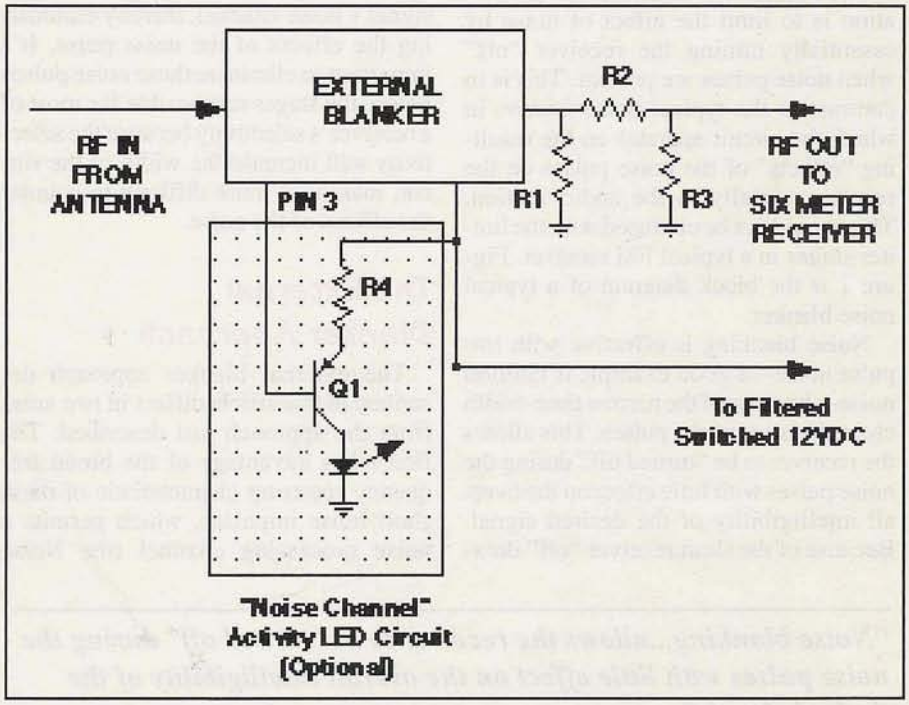



*Figure 3. Configuration of the external noise blanker. See text for discussion.*

ciated with this project, I did not remove the circuitry from the original Motrac receiver, but I did remove all receive channel crystals after the circuitry was retuned. The Motorola receiver is not that large and, by not removing the Extender circuitry, you minimize the possibility of damaging the subassemblies or interconnect wiring.

The power and Extender control wiring can be traced from the main power connector of the transceiver. The RF input to the receiver comes from the T/R relay. RF output from the front end is taken from the last tuned circuit, which normally would be a single-wire output going to the input of the first mixer of the Motrac. I disconnected this wire and connected the inner conductor of a short piece of small-gauge coax cable in its place (see Figure 4).

## Output Attenuator

At the output of the external blanker is a resistive attenuator (R1, R2, and R3 in Figure 3). The attenuator compensates for the gain in the Signal + Noise Channel to minimize front-end overload of the following 6-meter receiver. The amount of attenuation you'll want to use will depend on the sensitivity of your receiver. When using the External Blanker with a mobile scanner receiver, which wasn't particularly "hot" on six, 0 dB of attenuation provided the best overall operation. When operating with my base antenna and a "hot" RCA commercial receiver, approximately 6 dB of attenuation provided the best trade-off between sensitivity and overload/spurious operation.

Experiment to find the best attenuation value for your set-up. I used the attenuator tables in the *ARRL Handbook* for the individual resistor values[3].In general, I'd rather have a little extra overload protection compared to the highest gain with the likelihood of overload and possible noise blanker desensitization.

***"...the broad frequency spectrum characteristic of these short noise impulses...permits a noise processing channel (the Noise Channel) to be tuned to a frequency several MHz away from the desired listening frequency (the Signal + Noise Channel)."***

## Tuning the External Blanker

Checking out and tuning the external blanker circuitry is most easily accomplished while it's still located in the "donor" radio. The donor transceiver manual is essential in helping you fix any problems you may encounter with operation of the circuitry. Basically, after the receiver is tuned and operational, the noise processing channel (Extender) in this vintage of radios is tuned to a noise sampling frequency sufficiently removed from both the desired operating band and the LO (local oscillator) frequency of the commercial transceiver. This is done to avoid additional interference.

You may choose any frequency in the 44- to 51-MHz range, but avoid tuning the Noise Channel to within approximately 2 MHz of the desired RF signal frequency range. This is necessary to prevent strong local signals from activating the Noise Channel and desensitizing the Signal Channel (which is why we're using separate frequencies in the first place). In the event of interference, the Noise Channel can be tuned to a clear channel without any change in performance of the Signal + Noise Channel. I found 45 MHz to be a good frequency in my area, but you should avoid any frequencies with high activity levels and/or strong signals. Especially avoid the 46- to 49-MHz cordless telephone/baby monitor frequencies!

## Be Prepared to Troubleshoot

The Motrac I used was a gift from an old amateur friend who hadn't used the radio in over 20 years. I really doubted that the transceiver would still work,

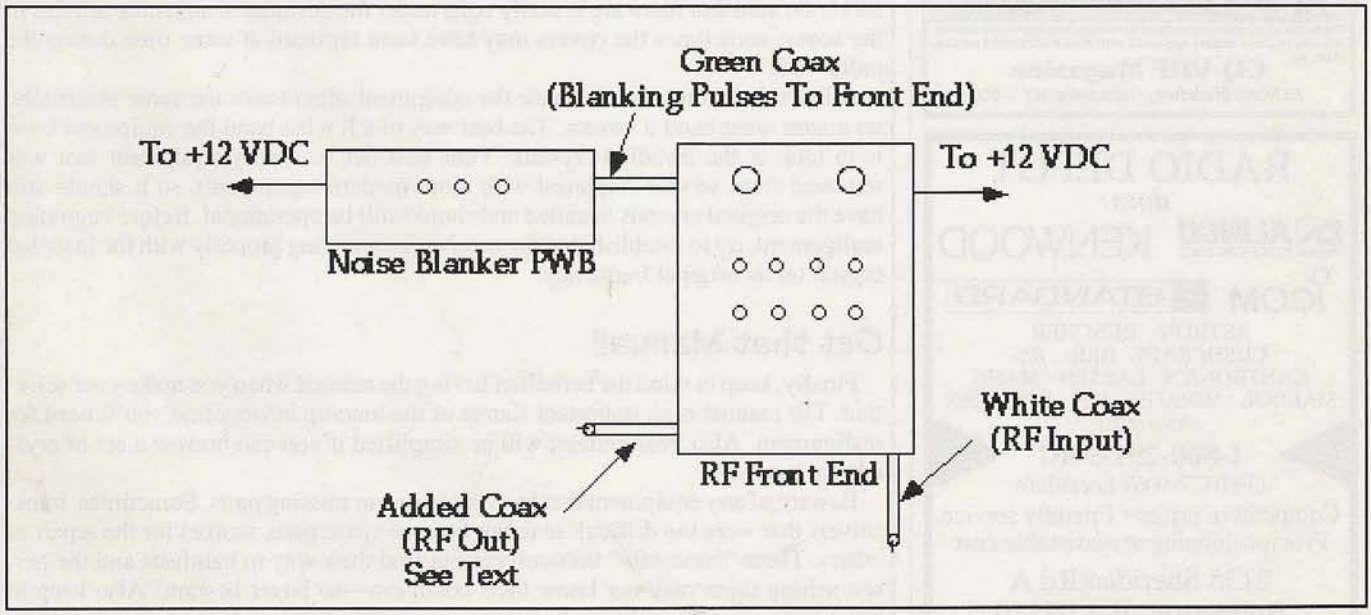



*Figure 4. The Motorola "Extender" circuit is connected in parallel with the antenna feedline of your 6-meter transceiver. This must be kept isolated from any transmitted signals.*

***"It wasn't long until I heard [a noisy signal on my receiver without the noise blanker]. Switching to the Motrac with the Extender, I was delighted to hear a significant reduction in noise."***

especially since it had spent the last 10 years in my friend's damp basement. The radio literally smelled of mildew and other unpleasant odors when I first got it. To my surprise, though, the receiver and transmitter were completely operational when checked out, but the Extender didn't work. After some straightforward troubleshooting guided by the Motrac manual, I found the problem was that no +12 Vdc was getting to the Extender.

After correcting this, I gave the Extender Channel RF amplifiers a quick touch-up on their original frequency, touched up the Extender Channel gain control and hooked up the antenna. I connected the Motrac with Extender and my base 6-meter FM transceiver to an antenna "A/B" switch and waited (listening without the Extender in line) for a noisy signal on 52.525 MHz. It wasn't long until I heard one. Switching to the Motrac with the Extender, I was delighted to hear a significant reduction in noise.

Several days later, I made the same comparison and was surprised that the Motrac was now showing significantly less sensitivity during the signal comparison; that is, until I turned the Extender circuit off. A subsequent investigation showed that a nearby baby monitor had been turned on and its full quieting signal was—guess where?—right on the Extender's noise sampling channel. The net effect of this strong signal was to essentially activate the noise blanking circuitry continuously, with a resulting major reduction in receiver sensitivity. The Extender was doing exactly what it was supposed to do! A move to a different noise sampling frequency solved the interference problem.

I offer this description to help you understand how the noise blanking circuitry works and the importance of selecting a relatively "clear" sampling frequency. If you encounter severe broadbanded noise, you may want to just turn off the External Blanker. In the Motrac and Mocom 70 receivers with Extender circuitry, there's a level-sensing circuit after the second mixer which senses when a very strong "on-channel" signal is present and, in turn, provides a "turn-off"

## How to Obtain the Basic Circuitry

The circuitry described in this article has been used by Motorola in several of its commercial radios, notably the Motrac and Mocom 70. The circuitry of both radios is very similar, and either of these models can usually be found at hamfests. The Motrac is more common, though, so the rest of this section will focus on that model.

### Equipment Identification

Used Motorola Low Band VHF commercial equipment typically covers 25 to 50 MHz and is usually subdivided into four "band splits": 25 to 30 MHz, 30 to 36 MHz, 36 to 42 MHz, and 42 to 50 MHz. Select "high split" 42 to 50 MHz equipment.

The Motrac radio I used was a type U41HHT-1400. The U41HHT/U51HHT series transmitters were typically entirely tube and the U41LHT/U51LHT series was part tube, part solid-state. On Motracs, the -XXXX numbers provide an indication of the radio's configuration. A complete review is beyond the scope of this article but the important part is that a -14XX or -34XX, where XX can vary, should designate a Motrac which contains Extender circuitry. (A similar numbering sequence is used for the Mocom 70 series, but the -14XX or -34XX designation significance *does not* apply[4].)

Another good indication that the radio has Extender circuitry is that the RF front end has a high number of tuning adjustments, usually designated L801 through L811. Be sure that there are actually coils under the designated adjustment holes in the cover; sometimes the covers may have been replaced at some time during the radio's life.

All of this is important because the equipment often looks the same externally, no matter what band it covers. The best way to tell what band the equipment is on is to look at the installed crystals. Your best bet is usually equipment that was removed from service (replaced with more modern equipment), so it should still have the original crystals installed and should still be operational. Before beginning realignment, try to establish that the receiver is operating properly with the installed crystal on its original frequency.

### Get that Manual!

Finally, keep in mind the benefit of having the manual when you make your selection. The manual is an important source of the tune-up information you'll need for realignment. Also, realignment will be simplified if you can borrow a set of crystals for tune-up.

Beware of any equipment that has visible rust or missing parts. Sometimes, transceivers that were too difficult to repair became spare parts sources for the repair of others. These "bone-pile" transceivers can find their way to hamfests and the person selling them may not know their condition—so buyer beware! Also keep in mind that you really only need a functional receiver front-end, so some risk may be acceptable if the price is right!

signal to the Extender noise channel RF amplifiers, effectively and automatically disabling the Extender.

In general, I leave the external blanker off until I hear a noisy signal on which I want to improve copy. This saves power and reduces the chance of inadvertent receiver desensitization from the external blanker. After all, if the signal is strong enough, you probably won't need the noise reduction help!

## Alignment Tips/ Alternate Alignment

The tuned circuits in the "time delay network" section can be difficult to shift more than a couple of megahertz in frequency. Follow the manual's instructions for presetting the inductor slugs. Be careful when tuning the slugs (they can be fragile) and try to use a non-metallic tuning tool as well. If necessary, follow the manual's suggestions for tuning separate sections of the tuned circuits at a time until they are all close enough in frequency to allow a normal tune-up. The best way I've found is to gradually "walk" the front end tuned circuits to the new operating frequency range, moving a couple of MHz at a time and retuning for peak signal at each new frequency until you've arrived at the desired sampling frequency.

## Summary

The 6-meter amateur band is very susceptible to interference, especially man-made ignition and power line noise. The receivers in many recently manufactured amateur 6-meter FM transceivers don't have noise blanking circuitry. Normally, the addition of noise blanking circuitry requires major receiver modifications. But by using the external circuitry described in this article—most of which is taken from commonly available used commercial radios—you can enjoy the benefits of a noise blanker without making any changes at all to your transceiver's circuitry. ■

Notes:

1. Motrac Manual #68P81001E30, 40 & 60 W RF Power, 25–50 MHz + 12 Volt Systems, ©1969, Motorola, Inc.
2."Evasive Noise Blanking," Mark Mandelkerm, *QEX* (ARRL), August 1993.
3. 1990 *ARRL Handbook*
4 Mocom-70 Manual #68P81008E75, 25–50 MHz, 50 W & 90/100 W RF Power, ©1975, Motorola, Inc.
"Motrac," "Mocom," and "Extender" are trademarks of Motorola, Inc.




# Two Responses to Our July "Q&A"

## Gear for Backpacking

Dear *CQ VHF*:

In your July "Q&A" column, reader Brad Husberg, KLØER, asked about antennas to use while backpacking in Alaska. I would like to suggest that he contact Antennas West, (P.O. Box 64590, Provo, UT 84605; 1-800-373-8425), which offers two of the products that he needs. Your article suggested he build a 2-meter wire antenna. Since he was buying a 2-meter/70-centimeter radio, he would have to use two different wire antennas for those frequencies. Antennas West offers a dual-band J-Pole antenna which will fit in an eyeglass case—perfect for backpacking.

They also have a small 11" X 6" solar panel (12-volt, 5-watt) which would also be perfect for backpacking. Imagine charging your HT while hiking by attaching the panel to the outside of your pack! I do not feel that you could carry enough AA alkalines to make a difference and imagine having to backpack out with a bunch of dead batteries to dispose of back in civilization.

Lewis Miller, KF4GHV
Louisville, Kentucky

## Duplexers, Diplexers, Perplexers...

Dear *CQ VHF*:

I believe that the answer to the duplexers and triplexers "Q&A" question in the July 1997 issue of *CQ VHF* is partially incorrect.

The November, 1996, *CQ VHF* article titled "The Duplexer and Triplexer Connection" may have continued some of the present confusion about the devices being sold today—such as the MFJ-916—that are commonly called "duplexers." The article properly describes the device that allows you to interconnect two devices operating on *different* bands to a single antenna, or that can be operated in the reverse manner, but incorrectly calls it a *duplexer*. This device is more accurately called a *diplexer*. (The November article does properly refer to the device that interconnects three bands and devices as a "Triplexer.") Let me try to explain the difference:

A *duplexer* is the device that is commonly used in many repeaters to interconnect the receiver and transmitter to a single antenna, generally operating in the *same* frequency band. It usually contains a series of cavities that provide a high degree of isolation between the receiver and transmitter.

A *diplexer* provides a similar degree of isolation between the two devices connected on *different* bands but accomplishes it in a much easier way, allowing it to be priced much more reasonably.

It does appear that, for some reason, the manufacturers of amateur "diplexers" are calling them "duplexers," but that does not change what they really are. Continuing to call them "duplexers" will probably continue the confusion.

One part of the Q&A question asked about simultaneously using transmitters into a triplexer. The answer stated that a duplexer with cavities was required for use on separate bands. I believe this answer was incorrect. You can use separate band transmitters using a "diplexer" (see above). An example of this is the specification for the MFJ-916 144/440, which states that "...all ports are 50 ohms and it can handle 200 watts PEP *combined*." I have personally used a diplexer to connect 146-MHz and 440-MHz transceivers to a dual band antenna that sometimes transmit simultaneously in packet operation with no problems.

I hope that this helps to resolve at least some of the confusion!

Bob Witmer, W3RW
Lansdale, Pennsylvania

CQ VHF Ham Radio Above 50 MHz

# Reader Survey—September, 1997

*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 see how far along you are on the road to ham radio/computer "convergence."*

**Circle Reader Service #**

**1. Please indicate whether you have a personal computer in your ham shack:**

| | |
|---|---|
| **Yes** | 1 |
| **No** | 2 |

*If you answered "No" to Question 1, please skip to Question 4. If you answered "Yes," please continue with Questions 2 and 3.*

**2. Please indicate the ham radio applications for which you use your personal computer (circle all that apply):**

| | |
|---|---|
| Radio communication (e.g., packet) | 3 |
| Radio control/programming | 4 |
| Antenna control | 5 |
| Antenna design/modeling | 6 |
| Tracking amateur satellites | 7 |
| Tracking other objects (e.g., APRS, the moon) | 8 |
| Logging/QSLing | 9 |
| Ham-related Internet e-mail | 10 |
| Other | 11 |
| No ham radio-related uses | 12 |

**3. Please indicate which statement below *most closely* reflects your view of the computer's role in *your* ham shack (choose one only):**

| | |
|---|---|
| "The computer... | |
| ... is an integral part of my station." | 13 |
| ... is an important station accessory." | 14 |
| ... is useful, but not really important." | 15 |
| ... does not play a significant role in my station." | 16 |

**4. Please indicate your willingness, if purchasing a new radio within the next five years, to consider buying one which operates *only* through a personal computer (again, only one choice, please):**

| | |
|---|---|
| I would be very willing to consider it. | 17 |
| I would be somewhat willing to consider it. | 18 |
| You'd *really* have to talk me into it. | 19 |
| I don't think so... | 20 |
| No way, no how. That's not radio. | 21 |

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

## What You've Told Us...

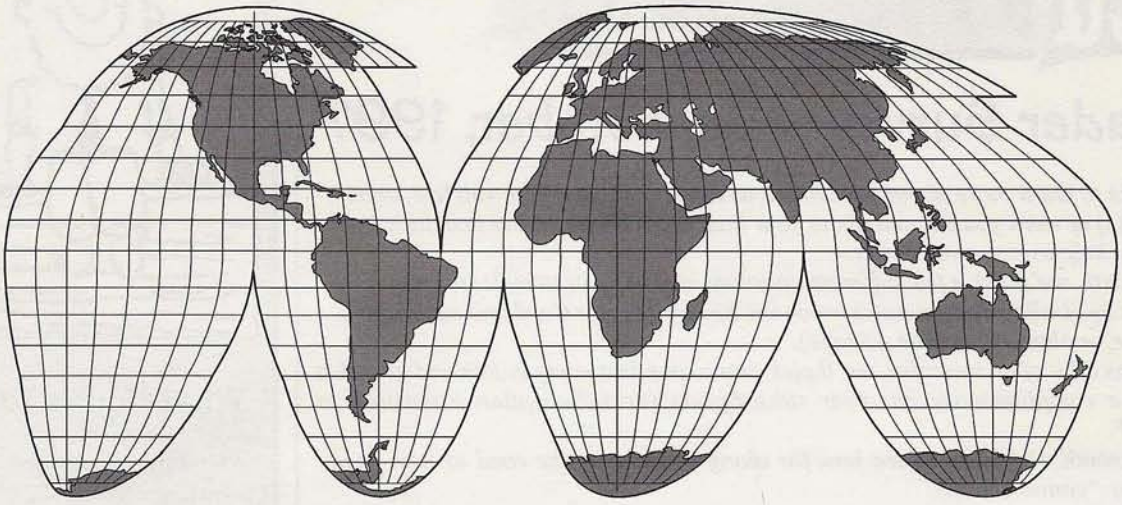
Our June survey dealt with VHF contesting. Nearly 22% said you're either "avid" or "regular" VHF contesters, and 23% more "occasionally" operate VHF contests. Just over a third of you (34%) said "I don't operate VHF contests but would like to someday." Finally, 20% said they had no interest. The pattern continued in the next question, about "general views toward VHF contesting."

Most—even non-contesters—had positive attitudes (you could circle more than one reply, so the numbers add up to more than 100%). Nearly half (44%) said contests challenge operating skills; 41% find them fun and exciting; and 37% each said contests challenge technical skills and help prepare for emergency operating. About one in five (22%) said contests are "OK for other people, but not for me," and 4% consider them "a waste of time and frequency space."

On the question of how current major VHF contests are structured, nearly half said they either don't know (30%) or don't care (13%). Among those offering opinions, 40% felt there should be more encouragement of FM activity; 27% said they're basically fine but need some tweaking; another 25% said "they ain't broke, don't fix 'em," and only 7% agreed with proposals to limit contests to SSB and CW.

Finally, 36% of you would like to see single-mode contests; 28% would like credit each time you contact a station on a different mode; and 24% would like to see long-duration (more than a weekend) competitions.

This month's winner of a free one-year *CQ VHF* subscription is Joe Simmons of Dayton, Ohio. As always, thanks for sharing your views with us.



# DLØART/AM: A Mini-Satellite over Germany

A balloon launch in northwestern Germany gave hams in five countries over an hour to make contacts via a "Mode B" transponder.

By Oliver Welp, DL9QJ/N3NSF*

Well, we did it again...the fifth launch of our balloon DLØART/am (aeronautical mobile) was on 18 May, 1997. The main feature of this flight was the Mode B transponder (432-MHz SSB uplink, 144-MHz SSB downlink), which worked quite nicely, and many hams took the chance to use it. Our group doesn't really have a name—we're just a small local amateur radio group in Münster, Germany, that enjoys flying ham radio balloons. This is the story of our fifth flight.

## What Went up...

The payload for this flight included two 2-meter beacon transmitters (one for telemetry and the other sending the call-sign and general information), receivers on 70 centimeters and 10 meters for remote control of certain functions, and a Mode B transponder for hams all over our part of Europe to use for making contacts (See "The DLØART Payload—the Details" for information about power, antennas, etc.).

The balloon had an 8.5-foot diameter when inflated and used hydrogen gas for lift. A remotely controllable valve allowed us to vary the amount of gas in the canopy to either reduce the lift or begin the touchdown procedure. The total weight of the package was about 4.7 kilograms, and descent was slowed by an 8-foot-wide parachute.


## The Balloon Team

Our balloon team was organized by function, with two ground control stations, two DF (direction-finding) control stations, and two two-man DF teams. Ground control was handled by Armin, DF1QE, and Fritz, DF9XE, while Joachim, DL3YBQ, and Ralph, DG3YEI, coordinated the DF effort. The DF teams consisted of Norbert, DL1YBR, and this reporter (Oliver, DL9QJ) on one team, plus Wilhelm, DG5YGF, and Kurt, DD3QQ, on the other. The DF teams kept in touch via repeater Osnabrueck, DBØCO (R 75).

## Launch Day

The balloon team met at 10:30 (all times UTC) on the morning of 18 May.

**Oliver Welp, DL9QJ/N3NSF, helped track the DLØART balloon during flight and after it touched down. He lives in Münster, Germany, and is a member of the Münster ballooning group.*

## The DLØART Payload In Detail

The amateur radio payload on flight #5 consisted of:

- A telemetry beacon transmitter, operating on 145.200 MHz with 2 watts into a ground plane antenna;
- A CW beacon transmitter, powered by five "D" cell batteries, sending out the station's callsign and some information text, with 100 milliwatts to a turnstile antenna;
- The Mode B transponder, operating in SSB and CW, with an uplink on 432.570 MHz and a downlink on 144.470 MHz, +/- 20 kHz, depending on the Doppler shift (*Note: the term "Mode B" is slowly being replaced by the designation "Mode UV," for UHF up and VHF down.—ed.*). The transponder also had a CW beacon transmitting on 144.470 MHz. Transmitter power for the transponder was 2.5 watts, and it used "big wheel" antennas for both 2 meters and 70 centimeters.
- Additional receivers for remote control on 70 centimeters and 10 meters. A ground plane antenna was used on 70 centimeters, and a quarter-wave vertical was the 10-meter antenna. The 10-meter receiver was not used during this flight.

## Table 1. Flight Data

| | Launch | 14:35 h | 15:55 h | Touchdown |
|---|---|---|---|---|
| **Altitude** | 280 ft | 12,125 ft | 12,700 ft | (885 ft) |
| **Outside Temp.** | 74°F | 22°F | -5°F | 46°F |
| **Inside Temp.** | 90°F | 82°F | 23°F | 22°F |
| **Battery Voltage** | 14.177 | 14.311 | 14.218 | 14.059 |

*The above values are believed to be accurate, but the author can't be certain, due to telemetry problems during the flight.*

We arrived at the launch site in Münster-Nienberge (JO32sa) by 11:15 and put in a phone call to air control Duesseldorf, which OK'd the launch.

We then started filling the balloon and attached the payload. It took nearly half an hour to inflate the balloon enough to get a sufficient lift rate. When filling was complete, we tested the transponder (it worked) and switched on the telemetry beacon (which also worked).

At 12:10, we called Duesseldorf again to announce the launch, and the balloon lifted off at 12:14. Two minutes later, the balloon was already at an altitude of 3,065 feet. About 20 minutes after launch, we began having problems decoding the telemetry, and it became obvious at this point that the telemetry data were invalid.

The balloon itself caused another problem. I think we got a very old balloon this time, and, because of that and some not very professional handling during the launch preparations, we were not able to open up the gas valve to get the balloon to land and it burst instead. The balloon burst at 13:55, and, for some reason, the telemetry data seemed valid again. The balloon touched down (crashed, actually) at 14:00, an hour and 46 minutes after liftoff.

The DF teams headed toward the landing site, stopping every 15 minutes to take new readings. On previous flights, we took readings every 10 minutes, but stretched it to 15 this time to give the DF teams a better chance "to make more miles." Even so, the 15-minute periods still seemed a bit short.

We found out later that the balloon hit the roof of a farmhouse near the city of

***"The payload for this flight included two 2-meter beacon transmitters...receivers on 70 centimeters and 10 meters for remote control of certain functions, and a Mode B transponder for hams all over our part of Europe to use for making contacts."***

## Table 2. DL9QJ/m's Transponder QSOs

Here is the log of DL9QJ/m's transponder QSOs (all contacts SSB, using an ICOM IC-820H and mag mount vertical antennas) All callsigns beginning with "D" are in Germany. Locations of other stations are as noted:

| UTC | Call | QTH | Name |
|---|---|---|---|
| 1250 | DD7LP | | |
| 1252 | DK6OO | | |
| 1255 | DG5AAE | | |
| 1255 | DL3KBH | | Uwe |
| 1310 | DG0ODA | Thueringen | Daniel |
| 1313 | DK1QJ | | Dieter |
| 1315 | ON6UG | Belgium | Freddy |
| 1320 | DB7EK | JO31BS | Daniel |
| 1318 | DG9BHV | | |
| 1325 | DK1KR | | |
| 1340 | HB9RDE | Switzerland | Rolf |
| 1342 | DK3WG | | |

Greven (JO32tc) and broke a tile (it was already fixed when we came to the house, but the place could still be recognized by the red color left by the balloon). The owner was a bit surprised (only a bit, though), and, since he read something about "explosives" on the package, called the police. The officers (almost correctly) recognized it as a weather balloon and took it to the Greven police station (was it arrested?!). From there, they called Armin, DF1QE, on his cellular phone since his number was written on the boxes. Shortly after that, we were able "recover" the equipment...and the beacons and transponder were transmitting when we arrived at the police station.

## Telemetry Problems

We had never had problems with telemetry on previous flights, but this time we had trouble both during final testing and during the flight. The information received between 12:35 and 13:55 UTC was clearly incorrect, so the telemetry data were not very useful this time. The figures in Table 1 show data that appeared to be correct at various points during the flight, but they may not be completely accurate. We think the telemetry problem was due to the very difficult flight conditions: the balloon got into a thunderstorm, which meant both high humidity and low temperature.

## Better Luck with the Transponder

The transponder was a big success and worked better than expected, even though we got a report (after the flight) that we were causing some intermodulation on the 2-meter band. But the device had never been tested under "real" conditions. Before the flight, we were afraid that the transponder would be hardly used since, during our final test, we did not find any stations that were able to help us in testing (seems that not very many people have all-mode equipment for 2 meters and 70 centimeters). But we were wrong. Once the flight was under way, the transponder was very busy, sometimes sounding almost like a contest. Among others, stations from all over Germany, from Belgium, Switzerland, the Netherlands, and Great Britain were able to use it (see Table 2 for the author's log).

Our second beacon (144.987 MHz) had problems with frequency stability, as it had during our second flight. Its deviation caused problems on FM repeaters on R0 (input on 145.000 MHz) and kept them open. Again, the reason seems to be the flight conditions: we had the same weather during our second flight when the same problem occurred. Of course, we regret any inconvenience caused by that fault!

***"Once the flight was under way, the transponder was very busy, sometimes sounding almost like a contest....Stations from all over Germany, from Belgium, Switzerland, the Netherlands, and Great Britain were able to use it."***

## Grounded?

The DLØART/am team hopes that all of you who participated enjoyed this experiment, as well as our previous flights. We regret that we have to terminate the project now, due to a substantial lack of man power (the same two or three people were always doing all the work) and —the main reason—limited financial resources (for example, insurance for each flight is DM 500.00/U.S.$ 300.00). We are just a small local amateur radio group and no longer able to put our money into this project.

But then again, we have a working transponder, a somewhat rare commodity. So maybe you will hear of DLØART/am again, perhaps flying on another group's balloon.

We might also launch a captive balloon during our annual Field Day (OK, a few hundred feet is much less than we had on this flight, but northern Germany is quite flat, and it would provide a chance for some nice QSOs). An alternative would be the flight of a manned hot air balloon, on which the transponder could be a piggyback passenger.

## Pse QSL

If you heard our signals, please send a QSL via packet radio, the Internet, or the DX QSL bureau—all will be answered with our DLØART/am QSL cards! Plus, any suggestions or comments are always welcome! More information about DLØART/am (including pictures!) can be found on the Internet at <http:// buene.muenster.de/darc/artob/homebale.htm>. *(The resolution of the photos wasn't high enough to look good in print, but they look fine on the Web page.—ed.)* ■

Letters *(from page 12)*

ing for a club by state, ARRL section, or —my personal favorite—within 20, 50, or 100 miles of any Zip code you specify.

Try it! It's fast and fun. And while you're at the ARRL Web site, check out the latest news about amateur radio in *The ARRL Letter*, which is posted weekly. 73,

David Sumner, K1ZZ
ARRL HQ

*K1ZZ is Executive Vice President of the ARRL*

Dear *CQ VHF*:

For several issues now you've run a sidebar entitled "Finding a Radio Club." I'd like to suggest a new idea, aimed at club officers: "How to Acquire New Members," Or, perhaps, "How Not to Tick Off Potential Members and Make Potential Enemies."

The number one suggestion should be *answer potential members' correspondence*! I sent letters asking about the club, *along with SASEs* to at least six local clubs listed on the ARRL's homepage.

That was more than a month ago. Since then, I've received only one (albeit very nice) response.

What happened to the rest? How much effort does it take just to drop a note into my pre-addressed, pre-stamped envelope, lick it closed and throw it into a mailbox? What's wrong here? Is it me? Do they not like my call or something? Did I use the wrong color ink? I could develop a complex, you know. Are they going to pay for the therapy? Even if they don't want me as a member for some funny reason, at least have the common decency to tell me so.

By the way, I love your magazine. It fits quite nicely into the space between *PopComm* (too basic and broad for me) and *CQ* (too technical for me). You will soon count me among your subscribers.

Rich DeSanno, KC2AGH

P.S. Thanks to Diane, K2DO, Of LIMARC for the personal note and the timely response. I'll be in touch soon about joining your fine radio club.

*Where's the Incentive?*

Dear *CQ VHF*:

I have been subscribing to this magazine from the first issue. As a new ham it has helped me immensely. It is a shame, though, that we as amateur operators spend so much time and effort trying to eliminate the code requirements instead of trying to learn it. When I first got into amateur radio, my understanding was that the reason for the testing we take to advance our license class was due to incentive licensing. What incentive does an amateur have if things are given to us? I thought this whole hobby was based on incentive licensing!

If someone has a medical problem with hearing, I see nothing wrong with a waiver, but only for that reason. I have worked hard at this hobby. I have been licensed for about 26 months and have advanced to an Advanced class operator, but I had some *incentive* to do it! I still enjoy SSB, but there still are many hams, including myself, who use CW and it's *fun*. Spend more time at trying to learn it than trying to eliminate it! There are many hams out there willing to help others who want to learn it. Work together not apart. Great magazine, keep up the good work.

73,

Kenneth A. Cavalieri, KB2SCN
Pendleton, New York

# ARRL September VHF QSO Party

Summer's over, but there's still plenty of good propagation available on VHF and UHF to keep the bands hopping during the ARRL's September VHF contest.

Here are the complete rules for the ARRL September VHF QSO Party, courtesy of the ARRL Contest Branch:

1) Object: To work as many amateur stations in as many different 2 degrees by 1 degree grid squares as possible using authorized frequencies above 50 MHz.

2) Contest Period: Begins 1800 UTC Saturday, September 13, and ends at 0300 UTC Monday, September 15, 1997.

3) Categories:

(A) Single Operator: One person performs all operating and logging functions.

(1) Multiband.

(2) Single Band: Single-band entries on 50, 144, 222, 432, 902, 1296 and 2304-and-up categories will be recognized both in *QST* score listings and in awards offered. Contacts may be made on any and all bands without jeopardizing single-band entry status. Such additional contacts are encouraged and should be reported. Also see Rule 9, Awards.

(B) Single Operator, QRP Portable: Run 10-W output or less using a portable power source from a portable location. The intent of this rule is to encourage operation from "remote" locations, not to have home or fixed stations run low power.

(C) Rover: One or two operators of a single station that moves among two or more grid squares during the course of the contest. A rover vehicle may transport only one station using a single call sign; thus a rover may not operate with multiple call signs under the family rule 7 (C). Rover vehicles must transport all the equipment, power supplies, and antennas used at each operating site. This rule is not intended to prevent an operator from using the same call sign to submit separate logs for single operator (fixed station) and rover entries. Rovers sign "rover" on phone and /R on CW after their call sign. All Rovers are encouraged to adopt operating practices that allow as many stations as possible to contact them.

(D) Multioperator: Multioperator stations must locate all equipment (including antennas) within a circle whose diameter does not exceed 300 meters (1,000 feet).

(E) Limited Multioperator: Multioperator stations that submit a maximum of four bands for score are eligible. Logs from additional bands used should be included as checklogs.

4) Exchange: Grid-square locator (see April 1994 *QST*, page 86). Example: W1AW in Newington, CT would send FN31. Exchange of signal report is optional.

5) Scoring:

(A) QSO points: Count one point for each complete 50- or 144-MHz QSO. Count two points for each 222- or 432-MHz QSO. Count three points for each 902- or 1296-MHz QSO. Count four points for each 2.3-GHz-or-higher QSO.

(B) Multiplier: The total number of different grid squares worked per band. Each 2 degrees by 1 degree grid square counts as one multiplier on each band it is worked.

(C) Final score: Multiply the total number of QSO points from all bands operated by the total number of multipliers for final score (see scoring example).

(D) Rovers only: The final score consists of the total number of QSO points from all bands times the sum of unique multipliers (grid squares) worked per band (regardless of which grid square they were made in) plus one additional multiplier for every grid square activated (made a contact from). Rovers are listed in the contest score listings under the Division from which the most QSOs were made.

6) Use of FM:

(A) Retransmitting either or both stations, or use of repeater frequencies, is not permitted. This prohibits use of all repeater frequencies. Contest entrants may not transmit on repeaters or repeater frequencies for the purpose of soliciting contacts.

(B) Use of the national simplex frequency, 146.52 MHz, or immediate adjacent guard frequencies is prohibited. Contest entrants may not transmit on 146.52 for the purpose of making or soliciting QSOs. The intent of this rule

## Scoring Example

| Band (MHz) | QSOs | QSO Points | Grid Squares |
|---|---|---|---|
| **50** | 25 (x1) | 25 | 10 |
| **144** | 40 (x1) | 40 | 20 |
| **222** | 10 (x2) | 20 | 5 |
| **432** | 15 (x2) | 30 | 10 |
| **1296** | 6 (x3) | 18 | 3 |
| **Totals** | 6 | 133 | 48 |

Final score = (QSO points) X (total no. grid squares): (6384 = 133 x 48).

# FULL-FEATURED!

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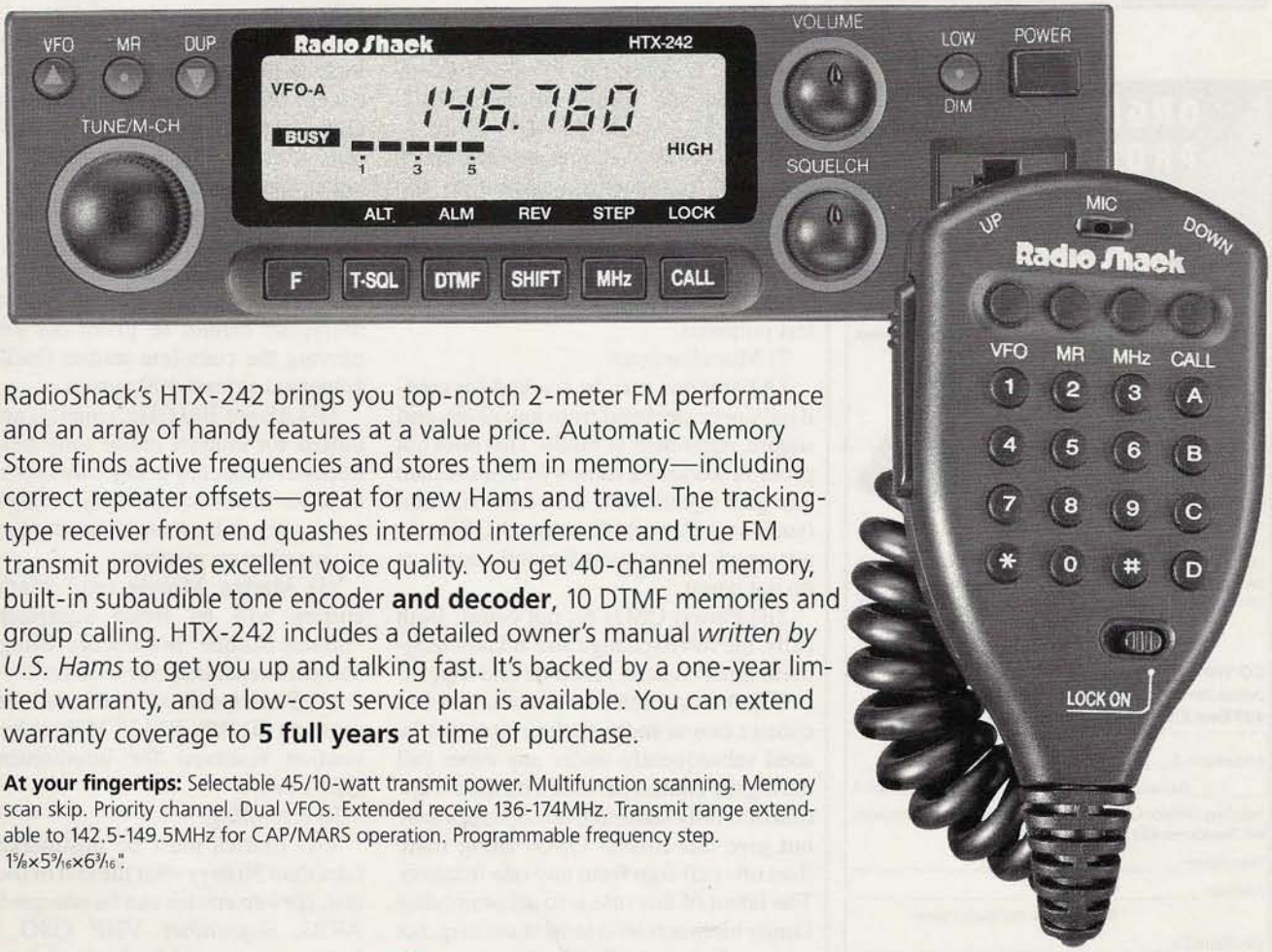


RadioShack's HTX-242 brings you top-notch 2-meter FM performance and an array of handy features at a value price. Automatic Memory Store finds active frequencies and stores them in memory—including correct repeater offsets—great for new Hams and travel. The tracking-type receiver front end quashes intermod interference and true FM transmit provides excellent voice quality. You get 40-channel memory, built-in subaudible tone encoder **and decoder**, 10 DTMF memories and group calling. HTX-242 includes a detailed owner's manual *written by U.S. Hams* to get you up and talking fast. It's backed by a one-year limited warranty, and a low-cost service plan is available. You can extend warranty coverage to **5 full years** at time of purchase.

**At your fingertips:** Selectable 45/10-watt transmit power. Multifunction scanning. Memory scan skip. Priority channel. Dual VFOs. Extended receive 136-174MHz. Transmit range extendable to 142.5-149.5MHz for CAP/MARS operation. Programmable frequency step. 1⅝×5⁹⁄₁₆×6³⁄₁₆".

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CIRCLE 125 ON READER SERVICE CARD

## VHF Participation Pins

Wouldn't it be nice to know that you've qualified for an award during the contest? Would you like to be sure that you will receive an award when you send in your September VHF QSO Party log? Here's an award you can earn, whether you're a first timer or a weathered veteran of the sport. The ARRL is offering a handsome VHF participation pin to qualified participants in the ARRL September VHF QSO Party.

Anyone who makes at least 25 contacts (any mode, any band or any combination) during the 1997 ARRL September VHF QSO Party will qualify for a VHF participation pin. Also, all the individual operators of a multioperator station (that qualify) are eligible for their own pins. The handsome pin is marked with the year, making it a possible collector's item. Wear them proudly in support of the September VHF QSO Party.

To order, include along with your log entry: (1) a mailing label (preferably self-adhesive label). (2) A check or money order for $5.00 for each pin, payable to the ARRL (includes the price of the pin, packaging, padded envelope and postage). Your pin will be shipped after your contacts have been verified and the results printed in *QST*.

is to protect the national simplex frequency from contest monopolization. There are no restrictions on the use of 223.50 MHz.

(C) Only recognized simplex frequencies may be used, such as 144.90 to 145.00; 146.49, .55 and .58, and 147.42, .45, .48, .51, .54 and .57 MHz on the 2-meter band. Local-option simplex channels and frequencies adjacent to the above that do not violate the intent of (A) or (B) above or the spirit and intent of the band plans as recommended in the *ARRL Repeater Directory* may be used for contest purposes.

7) Miscellaneous:

(A) Stations may be worked for credit only once per band from any given grid square, regardless of mode. This does not prohibit working a station from more than one grid square with the same call sign (such as a Rover). Crossband QSOs do not count. Aeronautical mobile contacts do not count.

(B) Partial QSOs do not count. Both calls, the full exchange and acknowledgment must be sent, received and logged.

(C) A transmitter or antenna used to contact one or more stations may not be used subsequently under any other call during the contest period (with the exception of family stations); one operator may not give out contest QSOs using more than one call sign from any one location. The intent of this rule is to accommodate family members who must share a rig, not to manufacture artificial contacts.

(D) Only one signal per band (6, 2, 1 1/4, etc.) at any given time is permitted, regardless of mode.

(E) While no minimum distance is specified for contacts, equipment should be capable of real communications (i.e., able to communicate over at least 1 km).

(F) Multioperator stations may not include QSOs with their own operators except on frequencies higher than 2.3 GHz. Even then, a complete, different station must exist for each QSO made under these conditions.

(G) A station located precisely on a dividing line between grid squares must select only one as the location for exchange purposes. A different grid-square multiplier cannot be given out without moving the complete station (including antennas) at least 100 meters.

(H) Above 300 GHz, contacts are permitted for contest credit only between licensed amateurs using coherent radiation on transmission (e.g., laser) and employing at least one stage of electronic detection on receive.

(I) Marine Mobile (and Maritime) entries will be listed separately as "Marine Mobile" in the score listings and compete separately for awards.

(J) Participants are reminded that the segment 50.100–50.125 MHz is by convention reserved for intercontinental QSOs only.

8) Reporting:

(A) Entries must be postmarked no later than 30 days after the end of the contest. No late entries can be accepted. Use ARRL September VHF QSO Party forms, a reasonable facsimile, submit your entry on diskette, upload your entry to the ARRL BBS, or send your entry to ARRL HQ via Internet.

(1) Official entry forms are available from HQ in the *ARRL Contest Yearbook*.

(2) You may submit your contest entry on diskette in lieu of paper logs. The floppy diskette must be IBM compatible, MS-DOS formatted, 3.5 or 5.25 inch (40 or 80 track). The log information must be in an ASCII file, following the ARRL Suggested Standard File Format, and contain all log exchange information (band, date, time in UTC, call of station worked, exchange sent, exchange received, multipliers [marked the first time worked] and QSO points). One entry per diskette. An official summary sheet or reasonable facsimile with signed contest participation disclaimer is required with all entries.

(3) You may submit your contest entry via the ARRL BBS (860-594-0306), via Internet to <contest@arrl.org>, or anonymous FTP to <ftp.arrl.org>. Send your summary sheet file (make sure it includes all the pertinent information outlined in the official ARRL summary sheet) and your log file following the ARRL Suggested Standard File Format.

(B) Logs must indicate band, date, time in UTC, calls and complete exchanges (sent and received), multipliers and QSO points. Multipliers should be marked clearly in the log the first time they are worked. Entries with more than 200 QSOs total must include cross-check sheets (dupe sheets).

9) Awards: Certificates will be awarded if the following categories:

(A) Single operator

(1) Top single operator in each ARRL/RAC Section.

(2) Top single operator on each band (50, 144, 222, 432, 902, 1296 and 2304-and-up categories) in each ARRL/RAC Section where significant effort or competition is evident. (Note: Since the highest score per band will be the award winner for that band, an entrant may win a certificate with additional single-band achievement stickers.) For example, if WBØTEM has the highest single-operator all-band score in the Iowa Section and his 50- and 222-MHz scores are higher than any other IA single op's, he will earn a certificate for being the single-operator Section leader and endorsement stickers for 50 and 222 MHz.

(B) Top single-operator QRP portable in each ARRL/CRRL Section where significant effort or competition is evident. Single-operator, QRP-portable entries are not eligible for single-band awards.

(C) Top rover in each ARRL Division where significant effort or competition is evident. Rover entries are not eligible for single-band awards.

(D) Top multioperator score in each ARRL/RAC Section where significant effort or competition is evident. Multioperator entries are not eligible for single-band awards.

(E) Top limited multioperator score in each ARRL/CRRL Section where significant effort or competition is evident. Limited multioperator entries are not eligible for single-band awards.

10) Condition of Entry: Each entrant agrees to be bound by the provisions, as well as the intent, of this announcement, the regulations of his or her licensing authority and the decisions of the ARRL Awards Committee.

11) Disqualification: See Contest Disqualification Criteria for details. ■

# Meet Your Emergency Manager...before the Disaster Hits. Plus: All About APCO

Emergency managers need to know about amateur radio's capabilities before they need our services, so they can include amateur communications in their plans and make the best use of our skills and equipment.

At 7:04 p.m. on September 8, 1994, police in Hopewell Township, Pennsylvania, received a phone call that set in motion an 11-day emergency response involving over 1,000 professional and volunteer disaster workers. The call came from the Green Garden Plaza, a shopping mall in this Pittsburgh suburb, reporting that a plane had crashed behind the mall.

The plane was USAir Flight 427 from Chicago to Pittsburgh. Flight 427's approach to the Greater Pittsburgh International Airport was normal until 23 seconds before the crash, when there was a garbled conversation with air traffic control in the airport tower. When the flight was about seven miles from the airport and at an altitude of 6,000 feet, the plane vanished from radar. The aircraft apparently had rolled to its left, and struck the ground almost vertically at a speed estimated at 260 knots. The high-speed impact of the Boeing 737-300 shattered the aircraft and instantly killed all 132 passengers and crew members.

Although this crash occurred a few years ago, the response by emergency workers—including hams—points out the important role of the incident commander in any disaster, and the need for him or her to be aware of the communication tools that amateur radio operators can provide.

## What Is an Incident Commander?

Under the law in Pennsylvania and many other states, the political jurisdiction in which a disaster (the "incident") occurs is the first responsible party for the emergency management response and recovery effort. So Jim Eichenlaub, the township manager and emergency management coordinator for Hopewell Township (population just over 13,000) became the incident commander for the crash recovery, coordinating a team of over 1,000 emergency workers from all levels of government, plus voluntary agencies (such as the Salvation Army and Red Cross) and other groups involved (such as hams).

There's a long list of items that any incident commander must make happen within hours, or even minutes, after disaster strikes. Working with his assistants, the incident commander has to establish lighting and perimeter control, feed rescue workers, set up a morgue, arrange for decontamination units, deal with biohazards, call in any additional resources that are needed, and provide amenities like portable toilets. In addition, arrangements have to be made for government officials visiting the site and news organizations reporting live from the scene.

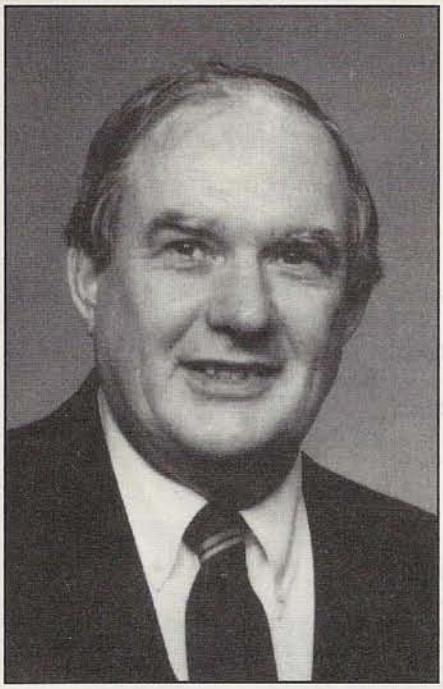
As Eichenlaub arrived on the crash scene in Hopewell Township, he found the roads being blocked by responding emergency units and the curious. Flight 427 had crashed in a difficult terrain, making access a problem. There was also an immediate need for interaction with federal agencies, such as the National Transportation Safety Board, the Federal Bureau of Investigation, and the Federal Aviation Administration. In addition, over 40 large news media vehicles and 300 reporters arrived within 24 hours.

## A Communications Mess

Communications were very difficult during the early phases of the response to the crash, as is the norm in large, fast-breaking emergencies. Emergency service radio communications were quickly swamped. Cellular phones provided only

***"When the cellular phones failed or quick point-to-point communications were needed, (RACES and REACT) teams could succeed."—Pennsylvania Emergency Management Agency***

By Bob Josuweit, WA3PZO



*APCO Volunteer Resource chief Tom Gibson, W3EAG. APCO's Volunteer Resource committee is made up entirely of hams. (Photo courtesy W3EAG)*

***"APCO International's mission ...includes promoting cooperation between towns, counties, states, and federal public safety agencies in the area of communication...a natural merge between the ham radio community and APCO."***

temporary relief until other communications "work-arounds" were made. One of those work-arounds was amateur radio.

An after-action report by the Pennsylvania Emergency Management Agency (PEMA) said:

The vehicle marked "RACES" represents a major communications capability not previously described. RACES—Radio Amateur Civil Emergency Service—uses licensed radio amateurs whose skill and equipment complement other communication means. In addition, REACT—Radio Emergency Associated Communications Team—like the RACES people, use citizen band radio equipment to expand communications. By the time the RACES/REACT teams were moved to the unified command post, they had base stations set up on the hill (crash site) and at the morgue. When the cellular phones failed or quick point-to-point communications were needed, these teams could succeed.

While many responders to this crash thought that the incident couldn't have been any worse, consider this:

• The aircraft nose buried itself in the ground less than 20 yards from a 20-inch high pressure natural gas pipeline that supplies gas for much of the northeast.

• Had the flight continued on the same course for several more seconds, it would have struck very close to a crowded shopping mall.

• A flight of less than four additional minutes would have resulted in a crash into downtown Pittsburgh.

• There is a nuclear power plant less than eight air miles from the impact area.

Whether it was simply luck or divine intervention that averted a much greater disaster, there was no luck involved in the handling of the disaster that *did* occur. Its success depended entirely on training, planning, and practice by all involved. And the overall recovery effort won high praise from veteran federal officials.

## The APCO Connection

In a disaster such as this, or any emergency, amateurs come into contact with the *emergency manager*. Educating these emergency managers about ham radio's capabilities is an important part of our "before disaster strikes" responsibilities. Many emergency communications personnel belong to APCO (Association of Public Safety Communication Officials) International, Inc. To gain a better understanding of APCO and its relationship with ham radio, *CQ VHF* spoke with Tom Gibson, W3EAG, chairman of APCO's Volunteer Resource Committee.

Gibson explained that APCO International is made up of emergency medical, law enforcement, fire, and other public safety communication personnel whose primary responsibility is the management, design, maintenance, and operation of communications facilities in the public domain. APCO's membership comes not only from traditional government agencies, but also from the U.S. Forest Service, colleges and universities, the military, and equipment manufacturers.

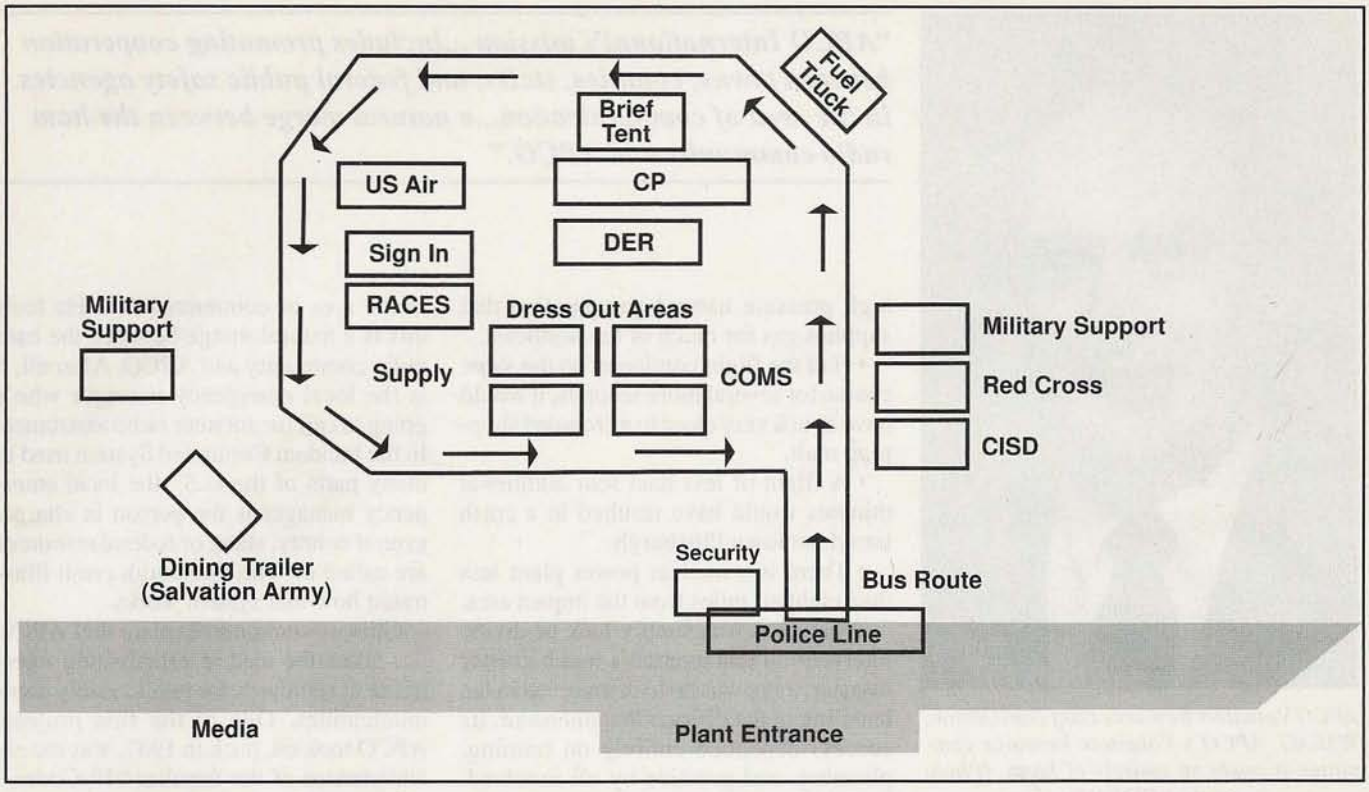
APCO International's mission, according to Gibson, includes promoting cooperation between towns, counties, states, and federal public safety agencies in the area of communication. He feels this is a natural merge between the ham radio community and APCO. After all, it is the local emergency manager who's going to call for amateur radio assistance. In the Incident Command System used in many parts of the U.S., the local emergency manager is the person in charge, even if county, state, or federal resources are called in. The Pittsburgh crash illustrated how that system works.

Gibson went on to explain that APCO has taken the lead in establishing international standards for public safety communications. One of the first projects APCO took on, back in 1937, was the establishment of the familiar "10-Codes." A project that APCO is currently working on involves addressing the problems associated with the emergence of wireless communications systems and their impact on the abilities of enhanced 9-1-1 services.* The organization is also reviewing other "N-1-1" usage, such as 3-1-1 for non-emergency calls. APCO also provides frequency coordination for police and local government users below 800 MHz and all public safety users above 800 MHz.

## Coordinating with Volunteers

To meet the objectives of the organization, Gibson said, APCO has several committees. His Volunteer Resource Committee defines areas of mutual cooperation between APCO and such volunteer service groups as the American Radio Relay League (ARRL), the American Red Cross, and the Salvation Army. It also recommends procedures for mutual aid during disaster situations and establishes contact points. Perhaps not coincidentally, APCO's Volunteer Resource Committee is made up entirely of hams. Gibson is a past Director of Communications for Montgomery County, Pennsylvania, just outside Philadelphia, and he currently serves as the county's RACES Radio Officer and ARRL Emergency Coordinator.

* Enhanced 9-1-1 services provide emergency dispatchers with the phone number and address from which a 9-1-1 call originates. Calls from cellular phones and amateur radio autopatch systems are often difficult to locate.




*Aircraft Incident Command Post structure, including RACES operations. Courtesy Pennsylvania Emergency Management Agency (PEMA).*

At the 63rd APCO International Conference last month, Gibson spoke about volunteer resources, their importance, and how to use them. He discussed the use of amateur radio, RACES, and ARES (the ARRL's Amateur Radio Emergency Service), as well as interaction during emergency situations with other volunteer organizations, such as the Red Cross and the Salvation Army.

Gibson explained how hams were used in major disasters like Hurricane Andrew and the recent midwest flooding. He also spoke about areas in which APCO members could help train ARES and RACES members to be more effective communicators when working with public safety officials.

These areas include:

1. Emergency response vehicle numbering system (police, fire, and EMS).
2. Names of political subdivisions and any numerical, or other special designation for them used by the dispatch agency.
3. Ten-code, if used, or standard terminology for clear speech, if used.
4. Names and business telephone numbers of emergency management officials.
5. Emergency room information, including hospital names, locations, physician in charge, and telephone number.
6. Frequencies of all emergency response agencies.
7. Emergency Medical Service Patient classifications.

Gibson based these topics on his own experience in the Philadelphia area, but noted that there would most likely be other topics in other parts of the country.

## Public Service Reports

### Twisters in Texas

As reported briefly in last month's "VHF News" (August, 1997, *CQ VHF*), emergency managers in Texas relied on amateur communication as deadly tornadoes struck the Austin area on May 27. Hardest hit—with 33 fatalities—was the town of Jarrel, about 35 miles north of Austin. According to radio operators on the scene, one of the most difficult jobs was giving directions. One operator said, "How do you give directions around town when the street signs are down and there's nothing left but concrete slabs?"

The Pedernales area, west of Austin, had a Southwestern Bell switching office totally destroyed, leaving about 5,000 phone lines out of service. Telephone service throughout the Austin area was bogged down by the extremely heavy calling volume. To make matters worse, a trunked radio system recently installed by Williamson County, north of Austin, suffered a computer failure, knocking it out of service for the entire evening of the 27th. Fortunately, the county had some of its older radios in inventory and quickly rushed them into service.

***"How do you give directions around town when the street signs are down and there's nothing left but concrete slabs?"—comment by a ham after a tornado swept through Jarrel, Texas.***

Within an hour after the tornadoes struck, three amateur nets were in operation. One weather net operated to watch for more severe weather (and although storms stayed in the area for several hours, none of the later ones turned out to be severe). Travis County ARES operated a tactical net for the immediate Austin area and Williamson County ARES operated another for areas to the north. These nets

dispatched radio operators to provide communications to work with the Red Cross at shelters, at the incident sites, at Red Cross headquarters and at the two Emergency Operations Centers. ARRL District Emergency Coordinator Joe Fisher, K5EJL, said the limited range of Red Cross radios meant some hams had to shadow Red Cross officials and help with communication when needed.

At one point, the Austin emergency medical services director was unable to reach the hospital in nearby Georgetown, Texas, by telephone to find out the condition of the hospital and whether it could receive and treat storm victims. Fisher said a ham was sent to the hospital and was able to relay the needed information the 25 miles back to Austin.

Williamson County Emergency Services Director John Sneed said the hams "were very instrumental in continuing to provide us the communications throughout the entire county during the tornado. They were able to help us as far as getting information from the tornado scene." (Info via NVOAD, the National Association of Volunteer Organizations Active in Disasters, and ARRL)

## Makani Pahili '97

Oahu amateurs participated in the annual Hawaii Hurricane Exercise, Makani Pahili '97, held over several days. The drill simulated preparations made during the approach of a hurricane and the hurricane's immediate aftermath.

The exercise involved multiple agencies throughout the islands, including Civil Defense, state and city governments, private and non-profit agencies, and the military. The exercise allowed each group to update and practice its emergency response plans.

Amateur radio operators provided communications for the island of Oahu, the Healthcare Association of Hawaii and the National Weather Service. At least 40 hams actively participated on Oahu alone, many of them taking vacation from their jobs or changing their work schedules to be part of the exercise, which was held on weekdays when most people would be working.

## Preparedness Nets

About 72 hours before the simulated hurricane's expected impact, Oahu RACES officials conducted extra nets at 7:30 a.m. and noon, and gave updates on the evening nets as they would do during the approach of an actual hurricane. These nets were used to give updates on exercise participation, but, in an actual hurricane approach, would be used to check availability of operators and to position hams in key locations prior to the expected impact.

Two days later, Skywarn conducted its drill from the National Weather Service offices in the Manoa valley. The simulated hurricane-related messages soon became actual messages as a severe rainstorm swept over Oahu that afternoon. This, combined with equipment problems, created a more challenging afternoon than anticipated.

The next day, Oahu radio operators, along with others across the state, participated in the portion of the exercise simulating the aftermath of the hurricane. Hams in Oahu manned stations at Oahu Civil Defense, State Civil Defense, six Oahu health care agencies, the Waikiki Hotels Emergency Operating Center, First Hawaiian Bank, and Ko Olina resort. There were additional hams operating as Net Control Stations and relay stations outside these institutions, plus others simulating positions, such as a Civil Defense District EOC, a public evacuation shelter, and individuals sending messages. For this exercise, they used voice communication only (no packet) on both VHF and HF frequencies.

## Permanent Ham Stations

Six Oahu health care agencies now have an amateur radio station permanently located in their facilities and each had its station in operation for this exercise. They participated as part of the Healthcare Association of Hawaii's Mass Casualty Exercise, passing messages given to them by their hospital's emergency operating center or originating with the healthcare association's exercise coordinator.

They operated their own VHF net, using the repeater at St. Francis Medical Center (145.49 MHz), with NCS located on the 28th floor of the First Hawaiian Center Building in downtown Honolulu. Stations were sent to simplex frequencies to pass the messages. During part of the exercise, the repeater was turned off to simulate the possible operating conditions in a real emergency. Net operations continued, almost without interruption, under control of the NCS, on the group's alternate simplex net frequency. Several long-time hams have commented that this was the best-run practice net they have heard on Oahu in 20 years.

***"The simulated hurricane-related messages soon became actual messages as a severe rainstorm swept over Oahu that afternoon. This, combined with equipment problems, created a more challenging afternoon than anticipated."***

The group operating from Oahu Civil Defense and the "hospital hams" each held an evening critique session to assess how they did, share their ideas and experiences, and identify weak areas. Each group identified two or three priority areas on which to focus during the upcoming year. The Oahu hospital group priorities were a) developing more operators and b) incorporating packet radio into the standard operations. The Oahu RACES group will focus on training and obtaining equipment and supplies to make their system more flexible and more organized for the high volume of traffic which can be expected at the Emergency Operations Center. (Info from California Office of Emergency Services Auxiliary Communications Service news-letter; reprinted with permission.)

## Be Part of the Program

The examples in this month's column show not only how helpful hams can be in providing communications during emergencies and disasters, but also how important it is to be sure that emergency management officials are familiar with amateur radio and its capabilities and that ham radio is included in the emergency response planning process. To help you educate officials in your city, town, or county, we will continue sharing with you reports of ham radio getting through when other systems fail. If you know of such a situation, or have other news of interesting public service or emergency communications via VHF ham radio, please share it with us. Send your information (and photos) to Bob Josuweit, WA3PZO, c/o *CQ VHF*, 76 N. Broadway, Hicksville, NY 11801; or via e-mail to <BJosuweit@aol.com>. ■

# Blowin' in the Wind

It's the peak of this year's hurricane season. And even if you don't live in an affected area, you may be called on to help with communications. Will you be ready when "the big one" hits?

Hams all across the country are gearing up to answer the call if needed—the hurricane season is upon us. Officially, the season runs from June 1 through November 30. But, historically, the weather patterns needed to generate these behemoth storms in positions likely to affect the U.S. are in place from mid August to late October. If you live near the Eastern seaboard or the Gulf of Mexico, you already know this. And even if you don't live in a hurricane "target" area, you'll no doubt hear or see something about one or more of these major storms in your local media.

## How Can I Help?

What can a new ham do to help out? Plenty. When a massive storm comes ashore, as Hurricane Andrew did in 1992, vast areas are devastated with monumental property damage, large numbers of injuries, and some fatalities (see Table 1 for NOAA tropical storm classifications and Table 2 for the Saffir-Simpson severity classifications of hurricanes).

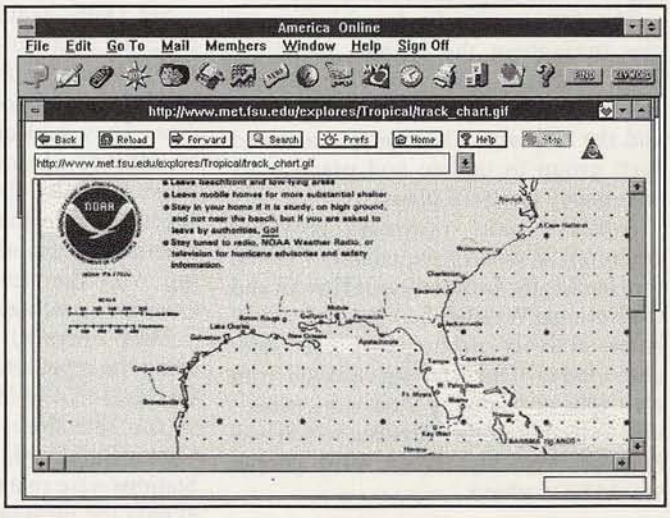
Sure, normal communications *may be* disrupted by these storms (read, completely knocked out). But what about cellphones? Haven't they changed everything? In such cases, cellular telephones are typically of little use. *If* the towers are still standing, chances are that power is out anyway; and few, if any, cell sites have emergency power. Without a fully functional tower in range, an individual cellphone is useless. And standard public service radio circuits (police, fire, etc.) quickly become overloaded.

That's where amateur radio comes in. It's been that way since 1913, when hams at Ohio State and the University of Michigan helped out after a major regional disaster. It's going to be that way for a long time to come. You can be part of that.

## Be Prepared

If you're a potential target area of one of these monsters and want to still be able to operate, you need to think ahead to what you'll need for yourself: auxiliary power (long-lasting batteries or generators), replacement antennas with feedline and connectors ready to go, tools (a little butane soldering iron could prove invaluable), string, tape, and some large zipper-lock bags are just some of the obvious things that come to mind.


*One of the many hurricane-related resources on the World Wide Web, this joint venture of the National Weather Service and Florida State University features general information in the top right window, subpages on individual storms in the top left, and the most recent NWS tropical weather statement across the bottom. Address: <www.nws.fsu.edu/tropical/tropical.html>.*




*The FSU Web site also features a downloadable hurricane tracking map you may use to do your own storm charting. Address: <www.met.fsu.edu/explores/tropical/track_chart.gif>.*

By Peter O'Dell, WB2D

***"Editors and reporters are always looking for a local angle on any national or regional story. It could be you. But they'll never know you're there unless you tell them. How do you do that?"***

## Table 1. NOAA Storm Classifications

A hurricane is a type of tropical cyclone, which is the general term for all circulating weather systems located over tropical waters. Tropical cyclones are classified as follows:

*Tropical Depression*—An organized system of clouds and thunderstorms with a defined circulation and maximum sustained winds of 38 mph (33 knots) or less.

*Tropical Storm*—An organized system of strong thunderstorms with a defined circulation and maximum sustained winds of 39 to 73 mph (34 to 63 knots). Names are given to tropical cyclones when they reach tropical storm strength.

*Hurricane*: An intense tropical weather system with a well-defined circulation and maximum sustained winds of 74 mph (64 knots) or higher. These same storms go by the name "typhoon" in the western Pacific and "cyclone" in the Indian Ocean.

If you haven't already done so, join a local club that's active in public service functions. Most of these groups have checklists prepared that will quickly tell you what you're most likely to need in your area. They also conduct regular training exercises in which you'll want to take part. Practice sessions give you the experience to know how to handle almost any communications situation that might come up. That's the key to getting the job done efficiently when the real thing comes along.

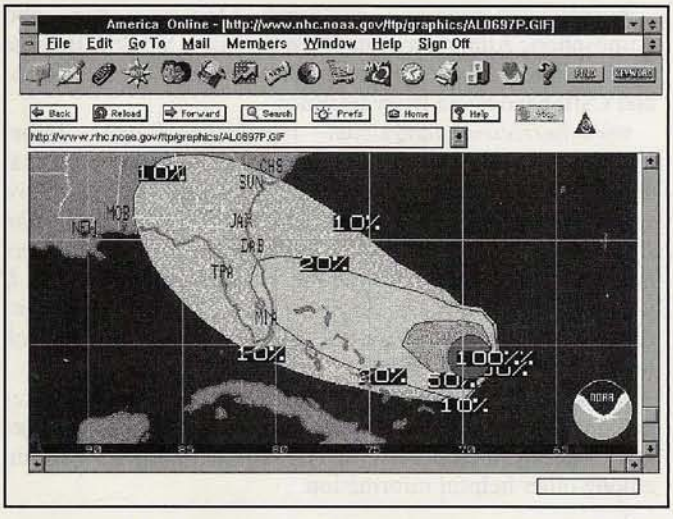
Along with learning how to get set up and on the air in less-than-ideal circumstances, you'll also need to learn how to properly handle written message traffic in a specific format. Luckily, that's not difficult to do. Many local clubs sponsor 2-meter FM nets that are part of ARRL National Traffic System (NTS). Traffic-handling is easy and fun, but there is a right way to do it. It just takes a little bit of practice to get the hang of it. You don't have to become a fanatic traffic handler. You do, however, need to learn the ropes—now. When the disaster hits, it's really too late.

One of the best resources for learning about emergency communications is ARRL's *Public Service Communications Manual*. It's only $1 plus shipping and handling from the ARRL. This booklet may be the best buy in ham radio today. Order a copy right now and ask the folks in Newington to also send you the free handouts that they have for message handling, net operation, etc. (*Another handy League publication is the* ARES Field Resources Manual, *available for $5 plus shipping.—ed.)*

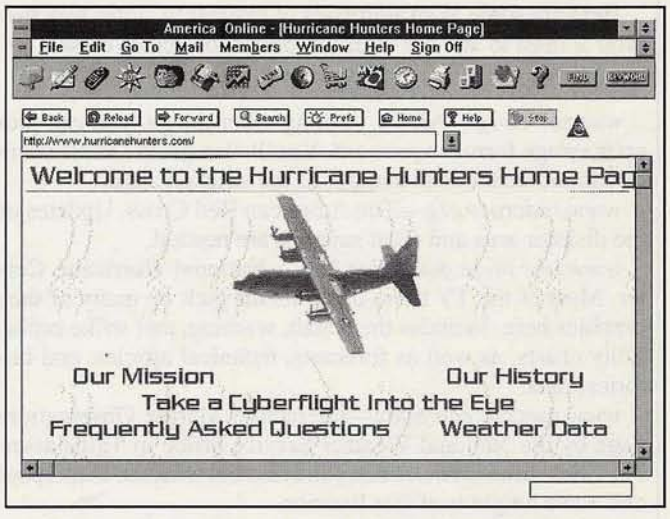
Do you have a packet station on the air? If so, start looking around on the local BBSs (bulletin boards) for what's going on in your area. In some places, a lot of the message traffic is handled by packet. Get the hang of sending and receiving messages this way if you haven't already done so. Your local BBS may be a wealth of information, too. Some boards have files you can download on emergency preparation and disaster drills, as well as other useful resources. For instance, there are a number of simple programs around to track storms. This would be a good time to download one and learn how to use it.

## But I'm Not in Hurricane Country

What if you're in the middle of Kansas? True, hurricanes hardly ever happen in that area, but you or your neighbors undoubtedly have relatives living in a target zone. When the big one hits, the Smiths are going to want to know how Uncle Bob is doing. Chances are, the phone lines in the affected area will be out or totally overloaded. Hams get the




*The National Hurricane Center's Web page offers a variety of updated maps, charts, and warnings when a hurricane is brewing. This sample map shows strike probability for a 1996 storm. Start at <http://www.nhc.noaa.gov/> and follow prompts for the storm you want to see.*




*The Hurricane Hunters home page. Along with useful information, this site features a "Cyberflight Into the Eye" in which you can follow along with a hurricane hunter crew on a mission. Address: <http://www.hurricanehunters.com/>*

messages through. Remember, though: health and welfare messages have the lowest priority in an emergency. When things are really bad, such messages will be passed *only* when the circuits are free of Emergency or Priority messages (you'll learn about these message "precedences" when you start handling traffic). But they do get through—usually well before the phone lines open up again.

In the meantime, Uncle Bob may have already sent messages out of the area to friends and relatives that he knew would be concerned about his welfare. So there will also be messages coming into your area from afar.

## Table 2. Saffir-Simpson Hurricane Scale

The National Weather Service classifies the severity of hurricanes according to the following scale:

| Scale Number (Category) | Sustained Winds (mph) | Damage | Storm Examples, Year, States Affected |
|---|---|---|---|
| 1 | 74–95 | Minimal | Florence, 1988, LA<br>Charley, 1988, NC |
| 2 | 96–110 | Moderate | Kate, 1985, FL<br>Bob, 1991, RI |
| 3 | 111–130 | Extensive | Alicia, 1983, TX<br>Emily, 1993, NC |
| 4 | 131–155 | Extreme | Andrew, 1992, FL<br>Hugo, 1989, SC |
| 5 | >155 | Catastrophic | Camille, 1969, LA/MS<br>unnamed, 1935, FL Keys |

## Become an "Expert"

Ham radio needs every bit of positive publicity it can get. You can educate yourself and become the local "expert" on tropical storms. If you have a Web browser, take a look at some of the Web sites listed in Table 3. You should be able to pick up enough information from these sources to speak with some authority on the storms. You don't have to learn everything about them now, but you may be surprised at how quickly you can become well-informed.

Once you're reasonably competent in traffic handling and emergency communications, it may be time to contact the media. Editors and reporters are always looking for a local angle on any national or regional story. It could be you. But they'll never know you're there unless you tell them. How do you do that?

You can do this as a "lone wolf," but I wouldn't recommend it. Check with your local club and find out if who's in charge of public relations for the group. Tell him (or her) of your interest in becoming a focal point for tropical storm communications. He may know someone who is already a storm buff. If so, approach him as a potential mentor. Tell him of your interest and ask for guidance. Deep friendships often evolve out of this sort of relationship.

Continue to work with the club PR person. He or she may already be friends with some of the local editors, which makes approaching them even easier. If not, ask him/her to go with you to see them. It's probably a good idea to call ahead and make an appointment, if possible. Most reporters and editors are available, if you approach them in the right way *at the right time*.

## Table 3. Web Addresses

Here are some Web addresses of interest to storm watchers (you'll need to add the <http://> prefix to each of these):

*www.arrl.org*—ARRL. Among other things, you can pick up message forms to pass out. You'll also get the latest status of communications in and out of the stricken area.

*www.redcross.org*—The American Red Cross. Updates on the disaster area and what supplies are needed.

*www.nhc.noaa.gov/index.html*—National Hurricane Center. Most of the TV news departments pick up many of their graphics here. Includes the watch, warning, and strike probability charts, as well as forecasts, technical articles, and historical data.

*www.nws.fsu.edu/buoy*—Interactive Marine Observations page by the National Weather Service office in Tallahassee, FL. Click on an offshore buoy and find out what the wind speed and wave height is at that location.

*www.nws.fsu.edu/tropical/tropical.html*—The National Weather Service, Tallahassee, FL office 1997 Atlantic Tropical Season Page. Provides the current forecast and a "hall of shame" of storms.

*goeshp.wwb.noaa.gov*—National Oceanographic and Atmospheric Administration's Geostationary Satellite Browse Server. Continuously updated photos of the Western Atlantic and Caribbean taken from satellites.

*www.hurricanehunters.com*—Hurricane Hunters. Information on the airplanes and crews that fly through tropical storms to gather data for forecasts. *(If you visit this page, give yourself a few extra minutes to take a "Cyberflight into the Eye" of a hurricane. It's a 23-page "trip" with a hurricane hunter crew into and through the eye of Hurricane Opal. If you have any interest in storms, this is a worthwhile adventure. You'll even get a virtual "Hurricane Hunters" patch when you're done!—ed.)*

*femapub1.fema.gov/fema/hurricaf.html*—Hurricane preparedness page of FEMA, the Federal Emergency Management Agency. Includes lists and tips for preparing for a storm, among other helpful information.

Additional useful sites to visit include home pages of the major newspapers in the targeted areas. Check out one of the search engines for other significant sources of information.

Most newsrooms operate at an ultra-frenetic pace during part of the day—not a good time to drop in. But there is usually some slack time. That's the time to aim for. How do you find out what that time is? Ask. It's that simple. Tell the editor that you anticipate being involved in passing health and welfare messages into any hurricane disaster area. You just want to give him a little bit of background information on ham radio as well as your phone number and address. *Make sure that you have this information put together before you call for the appointment!*

Your club PR person probably has a stock of literature explaining ham radio and its role in disaster relief. If not, contact the ARRL. Have this information in hand before you approach the editor. Make sure that any information you provide about yourself is neat and legible—this is not the time for crayon scribbles on the back of a brown-paper bag.

If you can't get an appointment to see the editor, call back and speak to a receptionist or secretary. Say that you just want to drop off some background information for the editor and you'd like to know what's the best time to come by so that you're least likely to interrupt something important. Chances are you'll get a good answer. Wait a couple of weeks and drop by with the literature at a "slack" time. Ask to see the editor and tell whoever you're talking to that you'll only be there a minute. If you still can't see the editor, then leave the packet of information and ask that it be given to him. Sometimes that's the best you can get.

Regardless of how, or if, you get to see the editor, make your visit friendly, informative, and businesslike. Be non-technical and stick to the point. This is not the time to launch into some long dissertation on the benefits of 2-meter FM over CB, the superiority of the Tamiguchi 811R over the Godzilla 2P, or how you spend 12 hours a day talking to your buddies on the local repeater. His business is news. You may be able to help him out in the future by giving him a local angle on a national story. That's all. Then ask him if he has any questions. If not, thank him for his time and leave.

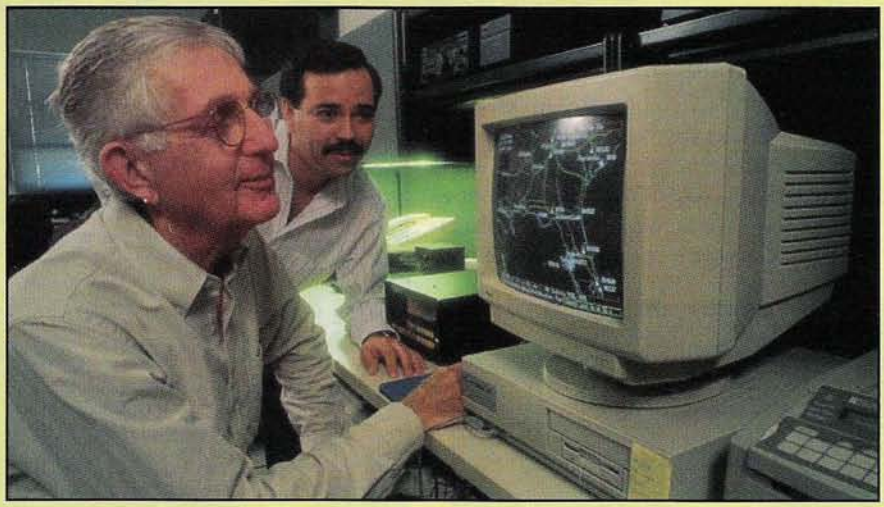
## When the Big One Hits

When the big one hits, you may get a call from some of the local editors or from reporters assigned to cover the story. In non-technical, non-jargon terms, tell them what you're doing. Don't exaggerate. Just give them a factual report of what you're up to. If they want to visit your station (maybe with a photographer or camera crew), that's great! That is, as long as your station is reasonably presentable. If you're a slob, do one of two things: get the place cleaned up before they get there or send them to another ham's shack that *is* clean. Just go over and operate from his shack during the photo/taping session.

This is where the Web site material can really come in handy. They may already have all the information/graphics from the Web, but it still makes a spectacular backdrop. It will make you look more knowledgeable and professional. And it increases the likelihood that the station or paper will use the story or give it a little more air time. Think like a camera. Be ready with the graphics before the crew arrives.

## You Have a Lot to Offer

Regardless of where you live, it's quite possible to become involved in a meaningful way in disaster relief. Hurricanes are a fact of life. You can help the victims and their friends and families. And you can help ham radio. Even a hurricane cloud has a silver lining. ■



## On the Cover

"If you're an amateur and wanted to put together a dream station, this is it." That's how Joe Schmidt, W4NKJ (on left photo) describes W4EHW, the ham station at the National Hurricane Center in Miami, Florida. Joe is the center's Volunteer Coordinator (although, by the time you read this, he'll have moved to Vermont, where hurricanes are less of a problem than in south Florida!). In the photo, he's joined by Julio Ripoll, WD4JNS, who's in charge of scheduling the volunteers to keep the station on the air when hurricanes threaten. In 1996, Joe says, ham volunteers put in more than 300 hours at W4EHW.

The station is located in the center's computer room, and includes operations on HF, 2-meter FM and SSB, and 440 FM, plus the APRS (Automatic Position Reporting System) unit shown in the photo. Schmidt says that W4EHW has become a leader in encouraging more amateurs to invest in weather instruments for increased accuracy in reporting conditions and has been in the forefront of using APRS to collect weather data. "We have 10 to 12 stations between Key West and Palm Beach that we can see," says Schmidt, "and they automatically update their information every five minutes."

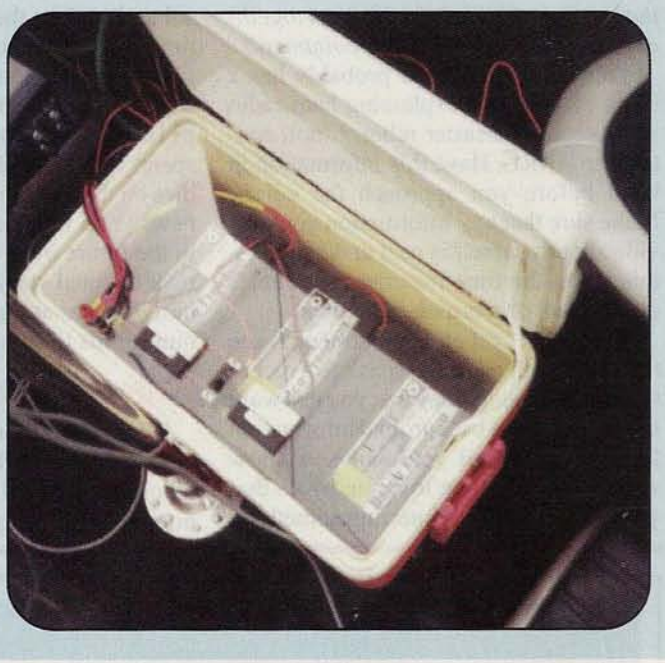
Schmidt says hams on VHF throughout any hurricane area are very important in gathering data that is then fed into the HF hurricane nets (such as the Hurricane Watch Net on 14.235 MHz) and relayed to the hurricane center. The VHF gear at the center, Joe says, is used to keep in touch with local emergency management officials. "If another major storm [like Hurricane Andrew] hits," says Schmidt, "the center wants to be able to talk to EOCs [Emergency Operating Centers] in Dade County, Naples [on the Gulf coast] and in the Keys."

Noting that W4EHW is located in a very secure area of the hurricane center, Schmidt says "it's a compliment to amateur radio that they allow us to do this," adding that "I don't know of any other place in the country where amateur radio has an ongoing relationship of this nature with a government agency." (Cover photo by Larry Mulvehill, WB2ZPI)

# Picture This!

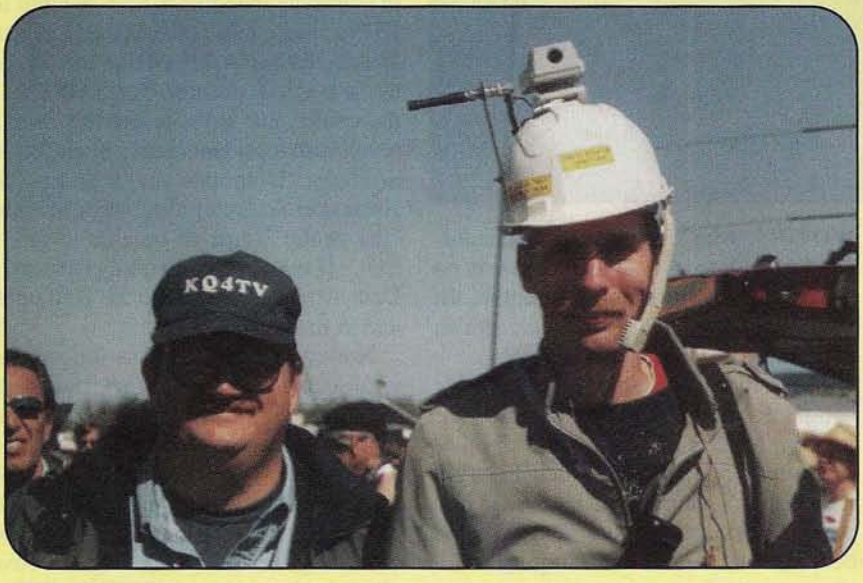
## What Would Washington Think?

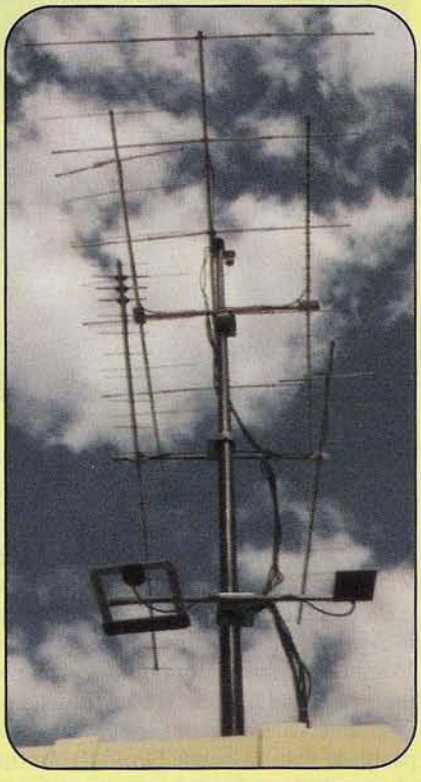
Furman Hendrickson, N3OBY, of Washington Crossing, Pennsylvania (where George Washington crossed the Delaware during the American Revolution), and Jim Millner, WB2REM, operated marine mobile on the Delaware River during this year's ARRL June VHF contest. They ran three bands (50, 144, and 432 MHz) with power supplied by three car batteries wired in parallel and mounted in a 48-quart cooler (see detail photo). No Hessian soldiers were sighted. (Photos courtesy N3OBY)



## The Dayton Flea Market Show

Smile! If you were at the Dayton Hamvention flea market this year, there's a good chance you were on TV—KQ4TV-TV! Actually, Robin Midgett, KB4IDC, was the "Ham Cam" cameraman (note the height advantage), while Bruce Martin, KQ4TV, directed. Pictures from the Apple Videophone helmet-mounted camera were transmitted on



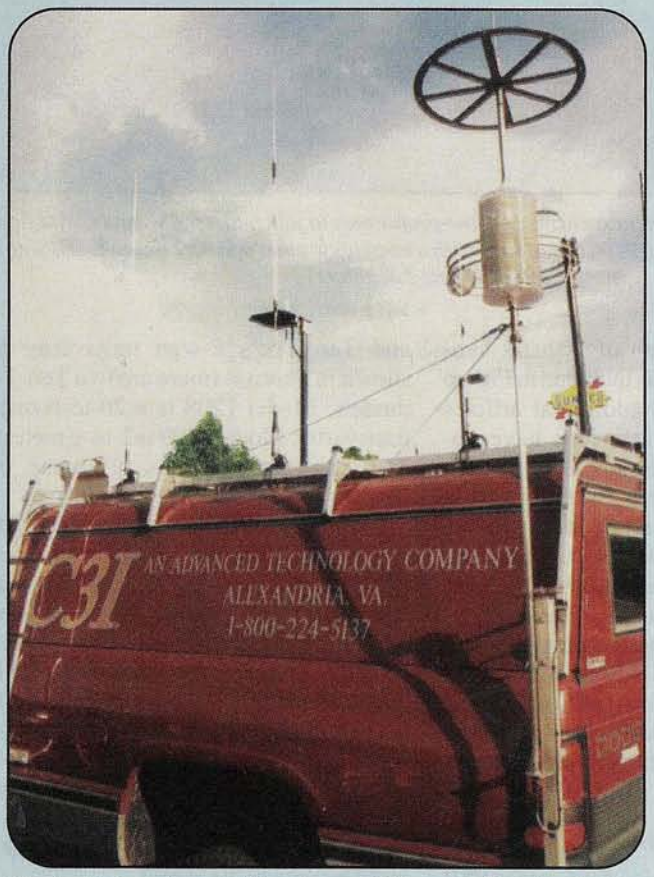



434-MHz simplex by a gel-cell-powered PC Electronics ATV transmitter and the "horizontally polarized" rubber duck mounted next to the camera. Back at the group's contest "rover" van elsewhere in the flea market, the scenes were received and recorded for the folks back home in the Nashville, Tennessee, area.

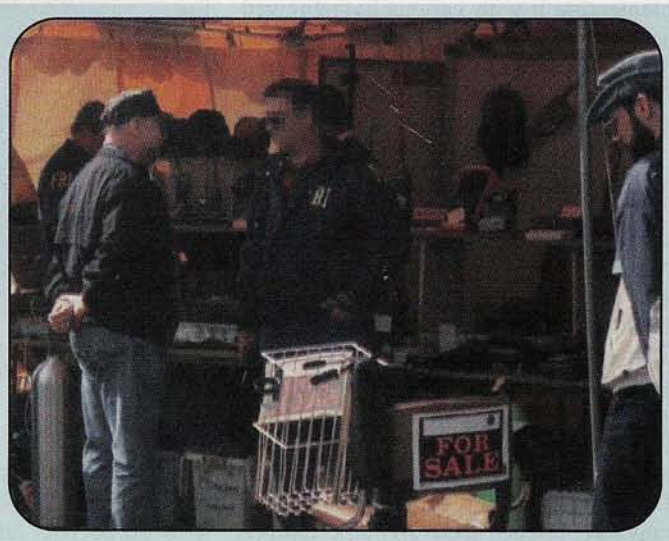
Getting there was *not* half the fun for the KQ4TV crew. Their 20-plus-year-old van broke down 115 miles outside of Dayton and had to be towed the rest of the way to the Hamvention...and then all the way back home! More photos and information about the group's activities can be found on the Web at <http://www.telalink.net/~martinbw/vhf/vhf.html>.

## More Dayton Doings

More snapshots from the 1997 Dayton Hamvention...




*How's this for a few mobile antennas? Of course, it's also a rolling advertisement for C3I, the Virginia-based company that recently brought Rutland Arrays VHF antennas back onto the market.*




*Yes, "Big Brother" IS watching! Friday afternoon at the Hamvention was livened up by an FBI raid on a flea market booth. No word on what the agents were looking for or whether they found it. The booth did not appear to be selling amateur gear.*

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!

# Let's Go Six'N!

Dave helps you get started on 6 meters with two quick 'n easy antenna projects, plus an antenna tuner you can build!

One of the most captivating aspects of amateur radio is investigating a previously overlooked area and discovering a world of enjoyment and excitement. Such "new frontier" pursuits are even more appealing when you can get started on a low budget. The key here is gearing up with an economical transceiver or transverter unit and then complementing it with various homebrewed accessories. An example of this is the focus of this month's column: combining SSB and CW activities in the 50.0- to 50.3-MHz range of 6 meters.

## The Magic of Six

Six meters is often called "the magic band," and if you've never operated there, you've got a big surprise in store. Newer licensees may ask what's so special about SSB and CW activities on six. Possibly you've heard friends talk about working stations a couple of hundred miles away through repeaters on 6-meter FM and assumed that was all the band had to offer. Or, if you've been reading *CQ VHF*, you may have learned about sporadic-*E* propagation, which provides band openings of up to 1,000 miles or more. Ah, but sunspot counts are beginning to rise and "super six" is once again on its way to becoming a hot band for *big-time* DXing. What do I mean by "big-time" DXing?

During peak years of the last sunspot cycle (and previous sunspot cycles), 6-meter SSB and CW offered some worldwide band openings that anyone with even a basic rig could enjoy. Many DXpeditions included 6-meter SSB and CW operations in their activities, and a number of 6-meter enthusiasts worked 100 countries on only 6 meters. Fun? You bet! Catch a good band opening into South America or Europe on six, and you'll be hooked! When six is hot, it is terrific! So let's start gearing up and join the action!


*Photo A. Looking for an inexpensive and low-profile way to join 6-meter SSB and CW action? Combine a 10-watt MFJ-9406 transceiver with a homebrew tuner and wire antenna and you're set for DXing fun galore!*

A general bandplan of "what's happening where" on six is included in Figure 1 to guide you, and additional articles describing 6-meter activities have appeared in previous issues of *CQ VHF*. (Digging through back issues of magazines, incidentally, is an ideal way to become even more knowledgeable and enthused about new areas of pursuit. Try it for yourself and see!)

That's enough inspirational rap on "magic band magic." Now let's talk about how you can get big results from a small investment (better known as bringing homebrew projects into the picture).

## Getting on Six

Two inexpensive rigs for 6 meter SSB and CW operation are the 10-watt MFJ-9406 transceiver, shown along with a homebrewed antenna tuner in Photo A, and Ten Tec's 8-watt transverter kit shown in Photo B (there are two Ten-Tec models: Model 1208 is a 20-to-6-meter transverter; Model 1209 is 2-to-6 meters). There are other choices, of course, but these are two of the least expensive.

After acquiring a transceiver or transverter for 6-meter SSB, your next thoughts will probably focus on a mating antenna system. The efforts of many newcomers often fall short here, as funds may be depleted and/or the installation of visible outdoor radiators may be limited (by zoning rules, restrictive covenants, and spousal tolerance). This is when a low-cost antenna made from blue or gray insulated wire proves its worth: it's almost invisible to untrained eyes, yet it radiates quite a respectable signal.

What type of easy-brew antennas are good starters for six? Two fine choices are the *Extended Double Zepp* shown in

By Dave Ingram, K4TWJ

| Frequency | Activity |
|---|---|
| 50.000 - 50.100 MHz | Morse Code/CW |
| 50.060 - 50.080 MHz | Propagation beacons (to alert you to band openings) |
| 50.100 - 50.300 MHz | Voice/SSB (USB) |
| 50.110 MHz | DX calling/monitoring frequency (Hot spot for sporadic-*E*, transequatorial propagation and meteor scatter.) Use for intercontinental DX only! |
| 50.125 MHz | U.S. SSB calling/monitoring frequency |
| 50.400 MHz | AM calling/monitoring frequency |
| 50.800 - 51.000 MHz | Radio Control (R/C) |
| 51.100 - 54.000 MHz | FM and repeaters |
| 52.525 MHz | National FM simplex/direct frequency |

*Figure 1. General "get you going guide" to 6-meter action. Place a copy of this info by your rig for quick reference.*

Figure 2 and the *mini Sterba curtain* (better known as a *Bruce array*) shown in Figure 3. Both are gain antennas using 300-ohm twinlead or ultra-low loss "ladder line" and require a balanced output antenna tuner. So let's talk about homebrewing both antennas and the antenna tuner as well.

## The E-Z Brew EDZ

The Extended Double Zepp (EDZ) antenna could be nicknamed the "one hour special," as that's approximately how long it takes to make and erect the little critter. This is an ideal "first brew" antenna, it can be conveniently whipped together for portable or vacation use, and it exhibits 3-dB gain broadside.

Items needed to construct the Extended Double Zepp are three regular "dogbone" insulators, 25 feet of stranded wire (so it can flex without breaking), and 25 to 50 feet of open window-type 450-ohm ladder line. All are available from antenna parts suppliers or amateur radio dealers nationwide. In a pinch, say while you're while vacationing, you can substitute home lamp cord for the antenna wire (pull it apart to get two separate wires), and heavy-duty (but not shielded!) 300-ohm TV "twin lead" as an alternative to 450-ohm ladder line.

Now refer to Figure 2 as we continue. Plan ahead by allowing an extra 5 inches on the end of each wire for wrapping through insulators, then cut two wires of 12.4 feet in length. Attach the wires to the insulators, then remeasure to ensure each side, or element, is 11.6 feet long. Remove insulation at the feedpoint/center insulator, then firmly wrap several turns of each ladder line wire to its related antenna wire. Use your heavy-duty soldering gun to solder the connections (remember our tips in the last column?), then wrap both soldered joints with "Coax Seal," or something similar, to weatherproof the connections.

Next, attach pull-up ropes to the end insulators, toss their ends over your selected supports or tree limbs, then hoist


*Photo B. Ten-Tec's 6-meter transverter kit is an ideal way to add 50 MHz operation to HF-only transceivers. The unit is quite affordable, goes together in approximately 16 hours time, and works great on SSB, CW, and FM.*

***"...a low-cost antenna made from blue or gray insulated wire...is almost invisible to untrained eyes, yet it radiates quite a respectable signal."***

the EDZ into position. Remember our previous notes on directivity. An EDZ "running" east to west will radiate and receive best in a north/south direction. Pick your supports accordingly. Finally, route the 450-ohm feedline at right angles away from the antenna, under a windowsill, and into your ham shack. Ladder line is less lossy than coax cable, incidentally, but it should not be placed near metal conductors like rain gutters.

The EDZ is a real "signal squirter." You will love it!

## Big Bruce

Say you prefer an all-out, no-holds-barred antenna for six'n? Well, the Big Bruce fills that bill in high style. It's big for sure, but so is its performance. Gain is 4.5 dB, with a bidirectional receive/transmit radiation pattern broadside to the wires like the EDZ, so pick your mounting supports for best coverage in desired directions.

Refer again to Figure 3 for general assembly details of the Big Bruce. Once again stranded wire with background-blending insulation is used to make the elements or "sections." The phasing lines between each element/section are 56-inch lengths of heavy-duty (but again, not shielded!) 300-ohm twinlead. The outer phasing lines are twisted a half-turn so the upper wire of one section becomes, or connects to, the lower wire of an adjacent section. The center phasing line, also 300-ohm twinlead, is not twisted.

Trim away approximately one-inch of insulation in its exact middle, and solder wires from the 300-ohm feedline at that point. Reinforce the feedline and center phasing line junction with a wrap of electrical tape, then weatherproof soldered connections with Coax Seal. Next, assemble the half-wave and quarter-wave sections using more insulated wire and 300-ohm twinlead. Lay the antenna on the ground in its approximate final shape, remeasure all dimensions to ensure they agree with those given in Figure 3, then solder and weatherproof all connections.

Assembly complete? Great! Add pull-up ropes to upper end insulators, stabi-

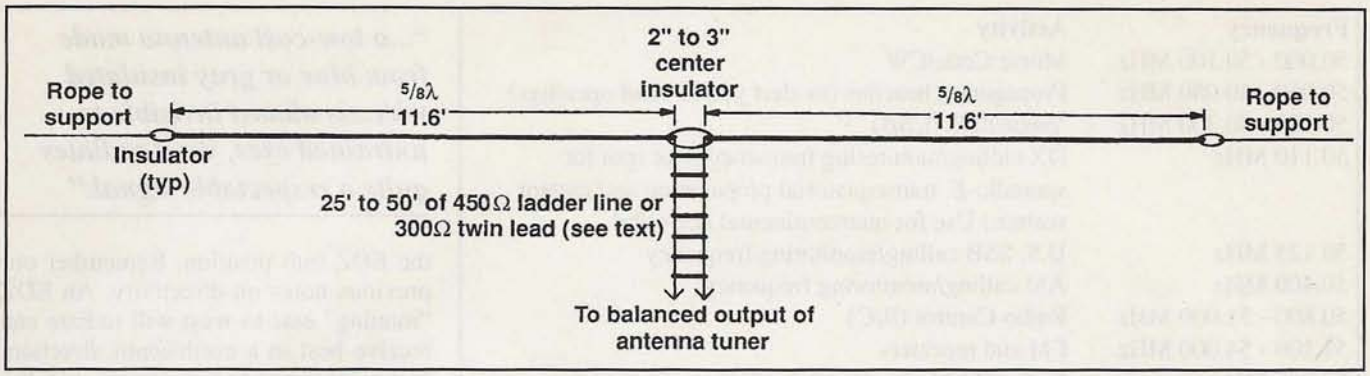



*Figure 2. Outline of the Extended Double Zepp (EDZ) antenna. This gem almost disappears in the sky when homebrewed from blue-gray insulated wire, yet it's very effective for big-time DXing. See discussion in text.*

lizing ropes to lower end insulators, toss the upper ropes over tree limbs or other supports, and raise the antenna into position. Route the 300-ohm feedline into your ham shack, connect it to your tuner's balanced output, and get ready for big-time 6-meter action!

One final note for our stouthearted brethren: Any number of additional half-wave sections can be added to the Big Bruce for additional signal gain. Simply include another half-turn twist phasing line for each section, move the quarter-wave square end sections out accordingly, and remember to do the same extension trick to both sides. In other words, the Big Bruce can be "sized up" to any gigantic length, but each side must be a "mirror image" of the other side. Good luck DXing with Big Bruce and remember that, like the EDZ, it should be used with a balanced-output antenna tuner. Guess what we've got next for you?

## W2OQI's 6-Meter Antenna Tuner

Answering your needs for a multi-purpose and ultra wide-range 6-meter antenna tuner is the very easy-to-duplicate unit from Van R. Field, W2OQI, shown in Photos C and D, and Figure 4. My quick-brewed copy of Van's tuner is also shown beside the MFJ-9406 6-meter transceiver in Photo A. Neither version is glamorous—there are no glitzy decals or flashy paint—but, as Van says, they do the job...and that's what counts.

Why use an antenna tuner, you ask? Aside from the fact that a wide-range tuner with balanced output is required to feed our two previously-highlighted sky-wires, a tuner also makes feeding a beam or vertical with a slightly high SWR a cinch. Most modern transceivers "dislike" reflected power and reduce their output accordingly. Adding a tuner between the transceiver and antenna gives the rig an optimum 50-ohm load so it delivers its full output. What's the difference between a 6-meter antenna tuner and a regular "low band" tuner? Generally speaking, less inductance and capaci-

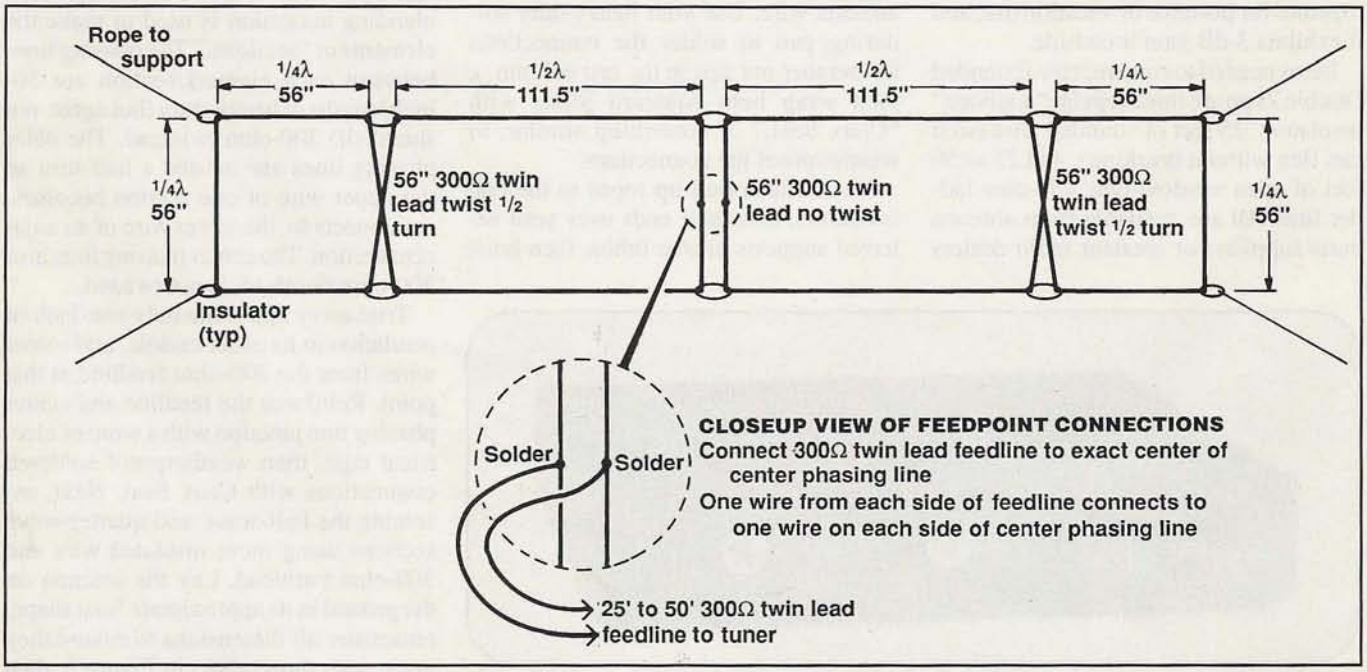



*Figure 3. When space for antennas is not a constraint, this "Big Bruce" array is superb for 6-meter DXing. Like the EDZ, it uses a balanced feedline and is fed through a homebrew antenna tuner. If desired, 450-ohm ladder line can be substituted for 300-ohm twinlead sections and feedline.*

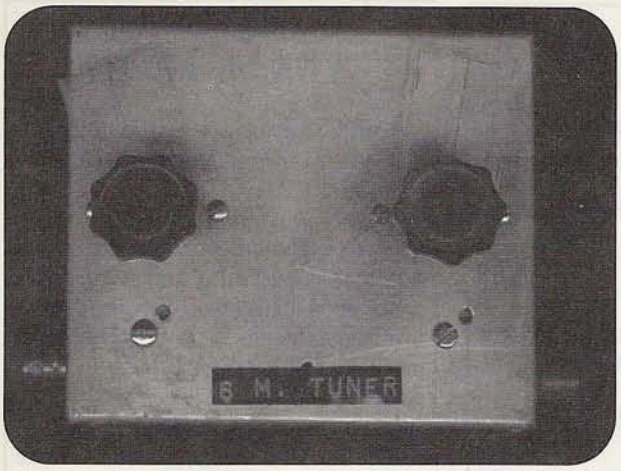



*Photo C. Front view of W2OQI's homebrew 6-meter antenna tuner. Input tuning capacitor is on the right and output tuning capacitor is on the left. The unit has both balanced and unbalanced outputs for matching a wide variety of antennas.*

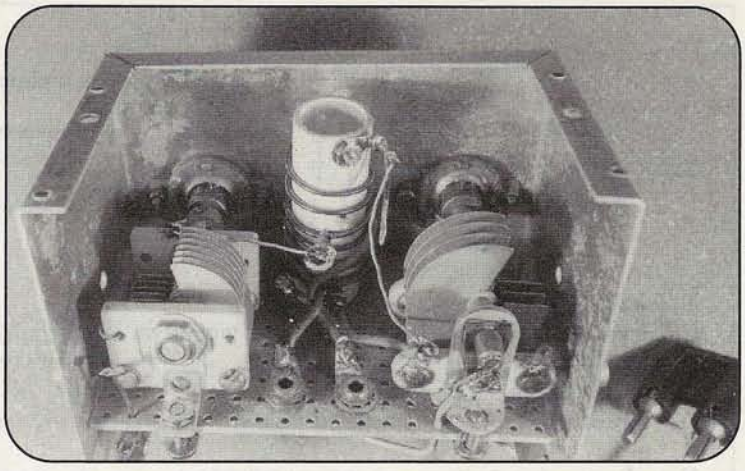


*Photo D. Rear/inside view of W2OQI's antenna tuner. Note perfboard and plastic shaft couplers are used to insulate capacitors from the metal cabinet. Banana sockets are used for output, and the double-prong banana plug to the right quick-connects the antenna to the tuner.*

tance are required for operation on 50 MHz than on HF. A regular tuner can occasionally be pressed into service on six, but adjustments are critical and tedious. A dedicated tuner makes hamming easier and more enjoyable. Now let's discuss tuner assembly!

## Finding the Parts

Items needed to reproduce W2OQI's tuner are:

1 50-pfd variable capacitor
1 25-pfd variable capacitor
2 SO-239 chassis mount sockets
2 binding posts
3 ft. #14 or #16 solid bare copper wire
1.5ft. #14 or #16 insulated solid wire
1 pill bottle (3/4-inch round by 2.5-inch-long)
1 wooden dowel or piece of plastic (PVC) pipe for a coil form
2 insulated shaft couplers and plastic knobs for the capacitors
1 piece of wood or sheet of perfboard (8 or 9 inches by 4 or 5 inches)
1 metal case for the tuner.

Finding authentic transmitting type capacitors (not wimpy trimmers) may involve hunting through hamfest flea markets and surplus dealers. That is another fun side of homebrewing, so enjoy the pursuit. You can estimate values of unmarked capacitors by (rotary) plate count like this: approximately seven plates is approximately 50 pfd, and capacitors with only four rotary plates are roughly 25 pfd. Any value between 25 and 50 pfd (four to seven plates), incidentally, is suitable for the output capacitor. Check the capacitors with your ohmmeter to ensure stator (stationary) and rotor plates are not bent and shorted. The case helps minimize TVI. Remember, too, that their mounting screws and shafts must not touch the metal case.

## Building the W2OQI Tuner

Begin construction by drilling a small hole near each end of your selected coil form, then wind six turns of the bare wire on that form. Stretch the coil so its turns are evenly spaced over a 2-inch length, then secure the ends through the previously drilled holes. Leave 2 or 3 inches of wire "pigtailing" from each coil end for connection to the output capacitor, then cut off excess.

Solder a tap to the coil's middle (third turn), and connect the tap to the input capacitor's stator terminal (connected to the plates that don't move) using a short piece of bare wire left over from winding the coil. Small solder lugs come in handy here: one can be bent over and soldered to the coil to make a neat tap point; others can be bolted to capacitors with screw terminals for neat connection points. Additional lengths of leftover wire are handy for connecting the input capacitor's rotor (which also connects to the coil's lower or "cold" end) to the SO239's shell, etc. (see Figure 4).

## Calculating Antenna Element Lengths

How do we determine the proper length for antenna elements? As you may recall from licensing theory, a $^1/_2$-wave antenna's length is calculated using the formula:

468/F(MHz) = Length (in feet).

A $^1/_4$-wave antenna's length is calculated using the formula:

234/F(MHz) = Length (in feet).

Likewise, an $^1/_8$-wave can be calculated as

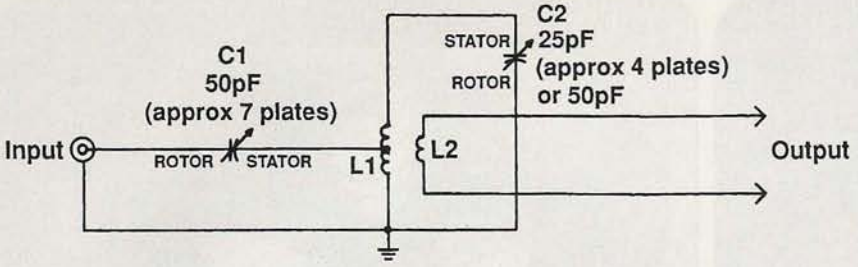
234/2, or 117/F(MHz) = Length (in feet).

Let's assume you want to make an antenna using $^5/_8$-wave elements, such as our EDZ, for 50.100 MHz (which should make your antenna resonant for both SSB and CW work, see Figure 1), and plug that frequency into our formulas:

468/50.1 = 9.3 ft. for $^1/_2$ wave
117/50.1 = 2.3 ft for $^1/_8$ wave

Remember, $^1/_2 = {}^4/_8$. Thus,

9.3 + 2.3 = 11.6 ft for 5/8 wave at 50.1 MHz.




**Notes for Figure 4:**

L1: Six turns #14 or #16 bare copper wire wound on 3/4-inch diameter form. Stretch coil to 2 inches in length, with equal spacing between turns, and tap in the middle (third turn).

L2: Three turns #14 or #16 insulated solid wire wound over ground/"cold" end of L1.

Note: Ensure that shell/ground of input SO-239, bottom of coil L1 and rotor of output capacitor (C2) are firmly connected together.

*Figure 4. Circuit diagram of W2OQI's 6-meter antenna tuner. Minimum parts and maximum efficiency make this an ideal quick-brew project!*

Next, wind three turns of insulated wire around the lower or "cold" end of the coil. Pull the coil tight enough to hold it in place, twist its pigtail ends once, then connect them to the (insulated from metal case) binding posts. The binding posts are balanced outputs for feeding a balanced antenna. If you wish to use unbalanced output to feed a coax-fed beam or vertical, add a second SO239 and connect its center pin to one binding post and its shell to the other binding post (do not connect two antennas to the tuner simultaneously, however). That completes the electrical details of the tuner; now here are some mechanical notes.

Remember to use insulated shaft couplings and/or insulated knobs on the capacitors. Ensure all wiring is short and straight. Mounting the capacitors 3 to 4 inches apart with the coil between them makes an effective layout. Also, the capacitors will be "hot" with RF energy, thus wood or perfboard insulates them from the metal case and fingertips. Finally, do not touch tuner "innards" while transmitting. RF energy burns!

## Initial Adjustments

CAUTION: If this is your first construction project, you also need a knowledgeable—and local—"Elmer" for guidance and assistance in checkout before use. DO NOT gamble or chance damaging your rig because of improper wiring! Ask a local "old pro" to check your work!

First-time adjustment of this tuner requires some patience and dexterity. Here are some helpful guiding tips:

Be sure an antenna is connected to the tuner's output and a VHF SWR meter is connected between the tuner and your transceiver (connect the output of the transceiver to the input of the meter, and the output of the meter to the tuner).

The tuner's capacitors interact and should be adjusted together. Set your rig for the lowest output that will provide SWR metering, then adjust the output capacitor until a decrease in SWR is noted on the meter. Next, carefully and slowly adjust both capacitors to produce the lowest SWR reading. After reading minimum SWR, increase transceiver output to normal and fine-tweak both adjustments for near 1:1 SWR.

### The W2OQI Tuner: A Bit of History

The HF version of this Z-match tuner has crossed the sea a few times. It was originally manufactured by the National Company of Malden, Massachusetts, around 1937. After 1946, National improved it and sold it as a continuous tuning tank circuit for amateur transmitters. After a long absence, the idea resurfaced in Australia in 1990. And in 1992–93, a simplified version showed up in New Zealand.

Bill Orr, W6SAI, took it from there and published it in the September, 1993, issue of *CQ* magazine. His 1996 *Antenna Handbook* contains this all-band tuner (pages 7–5 through 7-10).

The tuner presented here is my version for 6 meters.

—W2OQI

Again, though, I emphasize that hams who have never built a homebrew project should seek advice or assistance from an old pro before trying out the completed tuner. Improper wiring of this unit can indeed damage your transceiver—and neither of us wants that consequence.

## Until Next Time...

That's all the column space for this time, so good luck on six, and remember to include an SASE (and keep notes brief) when writing me with your comments on future columns. 73, Dave, K4TWJ

### Resources

Here's who to get in touch with for more information on the products presented in this column:

*MFJ Enterprises, Inc.*, P.O. Box 494, Mississippi State, MS 39762; Phone: (601) 323-6551; Nearest dealer: (800) 647-1800; e-mail: <mfj@mfjenterprises.com>; WWW: <http://www.mfjenterprises.com>.

*Ten-Tec, Inc.*, 1185 Dolly Parton Pkwy., Sevierville, TN 37862; Phone: (423) 452-7172; Orders only: (800) 833-7373; e-mail: <sales@tentec.com>.

For general information on 6-meter propagation and operating, we recommend the following:

*CQ VHF* magazine (of course!), regular coverage of 6-meter activity.

*The VHF How-To Book*, by Joe Lynch, N6CL; CQ Communications, CQ Bookshop, 76 N. Broadway, Hicksville, NY 11801; Phone: (516) 681-2922; Fax: (516) 681-2926.

*Six Meters: A Guide to the Magic Band*, by Ken Neubeck, WB2AMU; Worldradio Books, P.O. Box 189490, Sacramento, CA 95818.

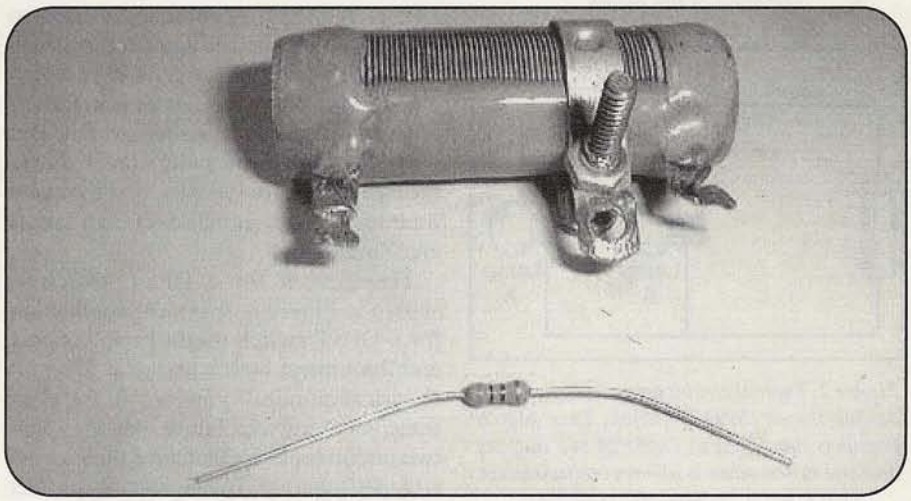
*The VHF/UHF DX Book*, edited by Ian White, G3SEK; RSGB Books (available in the U.S. from the ARRL and the CQ Bookshop; see address above).

# Components and Circuits—Part 1

*Several of the questions on the Novice and Technician license exams cover electronic components. This month, Don discusses three of the most basic ones: switches, batteries, and resistors.*

Back in the '50s, hams who purchased their equipment at the local amateur radio store were called "appliance operators." If you hadn't built it yourself, or didn't know how to repair your "appliance," you faced an electronic purgatory much like many No-Code Techs face today.

This helps explain why kits were so popular back in those days. If you had a Central Electronics SSB exciter in 1955, your peers knew you had successfully wielded a soldering iron. Whether you "rolled your own," or built a kit, you automatically learned about the electronic components—capacitors, resistors, inductors, connectors, and so forth.



*A resistor is one of the basic components of an electronic circuit. Two types are shown here: a low-power carbon-composition resistor in the foreground and a high-power wirewound resistor in the background.*

## Electronic "Innards"

Most hams have seen the "innards" of an electronic product. Older equipment was a maze of wires and mysterious, colorful shapes. Modern electronic goodies use etched circuit boards with objects that are even more mysterious and colorful, but much smaller and aligned in a more orderly manner. These bits and pieces of electronic trivia are the devices which make the product function and are called *electronic components*.

Components are the ingredients of an *electronic circuit*. By themselves, they do nothing, but, when arranged in a predetermined manner, they can do almost anything you can imagine. They can be laced together by copper wires in a handmade device or by copper circuit traces on an etched circuit board. Many of the same parts found inside ham radio equipment are also used in television receivers, telephone answering machines, stereo receivers; in fact, in everything electronic. They're just arranged differently to perform different functions.

Each piece of electronic equipment has a "roadmap" of how all the parts are connected together. This guide is called a *schematic diagram*. In a schematic, each of the electronic components has a *schematic symbol* which is a standardized representation of the device. Anyone skilled in electronics can look at the schematic and say "that's a resistor"; "that's a transistor"; or "this end of the capacitor is grounded."

In some cases the "roadmap" is drawn to show the physical appearance and location of the components. This is referred to as a *pictorial diagram*.

## Switches

Everyone has used a switch. Each time you turn on a light in your house, fire up the television or stereo, or start your car you use a switch. Switches come in many varieties and several are mentioned in the ham radio examination.

A switch has two or more contacts. When they're not connected to each other, no current can flow in a circuit. However, when you move the control for the switch (a lever, knob, or other interface) so that the contacts touch, you complete the circuit. This is what happens when you turn on a light. When the switch is off, the electrical power in your home stops at one of the switch contacts. When you turn on the switch, the circuit is completed and voltage, usually 120 volts AC, is applied to the light.

You can illustrate this while working with voltages that are not harmful. Let's say you touch the two wires from a small flashlight bulb to a flashlight battery. When you do this, the bulb lights up. When you lift either one of the wires, the bulb stops shining. You have just created a switch.

Figure 1 shows a similar arrangement in pictorial diagram form, but I've shown the switch in this and successive draw-

By Donald L. Stoner, W6TNS

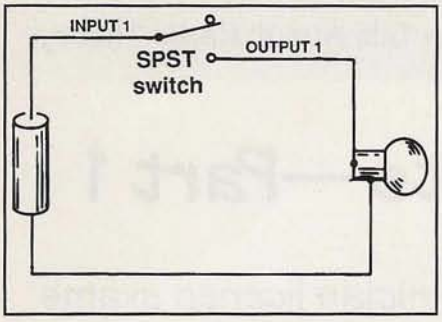



*Figure 1. Typical circuit using a single-pole, single-throw (SPST) switch. This switch connects one input to one output and is either off or on. Note the pictorial representation of the battery and lamp, and the schematic representation of the switch.*

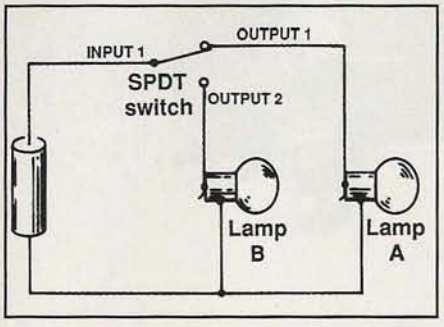



*Figure 2. Typical circuit using a single-pole, double-throw (SPDT) switch. This switch connects one input to either of two outputs and one or the other is always on (unless the switch has a "center off" position).*

ings in schematic form. One bulb wire is connected to the positive terminal of the battery in series with a switch. The other light bulb wire connects directly to the negative terminal. Since all the parts are in series, you only need to switch one wire to open the circuit and prevent the bulb from illuminating. This type of switch is called a *single-pole, single-throw*, or SPST, switch. *An SPST switch can connect one input with one output.*

Now let's connect the battery wire to the arm contact of a switch with two other contacts, as shown in Figure 2. In one position (up), the battery connects to lamp A and, in the other position (down), the same wire connects to lamp B. The other two lamp wires are connected to the negative end of the battery. When the switch is in the up position, lamp A will illuminate; when you move the switch to the down position, lamp A goes out and lamp B lights up. This type of switch is called a *single-pole* (the arm), *double-throw* (the two contact positions), or SPDT, switch. *A single-pole, double-throw switch can transfer one input to either of two output lines.*

Note that in this diagram one lamp or the other will always be illuminated because there is no *off* or open-circuit position on the switch. Either way you move the switch handle, a bulb is connected to the battery. You'd need an SPDT switch with a *center off* position to extinguish both lamps.

It's possible to use one switch to control two independent circuits at the same time. The circuit to accomplish this is shown in Figure 3. The switch in this instance is called a *double pole* (the arm), *single throw* (one contact position), or DPST. A DPST switch can be used to switch two lines at the same time, one arm to one circuit and the other arm to a second circuit. When the switch is in the off or up position, both lamps are out. But when you move the switch lever down, the two inputs are connected at the same time to the two outputs and both lamps are illuminated.

The symbol for a DPST switch is shown in Figure 3. A typical application for a DPST switch might be to connect and disconnect both wires of a 220-volt electrical circuit. If you look in the electrical panel for your house, you may find two circuit breakers that have their levers strapped together. These probably protect the circuit to your kitchen range. Each of these circuit breakers is an SPST switch, but when two are strapped together, it creates a DPST switch. *A DPST switch can switch two inputs at the same time, one input to one output, and the second input to the other output.*

***"Each piece of electronic equipment has a 'roadmap' of how all the parts are connected together. This guide is called a schematic diagram."***

You can also control two circuits with a *double-pole, double-throw*, or DPDT, switch. Let's say that you wanted to control two independent sets of lamps at the same time. The circuit to accomplish this is shown in Figure 4. When the switch is in the up position, the power is applied to both lamp 1A and 2A. When you move the switch down, it extinguishes these lamps and transfers the voltage to lamps 1B and 2B and they light up. The schematic symbol for DPDT switch is also shown in Figure 4. *A DPDT switch can transfer two inputs at the same time, each input either of two outputs.*

## Batteries

A battery always has a positive and a negative terminal. The symbol for a battery is not a round cylinder with two terminals as shown in the previous illustrations. This pictorial drawing was just a representation to illustrate a familiar object. The schematic representation of a single-cell battery is shown in Figure 5. The voltage of a single-cell battery is between 1.3 and 2.2 volts depending on what type of chemical is used inside.

To be perfectly correct, by definition, a battery consists of two or more cells, but we usually call even the single-cell device a battery, as I did in the previous paragraph. If you need more voltage, several cells can be strung together in series. The positive terminal of cell 1 would be connected to the negative terminal of cell 2; its positive terminal would be connected to the negative terminal of cell 3 and so on. A common application for this can be found under the hood of your car. The battery that starts your car uses six cells, measuring about 2 volts each to provide a 12-volt battery. The schematic symbol for a multiple cell battery is also shown in Figure 5.

## Resistors

One of the most common components found in electronic equipment is a resistor. The most common form of this component is made from carbon, much like the black material that one finds in the center of a pencil. There are four principal types of resistors used in electronics: carbon-composition, carbon-film, metal-film, and wire wound; the schematic representation of a resistor is shown in Figure 6.

The main purpose of resistors is to impede or limit the flow of an electrical current in a circuit, but they also convert electrical energy to heat energy. A common example is found in your kitchen in the form of a toaster. The little wire inside that gets red hot is really nothing more than a resistor. The burner on top of your electric stove is nothing more than a resistor inside a metal tube wound in a spiral fashion. When turned on, electrical energy is converted to heat as it flows through the resistive element.

Since resistors impede the flow of an electrical current, they always produce

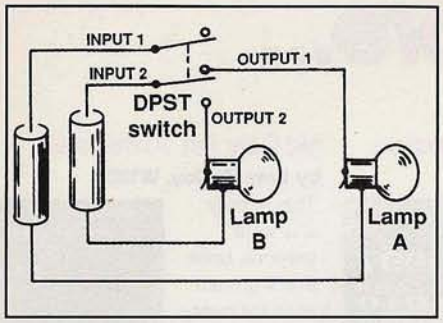



*Figure 3. Typical circuit using a double-pole, single-throw (DPST) switch. This switch can control two separate circuits simultaneously, but Input 1 always goes to Output 1, etc.*

heat. In some cases, such as in transistor circuits, the heat is so small as to be immeasurable. In other cases, such as the previous kitchen example, the heat generated can be sizable. Because of heating, it's necessary to observe the *wattage rating* of resistors. Carbon composition resistors vary in size from tiny chips of carbon rated at a small fraction of a watt up to about 2 watts. For higher-power applications, wire-wound resistors are used and have ratings from 1 watt up to several hundred watts. Usually the physical size of a resistor is proportional to its power dissipation capability (ability to get rid of heat). By the way, that incandescent light shining above your desk is nothing more than a resistor inside a glass globe. It produces light by glowing white hot; the vacuum inside the bulb keeps it from bursting into flame.

Resistors are available in stepped values from 2.7 ohms up to 22 million ohms (22 megohms or 22M). It is difficult to accurately make a value smaller than 2.7 ohms from carbon, while there is very little use in electronic equipment for resistors that are above 22 megohms.

***"Let's say you touch the two wires from a small flashlight bulb to a flashlight battery. When you do this, the bulb lights up. When you lift either one of the wires, the bulb stops shining. You have just created a switch."***

## Color Coding

The numeric value of resistance is not printed on the resistor. Rather, a coding scheme employing color bands is used. A chart of the color code is shown in Figure 7. The bands of color are usually closer to one end of the resistor, and the band closest to the end is the beginning of the code. The first three color bands are used to indicate the resistance.

It would be impossible to indicate huge numbers like 22 million, so a unique system is used that permits every value of resistor to be shown with only three color bands. The first two bands are numeric indicators, while the third band is a multiplier which indicates the number of zeros following the numeric value. Thus a resistor marked with red-red-orange would have a value of 22 (the two red bands) plus three zeros (orange is three), or 22,000 ohms. If the third band is blue, the resistor value is 22 megohms. For values between 2.7 and 99 ohms, a black band indicates no zeros. If the third band is gold in color, it indicates the numeric values should be divided by 10.

There is a fourth band found on most resistors which indicates its *tolerance*. Because of manufacturing variations, the

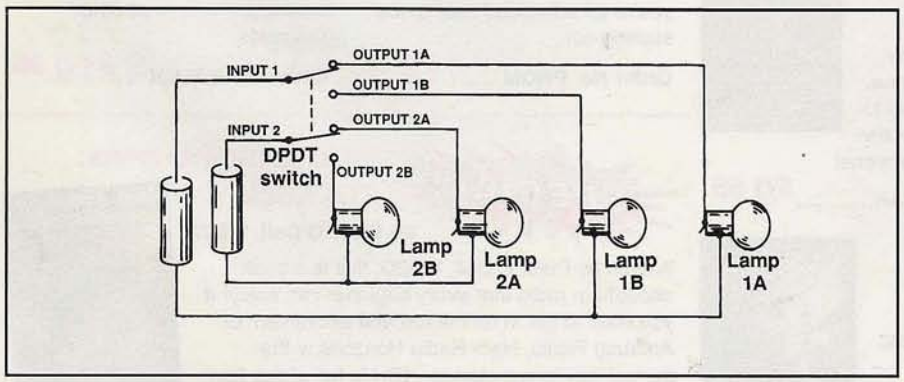



*Figure 4. Typical circuit using a double-pole, double-throw (DPDT) switch. This switch controls two separate circuits* and *switches one input between two outputs within each circuit.*

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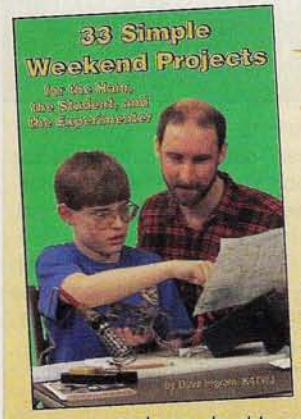


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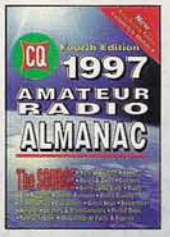


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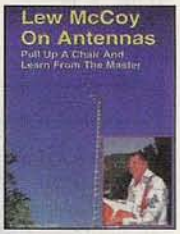


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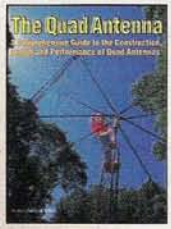


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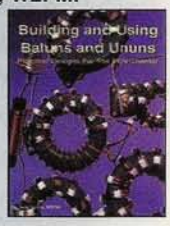


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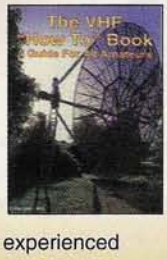


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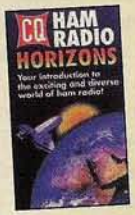


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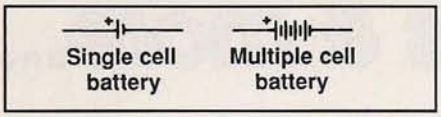


*Figure 5. Schematic symbols for a single-cell battery and a multiple-cell battery, respectively. Only the positive (+) end is noted, so it's assumed you'll realize that the other end is negative (-).*

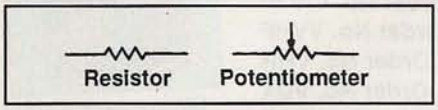


*Figure 6. Schematic symbols for a resistor and a potentiometer (variable resistor). See text for discussion of their role in a circuit.*

values are seldom exactly as shown. For example, the resistor mentioned above might actually measure 21,000 ohms or 23,000 and still be perfectly acceptable. Except in critical applications, such as filters, this manufacturing variation is normal. But to indicate the tolerance limitation of the resistor, a fourth band (gold or silver) is often added.

For example a 100-ohm resistor (brown-black-brown) might have a 10 percent tolerance as indicated by a fourth silver band. This actual value of the resistor might be anywhere between 90 and 110 ohms. This would be considered a rather poor quality resistor by today's standards. Most resistors in commercial equipment are 5% tolerance. Military equipment almost always uses 1% resistors. A 1% resistor has an extra value-indicating band. In other words, there are three color-coded indicating bands before the multiplier band. A resistor with *no* fourth band has a 20% tolerance.

Occasionally we need to be able to *vary* the resistance in a circuit. Toy train sets usually employ a variable resistor, made of resistance wire with a sliding arm. This device is called a *rheostat* and is used to vary the speed of the locomotive. A smaller version, made of carbon composition material, is called a *potentiometer*. There are contacts at each end of the resistive element and a sliding contact that moves along the element to select the desired resistance. The sliding contact is coupled to a shaft. When the shaft is moved, the resistance is varied. A knob of some sort is usually attached to the shaft. This device is found in most TV sets, stereos, etc., and is called the *volume control*. The schematic representation of a potentiometer is also shown in Figure 6.

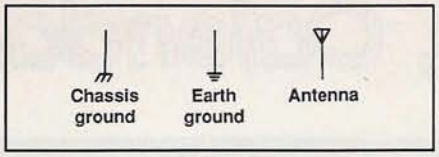


*Figure 8. Schematic symbols, respectively, for chassis ground, earth ground (see text for the difference), and antenna.*

## Antenna and Ground

There are a few miscellaneous circuit symbols that you should be aware of since you may be asked questions about them on your Novice/Technician test. These are the symbols for antenna and ground.

As I'm sure you are aware, the purpose of an antenna is to intercept or radiate radio frequency energy. The symbol for an antenna is shown in Figure 8 along with two other common schematic designators: chassis and earth *ground*.

Earth ground is one of the most common symbols you will find on a schematic. In most pieces of electronic equipment, one end of the power source (usually the negative end) is common to all circuits in the device. Rather than complicate the schematic by showing a common wire running all over the place, things which connect to this point are indicated by a ground symbol. In older equipment, this common point was usually the metal chassis upon which the circuit was constructed. This is referred to as the *chassis ground* or *common ground*.

Today, few pieces of electronic equipment use a metal chassis for the common ground. A transistor radio, for example, uses one or more plastic circuit boards, all contained inside a plastic enclosure. Even a large VCR in a metal case confines its "chassis ground" to a common length of metal foil running around the many circuit boards found inside. The term is, therefore, a little misleading. *A common ground simply means the end of the circuit that is common to most parts in the circuit.*

***"The main purpose of resistors is to impede or limit the flow of an electrical current in a circuit, but they also convert electrical energy to heat energy. A common example is found in your kitchen in the form of a toaster. The little wire inside that gets red hot is really nothing more than a resistor."***

For example, in Figure 2, note the lamp connections that connect to the lower end of the battery. These three points could all be connected to a metal chassis (rather than wired together) and the circuit would work exactly as explained earlier. In Figure 2, this point could be labeled common ground.

Obviously, you don't have to go outside and drive metal stakes into the ground to make the circuit work. But occasionally we *do* need to signify an outside earth ground. As an example, all your ham radio equipment that connects to an outside antenna should also connect to an *earth ground*. A schematic showing this would use the earth ground symbol shown in Figure 8.

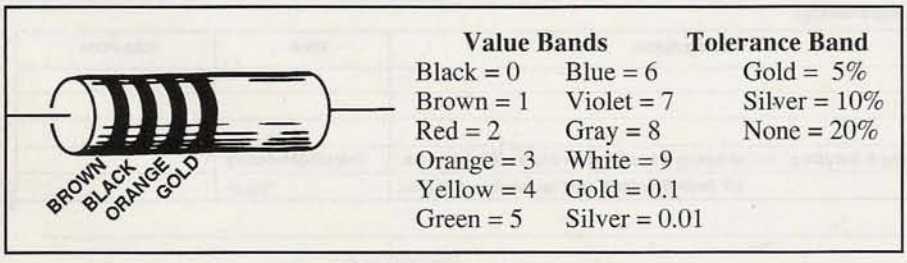


*Figure 7. The value of a resistor can be determined by reading the color code imprinted on it. Generally, the first three bands are "value" bands, and the fourth band indicates the resistor's "tolerance," or level of precision. The brown, black and orange bands identify this as a 10K (10,000) ohm resistor (1,0, three 0s), and the fourth, gold band says the actual value is within 5% of 10,000 ohms (9,500 to 10,500 ohms), precise enough for most applications.*

## We're at Capacity

That's it for this month. In my next column we'll discuss two other fascinating components called capacitors and inductors. Until then,

73, Don, W6TNS.

# Time for a New Packet Revolution

The President of TAPR—Tucson Amateur Packet Radio—says it's time to reinvent packet radio if amateur digital communications is to remain viable in the future.

*Editor's Note: The following is reprinted with permission from the May, 1997 issue (#66) of the TAPR* Packet Status Register.

Will amateur radio digital networks look any different two years from now than they did 10 years ago? Let's start by looking back at how we began in the early 1980s with this thing called "packet radio."

We (amateur radio) began by building units capable of talking to each other in a local environment. It was a thrill to be able to talk to someone across town or within the county. Not until later in the process did we have any kind of long-distance networking. Networks like NetRom, ROSE, KaNodes, TexNet, etc., came on the scene to provide linking to get us from point A to point B via RF paths over several miles or hundreds of miles. These systems did not appear until after 1984, more than five years after the first TNCs were available.

This entire trend of networking was driven by interest within the community to build such networks and the growth of the user base of TNC owners. As we had more people owning a common data communications interface, we had just enough critical mass to make networks happen and to keep them going and growing. Some of these networks have been operating over 10 years—a real accomplishment, considering the fact that there are only a few volunteers behind the process for each network. Much of this interest and growth occurred because packet was a new and exciting technology for amateur radio operators to be involved in.

## Interest and Excitement—What It's All About!

As technology has remained the same (for the most part), have we not seen a general lowering of interest within the packet using community as a whole? There are exceptions to the interest and excitement indicators—look at APRS or continued experimental development. Resources (money/equipment) are still hung at speeds that were available in 1985, while personal interest has moved in favor of a much different type of access which is focused on speed, bandwidth, and information access and availability. Let's face it—technology has passed us by if we say 1200 baud AFSK or 9600 baud FSK communications are the best we can do as amateur radio hobbyists. It is time to make the jump to a new technology base.

## The "Evil End of Amateur Radio"?

I have recently been accused of being the "evil end of amateur radio as a whole" for stressing the importance of taking a step forward with new technology, but taking a step backwards at the same time because of the need to focus on local access issues.

This is where we need to move back to now. The emphasis has to be back on creating new technology to serve the general community for local access. The reason long distance networks were created was to connect these dispersed local areas together, but this process took time—years, in fact—and new technology was created to make it happen.

However, this new technology was a result of the user interface as it was designed. There is the problem. No new user interface was really ever brought forward past the TNC-2 that was so widely adopted. There are several reasons for this, but I believe the main one was price. TAPR did too good a job on the TNC-2. The cost was so low after the first four years that most amateurs just didn't want

***"Resources (money/equipment) are still hung at speeds that were available in 1985, while personal interest has moved in favor of a much different type of access....It is time to make the jump to a new technology base."***

By Greg Jones, WD5IVD

* *Greg Jones, WD5IVD, is President of Tucson Amateur Packet Radio (TAPR). TAPR pioneered the use of packet radio in the U.S.*

to pay any more money to do better. There was also no incentive for doing it, since if you made the technology jump, there was typically no one else to talk to and getting a group to do something together was difficult, if not impossible.

We are now looking at developing new communication systems with physical limitations different from the past era of technology that will act as a current nodal point in communications. The systems that are being developed are a jump ahead in access and usage. Why hamper them with the requirements to work with systems that were based on 1970s technology? We shouldn't.

We have to start from the beginning. Build new local access infrastructures and then begin to explore ways of intercommunications based on the tradition of amateur radio ingenuity and availability. We cannot expect much of the technology currently installed to support the speeds of access for enabling long-distance communications that these new technology implementations represent.

***"The only thing that does remain viable in many of the networks today are the sites, the sites, and the sites. Sites are one of the most valuable resources we have today and they get used with any new technology that comes along."***

The only thing that does remain viable in many of the networks today are the sites, the sites, and the sites. Sites are one of the most valuable resources we have today and they get used with any new technology that comes along.

## Don't Miss the Main Point

Those who may "rant and rave" concerning what I am saying in this column (the possible abandonment of long-distance 1200 and 9600-baud systems), have missed a major point—these systems have already collapsed in many parts of the U.S. While some are still functioning, this is because of a few dedicated volunteers maintaining them. However, without a new technology influx to stir activity once again and maintain the interest of current and future participants—total collapse and stagnation is very apparent in the future of our aspect of the hobby and possibly the hobby as a whole.

We seem to have basic choices to make. Do we remain the same, using and supporting current technology with limited volunteer time and money? Or do we use our talent and resources to push forward into the future and develop new systems and operating benefits? There is some overlap in both, but trying to do both will limit our resources for accomplishing our goals and later implementing them in any wide scale solution that really moves the hobby forward. ■

## Announcing

# The Second Annual WSWSS VHF and Above Sprint

The Western States Weak Signal Society presents the Second Annual WSWSS VHF and Above Sprint, on Wednesday, September 3rd, 1997, from 7:00 to 11:00 p.m. local time. The object is to QSO as many stations as possible in as many different grids as possible on the bands of 50 MHz and up during the four-hour contest period. This event is a good opportunity to test your equipment in preparation for the ARRL September VHF QSO party.

## The Details

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*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 our "Letters" department.* CQ VHF *reserves the right to edit all submissions for length and style.*

# Pondering Packet's Future

What's in store for amateur digital communication? TAPR's WD5IVD shares his views in this month's "Op Ed" column, and our own N2IRZ brings a different point of view to this month's "Digital Data Link."

Just what is the future of amateur digital communications? That's a very provocative question, and we'll take a look at it this month. Elsewhere in this issue, Greg Jones, WD5IVD, the president of Tucson Amateur Packet Radio (TAPR), has written an "Op-Ed" about that subject and makes some interesting proposals. I'll comment on those in a bit, but first, to see where we're going, we have to know where we've been.

## A Bit of Packet History

In the early 1980s, packet radio was mostly for high-end "computer weenies," and there were only a few hams on packet. Some time later, packet exploded after TAPR introduced the TNC-2 kit, allowing the "masses" to play with this very new technology.

As this new "frontier" was placed before the amateur world, thousands of *do-ers* got involved, *do-ing* all sorts of new things with packet. Some people got involved early, before the TNC-2, and developed the AX.25 protocol. This was a very complex, technical subject, and a lot of people put in their two cents (some even more), but what came out of it all was a fairly robust, near-state-of-the-art (at that time) protocol for passing data on a radio network. Later came the BBS (bulletin board) programs, then to support them came the networks, and then the chat nodes, the DX clusters, higher-speed modems, loads of software, and APRS (Automatic Position Reporting System). And that only skims the surface.

The lesson here is that the new digital frontier created by packet radio brought the *do-ers* out of the woodwork, all competing to *out-do* each other in creating new things to make packet better. People worked together in groups, large and small. Research was done to find the ultimate solution to whatever. Comments, thoughts and ideas were routinely communicated using the medium in question, via packet.

Then came the beginning of the end.

First, the people *do-ing* all this got tired of it. Users didn't seem to understand the costs involved in deploying a network, and were even less willing to cough up more for a "better" network, and network construction slowed to a crawl. Some *do-ers* got married, had kids, and couldn't devote the time anymore. Some got tired of "trips to the site" to reset something or another. Bored with 1200 baud, and unable to finance 9600, tired of "protocol wars" pitting networkers against each other based upon their preferred networking software, slowly becoming disgusted with getting "flamed" for expressing an opinion, and no longer interested in the "For Sale" messages clogging the BBSs, it happened: the *do-ers* decided to stop *do-ing*.

***"Users didn't seem to understand the costs involved in deploying a network, and were even less willing to cough up more for a 'better' network, and network construction slowed to a crawl."***

## Don't Blame the Internet

The rise of the Internet didn't cause the problem. The problem was there long before that—it's just that there was no other game in town, so the *do-ers* just kept *do-ing*, more for a lack of alternatives than for a real interest. Once the Internet became reasonably priced, that sealed it: here was a place, a new, unexplored frontier where the technical wizards could play once again, where the network was handled by others, and funding wasn't a problem. Thus, all the best talent quit working on packet and started fooling with HTML, Java, and the like.

OK, so that's where we went wrong: we didn't tolerate the *do-ers* very well and gave them plenty of reason to go away. At the same time, a place appeared where they could go to. And packet stagnated.

## Where to Now?

Every so often, someone gets energetic and tries to generate a greater interest in packet, usually focusing on the networks. But, this can't be done alone, and after trying for a while, they quietly give up. What can be done? Is it worth doing it? What, exactly, do we want to do with packet radio? In other words, what is it good for?

I'll start by saying what it *isn't* good for. It isn't good for replacing the Internet. There's no chance that packet radio can even begin to compete with the Internet, at least not in North America. The Internet is too fast, too well funded, and too inexpensive to get any real competition from amateurs. So, think of any data application—digital voice and video, e-mail, Web pages, whatever—it's better, faster, cheaper on the Internet. In my opinion, we should stay as far away from Internet applications as possible because it is a losing proposition.

So, what *is* it good for? I've done a lot of thinking about this lately, asking doz-

By Don Rotolo, N2IRZ

***"In my opinion, we should stay as far away from Internet applications as possible because it is a losing proposition."***

ens of trusted friends and colleagues, and there is a general consensus that there are a few, but not many, things that the Internet cannot do as well as amateur packet today. These include mobile operation, where cellphones and PCS (personal communication systems) are still too expensive; multipoint communications, meaning one sender to many receivers; public service activities, where the need is temporary, cost is a factor, and deployment speed is critical; emergency activities, where a PSTN (Public Switched Telephone Network) is simply not available or massively overwhelmed; and applications in which hams are just too cheap to spend a dime to pass some data.

However, we should look at the Internet, and learn from it. In his "Op-Ed" piece, WD5IVD touches on a number of ideas, one being the adoption of TCP/IP as a standard amateur packet radio protocol. I fully support this idea. There is, however, a catch: TCP/IP, in its native state, is not well-suited to radio networking applications. Many of the existing network protocols, such as TheNET, ROSE, TexNet, and FlexNet all handle the radio environment fairly well and can carry the TCP/IP frames encapsulated within their own protocols.

## N2IRZ's Ideas

My proposal is for a number of genuine TCP/IP routers and servers, running on real computers with hard disks and all, to be connected by a bunch of TNC-based radio links. It isn't practical to put a full TCP/IP router at every node site, so we fill in the gaps between "big" sites with higher-speed versions of what we use today. Eventually, we can link these routers together directly, as they become more plentiful, but, for now, the existing networks can be used.

Used for what? None of the application types I mentioned as being better done on packet needs anything more than 1200 baud. Sure, 9600 or faster would be nice, but "nice to have" is very different from "need to have." Greg, in his article, seems to assert that if a super-duper network is developed, then the applications to use all that horsepower will follow. I disagree. Traditionally, applications have pushed the need for network improvements, not the other way around. What we need are applications that are so great that everyone will want to use them, building high-speed networks just so they can.

Greg makes another good point: Our most valuable resource is the sites we have. The hardware in the existing networks are nothing compared to the value of the sites. Certainly, not all sites are ideal—some are wretched—but many excellent sites are in use, and to lose them would definitely doom any chance of a decent network. So, if nothing else, we should take pains to maintain access to the good sites we already have. You'd be surprised how far an inexpensive plaque honoring someone who lets you use a site can go towards a warm and fuzzy feeling about amateur radio.

## Needed: A New Frontier

So, back to the problem: What do we do? I don't have a definitive answer to that, but it's become clear to me that what amateur radio data operations need is a new frontier. Something to grab the *do-ers'* interest and get them *do-ing* again. I can't say that I have the gift of vision to see just what that new frontier could be. Perhaps it will be improving modems, optimizing spread-spectrum operations, or a breakthrough in Forward Error Correction (FEC) techniques. Maybe someone will make good high-speed radios affordable for the amateur market. Most likely, it will turn out to be something that nobody has even thought of yet. Or, perhaps, packet will become a historical footnote, like AMTOR—used by some, but not a really major operating mode.

If you were ever a *do-er*, if you think you want to become a *do-er*, if you have any interest at all in the digital modes, then I urge you to action. Write to me and tell me your ideas for the next frontier. I can't do this alone. And, in speaking with a few dozen people, I haven't heard anything new. So, let's try it with 30,000 hams. Got any ideas? Maybe, just maybe, someone has that golden idea that can change history. Maybe it's you! But, unless you write and tell me, I'll never know about it. Think about it, and write, right now, while you're thinking about it.

## Test Transmitter Notes

A comment about the digital test transmitter featured last month: If you seem to be unable to get a decent eye pattern, check the eye pattern you're getting against a known good transmitter, at a reliable speed. If the known good transmitter gives a noticeably better eye pattern, try a different crystal in the test transmitter. In playing with the test transmitter, I've found that higher frequency crystals seem to modulate more cleanly than lower frequency ones, and crystals of the *same* frequency vary, sometimes widely, in their modulation linearity. It wouldn't be a bad idea for everyone who built one of these transmitters to perform this check, just to be sure you're working with a good signal to start with.

Be aware, though, that higher frequency crystals translate to wider harmonic spacing at the output. You don't want to go too high in crystal frequency, or you won't always be able to tune for your receiver frequency. Remember, too, that there may be sub-harmonics between each harmonic, and trying to tune in on one of those low-strength signals will result in considerable frustration, as I discussed last month. Also, remember that it is sometimes desirable to use a signal attenuator to keep the signal weak enough to prevent AGC (Automatic Gain Control) overload. If this does happen, it can also get frustrating, as you'll never be able to get a clean eye.

## Connections

This month, we're starting a new feature in the "Digital Data Link"—radio-to-TNC connection diagrams. One of the most frequently asked questions is "how do I connect my (TNC type) to a (radio type)?" In response, I'll show a few dia-

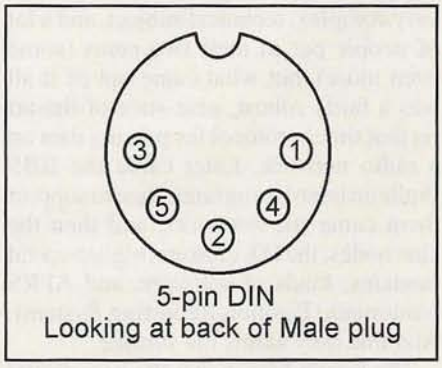



*Figure 1. Connecting to a TNC-2 or compatible (including PacComm and MFJ). This shows the back (solder) side of the male five-pin DIN plug that connects to the TNC. Connections (see text for meanings): TXA-Pin 1, GND-Pin 2, PTT-Pin 3, RXA-Pin 4.*

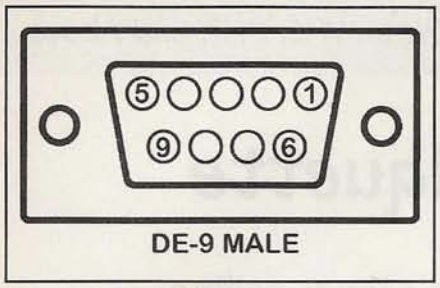



*Figure 2. Connecting to a Kantronics TNC. This shows the back (solder) side of the male nine-pin sub-D plug that connects to the TNC. Connections: TXA-Pin 1, GND-Pin 6, PTT-Pin 3, RXA-Pin 5. The same plug is used for DRSI PC*PA types 1 and 2, except the pin assignments are slightly different. Connections: TXA-Pin 1, GND-Pins 6–9, PTT-Pin 5, RXA-Pin 3.*

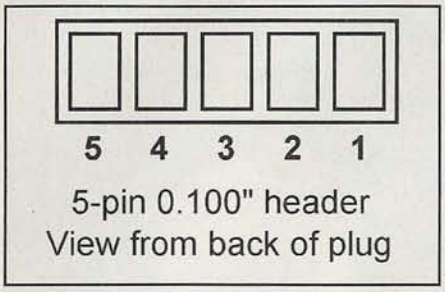



*Figure 3. Connecting to an AEA PK-232. This shows the rear (solder/crimp side) of the five-pin female 0.100" header connector that connects to the PK-232. Connections: TXA-Pin 2, GND-Pin 4, PTT-Pin 5, RXA-Pin 1.*

grams every month or so, as space permits. This month, we'll start with the most common connections, and continue until we've run out of things to connect to. The idea here is for you to copy the diagrams and put them into a looseleaf book for reference.

Figure 1 shows how to wire up the TNC end of the cable between your radio and a TAPR TNC-2 (or compatible) TNC. Figure 2 provides the same information for Kantronics TNCs, and Figure 3 shows the wiring for an AEA PK-232. Figure 4 is a generic guide to wiring up the radio end of the cable, if your radio has an old-style 8-pin mic plug.

The most important thing to remember is that the average TNC requires only four signal connections to the radio: Transmit Audio from the TNC to the radio (TXA); Receive audio from the radio to the TNC (RXA); Push-to-talk (PTT), which switches the radio into transmit mode; and Ground (GND). These signals, with the possible exception of RXA, are universally available at the microphone connector. RXA is often taken from the external speaker jack, or in the worst case, directly from the speaker terminals. If you have the instructions for the radio or TNC, and those conflict with what I've drawn here, then go with the manufacturer's guidelines.

***"Traditionally, applications have pushed the need for network improvements, not the other way around. What we need are applications that are so great that everyone will want to use them, building high-speed networks just so they can."***

## Off We Go...

Around the time you read this, if all goes according to plan, I'll be off with Rich Moseson W2VU, *CQ VHF*'s editor, to the international VHF/UHF meeting in Weinheim, Germany. In addition to learning more about the status of the European packet community, and the newest and greatest for VHF and above, we'll be there to give you a first-hand report on just what it is that attracts over 10,000 hams every year, especially when there's no fleamarket involved!

## The DCC

Finally, I'll remind you that this year's ARRL/TAPR Digital Communications Conference, the premier event in the digital community, will be held in Baltimore on October 10–12, 1997. Co-hosted by AMRAD (Amateur Radio Research And Development Corp.), this year's conference will feature a seminar on "RF Basics for Computer Weenies," as well as the usual conference presentations and beginner seminars. If you live within a day's drive of Baltimore, you should definitely attend—you'll find it well worth your time. For more information, contact Tucson Amateur Packet Radio, 8987-309 E. Tanque Verde Road #337, Tucson, AZ 85749-9399; Phone: (940) 383-0000; Fax: (940) 566-2544; Internet: <tapr@tapr.org>, <http://www.tapr.org>.

Well, that's all the space for now. I really hope to hear from you regarding packet's next frontier. Until next month, keep those bits flying!

73, N2IRZ

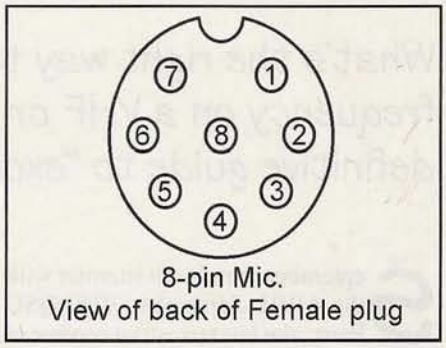



*Figure 4. Connecting to most older mobile radios. This shows the back (solder) side of the round female eight-pin microphone plug that connects to the radio. In each case, take RXA from the external speaker jack, though some radios have audio on the mic plug. Connections for ICOM: TXA-Pin 1, GND-Pins 6 and 7, PTT-Pin 5, RXA (if available) is on Pin 8. Connections for Kenwood: TXA-Pin 1, GND-Pins 7 and 8, PTT-Pin 2, RXA (if available) is on Pin 6. Connections for YAESU: TXA-Pin 8, GND-Pin 7, PTT-Pin.*

# Calling Frequency Etiquette

What's the right way to use and share the weak-signal calling frequency on a VHF or UHF band? This month, we present K7XC's definitive guide to "excruciatingly correct" calling frequency etiquette.

September rounds out summer with the ARRL September VHF QSO Party, the last terrestrial contest of the year, and marks the beginning of the winter EME season. *Es* is all but gone, leaving tropo the king of propagation modes for this event. The highest mountain peaks should still be free of snow, encouraging high levels of activity from every corner of the country. In many places, it's the last warm month for some time to come, so now is the time to finish weatherproofing your antenna systems before old man winter arrives...and it's not a bad time to brush up on your etiquette, either.

*Dayton Weak Signal Dinner. About 150 weak-signal ops enjoyed an "eyeball" get-together (as well as a great meal) in May, during the annual Weak Signal Dinner at the Dayton Hamvention. (W2VU photos, except as noted)*

## Calling Frequency Etiquette

With the recent exposure and growth of "weak signal" VHF operating, many newcomers to the low end of the bands seem lost as to the proper way to conduct themselves away from FM repeater and simplex operation. Many hams (old and new alike) discover 144.200, the 2-meter SSB calling frequency, and use it as if it were just another repeater channel, holding forth for hours at a time, not knowing how much they're affecting the rest of us.

It's time to set things right and dispel a few myths...

*Etiquette Rule #1.* The proper use of *any* calling frequency is to call CQ, make contact, then *move* to a clear frequency, leaving the calling frequency open for someone else to do the same. During my June '97 rover trip, I would call CQ on 144.200, quickly work a few folks, stop the pileup, announce "I'm moving to 144.210 NOW" and QSY.

This technique is *extremely* useful, as it puts your callers on a quiet part of the band. This lets you be heard in the clear and allows you to hear the weak replies normally lost in the congestion on the calling frequency. Once the pileup dwindled to nothing, I would CQ here (.210) several times, usually with success, and only after receiving no replies for a minute or more would I go back to 144.200 and start the process all over again. I'm hearing more and more folks starting to do this. The more competitive contesters have adopted this technique to great advantage, some doubling their score from previous years.

## The Case of 6 Meters

One of the best things happening on 6 meters is the current debate over where the calling frequency should be. In his *QST* column, Emil Pocock, W3EP, has called for moving the frequency from 50.125 to 50.200 to prevent the crowding problems encountered during the last $F_2$ season. (*This originated from a discussion at the SMIRK breakfast at last year's Central States VHF Society conference.—ed.*) Personally, I think 50.150 is high enough to accomplish this result. Regardless of who is right or wrong, the debate has accomplished something wonderful—when six is open, I now tune the entire SSB spectrum and find folks CQing anywhere and everywhere from 50.125 to 50.220 and beyond! Thank you, SMIRK and Emil!

*Etiquette Rule #2.* Trying to "drum up DX" by rag chewing on *any* calling frequency has the opposite effect. It blocks others from hearing any DX, as all they copy is your loud signal, desensing their receiver to any truly weak signals out there. Engaging in this practice during peak propagation enhancement is one of the most maddening things I've ever heard. You know...the guy who works the

By Tim Marek, K7XC


*Just to prove that he was really there,* CQ VHF *Editor W2VU (far right) had his picture taken at the Dayton Weak Signal Dinner with Central States VHF Society President and ARRL Vice President Joel Harrison, W5ZN (far left), and dinner host Tom Whitted, WA8WZG (center). (WB6NOA photo—he was there, too)*

KH6 on 144.170 and then chats with his friends about it...on the same frequency, denying others the chance of doing the very thing he is talking about.

*Operating Myth #1.* "If I leave the calling frequency, no one will hear me." During the 1993 June VHF QSO Party, I was the 2-meter op of the NC7K two-man Multiop team here in DM09. I was hoping to work the last few grids needed for my 144-MHz VUCC. Using the "CQ and Move" method, I had run a pileup to nothing and was CQing south on 144.210 CW when XE2/K9VV answered me from DM11—over 650 miles south and grid #100 on 2 meters! That *never* would have happened during the middle of the day on 144.200. Other than my contact with Paul, KH6HME, in Hawaii, this is my longest Tropo QSO to date.

Pat, N6RMJ, is the 2-meter op at WB2ODH/6 atop Frazier Mt. in DM04. These folks are literally on the last tall mountain above Los Angeles to the north. They can and have worked folks in Oregon and northern Nevada from there on 2 meters (over 600 miles), but still have all the problems of being so close to a large metropolitan area. How do they cope? They CQ on 144.250 and higher for the entire contest! Their group has been doing this for so long now that folks know to look for them there. They spend very little time on 144.200 anymore, and their scores have skyrocketed as a result (of course, the kW amp, GAsFet preamps, and four-bay arrays help, too...HI!)

My rule of thumb: Those *farthest* from large population centers should be the ones operating *closest* to the calling frequencies, and those *closest* to the metropolitan areas should be the *farthest* from *any* calling frequency. Using this strategy, not only will we be able to hear and work the weak stuff farther away, but we will know where to find everyone and 144.200 will become a place for those who truly need it, such as rovers, who have way too many distractions to be creative in their QSYing. This past June, I was on 144.200 to stir the pot and 144.210 to run rate. As a single-op rover, I didn't have the luxury of being able to tune the band as much I would have liked, but folks know I run 144.210 when mobile and looked for me there.

*Operating Myth #2.* "CW is dead." Little is further from the truth than this statement. Judicious use of CW while CQing will get attention quicker and farther away than any other mode. Over a difficult SSB path requiring stacked Yagis and a kW, I can work the same station using 100 watts into a single antenna if he switches to CW. QRM and QRN are much easier to filter out. Aurora (AU) is not very practical without using CW. SSB EME is only possible for the very large stations while the rest of us can work quite a few using CW with modest arrays and power output. There is nothing simpler than CW to penetrate the noise and travel the long haul, That's why it will always be with us.

These are all observations and examples that have occurred during some of my time operating CW/SSB on VHF/UHF. I'm sure there are many other things I haven't mentioned that have come to mind along these lines. Some want to change the contest rules to curb some of these problems, such as eliminating FM or banning the use of 144.200. My opinion: We don't need new rules governing how we operate during a contest, we just need to operate smarter. It's that simple.

## Activity Reports

Es was all but nonexistent during the June VHF QSO Party. Some did work a surprising number of Qs (contacts) and Mults(multipliers), but for the most part, it resembled a September event. Here are some comments off the Web:

From Jim, WB9AJZ/6 CM87xi:

Enjoyable contest from CN70xb near Shelter Cove, CA, on the "Lost Coast." Heard (didn't work) several east coast stations on 6 m at the beginning of the contest for about 15 minutes. They were busy with one-hop stuff. Worked my first EME contact, with W5UN. Completed a laser Q with KD6OSV/CN70. Completed 2-m Qs from CN87 to DM04. Final Score: 214Qs x 67Mults = 14338 Points.

From Jim WB9SNR/R:

I didn't know until late Friday night that I would even be able to make this trip. Fortunately, things went pretty well once I got on the road. I was able to hit eight grids in and around the Chicago area, with at least two hours operating time each in seven of them (a local dust storm chased me out of one grid after one hour). Grids activated: EN63, EN53, EN62, EN52, EN61, EN51, EN50 & EN60. 355 Qs, 717 Q Points x 97 Mults x 8 Grids activated = 75285 total score. Activity seemed about normal, and Tropo conditions went way above normal starting late Saturday night. This time, the Tropo favored the higher bands, 222–296. In addition to beating my score from last year, I managed to pick up three new grids each on the 222 and 902 MHz bands, and one new grid on 1296. Made my day!

From Shawn N7LQ DM09dn:

We were lucky enough to be on site by Wednesday afternoon and get some of the early prep work done. Thursday and Friday were cold, windy, and wet, with nearly two inches of ice forming on all the antennas by 0330 PST Friday. On Friday morning, the temperature came up to slightly above freezing and the ice began falling off. Fortunately, all the antennas survived with little if any damage. Most of this time was spent with a cloud all around us. Cold and wind was the order of the day. We did complete the 432- and 6-m antennas and 1296 had been finished on Thursday. The 2-m array had been assembled on a ground stand on Thursday, but wind and cold prevented it from being fully installed until about one hour before the contest started. Saturday saw us in a dense fog again until about 8:00 a.m. The temperature was defi-

nitely warmer (i.e., above freezing), as all the ice was now gone along with a good portion of the wind. 311 Qs, 378 Q Points x 133 Mults = Total Score: 50274.

From Larry Hogue, WB5OMF CM98:

A wonderful thanks to all who went the extra mile...to all the stations that shared the contacts...to some really great people out there who made for a great Father's Day...to the rovers, we couldn't have made it with out you...Roger, KM6RH; Rich, K6ALE; Jeff, KE6ILX, and Tim, K7XC. I know, the war stories are yet to come...For those who went the Extra Extra Mile...Len, WA6KLK, *thanks for the new grid* (DN12)!!! Shawn, N7LQ, what a signal from DN01...a 559 without a doubt...Sure wish 222 was a little more active...Thanks, Todd, for DM15 on 222.1 CW; Excellent first. So many great stations, it's hard to quit and share the reflector. So, one last time, thanks to all! 311 Qs, 483 Q Points x 78 Mults = Score: 37674.

From Beau, N1MJD/R:

We had wanted to try and better our January score of ~7200 points. I guess we did OK. No equipment failures. Our schedule needs to be fine tuned, but no real complaints. We fell behind both days. It was mostly because, with all the hardware on the roof, we had a lot of people stop and ask if we had found "The Energizer Bunny" yet. Then we had to explain that we weren't bunny-hunting, but checking for residual radiation from Chernobyl. Just kidding! Contest high point was when we were bombing down I-95 at 65 miles per hour and I reached for the 223.5 FM radio. I keyed down, called CQ, and the Ford Explorer cruise control suddenly said "let's go 90!" Man, isn't 222 a great band! Not only can you talk to people, but you can remote control your vehicle as well. We traveled ~1000 miles. We've had some sleep and time to go over the log. It's in pretty good shape, so here's the score: OPs N1MJD + N1JEZ, 496 Qs x 91 grids x 11 grids activated. Final Score = 60,588.

From Peter, VE3AX FN02cw:

Local activity was absolutely deplorable! Where were all the VE3s? If it had not been for the efforts of the VE3OIK and VE3NPB rover crews, I would have missed many adjacent grids. Thanks, guys! The weather here was just beautiful (sorry, Tim!)—couple that with Father's Day, and (I) think everyone went elsewhere!

With only 100 watts on 6 meters, I did not put much effort there, as evidenced by the score on that band, but did catch C6AIE Sunday a.m., and the *E*s to Manitoba, Saskatchewan, Alberta, Washington, and Oregon Saturday evening was interesting. Best 2-meter DX was a quickie meteor scatter contact with Dick, KØMQS, on Sunday a.m. We've been running every weekend (just for fun) for months. Best DX on 222 and 432 was probably K1TR in FN44. Next year, new 6-meter 8877 amp/antenna, new 432 amp/three more Yagis, *higher antennas*!

My parents decided to move out of their

*The noise figure measurement table at the Weak Signal Dinner was set up and operated by the 1997 Dayton Technical Excellence Award winner himself, Al Ward, WB5LUA.*

home of the last 30 years this weekend, requiring me to make two more trips with the trailer to Mississauga (over one hour each way) to pick up miscellaneous "just can't throw it out" collectibles (read *junk*). Despite these higher priorities, I still managed a personal best, but failed to surpass Kevin (VE3KDH's) score from last September. I was well on my way, but had to QRT at 1830 Z Sunday afternoon with 8-1/2 hours still to go. Results: 50 MHz, 64 x 40; 144 MHz, 155 x 48; 222 MHz, 49 x 28; 432 MHz, 57 x 30; 1296 MHz, 14 x 8; Total Score = 72,842.

From Chris Cox, NØUK:

A pretty underwhelming effort on our part! Didn't make our first QSO until 2225 Z on Saturday and were plagued with antenna problems, especially on 1.3 GHz, for the whole event. At least the new 902 transverter and antenna worked flawlessly. Weather Sunday took a decided turn for the worse around lunch time and we had to tear down in a hurry. A very special thanks to Donn, WA2VOI, for his rovering efforts and more so for stopping at our site and helping us tear down to beat the storm! For this, Steve, KAØVYB, and I will be eternally (well almost!) grateful. 105 Qs x 59 Mults = 8142 Final Score.

## The W7KK Debacle

Mud! That's what I remember most about the W7KK attempt to activate Mt. Moses in DN10. Two weeks before the contest, the road and weather were dry all the way up. But on contest weekend, a classic "Tonopah low" weather system was stalled directly overhead, slowly spinning in place, drenching the desert with huge rain/thunderstorms.

I did make it up top, but there was no way we would endure ice, sub-zero wind chill, 70-plus mph winds, and 10-foot visibility just to play radio. It simply wasn't safe. Russ, K6KLY, hit a rock with his van on the way up and punched a hole in his transmission, requiring a tow truck to rescue him and pull him back to town. After much thought about relocating south to DM18, we decided not to risk it and called off the Multi. Plus, Dave, W7KK, had pressing family emergencies crop up and really needed to get home. Russ wanted to do something and I was frustrated beyond words.

I reinstalled the rover station in my truck to salvage something from the event. On Saturday morning, while most folks were doing last minute touch-ups to their stations, I dismantled (in the pouring rain) my new six-element 6-meter Yagi and literally threw it into the back of the truck. As a rover, I needed an uncluttered rooftop for maximum efficiency of the KB6KQ Loops.

Once Russ's van was running again, we caravanned back to my home while working each other on 2 and 440 FM at every grid intersection. Once home, we dumped the tower trailers, unloaded most of my truck, and said our good-byes. I took a long shower, posted a quick synopsis to the Internet, along with my route for the rest of Saturday and all of Sunday. I arrived in Red Bluff, California, at 1:30 a.m. and was sound asleep by 2 a.m., only to be awakened at 5 and on the road again by 6. Functioning on only three hours sleep, I somehow managed to stay awake to the very end when I entered DM04 with just minutes to spare. My last hour was spent driving up Frazier Mt. in DM04 to visit with the WB2ODH/6 group.

My main reason for roving this time was as a form of therapy. I was so frustrated with all the "Murphy" problems we encountered that I needed some kind of release and going rover was just the ticket. How did I do? With little advance warning that I was coming, I did round up the troops fairly well, attracting the usual crowds when it came time to change grids. One highlight was working Jack, XE2/N6XQ, from the roadside in DM06 with nothing more than the omen loops and 100 watts. Raw Score = 545 Qs, 698 QSO Points, 96 Mults (including a bonus of 17 grids activated). Unofficial raw score of 67008 Points (before dupes). Not bad for a "forced rover" expedition with no prior PR or planning.

For the September contest, I plan on giving Mt. Moses another try. Hopefully, this time I can get to the top and operate for a while. Meanwhile, keep those reports coming: 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...sk

# Playing Hide and Seek with Phase 3D

In its early maneuverings after launch, the Phase 3D satellite will occasionally "disappear," and it'll be up to AMSAT controllers to figure out where it is.

*Editor's Note: Once again, work demands have kept WA4SXM away from his keyboard. We hope to have his telemetry column for you in October. This month, Guest Columnist James Miller, G3RUH, steps in to offer a look at how AMSAT controllers will keep track of the P3D satellite immediately after launch—scheduled at press time for September 30. This report was provided by the AMSAT News Service and is used with permission.*

Regular users of the FO-20 (Fuji-OSCAR 20) satellite may have been puzzled in early June by a strange buzzing sound on its mode JA transponder. This was caused by command stations testing the new *P3D* (Phase 3D) *Range Determination* software and hardware with FO-20.

P3D's orbit will change significantly after motor firings needed to place it in its proper orbit, and NORAD (the North American Air Defense Command, which tracks every satellite orbiting the Earth) will lose track of us. So would we, without the *P3 ranging system*, which enables our worldwide network of Command Stations to measure distance to the satellite from different locations and at different times and so compute the new orbit's Keplerian elements. This information is used by us (the command stations), the AMSAT community, and of course given back to NORAD so it can re-acquire our satellite by radar. This methodology was used to remarkable effect in picking up OSCAR-13 after both its motor firings.

**James Miller, G3RUH, was an OSCAR-13 command station for over 10 years and is now part of the P3D command team. He lives in Cambridge, England.*

## Updating 1988 Technology

Back in 1988, the P3C engineering software was still based on the Atari 800XL computer (*prior to its launch and successful orbiting, OSCAR-13 was known as Phase 3C, or P3C.—ed.*). This was a legacy from the very successful designs originating as far back as 1979 and the ill-fated P3A satellite (which was lost in a launch failure in 1980).

However, the prospect of working on P3D and still using dual audio cassettes for storage and an 8-bit, 2-MHz, processor, has never been very attractive, and a re-engineering of many of the tools has been undertaken by this author over the last couple of years. The P3D Range Determination package marks the successful completion of a substantial development programme that includes the following principal packages:

- *Tracking*
- *Telemetry Display*
- *Command Uploader*
- *IPS-X1802*
- *Ranging*, and
- *OrbitFit*

## Tracking, Telemetry, and Command

These first three packages were used for AO-13 and have been updated for P3D. *Tracking*, of course, needs no introduction. It is the software necessary to keep track of the satellite's position in the sky and location within its orbit.

*Telemetry Display* is essentially the same package that was used for AO-13, but with P3D-specific changes. This software will be publicly released for several computer platforms when P3D is finally "nailed down."

*Command Upload* software is used for commanding the spacecraft both during lab testing and in space.

## Coming up to Speed

Like its predecessors, P3D has a flight computer based on a radiation-hardened CDP-1802 microprocessor. It runs an operating system called *IPS*. But generation of the flight operating system and onboard control software is done on a ground-based host computer. The *IPS-X1802* package is, as its name suggests, a cross compiler. Source files for P3D are written using the IPS language. They are compiled by the IPS-X1802 development system (itself written in IPS), which then outputs a target binary in 1802 machine code.

In the days of P3A/B/C, this compilation took half an hour on the Atari 800XL. Imagine how tedious a simple edit used to be. Today, from source files to uploadable binary, flight software compilation takes half a *second*. The IPS-X1802 cross-compiler is a major part of the P3D development programme. Without it, the flight software which controls the space-

By James Miller, G3RUH

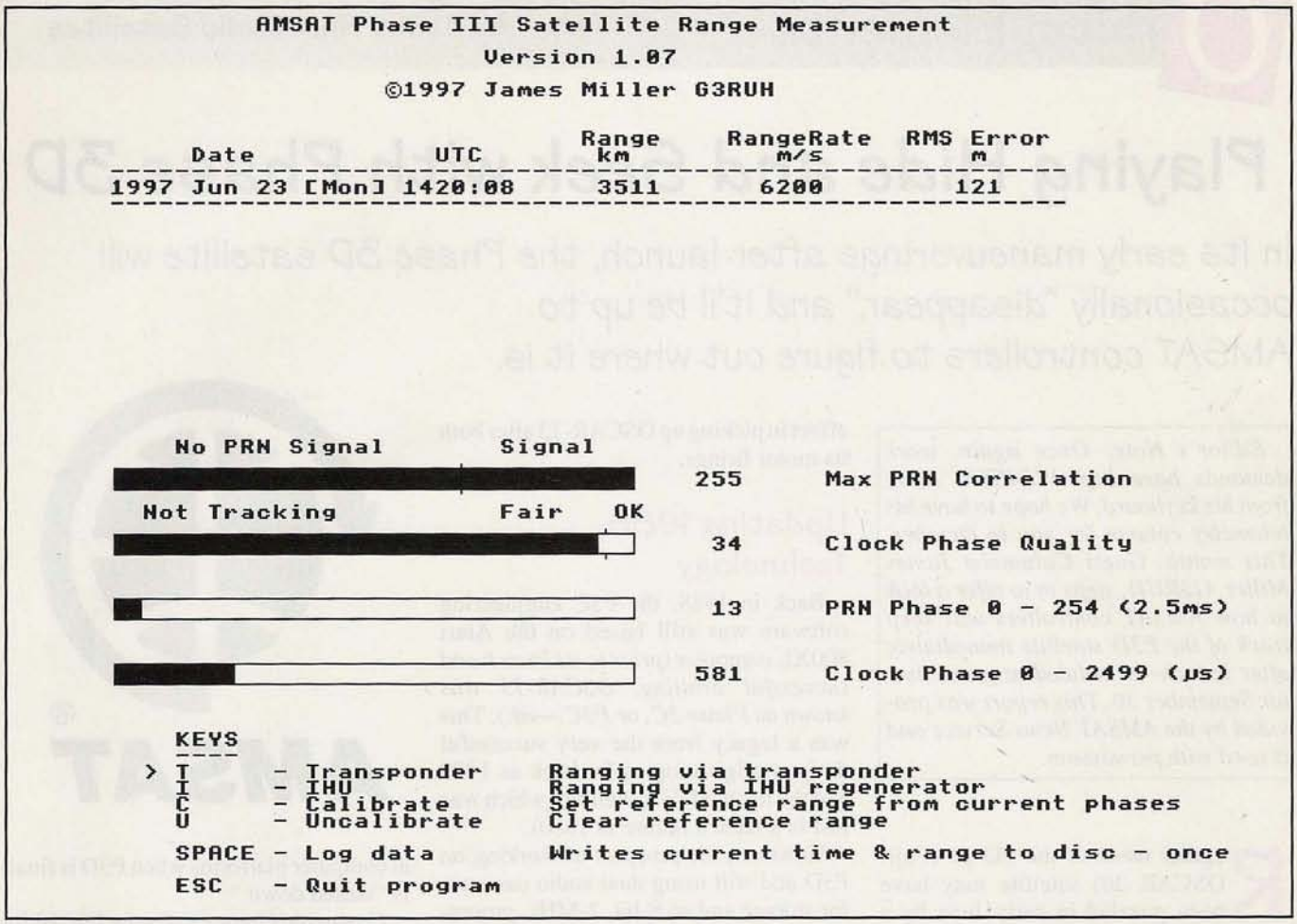



*Figure. A sample GIF image from the* P3D Range Determination *software, as tested on a pass of Fuji-OSCAR 20 (FO-20). This software will help AMSAT controllers keep track of the P3D satellite as it maneuvers toward its permanent orbit.*

craft—and which is much different than that of P3A/B/C—would be impossible to produce efficiently in the short timescale left to us.

The *Ranging* software, mentioned earlier, measures range to the satellite with a basic accuracy of about 150 meters (1 microsecond). Comparison of ranges measured via FO-20, with ranges displayed by regular tracking programs, shows agreement within 5 kilometers, often better.

During tests, signal strengths have been kept to the absolute minimum needed for "lock" and are weaker than AO-13's general beacon used to be. The uplink power to FO-20 is typically under 1 watt to a KLM14C antenna, rather less than a typical SSB user's. The ranging software can track down to a level where the signal is virtually inaudible. A sample GIF image taken during an FO-20 pass is shown here (see Figure) and can also be viewed on the World Wide Web at: <http://www.jrmiller.demon.co.uk/IPS/range.gif>. The IPS directory also contains details of a 120-page book describing the IPS operating system.

## Fitting It All Together

The final program, *OrbitFit*, takes range measurements from the network of command stations and computes an orbit that best fits the data. It was written 10 years ago by Stefan Eckart, DL2MDL, and I have adapted it for our current needs. Tests made by processing FO-20 ranging data have been completely successful.

The software is written in BASIC and ARM assembler for the Acorn Risc Computer (see "Resources"). Current machines use the DEC SA-110 processor at typically 200 MHz/700 mW/$50, highest MIPs/mW and MIPs/$$ (taken together) in the business and currently the embedded systems processor of choice. (*I think this means it gets more bang for the buck than anything else out there today.—ed.*) It makes a cool personal computer, too.

Software isn't as photogenic as hardware, and thus gets little or no exposure. So I hope this summary gives you some idea of how the backroom boys have been keeping busy. There are many such heroes in the P3D program, but I'll just cite fellow P3D command stations Peter Guelzow, DB2OS; Graham Ratcliff, VK5AGR; Stacey Mills, W4SM; and Ian Ashley, ZL1AOX, for enthusiastically thrashing every development as it has staggered off the production line. ■

### Resources

For more information on the Acorn Risc Computer, visit Acorn on the World Wide Web at <http://www.acorn.co.uk/acorn/products/strongarm/>.

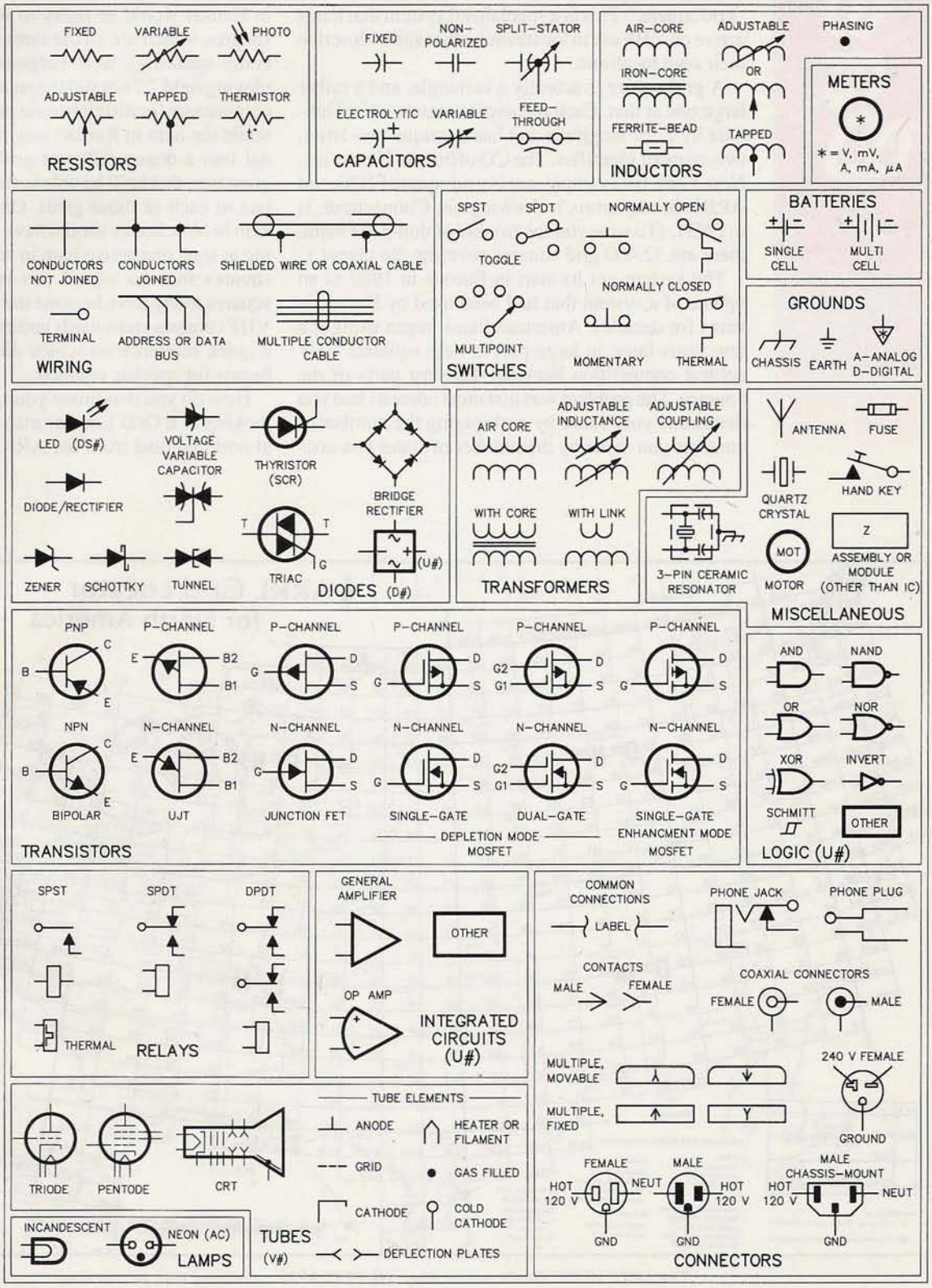
Information on the DEC SA-110 processor is available at <http://www.europe.digital.com/info/semiconductor/sa110.htm>.

General information on Phase 3D and the amateur satellite program is available from AMSAT-NA at P.O. Box 27, Washington, DC 20044; Phone: (301) 589-6062; Web: <http://www.amsat.org>.

Basics

# Common Schematic Symbols Used in Circuit Diagrams

Building a project from a schematic diagram is always easier if you understand what the various symbols stand for. Here's a guide to the most common ones.




*(Reprinted with permission from the* ARRL Handbook.*)*

Basics

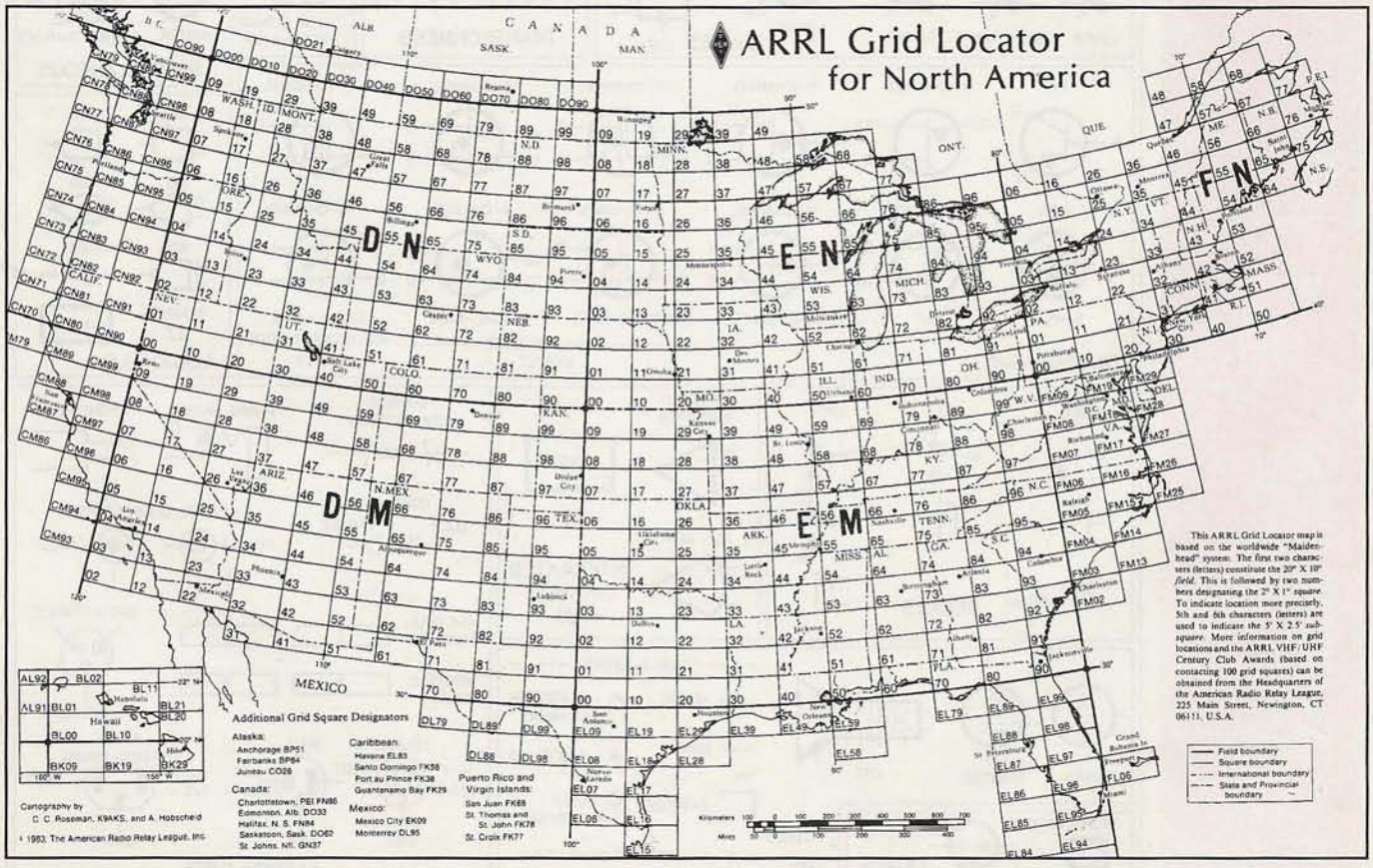
# Grid Squares

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 pro-grams 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 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. ■

## Hamfest Calendar

*(from page 29)*

**Sept. 21**, Tailgate Electronics, Computer and Amateur Radio Flea Market, Albany and Main St., Cambridge, MA. Talk-in: 146.52 & 449.725/444.725 pl 2A -W1XM/R. For information, call (617) 253-3776.

**Sept. 21**, 7th Annual Hamfest & Computer Show, New Port Richey Recreational Center, New Port Richey, FL. Talk-in: 145.35- & 147.15+ repeaters. For more information, call Mimmie, KO4FB, (813) 937-7455, or e-mail: Marv, N2AT: <MARVB@IX.NETCOM. COM>

**Sept. 21**, 25th Annual Hamfest and Computer Show, Lenawee County Fairgrounds, Adrian, MI. Talk-in: 145.370-. For information, contact Brian J. Sarkisian, KG8CO, 139 N. Main St., Adrian, MI 49221; or call (517) 265-1537, e-mail: <kg8co@juno.com>; <http://www.qsl.net/W8TQE>. (exams)

**Sept. 27**, Hamfest and Computer Show, Campus of Embry Riddle Aeronautical University, Daytona Beach International Airport, FL. Talk-In: 147.150+. For information, call John Munsey at: (904) 677-8179; or e-mail: <K4BV@JUNO.COM>; Web page: <http://erau.db.erau.edu/~stokess/hamfest.html>. (exams)

**Sept. 27**, Hamfest & Computerfest, Chemung County Fairgrounds, Horseheads, NY. Talk-in: 147.96/36, 444.20. For information, contact Dave Lewis, 465, CR, 13, Van Etten, NY 14889, or call (607) 589-4523. (exams)

**Sept. 27**, Hamfest and Computer Fair, New Civic Center, Anderson, SC. Talk-in: 146.79. For information, send SASE to Anderson Hamfest, Anderson Radio Club, P.O. Box 1525, Anderson, SC 29622, phone: (864) 226-7156; fax: (864) 225-7156. (exams)

**Sept. 28**, Giant Electronic Fleamarket, Lincoln High School, Yonkers, NY. Talk-in: 449.425 MHz PL 156.7, 223.760 MHz PL 67.0, 146.910 Hz, or 443.350 MHz PL 156.7. For information, call Otto Supliski, WB2SLQ, (914) 969-1053. (exams)

**Sept. 28**, Fleamarket, Framingham High School, Framingham, MA. For additional information, contact Bev Lees, N1LOO, FARA P.O. Box 3005, Framingham, MA 01705, or call (508) 626-2012. (exams)

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Here are some of the articles we're working on for upcoming issues of *CQ VHF*:

- "Are You Covered?"—a look at ham gear and homeowner's insurance, by Brad Pioveson, W9FX
- "Is 10 Meters *Really* a VHF Band?" by Arnie Coro, CO2KK
- "CQ Universe—Is Anyone Out There?"—the growing role of hams in the Search for Extra-Terrestrial Intelligence (SETI), by Denis Jakac, VE3ZXN
- "Rockets into the Ionosphere," by Ken Neubeck, WB2AMU

*Plus...*

- "Build a VHF/UHF SWR Meter," by Dennis Wilkison, KE6UZQ
- "An *Efficient* HT Power Supply," by Phil Salas, AD5X
- Two antennas you can build...
  ..."The 'Simple-Easy' 2-Meter Antenna," by Lee Aurick, W1SE
  ..."The VBW-1, a VHF Broadband Wonder," by Arnie Coro, CO2KK

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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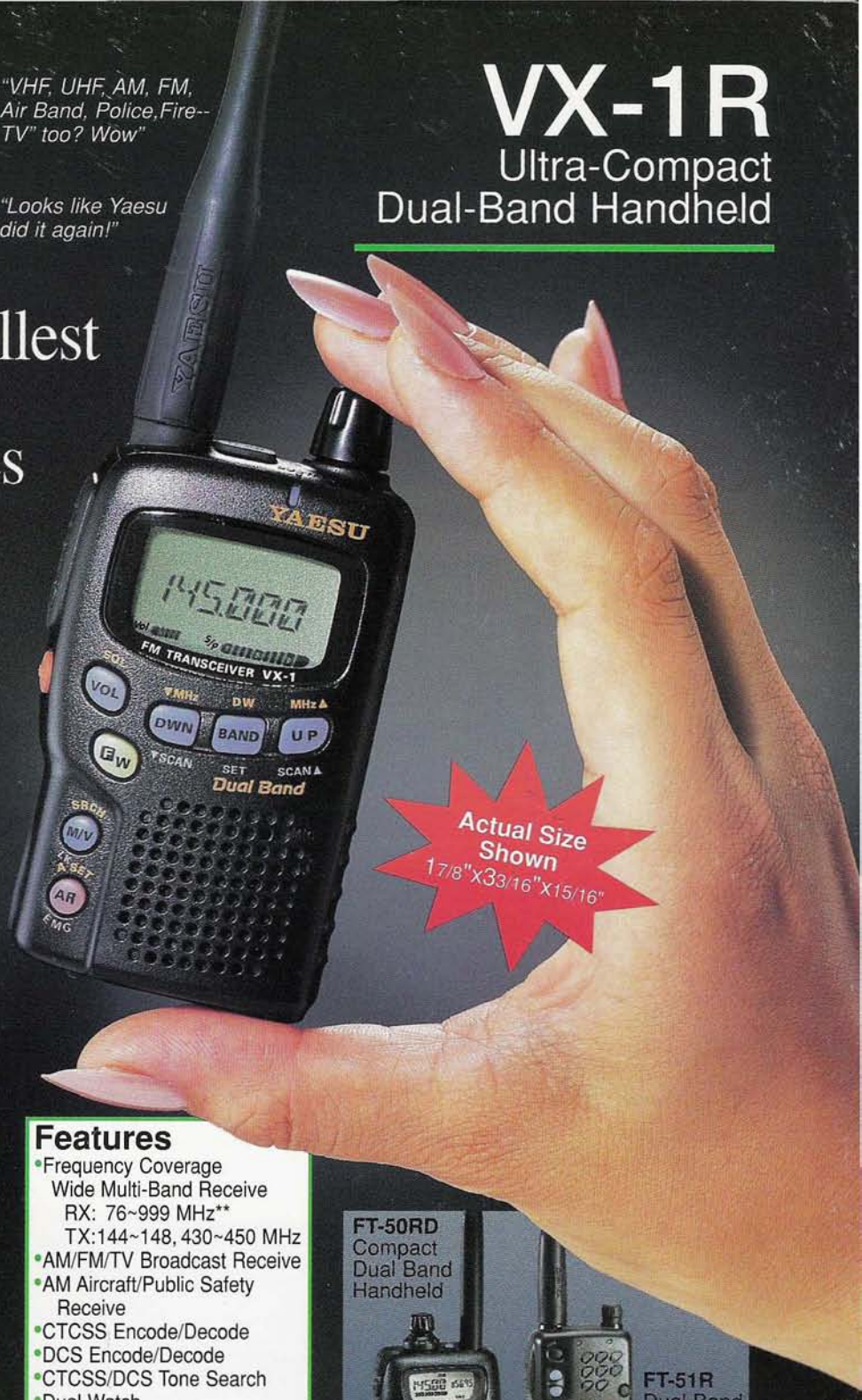


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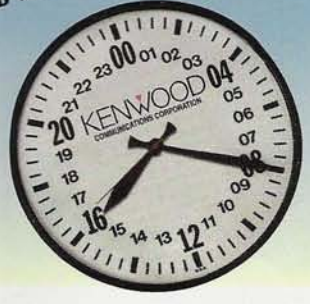


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