ICD 08237

CQ VHF

Ham Radio Above 50 MHz

December 1996

- **Gordo's Goodie Guide and other Holiday Gift Ideas**
- **Build a Portable ATV Repeater**
- **CQ VHF Review: Alinco DR–605 Dualbander**
- **dB or Not dB: Solving the Decibel Dilemma**

Plus Two New Features

- ***CQ VHF Profile*: Ed Kracum, WB2COP**
- ***VHF Worldwide*: News from South Africa**

. . . and the 1996 Annual Index

On the Cover: Warren Elly, WA1GUD, Tampa, Florida. Details on page 18.

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- 5 watts high power
- 100 memories
- 135 to 174MHz extended receive
- Clear Dot-Matrix display with alpha-numeric ID
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- Auto repeat offset
- Built-in 1750 Tone Burst
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- CTCSS Encode/Decode
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C528A
C628A
C228A

C228A 2M & 220MHz Deluxe Twin-Band HT

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- 130-174 and 200-244MHz extended receive
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- CTCSS Encode/Decode
- DTMF squelch with Paging
- Scanning-busy, pause or hold

C188A
C288A

C188A 2 Meters The Slim-Line HT

- Fits in your shirt pocket!
- 5W at 12VDC
- 40+ memories (or optional 200+memories with snap-in chip)
- 115-174MHz extended receive (including AM air band)
- CTCSS Encode/Decode
- DTMF squelch with Paging
- Scanning-busy, pause or hold

C288A 220 MHz Slim-Line HT

- Same as C188A but for the 1 1/4 meter band
- 115-249 MHz extended receive
- TX 220 MHz band

C468A
C168A

C168A 440MHz The Deluxe small HT

- 2 Meters
- The Deluxe small HT 5 watts at 12VDC
- 40+ memories (or optional 200+ memories with plug-in chip)
- 115 to 174MHz extended receive (including AM aircraft band)
- CTCSS Encode/Decode
- DTMF squelch with Paging
- Scanning-busy, pause or hold

C468A 440MHz The Deluxe small HT

- 5 watts at 12VDC
- 40+ memories (or optional 200+ memories with plug-in chip)
- 400-474MHz extended receive
- CTCSS Encode/Decode
- DTMF squelch with Paging
- Scanning-busy, pause or hold

C528A 2M & 440MHz Deluxe Twin-Band HT

- 5W (2M and 440) at 12VDC
- 40 memories (20 + 20 "limited" memories)
- 130-174 and 300-474MHz extended receive
- CTCSS Encode/Decode
- DTMF squelch with Paging
- Scanning-busy, pause or hold

C628A 70 cm & 23 cm

- Same as C528A but for the 70 & 23 cm band
- 5W 70 cm and 1W 23 cm at 12VDC

C558A

C558A 2 Meter & 440MHz Elegance, Balance and Twin-Band Performance

- 5W at 12VDC
- 40+ memories (opt. 200+ memories with plug-in chip)
- 115-174 & 340-474MHz extended receive (including AM aircraft band)
- CTCSS Encode/Decode
- DTMF squelch with Paging
- Scanning-busy, pause or hold

C108A

C108A 2M & Very Small HT

- 20 memories
- 100-174 0MHz extended receive (including AM aircraft band)
- CTCSS Encode 23 tones
- 1 MHz, Full Range, Memory, and Memory-Scan-Memory: Programmable for Pause & Busy
- DC Power: 2 alkaline AA penlight cells

C178A

C178A 2 Meters (+low power 440) The Deluxe Dual-Band HT

- Single-Band Price
- 5W (2M) at 12VDC & 50mW (440)
- 40+ memories (opt 200+ with plug-in chip)
- 110-174 & 320-474MHz extended Rx (including AM air band)
- CTCSS Encode/Decode
- DTMF squelch with Paging
- Scanning-busy, pause or hold

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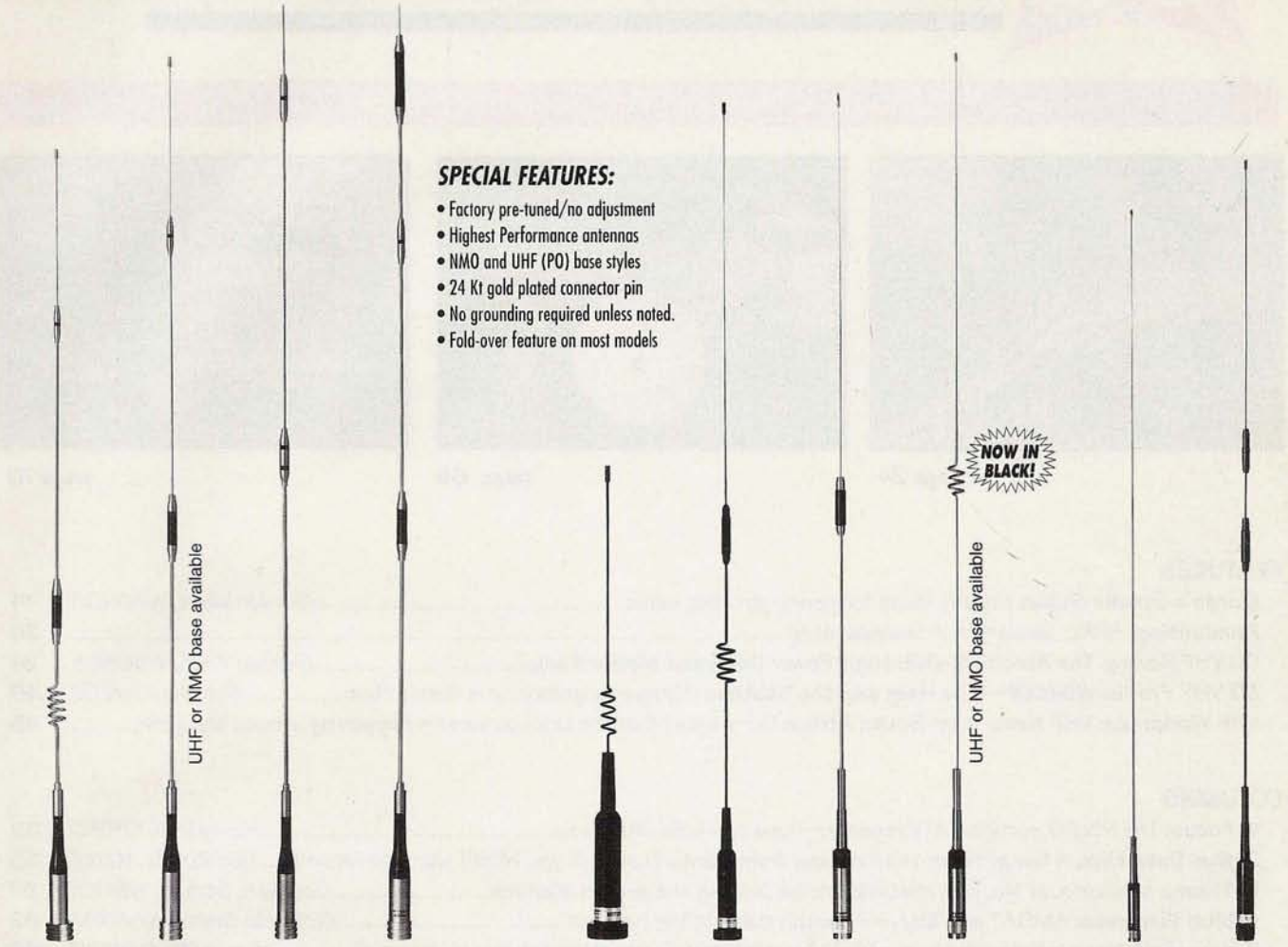

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- No grounding required unless noted.
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MODEL	BAND	GAIN (dBd.)	WATTS	CONN.	HT. IN.	ELEMENT PHASING
NR72BNMO[6]	2m/70cm	2.15	100	NMO	13.8	1/4λ, 1/2λ
NR73BNMO	2m/70cm	2.15/5.3	100	NMO	33.5	1/2λ, 1-5/8λ
NR770SA[6]	2m/70cm	2.15/2.15	100	UHF	16.9	1/4λ, 1/2λ
NR770HA[7]	2m/70cm	3.0/5.5	200	UHF	40.2	1/2λ, 2-5/8λ
NR770HNMO[8]	2m/70cm	3.0/5.5	200	NMO	38.2	1/2λ, 2-5/8λ
NR770RA	2m/70cm	3.0/5.5	200	UHF	38.6	1/2λ, 2-5/8λ
NR790A*	2m/70cm	4.5/7.2	120	UHF	57.5	6/8λ, 3-5/8λ
SG7000[6]	2m/70cm	2.15/3.8	100	UHF	18.5	1/4λ, 6/8λ
SG7200NMO	2m/70cm	3.2/5.7	150	NMO	36.6	1/2λ, 2-5/8λ
SG7500A	2m/70cm	3.5/6.0	150	UHF	40.6	1/2λ, 2-5/8λ
SG7500NMO	2m/70cm	3.5/6.0	150	NMO	41.0	1/2λ, 2-5/8λ

1/4λ antennas rated in dBi.

MODEL	BAND	GAIN (dBd.)	WATTS	CONN.	HT. IN.	ELEMENT PHASING
SG7900*	2m/70cm	5.0/7.6	150	UHF	62.2	7/8λ, 3-5/8λ
SG2000*	2m	5.2	150	UHF	62.6	7/8λ
SG6000NMO[6,9]	6m	2.1	150	NMO	39	1/4λ
NR140A	1-1/4m	3.8	100	UHF	36.2	5/8λ
NR124	23cm	8.4	100	N	25	4-5/8λ
CR214S[6]	2m/1-1/4m	2.15/3.4	120	UHF	37	1/2λ, 5/8λ
CR224A*[6]	2m/1-1/4m	5.0/6.0	150	UHF	68.5	7/8λ, 2-5/8λ
CR320A[6]	2m/1-1/4m/ 70cm	2.15/3.8/ 5.5	200/ 200/100	UHF	37.4	1/4λ, 1/2λ, 2-5/8λ
CR627B[6,9] CR627BNMO[6,9]	6m/2m/ 70cm	2.1/4.5/ 5.5	120 200/100	UHF NMO	60	1/4λ, 1/2+1/4λ/ 2-5/8λ
NR2000NA	2m/70cm/ 23cm	3.15/6.3/ 9.7	100	N	39	1/2λ, 2-5/8λ 5-5/8λ

* Not recommended for Magnet Mount
[6] Grounding required.
[7] NR770HB same specifications but in black finish.
[8] NR770HBNMO same specifications but in black finish.
[9] 50MHz antennas adjustable

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Patented One-Touch Fold-over Feature
(Not available on NR72BNMO, NR73BNMO or NR770SA.)

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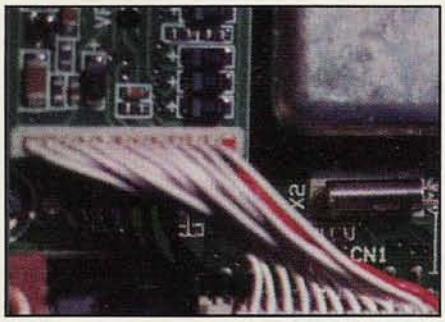
CQ VHF Ham Radio Above 50 MHz

Volume 1, Number 11—December, 1996



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Meet the Mobile Radio Value Leaders
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New Alinco DR-140T
2-Meter Mobile/Base with Alphanumeric Display

Alinco makes it possible to get a full-featured, full-performance 2 Meter mobile/base radio at a "showstopper" price. The alphanumeric display shows up to 7 characters to identify your favorite memory channels. Select call signs, locations, nicknames, club name, whatever! Great for organizing your operations, because the DR-140T gives you 51 memory channels to use as you please! Aircraft (AM) receive is included at no extra cost. Don't settle for a "basic" radio when you can own the DR-140T—check the low price at your favorite Alinco dealer.

- **Alphanumeric Display. You can also choose frequency or "channel number only" display.**
- **51 Memories, each capable of odd-split, different CTCSS encode & decode tones and more (CTCSS decode requires optional EJ-20U CTCSS board).**
- **CTCSS encode plus European tone bursts; the DR-140T is ready to travel the world!**
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Get full-featured 2 meter/440 performance at an amazingly low price! 50 memory channels per band, CTCSS encode, cross-band repeat capability, full duplex capability, internal antenna duplexer, 9600 packet port and much more! Large display, big controls, easy to operate and program. Up to 50 watts output on VHF; 35 watts on UHF. MARS/CAP capability, extended receive on both bands, cloning capabilities, "set and forget" squelch, CTCSS encode plus European tone bursts. All this and more for much less than you might think.

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Where Has All the Hi-Tech Gone?

Hams are as involved as ever in hi-tech electronics, but ham radio seems to be taking a back seat.

I'm writing this at the Mid-Atlantic VHF Conference, where I've been listening to talks by hams who are working at the frontiers of the state of the art in electronics...hams like Richard Fiore, WB2SOM, of American Technical Ceramics, who just patented a new type of "broadband microwave capacitor" for his company; and Jim Rautio, AJ3K, a pioneer in computer-aided design of microwave circuits. Their work is fascinating, but one aspect of it is troubling.

While we're all accustomed to having hams in the leading ranks of technical development, as has been the case since the dawn of radio, what's troubling is that amateur radio has very little involvement with the pioneering work that these professionals (who happen to be hams) are doing. This is not their fault; it is ours.

Technology at a Standstill

There has been a major revolution in telecommunications in the past decade, and hams have played a major role in it—but ham radio has not. While the commercial world was unplugging telephones from the walls and putting them into cars and pockets; taking mail out of envelopes and putting it onto fax machines and the Internet; and moving computers from "glass houses" to desktops to laptops, ham radio technology has moved...nowhere.

Think about it. We're using repeater technology from the 1970s and slow, text-based digital technology from the early 1980s. The only technical advancements we've seen have been refinements, primarily the integration of the personal computer into our ham shacks (and of microprocessors into our radios), and the application of digital signal processing to improve the intelligibility of weak signals.

Amateur Acrophobia

Part of the problem is that we seem to have developed a communal case of acrophobia: a fear of heights. No, not physical heights. We're as good as ever at climbing towers and mountains. I'm talking about frequency heights. Look back at the work that AJ3K and WB2SOM are doing. What's the one word that appears in both descriptions? That's right: *microwave.* Maybe it's because we use them in our kitchens to heat food, and don't want to risk getting cooked ourselves, but most hams seem very reluctant to do anything involving our microwave bands.

I'm as guilty as anyone else. The equipment in my shack right now will let me operate at least one mode on every ham band from 1.8 MHz to 450 MHz. But the only pieces of equipment I have that operate at higher frequencies are my microwave oven and the lasers in my CD player and the CD-ROM drive in my computer.

Throughout our history, hams have been taking frequencies deemed "useless" by the "experts," and putting them to work for meaningful, useful—often long-distance—radio communication. First, it was 200 meters, then HF, then VHF and UHF. The frontier we face today is the microwave spectrum. But this time, the commercial world is far ahead of us. Cellular telephones, communication satellites, direct broadcast TV satellites, and wireless computer LANs (local area networks) all operate on microwave frequencies. This is where the future of electronic communication lies, but, for whatever reason, we seem to be afraid to try our hands at it.

When Apple Computer petitioned the FCC for a secondary, non-interference, allocation at 5 GHz, including parts of the 5.7-GHz amateur band, the ARRL objected, citing the potential for interference to amateur operations on the band. What amateur operations? According to the latest edition of Tim Marek's *North American VHF Directory,* only about 50 hams in the U.S. and Canada are active on 5.7 gigs. Gotta find 'em before you can interfere with 'em.

What does Apple want to do with these frequencies? It wants to use them for very low-power wireless LANs. Well, one of the main impediments to amateur activity on this and other microwave bands is a lack of affordable equipment. So before we automatically object to further sharing of a band on which we already have only a secondary allocation, and on which no more than a few dozen hams are active, let's consider the positive possibilities of wireless LANs on 5.7 GHz. Equipment—readily available and reasonably priced—might no longer be a problem. And it wouldn't even have to be retuned to operate on ham frequencies. All we'd need to do is crank up the power and add some higher gain antennas.

There has been a major revolution in telecommunications in the past decade, and hams have played a major role in it—but ham radio has not.

Let's Build Our Own Information Highway

But who would we talk to and what would we do on these frequencies? Well, there's enough bandwidth available to us at 5.7 gigs and on other microwave bands

By Rich Moseson, NW2L, Editor

to make packet radio as we know it obsolete. There's enough space to easily handle digital signals at 56 kilobaud and even faster. We could leave the World Wide Web and 28.8 k modems in the dust. We could build our own Web, with no more waiting three and four minutes for a page to download and decode.

But the most interesting possibility for a wideband, high-speed digital network is that the information we put on it wouldn't need to be limited to traditional data signals, such as text and still images. Live audio and video become real possibilities (once a signal is digitized, the network doesn't care if it started out as characters on a screen, a voice spoken into a microphone, or a picture seen through the eye of a video camera), with opportunities for repeater linking, regional ATV networks, and ham radio Web pages—all traveling simultaneously on the ham radio information highway.

This isn't pie-in-the-sky by any means. On my drive down to the Mid-Atlantic VHF Conference, I bumped into a repeater that was linked to other repeaters around the U.S. and Canada. I spoke on my 2-meter rig, *via the Internet,* from eastern Pennsylvania to hams in Manitoba and Arkansas. And the voice quality was excellent. The technology is here, now.

At the other end of the bandwidth spectrum, commercial repeater users are squeezing their signals into ever-narrower bandwidths (see this month's "Op-Ed" column) while sharing frequencies with each other through *trunking*, a concept I'm planning to explain in greater detail, perhaps next month. Here, too, the technology is available, now.

Going Wireless

The world is going wireless and we should be showing the way, not lagging behind. We need to regain amateur radio's traditional role as a telecommunications leader. But we can do it only by redefining the concepts and the technology of our current communications systems. And the place it's going to happen is on the microwave bands...if we don't wait too long and lose them.

• • •

Missing Features

If you look closely at this month's issue, you'll see that the "Club Spotlight" and "Reader Snapshot" columns are missing. We'd like to continue running these columns, but we haven't been receiving any submissions. Remember, if we print your "Snapshot" or your club's "Spotlight," we'll give you or your club a free one-year subscription (or extension) to *CQ VHF*. Also missing this month—in order to make room for our "Annual Index"—are "Q&A" and "Basics." Don't worry, though, they'll be back as usual next month. By the way, let us know if there are any "Basics" topics you'd like to see covered.

We're using repeater technology from the 1970s and slow, text-based digital technology from the early 1980s.

Something New

A new feature this month is "VHF Worldwide," with a report on VHF activities and news from South Africa. We'll have another one early next year about VHF in Italy. We have a worldwide readership and it's nice to hear from folks in places we can't easily visit. So, if you live outside the U.S. or Canada, please let us know what's happening in VHF and UHF where you live, and we'll share it with all of our readers.

Season's Greetings

The shortest, darkest days of the year are upon us here in the Northern Hemisphere. And every northern culture has coped with the darkness by developing observances and ceremonies at this time of year that bring more light onto our streets and into our homes.

We, as hams of all religious persuasions, can use this time of year to bring some more light into the lives of those around us, not only our friends and families, but those less fortunate as well. Let us use our volunteer spirit—with or without our communication skills—to make the holidays a little more special for our neighbors as well as for ourselves.

And whether the added light in your house comes from a Christmas tree, a Hanukkah menorah, or something else I haven't yet learned about, may the season be filled with joy, and may your new year be one of health, happiness, prosperity, and peace.

73 de Rich, NW2L

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 the above address (send an SASE for free writers' guidelines), or by e-mail at CQVHF@ aol.com, 72127.745 @compuserve.com or CQ@ genie.com. We look forward to hearing from you.

VHF News

ARRL to FCC: New RF Exposure Rules Unfair

Calling the FCC's new rules on exposure to RF radiation "regulatory overkill," the ARRL has petitioned the Commission to reconsider and reverse portions of its August 1 ruling that, among other things, requires amateurs to perform an RF safety evaluation for any transmitter operating with more than 50 watts of power (except mobile installations, using push-to-talk).

According to *The ARRL Letter,* the League argued that the new rules don't take into account variations in antenna height or gain, operating mode and frequency, or how often a station is on the air. The ARRL also complained that amateurs were being subjected to stricter standards than other users on adjacent frequencies and that the rules were adopted without sufficient notice to the amateur community, denying hams the opportunity to comment.

Finally, the League argued that these new rules, coupled with local antenna restrictions, might create "a de facto revocation" of amateur licenses. "If amateurs cannot operate using outdoor antennas due to deed restrictions," said the ARRL appeal, "and they cannot use indoor antennas due to concern about exceeding the MPE (maximum permissible exposure) levels, all amateur communications are precluded." Unless the Commission agrees to reconsider the new rules, they take effect January 1, 1997.

MARS Goes No-Code

Whether or not there's life on Mars, there's no more code on MARS. The U.S. Department of Defense ordered all stations of the Military Affiliate Radio System to cease Morse code transmissions on MARS frequencies as of October 1, 1996. According to reports in various ham media, no reasons were given for the decision, which now bans all CW activity on MARS frequencies.

Alinco Breaks $150 HT Price Barrier

For the first time, amateurs can purchase a new transceiver from a major manufacturer for less than $150. That's the reported "street price" of Alinco's new DJ-S41T, a low-power (340-milliwatt) 70-centimeter handheld. The pocket-sized radio, which transmits and receives between 425 and 450 MHz, has a permanently attached, pivoting, antenna, and operates on three AA batteries (a rechargeable NiCd pack is an option). Alinco Sales Manager Doug Wynn says the radio is expected to be particularly appealing to multi-ham families, women and parents of young hams. (See "Product Update" for additional details.)

ARRL/NFCC Reach Tentative Agreement

A tentative agreement on repeater coordination has been reached by the Board of Directors of the National Frequency Coordinators' Council and the ARRL's Ad-Hoc Repeater Committee, according to a joint statement. Under terms of the proposed Memorandum of Understanding, the NFCC—a year-old organization made up of representatives from the nation's repeater coordinating bodies—will, among other things, develop uniform coordination standards for use throughout the U.S. and will administer "a fair and equitable process for dispute and interference resolution related to frequency coordination." The NFCC will also act as the FCC's main point of contact on coordination matters, through its National Frequency Coordinators' Office (NFCO). The ARRL, in turn, will provide unspecified "resources and support" for the NFCO as well as "utilizing its resources" to help the NFCC achieve its goals, when consistent with ARRL goals on specific issues. The agreement was scheduled for a ratification vote by the ARRL Board of Directors in October.

Phase 3D Launch Update

AMSAT reports that its new Phase 3D satellite is now expected to be launched this coming spring. According to AMSAT, the European Space Agency (ESA) has tentatively scheduled the launch of Ariane 502 for mid-April, and has confirmed that the P3D satellite will be aboard. The ESA announcement also outlined specific actions that the agency is taking to correct the software problems that led to the launch failure of Ariane 501—the first flight of the Ariane 5 rocket—last June. (See this month's "Orbital Elements" column for more on ESA rockets and AMSAT satellites.)

UNAMSAT-B Now "MO-30"; Includes Meteor Experiment

Mexico's first amateur radio satellite to reach orbit, known before launch as UNAMSAT-B, is now "Mexico-OSCAR 30," or "MO-30." The satellite, launched from Russia in September, was built by students at the Autonomous University of Mexico, whose Spanish initials are UNAM. The first UNAMSAT was lost in a launch failure earlier this year, along with an Israeli amateur satellite, TECHSAT-1. The new satellite will relay packet data at 1200 baud, with multiple uplinks on 2 meters and an single downlink on 70 centimeters.

The ARRL Letter reports that the bird also carries a meteor experiment, which will use pulses transmitted on 40.997 MHz to detect meteors entering our atmosphere. At press time, MO-30 was reported by the AMSAT News Service to be undergoing tests and was not yet available for general use. You can listen for its beacon on 437.206 MHz and check out the UNAMSAT Web page at <http://serpiente.dgsca.unam.mx/unamsat/unameng.htm>.

President Recognizes Hams' "Lifeline of Relief"

Ham radio operators' contributions to worldwide communications and disaster assistance have been recognized in a letter from President Clinton to amateur Darlana Mayo, KB2EPU. While unsuccessful in her attempt to get the President to proclaim the second week in October (traditionally the week of the ARRL's Simulated Emergency Test) as "Amateur Radio Week," Mayo did receive a letter in which Mr. Clinton offered "warm greetings to everyone observing October 7 through 13 as Amateur Radio Week."

"In the past century, the medium of radio has changed the way we live and the way we view our world," wrote the President in a letter dated October 8, "and amateur radio operators have played a vital role in this communications phenomenon. Sharing knowledge and technological expertise, connecting comput-

HAM EQUIPMENT TO HELP YOU ACHIEVE SUPERIOR OPERATION

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SWITCH MODE POWER SUPPLY

SS-606

FEATURES:

- 1/4 the weight, 1/3 the weight, and 1/2 the size of conventional power supplies
- The use of high speed F.E.T. technology ensures 84% conversion efficiency.
- 40A available (SS-404) & 60A available (SS-606) at all DC output voltages.
- Can be used for DC motors requiring peak starting currents.
- Automatic cooling fan.

	SS-606
Input Voltage Range:	170-250V / 90-130V
Output Voltage:	5-15VDC, 60A continuous
Ripple:	less than 5mv
Conversion Ratio:	83% at 40A
Dimensions:	8.5"W x 4.5"H x 14.5"D
Net Weight:	4.8KG

••Output voltage: 15-30V, 30A continuous is available as SS-606H. When you place an order, please differentiate.••

NEW POWER SUPPLY

PS-880

with Cooling Fan

PS-140y

	PS-880	PS-140y
Input Voltage :	115/230V Two Way Use Rewiring Transformer Taps	
Output Voltage:	1-15VDC Variable	
Output Current:	MAX: 40A 32A continuous	MAX: 14A 12A continuous
Conversion Ratio:	83% at 40A	
Dimensions:	8.5"W x 4.5"H x 11.25"D	5"W x 4.25"H x 9"D
Net Weight:	19 lbs.	11 lbs.

SWR & POWER METER

CN-720B

Specifications

		CN-720B
Frequency (MHz):		1.8 - 150MHz
Input/output impedance:		50Ω
Ratio of Forward vs. Reflected power:		5:1
Power Range:	*Forward:*	20W/200W/2kW
	Reflected:	4W/40W/400W
Tolerance:		±10% at full scale
SWR measurement:		1:1-1: infinity
SWR detection sensitivity:		4W min.
Input/output connectors:		SO-239
Dimensions:		7 1/8W x 4 7/8H x 5 1/4D (inch.)

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MM-300

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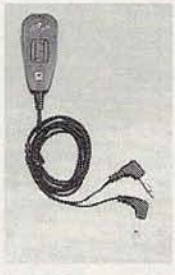

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ers via radio equipment, and linking people all across the globe, ham radio operators have helped to make our world a true global village. But even more important, they have provided a crucial lifeline of relief in times of disaster and hardship, ensuring that hope and help are on the way to those most in need."

The President concluded by thanking America's amateurs "for their commitment to excellence and their willingness to work for the well-being of others."

First Lady Spurs FCC Enforcement Action

Repeater users in the Phoenix, Arizona, area have a little less interference to deal with, thanks to First Lady Hillary Rodham Clinton. Several Phoenix repeaters have been plagued for four years by "vile, malicious interference," according to Lance Halle, KC7FVX, a member of the Arizona Repeater Association. Halle told *The ARRL Letter* that the group's local interference committee tracked the transmissions two years ago to a single individual posing as a ham and using other people's callsigns on the air. Based on the group's information, the FCC issued a Notice of Violation to Timothy Hoffman of Phoenix, but did not levy a fine.

Halle says, "that stopped him for a couple of months, but he soon was back, worse than ever." Repeated attempts to get further FCC action got nowhere, and about a year ago, the club began a letter-writing campaign to the White House and members of Congress.

Finally, in August, Halle received a letter from FCC enforcement chief Beverly Baker, which read, "First Lady Hillary Rodham Clinton has asked me to respond to your inquiry...." Baker said the FCC had traced illegal transmissions to Hoffman's residence in May. In June, he received another FCC Notice of Violation, this time accompanied by a $6,000 fine.

"It seems the system does work," Halle told the *Letter,* but sometimes, it "needs a little help."

International Operating May Soon Be Easier

The FCC has proposed rules to make it easier for U.S.-licensed hams to operate in Europe and Central/South America, and for hams from those parts of the world to operate in the U.S. "WT Docket 96-188" proposes U.S. participation in two international amateur licensing agreements, the European "CEPT" license, and the inter-American International Amateur Radio Permit (IARP). If approved, hams from all participating countries will be able to operate in any other member country for up to six months in a five-year period without getting special permission.

Comments, which should refer to "WT Docket 96-188," are due by December 13, 1996, with reply comments due by January 13, 1997.

"Newsline" Makes 1,000th Newscast

Amateur Radio Newsline, a ham radio newscast aired on repeaters across America and posted on the Internet each week, celebrated its 1,000th consecutive newscast on October 11. The weekly program began just over 19 years ago as the Westlink Radio Network, produced (as it still is today) by Bill Pasternak, WA6ITF. Perpetually short of cash, the program has been supported entirely by private donations, as well as by volunteers providing news reports and regional distribution.

Mir Ham Station Remains Active

The return to Earth of Astronaut Shannon Lucid, who operated RØMIR as a "guest operator" during her six-month stay on the Russian Mir space station, has not slowed activity from Mir's ham station. One of the new crew members is John Blaha, KC5TZQ, an active ham even before going into orbit. He's been heard making frequent voice contacts on Mir's 145.55-MHz downlink frequency. QSL manager for Mir ham contacts is Dave Larsen, N6JLH, Box 1501, Pine Grove, CA 95665.

Ham Killed at VHF Conference

Thom Gooding, K4LHB, of Sterling, Virginia (FM18) was struck and killed by a hit-and-run driver on October 4, while trying to cross the road outside the headquarters hotel of the annual Mid-Atlantic VHF Conference in Horsham, Pennsylvania. Gooding, best known as a contester active from 50 to 1296 MHz, had been off the air for several years and was attending the conference in preparation for returning to active hamming. Gooding, a retired county fiscal officer, was also a partner in G&G Electronics. The driver of the car was later apprehended.

CQ VHF Ham Radio Above 50 MHz

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Letters

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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>; <CQ@genie .com> or <72127.745 @ compuserve .com>. Please specify that it is a letter for* CQ VHF.

Protect Our Bands

Dear *CQ VHF*:

I have been reading about the potential of having the 2-meter and 440 bands taken away from amateur radio and given to the Commercial (Big $$$) interests.

Ham operators need to understand that this is a very real threat—look who the Commissioners are in the FCC. They're typically lawyers that have obtained this position by Presidential appointment as a pay-off for election support or good old-fashioned buddyism. None of the Commissioners, that I'm aware of, have an amateur radio license or any background in communications or electronics (in general).

Remember the 220–222-MHz band take away? That appears to have been planned out years ahead of time as evidenced by the Novice Enhancement 220-band limits! Novice Enhancement was put in place well over a year before UPS requested the 220-band spectrum. But the Novice band perfectly fit the UPS request!?! Then about a year later UPS gave up the frequency spectrum due to technological difficulties. The band was never returned to ham operations but sold to commercial interests. Also at this time the ARRL did not attempt to get back our lost spectrum.

We need to take the amateur radio bands frequency allocation power out of the FCC's hands. I have been a strong supporter of trying to get a law presented and passed by Congress, making the amateur radio band spectrum declared a "National Radio Refuge." [It would be] the first of its kind but will forever cement in place amateur radio in the United States of America.

This would eliminate the power of the FCC to re-allocate our spectrum without the approval of Congress and the President! The effort and high costs that would be required to buy Congress by Commercial interests desiring change to the "established-by-law" amateur radio spectrum would be extreme!

This is how to protect our amateur radio spectrum—by using the system to create laws that will be very difficult to change in the future!

So write your congresspersons and ask for this type of legislation justified by examples of the unselfish, patriotic emergency services that amateur radio is known for! Make this a platform item for your Congressional representatives. Your children will thank you for saving our hobby so they can be part of this great hobby in the future.

Dale R. Kubichek, N6JSX/9
Manitowoc, Wisconsin

Dear *CQ VHF*:

Regarding the article in your September '96 issue, "CQ VHF Review"—"Tucker V-100W 2-Meter Amplifier," I have no idea where the author, Gordon West, gets the facts that preamps don't work on FM modulation. He is completely misinformed.

I use a TE-Systems 1403G 2-meter amp with a built-in 15-db preamp. This is in line with my RadioShack HTX-202 FM 2-meter HT. This is all hooked up to my two 2-meter antennas, a 14-element beam, and a 6.7-db gain vertical.

I use the preamp all the time with none of the problems he talks about. It works great on FM simplex as well as distant FM repeaters. I have made many distant contacts that could not have been made without the preamp. I'll work a distant weak station with the preamp on and if I turn it off it is completely gone even with the squelch wide open.

He may be referring to other HTs that have wideband receive with poor front ends, or he made his tests where there was a lot of RF being generated in the area. The great HTX-202 exhibits none of the problems he mentioned. The line in his article "and weak signals actually disappear rather than get stronger" is completely wrong in my experiences with a preamp on FM. I also know of other hams who have mast-mounted preamps for 2-meters and use them exclusively on FM.

I don't think your readers should be misinformed by this article concerning the use of preamps on 2-meter FM. It definitely does not apply in my situation.

Tony Aiello, N2VLA
Highland Lakes, New Jersey

Tony—I'm glad the preamp is working well for you on FM. In many cases, though, it will amplify the noise as well as the weak FM signal, letting the noise "capture" the frequency and blocking out the weak signal altogether. Plus, in areas of high RF, it can also increase problems with intermod. Your experience is the exception, not the rule.

More Code Comments

Dear *CQ VHF*:

I am writing to encourage dropping the code requirement for HF, but I want to add some sense to this schism: I am NOT against CW. I want to see it continued. Some people can paint pictures even though technology has allowed the rest of us to take photographs. Well, I am NOT an artist...I have struggled with the code for about the last 40 years. (since I was age 10)! I ended up being an SWL and a frustrated wanna-be ham.

Every few years I have tried to pick up this skill with a long and concentrated effort, but it was a skill that eluded me. When I was in my high school radio club, and had a code record and a key, I could send really well (at one time 20 wpm), but receive? Forget it! I have a dozen computer code programs, lots of tapes, and I still have my U.S. Navy straight key I had as a kid. I now have an automatic code sending tutor as well.

Theory is easy for me, as is construction and home-brew. I still have my old HF receivers as well as some new ones

and I continue to listen regularly. I was thrilled when the "No-Code Tech" came out. Now I live with being called a "hamlet" or "a hamster" since REAL hams, I'm told, can do code! Since I am proficient at radio, construction, have some older gear, and have been around a long time, it is assumed that I have a much higher grade of license than I do, and people are surprised when I tell them I'm a "No-Coder."

I may well have some sort of undiagnosable block. I don't think anyone would call me stupid. I qualify for MENSA, I run a healthcare center full of other doctors and therapists. I am a published technical writer and taught space sciences on the college level. Obviously, HF will not be in my future as a No-Code Tech the way things are. I don't know that anyone would do it, but I don't think it would be fair to ask a VE to test and pass me on sending with the (wink) assumption I could receive. Since CW is an art, the only way for some to communicate, another way of expression, and very effective for QRP or cutting through the mire for DX, it should remain—as should CW only frequencies...but it should not be mandatory.

We need more talented people in the hobby who can add to it, but whom we will not get otherwise. Politically, we need numbers for reasons that have been stated by others before me. In the meantime, I'll keep trying, and it is my hope to be able to talk with other readers on HF someday.

(Name and call withheld by request)

10-Codes Again—With a Twist

Dear *CQ VHF*:

I've have been following with some amusement the letters in *CQ VHF* regarding the 10-Code debate. While watching the TV program "COPS" one evening, I was surprised to hear the Miami Police dispatcher using Q-signals!

A fellow amateur who winters in Florida told me that a number of police departments there use the Q-codes and that many of these departments routinely monitor amateur communication, especially during weather emergencies.

Keep up the good work, I eagerly look forward to every issue of your outstanding magazine.

Tony Vanacore, AK1O
Northford, Connecticut (via e-mail)

Product Update

Alinco Introduces "Pocket Size" HT for Under $150

Alinco has announced the introduction of the DJ-S41T, a handheld transceiver for the 70-centimeter (440-MHz) band. The new HT, only slightly larger than most pagers, runs on three AA cells and is expected to be available for less than $150 at most Alinco dealers.

Alinco Vice President Taka Nakayama said the DJ-S41 makes a quality amateur radio communicator available at a price nearly every ham can afford. The unit features 21 non-volatile memories, CTCSS encoder, offset capability up to 15.995 MHz, a broader-than-usual transmit range (425–449.995 MHz) and a power output of 340 milliwatts.

Nakayama is confident that the output power is more than adequate to "hit" repeaters or carry on simplex communications over a considerable distance. The unit could also prove popular with those who have access to mobile units with crossband capabilities.

A unique feature of the DJ-S41T is its pivoting "swing up" antenna. This allows the radio to remain compact in pocket or purse without detaching the antenna. It also does away with the risk of misplacing a detached antenna.

Alinco believes this radio will be especially appealing to multi-ham families (because of its price), to women (because of its size), and to parents for use by children (because of its ruggedness and attached antenna).

The DJ-S41T also has a lengthy list of options, from the traditional speaker mic and cigar-lighter external power cord, to a voice-operated tie-pin mic or vox-headset.

The DJ-S41T should be available at Alinco dealers now.

Circle 100 on reader service card.

Kenwood's New FTP site

Kenwood has introduced an extensive FTP site on the Internet that includes many Kenwood Service Bulletins and Application Notes dating back to 1975. With over 100,000 visits per month to the Kenwood World Wide Web (WWW) site, the company expects this new service to be of great help to Kenwood amateur equipment owners and service providers. (An FTP site is an Internet-accessible archive from which people may download computer files.)

Kenwood's National Sales Manager, Paul Middleton states, "For many years we have realized that our customers throughout the USA and the world are in need of more information about older amateur products. This has always been difficult to provide. With the power of the Internet, we are now able to provide this information in an easy-to-use JPEG format that is downloadable and printable. As use of this FTP service increases, we will be able to consider additional Internet features for our customers."

The Kenwood FTP site can be visited through its WWW address, <http://www.kenwood.net>, that includes a complete file directory, or visit the site directly at <ftp://ftp.kenwood.net>.

Circle 101 on reader service card.

Cutting Edge Enterprises Powerport 149

Cutting Edge Enterprises has added the "Powerport 149" to its portable power supply line. With more muscle and endurance than the current Powerport 50, the Powerport 149 provides 12 volts DC and 140 watts AC power with 9 amp hours of storage capacity. It is compact (4" x 4.5" x 6") and lightweight (9 pounds), a size that belies its heavyweight abilities.

The Powerport rechargeable power supply is built around a sturdy 12-volt, 9 amp-hour gel cell battery. It is equipped with a fully automatic wall charger which allows you to leave your battery plugged in year-round, keeping it in prime condition and ready to go at a moment's notice. Powerport can also be charged in your vehicle through the cigarette plug.

Powerport can be used to run and charge handheld radios, cell phones, laptop computers, test equipment, soldering irons and electric hand tools, fax machines, video cameras, emergency lighting, and more. It can even be used for boosting a low battery in your car through the cigarette plug adapter and is great for remote setups on Field Days, camping trips, sports events or emergency power. List prices: 50-watt Powerport 50, $114.95 plus shipping; 140-watt Powerport 149, $159.95 plus shipping. For sales and information, contact Roger Hall at Cutting Edge Enterprises, 1803 Mission Street, Suite #546, Santa Cruz, CA 95060; Phone: (800) 206-0115.

Circle 102 on reader service card.

- Correction -

In October's "Product Update" column, we told you that Cutting Edge Enterprises' HT power adapter would provide 2,000-2,300 amp hours of power from a camcorder battery. That must be some camcorder battery! The correct numbers are 2,000-2,300 *milli*amp hours, or 2.0 to 2.3 amp hours. Cutting Edge and *CQ VHF* regret the error.

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Gordo's Goodie Guide

Looking for gift ideas that won't bust your budget? Just in time for the holidays, WB6NOA takes a look at accessories to boost your station's performance without emptying your piggy bank.

By Gordon West, WB6NOA*

You don't have to spend a kilo-buck to improve your VHF and UHF communications. There's a world of accessories out there to help you sound better, hear better, and talk longer. And most of them are under $100. In fact, some of the accessories and features that you'll read about in this article may already be built into your handheld or mobile unit. This means a zero-buck investment to improve the usefulness of your handheld or mobile radio.

For example, did you know that most new handhelds already have the circuitry built in to turn them into selective pagers? Did you know that your mobile unit might already have decode capabilities to keep it absolutely silent until someone dials in the right subaudible tone code?

Let's take a look at what you can do to improve your VHF and UHF communications system.

Accessories such as a headset mic (a Heil "Pro-Micro" in this case) helped quiet engine noise on both transmit and receive during this marine VHF DXpedition.

Handheld Transceivers

Alkaline Battery Packs

Your single- or dualband HT is one of your most important tools in disaster preparedness. It goes everywhere you go, and stays on the air even if AC power is out or you're nowhere near a 12-volt car battery. But your HT can only stay on the air as long as your batteries hold up. And if you have been constantly trickle-charging your nickel cadmium (NiCd) battery pack for weeks and months on end, chances are your battery pack may be fried, and you'll be off the air in no time. *(It's always best to fully discharge your NiCd battery pack before recharging. This will extend the pack's life.—ed.)*

What to do? There are alkaline battery holders available for virtually all handhelds, either directly from the radio's manufacturer or from battery manufacturers. And most of them take standard "AA" penlight cells. The biggest benefit is that alkaline batteries can be found inexpensively in virtually any supermarket, drug store, convenience store, etc.

The alkaline battery holder makes a terrific safety investment for your HT. They're relatively inexpensive—a BP-170 for ICOM's new IC-278 is under $30. Same thing for the Kenwood BT-9. And the Yaesu FBA-17 sells for under $25.

IMPORTANT: Every radio series has its own style of slip-on battery packs, so make absolutely sure the alkaline battery holder is specifically designed for your radio brand *and model*. Trying to use an ICOM BP-4 on a Radio Shack HTX-202 will lead to disastrous results, even though the battery pack "fits" easily onto the radio's rails. (If you have an HTX-202, the alkaline pack is included as a free accessory within the new radio box, so don't worry.)

Quick Chargers

Handheld quick chargers will decrease the chance of accidentally frying your NiCd batteries when you accidentally leave your unit plugged into the wall

Gordon West is Senior Contributing Editor of CQ VHF.

"The alkaline battery holder makes a terrific safety investment for your HT."

charger for weeks on end. Quick chargers power up your batteries in about half an hour using the slide contacts on the bottom of your battery pack. (Times vary depending on your battery pack and charger. Be sure to read your manual). These quick chargers sense voltage when the battery reaches full capacity, or sometimes the battery itself cycles off-line when an internal thermistor detects battery temperatures in excess of a predetermined amount. All quick chargers have some way of shutting down in order to prevent a NiCd battery fry-out.

You can expect to pay $90 to $110 for a good quick charger. For example, the popular Alinco DJ-G5 quick charger (EDC-60) sells for around $90. You're buying both convenience and extended life for your battery packs. A new NiCd pack, by the way, will cost $50 to $100.

Another option is the slightly more expensive quick chargers offered by battery manufacturer experts that might require a slide-in cup to work with a specific brand of radio. These "brand unspecific" chargers might also handle the charging requirements needed for lithium batteries, which have yet to hit the ham market in force. Right now, the most popular rechargeable battery package remains the NiCd power pack, along with a quick charger.

Boost Your Output

If you run your handheld mobile, you may wish to boost its 3 to 5-watt output power up to 40 watts. Several power amplifiers under $99 will work with any brand of HT. Examples of these include amplifiers from Tucker Electronics, Mirage, RF Limited, and Daiwa (from EDCO). Not only will you up your handheld power for under $99, but at 40 watts, you'll stay within the brand new FCC regulations that impact on mobile installations running more than 50 watts of output power. *(These new FCC rules on limiting exposure to RF fields apply to* all *amateur transmitters—base and mobile —except those running 50 watts or less. The rules take effect January 1, 1977, unless petitions for reconsideration are successful.—ed.)*

Many of these little amps also have a receiver pre-amplifier, but I suggest you leave the pre-amp turned off unless you really need it. They tend to work too well, often overloading the handheld receiver's RF amplifier and giving you intermodulation from out-of-band signals. And use the amp only when necessary. If you're close to a repeater or another station that you're working on simplex, switch the amp out.

Headset Mics

HT headset microphones are good for parade communications and disaster radio work. Lightweight, inexpensive headsets run about $50; if you want VOX, or automatic voice-operated transmit (*if* your radio is set up for it), you'll spend about $100. Headset mics are generally available as accessories from your radio's manufacturer or from accessory specialists, such as Heil Sound.

Secret Decoder Rings

Nearly all handhelds feature subaudible tone *encode* capabilities, but only a few also give you *decode* capabilities straight out of the box. If you don't have decode, you may be listening to a lot of racket you don't necessarily need to hear. CTCSS decode is a tiny module that can plug into most handhelds. If you're all thumbs, get a pro to do it so you don't rip a trace on that flexible circuit strip. It's like brain surgery, but getting CTCSS decode now lets you monitor a channel for another specific unit without having to listen to anything else on frequency. But be sure to monitor off of decode when you respond to that other station's call to make sure you're not interfering with anyone else's transmission.

Many decode units may also feature *sequential-tone paging* also known as *DTMF paging* or *groupcell*. Many handhelds already have paging capabilities built-in, but these are considered "advanced features" and you may have missed the dialogue in the back of your instruction book. Take a look.

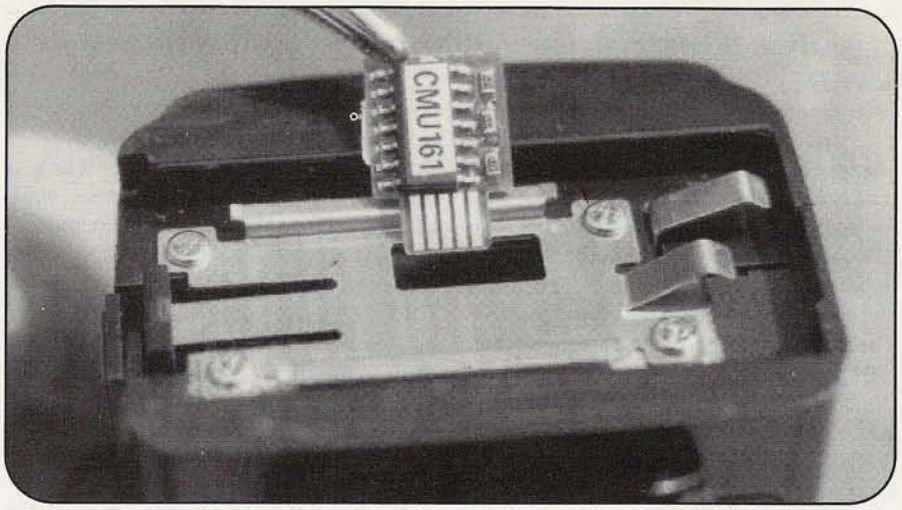
Sequential paging allows other stations to selectively call single units, 10 units at a time, 20 units as a group call, or 50 units as an "all call." This is handy, for example, for ARES/RACES groups on a winter night's callout. Your unit remains silent until it receives a portion, or all, of the specific single or group call. I bet your handheld already has it built in!

Mobile Radios

Decode on the Road

Your mobile single- or dualband radio is also a good candidate for a tone squelch decode board. It's a lot easier plugging these boards into mobile radios than into tiny HTs. The plug goes in only one way

Several manufacturers offer amplifiers to boost the 3 to 5-watt output power of the typical HT. This is the Tucker V-100W.



Tone decoder boards allow you to listen for a specific station without having to listen to other chatter on your local repeater. On this Standard HT, you can add in the board without opening up the case!

and double-stick tape holds the board in place. Plenty of room for big fingers. These work the same way in mobile rigs as they do in HTs.

External Speakers

You can increase the volume of your mobile unit by adding a simple external speaker. Mobile external speaker jacks generally are standard "miniature" phone jacks and take the normal "miniature" ($^1/_8$") mono plug. Most speakers are sold with about six feet of wire with the mono plug already attached. You won't believe the amount of additional volume and fidelity you'll get out of your mobile radio when you plug in that new external speaker. Almost anyone's external speaker will work great, and there's little need to go to any sort of amplification inside the speaker, even for very noisy mobile units. An amplified speaker will just give you headaches—trust me!

Line Filters

If your repeater mates are complaining that your mobile radio has a whistle or a whine on it (especially one that varies with your engine speed), stop by any RadioShack store and pick up their universal alternator line filter (270-055), which sells for under $20 and is specifically designed to cancel alternator whistle heard over your transmitted signal. When you transmit, you load down your car's charging circuit, and this makes your alternator work harder, thus creating the whistle. *(These filters may also be available from other accessory dealers or even auto parts stores.—ed.)*

"You can improve your mobile unit's range by going to a taller...antenna with more gain."

Gain Antennas

You can improve your mobile unit's range by going to a taller single-, dual-, or triband antenna with more gain. Gain is achieved by stacking and phasing the vertical elements in a taller configuration than what you already have. If you have a 12-inch, dualband mobile antenna, you can double your effective radiated power (ERP) by going to a 36-inch long dualband whip with specific phasing elements that look like open coils or solid black matching networks. Generally, the taller the whip, the better performance to distant simplex stations and repeaters, even more than 30 miles away.

Comet, Diamond, DAX whips from Electronic Distributors, plus the power-up and power-down Maldol whips are good gain masters. Take a look at your mount and choose a whip that will screw into the same type of threads that your present mount has. If your present mount is old and rusty, consider the new lip-mounts from all of these manufacturers. *(For more on mobile antenna mounts, see Gordon's article, "No More Holes for Mobile Antenna Mounts," in the October, 1996 issue of* CQ VHF.*—ed.)*

"...if packet is your main activity, you might consider your radio to be an accessory!"

Beyond FM

Packet Pieces

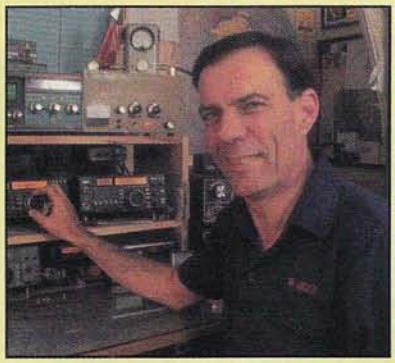
Among the more popular accessories to attach to a VHF/UHF FM rig is a packet radio TNC, or terminal node controller. There are dozens of choices from several manufacturers. Of course, you'll also need a computer or (at minimum) a "dumb terminal," and the cables to hook them all together.

But if packet is your *main* activity, you might consider your *radio* to be an accessory! If that's the case, you might want to check out two new 9600-baud digital transceivers, AEA's IDR-96 and Azden's PCS-9600. Both of these operate on the 70-centimeter band. All you need to put them on the air is a cable to your computer. You can build your own or look for something preassembled. One excellent source is the MFJ catalog. MFJ has the largest inventory of accessory products for almost any rig and any ham radio application.

Serious VHF weak-signal operators are learning the benefits of outboard DSP (Digital Signal Processing) units, such as SGC's "PowerClear."

More for Multimode

If you're into VHF weak-signal and contest work, there are plenty of accessories out there for your station. Among the most popular are mast-mounted preamplifiers, for building up weak signals before they have to travel down your feedline, and outboard DSP (digital signal processing) units to pull barely audible signals out of the noise. During the



On the Cover

Warren Elly, WA1GUD, Tampa, Florida

"Operating weak signal opened a whole new world for me," says this month's cover subject, Warren Elly, WA1GUD, of Tampa, Florida (Grid Square EL87). "I've been an amateur since 1966, and into weak-signal work since 1991. I was getting bored with the low bands, they weren't much of a challenge. But the weak-signal bands were a whole new world of propagation techniques. It's amazing to me that a radio wave three feet long can propagate 1,800 miles; or that you can bounce a signal off a meteor over Florida and talk to someone in Nova Scotia. After 30 years in ham radio, I'm still finding new things that I never even knew existed. To me, that's the most fascinating thing about this hobby."

In addition to weak-signal work, Warren says he's worked most of the shuttle flights with ham stations aboard, plus the Russian Mir space station. He is also a VHF contester, very active in packet radio, runs a Packet Bulletin Board System, and is net control of the weekly Tampa Bay Swap Net, which Warren says is the longest-running VHF swap net in Florida. He also collects vintage gear and enjoys operating AM on weekends.

The heart of Warren's weak-signal station is a set of ICOM transceivers, for 6 meters through 70 centimeters, and three Yagis on a 75-foot tower (five elements on 6 meters, 19 elements on 2 meters, and 32 elements on 432 MHz).

Professionally, Warren is a reporter for WTVT-TV in Tampa and regularly covers the space shuttle. He's also very active in Scouting and enjoys demonstrating ham radio for Cub Scouts and Boy Scouts. Warren's 17-year-old son, Walter, is also a ham, KC4UCQ. (Photo by Larry Mulvehill, WB2ZPI)

last Perseids meteor shower, for example, I used SGC's "PowerClear"™ add-on DSP head, and it added unbelievable clarity to signals that I wouldn't have heard at all without the DSP.

Look Before You Leap

Finally, know your accessory options! Carefully read over the instruction manual or fact sheet about your particular radio. Make sure you're not buying an accessory that's already built into the radio or that is included in the box at no additional cost.

Plus, double-check that a specific add-on won't somehow limit the capabilities you may already have. If you presently operate a dualband handheld, the linear amplifier that boosts your HT's 5-watt output to 45 watts must also be a dual-bander for both sides of your handheld to work properly.

And look for maximum flexibility. If you operate more than one brand of handheld, you can either buy two fast chargers or something like W & W Associates' "Master Charger" with its changeable adapter cups. Again, make sure it's compatible with your specific radios.

I suggest buying your accessories new. Purchase your products from a reliable manufacturer; and if the accessory is not the right one for you, you can generally get it exchanged for the proper product without hassle. When you buy used, if the item has been modified, and doesn't work properly, you may be stuck with it.

More than the Sum

Easy-to-find, easy-to-use, and generally inexpensive accessories are a great way to enhance your VHF and UHF operating, even if the heart of your station can fit in the palm of your hand. ■

Resources

For more information about the products mentioned in this article, contact your local ham dealer or the manufacturers listed below:

AEA (Advanced Electronics Applications, Inc.)—2006 196th St., SW, P.O. Box C-2160, Lynwood, WA 98036; Phone: (206) 774-5554; Literature request: (800) 432-8873.

Alinco Electronics, Inc.—438 Amapola Ave., Suite 130, Torrance, CA 90501; Phone: (310) 618-8616.

Azden Corp.—147 New Hyde Park Rd., Franklin Square, NY 11010; Phone: (516) 328-7501.

Comet Antennas (NCG Co.)—1275 N. Grove St., Anaheim, CA 92086; Phone: (714) 630-4541; Toll-free: (800) 962-2611.

Daiwa (Electronic Distributors Corp.)—325 Mill St., NE, Vienna, VA 22180; Phone: (703) 938-8105.

DAX—(See Daiwa listing above).

Diamond Antennas—435 So. Pacific, San Marcos, CA 92069; Phone (619) 744-0900.

Heil Sound Ltd.—2 Heil Dr., Marissa, IL 62257; Phone: (618) 295-3000.

ICOM America, Inc.—2380 116th Ave., NE, Bellevue, WA 98004; Phone: (206) 454-8155; Brochures: (206) 450-6088.

Kenwood Communications Corp.—2201 E. Dominguez St., P.O. Box 22745, Long Beach, CA 90801; Phone: (310) 639-4200.

Maldol Antennas—4711 NE 50th St., Seattle, WA 98105; Answer Fax: (206) 525-1896.

MFJ Enterprises, Inc.—P.O. Box 494, Mississippi State, MS 39762; Phone: (601) 323-5869; Toll-free: (800) 647-1800.

Mirage Communications Equipment—(see MFJ listing above).

Radio Shack—1500 One Tandy Center, Ft. Worth, TX 76102; Phone: (800) 843-7422 (check your phone book for local store).

RF Limited; Clear Channel Corp.—P.O. Box 1124, Issaquah, WA 98027; Phone: (206) 222-4295.

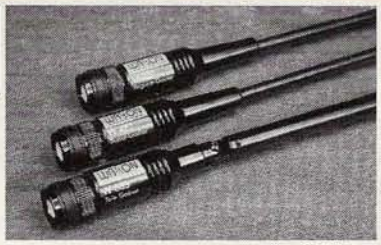
SGC, Inc.—The SGC Building, 13737 SE 26th St., Bellevue, WA 98005; Phone: (206) 746-6310; Toll-free: (800) 259-7331.

Tucker Electronics—1717 Reserve St., Garland, TX 75042; Phone: (214) 340-0631; Toll-free: (800) 527-4642.

W&W Associates—800 S. Broadway, Hicksville, NY 11801; Phone: (800) 221-0732.

Yaesu USA, Inc.—17210 Edwards Rd., Cerritos, CA 90703; Phone: (310) 404-2700.

WATSON



A New Range of Low-Cost Antennas

Watson scanning aerials have been designed to bring you the very best reception possible. High quality engineering and ergonomic design ensure that Watson Aerials are the natural replacement for those seeking to extend their receiver's range. All models cover 25MHz-1900MHz and are fitted with BNC connectors

WEP300

Clips easily over the ear taking the fatigue out of constant monitoring. Superb fidelity makes this a worth while investment. Don't confuse this with the normal earpiece, this is a quality item that will out perform anything you have ever tried before. Includes 4.9ft cable w/ 3.5mm plug.

ANTENNAS

Base station amateur antennas for 2 Mtrs& 440, a variety of sizes to suit your needs.

- W-30 - 2M/70 cm Base antenna, fibre glass, 3/6dB, 150W
- W-50 - 2M/70 cm Base antenna, fibre glass, 4.5/7.2dB, 200W
- W-300 - 2M/70 cm Base antenna, fibre glass, 6.5/9dB, 200W

W - 30

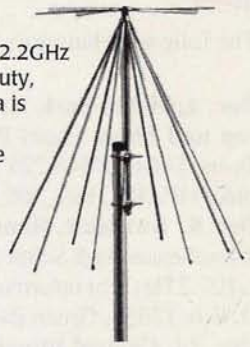
SP-300N Speaker

- Highest quality external speaker.
- Built-in Noise Filter, 6 Watts Max, 8 Ohms.

DAIWA

NEVADA

2200 BABY DISCONE



Microwave-Mobile optimized 800MHz-2.2GHz RX and TX performance! This heavy duty, compact, all stainless steel 24" antenna is rated for 200 watts transmit power throughout its range. With female type "N" connector, weather proofing support tube and all hardware included, the new SE2200 is a perfect match for the AOR AR3000A wide-band scanner, or any application where optimized .8 - 2.2GHz coverage is a must!

1300 DISCONE

If you've been looking for a superior wide band omnidirectional antenna covering 25-1300MHz, the 1300 is the ultimate antenna for hours of listening pleasure. Fitted with a low loss 'N' connector, mounting hardware, and short mast section. Rated for 200 watts max transmit at very low VSWR. The antenna is sold without cable, enabling you to add true "low loss" cable for superior performance. The 1300 is excellent for indoor installation since it's only 5'6" and weighs just 2.2 lbs., yet its construction and weather protected feed point beg to be out in the elements. This antenna is a must if you want the best possible results for years to come!

QS200 - Mobile HT Holder

Now, quickly and conveniently mount your handheld scanner or amateur band HT in your car! The Scanmaster QS200 attaches to your air vent cover and hold your radio firmly in position, yet is easily and quickly removed for security.

DAIWA's NEW line of Dual Band Non-Radial Mobile Antennas

- **DAX-3000** Gain:3.5dB(144MHz), 6.0dB(430MHz) MAX. power rating: 150W, Type: 1/2 wave, C-Load (144MHz), 5/8 wave 2 element C-Load (430MHz) VSWR:Less than 1.5, Weight: 330g, Length: 1.06m

- **DAX-3500** Gain:2.15dBi(144MHz), 5.3dB(430MHz) MAX. power rating: 120W, Type: 1/2 wave, TWO 5/8 wave Phased element(430MHz) VSWR:Less than 1.5, Weight: 260g, Length:0.89m

- **DAX-1000** Gain:2.15dBi(144MHz), 5.5dBi(430MHz) MAX. power rating:50W, Type:1/2 wave (144MHz), TWO 5/8 wave (430MHz) VSWR: Less than 1.5, Weight: 120g, Length: 0.95m

- **DAX-1500** Gain:3.0dBi(144MHz),5.8dBi(430MHz) MAX. power rating:50W, Type:1/2 wave (144MHz), TWO 5/8 wave C-Load(430MHz) VSWR:Less than 1.5, Weight 130 g, Length: 1.07m

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Hamfest Calendar

The following hamfests are scheduled for December, 1996:

Dec. 1, Hazel Park Amateur Radio Club, 30th Annual Swap and Shop, Hazel Park High School, Hazel Park, MI. Talk-in: 146.640/443.225 DART Repeaters. For information, contact HPARC, Box 368, Hazel Park, MI 48030.

Dec. 8, Swapfest, Ham Radio & Computer Fleamarket, Ashwaubenon High School, Green Bay, WI. Talk-in: 147.075+ (PL 107.2 Hz). For information, contact Scott Cole, KB9AMM, P.O. Box 12631, Green Bay, WI 54307. (exams)

Dec. 14, Central Illinois Winter Superfest, Turner Junior High School, Jacksonville, IL. Talk-in: 146.775- and 444.675+. For information, contact Tim Childers, KB9FBI, 773 E. College, Jacksonville, IL 62650 or phone (217) 245-2061. (exams)

Dec. 14, Gateway to Florida #2 Tailgate/Hamfest, Florida National Guard Armory, Lake City, FL. Talk-in: 145.490-, alternate 147.150+. For information, contact Columbia Amateur Radio Society, P.O. Box 1649, Lake City, FL 32056, or phone (904) 755-7968.

Operating Notes

For late November and December, 1996, and early January, 1997:

November

22–24 ARRL International EME Contest (2nd weekend) (see rules, October *CQ VHF*, p. 27)

December

12 Moon Perigee

13 Geminids meteor shower peak

22 Ursids meteor shower peak

January, 1997

3 Quadrantids meteor shower peak

9 Moon perigee

18–20 ARRL January VHF Sweepstakes (see rules below)

Announcing

ARRL January VHF Sweepstakes January 18–20, 1997

Following are the complete rules for the ARRL's 1997 January VHF Sweepstakes:

1) Object: To work as many amateur stations in as many different 2° X 1° grid squares as possible using authorized frequencies above 50 MHz. Foreign stations work W/VE amateurs only.

2) Contest Period: Begins 1900 UTC Saturday, January 18 and ends at 0400 UTC Monday, January 20, 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, 1,296, and 2,304-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 callsign; thus a rover may not operate with multiple callsigns 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 callsign to submit separate logs for single operator (fixed station) and rover entries. Rovers sign "rover" on phone and /R on CW after their callsign. All Rovers are encouraged to adopt operating practices that allow as many stations as possible to contact them. Rovers entering club competition must indicate the grid squares where operating sites were within their club's area, as spelled out in the Club Competition Rules (January *QST*). Only scores from those operating sites count toward the club's aggregate score for club competition.

(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*, p. 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 four points for each 902- or 1296-MHz QSO. Count eight

points for each 2.3-GHz or higher QSO.

(B) *Multiplier*: The total number of different grid squares worked per band. Each 2° X 1° 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 on 2 meters 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 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 callsign (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 and received.

(C) A transmitter or antenna used to contact one or more stations may not be

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
902	36 (x4)	144	9
1296	5 (x4)	20	3
2304	1 (x8)	8	1
5760	1 (x8)	8	1
Totals	133	295	59

Final Score = (QSO Points) x (Total no. of Grid Squares)
17,405 = 295 x 59

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 callsign 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 (transmitter, receiver. and antenna) 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 listings and compete separately for awards.

(J) Participants are reminded that the segment 50.100–50.125 MHz should be used for intercontinental QSOs only, using 50.125 MHz as a calling frequency then QSY after contact is established.

8) Reporting:

(A) Entries must be postmarked no later than 30 days after the end of the contest (February 20, 1997). No late entries can be accepted. Use ARRL January VHF Sweepstakes 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) 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, mode, 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.

(2) You may submit your contest entry via the ARRL BBS (860-594-0306), anonymous FTP (ftp.arrl.org), or via Internet to contest@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, mode, 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). Send entries to: ARRL Contest Branch, 225 Main St, Newington, CT 06111.

9) Awards: Certificates will be awarded in 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 endorsements.) 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 Iowa single op's, he will earn a certificate for being the single-operator Section leader and endorsements for 50 and 222 MHz.

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

10) Club Competition: ARRL-Affiliated clubs compete for gavels on three levels: unlimited, medium and local.

11) 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.

12) Disqualification: For excess duplicate contacts and callsign or exchange errors. See Contest Disqualification Criteria for complete details.

Courtesy ARRL Contest Branch

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FT-1000MP HF Transceiver

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Special Low Pricing!

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- Ultra compact 50W/35W
- 94 Memories • Non-remotable
- Dual in-band receive
- Built-in DTMF paging/Coded Sql.
- CTCSS Encode built-in
- Backlit DTMF mic included

FT-900CAT

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

Call Now For Low Price!

FT-50R

2M/440mHz Compact HT

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FT-8000R 2M/440 Mobile

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- 110 memories • Wide Band RX
- Backlit mic • Crossband Repeater • Smart Scan

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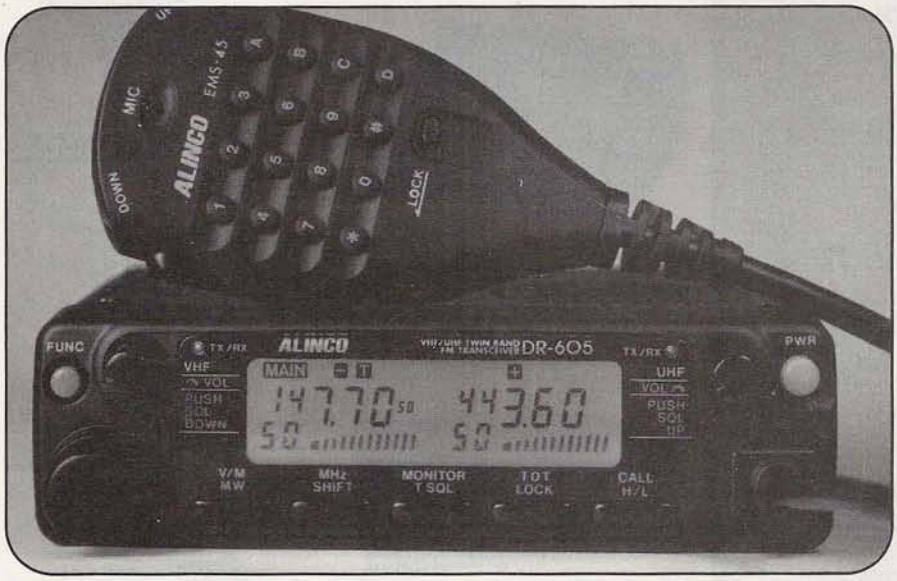
The Alinco DR-605 High-Power Dualband Mobile Radio

If you're looking for a good 2-meter/70-centimeter mobile rig you can buy on a budget, check out this new offering from Alinco.

By Gordon West, WB6NOA*

Alinco's latest dualband transceiver, the DR-605, is positioned in the marketplace to be one of the least expensive full-featured dualbanders available—seen selling at a major hamfest for under $450. This is at least $50 less than the competition and almost $75 less than Alinco's own very successful DR-610. Even so, there's little left out in the way of features, making this relatively inexpensive dualbander quite a rig.



Alinco's DR-605 is a full-featured dualband FM mobile rig with a budget price—about $450 "on the street." (Photo courtesy Alinco Electronics)

Plenty of Memory

The DR-605 has 100 independently tunable memory channels, 50 VHF and 50 UHF. Each memory can store frequency, tone setting, repeater offset, transmit lock-out, and memory scan lock-out. This last feature—permitting any memory channel to be skipped during scanning—is one of my favorite bits of flexibility in this radio.

And if you don't want your pals to know what frequencies you have stuffed into memory, hold in the V/M key and the VHF or UHF knob, then turn the power off and on. Now all you read out are memory channel numbers! This will drive them crazy when they're trying to see what you have in memory.

And before I leave memory, it's easy to transfer memory from one DR-605 to another. In the cloning mode, it's a simple hard wire transfer of data from one speaker output jack to another. You'll need to make a jumper cable with a 3.5 mm (mini) stereo plug on each end, as the programming information is carried in and out via the isolated center sleeve connection. You can transfer all 100 memories in just a few seconds "off the air" between your unit and another DR-605. During the transfer, your unit will indicate "send," and the other set will display "load." After the transfer, both units indicate "pass," and both units will automatically exit the cloning mode. Turn the power off to both units, disconnect the jumper cable, and your friends can now enjoy all of the memory channels you have previously stored in your own set.

Making Connections

If you're into packet, you'll enjoy the capabilities of selectable 1,200-bps or 9,600-bps packet operation. Your TNC connections vary, depending on your data rate (see "Packet Plugs" for hookup details). In addition, the receiver does not have a fixed low-level audio output, so you must make sure to adjust the volume control according to the level of incoming packet signals. (This applies only for 1200-baud signals; 9600-baud packet is taken straight from the discriminator and is not affected by the volume control.)

I ran this unit with an older PK-232 from AEA, and once I set the levels properly, packet was a snap. But just make sure you wire up your mic plug correctly, or better yet, go with plugs that have already been soldered to avoid the aggravation of tedious soldering on a relative-

Gordon West is Senior Contributing Editor of CQ VHF.

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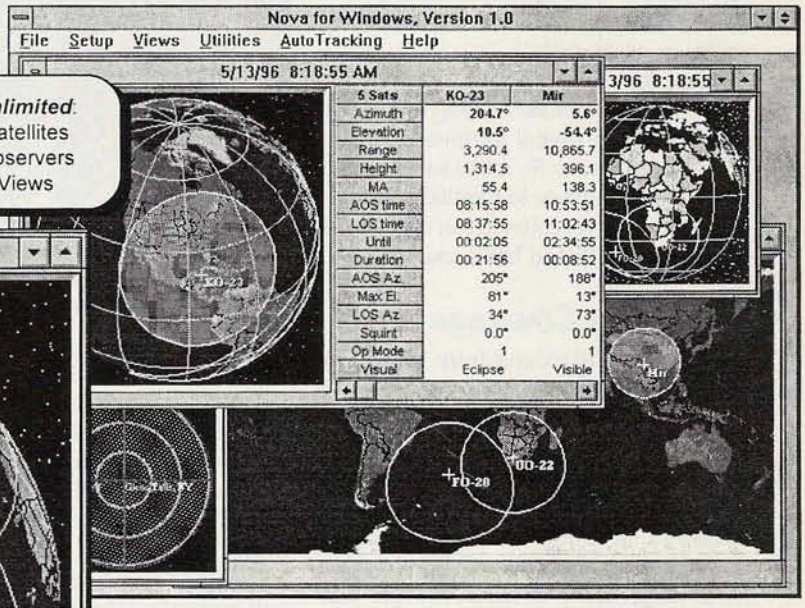

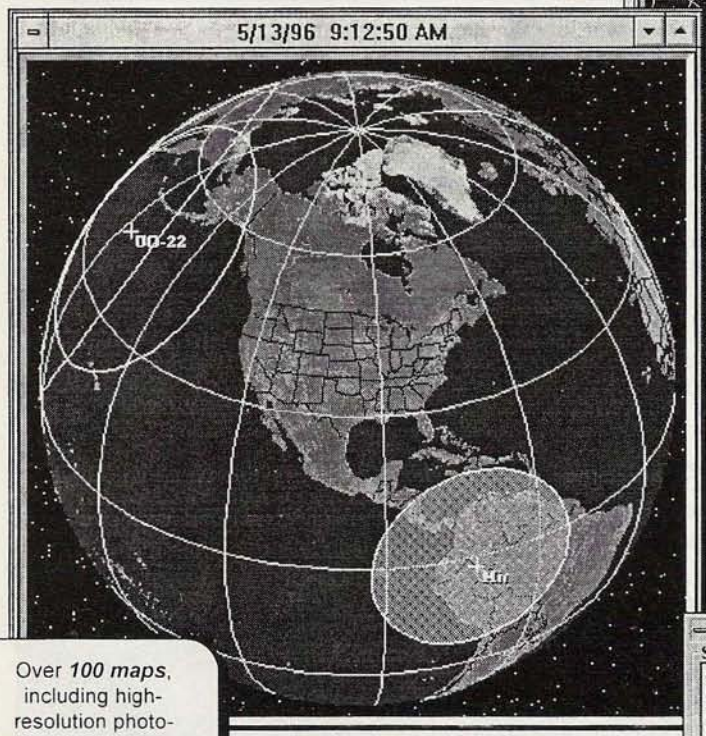

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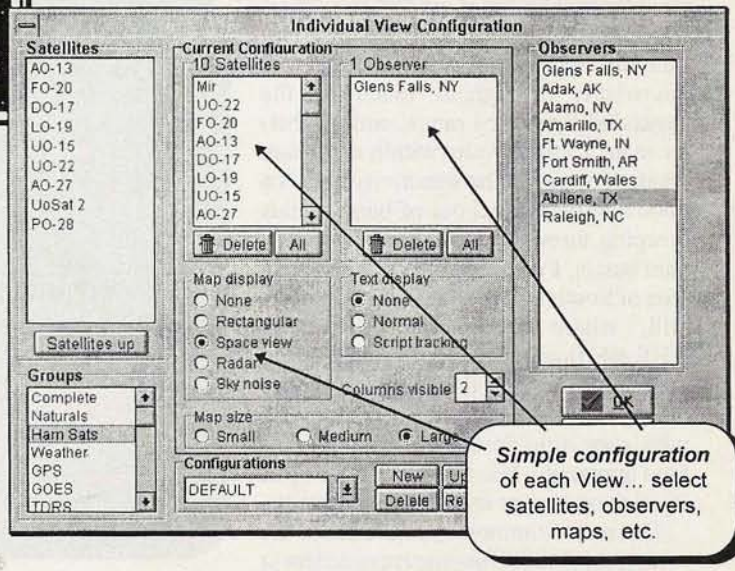

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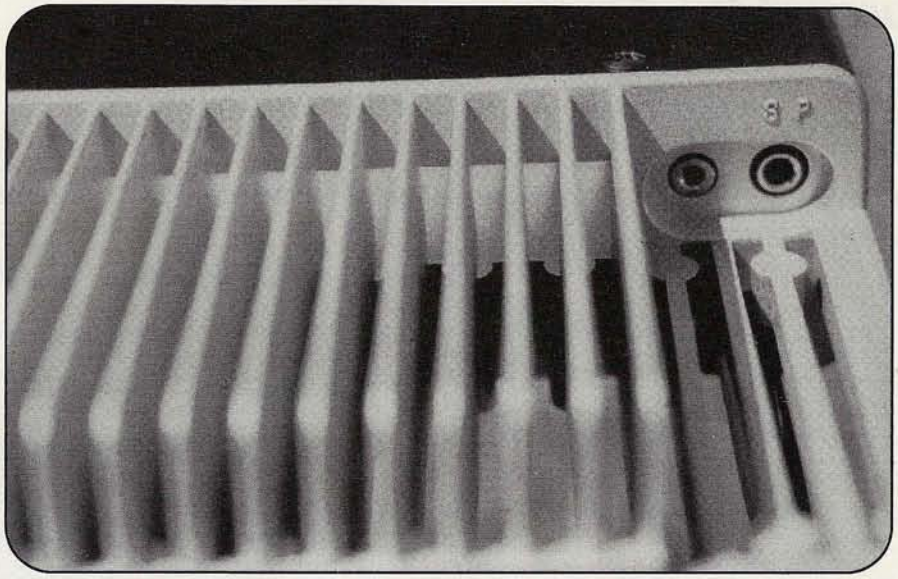
CIRCLE 79 ON READER SERVICE CARD

"Each memory can store frequency, tone setting, repeater offset, transmit lock-out, and memory scan lock-out."

ly new type of communications mic connector. (If you're not up to wiring your own modular mic plug—mandatory for 1200 baud and optional for 9600—Alinco offers pre-made connecting cables as accessories.)

Speaking of connectors, the DR-605 has a built-in duplexer leading to a single antenna output pigtail terminating in an SO-239 connector. So make sure to use a dualband antenna or to purchase an add-on duplexer if you plan to run this set off of separate VHF and UHF antennas.



The two jacks on the rear of the radio are for packet data (left) and a combination cloning/external speaker (right). See text for details.

Frequency Coverage

This radio will receive from 136 to 174 MHz on VHF and will transmit from 144 to 147.995 MHz. On UHF, you have wide-band receive from 420 MHz all the way up to 470 MHz. Transmit is enabled from 430 to 450 MHz, letting you transmit to the occasional satellite or spacecraft (such as Mir) using FM in the 435-MHz range. Keep in mind, though, that the frequencies below 440 MHz are generally reserved for weak-signal modes, satellites, and some amateur television. *Don't transmit FM below 440 MHz unless you are certain you are transmitting within the intent of the band plan.*

What is absent from this wide-band reception capability is aircraft receive on VHF. But for everything that you *can* tune in, sensitivity is better than .50 microvolts throughout much of the expanded frequency range, and it's better than .15 microvolts within each ham band. Along with the sensitivity comes a good ability to reject out-of-band signals creeping through on the VHF and UHF ham bands. I operated the DR-605 in an area of South Los Angeles called "Signal Hill," where there's enough VHF and UHF RF floating around to cause even the most expensive dualband mobiles to hiccup. The DR-605 performed very well, with very little desensitization or intermod apparent while operating with open squelch on vacant repeater frequencies.

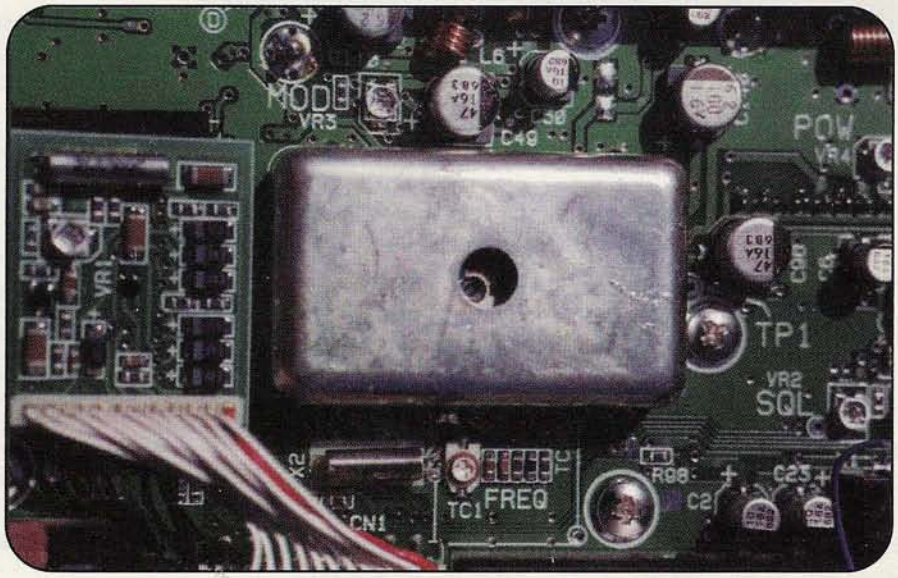
The most common interference is the reception of strong paging transmitters at 152 MHz and 157 MHz mixing and combining with non-linear sections of the receiver to cause the 2-meter band to be vulnerable to these powerful pagers. The Alinco DR-605 held up to rejecting these signals as well as more expensive equipment from the "big three" manufacturers.

And if you *do* have problems with local pagers coming over the 2-meter band, a 152-MHz notch filter (see "Resources") will generally take care of it.

Easy Startup

Starting off and running some of the basic features of the Alinco DR-605 is relatively easy, even before plowing through the well-written instruction book. POWER ON is an orange button on the right upper-front of the radio, and each band has its own independent volume control. Front-panel functions which require only a single button-push are marked in white. Sub-functions, which require first pushing the FUN button, are marked in yellow.

Squelch is a sub-function! To set the squelch, you first push either the VHF or UHF volume control for a beep to access that particular band. Now push FUNCTION,



The CTCSS decode unit is installed at the left of the silver can and plugs in easily. It's an extra-cost option, but it's worthwhile.

and then push the left-hand volume control to decrease the squelch point, or the right-hand volume control to increase the squelch threshold. The squelch setting reads out from 1 to 9, and I found that a setting of 1 would silence the normal background noise. You can assign independent squelch settings for either the VHF or UHF bands.

This new type of sub-function squelch is probably OK for most operators, but I like to lean over, crack the squelch to make sure my receiver volume is just right, and then get on with what I'm doing. To "crack the squelch" with the DR-605, you'd better pull over to the side of the road and get set for some serious button-pushing.

Dialing in a frequency is much easier. First, push the MHZ button once and rotate the big knob one click for each MHz. Then push it again to return to the normal 5-kHz tuning steps and dial in your exact frequency. You can also change frequencies with the microphone's UP and DOWN buttons. But don't hold them down too long or else the unit will go into scan. A simple way to get out of scan is to tap the PTT button once. This stops scanning without keying the transmitter because the set "knows" you were scanning and simply wanted to stop. Pretty smart.

A Hot Transmitter

On transmit, I measured 55 watts out on VHF at 12 amps with the engine running and the supply voltage "hot" at 14.2 volts. On UHF, I was surprised to see 40 watts at about the same current and voltage. When I turned the engine off, power dropped back to the specified levels of 50 watts VHF and 35 watts UHF.

I probably got a little bit more power output because I did away with most of the red-and-black power cord. I've never seen an in-the-box power cord as long as the one Alinco supplies! It must be over 12 feet long with the fuse holders at the tip end. It's always good to have fuse holders right at the voltage input source, but it's not good to have all that extra wire hanging around. Cut off the excess, reattach the fuses up nice and close to your voltage source, and you're set.

Storing and Scanning

Storing frequencies in memory is straight-forward. Pick your band (VHF or UHF), dial in the frequency of your choice, along with other settings, such as offset and tone, push the FUNCTION button once to bring up the memory numbers, rotate the dial to select wherever you want the memory, and then push MW. It gives you a single beep. Nothing to it.

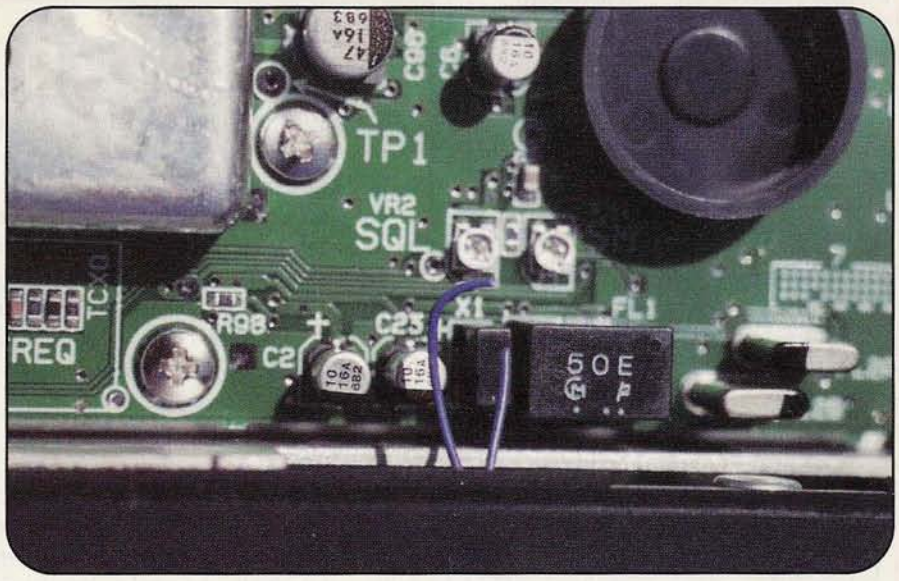
There are three scanning options, including memory scanning with selectable lock-out; tone scanning as you search a repeater input frequency to discover the correct CTCSS frequency (with the optional tone decoder installed); and band scanning, which searches the entire range of frequencies in the main band. You can scan for busy and hang indefinitely (it resumes scanning 2-1/2 seconds after the repeater or signal drops out), or scan for a busy channel, hear it play for 5 seconds, and, like or not, have it move on. When the DR-605 is scanning frequencies or memories, you can kick it off an occupied channel by simply turning the big knob to the right or to the left. If you turn the knob to the right, the unit scans up in frequency; turn it to the left, it scans down.

"You can transfer all 100 memories in just a few seconds 'off the air' between your unit and another DR-605."

At the Tone...

The DR-605 is like most other dual-band mobile radios when it comes to CTCSS—subaudible tones sometimes needed for repeater access. It gives you *encode*, but you need to buy an add-on module if you want CTCSS *decode*. Encode is set by the exact tone frequencies, and it's also straight-forward in the FUNCTION TSQL mode.

But do get the tone decode unit (EJ-24U) if you buy the radio. It's a great way to look at repeater input frequencies and see what tone is being used when you need to access an open repeater with CTCSS control. In the decode mode, your set remains silent until you either scan or turn the knob for the right tone. When you hit the right tone, audio opens up, and you can then spot which CTCSS frequency is in use. NOTE: This is for accessing *open* repeaters only. The closed and private repeater boys and girls won't appreciate you coming up on "their" channel with a discovered tone.



Cutting the blue wire in the foreground opens up transmit capabilities outside the ham bands for use by authorized MARS, CAP, and Coast Guard Auxiliary stations.

Installing the Tone Board

The tone decode board simply plugs in on the inside top-left of the DR-605 (see photo). The directions illustrate pulling out the encode unit, but they must be old directions because the DR-605 I got from Alinco had no board plugged in where the decode board goes. Yet it had CTCSS encode out of the box, so don't get excited if there's nothing there to remove.

As long as you have the top off (four simple screws), look carefully inside the front panel assembly for a little blue wire loop (see photo). This wire controls VHF and UHF band limits: if you hold a Mil-

Packet Plugs

How you wire up the DR-605 for packet depends on whether you're operating 1200 baud or 9600 baud, as the wiring for each is *completely* different.

9600-Baud Hookup

For 9600 baud, you have a choice of using the rear-panel jacks (see photo) or the modular mic plug. Here's how to wire up the mic plug for 9600:

Pin 1	Ground for transmission data
Pin 2	9600-bps data output, 300 mV P-P/47 K (to TNC input)
Pin 3	Transmission data input (from TNC mic output)
Pin 4	PTT ground
Pin 5	PTT from TNC
Pin 6	No connection

If you're using the rear panel connectors, the wiring is as follows:

To the "Ext. Mic" terminal, use a 2.5-mm (submini) stereo plug, running the TNC audio output (to the transmitter) to the tip; the receive audio line (to the TNC) to the ring behind the tip, and ground to the sleeve behind them both.

Next, wire up a 3.5-mm (mini) stereo plug, which will go into the "Ext. Spkr" terminal, with nothing to the tip, the TNC's push-to-talk (PTT) line to the ring, and PTT ground to the sleeve.

1200-Baud Hookup

For 1200-baud packet operation, you must use the mic connector and the speaker jack. Wire up the mic connector as follows:

Pins 1-3	No connection
Pin 4	PTT from TNC
Pin 5	Ground
Pin 6	TNC audio to transmitter
Pin 7	Ground

Wire up the 3.5-mm stereo plug as follows: Receive audio (to the TNC) goes to the tip; nothing is connected to the ring; and audio ground goes to the sleeve.

itary Affiliate Radio System (MARS), Civil Air Patrol (CAP), or U.S. Coast Guard Auxiliary credential, and are authorized to transmit just outside of normal ham band limits, you can cut this blue wire to open up these frequencies for transmitting. *If you're not a member of one of these organizations, leave the blue wire alone.* And remember, you're always responsible for ensuring that you transmit only on authorized frequencies.

Time Out...

For those of us who've endured lengthy repeater tie-ups when someone accidentally sits on the mic, this set has a built-in time-out timer that will automatically stop a continuous transmission after a preset time. You can choose a time between 30 seconds and about five minutes. I suggest you set it at 90 seconds.

If you ever decide to run this dualbander as a crossband "repeater" (another option), that time-out timer will save the day if something should lock up the input. Crossbanding with an unattended mobile unit is legal only if certain conditions are met (see Part 97 of the FCC rules) and is somewhat controversial overall. If you ever decide to operate in this mode, study the rules (especially those for *auxiliary stations,* which is what your HT-to-mobile link becomes) and be sure you observe them. Be careful!

On the Air

Everyone I talked to on the air liked the transmit audio. The microphone looks a bit goofy to me, but it feels comfortable and the unlit keypad worked smoothly to dial in phone numbers. It doesn't have autodial memories, but how many peo-

"Starting off and running some of the basic features of the Alinco DR-605 is relatively easy, even before plowing through the well-written instruction book."

ple really use them, anyway? Subtle little "extras" like this are what Alinco left out in order to keep the suggested retail price nice and low.

But there's plenty that isn't left out. There is a whole section in the back of the manual that takes you into subtle operating modes where you can set many different types of operating parameters and reset some of the keystroke conditions. Too many options to go into, but be assured, this is a full-featured radio.

The audio output is plenty loud. If you need it louder, hook in an external speaker. The LCD display is appropriately sized, and you can read the display very well at big angles to the left and right and from the top looking down. If you mount this unit up on the roof of your cab, however, you'll find that looking almost straight up at the display from the bottom will yield fuzzy numbers until you turn on your dome light. Exterior lighting makes the display easier to read when looking at it from a hard angle from down below to almost straight up. At all other angles, the display works out fine.

And Finally...

I tried the usual blow-it-up tests: I reversed the polarity and only the fuse blew. I then transmitted for five minutes on VHF with no antenna, and I found no problem other than a relatively warm heat sink. I didn't notice the bar graph on transmit reducing with no antenna, so this tells me that there's no automatic power-down circuit and that the unit just transmits full bore into an open or short circuit. Same thing with UHF—five minutes with nothing on the end of the hose; the radio got warm but still survived. I even did a brief short-out test, and all I could get it to do was to finally blow the 12-volt fuse. *(By the way, leave this sort of destructive testing to us "reviewer types." After all, if it* does *blow up, you could be stuck with a dead radio. And most warranties don't cover intentional abuse.—ed.)*

So if you're looking for a good, basic, 50 plus 50 channel, powerful dualband FM mobile transceiver (and that's quite a mouthful), this unit is certainly worth a second look. It works great off of a big home antenna, too. Nice radio, Alinco!

Resources

For more information about the DR-605, see your dealer or contact:
Alinco Electronics, Inc., 438 Amapola Ave., Lot #130, Torrance, CA 90501; Phone: (310) 618-8616; Fax: (310) 618-8758; Internet: <http: \\www.alinco.com>

Antenna duplexers are available from many dealers or:
Comet/NCG, 1275 N. Grove St., Anaheim, CA 92806; Phone: (714) 630-4541; Fax: (714) 630-7024; Toll-free: (800) 962-2611
Diamond Antennas, 435 So. Pacific, San Marcos, CA 92069; Phone: (619) 744-0900.

Notch filters are available from:
Par Electronics, 6869 Bayshore Dr., Lantana, FL 33462; Phone: (407) 586-8278; Fax: (407) 582-1234; e-mail: <parf@aol.com>

The N5JXO Portable ATV Repeater

If you're operating ATV from the scene of an event or disaster, you may want to have an ATV repeater right there with you. Here's how to build and control one at minimal cost.

In our October column, we reported on last summer's HATS (Houston Amateur Television Society) symposium and mentioned a presentation by Fred Juch, N5JXO. Fred had discussed how easy it is to build a portable crossband ATV repeater with just a combination of a transmitter, a receiver, and a circuit built around a P.C. Electronics VOR-2A circuit board. We didn't have space to bring you the details in that issue, so that'll be our focus for this month.

First of all, an apology to Fred. We got his callsign wrong in October. It's N5JXO, not N5IXO. Sorry, Fred. Now let's look at the linking system that Fred has lashed up for an in-the-field crossband ATV repeater.

Gotta Go Crossband

The reason you need to go crossband to run a repeater in the field is that in-band repeating generally requires a duplexer to permit simultaneous use of the same antenna for transmit and receive and cavity filters to keep the transmitted RF from blowing out the receiver. All of these are big and heavy and don't lend themselves to easy transport and setup in the field.

On the other hand, a transmitter operating on 70 centimeters (420 MHz) generally won't bother a receiver operating on 23 (902 MHz) or 13 centimeters (1,240 MHz). The frequency separation provides sufficient isolation. And chances are that both transmitter and receiver will operate on 12 volts DC, so you won't be tied to AC power mains, as you might be with a regular repeater.

You'll need two antennas, of course, but that can be a blessing for a field operation. If, for example, you'll be repeating video from a specific location for a long time, you can use a beam antenna on the receive side, aimed at the remote transmitter, then put the repeater output signal on an omnidirectional antenna for wide-area reception. Of course, you'll also have the flexibility to change the antenna system configuration to meet changing needs.

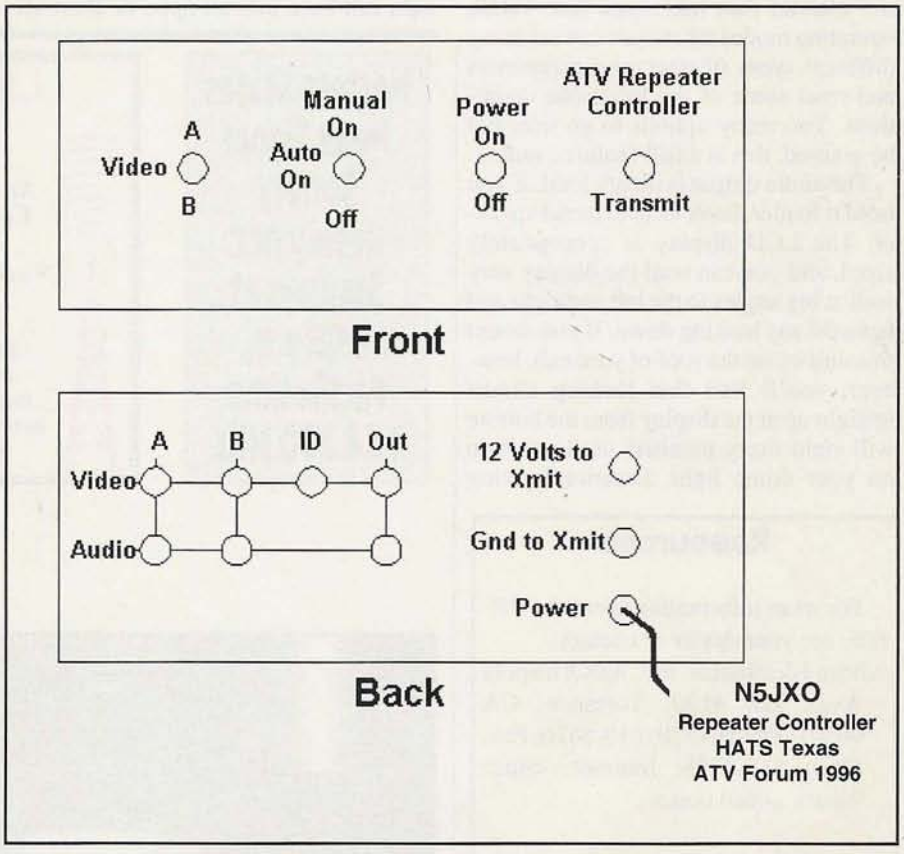


Figure 1. Front and back panel layouts of the N5JXO crossband ATV repeater controller. The front has three switches and a light; the rear has 10 RCA jacks.

The N5JXO Controller

The heart of this crossband ATV repeater system is a simple control box with three switches, a relay and a ready-to-roll circuit board: the VOR-2A from P.C. Electronics. The rest of the parts are available from your favorite parts supplier.

Take a look at Figure 1, which shows the front and rear panels of the controller; we'll use that to discover just what this box can do and how it does it. The first switch on the left is a video source switch, which allows you to select either of two inputs, perhaps a receiver and a local camera, or two different receivers.

By Henry Ruh, KB9FO

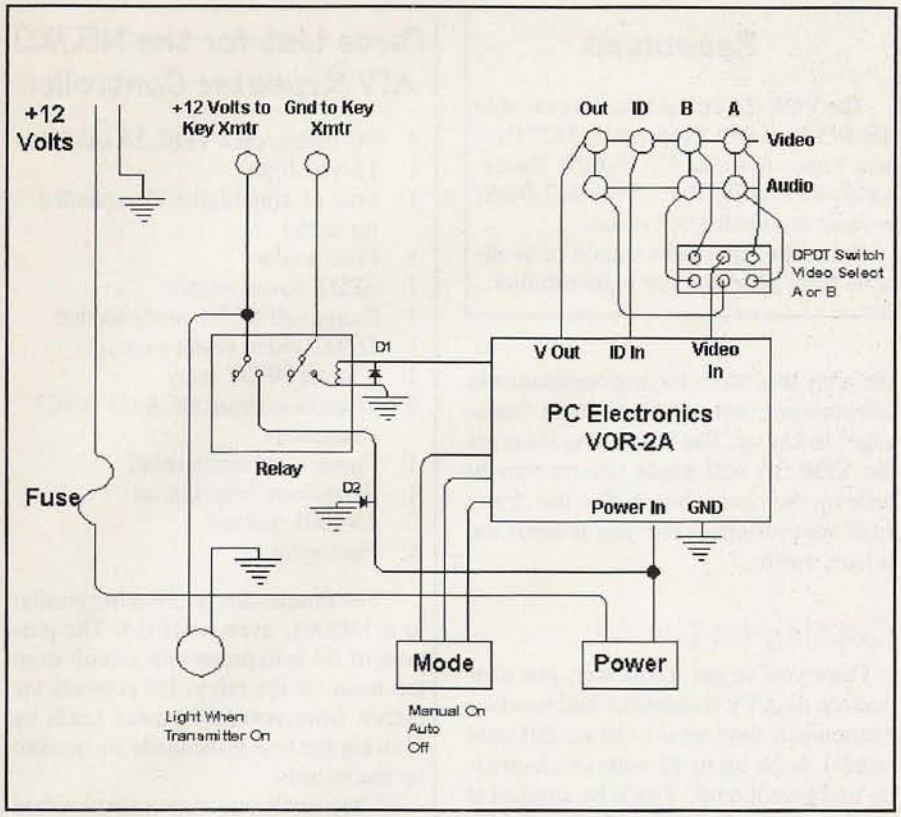


Figure 2. Schematic of the N5JXO controller. The heart of the circuit is the P.C. Electronics VOR-2A circuit board.

The second switch controls the mode in which the VOR-2A board operates (see Figure 2) and can be set in one of three positions. "Off" is off. Even though the controller is active, it won't send power to activate the transmitter. "Manual On," the top position, keys the transmitter continuously. If no video is being received on the input, a station ID will be transmitted. If a video signal comes in, the received video will replace the ID (this is a function of the VOR-2A circuit, as is a 10-minute ID timer that's active whenever the transmitter is keyed on). Finally, the center switch position is "Auto On." In this configuration, the transmitter comes on only when video is received. When the VOR-2A senses incoming video, it keys the transmitter, passes the video, and inserts an ID every 10 minutes. When the incoming video drops, the circuit shuts down the transmitter.

The third switch is a power switch, and at the far right is a bulb that lights when the transmitter is active.

The rear panel has jacks on the left side (your choice, but RCA is most common) for audio and video input from two sources, an ID input, and audio/video outputs to the transmitter. On the right is a

hole on the bottom for 12 volts DC in to power the unit, plus two power jacks above it, to send either +12 volts or a ground connection to transmitters that require either of those in order to key up. These jacks are controlled by the relay and are active only when the controller is in the transmit mode.

The fact that everything here operates on 12 volts is another plus for portable operation, allowing your repeater to function even if no AC power is available. (If you're not using the +12-volt line to activate a transmitter, you can hook a buzzer to it as a video detect alarm.) Since the 12 volts can also be used to power the transmitter, the fuse inside should be 1 amp *higher* than the value needed for the transmitter alone.

Resources

The VOR-2A circuit board is available for $45 from P.C. Electronics, 2522 Paxson Lane, Arcadia, CA 91007; Phone: (818) 447-4565; Fax: (818) 447-0489; e-mail: <tomsmb@aol.com>.

All of the other parts should be available from your favorite parts supplier.

The Circuit

As with most solid-state circuits today, it's what you *don't* see that counts. The VOR-2A circuit does all the "thinking" and "decision-making" for the unit (unless you've put it on manual control), sensing received video, turning the transmitter on and off, deciding whether to send out video or the ID, and controlling the relay that sends keying commands to transmitters that need a voltage "message" to key up. The instruction sheet for the VOR-2A will guide you on how to wire up the circuit board. See the "Parts List" for everything else you'll need (and it isn't much).

Getting on the Air

Once you've got it together, just connect up an ATV transmitter and receiver (remember, they need to be on different bands), hook up to 12 volts of electricity, and give it a try. You'll be amazed at the fun and flexibility that this system can provide. Plus, it'll give a needed boost to activity on our bands above 450 MHz.

Parts List for the N5JXO ATV Repeater Controller

1	PC Electronics VOR-2A module
1	12-volt light
1	Fuse (1 amp higher than needed for xmtr)
1	Fuse holder
1	SPDT power switch
1	Center-off SPDT mode switch
1	DPDT video select switch
1	12-volt DPDT relay
9	Chassis-=mount RCA (or BNC) connectors
1	Power cord strain relief
1	Scratch-on lettering set
2	1N4001 diodes*
1	Enclosure **

* The diodes can be anything similar to a 1N4001, even a 1N914. The purpose of D1 is to protect the circuit from the noise of the relay. D2 protects the circuit from reversed power leads by blowing the fuse if the leads are hooked up backwards.

** My enclosure was a surplus box 6" wide, 3" tall, and 4" deep. It is very oversized. —N5JXO

A Few Gifts for the Holidays

HO! HO! HO! Santa Don is here to spread digital joy and share some gifts of the season!

Welcome once again to the Digital Data Link. This month, in the spirit of the end-of-year holiday season, I'd like to give all of you faithful readers a few gifts. Today, I'll be giving away a few of my better secrets.

2400 Baud for Cheap

One really neat secret, which I learned from a German packeteer, is a simple and inexpensive way to upgrade a 1200-baud link to 2400 baud. This upgrade, which I've never seen documented anywhere else, will work *only* if your TNC is using the Texas Instruments TCM3105 Modem IC. To be certain, look inside your TNC for the chip (it has 16 pins) and, if you find it, take note of the crystal near it. This is the clock crystal for the modem and, if you change it to a higher frequency, you can push the TNC to 2400 baud!

Of course, once you perform this modification, the modem is no longer compatible with other, unmodified modems. That means you have to modify *all* of the modems on a channel so they can *all* understand each other. Naturally, any TNCs on the channel that *don't* use the TCM-3105 can't be modified and, therefore, can't be used on that channel. So, when you go to buy crystals, buy a few extras (they're cheap) for all the other TNCs.

The Details

When doing this, first verify that you *really* have a TCM3105 modem chip in there and that the clock crystal is the original 4.433-MHz one—it's unlikely that it was changed without your knowledge, but make sure. (Refer to Figure 1 if you have a PacComm Tiny-2). Second, you should locate the clock crystal for the microprocessor in your TNC. It's most likely far away from the modem chip and marked with a frequency of 4.9152 or 9.8304 MHz. Take careful note of this crystal: you must NOT make the mistake of replacing it to upgrade the modem! Just leave it alone.

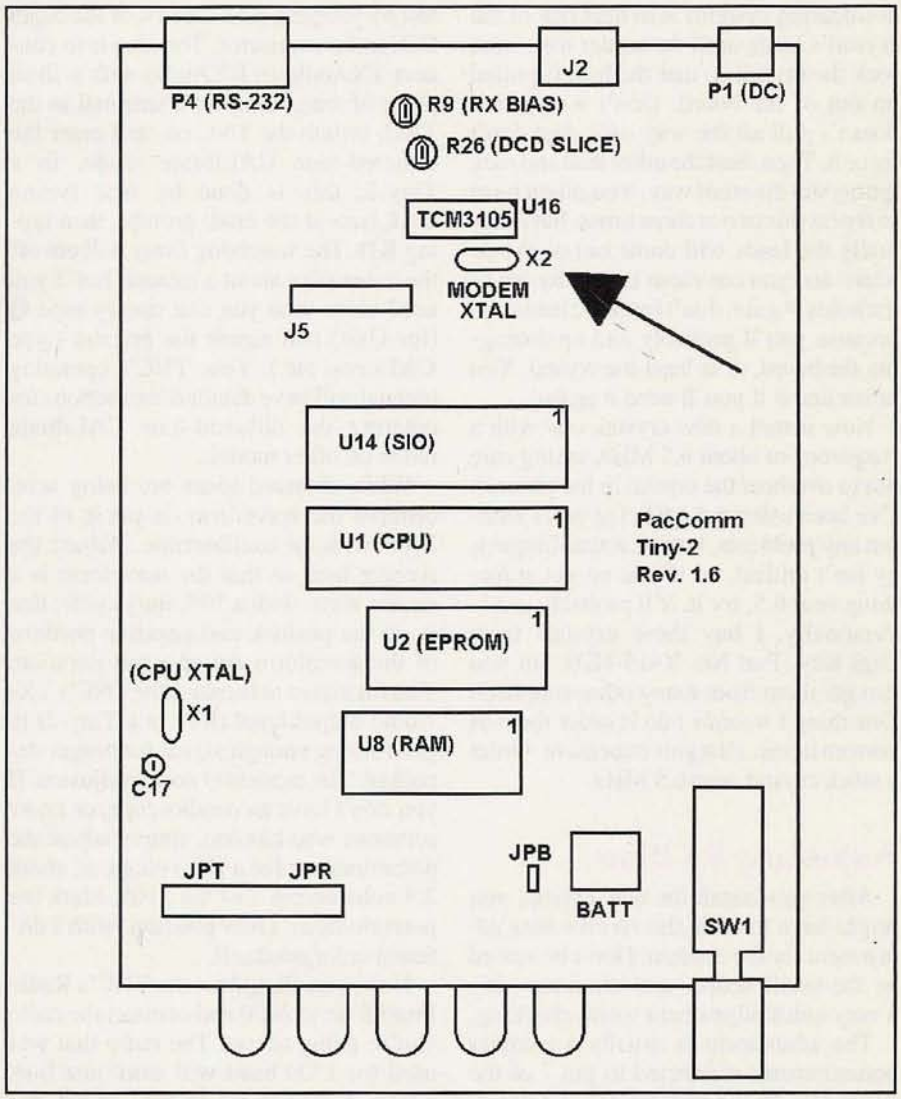


Figure 1. The location of the modem crystal (X2, arrow) in a PacComm Tiny-2. This diagram was drawn from an older board (rev 1.6), but the newer ones are similar.

Next, unsolder the modem crystal. I've found the best way to unsolder a crystal

By Don Rotolo, N2IRZ

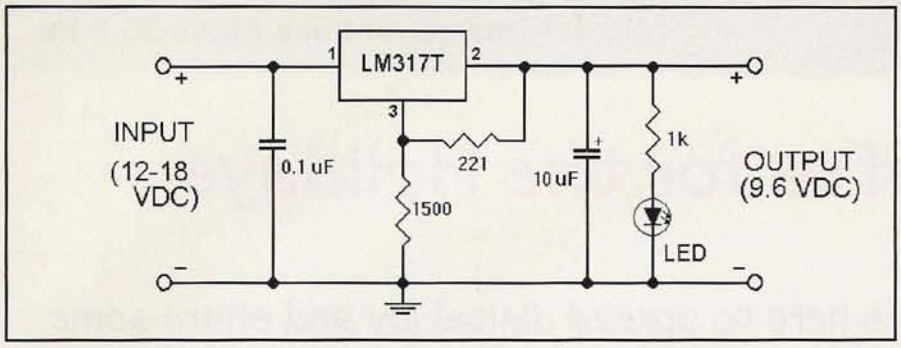


Figure 2. The schematic for the TEKK Radio power supply circuit. Refer to the text for construction details.

(assuming that you don't have an electric desoldering system) is to heat one of the crystal's leads until the solder melts and rock the crystal so that the lead is pulled up out of the board. Don't worry if it doesn't pull all the way out—just don't force it. Then, heat the other lead and rock the crystal the other way. You might have to repeat this two or three times, but eventually the leads will come out of the pc board and you can clean the solder out of the holes. Again, don't force the leads out, because you'll probably end up damaging the board, or at least the crystal. You never know if you'll need it again!

Now install a new crystal, one with a frequency of about 6.5 MHz, taking care not to overheat the crystal in the process. I've been using 6.5 MHz for years without any problems, but the actual frequency isn't critical, so if you've got something near 6.5, try it, it'll probably work. Personally, I buy these crystals from Digi-Key (Part No. X415-ND), but you can get them from many other suppliers. One thing I *wouldn't* do is order them as custom items...that gets expensive. Order a stock crystal near 6.5 MHz.

Adjusting RX Bias

After you install the new crystal, you might have to reset the *receive bias* adjustment for the modem. Don't be scared by the oscilloscopes and trimmers—it's a very quick adjustment worth checking.

The adjustment is usually a trimmer potentiometer connected to pin 7 of the 3105. In a PacComm Tiny-2, it's designated R9. I don't have any info about other brands or models, but either the technical reference, the manufacturer, or just a close look at the pc board should help. Mark the original position of this potentiometer with a fine-tip permanent marker, so adjustment will be easier if you ever go back to 1200 baud.

Prepare the TNC for an audio loopback test by jumping pins 1 and 4 of the 5-pin DIN radio connector. The idea is to connect TXAudio to RXAudio with a short piece of wire. Connect a terminal to the TNC, switch the TNC on, and enter the dithered-tone CALibrate mode. In a Tiny-2, this is done by first typing **CAL**<cr> at the cmd: prompt, then typing **KD**. The watchdog timer will cut off the tones after about a minute, but if you need more time you can simply type **Q** (for Quit) and repeat the process (type **CAL**<cr>, etc.). Your TNC's operating manual will have detailed instructions for entering the dithered-tone CALibrate mode on other models.

While dithered tones are being sent, observe the waveform on pin 8 of the 3105 with an oscilloscope. Adjust the receive bias so that the waveform is a square wave with a 50% duty cycle; that is, so the positive and negative portions of the waveform are of equal duration. You may have to increase the TNC's TXAudio output level (R12 in a Tiny-2) to get a strong enough signal for proper decoding. The modem is now readjusted. If you don't have an oscilloscope, or know someone who has one, simply adjust the potentiometer for a DC voltage of about 2.9 volts on pin 7 of the 3105. Mark the potentiometer's new position (with a different color marker!).

Now, you should set the TNC's Radio Baud Rate to 2400 and connect the radio you're going to use. The radio that was used for 1200 baud will work just fine. Using a deviation meter, adjust the TNC's TXAudio level to produce a 3.0-kHz deviation maximum. Be sure to check both tones—you'll find that one will be lower than 3 kHz with the other adjusted properly. If you don't have a deviation meter, use the following procedure: While listening on another radio, turn the TXAudio level adjustment higher until it doesn't get any louder in the receiver, then back it down until the loudness is about one-half of the loudest. This should give you about 3-kHz deviation. It's better to have a slightly low deviation than a slightly high deviation.

"One really neat secret, which I learned from a German packeteer, is a simple and inexpensive way to upgrade a 1200-baud link to 2400 baud."

Adjusting CD Level

The only other thing that can possibly need readjustment (rarely) is the Carrier Detect Level. This is the trimmer potentiometer connected to pin 10 of the TCM-3105 (R26 in a Tiny-2). If you want to check it, prepare the TNC for an audio loopback test (see above), lower the TX-Audio level to about 20 millivolts, enter the converse mode (type **K** at the cmd: prompt), and send a series of brief packets, such as carriage returns. The DCD lamp should light reliably every time a packet is sent and go out when no packet is being sent. If it does not, slowly turn the trimmer potentiometer until it does.

TANSTAAFL

That's right: "There Ain't No Such Thing As A Free Lunch." Of course, you don't get anything for free these days. After you perform the upgrade, you can expect a very slight decrease in the modem's sensitivity. This is because you're operating the TCM3105 outside of its specified range. On a solid RF link, you won't notice a thing, but if the RF path was weak to begin with, it will get just a little bit weaker. Although I haven't had any problems, I thought it only fair to mention it.

You also can't continue to use the 3105-specific open-squelch DCD adapter. This is the little pc board-type that just plugs into the 3105's socket, and the 3105 plugs into it. If you have a Universal-type DCD adapter, which has a few wires which need to be connected, it should work fine.

Powering a TEKK

I've written before about the TEKK T-Net series of UHF data radios (models KS-900 and KS-960). They provide good

plug-n-play performance at 9600 baud, with 2 or 5 watts output (which can always be amplified), and are reasonably priced. The only problem is that they need a 9.6-volt power supply, not the normally available 12 volts.

The circuit in Figure 2 is a simple 9.6-volt power supply, which uses the LM-317T adjustable voltage regulator to provide up to 1.5 amps, assuming a proper heat sink. This circuit has been used hundreds of times to power TEKK Radios. It's available commercially, but it's so simple to build that you can do it yourself in an hour. Most of the parts (see "Parts List") are available at Radio Shack, except for the precision resistors, and it shouldn't cost you more than $10 to build. A simple, single-sided pc board pattern is also included as Figure 3 to make it even easier.

The precision resistors are available from Digi-Key and most other parts suppliers, but you can also use standard 5% resistors (220 and 1.5 k are standard values, but Radio Shack doesn't carry them). Buy a few and select the ones that are closest to the desired value; a difference of a few ohms won't matter. The rest of the component values are not critical, either, and anything close should do.

A few words of caution are in order. First, the LM317 must be attached to a heat sink and you have to use heat sink grease. When the radio draws full current, the regulator gets quite warm and will fry without a good heat sink. Second, the tab of the LM317 (and, therefore, the heat sink if you don't insulate it) is connected to the output voltage, NOT TO GROUND. If you ground this tab, the smoke will come out of the regulator and it will stop working. (Also note that the 0.1-uF monolithic capacitor across the input is not mounted through the pc board holes, but on the copper side, dead bug style.)

I recommend installing the power supply inside a small box, like the Radio Shack Part No. 270-233, and using the aluminum cover as the heat sink. Just use plastic screws and a mica or plastic insulator to attach the LM317 to the cover, or you'll have a disaster waiting to happen (remember the tab is at output voltage!). You can also mount the radio to the same box, using tape or velcro, for a neat and compact installation. As an option, you can connect a small LED to the circuit as a power indicator.

"This circuit (in Figure 2) has been used hundreds of times to power TEKK Radios. It's available commercially, but it's so simple to build that you can do it yourself in an hour."

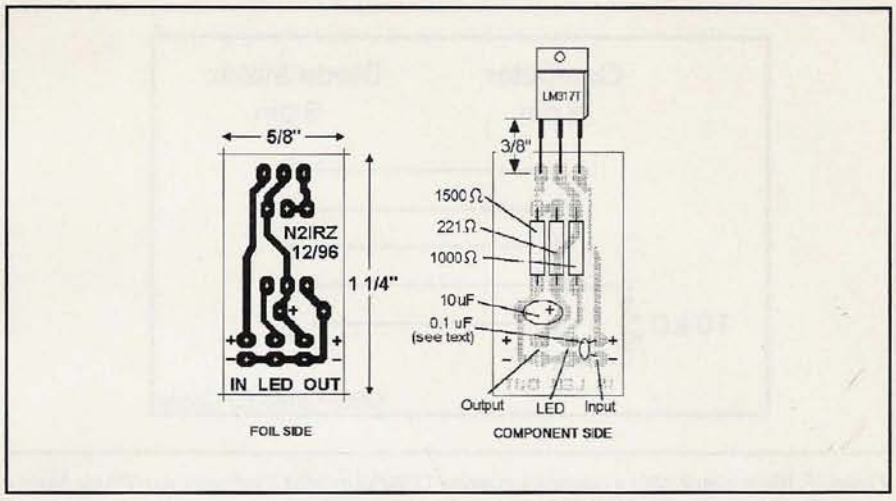


Figure 3. The pc board pattern and component placement for the TEKK Radio power supply. The pc board is small—5/8" by 1-1/4". Note that the 0.1-uF capacitor is mounted "Dead Bug" style on the copper side of the board. The LED and 1 k resistor are optional.

Network EPROMS

I've had a substantial number of inquiries about obtaining networking EPROMs. Although you should be able to contact your local Sysop to find out who has an EPROM burner (a piece of hardware used to program EPROMs), there are some people around who are either starting a new network, or can't get help for silly political reasons (really!), and don't have any way of getting a networking EPROM programmed.

Well, there is someone out there who will program networking EPROMs for free, if you meet some simple requirements. All you have to provide is the EPROM, a floppy with the binary image to be programmed into it, and the SASE for the return trip. Amateur Networking Supply (ANS), whose products I've mentioned before, has made this kind offer to anyone who needs it, and gifts don't get much better than this (see "Resources"). Of course, if anything is wrong—bad EPROM, wrong or bad binary image, not enough postage, etc.—the request can't be processed.

You can get EPROMs from nearly any electronics supplier. Jameco offers reasonable prices. For both TheNET X1J and ROSE, you want to get a 27C512-15, which is a 512-kilobit (64 k x 8) EPROM

Parts List for Data Radio Power Supply

Quantity is one each; "RS" numbers indicate Radio Shack part numbers.

221-ohm, 1%, 1/4-w resistor (or selected 220-ohm, see text)
1500-ohm, 1%, 1/4-w resistor (or selected 1.5-k, see text)
LM317T, variable voltage regulator, TO-220 case (RS 276-1778)
0.1-uF monolithic capacitor (RS 272-109)
10-uF, 16-v, tantalum capacitor (RS 272-1436)
Case (RS 270-233) (use metal cover as heat sink)
Heat sink grease (RS 276-1372)
Heat sink hardware & insulator (RS 276-1373)
Hook up wire
pc board

Optional:
Miniature LED (RS 276-026 or similar)
1-k ohm, 5%, 1/4-w resistor (RS 271-1321)

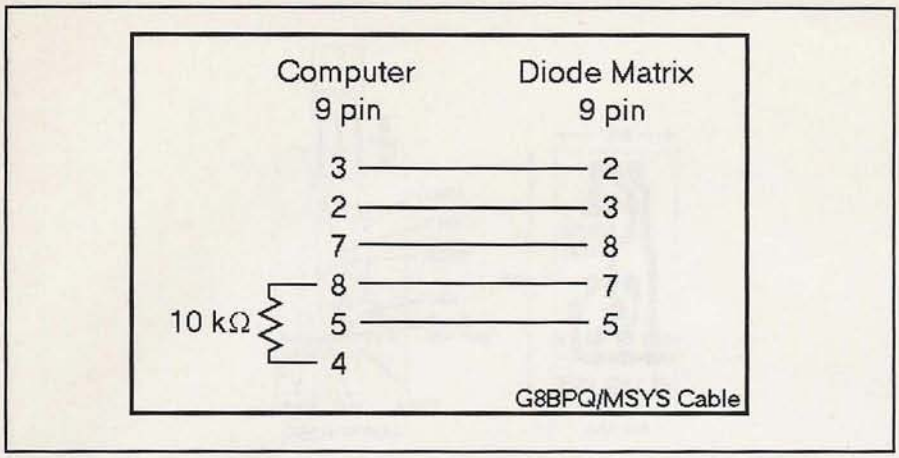


Figure 4. When connecting a computer running G8BPQ or MSYS software to a Diode Matrix Board running TheNET X1J, you need to use a cable like this to make it work.

with a 150-ns speed. Faster is always better, but not required. Of course, you can just pull the one from your TNC, if it's the correct type, but then you'll have to wait a few weeks for it to return. But ANS does appreciate working with new EPROMs, because they don't have to be erased. Also, remember that EPROMs are static sensitive—wrap them in foil for transport and don't touch them!

The binary image for the EPROM is created by the networking software. For TheNET X1J (rev 4), you run the program PATCH.EXE, and the resulting binary image files are THENET1.X1J and THENET2.X1J. Both files, each about 32 k, are required. For ROSE v3.7 or 3.8, you run the program MAKEPROM.EXE, and the resulting binary image file is whatever you specify as OUTput. Only this one file, about 64 k, is required. Place the file(s) on an IBM-formatted floppy and send it with your EPROM and SASE. Check with the post office to see how much return postage you should include.

Joy and Peace

Well, that's about it for this month... and for 1996. It's been a good year for me, and I hope that it was also good for you and your loved ones. At this time of year, it's traditional to pause and give thanks for what we have. I think if we all did this, throughout the year, it would be a better world in which to live. Wishing you the joy and peace of the season and a happy, healthy, and prosperous New Year, 73. ■

Resources

When contacting these sources, be sure to mention *CQ VHF*!

Digi-Key Corporation, 701 Brooks Ave. South, Thief River Falls, MN 56701-0677; Phone: (800) 344-4539

Radio Shack, a division of Tandy Corporation, locations worldwide, or call (800) 843-7422 (in U.S. only)

A reasonable source for TEKK Data Radios is:

George Franklin, WØAV, Metro North Communications, 4417 North Elmwood Ave., Kansas City, MO 64117; Phone: (816) 452-1900

For the free EPROM programming service, contact:

Amateur Networking Supply, P.O. Box 219C, Montvale, NJ 07645-0219

For electronic parts and EPROMs:

Jameco Electronics, 1355 Shoreway Rd., Belmont, CA 94002-4100; Phone: (415) 592-8097

What You've Told Us...

Message to advertisers: Your new customer-service line is on the World Wide Web. But don't cancel your print ads. See details below.

The survey questions in our September issue asked more about your usage of computers and the Internet. Please remember that all numbers are rounded, so the percentages may not always add up to exactly 100%.

It's no surprise that 70% of you have access to the Internet, either at work or at home. What *was* surprising is that just under half of you (46%) say you *don't* have an e-mail address. Comparing those to the total, we find that 26% of youwho have Internet access don't use it for e-mail!

Now, back to the expected: Among those readers with e-mail addresses, 78% of you use e-mail for ham radio-related correspondence. The vast majority of you (75%) do your ham e-mailing at home, 13% do it at work or school, and 12% do it somewhere else (Where? In your car? At the public library?).

The greatest number of you (38%) access the Internet through a commercial online service (America Online: 24%; CompuServe: 8%; Delphi: 0%; Genie: 1%; Prodigy: 5%; there may be more, as we forgot to separate out a few of the other online services, such as Microsoft Network). These figures were followed by direct Internet providers, such as Netcom (35%), "other" (15%), work network (10%), school network, and packet gateway (each at 5%).

Our last two questions dealt with the World Wide Web. Just over half of you (53%) say you use the Web regularly. Among that group, 18% have made a purchase directly on the Web, 40% have made a purchase based on Web advertising, and a whopping 77% have used the Web to contact a manufacturer or dealer. Looks like the Web is the place to be for customer service and technical support, but its value for direct sales is still off in the future.

The winner of our free subscription for responding to our August survey is John Kellogg of San Jose, California. Congratulations, John. We'll be back next month with your replies to our October survey, in which we poked into your level of political activity. Thanks again to all of you for your responses.

CQ VHF Ham Radio Above 50 MHz

Reader Survey—December, 1996

We'd like to know more about you...about who you are and where you live, about the kinds(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 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).

As 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 know what you think is a reasonable price for different kinds of VHF/UHF ham gear.*

Please indicate the highest price you would be willing to pay for a new radio of each of the following types:

	Circle Reader Service #
1. Singleband FM handheld	
Under $200	1
$200-$300	2
$300-$400	3
Over $400	4
Don't Know/No Interest	5
2. Dualband FM handheld	
Under $300	6
$300-$400	7
$400-$500	8
Over $500	9
Don't Know/No Interest	10
3. Singleband FM mobile	
Under $300	11
$300-$400	12
$400-$500	13
Over $500	14
Don't Know/No Interest	15
4. Dualband FM mobile	
Under $400	16
$400-$500	17
$500-$600	18
Over $600	19
Don't Know/No Interest	20
5. Singleband multimode (FM/SSB/CW)	
Under $400	21
$400-$500	22
$500-$600	23
Over $600	24
Don't Know/No Interest	25
6. Multiband multimode (FM/SSB/CW)	
Under $500	26
$500-$600	27
$600-$700	28
Over $700	29
Don't Know/No Interest	30

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

CQ VHF Profile: WB2COP—The Ham and the Station

Ed Kracum, WB2COP, is involved with ARES, RACES, FM, packet, ATV, APRS, NTS, and weather. The driving force behind all this activity is a passion for emergency preparedness and public service.

By Bob Buus, W2OD*

Ed Kracum lives in a typical suburban home in central New Jersey on an acre lot on a quiet street. His house is at the end of the street, on the top of a hill, with many lovely trees...that conceal the most incredible antenna farm I've ever seen.

Covering about a half-acre, the antennas, mostly AEA Isopoles, sprout like onions on individual masts. So many antennas in such a confined space!—nine 2-meter Isopoles, a 2-meter Ringo Ranger, two 220 Isopoles, a 220 beam, a 440 Isopole, two 16-element beams for 440, a trap vertical for HF, and a couple of weather stations.

Upon answering the door, Ed ushers you into his radio room. What a sight! One wall is completely covered with shelves of equipment which include VHF and UHF transceivers, TNCs, power supplies, switches, computers, and CRTs. It looks like a large radio dealer's display except that everything is on and running, so lights blink, displays light, and transmitters periodically send bursts of packet. The other side of the room is dominated by a large bench containing more computers, keyboards, and printers.

The window of the room has a large aluminum plate covered with coaxial bulkhead connectors which bring coax from the antenna farm to the various rigs in the room. Surprisingly, everything looks quite neat without the usual clutter of cables and wires, which are discretely dressed behind the shelves and equipment.

Ed Kracum, WB2COP, with some of his radios and TNCs. (Photos by Gina Palazzo-Smith, N2FRP, and Bob Smith)

The sight of so much equipment can be overwhelming, and I find it hard to know how to describe it. So let's back up and give a little history of Ed Kracum himself, the creator of this station complex.

A Public Service Ham

The driving force behind this monument to ham radio is Ed's activity in emergency preparedness, with which he's been involved since about 1960. Ed played an active role in the Civil Defense organization of Middletown Township. He was told he could be a lot more effective if he would get his amateur radio license so he could operate the Gonset Communicators used in those days, and he got his Technician license in 1963.

He saw the Civil Defense organization evolve into RACES and ARES while 2-meter AM evolved into FM with the significant improvement in voice quality

"[Ed's shack] looks like a large radio dealer's display, except that everything is on and running, so lights blink, displays light, and transmitters periodically send bursts of packet."

** Bob Buus, W2OD, has been licensed since 1953 and has been using WB2COP's BBS for the past five years.*

Antenna Farm at side and back of WB2COP's house.

"The driving force behind this monument to ham radio is Ed's activity in emergency preparedness, with which he's been involved since about 1960."

that came along with the switch. He also saw the size of the radio equipment continuously shrink while its capabilities grew. But the same improvements were also taking place in the radio equipment used by the police, fire, and first aid agencies. Ed feared that amateur radio efforts with voice communications were usually redundant and of little use in an emergency except as a backup to regular radio channels. (Amateurs did save the day when a lightning strike took out the Middletown Police radio system and local hams provided vital back-up communications for a few days.)

Enter Packet Radio

Ed saw packet radio as a way to pass accurate, written messages without tying up voice channels, a significant advantage in emergency communications. Plus, it was something unique that could be provided by the amateur radio community. Ed built up his packet capability with a reliable BBS and a fervor to encourage other amateurs to take up this aspect of the hobby. Encouraged to set up a packet station at the county Office of Emergency Management (OEM), he soon had the county on the air, giving packet training to any local amateurs interested in knowing more about the mode. Once the capabilities of packet were demonstrated to the initially-hesitant local OEM, packet was embraced there as well. Today, Ed is the packet coordinator for Middletown and conducts all packet training.

The Packet BBS run by Ed, WB2COP-4, has continued to evolve and improve. Presently, WB2COP-4 consists of a 386DX-33 computer with six TNC ports as well as a dial-in modem port. Three Kantronics KPC-4 dual port TNCs service the six ports. Stations on 145.03 and 145.09 MHz are each driven by Kenwood 2570 transceivers feeding Isopoles. Additional signals on 145.51 and 145.54 are provided through ICOM IC-2ATs with "brick" amplifiers on the outputs, feeding Isopoles. The ports on the 220 band are used primarily for *backbone* (BBS-to-BBS) data transfers. The one at 223.48 is driven by a Kenwood 3530 and the one at 223.70 is an ICOM IC-38A. Each 220 port drives an Isopole antenna. Figure 1 shows a block diagram of this setup.

Ed also operates nodes on WB2COP-2 on 145.03, 145.09, 145.51, 145.54, 223.48 and 223.70. Plus, he has a NOS (TCP/IP) node on WB2COP-8 on 145.51 MHz.

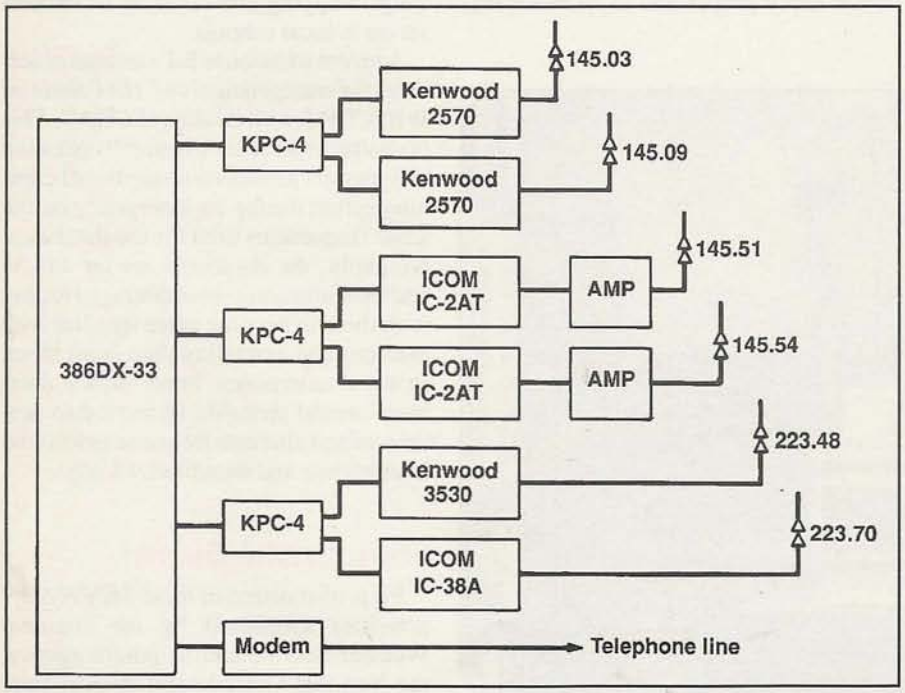


Figure 1. Block diagram of Ed Kracum's WB2COP-4 Packet BBS. The 386DX-33 computer feeds three Kantronics KPC-4 TNCs, plus a telephone modem. Each TNC feeds two radios. The system operates on 2 meters and 1.35 meters.

Traffic and Triage

For the past 2 years, WB2COP-4 has also served as the official central New Jersey BBS for handling traffic on the National Traffic System (NTS). In the past year, over 500 messages have passed through this system—many of them delivered through local VHF phone nets. Ed has published a manual on proper mes-

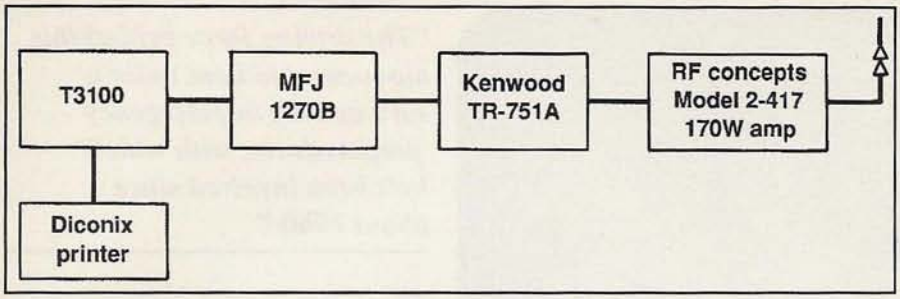


Figure 2. TRIAGE Database Setup at WB2COP-7 (alias TRI). The T3100 laptop computer is the heart of the portable system.

sage handling procedures to be used with packet and has trained local amateurs (many of them newcomers) on proper handling of NTS traffic.

In the December, 1990, issue of *QST*, Ed saw an article about "ARES/Data," a packet database for emergency and public service communications written by W. E. Moerner, WN6I, and David Palmer, N6KL. This database looked promising, so Ed contacted the authors and got a copy of the software, which he installed on one of his systems. Over the years, this has evolved into two databases: one called *SHELTER* for keeping track of evacuees in shelters, and the other called *TRIAGE* for tracking victims of a multiple casualty incident.

The SHELTER database is on WB2COP-10 and carries the alias SHL. It consists of an AT&T 6312 computer, a PK-80 TNC, a Drake UV-3 25-watt transceiver, a 100-watt brick, and an Isopole antenna. The UV-3 is also capable of operating on 220 or 440 with an appropriate antenna. The TRIAGE database is on WB2COP-7, carries the alias TRI, and consists of a Toshiba T3100 laptop computer, a Diconix printer, an MFJ 1270B TNC, and a Kenwood TR-751A transceiver. This portable system, shown in block form in Figure 2, is capable of being set up anywhere on short notice and operated entirely from battery power.

Many local amateurs have been trained in the use of these databases, which have been used for several drills. Local hospitals have been particularly impressed with the TRIAGE database capabilities and demos have led to installation of antennas and packet stations at some hospitals. The SHELTER database was actually used during a storm a few years ago when many people had to be evacuated from low-lying coastal areas to shelters set up in local schools.

The portable set-up used for the TRIAGE database: Diconix printer on top, 12 volt MFJ power supply sitting on Kenwood TR-751A, on top of MFJ 1270B. Base holding aluminum stand fits over "hump" in vehicle.

The AT&T 6312 Computer on the left is used for the SHELTER database and the Toshiba T3100 Laptop on the right is used for the TRIAGE database.

A recent addition to Ed's arsenal of services for emergencies is a *CHAT Node* on WB2COP-6 with an alias of CHAT. This is similar to a Packet Cluster™ operation and permits keyboard-to-keyboard communication during an emergency on the same frequencies used for the databases. Normally, the databases are on 145.54 and local amateurs are encouraged to play with them to become more familiar with entering and extracting data from them. In a real emergency, however, the databases would probably be moved to predetermined alternate frequencies to avoid interference and unauthorized use.

Look to the Skies

Ed is also active in local SKYWARN activities sponsored by the National Weather Service and its parent agency, the National Oceanic and Atmospheric Administration (NOAA). He operates a weather node on WB2COP-9 which transmits local weather information de-

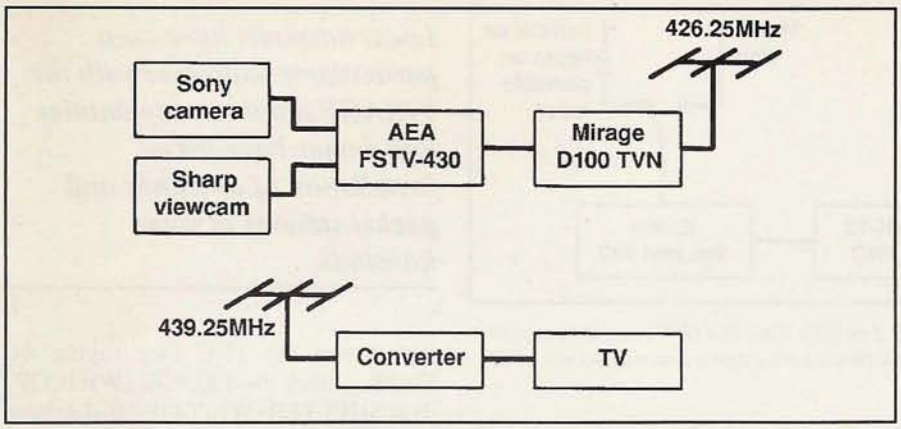


Figure 3. Block diagram of WB2COP's portable ATV setup. Two cameras feed an ATV transmitter and amplifier. On receive, a downconverter lets viewers watch any TV or video monitor.

rived from instrumentation in Ed's antenna farm as well as data received from NOAA through the County Weather Center. The WXN Weather Node consists of a Kantronics KTU driving a PK-80 TNC, followed by a Kenwood 201B transceiver, feeding an Isopole antenna on 145.540. Ed has recently installed an Ultimeter 2000 weather monitoring system which he hopes to use with the APRS system described below.

About five years ago, Ed saw a need for live TV coverage for disaster assessment from a disaster area to the OEM. To that end, he set up a complete portable video system consisting of a Sony camera, an AEA FSTV-430 video transmitter, a Mirage 30-watt brick, and a 16-element Yagi antenna that could be transported to wherever live coverage was needed. For receive, he has another 16-element Yagi beam and a downconverter to feed a video monitor or TV set.

Unfortunately, this proved impractical because of the hilly terrain and the relatively large area (41 square miles) of Middletown. Recently, though, nearby Brookdale College has put up an ATV repeater on a 350-foot tower and many of the coverage problems have been eliminated. Ed is back on the air through the repeater and has added a Sharp Viewcam camcorder to his available equipment (see Figure 3).

Time will tell how useful ATV will be, and even if the video link doesn't work out, the camcorder can make a recording in the field to be reviewed at the OEM.

Ed's latest acquisition is a station running Bob Bruninga's (WB4APR) Auto-

ATV Monitors and camera (right) at WB2COP

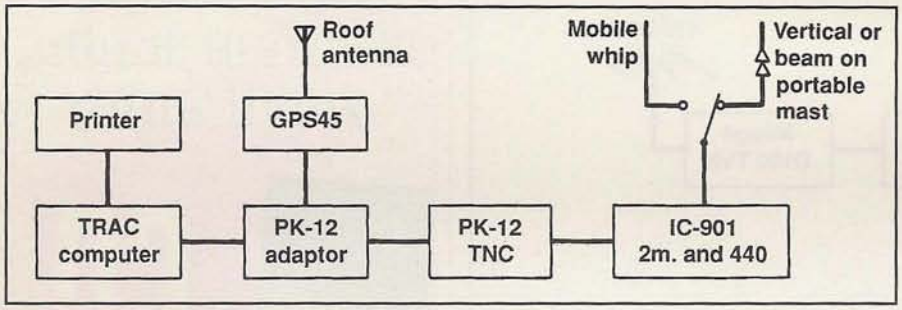


Figure 4. Mobile APRS Packet Station WB2COP-5 in Ed's Van. The GPS receiver constantly updates the position information in the computer that's periodically transmitted via APRS.

matic Position Reporting System (APRS™). This is a way of using packet to transmit a station's location and other information, such as weather conditions. Ed's APRS station is on WB2COP-15 on 145.790. His equipment consists of a 386DX-33 computer, an HP Laserjet IIP printer, a PK-232 TNC, an FT-726R transceiver, and an Isopole antenna for two meters. The FT-726R can also go on 6 meters or 440 if necessary.

The setup also includes an IC-761 feeding a Telrex HF trap vertical in case he wants to run on the HF bands. Ed also has a portable Garmin 45 GPS receiver, a PK-12 TNC, and a 2-meter HT that can be put in any vehicle and be tracked via APRS. Ed is now encouraging others to build up portable GPS receiver capability and at least two of us in the area are working toward that goal. By next summer, we should be able to offer APRS at public service events.

We're Not Done Yet!

Out in his driveway, Ed's van is ready for action wherever it's needed. Installed in the van is a mobile packet station, WB2COP-1, consisting of a TRAC laptop computer, a 12-volt printer, and a PK-12 TNC driving an IC-901. The van has two antenna systems: a mobile on the roof and a portable mast that can extend up to 25 feet and hold both a vertical omnidirectional antenna and a four-element 2-meter beam. The van can also operate APRS on WB2COP-5 with a Garmin 45 GPS receiver, a Garmin rooftop antenna, and an AEA APRS adapter between the laptop and the TNC (see Figure 4). Finally, either the TRIAGE (WB2COP-7) or SHELTER (WB2COP-10) database systems can be loaded in the laptop and run from the van.

Local hospitals have been particularly impressed with the TRIAGE database capabilities and demos have led to installation of antennas and packet stations at some hospitals.

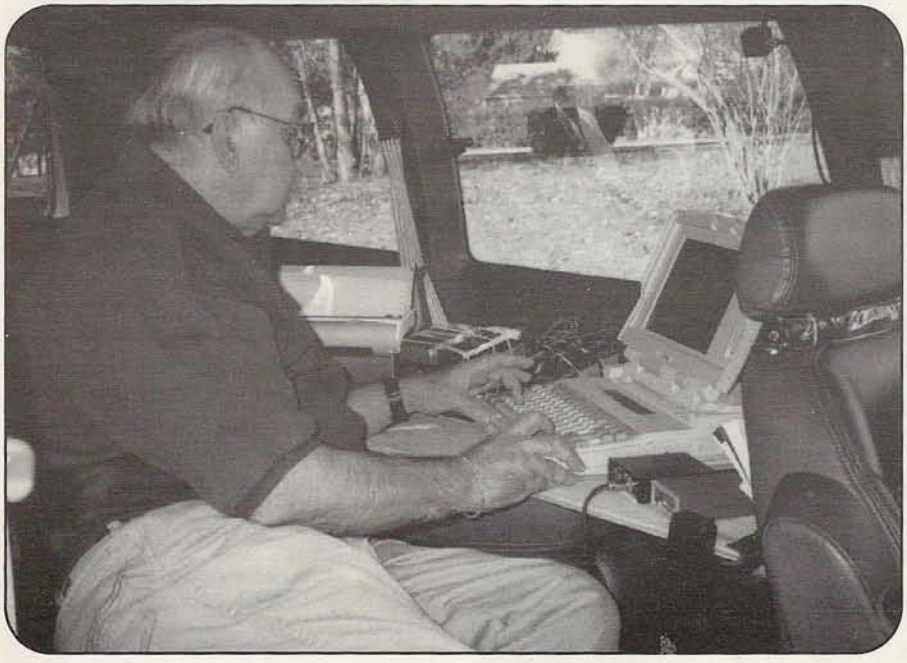
For backup, Ed keeps an extra complete packet system consisting of a AT&T PC6300, a PK-232 TNC, and an ICOM IC-229H transceiver. This is a "floating" system and can replace anything that might go down. Ed also has a spare IC-28H 2-meter rig and an IC-901 all-band, all-mode rig that can be called into service as needed. Finally, in case of power failure, Ed has a gasoline-powered, 5-kW AC generator that can power all of the packet operations. He *really* is well-prepared.

Always Active

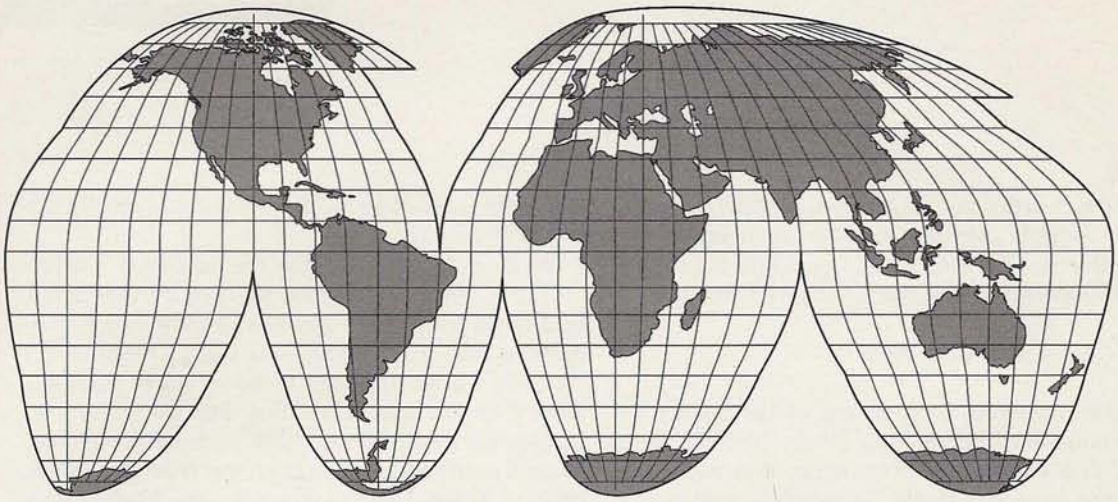
Early in this article, I compared this impressive array of equipment with that of a large radio dealer. The difference here, however, is that this equipment is generally in use. Ed participates in all emergency drills in the area and of course, has participated in the few real emergencies that have arisen over the years. Testimony to Ed's ongoing involvement over the years is an entire wall in his den covered with awards and commendations from Middletown, many surrounding towns, the county, the Red Cross, and the ARRL.

Clearly, Ed is driven by the need to provide the best possible communications in case of an emergency. He also loves teaching and training the rest of us in using our communications capabilities to maximum efficiency and advantage. Ed continues to be active in both Middletown and Monmouth County RACES and ARES. He is an active member of the Garden State Amateur Radio Association as well as Central New Jersey Chapter 138 of the Quarter Century Wireless Association (QCWA).

Truly he is a man for all seasons providing communication capabilities for all occasions—especially emergencies. ■



Ed operating packet from behind the driver's seat of his van. The Garmin GPS 45 is above his left hand and the 12-volt printer is off his left shoulder.



VHF News from South Africa

Editor's Note: This is the first in an occasional series of reports on VHF news and activities in different parts of the world. Our readership is worldwide and, while the majority of our coverage will always be centered on North America, we want to keep up on what the rest of the world is doing as well. We invite contributions from VHF-active amateurs anywhere in the world.

Johan le Roux, ZR1AEZ, reports from South Africa that the government there is considering proposals for three new amateur bands, dates for the SARL VHF Contest, and progress toward the launch of SUNSAT, South Africa's first amateur satellite.

New Band Proposals

SABRE, a band-planning committee of South Africa's Post and Telecommunications agency, is considering revising its current allocations between 20 MHz and 3 GHz. Proposals being considered by SABRE include one for three new amateur allocations, as follows:

40.675–40.685 MHz: Propagation studies, maximum ERP (effective radiated power) of 10 watts.

70.0–70.3 MHz: Propagation studies, secondary basis. (*Hams in Europe have long had access to these frequencies, known as the 4-meter band.—ed.*)

430–440 MHz: Regular amateur use, in accordance with ITU Region 1 allocations. (*The International Telecommunications Union's Region 1 includes Europe and Africa. Most European countries grant privileges to amateurs in the 430–440 MHz band.—ed.*)

SARL VHF Contest

The South African Radio League (SARL) has set the dates for its spring and fall VHF contests. The spring contest, which will be over by the time you read this, was held on September 21 and 22, for 24 hours (1200–1200 SAST; 1000–1000 UTC). The fall contest is scheduled for March 22 and 23, also from 1200–1200 SAST. Johan reports that operation is normally restricted to South African (ZR/ZS) hams, although a V51 (Namibia) station will occasionally participate, and that most participants are from ZS5 (Natal) and ZS6 (Transvaal).

SUNSAT Delay

Latest word from SA-AMSAT is that the launch of South Africa's first ham satellite, known as SUNSAT, has been delayed another five months, until August, 1997. The satellite will offer standard 1,200-baud packet, 9,600-baud PSK packet, and a "parrot repeater," which will digitally store and retransmit FM voice signals.

South African satellite enthusiasts met in Johannesburg on August 31, at SA-AMSAT's annual one-day Amateur Radio Space Communications Conference. Topics included the upcoming demise of OSCAR-13, Phase 3D, SUNSAT, and use of weather satellites in schools. Plus, Hans van de Groenendaal, ZS5AKV, was elected president of SA-AMSAT.

Meteors, too

Finally, Johan reports that he's been able to make several meteor scatter (ms) contacts on 6 meters, using a converted CB rig putting out 10 watts to a homebrew five-element Yagi. His contacts have been both random and scheduled. Johan also reports that ZR1EV made a meteor contact with A22MN in Botswana and that ZS5DJ completed a QSO via ms with a 7Q7 station in Malawi (see map).

Reader FEEDBACK!

Views on a Review

We received two informative letters about using the Tucker V-100W 2-meter amplifier (reviewed in the September issue of CQ VHF*) along with the ICOM IC-706 transceiver, and share them with you here.*

From Clair J. Robinson, KØCJ...

In the September issue review of the Tucker V-100W amplifier, Gordon West gives a "mod" to limit the IC-706's 2-meter power output to 5 watts. He states that turning down the 2-meter power output by using the menu item will also turn down the power on the other bands. Wrong! The menu item affects only the band to which the radio is tuned when it is called up. I just went and checked mine. The 2-meter power output in the menu is "5" and "H" in the other bands. I have mine set that way to avoid overdriving a 2-meter amplifier.

I also take issue with the statement that the IC-706 can directly drive the V-100W on SSB without turning down the drive power. If the carrier power is 10 watts output on FM, the peak power output on SSB is likely also 10 watts. Most VHF solid-state so-called "linear" amplifiers are linear only when they're driven quite lightly. I like to call them "sorta linear amplifiers." The voice peaks from the IC-706 are sure to cause flattopping and splatter. Coupling this with the fact that the IC-706 is no cleaner than it needs to be in the first place just means more noise and splatter on the band.

Finally, please *don't* use RF-sensing amplifiers on SSB. Not ever! The splatter caused by the amplifier switching on and off as you talk will drive your neighbors on the band to organize a lynching party. Connect up that T/R switching wire!

Editor's note: The folks at ICOM technical support confirm that 2 meters does indeed have a separate power control from the menu. But they point out that all *of the other bands are controlled together. So, if you turn down the power on 6 meters, for example, you also turn it down on 160–10 meters.*

From Bob Witmer, W3RW...

Congratulations on *CQ VHF*! In my opinion it is a great magazine for all active VHF/UHF-oriented amateurs! The purpose of this letter is some thoughts about potential misunderstandings of some of your newer ham readers based on the recent review of the Tucker V-100W amplifier.

On page 41 of the review the statement is made "...The V-100W is designed for both 2-meter handheld transceivers and—along with some power precautions we'll explain later—for the IC-706 as well." Actually I'd be surprised if the V-100W wouldn't work with *any* transceiver that does not exceed its input power requirements. Later, there's the comment, "You'll need an RG-8X coax jumper from your handheld...." Again, I don't know why *any* 50-ohm coax cable wouldn't do the job. This can be confusing if you're new to the hobby.

On page 42, the comment is made that the power was purposely hooked up in reverse to the V-100W. I believe it would be in the best interest of your readers to mention that this is something you would not want to try on other pieces of equipment.

In the sidebar under the heading entitled, "The T/R Switch Option," the statement is made that "The amp will sense modulation...." The amp does not sense modulation—it senses the RF associated with the modulation.

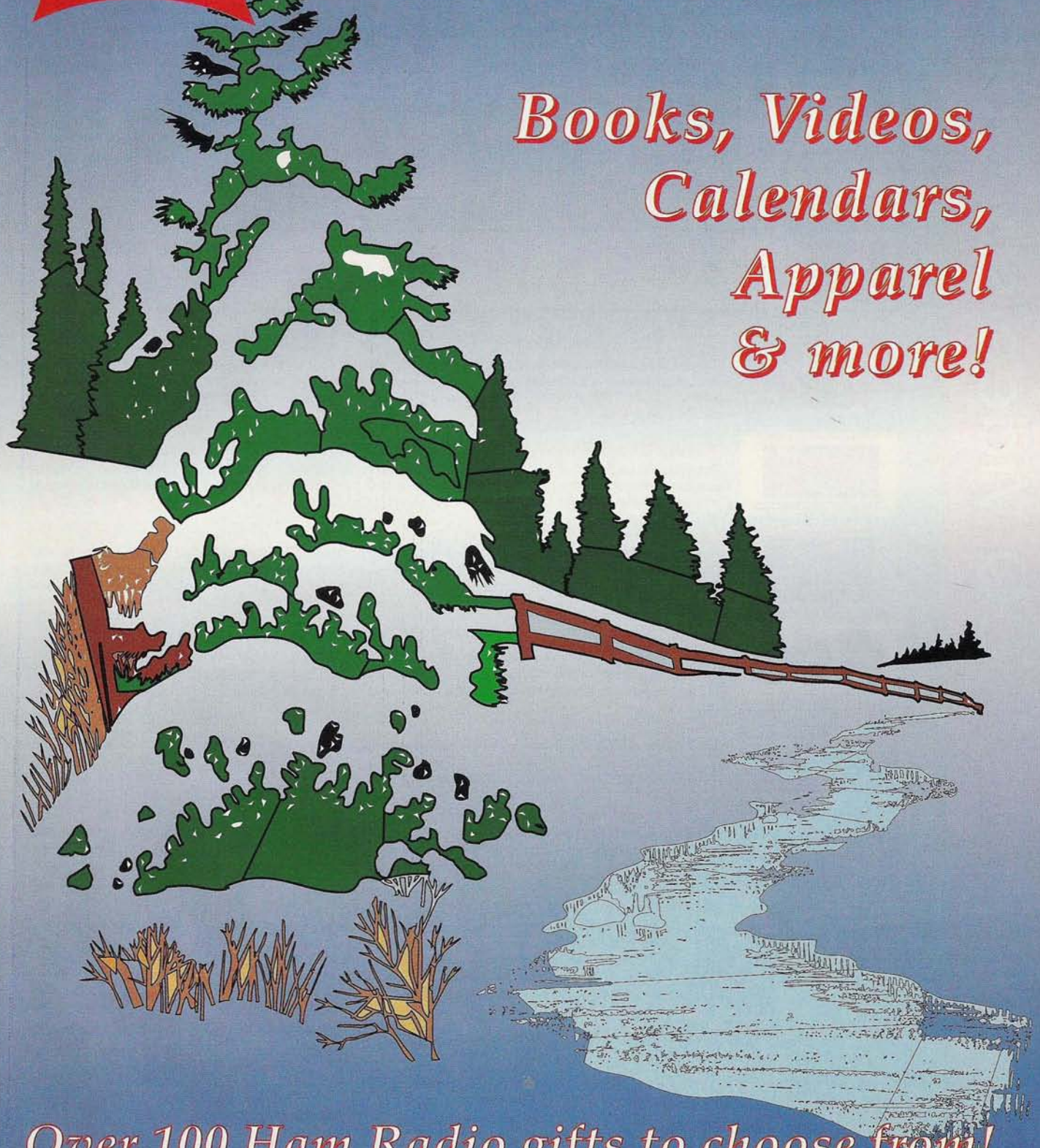
(Bob goes on to agree with Clair's concerns about average versus peak power and recommends reducing the output power of the IC-706 to avoid overdriving the amplifier. He then continues with further explanation):

I would guess that the evaluated amplifier may not have sufficient hours on it to determine if SSB peak power overdrive will have an effect on power amplifier transistor life. If the manual does indeed state that power inputs of 6–10 watts are not recommended, and a ham uses the amp with the IC-706 at 10 watts and later has an amplifier failure, it is possible that Tucker, or any other equipment manufacturer in a similar situation, may exclude a warranty repair claim because the equipment was not used within the stated operating conditions.

In summary, you have a great magazine. I believe a little extra review may go a long way to help your newer ham readers avoid problems and misunderstandings.

Editor's sidenote: In talking with ICOM technical support, we have been assured that there have been no factory modifications so far to the IC-706, contrary to rumors on the Internet of "major modifications" after #5,000. "It simply isn't true," says ICOM. "No changes have been made."

CQ Holiday Gift Ideas



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Photos by Joe Veras, N4QB

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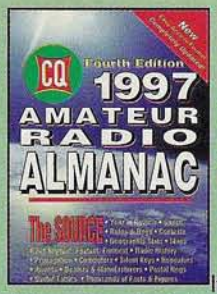

NEW!

1997 Amateur Radio Almanac, 4th Edition

If you're looking for information about ham radio, it's in the 1997 Amateur Radio Almanac! This Sourcebook is filled with over 600 pages of facts, figures and information. CQ's **1997 Amateur Radio Almanac** is a resource you'll refer to over and over again. If it's ham radio, it's in The Source! Don't miss out on this year's edition – it's the best yet!

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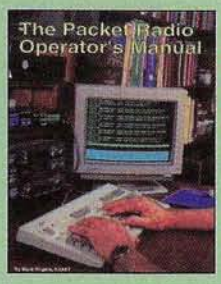

The Packet Radio Operator's Manual

This book is written by CQ columnist and Amateur Radio Packet authority Buck Rogers, K4ABT. An excellent introduction and guide to packet operation, it's the perfect single source, whether you're an advanced user or just starting out. Learn about packet radio without all the technical jargon. Also included are detailed hookups for dozens of radio/packet controller/ computer combinations, making this book the one-step resource for the active packet user.

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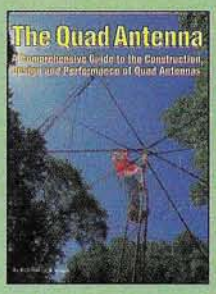

The Quad Antenna 2nd Printing

Hams love antenna books and this book is no exception. Written by world renowned author Bob Haviland, W4MB, **The Quad Antenna** is the authoritative technical book on the design, construction, characteristics and applications of quad antennas. Discover how to easily build a quad antenna for your station that will help you fill your logbook with rare DX that you have only dreamed about before.

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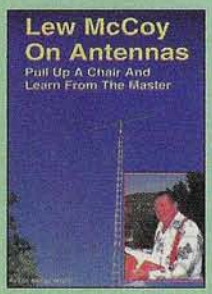

Lew McCoy on Antennas

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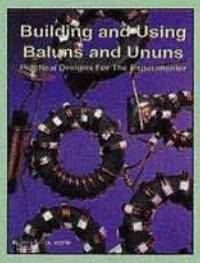

Building and Using Baluns and Ununs

Written by Jerry Sevik, W2FMI, world reknown as the leading authority on the subject, this is the definitive source of practical information on designing, building and using these versatile impedance matching and balancing devices. Designs range from simple 4:1 baluns to sophisticated 12:1 types with many variations in between. Whether your need is to match an unbalanced load to either a balanced or an unbalanced line, you'll find the answers here.

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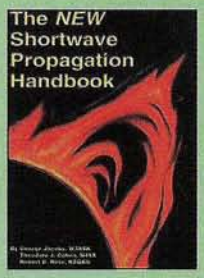

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The most comprehensive source of information on HF propagation is now available from CQ! We've built an award-winning team, gathering information from individuals and organizations around the world. Collectively, co-authors George Jacobs, W3ASK, Ted Cohen, N4XX, and Robert Rose, K6GKU, have devoted much of their professional and amateur careers to advancing ionospheric science. Find propagation principles, sunspots, ionospheric predictions, photography, charts and tables galore—it's all in this unique reference volume!

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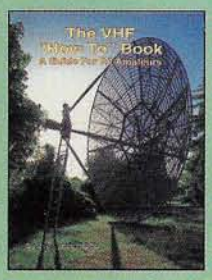

The VHF "How To" Book

This book is the perfect operating guide for both the new and experienced VHF enthusiast. Developed by CQ VHF columnist, Joe Lynch, N6CL, it's the ideal reference tool for all phases of VHF operating. Learn more about packet, EME, satellite, ATV, and repeater operation. You'll also find a complete tutorial on exotic propagation modes as well as pages of data and sources for additional information.

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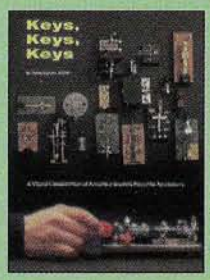

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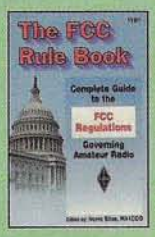

The FCC Rule Book is more than an up-to-date set of the rules. It will help you learn how FCC rules are made, and show you how you can be a part of the rulemaking process. You'll find reference information on international regulations, a listing of countries permitting third-party traffic handling with US amateurs, operating abroad, band plans, callsign assignment and much more.

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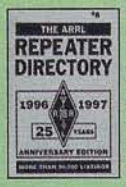

The **1996-1997 ARRL Repeater Directory** includes more than 20,000 listings for voice and digital repeaters and propagation beacons located in North, Central and South America. This edition also lists more than 600 beacons from 7 MHz to 10 GHz. You'll also find band plans, a CTCSS tone chart, a list of frequency coordinators, ARRL Spectrum Committee, Digital Committee and Future Systems Committee, and a user-friendly list of ARRL Special Service Clubs.

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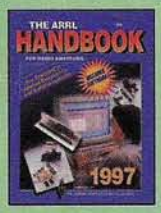

The 1997 ARRL Handbook for Radio Amateurs will place you on the cutting edge of amateur radio technology. The 74rd edition is completely revised. This edition presents a wealth of subjects ranging from analog electronic theory to transceivers, repeaters to DSP, circuit construction to interference, transmission lines to antennas and propagation. For the first time, software is included for: designing active audio filters, designing matching networks, programs used in the book, and more!

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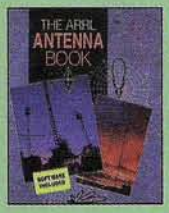

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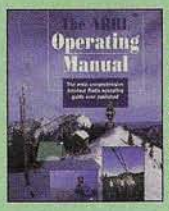

The 5th edition of the **ARRL Operating Manual** reflects the many changes that have taken place in Amateur Radio during the last five years. **The Operating Manual** is your most valuable resource for whatever operating-oriented questions you may have. You'll also find an impressive and colorful section that features dozens of US and overseas operating awards, and a handy reference section includes an ARRL DXCC Countries List, beam-heading information, a series of maps, US counties, sunrise/sunset tables, and much, much more.

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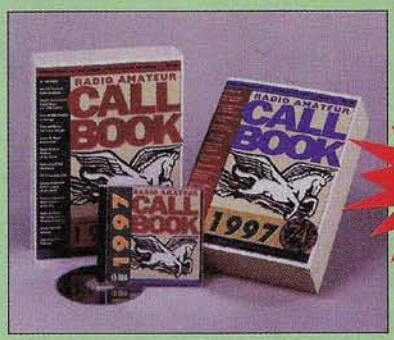

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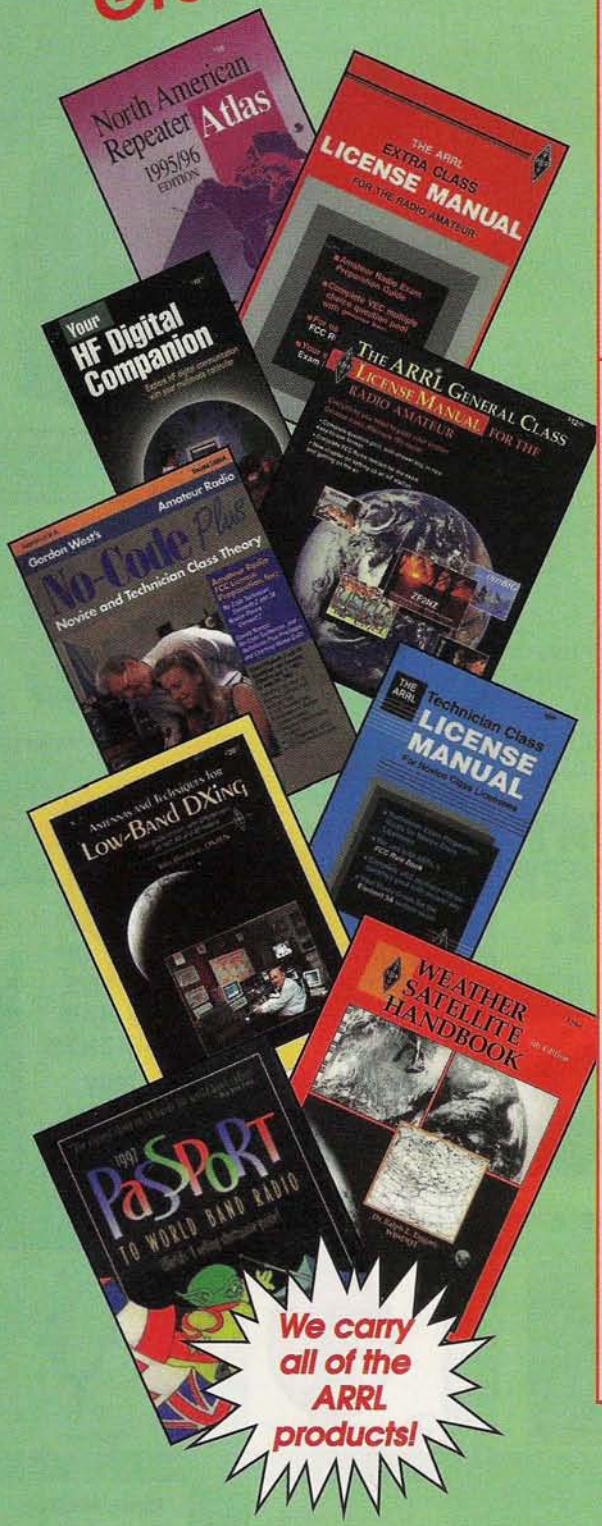

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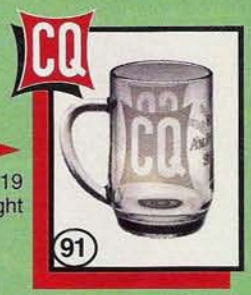

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T7	n/a	n/a	TVI ... What TVI
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T9	n/a	n/a	DX IS
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Solving the Decibel Dilemma

DB or not dB, that is the question. Did you ever wonder what that mysterious "dB," mentioned in so many places, really means? In this issue, W6TNS explains the mysteries of the decibel, particularly as they relate to ham radio.

It ain't easy being a decibel...they're so misunderstood by so many people. Even the newest ham has heard the term dB mentioned when discussing handheld radios or when reviewing specification sheets for amateur products. But few newcomers (not to mention a lot of old timers) really understand the ins and outs (or rather, the ups and downs) of dBs.

The term decibel always represents the same thing, but it does not refer to a specific unit, like feet or pounds. In other words, a dB isn't a specific item; rather, it's a ratio between two values. It can refer to sound energy, power, or voltage, but it always expresses a ratio or change between the two values.

"A dB isn't a specific item. Rather, it's a ratio between two values. It can refer to sound energy, power, or voltage, but it always expresses a ratio or change between the two values."

Think Earthquakes

It might be easier to digest the dB by relating it to something a bit more familiar—such as earthquakes. I'm sure you've heard of the Richter scale, particularly if you live in California. It was devised in 1935 by Dr. Charles Richter of CalTech, to measure the force of quakes. The earth movement S-waves were measured by a Wood-Anderson seismograph. The device was so sensitive it could detect a tremor halfway around the world, but it could also measure movement of the Southern California faults tens of thousands of times stronger.

So how could one resolve the tiny jiggles on the chart recorder of an earthquake in Siberia and still accommodate the violent movement of the pen caused by local earthquakes? Richter's scale assumed that the machine was 100 km from the epicenter as a starting point. Each increment of one, on the paper chart, represents a tenfold increase in S-wave magnitude. Thus a movement of one 1/1000th of a millimeter represented a magnitude of 1; one 1/100th of a millimeter was 2, and so on. If you extend this, you'll see that a magnitude-7 earthquake would move the recording arm one meter. Thus, on a strip of recording paper less than 40 inches wide, it was possible to trap and measure the S-wave from every Earth movement reaching the seismograph.

You can also see that a magnitude 7 earthquake is 10 times stronger than one which measures a magnitude of 6. This tenfold increase (or decrease) for a 1-unit increase (or decrease) is referred to as a *logarithmic scale*. This varies from a *linear scale* such as 1, 2, 3, 4, and so on. The logarithmic scale makes both the Richter scale and the decibel very useful for describing the difference in numbers of greatly varying magnitudes.

So What's a Decibel?

The decibel is 1/10th of a Bel and is named after Alexander Graham Bell, the inventor of the telephone. *(The decibel is properly abbreviated as dB, with a capital B, because the root word, Bel, is capitalized. The same applies to the Volts and Hertz—also named for people—and is why microvolts are abbreviated μV, with a capital V, and the abbreviation for kilohertz is kHz.—ed.)* The decibel is defined as the smallest change in sound intensity that the human ear can detect. Keep in mind that the decibel means little more than this simple definition unless we know what levels are being compared.

A measurement in decibels must always be so many decibels above or below a given reference point. If a sound has 10 times the power of a reference (10 dB), we perceive it to be twice as loud. For example, if we increased the power output of a stereo amplifier from 10 watts (the reference level) to 100 watts, (a 10-dB increase) we would say that it was now twice as loud as before.

The accompanying table shows the extremes in sounds that we hear everyday and the relationship in decibels. The need for a logarithmic decibel scale becomes obvious when you consider that the softest audible sound has a power of about 0.000000000001 watt/square-meter and the threshold of pain is 1 watt/square-meter, or a total range of 120 dB.

Beyond Sound Measurements

Why do we need the decibel in electronics? Let's talk about radio frequency equipment rather than the sound output of your stereo. If you look in the instruction manual for your handheld radio, you'll see a specification for "spurious emission." The process of generating the signal your radio sends through the air creates many signals other than the one you want. If these spurious signals are not sufficiently suppressed, they can interfere with other radio services.

Ideally, the radio circuitry would eliminate these spurious signals. But this isn't

By Donald L. Stoner, W6TNS

Noise Levels in Decibels

Noise Source	Decibel Level	Noise Effect
Jet takeoff (25 meters)	150	Eardrum rupture
Aircraft carrier deck	140	Earphones at high level
Jet takeoff (100 m)	130	
Thunderclap, live rock music, chain saw	120	Human pain threshold
Steel mill, riveting, auto horn at 1 m	110	
Jet takeoff (305 m), outboard motor, power lawn mower, motorcycle, farm tractor, jackhammer, garbage truck	100	Serious hearing damage (8 hrs)
Busy urban street, diesel truck, food blender	90	Hearing damage (8 hrs)
Garbage disposal, dishwasher, average factory, freight train (15 m)	80	Possible hearing damage
Freeway traffic at 15 m, vacuum cleaner	70	Annoying
Conversation in restaurant, office, background music	60	
Quiet suburb, conversation at home	50	Quiet
Library	40	
Quiet rural area	30	
Whisper, rustling leaves	20	Very quiet
Breathing	10	
	0	Threshold of hearing

Table. Noise levels of common objects and activities, expressed in decibels (dB). Every increase of 10 dB represents a doubling of loudness. (Data courtesy Temple University)

possible in the real world. The best that can be accomplished is to suppress these unwanted emissions to a level that is significantly below the level on the desired transmit frequency.

How much is "significantly" less?" The FCC rules and regulations specify how much suppression is required for an amateur radio transmitter, and your manual tells you the specification for your unit. Usually, it's 60 dB.

More Is Less

But not all manufacturers give the specification the same way. Your manual may say "not less than 60 dB," "–60 dB or better," or "–60 dB or more." What does this mean? Let's say you're operating on the 1-watt position. The spurious signals are going to be less than the main signal, but by how much? If the spurious levels were suppressed by 10 dB, they would be 1/10th of the main power or 0.1 watts. If the manual said "more than 10 dB," it would actually mean less power than 0.1 watts.

Confusing? Not really. Read the last paragraph once again and the light will go on. If the specification stated "–10 dB or more," it would mean the same thing. More than 10 dB below 1 watt is some power level of less than 0.1 watts. Even if a lazy copy writer wrote that the spurious signal suppression was "more than 10 dB" (rather than –10 dB), you'd know that "minus dBs" were referred to, since the spurious output is obviously going to be less than the main power output signal.

Actually if the spurious suppression were only –10 dB, you would receive post cards from ARRL "Official Observers," or even a "pink slip" from the FCC, about the interference.

At –20 dB, the "spurs" would be less than 0.01 watts, –30 dB would be 0.001, –40 dB equals 0.0001 watts, –50 dB is 0.00001 watts and the goal, –60 dB represents 0.000001 watts of radiated power on frequencies where you *don't* want to transmit. This is virtually zilch (a highly technical term which is beyond the scope of this article).

Sometimes it's tough to get through to the other station with 1 watt of power. You can see that a 0.000001 watt signal is essentially non-existent. Hopefully, after reading this far, you can see that all three versions of 60 dB, given above, mean the same thing.

"The decibel is defined as the smallest change in sound intensity that the human ear can detect. Keep in mind that the decibel means little more than this simple definition unless we know what levels are being compared."

Signal-to-Noise Ratio

Most of the time, the stations you hear on your handheld radio are strong and noise free. But what happens when the other station moves farther and farther away? The signal gets weaker and the background noise (both internal and external to the radio) starts to become apparent. If the station keeps moving away, the signal gets weaker and the noise gets louder. The difference between the signal level and the noise level is called the *signal-to-noise ratio* (SNR or S/N) and is expressed in decibels.

All radios create noise in their highly sensitive radio frequency amplifying stages. The hiss you hear with no signal input, or with the antenna removed, is actually the sound of electrons cruising through the radio circuitry. Some radios use very low noise transistors and sophis-

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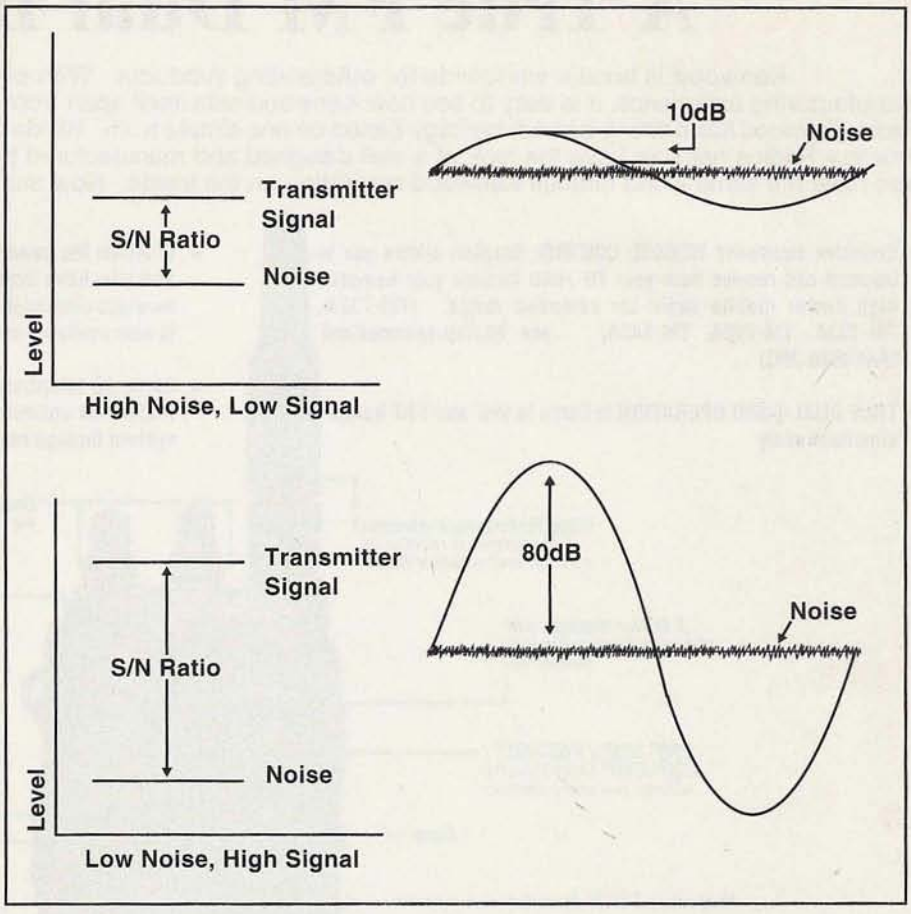


Figure. Signal-to-Noise Ratio (SNR) is a comparison of signal strength to the noise level on a frequency, expressed in decibels. A signal that's 10 dB above the noise is twice as loud as the noise level, but a signal with an 80 dB SNR is nine times louder than the noise.

ticated circuitry to minimize this noise. But if you're the engineer designing the handheld, how do you tell the customer how good your pride and joy is?

First, the engineer sets the volume control so the noise level, measured at the speaker, provides a specific reference; for example, 0 dB on a meter scale. Then he connects a signal generator to the antenna, injects a signal, and slowly increases its value. Once the noise level drops by, say, 20 dB (almost full quieting), the engineer notes the level of the generator output. Typically this will be 1 microvolt (1/1,000,000th of a volt) or less. Thus the specification for the radio would be 1 microvolt for a SNR of 20 dB.

In this example, the SNR is called *quieting*. In practice, a more critical measurement is generally used that includes figures for *interference* and *distortion* (*SINAD—Signal, Interference, Noise And Distortion*). Also, the noise reduction is usually specified at 12 dB. The manual for a five-year-old handheld that I use daily shows a 12 dB SINAD of 0.16 microvolts (truly excellent).

"The difference between the signal level and the noise level is called the signal-to-noise ratio (SNR or S/N) and is expressed in decibels....The measurement of antenna performance is another application for using decibels."

Power Output

Mr. Bell (or at least the measurement named for him) gets into all aspects of ham radio. If you want to increase the signal level of your 6-meter single sideband rig, you might add a linear power amplifier. Let's say the radio has a 100-watt power output rating. If you add a 1-kilowatt amplifier (1,000 watts), it would amplify your signal by 10 dB and your signal would be twice as loud as before. An expensive accessory, perhaps, but

when you are chasing DX (stations far away), an amplifier like this can make the difference between being heard and not.

Antenna Gain

A less expensive way to "soup up" your signal is to use a better antenna. This has the added benefit of amplifying received signals as well. The measurement of antenna performance is another application for using decibels. I'm sure you remember from studying for your license exam that you can concentrate the radiated signal from a dipole antenna by adding elements called reflectors and directors.

By redirecting and focusing energy that is radiated in unwanted directions by a dipole, it's possible to increase the *gain* of an antenna in a desired direction. The gain of this improved antenna, with respect to a dipole in free space (no earth, metal structures, buildings, etc.), is expressed in decibels. The ratio is the signal level at some distance, with respect to a dipole in space, compared to the signal level at the same point relative to a multielement beam antenna. (You'll typically see two types of antenna gain references—*dBi* and *dBd*. The *i* in *dBi* stands for *isotropic*, an antenna that radiates equally well in all directions. Such an antenna exists only in theory, but provides a common reference point from which to make gain comparisons. A gain figure measured in *dBd* refers to decibels of gain over a *dipole*. Each is an equally valid way to express antenna gain, but you should only compare dBi to dBi and dBd to dBd.)

A discussion of antennas, gain, types, polarization, and so on provides fodder for next month's column.

If You Want to Do the Math...

I've just hit the "high spots" in a dB discussion and glossed over many other points to salvage the nerve fibers of those who have difficulty with mathematics. For example, to calculate decibel ratios more or less than an even 10-dB value, you need to understand logarithms or, at a minimum, know how to use a log table. And there's a difference between the ratios of power, which we've just been discussing, and voltage.

The formula for the power ratios is:

$$10 \log(P2/P1)$$

but if one refers instead to voltage, the formula now becomes:

$$20 \log (V1/V2)$$

The reason for the difference is that power varies with the square of the voltage. You don't need to be able to do the math, though, as long as you know how to use the results of someone else's calculations to make comparisons based on decibel measurements.

In all of the above examples, I've used variable values for the reference. But often a specific reference is used. For example, if 1 milliwatt is assigned a value of zero, then we refer to values using this fixed reference as dBm (decibels per milliwatt). If 0 dBm is 1 milliwatt, then 10 dBm is 10 milliwatts, and so on. Or, if we use a zero reference of 1 microvolt (μV), then 20 dBμV is 100 microvolts.

Go Dabble in Decibels

Now aren't you glad I glossed over the nitty-gritty of decibels? However, this basic discussion should get you started in coming to grips with the devilish dB. You can learn more about them by purchasing an *ARRL Handbook* at your local radio store, or by mail from the CQ Bookstore.

For now, 73 Don, W6TNS

New VHF Web Site Addresses

Please make a note of World Wide Web address changes for three major VHF groups:

North East Weak Signal (NEWS) Group:
<http://www.connix.com/~wz1v/ newsvhf.html>;
Central States VHF Society (CSVHFS):
<http://www.tc.umn.edu/nlhome/m042/leibe009/>;
Northen Lights Radio Society (NLRS):
<http://www.tc.umn.edu/nlhome/ m374/husby002/>.

AMSAT and ESA—A Match Made in the Heavens

The European Space Agency (ESA) has become one of the major launchers of amateur satellites...and it's gotten at least as much as it's given in the process.

One of the most common questions asked about amateur satellites is, "How do you get them into orbit?" The answer is simple. Just like commercial satellite organizations, AMSAT groups contract with various rocket launch agencies to fly the AMSAT satellites into orbit. In the early days of amateur satellites, we were often able to "hitch rides" for free on launches of military or commercial satellites. But it appears that the era of free launches has come to an end.

Over the past 20 years, AMSAT and the European Space Agency (ESA) have developed an excellent working relationship. ESA has offered AMSAT launches at reduced cost, and, in return, AMSAT has proven the feasibility of microsats and provided additional standard integration hardware to ESA.

In this month's column, we'll take a look at what ESA is and how it functions, and we'll examine AMSAT's long-standing relationship with the agency.

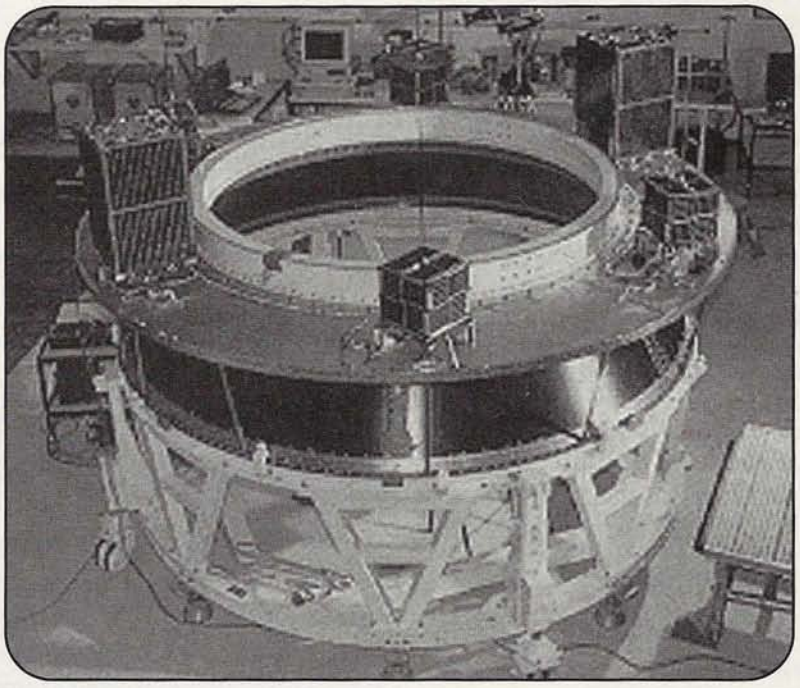


Figure 1. AMSAT-designed ASAP (Ariane Structure for Auxiliary Payloads) ring for use with Microsats and UoSats. AMSAT technical innovations are part of the relationship with ESA that provides relatively low-cost launches for amateur satellites.

What Is ESA?

In the early 1960s, a number of European nations were interested in creating a presence in space. Six European nations and Australia banded together in 1962 to form *ELDO*, the *European Launcher Development Organization*. Their purpose was to develop and build a launcher system known as *Europa*. Concurrently, the European ELDO countries and four others formed *ESRO*, the *European Space Research Organization*, to create a complementary satellite program. In May, 1975, these countries merged ELDO and ESRO into a new organization: *ESA*.

The current membership of ESA is comprised of 13 full members (Austria, Belgium, Denmark, France, Germany, Ireland, Italy, the Netherlands, Norway, Spain, Sweden, Switzerland, and the United Kingdom), one associate member (Finland) and one non-European "external" member (Canada).

ESA participation is divided into two categories: Mandatory and Optional. All member nations support the Mandatory program in proportion to their GNP (Gross National Product). These programs support the basic activities of ESA, such as technology research, shared technical investment, studies for future programs, information systems, scientific satellites, and training programs. Participation in other programs is optional for any member nation. Each nation can decide what level of support to provide to any of the Optional programs. The Optional programs include such areas as Earth observation, telecommunications, space transportation (Ariane), the space station, microgravity research, and

By G. Gould Smith, WA4SXM

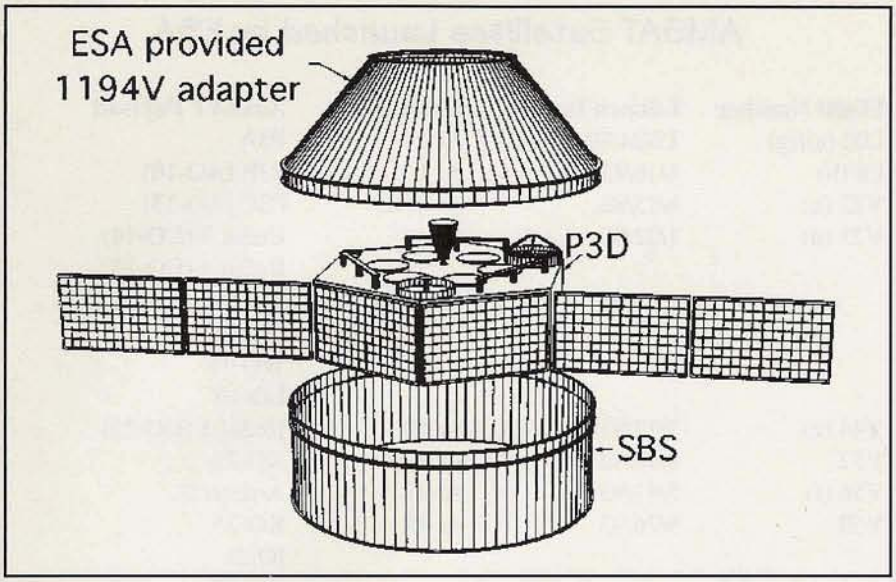


Figure 2. P3D satellite fitting inside the AMSAT-designed SBS (Specific Bearing Structure).

manned spaceflight. The 1995 budget saw 22% of the expenditures devoted to Mandatory activities and 76% to the Optional programs.

ESA Organization

The main governing body of ESA is the ESA Council. The ESA headquarters building is located in Paris, France. There are five major operating units in ESA, known as establishments. They are ESTEC, ESOC, ESRIN, EAC, and Kourou.

ESTEC—the European Space Research and Technology Center, is located in Noodwijk, the Netherlands, and is the largest of the establishments. This center is responsible for the technical preparation and management of ESA space projects.

ESOC—the European Space Operations Center, in Darmstadt, Germany, ensures the smooth operation of the satellites in orbit. It also receives and processes signals from ESA satellites, which provide communication links, conduct scientific experiments, and collect weather information and Earth images.

ESRIN—ESA's *Earth Observation Mission Exploitation Centre,* is in Frascati, Italy. Although a major part of the operation at ESRIN is Earth observation activities, this establishment is taking on the role of ESA's information source to the outside world. One of the most useful and visible products of ESRIN is the comprehensive and up-to-date WWW (World Wide Web) site it maintains for ESA, <http://www.esrin.esa.it>.

EAC—the European Astronaut Center, at Cologne, Germany, is the newest of the ESA establishments. This group has the job of selecting and training the men and women who will participate in missions aboard the International Space Station, the U.S. Space Shuttle and the Russian Mir space station.

Kourou—ESA's spaceport is located on the northeast coast of South America in Kourou, French Guinea, just ashore of the former French penal colony, Devil's Island, made famous by the book/movie, "Papillion." Supplies and launcher assemblies can be shipped there easily, but the most important reason for choosing this site was its location on the coast and close to the Equator. These are the two best assets of a good launch site.

Location, Location, Location

Here's why a tropical shore location is important (besides good beaches): Launching a rocket due east takes full advantage of the "boost" provided by the Earth's rotational velocity. At Kourou, this boost amounts to 460 meters/second. Having this launch path go over the ocean is also a plus. Since the area downrange is very sparsely populated, there's much less chance of causing harm to people should there be any problems during launch. In addition, the area to the north of Kourou is also ocean, so it's also good for northward-aimed launches of satellites in polar or sun-synchronous orbits.

The latitude of the launch site is also important because it requires a great deal of energy to place a satellite into an orbit that has a low *inclination*, or orbital angle relative to the equator. A geostationary satellite in orbit over the equator has an inclination of 0°, while a satellite in polar orbit has an inclination in the neighborhood of 90°. Launching due east from Kourou is optimum for a *geostationary transfer orbit*, or *GTO*. This is a temporary orbit around the equator from which an onboard satellite motor will propel the satellite into an elliptical or geostationary orbit. (A satellite in geostationary orbit appears to the observer to remain stationary in the sky.)

The ELDO group originally used the Kourou site, known as the *Centre Spatial Guyanais (CSG)*, for its Europa launcher program. In 1975, ESA took over the facilities at CSG and built ELA-1 (Ensemble de Lancement Ariane—the Ariane launch complex 1). ELA-1 was used for the Ariane-1, Ariane-2, and Ariane-3 rockets. When the launch rate was increased for the Ariane-4 program, a new launch site was constructed and named ELA-2. The new design of the Ariane-5 launcher necessitated a new launch area, so ELA-3 was started in 1988. The entire spaceport covers 96,000 hectares (237,000 acres) and employs a work force of 1,300 people.

The CSG complex is managed by *Arianespace*, an international company that also markets the Ariane launches. By August, 1996, ESA had conducted 87 launches carrying more than 150 satellites with only eight failures involving 15 satellites. This is considered a low failure rate by international standards. Arianespace has maintained an aggressive schedule, averaging seven launches a year since 1989. And despite increased competition from Russian and Chinese space agencies, Arianespace currently has orders for 60% of the world market for launches and a waiting list of enough satellites for 45 launches.

ESA Launchers

The first European Ariane rocket successfully lifted off on December 24, 1979. These Ariane-1 rockets were used consistently until 1984, when the first Ariane-3 rocket was launched. As the mass of the satellites began to grow, Ariane-1 gave way to the Ariane-3 and Ariane-2 rockets, and finally to the Ariane-4 series.

AMSAT Satellites Launched by ESA

Flight Number	Launch Date	Launcher	AMSAT Payload
L02 (a)/(g)	12/24/79	Ar 1	P3A
L6 (b)	6/16/83	Ar 1	P3B (AO-10)
V22 (c)	6/15/88	Ar 44LP	P3C (AO-13)
V35 (d)	1/22/90	Ar 40	UoSat 3 (UO-14)
			UoSat 4 (UO-15)
			AO-16
			DO-17
			WO-18
			LO-19
V44 (e)	7/17/91	Ar 40	UoSat 5 (UO-22)
V52	8/10/92	Ar 42P	KO-23
V56 (f)	5/11/93	Ar 4	Arsene(?)
V59	9/26/93	Ar 40	KO-25
			IO-26
			AO-27
			PoSat
V?? (g)	<7/97	Ar 5	P3D

Notes:
a — lost in launch failure, second ESA launch
b — promotional flight
c — first Ariane-4 (44LP) flight
d — first Ariane-4 (40) flight
e — second Ariane-4 (40) flight
f — Arsene was launched successfully but may not have reached its proper orbit and never came on the air.
g — qualification flight

Although the latest Ariane-4 launcher, the -44L, will lift more than two and a half times the cargo weight of the Ariane-1, ESA realized very early that even the series-4 rockets would not keep the agency competitive in coming decades. So, in 1985, the agency began designing a new rocket that was not a mere follow-on to the three-stage Ariane-4, but one that was more powerful, more reliable and more economical: Ariane-5.

The Ariane-5 Rocket

This new rocket that will take AMSAT's Phase 3D (P3D) satellite into geostationary transfer orbit* ushers in a new era for ESA. The powerful Ariane-5 rocket has launch engines that are 10 times as powerful as the Ariane-4 rocket and will be able to carry multiple, large satellites. The electronic control system is 100 times more powerful than on previous boosters. The Ariane-5 is a two-stage rocket, with a huge cryogenic stage of liquid hydrogen and liquid oxygen. This stage is flanked by two solid propellant boosters. This rocket was designed with enough power to carry one, two, or three satellites weighing up to seven tons into GTO or 23 tons into low earth orbit. The upper composite structure will carry 10 tons of propellant.

(*Even though P3D will be launched into a geostationary transfer orbit, it's not going to be a geostationary satellite. Once in GTO, the P3D satellite will fire an onboard engine to move its inclination to 60° and will then move into its highly elliptical *Molniya* orbit. For additional information on P3D's projected orbit, see the article, "Phase 3D Orbit Estimation and Characteristics," by Ken Ernandes, N2WWD, in the March/April 1996 issue of the *AMSAT Journal* or in the P3D section of AMSAT's WWW site, <http://www.amsat.org>.)

AMSAT and ESA — Perfect Together

When ESA was formed in 1975, AMSAT was having difficulties finding

launch vehicles for the types of satellites AMSAT envisioned. ESA offered exactly what AMSAT needed—readily available and reasonably priced rides into space. An AMSAT satellite (P3A) flew on the second Ariane launch, but was lost in a launch failure. The track record since then has been excellent, and the relationship between the two groups has grown stronger. Sixteen of the last 24 (66%) amateur satellites launched have flown aboard ESA rockets on nine separate launches (see "AMSAT Satellites Launched by ESA" for a comprehensive list). But while ESA has provided AMSAT with launches, generally at cut-rate prices (and believe it or not, $1 million to launch P3D is a *bargain*!), AMSAT has repaid ESA with a variety of technical innovations.

AMSAT also Helps ESA

Nearly every ESA launch of an AMSAT satellite poses challenges for AMSAT, which must provide a unique device to attach the amateur satellite to some part of the payload structure. In the case of the ill-fated P3A, the satellite was stuck on the side of the payload. Other launches provided AMSAT an opportunity to design an interface that could be used again. Specifically, AMSAT has provided ESA with two pieces of satellite interface hardware that can be used commercially for other launches.

The first is the Ariane Structure for Auxiliary Payloads (ASAP) adapter ring that was used on the upper stage of the Ariane 4 to take advantage of unused space there. Figure 1 shows this ring with six amateur satellites (four Microsats and two UoSats) attached to it. This structure has since been used by ESA to carry other small payloads into space, many of them carrying derivatives of the same digital "store-and-forward" satellite communications technology pioneered by AMSAT groups around the world.

The second piece of AMSAT-supplied hardware used by ESA is the SBS (Specific Bearing Structure) ring used to allow P3D to fit under the standard ESA conical adapter. This adapter interfaces between the bolt circle on the Ariane upper stage and a clamp-band used for major payloads. In addition to housing P3D, this ring must be able to withstand the load forces imposed by a 4.7 T [4.7 metric ton, (10,350 pounds)] satellite load. Figure 2 shows the SBS, P3D, and the ESA-supplied conical adapter.

Satellite Launch Insurance

As each AMSAT satellite project nears completion, the question of launch insurance is brought up by the AMSAT membership. Launch insurance typically costs about 20% of the insured value of the satellite. This insurance is only available for satellites on reliable, tested launch vehicles. Insurance for a $4 million satellite (the total cost for P3D) would run about $800,000. Since P3D will be on a new launcher qualification flight, as has been the case with many previous AMSAT satellites, there is little chance of getting insurance even if AMSAT *had* the money with which to buy it. Remember that the reason that AMSAT only had to pay the equivalent of $1 million for the P3D launch was because it will be an experimental flight.

The existence of the amateur satellite program is due to the huge *volunteer* effort of those who design, build, test and maintain each satellite. The impressive amount of monetary donations to P3D have gone for materials and launch expenses. There are no funds left for insurance, and even if there were, it could not cover new satellite costs. The monetary value of the satellite is small compared to the countless hours of volunteer labor to produce the satellite. It would take many times the total donations received for P3D to purchase these services on the open market.

The Loss of Flight 501

The first flight of an Ariane-5 launcher took place on June 4, 1996. This qualification flight abruptly ended 37 seconds after launch. Preliminary information on the cause of the failure indicated that the inertial guidance system malfunctioned due to errors in the software. ESA officials recently outlined specific actions they are instituting, including improved simulator testing, to identify any additional problems prior to the next launch.

But High Hopes for 502

AMSAT's P3D satellite was originally slated to be launched on the 501 flight, but was "bumped" to the following flight, 502. ESA has announced that P3D *will* fly aboard Flight 502 (still a qualification flight) and has tentatively scheduled the launch for mid-April, 1997. *(See "VHF News" for more on the upcoming P3D launch.—ed.)*

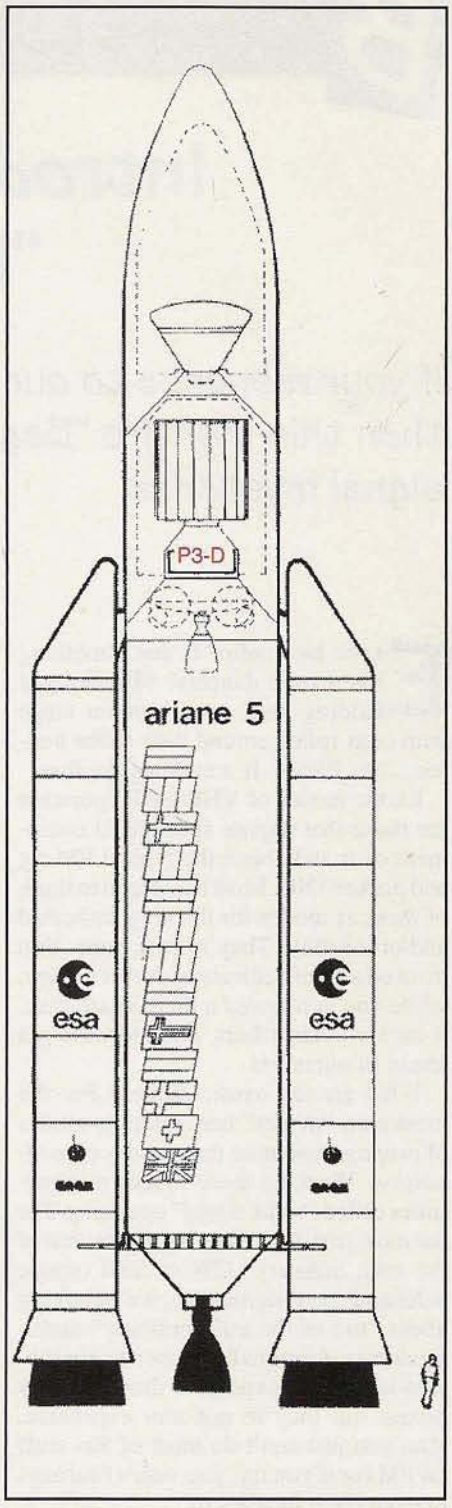


Figure 3. Ariane 5 launcher with possible P3D configuration.

We all look forward to the launch of Ariane 502 and AMSAT's P3D satellite and all the great things they'll mean for us satellite enthusiasts. Till next time,

73 de WA4SXM

Introducing Ham Radio's "Exotic Modes"

If your response to our "Weak Signal News" column has been "Huh?", then this month's "Beginner's Corner" should unravel some weak-signal mysteries.

Exotic ham radio? Is that something like exotic dancers? Middle-aged balding men come out on stage with coax rolled around their entire bodies....No. Please. It's nothing like that.

Exotic modes of VHF/UHF operation are those that require specialized equipment over and above the typical FM rig and packet TNC. Most hams tend to think of these as modes for the very dedicated and/or wealthy. They're half right. You *do* need a lot of dedication. As for money, while you don't *need* a lot of spare cash, it sure wouldn't hurt. But let's not get ahead of ourselves.

What are the exotic modes? For the most part, "modes" here refers to modes of *propagation* more than modes of *modulation.* Working these modes is sometimes called "weak signal" operating. For the most part, we're talking about "run of the mill, ordinary" CW or SSB (single sideband) type signals. So, we're talking about "run of the mill, ordinary" multimode rigs. Admittedly, these rigs are substantially more expensive than FM-only boxes, but they're not *that* expensive. And you just can't do most of this stuff on FM (or if you try, you won't find anyone out there to talk to).

It's the add-ons that can run up the tab. Here we're talking about everything from beam antennas and hard-line coax to preamps and big amplifiers. Of course, ham tradition says to "scrounge for parts and never pay list price for anything," and you don't need to start out with a superstation. Many hams start small and slowly improve their stations as their budgets allow.

You'll need a multimode rig capable of SSB and CW operation—such as the popular ICOM IC-706 pictured here—to make use of the "exotic modes" discussed in this article.

Now let's take a look at some of these exotic modes and what extras you'll need to get on the air and make contacts.

Starting Out on 6 Meters

Probably the least exotic of the exotic modes is simple terrestrial contacts via the ionosphere (F_2), similar to what you find on HF. In fact, if the upcoming sunspot cycle turns out to be another good one, you'll find HF-style propagation on frequencies as high as 6 meters. It happened last time, and it might happen again. There's no way to tell for sure; we're just going to have to wait a couple of years to find out.

It takes a fairly active cycle to open 6 meters up for F_2 propagation, and it's only going to happen during the peak. Even so, if you're interested in trying this mode, you'd be well advised to get your station set up now instead of waiting until you hear that "Fred just worked Hawaii and Europe on six! Can you believe it?" There just won't be that many days with openings like that, even if the next cycle is spectacular. You won't have time to iron out the bugs. Besides, there's plenty to do right now!

What do you need to have a decent signal on 6 meters? First of all, you're going to need a directional antenna and something to support it. Virtually all SSB and CW work on 6 meters and other VHF/UHF bands is done with horizontally polarized antennas, so a vertical beam intended for FM use just won't do.

The good news is that a 6-meter Yagi is only slightly larger than a big TV anten-

By Peter O'Dell, WB2D

It's easy to go mobile with weak-signal VHF. Here, Mark Casey, N1LZC, and his daughter, April, pose in front of Mark's van on the beach in Florida (in February!). The beam above Mark's head is for 2 meters, as is the omnidirectional loop on the back of the van. (Courtesy N1LZC)

"Middle-aged balding men come out on stage with coax rolled around their entire bodies....No. Please. It's nothing like that."

na, so you can probably get away with less of a tower, or even a roof tower, than you'd need for an HF Yagi. And your rotator can be a lighter-duty model, too. Plus, you're still low enough in frequency that you can use fairly cheap coax for moderate runs without doing too much damage to your signal. For 150 feet or less, RG-213 (or even RG-8) should be just fine. And you can still use those awful PL-259 (misnamed "UHF") connectors without losing all of your signal in an impedance lump.

What about the rig? There are several current or recent models available new and used. Most offer power output levels of 10 to 100 watts. If the band is wide open, like it was during the last solar cycle, 10 watts will be more than enough. But when things are marginal (as they often are), you're going to find that 10

"...you don't need to start out with a superstation. Many hams start small and slowly improve their stations as their budgets allow."

watts just doesn't cut it. So look for a rig that has output power of at least 50 watts, or scout around for an amplifier to add onto a lower-power unit.

Sporadic-E and Tropo, Too

What do you do while you're waiting for the sunspots? Don't worry. There are several other modes of propagation available for the 6-meter enthusiast, and they're not as dependent on the sunspot cycle as F_2 propagation. *Sporadic-E* is probably one of the better-known examples. Here, the signal is bounced off a charged cloud to distances of often hundreds of miles, the cloud and the two stations involved forming a sort of triangle.

Suppose you're in Cleveland and you hear a station in Nashville. You point your antenna toward Nashville and the signal totally disappears? What the heck? Grab your newspaper and look for the national weather map. You may find a large storm system over the Dakotas. Point your antenna toward the Gateway 2000 computer plant, and boom! There's the Nashville station loud and clear. It's fun and it's a great way to start building your state total on six.

Most of the propagation on 6 meters (and higher) will be via tropospheric means (that is, the level of the atmosphere where weather conditions form, not the ionospheric shell around the earth's atmosphere). If you still have your TV on an outside antenna (or you can recall when you did have it that way), this is the same mode of propagation that occasionally brings in distant TV stations. Air masses become ionized and reflect the VHF signals back to earth. Sometimes, when conditions are right, you can get more than one bounce, or *hop*. So the distance can be pretty good.

One thing to keep in mind about 6 meters is that it's a fairly sparsely populated band. Before cable TV, it was very difficult to operate much on six and have any peace in your neighborhood if you happened to live in a Channel 2 coverage area, particularly the fringe. The old TV sets had front ends that were just too broad to keep the 6-meter signals out.

Dish antennas for the microwave ham bands (902 MHz and up) are easily found at hamfests, and often at bargain prices. (Courtesy N1LZC)

Most of those problems have disappeared in areas where cable TV is available.

Also, 6 meters is not a ham band in all countries. But it is a fun band and one of the easiest to get set up on.

Meteor Scatter

Another exciting VHF mode is meteor scatter. There's some activity on 6 meters, but most of it's on 2 meters and 70 centimeters. Here, the idea is to bounce your signal off the ionized trail of a meteor as it enters the earth's atmosphere and burns up. For a few seconds, the propagation can be excellent. Meteor scatter enthusiasts have developed a whole protocol of how to call CQ at specific intervals depending on whether you're east or west of the area where the meteors are entering the atmosphere. And since major meteor showers are very predictable, this can be a fairly easy mode to have some fun with.

One major caveat, though, is that the contacts have to be kept short and sweet—real short! You have a few seconds, at most, to complete the whole contact before the vapor trail from the meteor dissipates and is gone. I recall one contact that I never completed because the fellow on the other end was a ragchewer. After answering his CQ with my call and a signal report, he came back to tell me his name and, I suppose, his QTH, his wife's name, how old his kids were, and, maybe later, a signal report. Without the report, it was an incomplete contact. I missed out on working a new state. It was probably a new one for him, too. Such are the frustrations of the meteor-scatter enthusiast.

Two Meters and Up

As you move up in frequency, some things change. First of all, the antennas become smaller. That's a good thing. Portable operation becomes much easier and less cumbersome. That's a good thing. But very small distances become appreciable portions of a wavelength. That's a bad thing. Well, maybe not bad to everyone, but it means that you have to really pay attention to details. For me, that's a bad thing. And there's virtually no chance of HF-style ionospheric propagation, even during the best of sunspot cycles. It just doesn't get that high. There is some possibility of north-south *trans-equatorial* contacts during the peaks, but that's pretty rare and too complicated an issue for this article.

If you're near the coastline, there's the possibility of *ducting*. Here, large air masses form a duct that carries the signal over fairly great distances. You can think of it as a giant air-conditioning duct suspended in the sky. Ducting seems to occur fairly regularly between the U.S. west coast and Hawaii.

Antenna height becomes really critical in ducting. If you're too low, you bounce off the bottom of the duct; if you're too high, you bounce off the top of the duct. Most ducting contacts seem to be made

by portable stations where the operators can drive up and down the mountainsides until they find the best height. There's little evidence of ducting occurring over land, so if you are landlocked, you're probably out of luck on this one.

To the Moon and Back

Several years ago, I was in Houston working on one of the SAREX missions, representing CQ and helping with the public relations. One of the AMSAT representatives was a friend of Dave Blaschke, W5UN, a prominent "moon bouncer." W5UN invited us out to his house to see his station.

When we arrived at his suburban home, he greeted us at the door and said, "Hurry. The moon is about to set." The phrase seemed strange to me. It was mid-afternoon and bright sunshine. I looked around and concluded that even if I knew where to look for the moon, I probably wouldn't be able to see it.

We stepped inside his shack, which resembled a broadcast station more than a ham set-up. He flipped a couple of switches and picked up his microphone and said, "W5UN testing." He released the mic button and after a short pause (it takes about 2.5 seconds for a radio signal to go to the moon and come back) we heard his voice. Then he passed the mic to each of us for a turn. I've done a lot of things in ham radio that gave me a thrill, but I don't think that I've ever had a bigger rush than listening to my own voice as it came bouncing back from the surface of the moon!

Then we went out in the back yard to look at his antennas. Thank heaven that Texas is a big state with a lot of land. His 2-meter antenna array was bigger than most New Jersey lots. He had 64 long-boom 2-meter Yagis mounted on a frame. The center of the frame was attached to a mast that was about 60 feet tall. Booms extended from the top and bottom of the mast in an H-fashion. The end of each bottom leg of the H was attached to a stripped-down car body supporting another vertical mast attached to the top leg. The car bodies still had their wheels, and azimuth rotation consisted of an electric motor that drove the two cars around a circular track. Elevation was handled by a complex set of pulleys and cables. It was the most impressive homemade array that I've ever seen.

Is all this necessary to do moonbounce? Absolutely not. You can do 2-meter moonbounce with as few as four long-boom Yagis *(and under ideal conditions, even with one. See EME articles referenced below.—ed.)*. You're going to need the biggest amplifier you can afford, but you can still make CW contacts. How much power does it take? I repeat, you're going to need the biggest amplifier you can afford.

One other thing to keep in mind, too, is that signals coming back from space often have different polarization than when they left the Earth. You need an Az-El (azimuth and elevation) rotator system of some sort to follow the moon, and one that allows you to switch polarization really puts the icing on the cake. Or even better, get one that lets you rotate through the polarization plane to find the best signal level.

As you go higher in frequency, the antennas get progressively smaller for greater gain. At 1,296 MHz, a dish antenna becomes really efficient. Surplus dish antennas abound, and you can also build them relatively inexpensively. But it takes a lot of detail work to make them perform really well. Above 430 MHz, amplifiers and converters are harder to come by, but not impossible. You can buy everything you need for a 1,296-MHz moonbounce station off the shelf. It's not cheap, but it can be done.

Onward and Upward

I hope you enjoyed our brief look at some of these fun weak-signal modes. Next time, we'll take a look at satellite communications and what you need to get started. ■

To Learn More...

Most of the exotic modes covered in this article have been covered in greater detail in various issues of *CQ VHF*. Here's a quick guide:

General VHF Weak-Signal:

"Discover the World that Awaits You... Beyond Repeaters," by Rich Moseson, NW2L, Jan/Feb., 1996, p. 17

"Basics: Weak Signal Modes,"—March, 1996, p. 80

"Weak Signal News" column, by Tim Marek, NC7K—monthly

Meteor Scatter:

" 'Incoming!' An Introduction to Meteor Scatter," by Gordon West, WB6NOA—Aug., 1996, p. 18

" 'CQ Scatter': A Meteor Scatter Operating Primer," by Ken Ramirez, KP4XS—Aug., 1996, p. 24

"Weak Signal News: Pursuing the Perseids," by Tim Marek, NC7K—Aug., 1996, p. 56

"Reader Feedback: Meteor Scatter—It's Not That Easy," by Gene Zimmerman, W3ZZ—Nov., 1996, p. 78

Moonbounce (EME):

" 'To the Moon, Alice!'—2-Meter Moonbounce Basics," by Tim Marek, NC7K—Oct., 1996, p. 22

" 'To the Moon, Alice!'—EME Operating Techniques for the Beginner," by Erik Dean, NI6G—Nov., 1996, p. 22

"Weak Signal News: To the Moon and Back," by Tim Marek, NC7K—Sept., 1996, p. 64

Sporadic-E:

"A Beginner's Guide to Sporadic-E on 6 Meters," by Ken Neubeck, WB2AMU —Jan/Feb., 1996, p. 27

"Predicting Sporadic-E Openings on 6 Meters," by Ken Neubeck, WB2AMU —July, 1996, p. 16

Tropospheric Ducting:

"VHF DX from Summer Tropos," by Gordon West, WB6NOA—June, 1996, p. 15

In addition, we recommend the following VHF reference guides, all aimed at beginners:

Getting Started in VHF (video), by Rich Moseson, NW2L (CQ)

Six Meters: A Guide to the Magic Band, by Ken Neubeck, WB2AMU (Worldradio Books)

The VHF "How-To" Book, by Joe Lynch, N6CL (CQ)

Your VHF Companion, edited by Steve Ford, WB8IMY (ARRL)

Ordering information:

ARRL, 225 Main Street, Newington, CT 06111; Phone: (860) 594-0200; Fax: (860) 594-0259.

CQ Bookstore, 76 N. Broadway, Hicksville, NY 11801; Phone: (516) 681-2922; Fax: (516) 681-2926; Orders only: (800) 853-9797 (CQ and ARRL titles available).

Worldradio Books, 2120 28th Street, Sacramento, CA 95818; Phone: (916) 457-3655.

Of Preamps and Perseids

It's winter—time to plan improvements to your station. Plus, we take a look back at last summer's Perseids meteor shower.

After recovering from Thanksgiving's bounty of food and bowl games, December kicks off with the secondary *Es* season (mid-December to mid-January), and the Quadrantrids meteor shower, not to mention Christmas shopping, family gatherings, NFL/NCAA football, and, of course, reduced temperatures and sunlight and plenty of snow. So, mountaintopping should be the farthest thing from your mind, right? Wrong! Not if you're a contester.

The more competitive stations begin planning now for next June's VHF contest. Why do I keep talking about the June contest, even in the middle of winter? Because it is *the* biggest event of the year for weak-signal operators (including many non-contesters), thanks to traditionally good *Es*/Tropo conditions coupled with tremendous activity levels.

Winning is hard work, requiring desire, motivation, ambition, strategy, planning, organization, building, travel, installing, operating, and the will to see it through. Beginning the process early allows plenty of time to brainstorm the entire operation, take notes on what worked, what didn't, what to do differently, what to try for the first time, what to acquire, and what to abandon. I can't stress enough how important this process is to being successful. With the January VHF Sweepstakes around the corner, many of these topics should already be on your mind as you make your final preparations for that event. Learn from your experiences in January along with your memories of last June to avoid the pitfalls and make 1997's event the best yet.

A Primer on Preamps

By now, you have hopefully settled on which antenna and which feedline is best for you. This month we'll discuss why you should own a low-noise/high-gain receive preamplifier (preamp) to work weak signal DX on the VHF bands, and where in the system it can/should be used. With the solid state devices available today, it's very easy to produce 20+ decibels (dB) of receive gain at less than a dB of noise figure (added noise) well into the microwave spectrum for only a few dollars per device.

"Why do I need one?" you ask. The main reason is that most all-mode VHF/UHF rigs are fairly "deaf" when they come out of the factory. They operate fine but just can't hear all the weak stuff. Placing a preamp in front of them really makes a big difference, allowing you to copy folks at the noise floor who are otherwise undetectable.

Where Should It Go?

The placement of a preamp in the coax line is a very important consideration. Any feedline losses between the preamp and the antenna basically act as an attenuator, weakening the signal before it's amplified. Ideally, it would be located atop the mast at the feedpoint of the antenna (a *mast-mounted* preamp). In the real world, this is problematic at best. The preamp needs to be gracefully switched out of circuit on transmit (using a *sequencer*) and back in on receive, without getting spiked by power supply voltage or RF. Otherwise, that nifty piece of high-tech silicon will become just so much smoke. *(A sequencer is a circuit that—between the time you key your mic or keyer and the time the transmitter turns on—disconnects the preamp from the antenna line. When you unkey, it reconnects the preamp before the receiver comes back on. This is all done in a fraction of a second.—ed.)*

Weather-proofing and insect-proofing are two other important considerations in installing a preamp at the antenna. It can be a headache, as Ken, KP4XS, found out recently. He put it all up near the top of his tower in a hermetically sealed box, only to find everything dripping wet and corroded two months later. Others have drilled air holes on the bottoms of their mast-mounted preamps (without screening them), then found them full of wasps a few weeks later.

My solution is to run an RF-switched preamp in the shack, between the radio and transmit amplifier, and to keep the feedline losses to a minimum. It also

Stan Hilinski, KA1ZE (right) shows off his new car and rover station to Dick Knadle, K2RIW. This replaces the huge A-frame bracket that held up the antennas on Stan's old car. (Photos courtesy of N1LZC)

By Tim Marek, NC7K

"The most exciting event was copying complete calls from W2CRS DM78 at 1,775 miles. We were both on CW and he was a steady 3-5 dB out of the noise. It says something for the S/N benefit of CW." — KM1H

keeps the complexity down during mountaintop trips where coax losses are low due to short cable runs. On the other hand, EME work almost *requires* tower mounting, as every tenth of a dB in signal improvement is worth chasing.

Go for the GaAsFET

Unless you live in the country with no VHF neighbors, avoid Dual Gate MosFET preamps (found in combo with most brick power amplifiers), as they have a very hard time trying to copy a weak signal with loud local inband signals. GaAsFET preamps handle these kinds of situations much better. Advanced Receiver Research (ARR), Angle Linear, Down East Microwave (DEM), Hamtronics, Janel, Landweir, Michigan Microwave, Mirage, SSB Electronics, and several others offer many models in various configurations covering 50–10,000 MHz. From the very beginning of my VHF career, I've used the ARR line on 50–432 MHz with great results. Whichever you choose, it will be a great asset to your station's ability to receive. And as the old saying goes, "you can't work 'em if you can't hear 'em!"

Activity Reports

Activity reports from August include Tropo, aurora (AU), sporadic-*E* (*Es*), and meteor scatter (MS), proving again just how much fun this month can be. Virtually all of the reports from August 12th talk about the Perseids meteor shower, which seemed this year to be better for some folks than for others.

From Bob Earl, KD6UIH, DM13:

8/8/96—Chuck, K6HKF (formerly KJ6FP), said 6 m was getting short and to listen for *Es* on 2 m. After calling CQ on 144 MHz for about 20 minutes, contact was made with Ben KA7MFM in DN15 at 01:12 Z, over an 830-mile path to DN15 in NE Oregon.

From Gene Biggs, KE6SQG, DM13:

8/7/96—We had the best 6-meter opening in a long time today, starting about 2300 Z and was still working at 0300 Z. I worked CN85, 87, 88, 89, DN09, 26, 32, 37, DO20, & DM41. CN85 reported 2-m contacts south into AZ.

From Mike Cherry, VE7SKA, CN88:

8/7/96 0132 0153 Z—Worked the following on 144 MHz: K7CA DM26, K7ICW DM26, AA7A DM43, & N7WS DM42. Signals were between S7 & 20 over S9. CN87 also worked this, the first 2 m *Es* opening this year!

From Del, KD1DU:

8/10/96—Worked WAØDXZ at 0411 Z on MS with a great 45-sec. burn with S9 signals.

From Mike, KSØF:

8/11/96—Completed with Dan KE7OI DN76 Montana at 0626 Z on MS. Not a peep at first, then a weak but perfectly readable 15- or 20-second burn did it all to 73s and good lucks. State number 44 for me.

From Peter Shilton, VE3AX, FN02cw:

8/11/96—Lots of activity today. Between 1020 Z and 1059 Z I worked five stations (including WØPW and KØFF on the same burst at 1059 Z).

You don't have to wait for winter to get snow on Mt. Washington, New Hampshire, the highest peak in the northeastern U.S. N1LZK (next to his van, which spent the night on the summit) drove up to do some hilltopping last Memorial Day!

The Peak of the Perseids

From Peter Shilton, VE3AX, FN02cw:

8/12/96—All 144 MHz. Total contacts = 30. All but three on random. Dual contacts with K5SW, N5LJL, and WØPW counted. Best DX on sked: W2CRS DM78lx at 1343 miles (new state). Best Random DX = N5TML EM14ap at 1131.75 miles. My condolences to KFØM and WØEKZ, worked on the same burn at 1200 Z Aug.12. Those two are listed in EM17io and EM17ij, about 7 miles apart! They must drive each other nuts on 144.200! WA2IEY deserves the Stamina Award. I don't think he ever left 144.200.

From Carl, KM1H, FN42:

8/12/96—On 2 m completed with KBØPYO EN24 1,205 miles; NØGXA EN13 1,288 miles, KP4XS EM84, N5LJL EM26 1,325 miles. On 222 was heard in EN34 and worked EM84. Possibly the most exciting event was copying complete calls from W2CRS DM78 at 1,775 miles. We were both on CW and he was a steady 3–5 dB out of the noise. It says something for the S/N benefit of CW. I'm using a TS940 as the IF with cascaded 400-Hz filters on CW and 2.1 kHz on SSB. May the fire gods ionize the rocks!

From Mike, KSØF, EM48sl:

8/12/96—On 144-MHz MS I worked: KE7OI DN76 sked, WD4KPD FM15 sked, WB4NFS FM18 sked, KC7KYO DN76 sked, & KØGU DN70 sked. WA2AEY FN23 random, plus NØEOQ EM24 sked on 6 meters. Lots heard on .200. Some long burns but no big signals. Personal opinion of shower—not up to snuff. State number 44 and five new grids on 2, plus one on 6. Thanks to all who took the time to run. It is appreciated.

From Ken, KP4XS, EM84:

8/12/96—I have a headache and it has Perseids written all over it! Here is my breakdown: 41 2 m QSOs, 11 skeds & 30 random; one 222-MHz completion with NN9K EN41. Best DX was KØGU EN70 at 2,128 km, W2CRS DM78lx at 2,102.7 km, & NTØV EN08 at 2,081 km. Heard only a ping from W2CRS on 432 MHz. Best random contact: W5SFW DM95 at 1819 km. Hats off to NOØY with "smooth" scatter style.

From Jon Jones, NOØY, DM98:

8/12/96—I operated from a rest stop two miles west of Kalvesta, KS. Heavy fog early in the morning made driving slow. I got there just in time to set up for a sked with KP4XS,

working Ken using the backup four-element Yagi as the Jr. Boomer takes 20 minutes to assemble. At 1349 and 1419 Z, I had some long bursts during which I worked several stations. (The 1419 burst sounded like *E*-skip.) Conditions at 1230 Z favored the east, then west/southwest beginning 1300 Z. KP4XS, K7CA, NC7K, and the AZ ops had the big signals here in KS off the meteors. Used a TR-751A, RFC 170-watt amp & a Jr. Boomer up 20 feet.

From Kyle Chavis, WA4PGM:

8/12/96—144 MHz 17 completions. Best DX: KAØKUY EM07 (took about 20 seconds to work!) and VE1PZ FN85.Thought I worked CO2OJ in one burn but later he was still calling.

From Doug, W2CRS, DM78lx:

8/12/96—Ran many long haul skeds. Aug. 11: KP4XS 1,307 miles 10 second burst, W3ZZ no contact but copied ping "ZZ" over 1,486-mile path, VE3AX 50 second burst over 1,343-mile path. Aug. 12: NØIT good 10-second burn from his Eggbeater and 170 watts!, AJ6T CM97, N6RMJ, AA7A, KB6IGC, K7CA, NC7K on 144.200 random, KM1H heard a 10-second burst from me over the 1,775-mile path(!), & after five years of trying with KA2RDO, we completed the 1,449-mile path (despite my line noise) for my best DX on meteor scatter after 30 years of this madness!

From Jay, KØGU, DN70mq:

8/12/96—Quite a learning experience for a rookie MS op. Sunday: Completed two of eight late night & three of 10 daytime skeds. My first four skeds failed. At that point (looking at two pages of skeds) I wondered what I had gotten myself into. My faith was restored with a nice burn to N5BA EL29 on sked #5. Monday: Completed 12 of 18 late night and seven of eight daytime skeds. Most were done in less than 12 minutes. By 1000 Z, western skeds were taking five minutes or less. 144.200 was chaos (but a "kind of fun" chaos) with many long burns. Nil on 144.100 CW. Most-distant QSOs: KP4XS 1,320 miles & VE3AX 1,305 miles. Loudest signals: KØFF & NØHJZ. Fastest sked: NØXX/7 ~20 seconds. Fastest talker: KP4XS—no one else even comes close. Used an FT-1000D/DEM 144/28, 8877 amp, 17B2@65', K1EA DVP.

From Dave, WX3N/9, EN40:

8/12/96—Spent several hours pursuing randoms while I unpacked and arranged the station (I just moved out to three acres). Threw the 13B2 and five-element 6-m beams up on the 40-foot TV tower Friday night. Tied a rope around the six so I could rotate it occasionally. My goal was to point the thing at VE5 and see what I heard. Then on Saturday night, I made my first scatter QSO from the new place with VE5LY! What a thrill, a 30-second burn. Later, worked W1XE/Ø, WA4PGM, NØWJY, and others random. My best SWLing was a quick burst from whom I believe was WA6IGZ (I copied WA6I before the thing died) at what must be close to 2,000 miles.

From Dave, AA9D, EN52:

8/12/96—144-MHz Perseids completions: Random: K2SMN, KA1YQ, AF1T, KP4XS, WA4PGM, KØGU (*big* burn during his sked with WA4PGM), WG6K; Schedule: AA4H, KØGU, KE7OI. Tried twice with KAØNNO EM24 and got as far as S2's, but I never got the "Rogers." Absolutely nil from KE7NS, VE6MK, W5EHM, N5BA, and ND3F. Overall it seemed down compared to previous years. Much more difficult on N-S paths than E-W. Thanks to everyone for their hard work and persistence.

From Rich, NØHJZ, EN34fv:

8/12/96—Although I thought the shower was below average, I had a bunch of fun! Picked up one new state (NJ) and many new grids. 144.200 was fun and fairly orderly in the EN34/35 area. People took turns calling and listening! Best burn goes to KØGU who was 59 + 40 for almost 30 seconds. VE3AX was *loud* on randoms most of the shower. I must agree about the "CQ Scatter" bit. I heard a W4 station say "CQ Scatter" four times then his call once. I didn't get a completion because he wanted to say "CQ Scatter" so much. My "CQ NØHJZ NØHJZ" seemed to work fine.

From Robert, N7STU, DM07aa:

8/13/96—Where did all the stations go on the 13th? Up at 1000 Z so I could play the rocks before work & I couldn't find anyone to sked except for two stations that I had previously worked. I called CQ on and off for two hours without a single ping in reply. Saturday morning I had a sked with NØXX. A couple minutes before the sked I was on frequency only to hear Bill tuning up for a good 7-10 seconds & heard only three pings afterward. The point: many stations are sitting on frequency before sked time, waiting. Why not start calling early? Nothing to lose (you are sitting there, anyway) & everything to gain if the other station is there. I put this into practice since and it paid off with N7WS. I heard him two minutes before sked, received calls and S2 in the last quarter just before sked, and we completed just seconds into the first period of our sked start time. Summary: Start those skeds early!

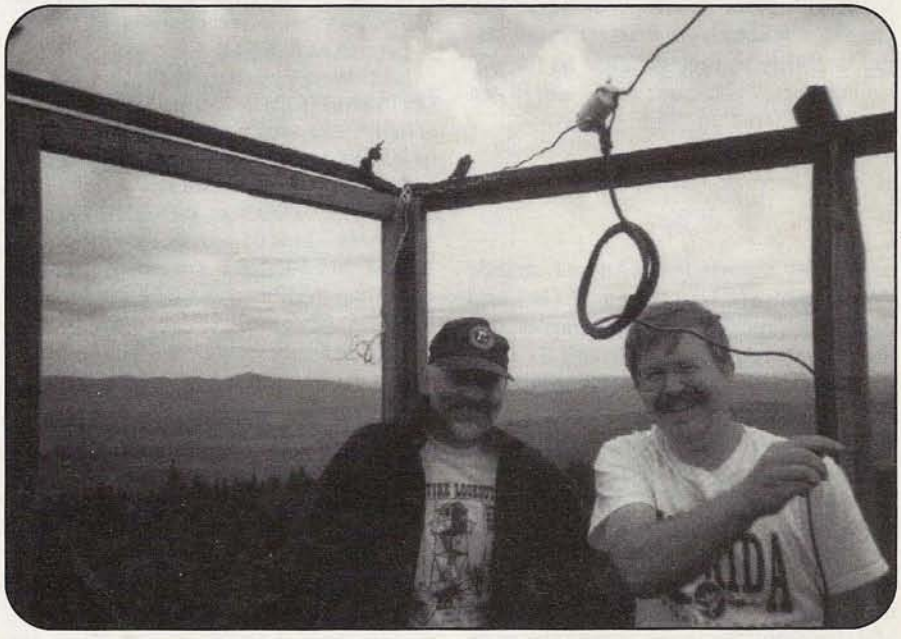
"After 5 years of trying with KA2RDO, we completed the 1449-mile path (despite my line noise) for my best DX on meteor scatter after 30 years of this madness!" — W2CRS

From Derek Hutter, KJ7HB, CN85:

8/12/96—Monday morning at 3 a.m. I had the pleasure of running into FMers on one of my sked frequencies. Their response was, "It's a gentleman's agreement and I ain't no gentleman." My question is this: Why not take the VHF/UHF/Microwave "weak signal" spectrum out of the gentlemen's agreement arena and ask the ARRL, W5YI, etc. to back a Part 97 regulation to prohibit wide spectrum modes in "weak signal" areas? The license manuals could spend a little time on the band plans, too.

From Dave, NØIT:

8/12/96—This was my first experience attempting to work meteor scatter. My station: an IC-290H driving a 170-w brick into an M^2 Eggbeater up 15 feet. Of eight skeds, I com-



Pete Hayes, K2AEP (left), and Mark Casey, N1LZC (right), hiked more than 10 miles to operate from the fire tower atop Vermont's Glastenbury Mt. (FN32lx) last July, reportedly the first ham operation from there since the 1950s. The dipole did double duty on 6 and 2 meters. Gear included an ICOM IC-706 for SSB, plus FM handhelds on 50, 144, 222, 440, and 1296 MHz.

pleted two (KD1DU 920 miles & W2CRS 780 miles). While high power and beams certainly don't hurt, they may not always be necessary. Keep this in mind the next time someone asks you about working meteors with a similarly modest setup or even a mobile.

Late-Season Transatlantic on Six

From Bob, WA1OUB:

8/12/96—Just when you think it's over for 6-m transatlantic, the magic band lives! On 12 Aug., 1825-2156 UT, we had a very widespread North America-to-Europe opening with some signals over S9. 50 QSOs into CT, EH, F, G, GW, HB9, I, ON, and S5 (14 Italians and two S5 stations were worked). Best DX from here in FN43 was I8KRO in JM88 at 7125 km. W2CAP worked HB0/HB9QQ, which I still need. What a pleasant and late 6-m surprise. This is latest 6-m transatlantic opening in my records!

From Michael Smith, VE9AA, FN65rr:

8/12/96—Alerted by Doug, VE1PZ, I had some late-season fun to Europe on 6 m today, just after finishing 2-m MS skeds with KMØA and KSØF. Heard/worked were: CT, I, VO1ZA/B, CTØWW/B, IK4, S5, F, EH1, 48/49 MHz video, GB3MCB/B, IKØ, GW, ON, G, & PA.

From Neil, GØJHC:

8/13/96—The 6-m opening to North America last evening was very spotty up here in IO83. Steve, W2CAP, peaked 59+ for a minute and stayed in/out for half an hour or so. W3EP, WA1OUB were also in there weakly on CW. Got the impression the GWs in IO73 had the best of it round my way. Who knows what the band will throw at us next...NA in August...VK in Sept.?? Hi!!

From Ron, WZ1V, FN31mp:

8/13/96—Arrived home at 2100 Z to find 6 m open again to Africa and Europe. Worked CT3FT, EH8BPX, a GW, and heard one F. Band stayed open until at least 2230 Z here. What a surprise for mid-August!

...And Some Tropo, Too

From Arliss, W7XU, EN13:

8/13/96—Tropo opening from South Dakota to Texas DM95, approximately 625 miles. Last evening, band was open via tropo as far east as EN82 and west to DM78.

From Brian, N5BA, EL29fx:

8/18/96—Started with skeds early as 1 Aug. My goal—get VUCC finished off. Needed 21 grids. A doable but not sure-shot goal. Picked up two on tropo on the 4th of Aug., but still going for the wallpaper. Results—Picked up 11 new grids. Most snakebit—Holly NØQJM with 4 skeds but no cigar. We finally kept one running a full hour and got it done. Monday night, on the way past my son's bedroom, he said, "Daddy, are you going to N5BA all night again tonight?" It was fun. I agree we all can make more Qs, more often, if we look to the rocks on other than the 2nd weekend in August.

A Perseids Top-10 List

Top ten ways to know this year's shower isn't up to par:

(10) You've only made 1 of 30 schedules and it's already the 12th.
(9) Your preamp really isn't blown, it just sounds like it.
(8) You run the first half of a sked on the wrong frequency, but it doesn't make any difference.
(7) You've just run six skeds without even a ping and begin to wonder if your noise figure really does exceed your IQ.
(6) Guys are calling you on the telephone to make tropo skeds.
(5) Your best DX of the shower is a tropo contact on 144.200.
(4) You go outside not to look for meteor showers but to see if your antennas are still up.
(3) You find yourself considering working the FMers on 144.138.
(2) You start reminiscing about how the Leonids used to be a major meteor shower, too.
(1) You find yourself making Top-10 lists instead of working randoms.

—Arliss Thompson, W7XU

In Conclusion...

Perseids '96 didn't disappoint me this year. I set up atop a 8,300-foot Virginia Peak here in DM09, 50 feet from the new NEXRAD weather radar site (I've used this spot for many years before it showed up) with little, if any, problems from its presence. Heard/worked many burns of 10 seconds or more on 144 MHz. Many thanks to NW7O/7 (with W7TVF) in DN20, who provided me with grid #44 on 432 MHz....Only SIX more to go! 432-MHz EME ops: listen up for the weak W7....HI!

Don't forget the January VHF Sweepstakes just around the corner (see complete rules elsewhere in this issue). I will be "rover" through 19 grids in CA and NV with 50, 144, and 432 MHz, running with stacked KB6KQ loops and small Yagis while mobile. Should be a good time for all.

Our photos this month come courtesy of Mark Casey, N1LZC, who's active in New England with the North East Weak Signal (NEWS) Group. Thanks, Mark.

Enjoy the family gatherings, holiday dinners, and early-morning excitement this season brings. My best wishes for a prosperous 1997. Happy Holidays from the Nevada High Desert.

Tim, NC7K, DM09

Find Service in the Season...and Advice from Ages Past

The holiday season brings many opportunities for public service—and a chance to turn "The Art of War" into "The Art of Emergency Preparedness."

This is a season with many special opportunities for generosity in service to our communities.

There are children's hospitals that could use a radio "visit" from Santa. There are YMCA Christmas tree sales that could use your help in communicating across the expanses of their sales lots. There are elderly neighbors, not as mobile as usual when it gets cold or slippery outside, who could use a friend to look in on them, see how they're doing, and find out if there's anything they need.

Many of our own ham clubs will be planning Christmas dinners, and many of us will be occupied with shopping and family activities and the like. Reserve a few hours each week, in this special season, to make your skills part of someone else's special time of the year.

There's More Than One Great Set of Teachings

This is a time of year when many of us will be reading familiar words from nearly 2,000 years ago: words about people faced with unexpected events and wondering how they should respond. Well, I have another book on the shelf that's closest to my desk, filled with practical advice for the ham who wants to perform meaningful public service in the process of enjoying our hobby. Its value to hams like us is more than a little surprising, since it was also written nearly 2,000 years ago.

I'm talking about Sun Tzu's classic book of strategy, *The Art of War*, and the hundreds of years of commentaries that have accumulated around the original work. As you flip through those pages, you'll find literally dozens of remarks that sound as if they were spoken by a master of modern-day emergency preparedness, rather than by a Taoist warrior-philosopher who is almost unknown except for this enduring collection of lessons in preparedness.

"The Enemy" Is the Disaster

To turn *The Art of War* into *The Art of Emergency Preparedness*, all you have to do is make a few simple substitutions. Change references to "the enemy" into "the disaster," change references to "the army" into "your volunteers," and so on. By taking these few liberties, we can derive several useful maxims for the well-prepared communicator:

"The survival or destruction of a country and the life or death of its people may depend on volunteers' actions, so it is necessary to examine them carefully."

It's hard to remember this in the course of normal preparedness drills and public service operations. When you're deciding whether to take 10 minutes of your lunch break to check into a weekday net, or whether to lose some of a precious weekend to handle a checkpoint for a fund-raising walk-a-thon, the connection between these activities and a genuine emergency may seem weak and distant.

Then you get an incident like August's west coast blackout (see "VHF News" in last month's *CQ VHF*). I felt so proud of the hams in our city when they came up on our planned simplex frequency, literally within minutes of the outage. They didn't sound like a bunch of hobbyists. They sounded like a trained corps of observers, able to provide concise reports while following practiced radio discipline.

Radio "visits" by Santa Claus to children's hospitals are one of many ways in which hams can use their skills to help their communities in this holiday season.

Many of our regular net control stations didn't even know about the blackout until they heard about it on the news because the distribution of the power outage was so irregular. It didn't matter. Our hams had all heard the procedure so often that the first station on frequency just went through the regular order, without even the usual printed script in front of him, and it sounded just like a regular weekday drill. Except, of course, that this time we were getting real-time information on actual safety-of-life issues, like who had power and water, which hospitals were in unaffected areas, and so on.

It's Hardest to Make Things Look Easy

How do we get to this point, where we respond to "the real thing" with a "this is

By Peter Coffee, AC6EN

"[The hams] sounded like a trained corps of observers, able to provide concise reports while following practiced radio discipline."

routine" lack of excitement? By anticipation, by preparation, and by refusing to care whether people underestimate the value of our contribution because we make it look easy.

Thomas Cleary, the translator of my edition of *The Art of War*, tells the story of the lord who asked his doctor who was the most skillful physician in the land. The renowned healer replied: "My eldest brother sees the spirit of sickness and removes it before it takes shape, so his name does not get out of the house. My elder brother cures sickness while it is still extremely minute, so his name does not get out of the neighborhood. As for me, I puncture veins, prescribe potions, and massage skin, so from time to time my name gets out and is heard among the lords."

Like that Chinese healer, we hams may relish the public acclaim that comes when our name is "heard among the lords." But this should be the exception, not the rule, in serious emergencies. If our procedures are familiar, our equipment tested and backed up with spares and contingency plans, and our interactions with public safety agencies well defined, then we'll be about as noticeable as the lights on your dashboard that let you see your instruments at night. We'll just be something that's there when you need it.

We are the medium, not the message. The press release after the fact can explain what we did. It doesn't need to be dramatic at the time. It needs to look like The Weather Channel, not like "Mission: Impossible."

The First Time Can't Be the Worst Time

Sun Tzu had further comments on the value of doing things routinely, under low-stress conditions, so that they will not produce surprises when we have to do them for real:

"Foreknowledge can not be had by analogy, can not be found out by calculation. It must be obtained from people: people who know the conditions."

What kind of conditions? Well, the "shadow zones" of your local repeaters are something you want to know in advance, not discover the hard way in a disaster. If someone is known to be headed into such a zone, your net control should be able to give the direction to QSY (change frequency) while the signals are still Q5. Otherwise, that mobile unit may lose precious minutes before realizing that the repeater can no longer be reached, and several minutes more before the mobile and net control find each other on some other channel.

And you need to practice for certain situations where even the slightest error—such as transposing digits in an address—could actually *kill* somebody in need of medical treatment or fire and rescue response. People need a training ground first. They also don't know what they can do until they try. And if you never give new volunteers jobs you, or they, believe they might not be able to do, they'll never develop new skills or the confidence to teach familiar skills to other volunteers.

Less Talk, More Action

Sun Tzu might have been telling us how to keep our volunteers challenged and interested when he wrote:

"Employ the entire group like employing a single person. Employ them with actual tasks, do not talk to them."

People can go to meetings together for years and still not really know each others' names or anything about what each of them can be counted on to do in an emergency. The biggest benefit of Field Day and similar exercises may be finding out who keeps a sharp knife in his pocket, who can solder a PL-259 in the rain without a ruler or an instruction sheet, and who can be counted on to get the other station's call and log the time of the contact—even when the mosquitoes are biting and the only light is from the frequency display on the rig.

When operators know each others' abilities, and trust each other to do what's needed, they rise above what you'd expect from "hobbyists." In the words of Sun Tzu, *"They enlist without being drafted, are friendly without treaties, are trustworthy without commands."*

Get Momentum on Your Side

We hear the phrase so often that it may not seem impressive any more: "Ordinary people doing extraordinary things." What makes this possible?

People don't do extraordinary things when they're bogged down in time-wasting confusion. For example, when your tools aren't where you can find them, you won't fix something when you first notice it's broken. You'll wait until you need it, then chew yourself out for not being able to find the 15-watt soldering pencil that you need to repair that connector.

Will you spend 15 minutes looking for the right tool, or will you spend half that time melting the connector by using the big soldering gun that's right on the bench in front of you? This isn't the choice that should be facing you when you're running on generator power, the phone won't give you a dial tone, and your neighbor needs to know the location of the nearest hospital that still has lights and water.

Keeping your tools in order, your patch cords and adapters close at hand, and your "go bag" ready to "go" are all part of the process of keeping momentum with you and not against you.

As Du Mu wrote in his 9th-century commentary on *The Art of War*, *"Roll rocks down a ten-thousand-foot mountain, and they can not be stopped: this is because of the mountain, not the rocks."*

Prior preparation is a mountain, from which you can roll down upon an emergency like a boulder going down a slope. When you know you can do what's difficult, you'll dare to try the impossible.

"We are the medium, not the message. The press release after the fact can explain what we did."

Let's Roll

In an earlier column, I suggested that it was folly to show up at an emergency site with spare batteries, spare radios, but no spare food or supplies for the operators. Well, the Chinese masters would disagree with me about the best strategy to follow in these matters.

"It takes twenty pounds of provisions to deliver one pound of provisions to a distant army," wrote Zhang Yu during the Sung dynasty (sometime around the 10th century). He and other commentators were elaborating on Sun Tzu's warning that long supply lines are the death of any effort in the field.

It follows that ham volunteers, who are providing specialized skills and equipment, should be able to rely on other vol-

"The need for reliable signaling devices is ancient indeed, and hams are part of a tradition that is much, much older than the technology of radio...."

unteers or public safety agencies for unspecialized support, like making sure that everyone has a place to eat and something on the plate when the bell rings.

I also said in an earlier column that we should not be shy about spelling out, in advance, exactly what we'll do to support an activity and where our commitment has to have a boundary. If I'm going to treat the Chinese masters as an authority in other areas, I should respect their advice here as well.

When Do We Go Home?

The current political scene has made a cliché of the phrase, "exit strategy." Members of Congress use it when they want the Executive branch to predict what may not be predictable, such as to say in advance when military forces will leave a situation that places them at risk.

We, too, face the impossibility of knowing exactly how events will unfold. But we should have at least a framework in place for phasing out our efforts as a situation comes under control, so that hams can return to their homes and families and so we leave before we're perceived as wanting to keep playing the hero after we're not really needed.

"The important thing is victory, not persistence," wrote Sun Tzu. To us, what this says is that the important thing is not how many hours of effort we contribute, but how many lives we save, or how many trained experts we can free from routine communications chores so they can do things that we're not able to do, like fighting fires that involve hazardous materials, or retrieving people from buildings on the verge of collapse. Being there when we're needed, and turning things over in a systematic way after (typically) 72 hours to mobilize the regular forces, is what we should aim for.

Communications... or Chaos?

But during those 72 hours, the role of radio can be extraordinary.

I took some flack from local telephone company employees, many of whom are hams, when I issued a press release that said the west coast blackout included phone service outages. Some of them suggested that I must have been saying this because I assumed it to be true, but said they had observed no such problems.

Well, what I know is that when the outage hit, I picked up the phone to call the power company and let them know. (We've had enough outages due to a single local transformer, for example, that I don't assume someone else will tell them.) I was unable to complete a local call; I just got messages saying, "Circuits are busy, please try again."

On my cellular phone, whose number is even in a different area code from my home phone, I didn't even get a message of this kind, just a dropped carrier after I dialed the number. Obviously, both systems were saturated, either due to loss of capacity or a sudden jump in demand.

Frankly, I don't care which it was. If I'd needed to make an emergency call, I'd have felt dangerously cut off. Except, of course, that I did have a charged gel cell and a ham station that's set up to switch from line power to battery power by replugging one power strip from one cigarette-lighter-type socket to another.

Carrying on an Age-Old Tradition

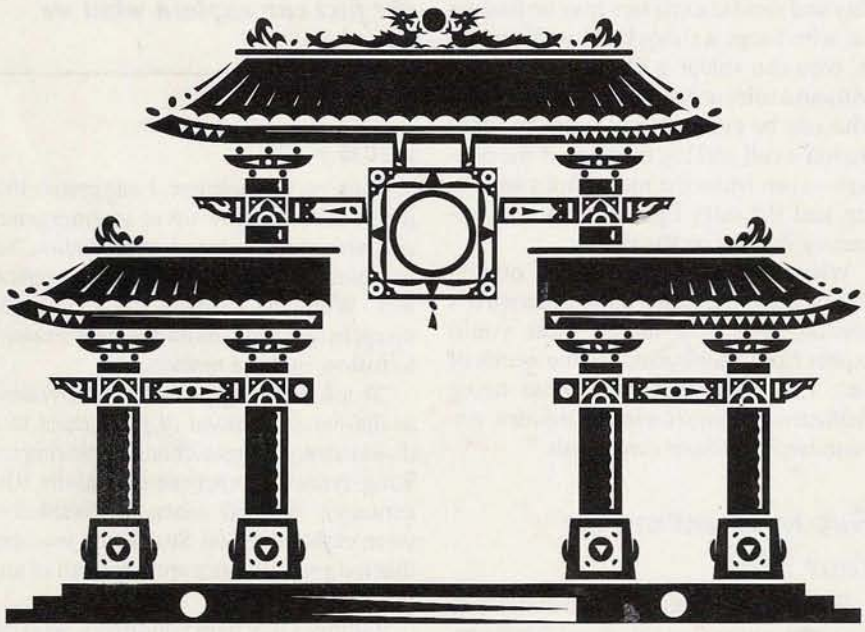
Sun Tzu had the right idea: *"Words are not heard, so cymbals and drums are made. Owing to lack of visibility, banners and flags are made. Cymbals, drums, banners, and flags are used to focus and unify people's ears and eyes."*

The need for reliable signaling devices is ancient indeed, and hams are part of a tradition that is much, much older than the technology of radio when we "unify people's ears and eyes" with our skills, our equipment, and our preparation—always, always our preparation.

"Using order to deal with the disorderly, using calm to deal with the clamorous, is mastering the heart." So wrote Sun Tzu, 2000 years ago, not long before another great teacher came among us to say that we should do for others what we would like them to do for us.

In this season, when so many of us celebrate that teacher's birth, it's well for us to remember that what we do is nothing new. Caring people have been looking out for their neighbors for as long as people have been settling in communities.

It's a good time of year to remember that. Happy holidays and a joyful New Year to you, your families, and your friends—in your town, and on the air. ■



Writing in China nearly 2,000 years ago, the philosopher Sun Tzu offered valuable lessons for today's hams in, of all things, a book titled The Art of War.

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Time to Broaden Our Thinking and Narrow Our "Splits"

Amateur repeater technology is standing still while the commercial FM world grows ever-more efficient. It's time for us to act, as well.

When I look back at the history of amateur radio, I see that it was the amateurs who used to lead the way in communications. It now seems that we have become complacent, particularly with regard to spectrum efficiency at VHF and UHF frequencies.

In the past, when there was a problem with overcrowding in the high-frequency area, the amateurs responded with single-sideband (SSB) transmission techniques, thus attaining at least a two-fold increase in the number of conversations possible at any given time. This did have a cost, though. The old AM rigs had to be retired and new equipment purchased. But in the end, we all benefited because more of us could be on the air at the same time. I must admit that the old AM rigs sounded better, but the SSB radios are more efficient in both spectrum and power.

So is there any need for us to follow a similar path in other areas of our valuable spectrum? Look at the 220-MHz band: we lost two Megahertz and all the existing users crammed themselves into the remaining three Megahertz. Could they have done something to accommodate everyone and even add channels? What about the totally coordinated bands of 420–430 MHz and 440–450 MHz? In most urban areas, when a coordinator is contacted, they tell you "no available channels." So is there an answer? What have other radio services done to improve spectrum efficiencies?

Learning from Other Services

We do not have to look far to see what is happening, and it is time for us to make plans to implement changes to improve the use of our valuable radio spectrum. Let's look at the business radio sector, for that is where our FM heritage comes from. It was the Motorolas, Dumonts, RCAs, GEs, and other business-band radios that the amateurs modified and started using on the ham bands. It followed that the bandwidths and channel spacings used by the commercial radios was also used by the amateurs.

"Let's look at the business radio sector, for that is where our FM heritage comes from."

The first channel spacing used was 100 kHz, and those early radios used "wideband" FM, with +/- 25 kHz signal deviation. That may be hard to believe today, but there were not very many users and most business communication was between 30 and 50 MHz, with a few users around 150 MHz. As the user base increased, channel spacing was reduced to 50 kHz, thus doubling the channel capacity (and making the older radios "surplus," and cheaply available to hams). At the same time, the FM deviation was reduced to 15 kHz either side of the center frequency.

Many of the old tube-type FM two-way radios of the 1950s were originally set to 50-kHz channel spacing. Then, in the early '60s, many of these radios were converted to "Narrow Band" 25-kHz spacing, with 5-kHz deviation (the current standard for amateur narrowband FM deviation). This was accomplished by either changing or modifying the IF filters. I can remember doing it to a lot of GE Progress Line radios. There was also a simple modification to the transmitter to improve the modulation. But again, progress was made. There were now four times the number of channels available to meet the ever-growing demand.

Beyond 5 & 25

So was that the end? Did business radio stop at 25 kHz channel spacing? No, it was soon apparent that still more frequencies were needed, and in the 1980s, an additional split was implemented in the 450-470 MHz band at 12.5 kHz, again doubling the number of channels. Since spacing was now very tight, a power limitation of 2 watts was placed on these 12.5-MHz "offset channels" to lessen interference to the main channels.

Now we have the Telecommunications Act of 1996 which, among other things, will further split the commercial channels to 6.25 kHz at 460 MHz. That is 16 times the number of original channels. And the old low power channels become high power channels. At 150 MHz, the channels are being split to 7.5 kHz. Naturally the deviation has to be reduced again, this time as low as 2.5 kHz.

And What About Us?

So are we going to cruise along at our current channel spacing of either 15 or 20 kHz at 144 MHz and 25 kHz on 440 MHz? Or is it time for a change? The manufacturers are already gearing up for the changes in the commercial radio services, so it would not be hard for them to include the better filters and stability in the amateur radio equipment that they produce. Most of the existing repeaters

By Rod Wheeler, WA6ITC

"The Telecommunications Act of 1996...will further split the commercial channels to 6.25 kHz at 460 MHz. That is 16 times the number of original channels."

could have their IF filters changed to work on tighter channel spacing. Let's get on the bandwagon, because if we are not using our spectrum efficiently, maybe someone else will.

This change cannot happen overnight. Some of the current equipment can be used at reduced bandwidth if precautions are used, such as low power operations at *both* the repeater and mobile stations and the use of CTCSS encoding *and decoding*. (We ran several tests where I work when we changed to the 12.5-kHz commercial split. We found that the biggest help in the rejection of unwanted adjacent channel interference was CTCSS decode versus carrier squelch. It provided a 40 db increase in rejection. We also replaced the 455-kHz "D" filters with "G" filters to tighten the IFs.)

In the long run, the use of AFC (Automatic Frequency Control) has to go and be replaced by high stability oscillators. To further improve adjacent channel problems, the deviation on all channels could be reduced to 4 kHz, thus increasing the guard bands.

What would we end up with? Twice the number of repeater/simplex channels and better use of our spectrum, all with minimal impact on current equipment. Plus, a foot in the door for the next generation of equipment capable of operation on 6.25-kHz channel spacing. On the 144-MHz band, we should look to 10-kHz channel spacing to provide the same benefits as 12.5-kHz spacing on 440 MHz.

A Plan for "Splinter" Channels

Here in California, where I live, the vast majority of the 440-MHz repeaters are listed in the *ARRL Repeater Directory* as either "closed" or "private." Plus, many of them are linked together in systems that repeat the same transmissions simultaneously on several different frequencies. It's good for keeping frequencies occupied, but very inefficient spectrum use. In addition, most of these repeaters—and even many "open" machines—are quiet most of the time.

How about making use of the spectrum between these usually-quiet repeaters? Let's open up 12.5-kHz splits on 440–450 MHz to low-power operation of 10 watts or less and try and get the main repeaters to lower their power to, say, 25–50 watts. Interference potential can be further reduced if *all* the repeaters reduce their deviation to 4 kHz and use full CTCSS operation (encode and decode). Then, we can start changing IF filters to narrow filters and think of replacing outdated equipment with gear designed for 12.5-kHz channel spacing (frankly, a lot of new radios already work fine with 12.5-kHz spacing).

With this sort of arrangement, we could handle twice as many amateurs in the same amount of spectrum space. Maybe there could even be some available channels for our new generation hams to build on and bring new technologies to our hobby. Why is there not a trunking repeater system for the amateurs? Maybe some amateurs could try a pair of 6.25-kHz channels in a 12.5-kHz slot. How about 10-kHz spacing at 144 and 222 MHz? We cannot afford to stay as we are. As we have seen all too clearly in recent months, there are too many others watching—and wanting—our spectrum. ■

"We cannot afford to stay as we are. As we have seen all too clearly in recent months, there are too many others watching—and wanting—our spectrum."

Editor's Note: WA6ITC's closing question about trunked amateur repeater networks is something that's been on my mind for a while, and it's a topic on which I'm planning an article next month. Whether you agree or disagree with the opinions expressed above, or the trunking proposal I'll outline next month, we can no longer hide our heads in the sand. We must start talking about ways to improve spectrum efficiency without sacrificing communication quality. This much is certain: If we do not start making better use of our frequencies, especially on VHF and above, we will be at grave risk of losing them. Let us hear your ideas, too.

• • •

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

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

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Oops!

In October's "Basics" article on "Calling Frequencies," we incorrectly listed the 3-centimeter (10 GHz) band CW/ SSB calling frequency as 10,368.000 MHz. The correct frequency is 100 kHz higher, at 10,368.100 MHz.

It looks like we're in good company, though. Both the *ARRL Operating Manual* and the *ARRL Repeater Directory* list the incorrect frequency (it's published correctly in the ARRL's *Your VHF Companion* and CQ's *The VHF "How To" Book*). Tnx to WA1MBA for pointing out the error.

Announcing

Call for Papers

According to conference chairman Jim Worsham, WA4KXY, the newly-formed South Eastern VHF Society is looking for papers and presenters for its first annual conference, scheduled for April 4–5, 1997, in Atlanta. For conference/paper information, contact Tad Danley, NZ3I, 2045 Amber Creek Dr., Buford, GA 30519; Phone: (770) 513-9252; e-mail: <tad.danley@nextel.com>, or visit the SVHFS Web page at <http://www.akorn .net~ae6e/svhfs/svhfs.html>.

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- "Driving the Public Service Highway," by Ken Collier, KO6UX
- "Using Propagation Beacons," by E. R. Hall, Jr., WD4GSM
- "Build Your Own 6-Meter Beacon," by Ken Neubeck, WB2AMU
- "W4B: Reaching for Europe on 2 Meters," by Rich Moseson, NW2L

Plus...

- "The VA7SKI DXpedition," by Scott Leaf, VE7VDX
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- "Build Your Own 2-Meter Notch Filter," by Jim Ford, N6JF

If you'd like to write for *CQ VHF*, send a request for writers' guidelines via e-mail to <CQVHF@aol.com>, or with an SASE (self-addressed stamped envelope) to *CQ VHF*, 76 N. Broadway, Hicksville, NY 11801.

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