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NOVEMBER 2000

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On the cover: Homebrew artist Randy Henderson, WI5W, of Oklahoma City talks into his homebuilt microphone, attached to his homebuilt transceiver, attached to his homebuilt amplifier! Details on page 104.

THE RADIO AMATEUR'S JOURNAL

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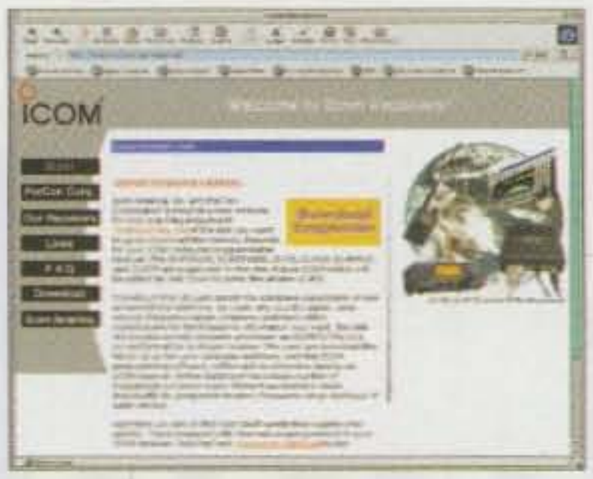

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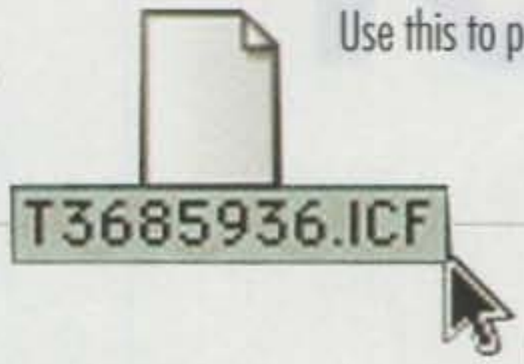

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PROVEN PERFORMANCE

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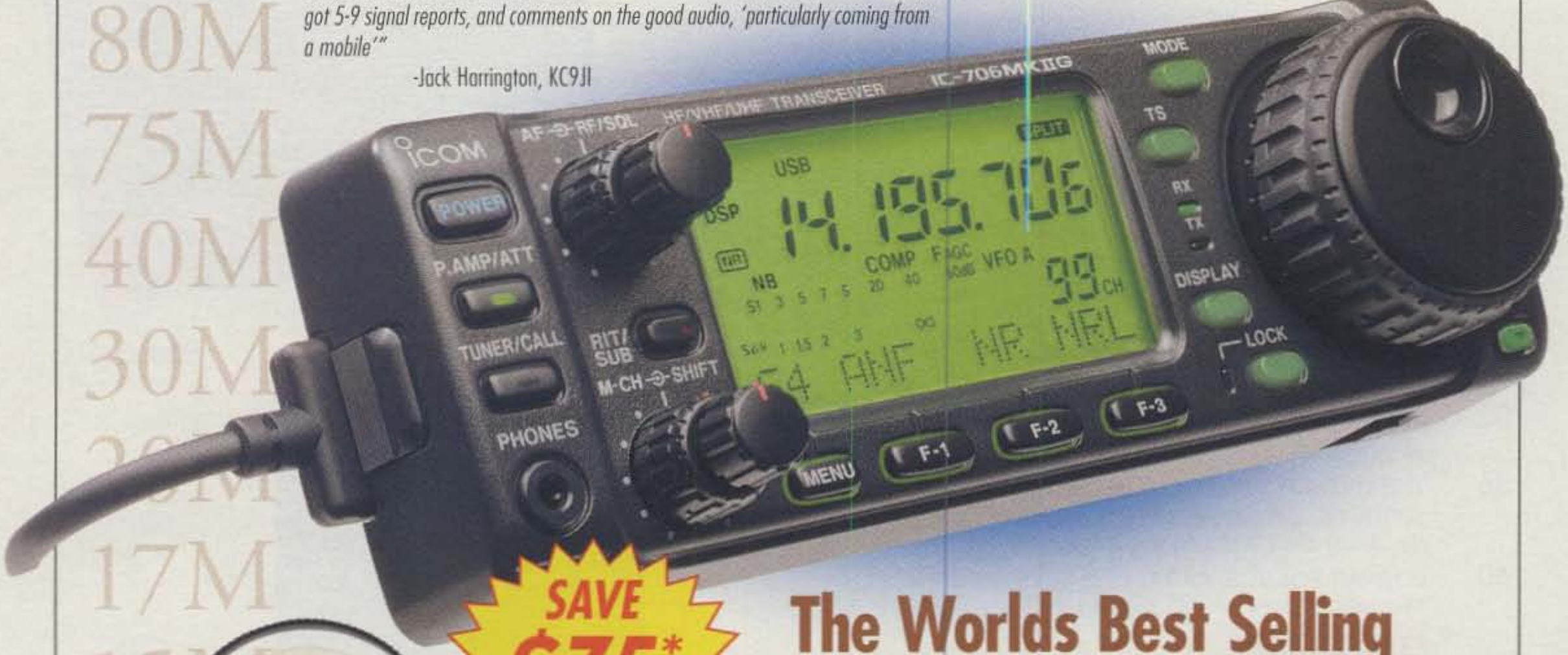
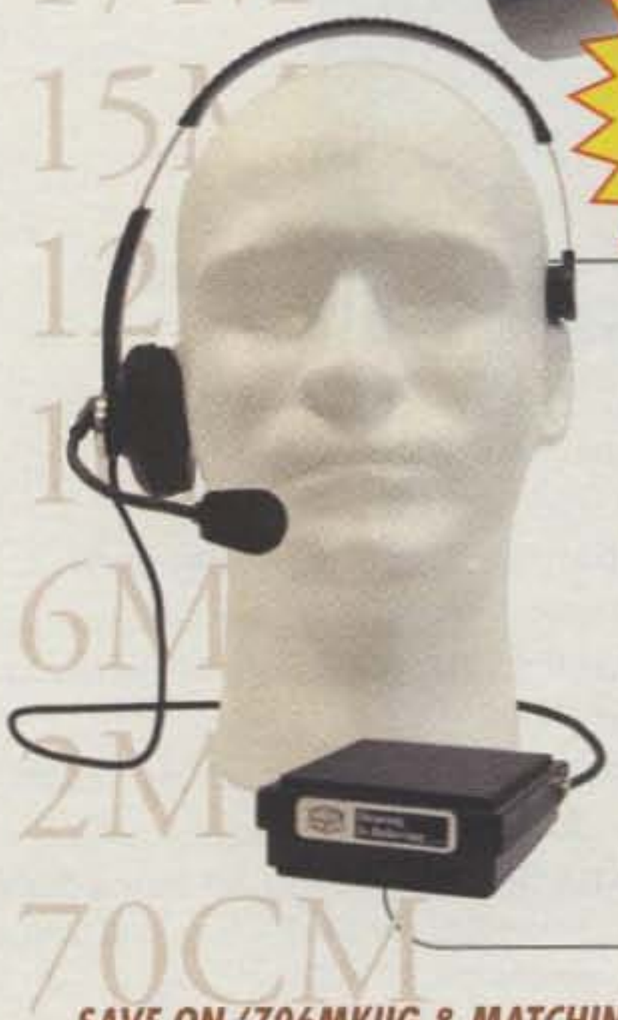
-Jack Harrington, KC9JI

"Great portability vs. Performance ratio. It's great to have a radio where you can talk on your local repeater, work on your mobile DXCC total and still not miss out on 6M openings!"

Kevin Olson, K3OX





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CQ Amateur Radio

NOVEMBER 2000 VOL. 56, NO. 11

FEATURES

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page 96

DEPARTMENTS

There's a Kenwood in your Future!

World's 1st HF Backlit Front Key Panel

…The All New Kenwood All Band/All Mode Transceiver **Coming Soon!**

Never before has an Amateur radio product provided such high performance and versatility. The new Kenwood transceiver is in a class by itself and will no doubt become the most desired All band/All mode Amateur transceiver ever produced. With Amsat's Phase 3D soon on the horizon, Amateurs everywhere will be looking to the sky to experiment with this exciting breakthrough in our hobby. Kenwood's new transceiver offers full functions on all HF bands as well as 6 meters. This is just the right equipment you'll need for making quick contacts. You'll discover it's dependable performance combined with easy operation will provide Ham operators a level of enjoyment impossible until now. VHF/UHF 144/440/1200 MHz operation is also available on the main band. Additionally, the sub-band offers 144/440 MHz operations for satellite TX/RX.

The All band/All mode transceiver also offers the following features that you could be missing on your current All-band/All mode transceiver: True IF-Stage DPS with 100% digital filtering; built-in auto antenna tuner; the world's first HF backlit front key panel; 5 antenna ports; transverter ready; 9-pin db connector for easy PC interface; built-in TNC; DX packet cluster monitoring with direct go-to function for HF and 6 meter openings; CW auto-tune…to name just a few.

Not only does the new Kenwood transceiver provide the most features and performance of any All band/All mode transceiver but it delivers exciting versatility by offering a traditional station radio or mobile head/no controls (black box) unit. It also can be operated by the ARCP computer control program to take control of most functions direct from your PC.

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Ham Radio News

From The CQ Newsroom

Phase 3D Launch Date Set

The international AMSAT Phase 3D satellite may finally be launched, after years of delays. Arianespace, which will launch Phase 3D atop an Ariane 5 rocket, says liftoff is now scheduled for October 31. Phase 3D is the most-sophisticated ham radio satellite ever built. It will operate on nine bands between 21 MHz and 24 GHz, with both analog and digital transponders, along with a camera that will transmit photos of Earth back to hams on the ground.

The AMSAT launch team—made up of hams from the U.S., Germany, Finland, and Belgium—gathered in early September at the European Space Agency's South American launch site in Kourou, French Guiana. They found the satellite to be in excellent condition and began conducting final tests of all spacecraft systems. As of press time, all tests had been successful, according to the AMSAT News Service.

Arianespace gave the green light for the Halloween launch after the successful launch of two commercial satellites aboard another Ariane-5 in September.

AO-27 Back on the Air

Rounding out our space news for this month, controllers report that the popular FM satellite AO-27 is back on the air after a computer crash. AMRAD, which built and launched the satellite, announced that it was returning to regular operation as of September 9, but that several shutdowns of the FM repeater were planned over the next several months to enable controllers to gather data and verify the satellite's continuing health. These shutdowns, according to the AMSAT News Service, will each be several days long.

Ham Gear Stowed Aboard International Space Station

The initial equipment for ham radio operation from the International Space Station (ISS) was delivered to the station in September (along with a few thousand pounds of additional material) by astronauts aboard the shuttle Atlantis. All three members of the ISS Expedition One crew have ham licenses, and some operation is possible soon after they arrive at the orbiting laboratory in early November (at press time, their launch was scheduled for October 30).

For more information on ARISS (Amateur Radio on the International Space Station) see a special "Amateur Satellites" column (p. 16) and the "VHF-Plus" column (p. 98) in this issue, and KC4YER's exclusive interview with the Expedition 1 crew members in last month's issue of *CQ*.

FCC: "No Business" Means "No Business"

Two hams have received warning letters from the FCC to stop conducting business activities on ham radio.

One ham in Nebraska was allegedly offering for sale "numerous items of Amateur and CB equipment, weather radios and marine radios and other items," according to a letter from FCC Special Counsel Riley Hollingsworth, K4ZDH, as well as offering "consignments, lay away plans and referrals for bank financing..." In the letter, Hollingsworth told the ham that these activities do not meet the narrow exception in the FCC rules designed to permit occasional sales of ham gear via on-air swap nets.

In addition, a Florida ham who apparently works for a company that markets traffic reports was warned by Hollingsworth to stop soliciting traffic information on amateur repeaters for relay to his employer. The letter also said the FCC had evidence that the ham had indirectly threatened ARRL Official Observers who sent him notices, had refused requests by certain repeater trustees to stop using their repeaters, and that he used repeaters "to extensively discuss business dealings regarding computer equipment." All of these activities, the letter warned, violate FCC rules.

The first ham was advised to familiarize himself with the amateur rules, while the second was given 20 days to respond in writing to Hollingsworth.

Case(s) Closed

The FCC has closed two investigations of possible improper activities by hams without taking any action. In Ohio, where there were allegations that a RACES net had been called up without authorization, primarily for making Workers' Compensation available in case of any injuries, FCC Special Counsel Riley Hollingsworth, K4ZDH, wrote to two Assistant RACES Directors, advising them that he had reviewed their responses to his initial letter and found no violations of FCC rules.

In addition, an inquiry into alleged irregularities in a VE test session in Yonkers, New York, was closed without any action being taken against the examiners. After reviewing all of the materials and statements from the participants, the FCC dismissed three license grants, approved one other, and found that the VEs had not acted improperly.

FCC Backpedals on Repeater Coordination

In a follow-up on a story in last month's "Ham Radio News," the FCC has now backed off from an August letter to Arkansas repeater owner Tom Lee, AC5RU, telling him that his repeater was uncoordinated and, therefore, he was solely responsible for resolving an interference problem. In two letters dated September 14, FCC Special Counsel Riley Hollingsworth, K4ZDH, said that additional information made it clear "that the issue regarding proper coordination is unclear and that the matter is not appropriate for enforcement action at this time." Hollingsworth urged all parties to avail themselves of the services offered by the ARRL's mediation and dispute resolution program.

New Repeater Coordinator in NY

On the topic of repeater coordination, there appears to be a new group trying to take on the task of amateur frequency coordination in the New York City area. The region has been without a repeater coordinator since the Tri-State Amateur Repeater Council (TSARC) became inactive several years ago. The new group calls itself "MetroCor," for the Metropolitan Coordination Association, and says it is "a totally new organization," according to the "Hudson Loop" newsletter, which is edited by MetroCor's new President, Stephan Anderman, K2SMA.

According to Anderman, the group has notified the FCC, the ARRL, the National Frequency Coordinators' Council, and spectrum management groups in adjoining areas of its intention to take on frequency coordination in the New York metro area. He also said the group had declared a moratorium on new coordinations until June 30, 2001, in order to give existing systems time to renew or re-register their coordinations through MetroCor. There is no accrediting body for repeater coordinators, so the new group's legitimacy will be based entirely on its acceptance by the repeater community in the area it serves.

W5YI: Numbers of General/ Extra Class Hams Way Up

Amateur license restructuring has given a tremendous boost to the numbers of hams holding General and Extra Class licenses, according to Fred Maia, W5YI, Editor of the *W5YI Report* and a *CQ* Contributing Editor. Maia says the num-

(Continued on page 130)

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Zero Bias

BY RICH MOSESON, W2VU

An Editorial

The FCC, Kenwood, and Restrictive Covenants

Last April, we discussed in detail two seemingly unrelated matters before the FCC: (1) the ARRL's petition for reconsideration of the Commission's refusal to extend the antenna and tower standards in PRB-1 to so-called "restrictive covenants" or "CC&Rs" (see "Zero Bias: Dairy Farms, Antenna Farms, and the 14th Amendment"); and (2) a dispute between Kenwood and the ARRL over the legality of Kenwood's Sky Command System for remotely controlling an HF rig with a VHF/UHF handheld (see "At Issue: ARRL vs. Kenwood Sky Command"; both articles are available on the *CQ* website).

The FCC handed down a rather troubling decision that sided with the ARRL on the Sky Command issue. The fact that the ruling went against Kenwood isn't really what's troubling, though, and it isn't really surprising either. The rules here are murky enough and the impact narrow enough that Wireless Telecommunications Bureau Chief D'wana Terry (who issued the ruling) was not about to break new ground on her own. The rules are murky because they were written two decades ago to deal primarily with over-the-air remote control of repeaters, links from multiple repeater receive sites, and on-air links between repeaters. Kenwood's Sky Command system is not a repeater, in that its primary purpose is to permit a single licensee the ability to remotely control his/her own HF station via a dual-band handheld.

We feel there is enough merit in Kenwood's system that the FCC (the full Commission, not just the WTB Chief) should consider revising the rules to permit it, and others like it, with proper safeguards against interference and "frequency ownership" claims. Perhaps Kenwood could sit down with the ARRL—which opposed Sky Command only on the basis of its use of 2 meters, where auxiliary operation is not permitted under the current rules— and jointly develop a proposal to allow such a system to operate using a typical dual-band HT. Regulations should not impede technical advancements, but should change to accommodate them while continuing to serve their original purpose.

The CC&R Connection

With all due respect to our friends at Kenwood, though, what was most troubling to us about the FCC's ruling was a paragraph that really had nothing to do with the issue at hand. In refuting Kenwood's claim that its system could help hams trying to operate from antenna-restricted locations, the ruling read, in part:

> Kenwood argues that grant of a waiver would be in the public interest because it would allow amateur service licensees to operate their HF equipment from areas with limited physical space or from neighborhoods that have restrictive covenants prohibiting outdoor antennas. As an initial matter, we note that such constraints do not necessarily prevent amateur service stations from transmitting on the HF amateur service bands. It is our understanding that amateur radio operators in apartments have used antennas designed for operating from cars and "slinky-type" antennas to transmit on the HF bands from locations that do not allow permanent outdoor antennas and towers. We also note that it is our understanding that some of these restrictive covenants prohibit only antennas that are visible from the front of the dwelling or that are above the roof line, thereby allowing certain HF antennas such as ground-mounted verticals. Other amateur radio operators have used attic antennas or hollow flagpoles as support structures for HF antennas or have chosen to operate on the HF bands from mobile stations.

This is very troubling, because it appears to be an advance indication of the Commission's feelings on extending federal preemption to include restrictive covenants, or CC&Rs. For those who missed the April issue, the FCC last year turned down an ARRL request to extend the protections of "PRB-1" to include private communities and homeowners' associations, even though it has pre-empted similar restrictions on broadcast and satellite radio and TV reception. The League has asked the FCC to reconsider, and to date there's been no decision on that request, which we strongly support. In fact, it is our opinion that *these restrictive covenants are the greatest single threat facing amateur radio today.*

The logic used in the FCC ruling is truly mind-boggling, though. A ham's ability to get on the air under adverse conditions does not change the basic injustice of these restrictive covenants or the fact that they operate outside the law. The fact that these homeowners' associations operate outside the protections of the law is becoming more and more apparent outside the amateur radio community as well.

The lead editorial in my local newspaper (the Newark, New Jersey, *Star Ledger*) on September 6 was entitled, "Rein in Homeowner Boards," and it talked about efforts at the state level to regulate these boards. It read, in part:

> In many ways, homeowner boards have become miniature town governments, with almost as much clout on some issues. They can regulate everything from the color of a front door to the use of an outdoor clothesline or width of a patio. They can assess fines or place liens on the property of those who don't pay fines. They can spend money on big projects that jack up yearly association fees, the equivalent of a second property tax.
>
> Experts estimate that 800,000 New Jerseyans live in communities governed by such boards, and the number is growing. Some of the communities are large enough to be bigger than many traditional small towns. But the boards don't have to operate under all the checks and balances that regulate local government... (and) there is no shortage of horror stories.

Speaking of horror stories, and getting back to amateur radio, the ARRL is trying to bolster its case before the Commission with specific stories from hams whose operating has been severely curtailed or eliminated by homeowner association rules. Here are the specifics of the League's request, from the August 18 issue of the *ARRL Letter:*

> The ARRL has begun compiling a dossier of amateurs' experiences with CC&Rs—covenants, conditions, and restrictions. Imposed by private homeowners' associations or by developers, CC&Rs—also known as "restrictive covenants" and "deed restrictions"—often impede or prohibit the installation of outside antennas...
>
> The ARRL is inviting narratives from amateurs who now are or have been denied the opportunity to install an antenna or support structure on a dwelling they own because of CC&Rs. Narratives should relate directly to situations involving restrictive covenants and should be no longer than one page for inclusion in the CC&R database. Submittals should include name, callsign, the address at which you were denied the opportunity to put up an antenna, and the basis upon which you were denied or would expect to be denied. Participants should include a copy of the contract language that would exclude your antenna or support structure and copies of any denial letters from a homeowners' association.
>
> Submittals should be sent to ANTENNAS, c/o Steve Mansfield, N1MZA, American Radio Relay League, 225 Main St, Newington, CT 06111. E-mail submittals are welcome to <smansfield@arrl.org> with the subject line "ANTENNAS."

If you have personal experience with these restrictions, we urge you not only to tell your story to the ARRL, but also to write to the FCC, tell the commissioners how these restrictions have affected your ability to operate your FCC-licensed station, and urge the commissioners to reconsider the ARRL's petition. A copy sent to your Congressional representatives couldn't hurt either.

Do the math!

2:1 Bandwidth (kHz)

40M	150
30M	>50
20M	>350
17M	>100
15M	>450
12M	>100
10M	>1500
6M	>1500

6 10 12 15 17 20 30 40

Meter Vertical Antenna

Rig+Amplifier+Tuner+R8=Performance

What happened to the multiband vertical antenna? For years, multiband verticals with their own counterpoise systems have been the answer for operators in need of a single omnidirectional antenna capable of working all of the desired bands within a small footprint. They were compact, easy to install and didn't require radials making them the perfect choice in many instances.

What happened?? The tuner is what happened. Thanks to the tuner, Hams are now capable of running more mismatched power from their solid state rigs to their antennas than ever before. Although the tuner has obvious merits, combining eight HF bands into thirty odd feet of antenna does not come without some concessions to the laws of physics. Clearly, the ability to tune across the bands combined with an amplifier adds new elements to the traditional multiband vertical equation.

The R8 is the obvious answer. The R8 will allow you to safely run a 3.0:1 VSWR mismatch at 1500 watts CW without damaging its sophisticated components*. The antenna is also quite broadbanded and is less likely to be as sensitive to its surroundings. Equally important, the antenna only has two traps that have been designed to virtually eliminate damage due to moisture induced arcing.

Call your dealer and order one today! The end result will be another equation that you will grow to appreciate.

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We reiterate our April opinion that the FCC—as it has already done in the case of broadcast TV, radio, and satellite receive antennas—needs to pre-empt restrictive covenants that bar or greatly restrict amateur antennas and apply the standards of PRB-1 to private as well as public regulations. The federal government traditionally has tried not to interfere with private contracts, which these regulations technically are, on the assumption that responsible individuals are capable of negotiating an agreement without government intrusion. There is no possibility for negotiation in most of these instances, though. It's either accept these rules or live someplace else, and often the only choice in a given geographic area is another planned community with similar non-negotiable rules. These are not true contracts; they are mini-dictatorships. And frankly, the problem goes far beyond amateur radio.

When living in a given location in the United States is subject to a requirement that you give up a carload of individual rights, then there is something fundamentally wrong. The Constitution guarantees each citizen equal protection of the laws and enumerates certain inalienable rights. The power of these associations to take away these rights and to treat residents of one housing development differently than their neighbors is, in our opinion, unconstitutional and un-American. Something needs to be done, preferably on the federal level so there is uniformity from one state to the next, and the FCC is in the position to begin that process. Actually, it has already begun the process. It needs to continue.

Another Case for Pre-Emption

Elsewhere in this issue you'll find an "Op-Ed" piece by James Alderman, K5FWT, making a case for FCC pre-emption of state and local regulation of cellular telephone usage, and why it's an issue that he feels should be of particular concern to hams. I'll let him make his arguments and let you decide how you feel about them, but I just wanted to add a personal note to the debate over the safety of cell-phone usage while driving.

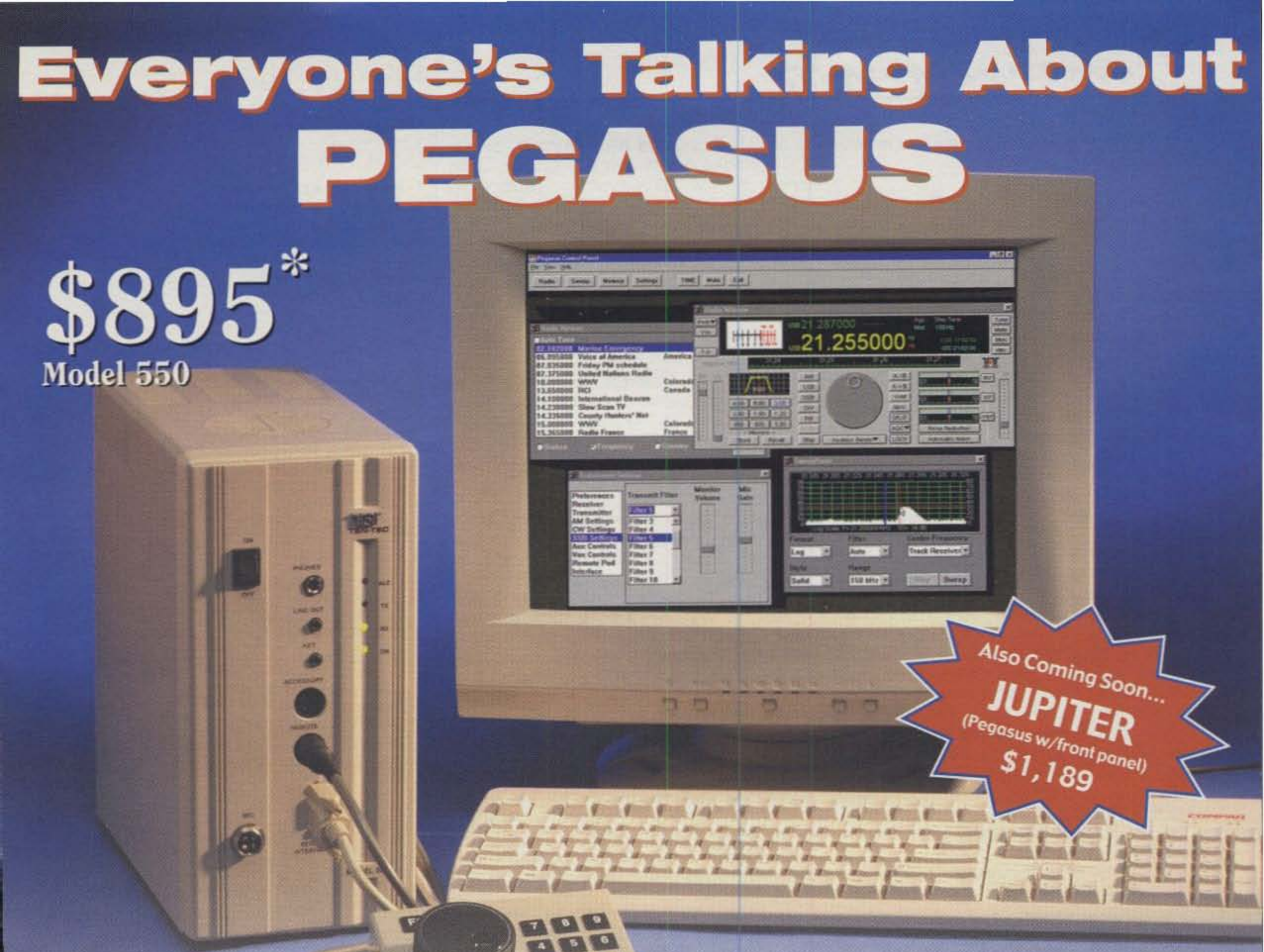
On the way to Maine for a vacation last August, my family and I encountered a car on the interstate that was being driven very erratically. The driver swerved in front of one vehicle with inches to spare, then pulled away. We backed off a bit and watched as the driver continued to weave all over the highway. After a minute or so of this, we got out our cell phone and dialed 911 (yes, folks, I used the cell phone instead of trying to find a repeater with open autopatch or someone who'd manually patch us through to the police). The state police dispatcher kept me on the phone for at least 10 minutes, as we continued tracking this vehicle and reporting on variations in lanes and speed (which ranged between 35 and 55 mph), until we reached a point where a trooper was waiting, pulled in between us, observed the car himself for a few moments, and then pulled over the driver.

Both the dispatcher and the trooper thanked me for (a) making the call, and (b) staying on the line until the stop could be made. At no point was it suggested that I hang up lest I create an additional hazard. In fact, the dispatcher specifically asked me to stay on the line. The key question to ask here is how many lives would have been endangered by my *not* using my cell phone while driving? We personally observed at least three near-collisions while driving behind this person.

Careless driving is dangerous, no question about it. But it's no more dangerous if you're distracted by a cell-phone call than if you're distracted by eating your breakfast, reading the newspaper, or checking your e-mail while driving down the highway. And not every driver using a cell phone is distracted, no more than a ham (or a police officer) operating a radio while driving is necessarily distracted by doing so. This is because the device itself is not the main distraction; it's the conversation. And if cell-phone use in cars is

(Continued on page 10)

Everyone's Talking About PEGASUS



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$139* Model 302

Whether you're listening on the bands or reading the mail here at TEN-TEC, the message is the same - PEGASUS is the most intriguing new development in amateur radio. Combining the power of your own PC with cutting edge IF-DSP, TEN-TEC is the first to offer this HF innovation at such an affordable price. Take a look at what owners have to say:

"Love this radio...all reports great...."
- Brad Mackay, WE4DX

"Outperforming a recent HF transceiver from a competitor that costs three times as much."
- Dave Garner, WA4YRK

"This is an impressive product."
- Ted Mackinnon, NW8W

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- Richard Maxwell, K3BL

"It is a wonderful radio."
- Norm Creller, W8MPM

"The receiver is quiet with beautiful receive audio."
- Jim Cox, K4JAF

"It took less than 10 minutes to have my first QSO."
- Paul Christensen, W9AC

"Consider me delighted!"
- Karl Heimbach, W5QJ

"It's nice to have a large number of filters to choose from."
- Mark Aaker, K6UFO

"Congratulations on an outstanding accomplishment in quality and price."
- Harvey Solomon, KQ0A

"This is a winner!"
- Charles Scheid, W3OHV

"Reports on the air have been nothing short of fabulous."
- George Shapow, NY2O

Anyone running Windows 3.1, 95/98®, will have PEGASUS operational in minutes as there is no hardware to install inside your PC. Control any transceiver function with your mouse or PC keyboard. For armchair operation, add optional Remote Encoder Keypad, Model 302. Test drive the PEGASUS before you buy - download the actual software from our website (www.tentec.com).

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$1,189

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Announcements

• The following Special Events are scheduled for November:

N2UL, from "CQ Veteran's Day," Nutley, New Jersey; Robert D. Grant ARA; 1200–2400Z Nov. 11 (no frequencies noted). For certificate send QSL to RDGULARA, P.O. Box 716, Nutley, NJ 07110-0716.

N8F, from 25th anniversary of Edmund Fitzgerald tragedy, Great Lakes Shipwreck Museum, Whitefish Point, Michigan; Stu Rockafellow ARS; 1300Z Nov. 10 to 1700Z Nov. 12 on 7.270, 14.270, 21.270, 28.370 (±20 kHz). For certificate send QSL with large SASE to Dave Langston, KB8RAP, c/o Maritz, 1000 Town Center, Suite 1200, Southfield, MI 48075.

WV8MRT, from commemoration of 100 years of radio since Marconi invented the wireless, Museum of Radio and Technology, Huntington, West Virginia; Tr-State ARA; 1700Z Nov. 4 to 1700Z Nov. 5 on 7.240, 14.240, 21.340, 28.340. For certificate send QSL and SASE to Tr-State ARA, P.O. Box 4120, Huntington, WV 25729.

• These hamfests, etc., are slated for November:

Nov. 4, **Enid, OK Hamfest Y2K**, Garfield County Fairgrounds, Enid, Oklahoma. Contact Fred, 580-242-3551; or e-mail: <N5LWT@hotmail.com>. Talk-in 147.15, 444.40.

Nov. 4, **Delaware Valley RA Hamfest,** Lawrence High School, Lawrenceville, New Jersey. Call 609-882-2240; e-mail: <W2ZQ@arrl.net>; <www.slac.com/w2zq>. Talk-in 146.670, PL131.8. (Exams)

Nov. 4, **Interstate Repeater Society Hamfest & Fleamarket**, Londonderry Lions Club, Londonderry, New Hampshire. Contact Paul, 603-883-3308; e-mail: <harold@neainc.com>. Talk-in 146.85, PL85.4.

Nov. 4–5, **2000 Odessa Hamfest**, Ector County Coliseum, Odessa, Texas. Contact Craig, W5BU, 915-366-4521; e-mail: <W5BU@caproc.net>; <http://Radioranch@qth.com>. Talk-in 145.470, 444.425. (Exams 1 PM Sat.)

Nov. 5, **Fox Cities ARC Hamfest**, Starlite Club, Kaukauna, Wisconsin. Contact John Ensley, N9RJZ, 335 W. Prospect, Appleton, WI 54911; 920-830-3194; e-mail: <N9RJZ@arrl.net>; <http://www.w9zl.ampr.org>. Talk-in 146.52. (Exams, sign in 8-9 AM)

Nov. 5, **Framingham ARA Fleamarket**, Framingham High School, Framingham, Massachusetts. Contact Bev Lees, N1LOO, FARA, P.O. Box 3005, Framingham, MA 01705 (508-626-2012). (Exams, Ed, W1NXC, 508-881-2301)

Nov. 11, **Montgomery Hamfest & Computer Show**, Garrett Coliseum, S. Alabama State Fairgrounds, Montgomery, Alabama. Contact Phil, 334-272-7980 after 5 PM CST; e-mail: <K4OZN@arrl.net>; <http://jschool.troyst.edu/~w4ap/>. Talk-in 146.24/84, call W4AP. (Exams 8 AM)

Nov. 11, **2000 Rocky Mountain Radio League Hamfest**, Jefferson County Fairgrounds, Golden, Colorado. Contact Ron Rose, NØMQJ, 303-985-8692; e-mail: <nomqj@arrl.net>. Talk-in 144.62/145.22. (Exams)

Nov. 18, **Waltham ARA & 1200 RC Amateur Radio & Electronics Auction**, Newton Masonic Hall, Newtonville, Massachusetts. Contact Eliot Mayer, W1MJ, 617-484-1089; e-mail: <w1mj@amsat.org>. Talk-in 164.64.

Nov. 18–19, **Fort Wayne Hamfest & Computer Expo**, Allen County War Memorial Coliseum, Fort Wayne, Indiana. Call 219-484-1314 (leave message); <http://www.acarts.com>. Talk-in 146.88. (Exams Sat.)

Nov. 19, **JARSFEST**, American Legion Complex, Benson, North Carolina. Contact Bill Lambert, AK4H, 919-894-3352 (7–10 PM); e-mail: <blambert@interpath.com>. Talk-in 147.270 +600. (Exams)

Nov. 25, **Evansville Winter Hamfest**, Vanderburgh Co. 4-H Center, Evansville, Indiana. Contact Neil, WB9VPG, 812-479-5741; e-mail: <Ears@w9ear.org>; <http://w9ear.org/hamfest.htm>. Talk-in 145.150, 146.925, 443.925.

Zero Bias *(from page 8)*

outlawed because of distracting conversations, what's next? Banning conversations with your front-seat passenger? Or with your kids or grandkids in the back? How many accidents result from turning around to yell at the kids vs. conversations on cell phones?

Virtually every state already has laws against careless driving. Enforcing those laws would be far better than singling out cell phones and banning their use, particularly because a cell phone is the only "distraction" among the many listed above that can just as easily save lives as it can endanger them. K5FWT has additional perspectives on this, and I urge you to read his "Op-Ed" column.

CQ Price Increase

Very few things in today's world cost the same as they did more than three years ago. The cost of a subscription to *CQ* hasn't changed since mid-1997, but our costs for paper, ink, and postage have risen steadily. We've finally reached the point where we have no choice but to increase our prices as well. Effective with this issue, a single copy of *CQ* costs $4.99 on US newsstands ($6.99 elsewhere), and subscription rates are increased by approximately $4.00 per year (or an additional 33 cents per issue). Rates for Canada, Mexico, and DX have been increased commensurately. We have tried to keep this increase small enough not to put an undue burden on our readers, while still recovering our added costs of printing the magazine and getting it to you.

Finally, since this is November, a time when we in the United States traditionally pause to give thanks for the good things in our lives, all of us at *CQ* want to give thanks to you, our readers, for your loyalty, and we hope that your monthly copy of *CQ* is counted among the good things in your life. Happy Thanksgiving.

73, Rich, W2VU

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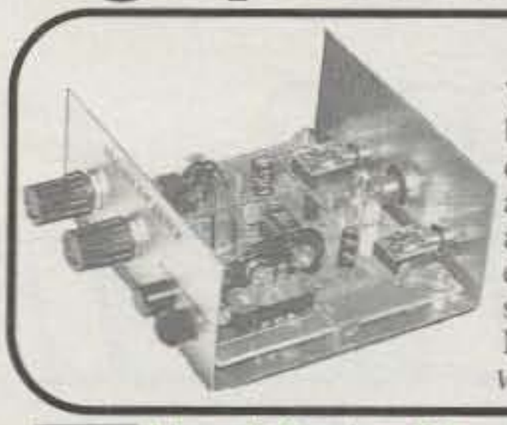

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If you're active in either the SSB or CW section of this year's CQ WW DX Contest, there's a good chance you'll pick up Zone 33 by working CN8WW on at least one band. Here's a view "through the looking glass" at last year's world-record-breaking operation from Morocco.

CN8WW and the CQ WW

How the Records Fell!

BY THE CN8WW TEAM*

The authors of this article have made the original version available for publication anywhere, so you may see this article, or something remarkably similar, in other amateur radio publications. Normally we publish only material that has been submitted exclusively to CQ, but we are making an exception in this case because the topic is our own CQ World-Wide DX Contest and CN8WW's record-breaking operations last year.
— W2VU

Many of you may have worked CN8WW during the 1999 CQ World-Wide DX Contests, but what is the story behind this operation? First of all, the operators behind the operation are members of the Bavarian Contest Club. After achieving the European records in the multi-multi (multi-operator/multi-transmitter) category as LX7A back in 1989, we decided it was time to try for the world record in 1999, as we knew the solar cycle should be at its maximum around the year 2000.

The place to go definitely had to be North Africa. CT3 (Madeira) and EA9 (Ceuta & Melilla) were considered, but the discussions came to an end when Ben, DL6FBL, told us about his 1998 CQ WW experiences from Morocco! *(Operating single-op as CN8WW, Ben placed third in the world and set a new African record in the 1998 WW SSB Contest, and placed fifth in the world in the CW event.—ed.)*

In September of 1999 DL6FBL and DL8WPX went to Morocco for the WAEDC SSB Contest to check out the location, do the final negotiations, and settle any unresolved questions. After their return to Germany, the work of organizing the effort began. With the help of an internet web site and an e-mail reflector, all participants knew the plans and always had the latest news about the project. Sixteen operators were recruited to join the SSB part. They would all fly to Morocco ten days before the contest, except for a group of three who would make the trip on the road to bring the equipment to CN8! It took 50 hours of driving, but they safely arrived in Rabat, the capital city of the Kingdom of Morocco.

Do you have one of these QSLs? If so, you're not alone! In the 1999 CQ WW DX Contest, CN8WW broke all records for both SSB and CW. If you didn't work them in '99, you still may have time to catch the 2000 CQ WW! (Photos courtesy of the CN8WW team)

Setting Up CN8WW

Once all the operators and equipment were in place, it was time to set up the antennas and the stations. The plan was to have verticals for the low bands close to the waterfront and Yagis for the high bands up on the hill about 60 meters (nearly 200 feet) above the sea. The low-band shack was located in the hotel directly at the beach, and the high-band shack was in a container up on a hill, connected via 250 meters (820 feet) of really thick powerline cable and Ethernet cabling.

After the ambitious effort of installing a 4-square for 40 and 80 meters at the beach was completed, the Atlantic Ocean showed us just how rude it could be! The verticals came down and some ropes were lost into the ocean. Maybe they were found later by the PJ4B boys! After that, there was only a single vertical for 80 meters and two beams for 40 meters (see below).

Here's the complete antenna setup:

160 meters: inverted-L and a dipole

80 meters: vertical and a dipole

40 meters: two Cushcraft two-element Yagis, plus a 2-element vertical array for CW

20 meters: three Cushcraft Yagis (4 and 5 elements)

15 meters: three Cushcraft Yagis (4 and 5 elements)

10 meters: three Cushcraft Yagis (4 and 5 elements)

**For information, contact Bernd Ock, DL6FBL, Christian-Wirth-Str. 18, D-36043 Fulda, Germany*
e-mail: <dl6fbl@boc.de>

Location, location, location... it counts for everything in real estate, and doesn't hurt in contesting, either. This aerial view shows the hotel that was home base for CN8WW's Morocco operation during the CQ WW.

We also had four optimized Beverage receiving antennas for different directions up to 250 meters long, which did a tremendous job for low-band reception. After the CW contest we received many e-mails such as this: "Wow! You heard my 5 watt signal from New Mexico on 160 meters!"

We rented three 24 meter (79 foot) towers from a local company; thus, we did not have to transport them. Each tower supported three monoband Yagis for a single band (10, 15, 20 meters), with the lowest one fixed to Europe, the middle one fixed to the U.S., and the highest one rotatable. With the help of WXØB Stackmatches, all antenna combinations were available in the shack.

All the radios were Kenwood TS-850s, because this is the most popular radio among the BCC members. In case of a failure, we could easily swap radios. We used a lot of filters—homebrew as well as commercial—to avoid interference between the bands. All stations were connected by an Ethernet link. DX spots came in over an internet dial-up link to a local provider.

Now the SSB contest was about to start, and a sheet of paper that planned an unbelievable 70 million points showed up on the wall. What no one had expected is that after a few hours we were ahead of the plan. We finally claimed 76 million points! The old record (PJ1B, 1990) was 57.6 million!

How did the others do? We heard IG9A (African Italy, also in Zone 33) claim 70 million points and PJ4B (Netherlands Antilles, Zone 9) claim 65 million. It was fantastic. We really did it!

(Note: These were raw scores, swapped immediately after the contest ended. Final, official scores for the three stations were 73,194,876; 61,215,336; and 59,127,810 points, respectively; each one breaking PJ1B's 1990 record of 57,610,400 points.—ed.)

The following night seemed very short, and on Monday we started to pull down the antennas and store the equipment that would stay in Morocco until the CW part of the contest a month later.

One week before the CW weekend 12 operators arrived at the hotel to see if they could break the CW record as well. This was an even bigger success. CN8WW managed to almost double the old multi-multi record of 39 million points (set in 1998 by 6Y2A) with a claimed score of 74 million points at the end of the weekend. This was derived from more than 4300 QSOs, 40 Zones, and 160 countries on each band from 10–20 meters; another 4400 QSOs, 40 Zones, and 140 countries on 40 meters; and an unbelievable 3300 QSOs and 1700 QSOs on 80 and 160 meters, respectively! *(The final, official score was 70,713,270, an incredible record-breaking performance—ed.)*

CN8WW Results 1999 CQ WW DX Contest

SSB (claimed)

Band	QSO	Pts	P/Q	Zones	Coun.	Ops
160	1049	3118	2.97	19	84	DL8WPX
80	2249	6703	2.98	25	117	DL6RAI, DL8OH
40	2755	8199	2.98	35	141	DK6WL, DK2OY, DL4MCF
20	5986	17841	2.98	40	186	OE2VEL, OE2MON, OE2LCM
15	5022	14975	2.98	40	180	DK7YY, DL2NBU, DK5WL
10	6163	18391	2.98	40	192	DL1MFL, DL6FBL
All	**23224**	**69227**	**2.98**	**199**	**900**	**=> 76,080,473**

Technical support: DJ5IW, DL9NEI

CW (claimed)

Band	QSO	Pts	P/Q	Zones	Coun.	Ops
160	1720	5139	2.99	23	99	DL8WPX
80	3298	9864	2.99	36	123	DK2OY, DK8LV
40	4420	13220	2.99	40	141	DL3DXX, DL3NCI
20	4898	14643	2.99	40	160	DL2MEH, S51TA, DJ2QV
15	4383	13088	2.99	40	160	DK9IP, DK1BT
10	4650	13892	2.99	40	161	DL6FBL, DL6LAU
All	**23369**	**69846**	**2.99**	**219**	**844**	**=> 74,246,298**

Note: The final scores are SSB 73,194,876; CW 70,713,270

CQ WW 2000

What are our plans for 2000? Although it seems impossible, we want to improve our own results this year. You will hear us as CN8WW again this year.

Group photo of the CN8WW team for the CW weekend of the 1999 CQ WW DX Contest. They'll be listening again for you this November 25–26!

Two of the CN8WW ops making their record-breaking run in the contest.

Please support our activity and call CN8WW again in the CQ WW DX 2000 on as many bands as possible. Even if you don't have good antennas for some of the bands, give it a try.:

SSB (October 28–29, 2000; *if you're a subscriber in the U.S., you should have this in time—ed.*): Preferred frequencies1.840, 3.799, 7.099, 14.255, 21.355, 28.455 MHz. U.S.—listen for split announcements on the low bands.

CW (November 25–26, 2000): Preferred frequencies: 1.833, 3.503/3.533, 7.003/7.033, 14.033, 21.033, 28.033 MHz.

QSLs for past activities have all been handed out. Every QSL (via DL6FBL) will be answered via the bureau or direct, and you will get special QSLs for five- or six-band QSOs. Please visit <http://www.dl6fbl.de/cn8ww/> for further information. We will provide you with additional tips on how to work CN8WW, such as propagation predictions to different parts of the world, etc.

See you in the contest! ■

Amateur Satellites

BY PHILIP CHIEN, KC4YER

Ham Radio in Space

Working the International Space Station

Last month we introduced you to the all-ham crew of International Space Station (ISS) Expedition 1, scheduled to occupy the station beginning this month. To help you prepare to contact them, we now present this special column about the ham gear aboard ISS and tips on contacting the crew.

The initial ham radio hardware consists of a pair of Ericsson handheld radios, a packet module, high-noise-isolation headsets, and a set of connecting cables. The key missing component is the external antennas, which weren't ready in time.

The ARISS (Amateur Radio on the International Space Station) team has been given permission to use the existing Sirius antennas on the FGB module (the Russian acronym for Functional Control Block; see October's column and cover). The Sirius antennas were used to downlink telemetry during the FGB's launch and are no longer needed. They were designed for operation at 147.25 MHz, so they're usable in the 2 meter ham band. At 146 MHz, Sirius has an SWR of 1.2:1.

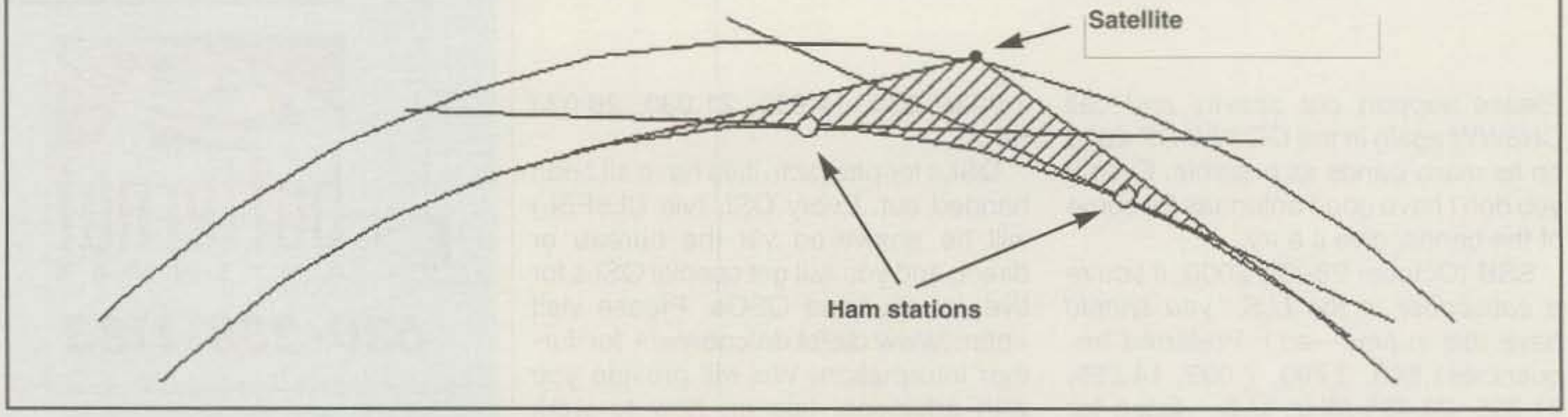
It may seem strange that a Russian spacecraft has an antenna in the 2 meter amateur radio band, but there's a good reason why. In ITU Region II (North and South America) 144 to 148 MHz is authorized for ham radio, but in Russia (ITU Region I) only 144 to 146 MHz is allocated for ham radio communications and 146 to 148 MHz is used for other purposes, including spacecraft telemetry. Thus, it's fortunate that this antenna happens to exist, is in an accessible location, is close to the correct frequency, and is no longer needed—a rather appropriate ham solution to a difficult problem!

The Sirius antenna does have one very major disadvantage—its location. There are no windows in the FGB, and most astronauts include looking at the Earth as one of their favorite activities in space. Unfortunately, therefore, the space- traveling hams won't be able to look out the window while making contacts and may not choose to spend as much time on the radio as they might if it was placed next to a window.

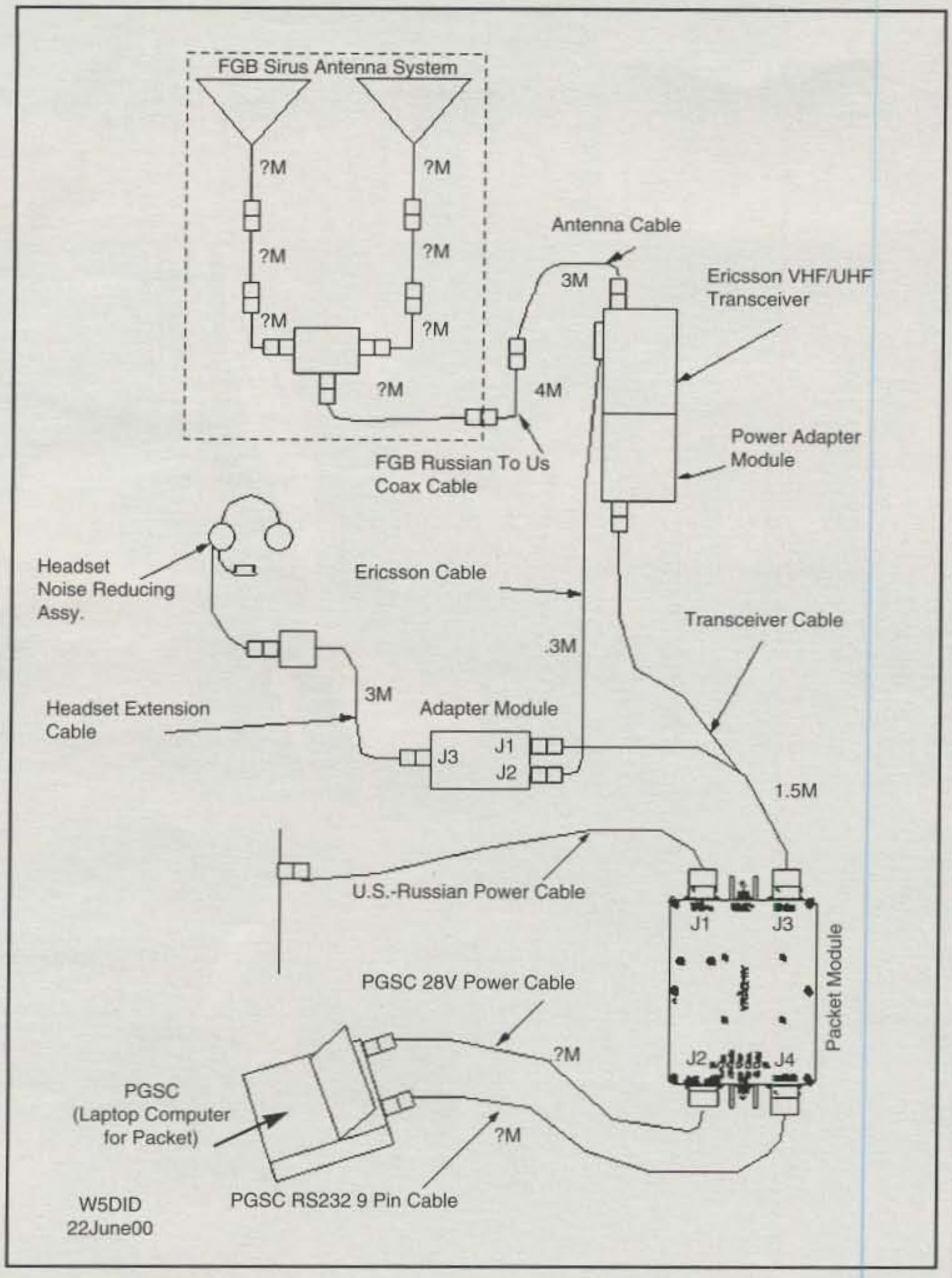
The heart of the initial ARISS ham shack is a pair of Ericsson handheld radios—VHF and UHF. Each radio has a cable which includes push-to-talk, audio-in, audio-out, and power functions. Current plans are to use only the 2 meter VHF radio until the permanent antennas are installed next year. These radios were selected because they can meet NASA's strict safety standards for equipment on crewed spacecraft. Over-

The initial ham radio equipment shipped to the space station on the STS-106 mission. (photo credit ARISS team)

779 Merritt Island Causeway #808,
Merritt Island, FL 32952
e-mail: <kc4yer@cq-amateur-radio.com>



Line-of-sight for a spacecraft. This diagram is not to scale. The black dot represents the space station in low Earth orbit with the shaded portion underneath the area which is within its line of sight. The two white circles represent ground stations, too far away to hear each other, but both within range of the space station. (Drawing by Philip Chien, KC4YER)



How all of the initial space station ham radio components connect together. (Drawing courtesy Lou McFadin, W5DID)

all the initial rig is similar in capabilities to the SAREX-C rig (voice and packet) which has flown on over a dozen shuttle missions, but it has a bit less overall performance.

One key change to the space station radios is that the batteries have been replaced with empty cases with pass-through power connectors. Custom power cables connect the rig to the space station's Russian power jacks.

The adapter module passes audio and power to the various components. The cable to the radio passes two-way audio and the push-to-talk signal. The headset also has a PTT function. An auxiliary jack passes audio and power to and from the packet module and future functions such as slow-scan television (SSTV). In addition, there is a standard mini-jack on the side for a tape recorder if the space traveler wants to record the contact.

The headsets are passive high-noise isolation models used by helicopter pilots. They have a rating of 25 dB of noise isolation, which is an important factor for the noisier areas on the station. There is also an extension cable for the headset with its own PTT switch in case the astronaut wants to operate from a different location.

The packet module includes DC-to-DC converters and an off-the-shelf Picopacket TNC modem. The TNC uses AFSK AX.25 1200 bps, the same as standard terrestrial low-speed packet networks for the past decade. It certainly isn't as efficient as the modulation systems or protocols used by high-speed, high-bandwidth, packet satellites. Remember, however, the purpose of the space station's packet rig is for e-mail to and from the crew members, not for transmitting large amounts of data intended for multiple recipients. Using common terrestrial protocols permits many more hams on the ground to have the opportunity to send a packet message to a space traveler. And while 1200 bps is slow by today's communications standards, it's perfectly adequate for text messages. Again, *the packet mailbox is intended solely for messages to and from the crew, not as a packet satellite to use to communicate with other hams.* If you try to use ISS as a packet satellite, you'll probably prevent another ham from getting through to the space station.

NASA's preliminary schedules show the spacewalk by the Expedition 2 crew to install the permanent ham radio antennas in the mid-2001 timeframe. The spacewalk is penciled between the STS-104 and STS-105 missions, but is subject to change.

Also planned for next year is a software-based slow-scan television system, a German-built digital voice recorder, and a 2 meter bandpass filter to avoid interference from Mir's non-amateur VHF radios if needed. The ARISS team members are also planning more advanced second-generation equipment for the future.

Making a QSO With the Space Station

The *most* important rule when trying to contact the space station is to let the space traveler control the flow. Remember he's the person in the unique location, and everybody else wants to make the DX contact with him. *(Note: Throughout this article, astronaut and cosmonaut and male and female terms are used interchangeably.)*

Practices such as increasing power or interrupting the astronaut while he's talking with somebody else, or constantly trying to contact the cosmonaut when he's trying to make contacts with others will assure that they avoid responding to your call in the future. Transmitting packet while the astronauts are trying to use the rig for voice, and other forms of intentional or unintentional interference will just annoy the crew members and encourage them to shut off the rig. Remember, the ham rig

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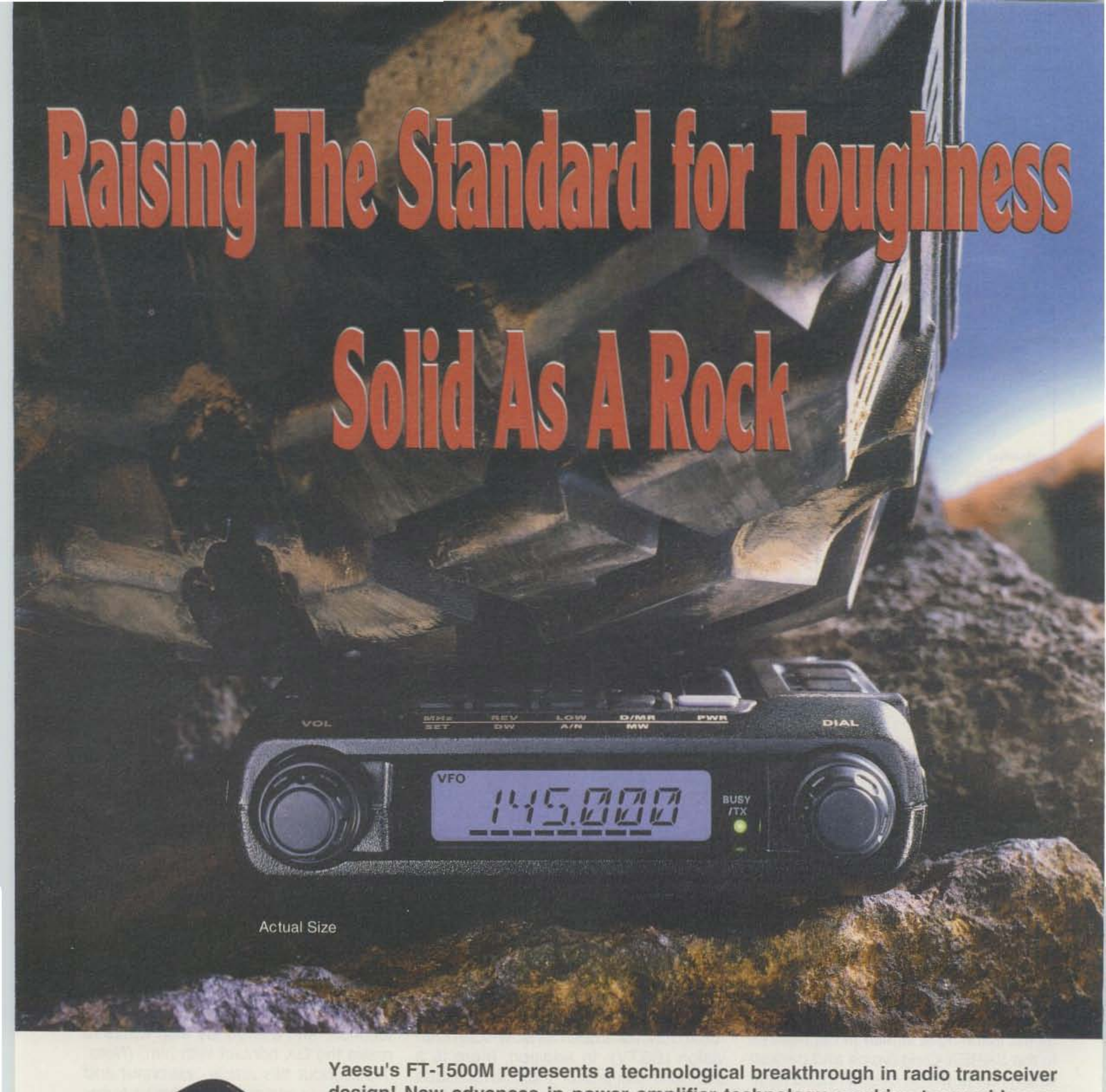

Yaesu's FT-1500M represents a technological breakthrough in radio transceiver design! New advances in power amplifier technology combine to provide you with 50 Watts of clean transmit power with enhanced current consumption efficiency. Yaesu's patent pending aluminum die-cast shell construction dissipates heat throughout the entire transceiver chassis and eliminates the need for a cooling fan. This allows the FT-1500 to fit in an incredibly small case size: less than 5 inches square X 1.4 inches high and offer superior operating specifications as well!

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VX-150
Compact yet incredibly rugged 2-meter handheld is designed to perform under the most difficult operating conditions. And it's packed with the leading-edge features you've come to expect from a Yaesu product. Five Watt power-output, 209 memories, DCS/CTCSS, 7 digit alphanumeric display, automatic repeater shift and much more.

FT-50RD
This durable, multi-featured
5 Watt Dual Bander is manufactured to rigid MIL-810 standards. Featuring wideband frequency coverage,* CTCSS/DCS operation, Dual Watch, 112 memory channels, and Digital Voice Storage.

FT23RMKII/FT33R
These ultra-compact, 5 Watt VHF FM Handhelds feature rugged die-cast aluminum cases, 10 memory channels, optional CTCSS, and multiple scan modes. The FT23RMKII (2M) and the FT-33R (222 MHz) are easy to operate, and give outstanding performance.

VX-110
This incredibly rugged 5 Watt VHF handheld features 209 memories, Smart Search,™ DCS/CTCSS, simple 8 key operation and Omni Glow™ display illumination for night time operation.

FT411MKII
The affordable FT411MKII is compact and durable. This 5 Watt VHF FM Handheld features a die-cast case, 40 memory channels, 10 DTMF memories, built-in VOX, and multiple scan modes.

VX-1R
The pocket-sized VX-1R is small in size only. Featuring Smart Search,™ DCS/CTCSS, Dual Watch, ARTS,™ wide-band coverage (76–999* MHz plus AM BC). The VX-1R provides 291 memory channels, and puts out ½ Watt (1 Watt w/optional E-DC-15 DC Adapter).

* Cellular Blocked

VR-500
This miniature Handheld Receiver provides FM, AM, SSB and CW reception on 100 kHz–1300 MHz, with 1091 memory channels, Smart Search,™ versatile Dot Matrix display, Band Scope, and Dual Watch.

VX-5R
Although Yaesu's newest Tri-Band Handheld Transceiver is the world's smallest, it offers the performance of a full-size unit. The VX-5R operates on the 50 MHz, 144 MHz and 430 MHz bands with 5 Watts of power output, along with ultra-wide receive coverage of the VHF and UHF spectrum, plus AM medium- and short-wave broadcast reception. The VX-5R is military rated, so its durable, lightweight design allows you to take it anywhere. It is equally suited to walking through the concrete jungle as it is to forging the raging rivers of a real one. Along with a temperature display, the optional barometer pressure sensor unit gives a read-out of barometric pressure and altitude.

TOUGH GUYS.

When you're small, you get picked on. Isn't that how it goes? Well not in Yaesu territory, because not only do we design compact handhelds for efficiency, but we give these clever little guys plenty of muscle. Yaesu handheld transceivers have earned the bragging rights for being the smallest handhelds with the most durable water resistant casings ever created. And packed inside the brawn are engineering accomplishments in performance that are unmatched in the industry. Our high-tech handheld transceivers provide clean power output on the VHF and UHF bands and offer revolutionary features that allows these tough guys to continually outperform the competition. Learn more about Yaesu products on the web at www.yaesu.com

YAESU ...leading the way.

John Blaha, KC5TZQ, using the ham radio shack aboard the Mir space station (Photo courtesy NASA, astronaut Jay Apt, N5QWL, on the STS-79 mission)

is on the space station as an off-hours recreational activity for the crew's enjoyment, not so hams on the ground can talk to somebody in space. Do *not* try to interrupt the cosmonauts while they are talking with their family or friends, or in the middle of an educational contact. This is the most certain way to make sure they won't want to talk to you.

Astronauts and cosmonauts may or may not be experienced or talented amateur radio operators. A few have been hams for a long time and have ground experience using ham equipment. Others just got their license because other astronauts recommended it could be useful; they don't have much experience. Many may not realize that it takes talent and skills to operate ham radio DX pile-ups, especially if you want to do it well. It can literally sound like white noise when hundreds of hams are trying to contact an astronaut, and it takes an experienced ear to pick a callsign out of the noise. Imagine that you're on a stage before a large audience of hams and each person in the audience shouts out his callsign. The person who enunciates most clearly has the best chance of being heard. Be patient with the folks up there!

The most important thing to remember is how line-of-sight works and the curvature of the Earth. Fig. 1 is an extremely exaggerated illustration of the space station in orbit and two ham stations. Each of the ground stations can communicate with the space station, but neither can hear the other. The space station is within view of both stations and literally thousands, if not hundreds of thousands, of other hams. At a typical altitude of 233 miles (375 km), the space station's footprint covers 5,474,000 square miles (14,177,000 square kilometers) and in theory could communicate with any ham underneath its orbit.

Since you can only hear other hams in your area, you *must* let the ham in space control how the contact goes. Listen to a couple of voice passes to get a feel for how things go. Let the astronaut call CQ or identify herself. At that point, transmit your callsign clearly using international phonetics. *Let the astronaut determine whom to talk to.* The astronaut may say something such as, "I heard a YER suffix; can you repeat the rest of your callsign?" or "Go ahead any hams in Florida." Follow the directions! After you make contact, talk to the astronaut, but when she says, "next station," let somebody else have a chance. Obviously, if there's no response for a while and the astronaut calls, "Is there anybody out there?" feel free to call again at that point. The key rule to remember is to let the cosmonaut control how the conversation goes. Remember that she's the person on the rare DX expedition to whom everybody else wants to talk.

When things work out well and everybody cooperates, dozens of hams can talk to a space traveler on each pass, and hundreds can participate. When Astronaut John Blaha, KC5TZQ, was on the Mir space station, he talked to as many hams as he could whenever he had the opportunity. He's an extremely enthusiastic Dallas Cowboys football fan, so after talking to several hams and "building up" an audience, he would ask whether or not anybody knew the score from the game the night before. At least some ham would respond positively, and John would talk to that person for a while, obtaining the play-by-play details. Everybody benefited. A large number of hams talked to John, many more enjoyed trying even if they didn't get

The Sirius antenna is shown here on the training unit in Russia. (Photo by Lou McFadin, W5DID)

through, and others just listened to John's downlink. John also enjoyed keeping up with the Cowboys!

John Blaha was the exceptional space traveler in terms of talking to hams for the sake of talking to them. Different space travelers will have different attitudes towards ham radio. Some enjoy talking to people, while others are only interested in using it to talk to their family, friends, and colleagues and are not interested in talking to anybody else. Moods can change over time, too. Some astronauts have gotten frustrated with hams constantly asking them for information or special requests and just stop talking to anybody except their friends. In other cases someone who isn't initially interested in ham radio picks up the radio out of boredom and finds it enjoyable.

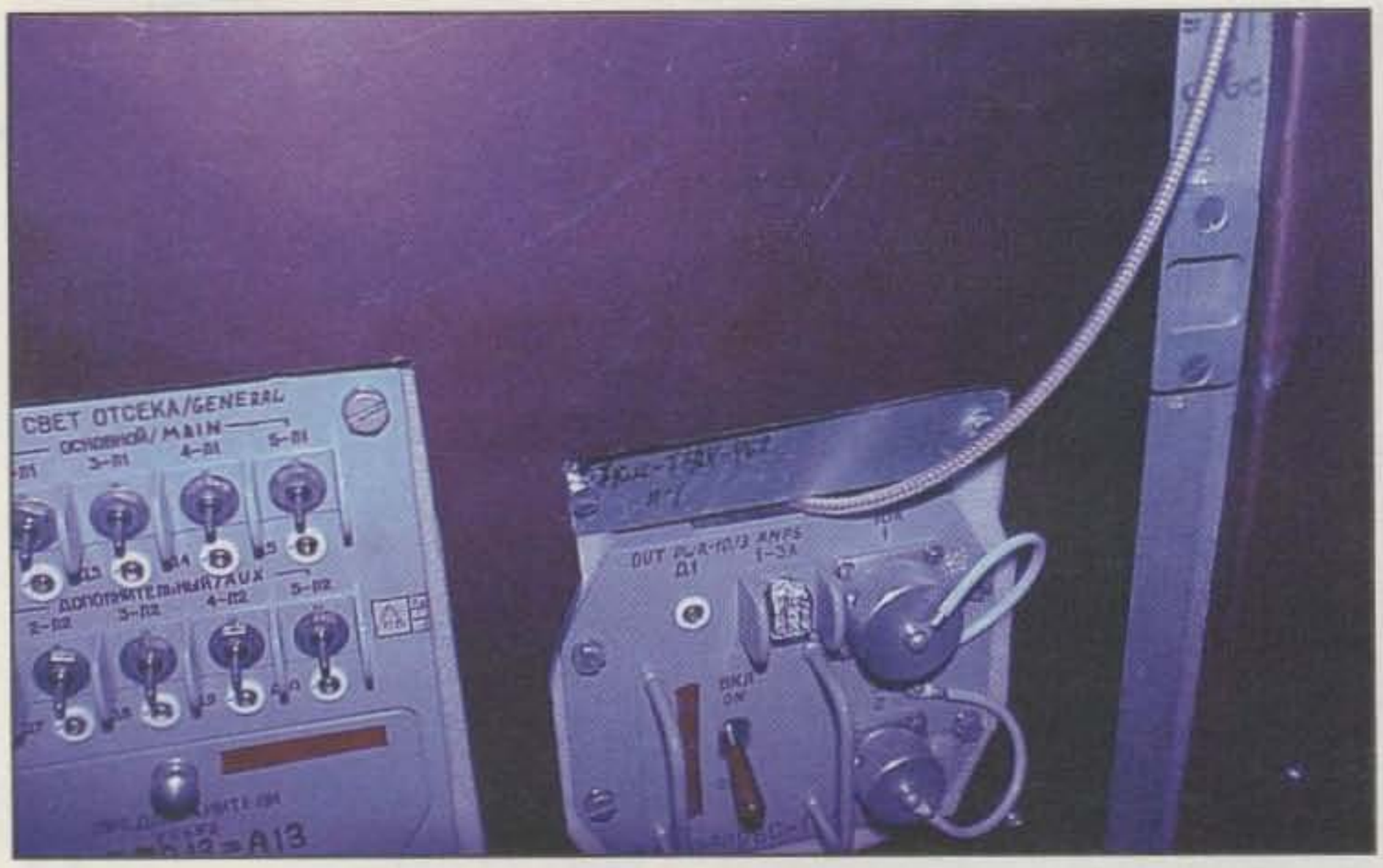
Do *not* ask the astronauts for special requests; that puts them on the spot. In particular, don't ask them to be available at a particular time to talk to your friends. Don't constantly ask the astronauts about life as an astronaut or the space program; there are plenty of other places to obtain that information.

Talk with the astronaut like you would talk to any other ham. Expedition 1 crew member Sergei Krikalev, U5MIR, said, "The nice thing about ham radio operators, they don't need to report something. This is random communications. We don't know when we'll have time to use the radio; it will be spontaneous. If people will tell us what's going on it will be nice."

A ham at a school is welcome to try to make a random contact just like anybody else, but the better choice is to put in an application for a scheduled school contact. This way you don't have to compete with everybody else and you have a prearranged time when the astronaut is available.

In short, treat the astronaut the way you'd want to be treated on the radio, especially if you're the popular ham in a unique DX location. The space traveler is using the radio to relax, not to answer a bunch of questions. Some cosmonauts are interested in sports, or finding out about what life is like in your area, while others want to know what's happening on Earth and still others may just want to chat. Let *them control how* the conversation flows.

As a rule, astronauts are most interested in using the radio when they're over their own home towns or countries, although there are exceptions. Expect that many of the passes over Houston, Texas will be occupied by the crew members talking to their families and colleagues at the Johnson Space Center. All of the residents on the space station speak English and Russian, although the fluency varies from person



The ground training mockup of the FGB showing how the antenna cable will be passed through an existing opening in the panel. (Photo by Lou McFadin, W5DID)

to person. If you're talking to a Russian space traveler, it certainly doesn't hurt to use any Russian you know, even if you only know a couple of words.

ARISS Frequencies

For all of the public ham radio operations (random contacts, school contacts, etc.), the downlink frequency will be 145.800 MHz. This is the border of the 2 meter bandplan for satellites (145.800–145.995 MHz), so it's quite possible to get interference from other radio operators using adjacent frequencies. The public uplink frequencies will be released by the ARISS team when the rig is set up and operational and will be published on *CQ*'s website. For school contacts, a separate unpublished uplink frequency will be used to avoid unintentional interference, but the downlink will be on 145.800 so everybody else can monitor the space travelers' answers. Unpublished downlink frequencies may be used for private family contacts. If you come across one of those frequencies, it's legal to listen in (but respect their privacy and don't try to break in or call them).

The space station crew will work a roughly Moscow timeline. The official sleep period for the space station's crew is usually 2200–0600 UTC. My simple trick is to use my satellite tracking program's terminator (the line which indicates sunrise/sunset). If Moscow is in daylight, the crew is *probably* awake. If Moscow is near the terminator, then the crew is probably in presleep/postsleep time and is more likely to be available on the radio. It isn't perfectly accurate, but it's simple.

Under most circumstances the crew members will set up their own schedules and may reschedule their tasks if they want to be available when they travel over a particular location. As a rule, weekends are off-days for the crew to do what they want to do. However, having the crew available will be more the exception than the rule. The crew's purpose for being aboard the space station is to assemble it and do experiments, not to use the ham rig from space. In the early weeks of each expedition the crew will be busy adjusting to life in space and probably will not have much time to use the radio.

Third-Party Confusion

The International Space Station is a multi-national project. This brings up some interesting quirks of how third-party agreements work. In most countries, a ham radio operator may pass communications on behalf of a non-licensed person (third-party traffic). This is used especially during emergencies or when you permit a non-licensed family member to use your radio to talk to someone else. International third-party traffic is permitted only if there is a signed third-party agreement with the other country. Regrettably, the U.S. and Russia do *not* have such an agreement.

Fortunately, the space station will have multiple international callsigns, which minimizes problems with third-party contacts. If you are an American in contact with a space traveler using a Russian callsign, international rules apply. If you are talking to somebody with an American callsign, then American rules apply. The actual nationality of the person isn't important. If a Russian space traveler has passed a U.S. license exam and uses that call, then he's bound by U.S. rules. So ...

... if you're a licensed ham anywhere in the world you can talk to anybody on the space station (normal ham-to-ham communications).

...if you're an American ham talking to somebody with an American license aboard the space station, then you may permit non-licensed people to use your radio as long as you are the control operator (U.S. third-party rules apply.).

... if you are a Cuban ham talking to an American aboard the space station, then you may permit a non-licensed family member or friend to talk to the astronaut in space because the U.S. and Cuba *have* a third-party agreement.

... but, if you're an American ham talking to somebody with a Russian callsign on the space station, then you *may not* permit a non-licensed person to use the radio—unless the Russian aboard the space station has somebody nearby with an American license to function as *his* control operator!

Yes it's stupid and archaic, but until a blanket third-party agreement is in place between the various countries, that's how things stand.

Of course, all of the other laws which apply to any ham radio contact are still in effect. You may only discuss items of a non-commercial nature, so it's illegal for a fellow astronaut on the ground to discuss operational matters, or for a reporter to use the ham radio to interview a space traveler even if the reporter has a ham radio license. For example, as Philip Chien, KC4YER, it's legal for me to talk to somebody on the space station, but I may not use those conversations for any of my articles. On the other hand, if I'm participating in a NASA-sponsored press conference using the space station's operational frequencies, I may interview the same person in space. *(Note: There is no restriction on a reporter monitoring or even recording someone else's contact with the space station and reporting on it, as long as the reporter is not a participant in the contact.—ed)*

It's anticipated that the space travelers will use their own callsigns, but they may also choose to use the station's callsign (in this case "station" as in ham radio station instead of space station). The Russian call RZ3DZR has been

assigned for space station use, along with the German callsign DLØISS, and a U.S. callsign which is supposed to have been issued by the time you read this. The ARISS (Amateur Radio on International Space Station) working group is considering asking the ITU and IARU for an international callsign.

When Should I Listen?

Determining when the space station is going to be over your location is fairly simple. There are dozens of shareware satellite tracking programs which predict the space station's orbit. The World-Wide Web site <http://www.heavens-above.com/> is primarily oriented toward visible passes for satellites, but it also has a ham radio function to predict all passes—visible and invisible. There's a very simple rule: If the space station is over your horizon and you hear voice on 145.800 MHz, they are using the radio.

"When you are talking about space communications, line-of-sight really does mean line-of-sight."

When you are talking about space communications, line-of-sight really does mean line-of-sight. Your 2 meter handheld normally may have a range of only a dozen miles and your 45 watt mobile may have a range of only about 50 miles, but believe it or not, they're both perfectly adequate for space communications over distances of hundreds of miles. You don't have any buildings or mountains in the way in space, and the space station can be extremely far from you but still above the Earth's curvature.

Any 2 meter FM radio or scanner can receive the space station's signal, but a higher gain antenna will certainly help. In theory, a handheld radio with a decent antenna can contact the space station, but only under the most optimum circumstances. A 45 watt mobile radio with a ground-plane antenna should be considered the minimal rig for making quick contacts. Circularly polarized antennas are preferable since they "level out" polarization losses. The space station will use linear polarization, but the Earth's ionosphere causes *Faraday rotation,* which makes the polarization unpredictable by the time it reaches the ground.

Higher gain and directional antennas certainly will improve your chances of getting through. However, more power is not necessary! Remember that you only need enough power and gain to get through for a decent quality contact; additional power is not going to increase the quality of your signal. Yes, a "big gun" certainly can overpower other stations, but space travelers tend to frown on high-power stations that overpower others trying to talk to them, and will avoid making contact with them.

If you have a relatively low-power station, try to avoid the "prime time" when you are competing with more hams. Weekends and holidays (both Russian and U.S.) are when the radio will be its busiest. The best voice times for a low-power station are weekdays from 1200–1900 UTC.

One excellent way to calibrate a motorized antenna setup is to pick a visual pass (e.g., when you're in relative darkness and ISS is lit by the sun) and watch ISS cross the sky. Watch to see how accurately your computer commands your antenna to follow ISS as it goes over your location. Some lucky hams have successfully contacted Mir while watching it go across the sky—a simultaneous visual and radio QSO!

If you have gotten through several times, give somebody else a chance. Some of the cosmonauts aboard Mir got so frustrated talking to the same high-power hams each time that they ignored them when they called, just because they were sick of talking to the same callers each time and wanted to give somebody else a chance. In many cases, though, the astronauts will make friends with hams on the ground and talk to specific individuals on a regular basis.

Do not ask the astronaut for a QSL card. That aspect of ham radio will be handled by a group of volunteers on the ground. If you want a QSL or SWL card for a contact with the first expedition crew, send a business-size SASE along with your QSL card to: ARRL EAD, ISS Expedition One QSL, 225 Main Street, Newington, CT 06111-1494, USA. Be sure to include an SASE or enough International Reply Coupons (IRCs). Only one QSL per person per expedition will be processed.

Additional information on how to make contacts with space station's ham shack are in the November-December 2000 issue of *The AMSAT Journal,* and on the ARISS web site at <http://ariss.gsfc.nasa.gov/>.

I would like to thank Lou McFadin, W5DID, and the ARISS team for their assistance with this article.

73, Phil, KC4YER

Our Readers Say

Digital Wireless a Hit!

The following letters were sent to "Digital Wireless" Editor Steve Stroh, N8GNJ, after the appearance of his first column in the September issue of CQ:

Dear Steve,

I just read your first column in *CQ* last night and really enjoyed it. Please keep up the good work! Some topics I would be interested in seeing you write about are:

• Software Defined Radios <http://www.sdrforum.org> and their use in ham radio, as well as homebrew ideas.

• "Advanced" (for ham radio anyway) protocols such as TCP/IP packet. How about someone making an HT with WAP built in?

• Marriage of digital, low cost, and QRP. In theory, digital circuits should be a lot cheaper to design and build than linear analog ones. Current "digital" modes such as AFSK and PSK31 typically use analog modulation (SSB). In theory, it should be possible to use cheap, digital ICs which implement protocols such as "bluetooth" <http://www.bluetooth.com/> to build cheap, portable, low-power ham radios that could interconnect with backbone trunking systems.

Good luck! There is certainly lots out there to keep you quite busy for a long time to come!

John Tarbox, WA1KLI
via e-mail

Hi Steve,

Hooray! Someone is actually working on Spread Spectrum! And with voice, we hope, not just data. Instead of working with 9800 baud, let's work to raise the speed!

We hope that you are serious about this wireless internet access. We, and many others, travel where telephone hook-up is *not* available. We want to get onto the internet, to get e-mail, surf, etc., wirelessly. We have a friend doing e-mail by PACTOR. Let's hear more!

Maureen Bianchi, KC8IOH
via e-mail

Hello Steve,

Welcome to *CQ*. I read your "Digital Wireless" article in the September 2000 issue and feel that we have a lot of view points in common on amateur digital systems. Digital systems and the increased efficient use of the amateur spectrum are our future. The amateur community needs forward thinkers like yourself. I would like to share some of my ideas with you.

Digital modes are great. HF digital modes are slow but serve a purpose. PSK31 is a terrific system. For ham-to-ham HF it is the best mode. Look out RTTY. VHF packet is old technology and slow. It is text only. We need a graphic interface and pictures to attract the new hams. Hams have lagged behind in networking—not wire networks, but RF networks.

I am not a network specialist, but I have read *Networking for Dummies*, the Windows manuals, and use wire networks everyday. Most amateurs have a computer with Windows 95/98 operating systems. Windows has networking built into it. We already have it; let's use it for an RF network. Why 9600 baud? Faster is better!! 1.2M baud! We have microwave frequencies that are low activity.

Jim Oberg, N9ZQS
Tinley Park, IL

W7DXX Remote Base Activity

The following was posted on the W7DXX reflector and forwarded by CQ's "Computers & Internet" Editor Don Rotolo, N2IRZ:

It would appear that we got tons of activity following the just-released mention about the remote base in *CQ* magazine ("Computers & Internet" column, September issue). I have just approved a lot of passwords.

The activity on the remote was such that the Real audio server crashed. I was on vacation and could not reset it until just now. I will redo the list of control operators over the weekend...

Welcome to our new control operators and thanks to *CQ* magazine for the nice write up.

Keith E. Lamonica, W7DXX

Editor, *CQ*:

After reading about W7DXX and his remote base (I thought hams had fixed stations), I have decided to put off buying that big new rig, amp, tower, and beam. Why bother? Move over Mr. DX, I'm getting my password and joining the computer ham crowd. By the way , these DX contacts do count for all CQ DX awards and ARRL awards, don't they? Even if they don't, so what ? I did actually contact these stations, didn't I? Ham radio today, I love it. Five wpm Extras, and with internet access a ham dosen't even need a radio; what a deal. Ham radio without a radio! It's great! See you on the internet.

Larry Brandon, K1ZW

Another Solar Resource

To the Editor:

I've been reading Karl Thurber, W8FX's "Uncle Sol" series with interest. Great series of articles.

I'd like to point out an additional excellent online resource for those interested in all things geomagnetic and solar: The Space Weather Bureau, at <http://www.spaceweather.com/>. It's sponsored in part by NASA.

The site has current solar wind conditions, meteor rates, sunspot count, coronal hole information, aurora alerts, and links to all manner of interesting and useful other information.

I personally use this site on a daily basis, and I'm sure that your readers would find it helpful as well.

Kevin McQuiggin, VE7ZD
via e-mail

Kevin: Thanks for reminding us of <spaceweather.com>, which I drop in on regularly as well. We did mention it in the October issue, in WB2AMU's follow-up piece on measuring geomagnetic weather. — W2VU

Optical Transmission

To the Editor:

I read (WA2NDM's) article in the September issue regarding various ways of modulating the light for transmission to another ham. I was surprised in not finding the way I feel to be the easiest to use: polarized lenses . By using two lenses and rotating them so they cross-polarize, the light would be diminshed or blocked sufficiently that it could be a means to cut off the light quickly and cheaply. Old polarized glasses might suffice. Just a thought.

Frank, KL7IPV
via e-mail

CQ WAZ Map

To the Editor:

I have found a .jpg file of a world map showing the CQ Zones. Is it possible to buy a nicely printed version of this map? I cannot find it anywhere on your web site.

Peter Hers, ZS6PHD
via e-mail

Peter: Currently, the WAZ map is available only in black and white on a standard-size (in the US) 8½ × 11 sheet. The map is also posted on our website and may be downloaded for personal use. I'm using it for "wallpaper" on my computer screen! — W2VU

(Continued on page 127)

AMERITRON . . . 800 Watts . . . $795

Ameritron gives you four 811A tubes, 800 watts and far better quality -- for less money -- than competitor's 3 tube 600 watt unit . . . Why settle for less power, less quality and pay more money?

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AL-811 has three 811A tubes and gives 600 Watts output for only $649.

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New class of *Near Legal Limit™* amplifier gives you 1300 Watt PEP SSB power output for *65%* of price of full legal limit amps! Four rugged *Svetlana* Russian 572B tubes. Instant 3-second warm-up. Plugs into 120 VAC. Compact 8½Hx15½Dx14½W. 160-15 Meters. 1000 Watt CW output. Tuned input, instantaneous RF Bias, dynamic ALC, parasitic killer, inrush protection, two lighted Cross-Needle meters, multi-voltage transformer.

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1500 Watts plus

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Single tube
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Both amps have an adjustable slug tuned input circuit, grid protecion, ALC control that is front panel adjustable,vernier reduction drives, heavy duty 32 pound grain oriented silicone steel core transformers and high capacitance computer grade filter capacitors.

These amplifiers have multi-voltage operation (14 user selectable AC line voltage from 90-140; 200-250 VAC), quiet pressurized ventilation systems, dual illuminated Cross-Needle meters that read peak forward and reflected power, SWR, high voltage, grid current and plate current.

Vernier reduction drives make tuning adjustments smooth and easy Ameritron's exclusive *Step-Start Inrush Protection™* stops damage to your amplifier from inrush current. Ameritron amps feature an attractive Lexan front panel decal and superior, all metal construction -- it's built to last! Ultra compact desktop size is perfect for your operating station. 8½ x16½ x14¼".

AMERITRON no tune Solid State Amplifiers

Ameritron ALS-500M Mobile no tune Solid State Amp has 500W out, covers 1.5-22 MHz

ALS-500M
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Suggested Retail

Ideal Mobile amplifier -- uses 13.8 Vdc mobile electrical system, very compact 3½x9x15 in., extremely quiet, 500W output, 1.5-22 MHz coverage, instant bandswitching, no tuning, no warm up, no tubes, SWR protected.

Ameritron ALS-600 no tune Solid State base amp includes heavy duty power supply, 600 Watts out

ALS-600
$1299
Suggested Retail

No tuning, no fuss, no worries -- just turn it on and operate. *Includes* AC power supply, 600 W output, continuous 1.5-22 MHz coverage, instant bandswitching, *fully* SWR protected, extremely quiet, very compact. Amp is 6x9½x12 inches.

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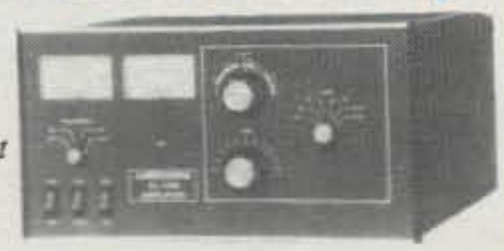
Ameritron's 3CX1200A7 linear Amp

AL-1200
$2395
Suggested Retail



Get ham radio's *toughest* tube with the Ameritron AL-1200 -- the Eimac 3CX1200A7. It has a 50 watt control grid dissipation. What makes the Ameritron AL-1200 stand out from other legal limit amplifiers? The answer: A super heavy duty power supply that loafs at full legal power -- it can deliver the power of more than 2500 watts PEP two tone output for a half hour.

Ameritron's dual 3-500 linear

AL-82
$2295
Suggested Retail

This linear gives you full legal output using a *pair* of 3-500s.
Most competing linears using 3-500s *can't* give you 1500 watts because their lightweight power supplies can't use these tubes to their full potential.

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ARB-700/702 amp-to-radio interface . . 39.95

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CQ Reviews:

The Alinco DM-330MV Switching Power Supply

BY KEN NEUBECK,* WB2AMU

Power supplies have always been taken for granted among hams. We just hook up our radios and amplifiers to them and never give them a second thought until they fail.

Perhaps my most vivid memory involving an amateur radio power supply was when I took my Kenwood PS-50 with me on a vacation trip to Hawaii in order to power my TS-440s radio. While the radio was portable enough to carry in a hard-shell case on board the aircraft, the 30-pound power supply was put in the checked luggage, making it quite heavy. I could see the limo driver groan as he tried to lift the bag into the car for the ride to the airport. How many more portable-radio operations could have been conducted by hams if the power supply was light enough to just carry along?

In recent years a new class of power-supply design has been developed and is known as *switching-mode power supplies*. By using an integrated circuit that generates a pulse-width modulated signal, the power supply is switched on and off at a very high rate. This type of power-supply design is able to run cooler than previous designs, as there is a significant reduction in heat dissipation. In addition, there is a tremendous savings in the weight, as smaller transformers can be used in lieu of those big iron-core jobs. Because of all these benefits, switching power supplies are widely used in both aircraft and computer equipment.

I remember the first time I saw a lightweight switching-power-supply design for electronic aircraft equipment. I was amazed by the number of major reliability problems associated with the conventional non-switching designs that were solved by a lighter design with fewer components. Typically, the larger power-supply components in electronic equipment were the first components likely to break while operating in the high-vibration aircraft environment. The newer switching-mode power-supply design used in many commercial applications is now making its way into amateur radio.

Now one would think that all should be well with this weight reduction for the amateur radio power supply. Well, not quite. Associated with the design of switching-mode power supplies is a condition known as *switching noise*, commonly known as *hash noise*, that is a function of the switching frequency (typically in the 100 kHz range). Hash noise tends to show up in the lower HF bands, such as 80 and 40 meters, and can make receiving signals very difficult. Some manufacturers have been able to make suitable suppression circuits. Alinco has come up with a unique solution to this particular condition, which we will discuss later, in its DM-330MV switching power supply. First, let's look at the unit's basic features.

Front view of the DM-330MV shows the various switches and the dual-function meter. The switching for the meter between current and voltage is on the immediate right of the meter.

Basic Features

- Dual-function meter for displaying voltage or current in amps
- Output current capability: 32 amps maximum, 30 amps continuous

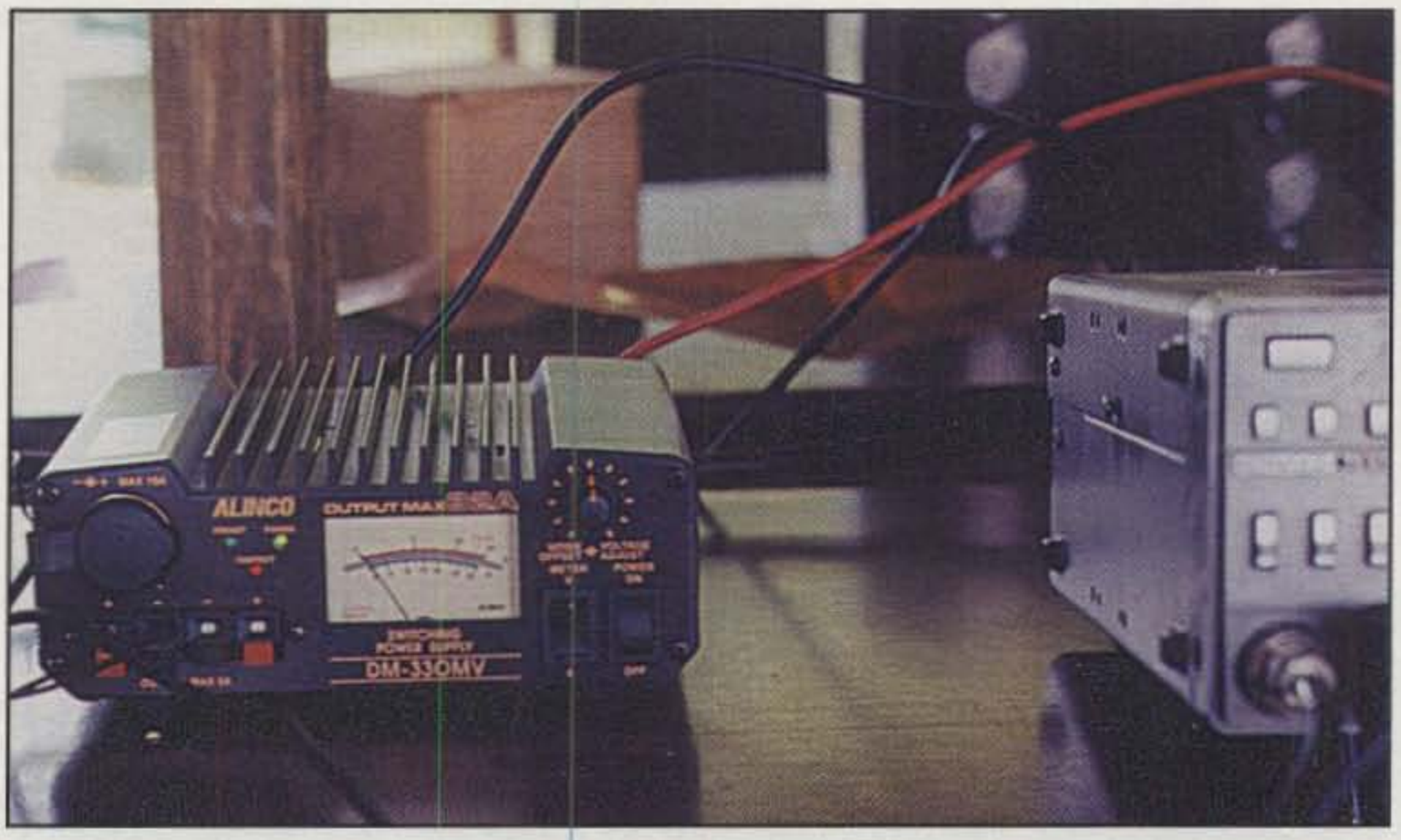
*Contributing Editor, CQ, 1 Valley Road, Patchogue, NY 11772
e-mail: <wb2amu@cq-amateur-radio.com>*

• Output voltage: 5 to 15 VDC variable with a notch setting at 13.8 volts
• Input voltage 120 VAC (220 VAC possible with adjustment of switch)
• Dimensions: Approximately 7 inches by 6 1/2 inches by 2 1/2 inches
• Weight: 4.5 pounds
• Protection features:
1. Short circuit protection
2. Automatic current limiting over 32 amps (When this is activated, an indicator light is illuminated on the front panel.)
3. Over-temperature protection (provided by rear-panel cooling fan that comes on automatically when needed)

There are a few ways to hook your amateur radio transceiver or amplifier to the DM 330V power supply. The inputs are:
• 10 amp maximum rated cigarette-lighter adapter input (on front panel)
• 5 amp maximum rated clip on inputs (two pairs of +/– on the front panel)
• 32 amp maximum rated output terminal posts (on rear panel)

Other features include a preset voltage value that allows one to set a nominal operating voltage and save the preset value. The preset voltage is stored by turning the preset switch to the preset position and adjusting the voltage to the desired output level. When this function is selected, the voltage-adjustment control on the front panel will be deactivated to protect from overvoltage. With the preset function activated, the preset voltage will be supplied regardless of the current voltage setting.

Another feature is that the front-panel meter can read either current (amps) or voltage, selected by a switch on the front panel. The unit also has a remote-control terminal input on the rear panel.



Imagine a power supply that weighs less and is smaller than the transceiver. This was the case during Field Day at W2AMC, where the DM 330MV was dwarfed by the TS-670 radio on the right!

In this close-up view of the front panel, the three LED indicators for PRESET, POWER, and PROTECT can be seen to the left of the meter. The cover on the left is over the cigarette-lighter-type jack input (10 amp max), and the inputs on the bottom are set at 5 amps max.

This allows you to connect a remote-control unit (with the power supply turned off) and remotely control the output voltage.

The power supply has the heat sink located on the top of the unit. Therefore, in order to get the maximum effect of the heat sink, it would appear that this unit should not have other equipment stacked on top of it when it is used in the shack.

Operation

We put the Alinco 330MV through its paces during the summer of 2000, using it for 6 and 10 meter operation at home as well as at Field Day, where it powered the 6 meter station at W2AMC, the Peconic ARC on eastern Long Island. One of the tests we performed was to run a few devices from the same power supply at one time. For example, we hooked up a TS-670 transceiver (that drew about 4 amps) to the front clips, and a Mirage A1015G 6 meter amplifier (18–20 amps) to the rear terminal posts. The DM 330 MV was able to handle both devices at the same time, and the combined current could be read on the front panel, with the meter in current mode.

During Field Day, the DM 330MV was used for long periods of time, operating up to eight hours without a break. Again, both the basic transceiver and amplifier were hooked up to the same power supply. The radio ran cool, and I did not notice the supply's fan kicking on at all during Field Day. No hash noise was noticed during Field Day or during home use on 6 meters.

The rear of the unit contains the over-temperature fan on the left and a set of 32 amp maximum rating terminal posts. The real panel has a jack for remote-control input along with the preset function. The unit uses an 8 amp fuse.

Special Feature

During home use (using the same radio), we did notice hash noise from the power supply throughout the 80 and 40 meter bands. Now this is where Alinco's unique feature comes into play. There is a special tuning circuit that allows one to *move* the hash noise up or down several kHz. It does not eliminate the noise, but it *relocates* it. Thus, any hash noise that is on top of a desired radio signal can be moved away. This feature will work fine for casual use on 40 and 80, but it may be cumbersome for contest work, where one has to search around on the band for contacts.

Summary

My overall opinion of the Alinco switching power supply is very favorable. At less than 5 pounds, it fits the need for portable operations and for a small, cool power supply for the base station. The only drawback I see is that those hams who enjoy contesting on 40 and 80 meters will constantly be using the hash tune knob to move the noise away from contest stations. However, for operations above 10 MHz—both portable and home—this power supply will meet just about all the needs of most hams.

The street price of the DM330 MV power supply is $200. There are no accessories needed.

I wish to express my thanks to Evelyn Garrison, WS7A, and Katsumi Nakata, KE6RD, of Alinco for their help in getting me technical information on the power supply. ■

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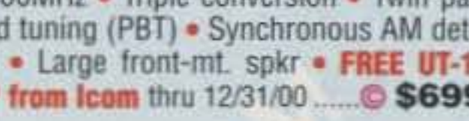

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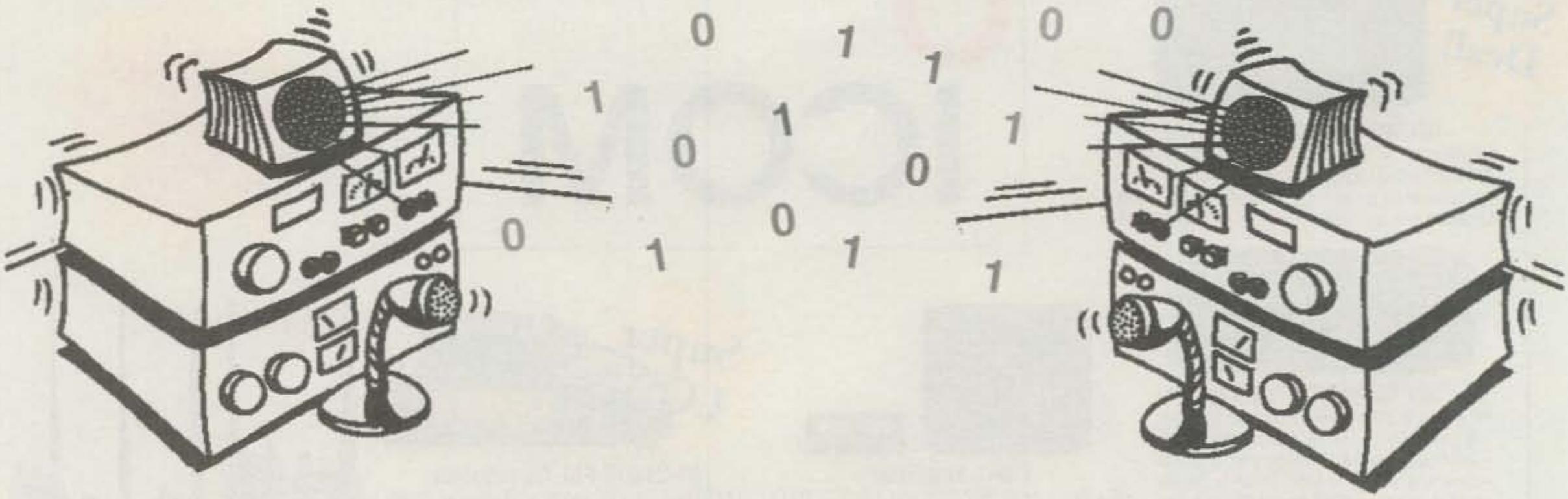

In Part I of this article last month, WA6ITF showed us how advances in digital audio technology likely would lead to Digital Amateur Repeaters and other ham radio uses. Now Bill takes us inside what is likely to be the next generation of ham gear—Software Defined Radios.

The Coming Revolution in Ham Radio Part II

BY BILL PASTERNAK,* WA6ITF

Life can really be scary for a writer trying to foretell the future. For example, in Part I of this article I stated: "I'll start by suggesting that after you finish reading the next several pages, you tear them out, put them in a sealed envelope, and store the envelope in a safe place. Ten years from now, as you sit in front of your 100% digital Software Defined Radio (SDR) amateur station with antenna mounted RF to digital converter, you will see how rudimentary these initial thoughts probably are." Now, only a few weeks later, I will modify that statement a bit and suggest that you re-read this two-part article in *five to six* years. In the transition from analog to digital communications, things are happening that quickly.

Even though this is a non-technical look at a very technology-laden future, I cannot ignore the fact that in the 1970s, '80s, and even into the last third of the 1990s, one probably could ignore changing technology. Now it's the year 2000. The pace of life has doubled, if not tripled, since 1996. Rarely do you see a person, male or female, who is not wearing a pager or carrying a cellular telephone—or both. In a growing number of families both parents carry cell phones and pagers, and each child wears a pager. Communications is a phone call or a page away. As a result, some restaurants, public buildings, and schools have banned the use of these devices on premises *(see note 1 at the end of this article)*.

Cell phones and pagers have also written an end to the concept of the nine-to-five job. They have forced a good part of the world's work force to be available at any time, for any reason, to do "the job." Those who do not embrace the change that technology has wrought will be left behind. Failure to become educated in the latest technology can, and eventually will, cost many their livelihoods. The digital revolution seems to have no pity on those who refuse to embrace the future. As with the rest of the world, that future seems to be the digital revolution itself.

Information—The Key That Opens the Door

The first reason for changing my "prediction schedule" was my introduction to the SDR Forum on the world wide web. It is located in cyberspace at <http://www.sdrforum.org/mmits.html> and describes itself as "...an open, non-profit corporation dedicated to supporting the development, deployment, and use of open architectures for advanced wireless systems," including voice, data, image, and multimedia. In other words, in their view you cannot separate digital communications from SDR.

The members of this forum include "an international mix of business and technical decision makers, planners, policy makers, and program managers from a broad range of organizations sharing a common view of advanced wireless networking systems evolu-

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SS-12	10	12	1¾ x 6 x 9	3.4
SS-18	15	18	1¾ x 6 x 9	3.6
SS-25	20	25	2⅞ x 7 x 9⅝	4.2
SS-30	25	30	3¾ x 7 x 9⅝	5.0

MODEL SS-25M

DESKTOP SWITCHING POWER SUPPLIES WITH VOLT AND AMP METERS

MODEL	CONT. (Amps)	ICS	SIZE (inches)	Wt.(lbs.)
SS-25M*	20	25	2⅞ x 7 x 9⅝	4.2
SS-30M*	25	30	3¾ x 7 x 9⅝	5.0

MODEL SRM-30

RACKMOUNT SWITCHING POWER SUPPLIES

MODEL	CONT. (Amps)	ICS	SIZE (inches)	Wt.(lbs.)
SRM-25	20	25	3½ x 19 x 9⅝	6.5
SRM-30	25	30	3½ x 19 x 9⅝	7.0

WITH SEPARATE VOLT & AMP METERS

MODEL	CONT. (Amps)	ICS	SIZE (inches)	Wt.(lbs.)
SRM-25M	20	25	3½ x 19 x 9⅝	6.5
SRM-30M	25	30	3½ x 19 x 9⅝	7.0

MODEL SRM-30M-2

2 ea SWITCHING POWER SUPPLIES ON ONE RACK PANEL

MODEL	CONT. (Amps)	ICS	SIZE (inches)	Wt.(lbs.)
SRM-25-2	20	25	3½ x 19 x 9⅝	10.5
SRM-30-2	25	30	3½ x 19 x 9⅝	11.0

WITH SEPARATE VOLT & AMP METERS

MODEL	CONT. (Amps)	ICS	SIZE (inches)	Wt.(lbs.)
SRM-25M-2	20	25	3½ x 19 x 9⅝	10.5
SRM-30M-2	25	30	3½ x 19 x 9⅝	11.0

MODEL SS-12SM/GTX

MODEL SS-10EFJ-98

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EF JOHNSON AVENGER GX-MC42
EF JOHNSON GT-ML81
EF JOHNSON GT-ML83
EF JOHNSON 9800 SERIES
GE MARC SERIES
GE MONOGRAM SERIES & MAXON SM-4000 SERIES
ICOM IC-F11020 & IC-F2020
KENWOOD TK760, 762, 840, 860, 940, 941
KENWOOD TK760H, 762H
MOTOROLA LOW POWER SM50, SM120, & GTX
MOTOROLA HIGH POWER SM50, SM120, & GTX
MOTOROLA RADIUS & GM 300
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UNIDEN SMH1525, SMU4525
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SS-10MG, SS-12MG
SS-101F, SS-121F
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SS-10SM/GTX
SS-10SM/GTX, SS-12SM/GTX, SS-18SM/GTX
SS-10RA
SS-12RA
SS-18RA
SS-10SMU, SS-12SMU, SS-18SMU
SS-10V, SS-12V, SS-18V

*ICS – Intermittent Communication Service

tion..." Translation: If you are involved in the future of telecommunications, this is the place in cyberspace to monitor.

Before you say, "Hey, this is a group I have to join," however, wait up. This is not a freebie. In fact, get ready for some "sticker shock," because membership in the organization is priced at $6000 a year for large commercial companies (revenues greater than $100 million), $3600 a year for medium-size commercial companies (revenues between $10 million and $100 million), $1800 a year for small commercial companies (revenues less than $10 million), and $2400 a year for government and nonprofit organizations. This is not a forum for most individuals, but it is one in which the ARRL, TAPR, AMSAT, AMRAD, and similar organizations ought to be active participants *(see note 2)*.

If you and I can't afford to join the SDR Forum, what can we do with it? We can visit it regularly and read the free presentations in the web site's public area. Some are quite lengthy and require that you have Microsoft Word, Powerpoint, Excel, and/or Adobe Acrobat installed on your computer. One presentation entitled "Software Defined Radio as an Open System Architecture," by Mark Cummings, CEO of enVia and SDR Forum Technical Committee Chair, is must viewing (it is a Powerpoint presentation) because in essence it defines the future of telecommunications, and that future is almost at hand.

In addition to the rather expensive SDR Forum, you can educate yourself about SDRs by using internet "search engines" such as Alta Vista, Yahoo, and my personal favorite, Google. Simply type in the words "Software Defined Radio" on your favorite search engine and hit the "go" or "search" button. In seconds you will be overwhelmed with SDR-related web sites. Unfortunately, few have any direct relationship to ham radio, but reading them does permit you to extrapolate more on where digital telecommunications is headed as it fast replaces the analog world.

SDR and the FCC

Another place to watch is the Federal Communications Commission web site at <http://www.fcc.gov>. Use its built-in search engine and enter the words "Software Defined Radio" or the letters "SDR."

Back on March 17th the Commission issued a Notice of Inquiry (ET Docket No 00-47) along with a press release stating that it was looking at new digital technology that could enable more efficient and flexible wireless transmission through the use of Software Defined Radio. The Notice was designed to solicit information about the state of SDR technology, interoperability issues, spectrum efficiency issues, equipment authorization processes, and other issues to assist the Commission in deciding whether to propose rule changes as a result of the developing SDR technology. Hams and ham organizations were specifically invited to participate in this process by Office of Engineering and Technology Chief Dale Hatfield, WØIFO, in a June speech to AMRAD, which was reported on in great detail in September *CQ*.

Ham Radio and SDR ... The Future?

What about the "digital destiny" of ham radio? Is SDR the key to our future as well? The ARRL appears to think so. Back in June the *ARRL Letter* reported that the League had filed comments on the FCC's SDR inquiry, and stated: "The ARRL says that amateur radio 'is a fertile testing ground' for software defined radio technology and that SDR would be especially valuable to facilitate disaster communications..."

The article went on to say that the League believes that the Amateur Service, because of its flexibility, utilization of multiple modes, and shared allocations, provides the proper environment to develop, test, and deploy SDR technology. The ARRL noted that amateur radio is not constrained by limitations imposed on other services and "serves as a reasonable paradigm for a regulatory structure that might be adapted to other services."

The Game is Afoot

To quote Sherlock Holmes, "The game is afoot." The process that will lead us to SDRs has already begun. I look at today's high-tech radios as the beginning of that process. Already we have single radios that can let us operate a variety of modes on any ham band between 160 meters and 70 centimeters, and handhelds with mini-spectrum analyzers that cover nearly everything "from DC to light." The power of the microprocessor made them possible, and the overall advancements in microprocessor technology, along with more advanced software, are taking all of us to even newer horizons.

I believe that we can (and will) cross the digital boundary starting with the next generation of ham radio hardware and software that's about half a decade away. This will be the "transition level

station," one which operates in both the analog and digital worlds, not unlike those high-priced digital television receivers that also receive the analog stations because in reality there is little to see on digital. Analog is still where the action is.

Likewise, you probably will see true ham radio digital communications first introduced as a "feature" in top-of-the-line HF/VHF transceivers. In the analog world, the radio will perform like any other radio in use today. Its big plus—coming initially at a premium price—will be its ability to take the analog word, digitize it, transmit it as some yet- to-be-determined form of packetized data, receive it, convert it back to analog, and interface it to you. As more people discover the wonders of digital, and analog use dwindles, future generations of hardware will delete true analog modes.

At this point the term "human interface" will become of importance because as outlined in Part I, in the digital world all communications will be nothing more than a bitstream. CW, SSB, FM, AM—you name it. It all will "seem the same" to the user, if he or she wants it to "seem the same." In reality, the "seem the same" will be generated by a computer in the radio that will let it "seem the same" or permit you to tailor its operation to your whim and will.

Too Expensive For Me?

"But I have a fairly new radio already," you say, "and I don't want to throw it out and spend thousands of dollars on a new one." The short answer: Unless it's a real oldie like a 1950s KWM-2, a '60s National NCX-3, or a '70s-era TS-520, you probably can keep on trucking with your present gear, albeit without some of the "bells and whistles" of newer gear. Your introduction to digital ham radio will either be through a digital repeater (see Part I) or something similar to what's being used right now to bring digital television to current analog receivers ... an add-on "black box" on which I will bestow the name "SDR Converter."

If I am seeing things correctly, the "SDR Converter" will be the part of a "smart radio" that your current radio does not now possess. It will connect to any radio that has some form of digital interface jack and do all the A-to-D and D-to-A conversions needed to permit your current station to continue for as long as you desire. In fact, this specialty item could wind up being one of the biggest selling after-market items ever in ham radio.

Initially, the curious such as me will buy them. Once we experience the wonders of digital, we will start telling everyone in the analog world what we are doing. Once the word gets out, the hordes will not be far behind. That's the way it was when SSB was introduced, when FM came to VHF/UHF, when packet radio was introduced, and when many other specialty modes came our way. My prediction is that for a few hundred dollars you too will be able to be a part of the digital transition. History repeats itself, and this will be no different.

This, of course, leads to other questions. Among them is how will spectrum managers coordinate digital audio repeaters once SDR technology is a part of ham radio? The answer is that they won't. They won't have to. Once SDR is a part of ham radio, the radios involved from "user" to "relay" to "user" will be smart enough to coordinate themselves—on a "QSO by QSO" and "transmission by transmission" basis. All that will be necessary is to have the needed database as a part of each radio and the limits as to where they can operate under whatever subband rules the

SDR Resources

Web Sites

AMSAT-NA: <http://www.amsat.org>
Amateur Radio Research and Development Corp. (AMRAD): <http://www.amrad.org>
ARRL: <http://www.arrl.org>
The SDR Forum: <http://www.sdrforum.org/mmits.html>
Tuscon Amateur Packet Radio (TAPR): <http://www.tapr.org>
Wireless Information Network Lab:
<http://www.winlab.rutgers.edu/Testbed/Hardware/Index.html>

Search Engines

Alta Vista Search Engine: <http://www.altavista.com>
Google Search Engine: <http://www.google.com>
Yahoo Search Engine: <http://www.yahoo.com>

Suggested Web Reading

FCC on SDR: <http://www.fcc.gov/oet/speeches/sdrforumsph.html>
Radioscape SDR:
<http://www.radioscape.com/software-defined-radio/soft-defined-radio.htm>
Communications Week International: <http://www.findarticles.com/m0UKG/>
<2000_May_8/62323711/p1/article.jhtml>
CQ September issue: <http://www.cq-amateur-radio.com/backissues>

FCC may have in place when all this comes to pass.

How Can We Make It Happen?

Two words: "cooperation" and "standards." For ham radio to be in the position to lead, we must put aside our differences. Over the years we have permitted ourselves to be divided into smaller and smaller demographic subcommunities based on license class and particular interest. A year ago there were six license classes (counting Tech and Tech Plus as separate entities). Now there are but three. While there is still some hostility in our ranks as the result of the "instant upgrades" to General granted to several thousand pre-1987 Techs, in time that too will disappear. The Vanity Call Sign System is fast blurring the lines of who held what call and when. It is all but impossible to tell the class of most licensees by their callsigns, and thankfully this part of the long-lived license-class prejudice is disappearing as a direct result.

Soon the only label left will be that of our interest in our primary mode. You know the terms: "He's a DXer," a "contester," an "FMer," etc. Even these eventually will become a part of ham radio's golden past as digital becomes a way of life. This is because on the air all of our signals basically will be the same—i.e., a bitstream of data from one smart radio being sent out to the world for another smart radio to decode and display to its human operator. The preference of "human interface" will remain a private affair between the operator and his or her rather smart radio.

What is needed most is for us in ham radio to either create our own data transfer standards, devise our protocols and our own algorithms, or have those developed for other services bestowed on us. While the nature of this development is well beyond the scope of this article, I will postulate that it cannot be proprietary and must permit hams to interface with the non-ham world (see note 2).

This need also leaves open some "human engineering" questions. Do we have the motivation? Do we have the will? Do we have the desire? Do we want to lead or follow? These are questions that only time will answer, and there is precious little time left for the service to come up with an answer. In realty, this may be the final test to see if ham radio remains a technical hobby or if it becomes just another method for people to talk to one another.

Saying Hello to the Future

As I said at the outset, this in no way is meant to be a technical article. Rather, it is one ham's view of what the future may hold in store. It is meant to make you think and wonder, and to motivate you to be among the first to welcome the world of true ham radio digital communications. If we can cooperate, we can be the first major communications entity to welcome the emerging digital technology. We can help to develop it and help others to implement it, thereby renewing part of the basis and purpose of our service as outlined in Section 97.1 of the Amateur Service Rules.

Maybe it will be totally different than what has been presumed by yours truly in this two-part "futurescape." So be it. The important thing is that we have it within our power to help usher in a new and better way in which to communicate and have a lot of fun doing it.

Notes

Note 1. Schools in particular are stopping students from carrying cellular phones and pagers for a variety of reasons, ranging from suspicion of gang activity to interference with classroom activities. In some areas, telecommunications advocacy groups are challenging this school restriction, claiming a violation of the students' civil rights. In addition, some schools reportedly are prohibiting all wireless communications devices, including ham radios, from their buildings.

Note 2. This writer believes that the time is now for the technical and political leaders in amateur radio worldwide to begin an open dialogue on the future of digital ham communications and the role of Software Defined Radio. While I am certain that some administrations are doing this, it is not being well publicized, if at all. A unified effort—possibly through AMSAT, TAPR, AMRAD, or the like—is needed to develop an amateur radio digital standard so we can begin software development for amateur-based SDR. ■

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Washington Readout

Regulatory News In The World Of Amateur Radio

BY FREDERICK O. MAIA, W5YI

Mystery and Intrigue at the IARU

Formed in Paris 75 years ago, the International Amateur Radio Union is a global organization made up of national amateur radio societies from around the world. The IARU concept was originated in 1924 by ARRL President Hiram P. Maxim. Although the IARU is officially classified as an "observer" and does not have voting rights at World Radiocommunication Conferences (WRC) and other international meetings, it is regarded as a responsible body which investigates problems and comes up with concerns and solutions.

The ARRL provides (or approves) the IARU top leadership in exchange for financing the organization. The policy and management of the IARU is carried out by its Administrative Council (AC). The members are the IARU president and vice-president, the secretary, and two members from each of the three regional organizations. The IARU is aligned with, and conducts meetings in each of, the three ITU regions. Region I includes Europe, Africa, ex-USSR countries, the Middle East (excluding Iran), and Mongolia. Region II is North, Central, and South America, including Hawaii, and Johnston and Midway Islands. Region III includes the rest of Asia and Oceania (the South Pacific).

World Radio Conferences used to be held every 20 years. However, with the rapid development of technology and its associated demands on spectrum, they are now convened every three years. Each IARU region also conducts a triennial conference of national amateur radio societies that lie within its borders.

The IARU is now developing a position on future amateur radio qualifications which are embodied in ITU Article S.25. The current rules require Morse code proficiency in order to operate on the HF frequencies. The International Telecommunication Union is the worldwide governing body for telecommunications. It is expected that the Amateur Service definition and requirements for entry will be considered at WRC-2003.

The Future of the Amateur Service Committee

Article S-25 has been subjected to careful review and scrutiny over a several year period by the IARU's Future of the Amateur Service Committee (FASC). Various interim reports were issued by FASC, and ultimately a strategy was conceived and adopted by the IARU Administrative Council. That strategy was based on a belief that the interests of the amateur services would best be served by the creation of an "ITU-R Recommendation" that would contain a reference to the specific technical and operational requirements deemed necessary for an amateur license.

Meeting in Venezuela in October 1998, after the conclusion of the IARU Region II Conference, the FASC issued a final report to the IARU Administrative Council supporting the incorporation by reference of an amateur operator qualifications recommendation in the ITU Radio Regulations. This replacement Article S25.1 simply stated, "S25.1: Administrations shall verify the technical and operational qualifications of any person wishing to operate an amateur station. A person seeking a license to operate an amateur station shall be required to demonstrate a knowledge of the topics specified in ITU-R Recommendation M-XXX." The current draft of this recommendation is now known as M-AOQ, an acronym for Mandatory Amateur Operator Qualifications.

National Volunteer Examiner Coordinator, P.O. Box 565101, Dallas, TX 75356-5101 (telephone 817-461-6443)
e-mail: <w5yi@cq-amateur-radio.com>

IARU Region I Conference

In September 1999 IARU Region I held its triennial conference in Lillehammer, Norway. It was attended by more than 50 national amateur radio societies from across Europe and Africa. One of the issues covered at the Lillehammer conference was consideration of an ITU set of amateur radio operator qualifications. The proposed draft new recommendation (PDNR) contains the technical and operational requirements for an amateur license rather than attempting to spell these out in Article S.25 of the Radio Regulations.

The new qualifications list was considered at Lillehammer by Committee C3. The majority of those in attendance voted in favor of eliminating Morse as a requirement for an HF license. The final IARU Region I agreement concluded that the S.25 requirements should contain the following qualification elements: Radio Regulations and Licensing Conditions, Interference, Operating Skills, EMC, Safety, Theory of Electronic Circuits and Devices, Transmitters, Receivers, Antennas, Propagation, Modes of Communication, and Measurements. The IARU Administrative Council voted in favor of the same set of operator qualifications. Strangely, however, the proposed recommendation to be submitted for consideration by ITU Working Party 8A was mysteriously reworded as follows:

Preliminary Draft
New Recommendation

The ITU Radiocommunication Assembly,

considering

a) that No. S1.56 of the Radio Regulations (RR) defines the amateur service as: A radiocommunication service for the purpose of self-training, intercommunication and technical investigations carried out by amateurs, that is, by duly authorized persons interested in radio technique solely with a personal aim and without pecuniary interest;

b) that No. S1.57 (RR) defines the amateur-satellite service as: A radiocommunication service using space stations on earth satellites for the same purpose as those of the amateur service;

c) that certain minimum operator operational and technical qualifications are necessary for proper operation of an amateur or amateur-satellite station,

recommends

1. that administrations should take such measures as they judge necessary to verify the operational and technical qualifications of any person wishing to operate an amateur station;

2. that any person seeking a license to operate an amateur station should demonstrate knowledge of:

Radio Regulations
  International
  Domestic
Operating skills

radio telephony
radio telegraphy
data and image
Radio system theory
transmitters
receivers
antennas and propagation
measurements
Radio emission safety
Electromagnetic compatibility
Avoidance and resolution of radio frequency interference

This new version differed from both the AC Resolution and the Region I Conference decisions at Lillehammer in a number of ways. For example, it omitted reference to "Licensing Conditions" and "Modes of Communication" and expanded the definition of "Operating Skills" to include radio telegraphy. Although radio telegraphy includes more than "Morse," it became apparent that someone wanted to make sure that CW proficiency is included as an amateur radio operator requirement, even though the Region I delegates specifically voted that it should be dropped.

According to Radio Society of Great Britain President Don Beattie, G3OZF, the decision of the Lillehammer Region I Conference was *not* to include any reference to Morse in the requirements in M-AOQ: "The conference felt strongly that a mandatory Morse testing requirement was not consistent with modernizing the image of amateur radio," Beattie said. "The RSGB believes the words 'radio telegraphy,' added under 'Operating Skills' in the draft recommendation, are capable of misinterpretation."

It appears now that the Chairman of Region I, Lou van de Nadort, PAØLOU (from the Dutch VERON Amateur Radio Society) may have taken it upon himself, possibly with input from IARU/ ARRL leadership, to reword the proposed amateur operator qualification draft to include radio telegraphy proficiency as a requirement for an HF Amateur license. According to G3OZF, PAØLOU insists that there was a ballot taken in Lillehammer to retain radio telegraphy, but no one in attendance at the meeting is aware of any such vote. All conference papers show an agreement in favor of eliminating Morse.

Don Beattie maintains that after the IARU Region I position was developed, the conference discussed the content of the M-AOQ recommendation and agreed "no Morse." He said he was "...surprised that VERON maintains that retention of radio telegraphy was voted for at Lillehammer." He said there was no such vote. The RSGB then dashed off the following letter:

To: Member Societies in Region 1 IARU
From: Don Beattie, President, Radio Society
of Great Britain
July 5, 2000

Dear Colleague,

IARU Region I EC request for input on draft PDNR M-AOQ:

You will have received a request from Region 1 Chairman PAØLOU to comment on the draft form of the Preliminary Draft New Recommendation reference M-AOQ. For those of you who were at the Lillehammer Region I Conference, you will recall discussion on this matter under paper 3.17, which was subsequently approved by the conference.

When this paper was debated, a lot of time was spent discussing the relevance of mandatory Morse testing for an HF license. In the end, conference decided that mandatory Morse testing was not relevant for an HF license in the future, and the content of the agreed M-XXX paper reflected this. M-XXX is now referred to as M-AOQ.

Since the Region I Conference, you will be aware that the Administrative Council of the IARU has also voted in favour of the identical wording for M-XXX as the Lillehammer decision.

At an informal international meeting at the Friedrichshafen "Ham Radio 2000" event two weeks ago, it became apparent that a document was in circulation, and had indeed been submitted to the ITU, which differed in several material respects from the papers agreed at the two Lillehammer meetings. Member Societies in Region I had not been given the opportunity to comment on this document until the last few days.

The RSGB has a number of concerns about the draft PDNR. In particular, the society is very concerned that the words "radio telegraphy" have been added under "Operating Skills." Whilst the international definition of radio telegraphy is broader than simply Morse, the RSGB believes that these words in the PDNR are capable of misinterpretation, and should be removed.

I am therefore sending you for information the formal RSGB response to the Region I request for input. I hope this may be of interest to you.

With best wishes,
Don Beattie, G3OZF
President, RSGB

The RSGB is asking the Executive Committee of Region I of the IARU and the Administrative Council of IARU "...to adhere to the decisions agreed at the Lillehammer Region 1 Conference and in AC Resolution 99-1 by returning to the original list."

Said G3OZF, "Most particularly, the RSGB formally asks, in returning to the original Lillehammer decisions, that no further amplification be included in the 'Operating Skills' section through inclusion of words such as 'radio telegraphy,' which are capable of misinterpretation.

"In this respect, the RSGB asked for confirmation that it is not the intention to seek, through the wording of M-AOQ, the continuation of the requirement for mandatory Morse testing for an HF amateur license."

The previous IARU Region conference (held in Tel Aviv in 1996) concluded that Morse should remain as a requirement for an HF license. Delegates at the Lillehammer meeting expressed surprise that PAØLOU had decided that the Region I position should be to retain radio telegraphy as a requirement, as they had no recollection of the Tel Aviv resolution on this matter being endorsed at Lillehammer. Quite the contrary, it was decided that it should not be endorsed. There are those who feel that the Amateur Operator Qualifications are being "manipulated."

IARU Region III Conference

Hosted by the Wireless Institute of Australia (WIA), the eleventh IARU Region III Conference got underway on August 28, 2000 at the Carleton Hotel in Darwin, Australia.

One of the conference agenda items was "Revision of Article S25, if any, of the Radio Regulations." The Wireless Institute of Australia was already on record as recommending that all Region III societies seek an interim top Morse code exam speed of 5 words-per-minute and that a policy of removing all Morse code testing be pursued with national communications regulators prior to the next WRC empowered to discuss the matter.

The IARU International Secretariat (the ARRL) sent a statement to the Darwin Conference contradicting the claim that the PDNR proposes to maintain the Morse code requirement unchanged: "ITU Regulations, Recommendations and usage radiotelegraphy has a much more general meaning and refers to facsimile, radioteleprinter and some other modes. This is, however, not all the same as stating that there is a

requirement to copy Morse by hand and send by ear as is presently stated in Article S-25. It does not imply a required demonstration of manual Morse code operating ability any more than 'radiotelephony,' also listed as an operating skill about which a licensee should demonstrate knowledge, implies a required demonstration of voice operating ability," IARU said.

Apparently still convinced that the IARU was not listening to its regional conferences, G3OZF traveled to Darwin to attend the IARU Region III Conference. He was entitled to vote there on the basis that tiny Pitcairn Island, a United Kingdom possession, is in ITU Region III. The ARRL was also there as a voting member, since the U.S. has island possessions in the South Pacific (Northern Mariana Islands, American Samoa, Baker, Howland, Jarvis and Wake Islands, Palmyra Atoll, and Kingman Reef).

In a report to the amateur community, Jim Linton, VK3PC, IARU Region III Conference Media Officer, said that 17 member societies were represented in Darwin. A wide range of issues was discussed, including ITU Radio Regulation S25, which currently requires Morse proficiency in amateur license testing.

At the end of the fourth day and after a number of wording revisions, the general intent of recommendations in a WIA input paper on ITU RR S25 was adopted. The Conference resolved to support lowering the amateur license Morse code test speed as a temporary measure, and the ultimate removal of Morse being an ITU license requirement.

At the final plenary session, a motion, proposed by WIA, seconded by SARTS (Singapore Amateur Radio Transmitting Society), read:

IARU Region III strongly supports Morse code as an effective and efficient mode of communication. However, it believes that the position of Morse as a qualifying criterion for an HF amateur license is not relevant to the healthy future of amateur radio. Therefore:

1. That IARU Region III urges member societies to seek, as an interim measure, the reduction of all Morse code testing speeds to five words per minute.

2. That setting aside any previous relevant decisions of earlier Conferences, a policy of the removal of Morse code testing as an ITU requirement for an amateur license to operate on frequencies below 30 MHz be adopted by IARU Region III.

3. Further, we recommend that the Administrative Council adopt the above position as IARU policy.

The motion was passed, with the ARRL voting against, and HARTS (the Hong Kong Amateur Radio Transmitting Society), whose members had three years ago supported retention of a Morse code as a license requirement, recording an abstention. The ARRL voted against the resolution in accordance with a 1997 Board Standing Order which states that the ARRL will not support changing the existing treaty requirement for the demonstrated ability to send and receive Morse code. This position was supposedly based on input from the ARRL membership which showed that the majority of members responding favor the retention of Morse code for HF operating privileges.

Also related to ITU RR S25 was another motion in which the R-III Conference addressed concern about the preliminary draft recommendation M-AOQ, which includes reference to "Radio Telegraphy" under a list of Operating Skills for the amateur license.

The concern expressed by delegates was that "Operating Skills" could be misunderstood, and in fact it had been wrongly seen by some in the amateur radio fraternity as indicating the retention of a Morse code telegraphy skill.

Delegates heard that in ITU terminology Radio Telegraphy meant all digital modes of transmission. In a motion proposed by the RSGB (Radio Society of Great Britain), and seconded by the ARRL, the conference resolved to instruct the IARU Region III representatives on the IARU Administrative Council to replace in the M-AOQ the term "Operating skills" with "Methods of communication."

The mystery of who changed the IARU Region I recommendation, and on whose authority, may never be fully solved. However, the reaction by member societies, especially the RSGB, and of Region III societies, suggests that the "revised" wording is by no means final.

73, Fred, W5YI

Public Service

BY BOB JOSUWEIT, WA3PZO

Public Service and Emergency Communications

A Need for Training—Before It's Too Late

Many of us rarely see a need for emergency communications. We may even be complacent and just check into the weekly club net. However, if the need for additional communications support arises, will you be ready to serve in the public interest?

Montana amateurs are representative of many hams across the country. Bob Avritt, Sr., N7CZ, an Assistant Emergency Coordinator for Cascade County and the Central Montana Skywarn Coordinator, recently posted a message on the internet list server requesting some ideas on how to provide a message service or link with various firefighter camps throughout the state. He indicated there was very little contact with the outside world for the firefighters who at that time were battling the worst forest fires in 50 years. Said Bob, "We don't have a lot of experience up here with large-scale disasters, so any ideas or suggestions would be great.

"Unfortunately, the ham radio community here in Montana has been very complacent," he continued. "I don't even know if these wildfires will wake folks up! It is very frustrating here, especially since I have been one of the loudest voices calling for training and regional cooperation! That is why three of us from different regions organized the Montana Field Day 2000 operation. We brought together three clubs for a big FD operation just to get to know each other and practice cooperative deployment."

There are bright spots, though, as Bob suggests: "I must say that there are many active hams who do work on training, etc. Our Skywarn program, for example, has many folks who on a regular basis prepare to assist the NWS here in Great Falls in verifying warnings."

Bob Avritt, Sr., N7CZ, and local hams helped put firefighters in contact with family and friends. (Photo courtesy USDA Forest Service, Erin Connelly)

In Montana, N7CZ says a call went out from the Forest Service for hams willing to run the Forest Service radios as paid employees. Hams are also assisting in the rescue of animals from the fire-affected areas.

Trained Communicators

Amateur radio operators traditionally tell the story of being trained communicators. This role is well recognized. On the East Coast, the American Red Cross has recognized the skill and knowledge of amateur radio operators by asking one state for the location of amateur repeaters so they can set up their own equipment if necessary. While the exact locations were not provided, a list of clubs having repeaters was provided with an offer to assist should the need arise.

Rainy Day Turns Into A Call for Action in NJ

"It was a rainy Saturday; the dog did not even want to go out," said Deb McKay, N2TTP, the Skywarn Coordinator for Sussex County, New Jersey. Almost 6 inches of rain had fallen in a little over 3 1/2 hours. "Living in the northwestern part of New Jersey, rain like this is not an everyday occurrence.

"I was getting staggering rainfall totals from the network of county Skywarn Spotters, the largest amount coming from the small town of Sparta, New Jersey. It was a spotter in Sparta who measured upwards of 15 inches within a 6 hour time period," she said. "Things were happening in Sparta. However, the extent of the devastation would not be uncovered until several hours later.

"During the hourly Skywarn net I was running for rainfall totals, I heard Dan Murphy, W2GZB, call on the radio for Bob Stepanek, N2TTT, to get the County Communications Van and meet him at the Hardyston Township Police Department. Upon my inquiry, Dan reported that Hardyston needed communications, as their antenna had been struck by lightning. I volunteered to come out and help. I felt obligated. After all, I live in Hardyston Township."

McKay made one final call to the National Weather Service Office with the latest rainfall totals. They were thankful for the data they received, as it helped substantiate what they were seeing on the Doppler Radar—a very wet stationary storm. Twenty-five miles away it was sunny with no rain. McKay thought that they were isolated. The storm was not affecting anywhere except Sussex County, specifically Sparta and Hardyston, in terms of rainfall amounts. The northern end of the county had less than an inch of rain. McKay reported 9.8 inches and just southwest of her home in Sparta, between 15–18 inches.

McKay Picks Up the Story . . .

I left my small lakeside community home and raced to the police department. Upon my arrival, Patrick Coleman, N2HWM, called me on my cell phone to tell me that I needed to bring sandbags up to the dam at Tamarack Lake. My heart stopped. I felt the color drain from my face and slowly panic set in. This was my lake and my dam! I turned my car around and drove back up the state highway to my community.

Upon arriving at the beach, we saw that there were firemen and a few residents filling up sandbags. One by one people came out in the pouring rain with shovels and wheelbarrows to help with the effort. By then the communications van had arrived at the site of the overspill from the weakened dam. I had never seen such a selfless effort by so

c/o CQ magazine
e-mail: <wa3pzo@cq-amateur-radio.com>

Sussex County, New Jersey amateurs discuss communications assignments behind the Sparta Police station. Left to right: Dan Murphy, W2GZB; Herb Wreden, N2EPA; and Kelly Levitt, KB2SYD. (Photo courtesy Deb McKay, N2TTP)

many. The road was closed, and homes downstream were evacuated. As a result of the Tamarack overspill, a second dam on a lake downstream from Tamarack was threatened. The evacuation efforts were stepped up.

Our county communications van is a 1968 Ford step van with less than 5000 miles on it. It is a self-contained vehicle equipped with an excellent assortment of VHF radios. We have a Kenwood 732 440 MHz/2 meter dual bander, and another Kenwood VHF mobile for both 2 meters and 222 MHz.

Additional radios include three Midland rigs. One covers the VHF high band, which includes the county radio, the State Police Emergency Network, and most of the other police departments. The second is a VHF low-band radio; with this one we can communicate with the county road department. The third is another low bander, which enables us to have two-way communication with the fire services.

After the evacuation started, the Red Cross opened their first shelter in a church hall a few miles from the two dams. We moved our van from the Tamarack Dam site to the shelter site, and that became the staging area. We had mutual aid from several northern New Jersey fire departments. All of the communications went through the communications van. One firefighter sat at the radio and kept his log. Initially, three hams were staged in the van, facilitating communication from one public service to another. The 911 center brought in an extra dispatcher to supplement the already clogged system.

Having access to the county radio enabled us to be in contact with Skip Danielson, Sussex County Emergency Management Director. It was through this communication that we learned Sparta (population about 18,000) was in trouble. Two dams had broken, roads were washed out, and gentle brooks that are usually almost dry at this time of year were overflowing their banks, washing homes off their foundations. In horror, we put out a call on both local repeaters asking for help. Dan, W2GZB, and I called people on our cell phones while trying to maintain a communication log. We had no idea how many would be affected.

Danielson was at the Sparta Police station about 10 miles from our staging area dealing with the Sparta catastrophe. His deputy, Bill Teets, was at the Tamarack location assisting in that emergency. Bill is also the Emergency Management Coordinator for Newton, New Jersey, the Sussex County Seat and the home of over 10,000 people. Shortly after dark Bill received a call stating Newton had suffered a water-main break and had no water. Bill then had to leave the scene to go to there, about 18 miles from the Tamarack location. That left Dan Murphy, W2GZB, to assist the municipal coordinator, Pat Colemen, N2HWM, with the Tamarack situation.

The radios were buzzing. To an onlooker it appeared to be chaos, but we knew we had communications under control. We were running three separate emergency situations from the van! Bob Stepanek, N2TTT, was net control. He kept his cool and got all of the informa-

tion straight and delivered to the correct persons. I was keeping a log and calling folks on the cell phone, trying to recruit more hams. In addition, every hour I was in contact with the National Weather Forecast Office in Mount Holly for weather updates which were relayed to the Emergency Operating Center (EOC).

Earl Cook, W2SV, was enroute to Sparta when he heard the calls requesting more help. Earl had his power supply, his 2 m/440 MHz mobile rig, and several antennas with him. He headed to the Sparta EOC and set up another staging area where he started to coordinate communications while maintaining contact with us at the Tamarack location. Four more shelters were opened as more than 1000 people had to be evacuated. We called again for more help. Now we needed additional communicators for the shelters.

We were able to man three of the shelters in a matter of a half hour. Tom Golembiewski, WB2UFF, and Gary Johnson, N2INP, helped out with that, and then Ken Neill, NG2N, and his wife Caitlin, KC2BNU, came out. Ken went to Skip to help him so we could get his messages out from the Sparta location to the masses. As chaotic and confusing as everything looked to the bystander, without a doubt it all was coming together.

By that time the Tamarack Lake dam had stabilized. The rain had stopped, and the shelters were stocked with cots, blankets, pillows, and food. I left the scene at about 1 AM, went back to my home on Tamarack Lake, pumped out my basement, and went to sleep, only to be awakened by the telephone at 6 AM. The call was a request for a communicator at the Tamarack Lake shelter. There were still people who could not return to their homes. Off I went with only three hours of sleep under my belt.

During the night the communications van had been relocated to Sparta, where there was a more acute need for it. The rain had stopped for the most part, but the damage was great where two dams had broken.

By the next day there was only one shelter open, with no idea of how long it would remain so. We had some amateurs stationed in the EOC and the headquarters of the Sussex County Office of Emergency Management, about 15 miles from the EOC in Sparta. All the phones were busy, and amateurs were relaying their messages back and forth among the shelters, the OEM, and the EOC. We covered the shelter and the EOC 24 hours a day for several days. Many of the amateurs spent 16

Heavy rains uproot trees onto local homes. Skip Danielson, County Emergency Management Director; Deb McKay, N2TTP, Skywarn Coordinator; and Jim Eberwine from the National Weather Service survey the damage. (Photo courtesy Deb McKay, N2TTP)

to 18 hour shifts at their posts helping to facilitate communications.

"The amateur radio operators were an asset to our communications," commented Danielson. "They are expert communicators, able to listen to four radios at a time and still pick out what is being said."

Monday morning the skies brightened some, but it was still noticeably overcast. New Jersey Governor Christie Todd Whitman was flying over the damaged sites in a State Police chopper. The news media were crawling all over the parking lot where we were located, and communication was still via ham radio. Federal Emergency Management (FEMA) arrived. We called out our need for more operators, and the response was wonderful. Again, we went to work.

FEMA and Red Cross Damage Assessment Teams were ready to go out into the field. They usually travel with another staff person for safety reasons. We were able to pair them up with hams, giving a three-fold advantage. First, they could create more teams and thus get the work done faster. The teams did not know their way around the county, but the local amateurs did. Also, the amateurs facilitated communication back to the EOC for both the county and the FEMA administration so they could obtain information in a more timely manner.Some of the communications even facilitated action to prevent further damage. FEMA was thrilled to have us with them.

We all were tired but felt wonderful in that we helped make a terrible situation a little better. Several of us continued to put in 16 to 18 hour days.

Nothing Like the Real Thing

McKay reported that amateurs volunteered well over 1200 manpower hours, used upwards of $60,000 of their own equipment, and clocked over 4000 miles in their own vehicles. There were 42 amateurs providing communications, with an additional 23 on standby. It was an amazing effort that spanned a full week!

McKay summarized that although the outcome was devastating to the people affected, the experience was a positive one in that it helped her realize how different a real emergency is compared to all the drills in which she has participated. As she left the disaster area for the last time after some 130 hours of volunteer time, she said, "We had no injuries and no deaths... that in itself tells me that we did an okay job."

Emergency Management Director Skip Danielson and former coordinator, John Ouweleen, N2TCA, believe in education, McKay commented. "It is through their recognition and their commitment to include the amateurs in emergency management preparedness that the amateurs were able to be such an asset during the flooding emergency in Sussex County, New Jersey." Danielson was quoted in the Morristown *Daily Record* as saying, "At emergency scenes RACES is very important. Their (RACES) communication is clean, strong, and direct." Gary Szatkowsky, Meteorologist in Charge of the Mount Holly, New Jersey National Weather Service, commended the Skywarn program on how the information helped to prevent loss of life and further damage to personal property.

Ready to Serve

You never know when your services might be needed. It could be on a day of torrential rains or when a fire starts. "When you don't practice what is needed and you don't 'coordinate' with other area volunteers, you are doomed," says Paul Cavner, NN7B, Nevada Section Emergency Coordinator. "Just because nothing ever happens in your area doesn't mean you don't need to be any less prepared."

With Thanks

This month we would like to thank Bob Avritt, Sr., N7CZ; Deb McKay, N2TTP, and Paul Cavner, NN7B, for the information used in the column. Without input from people such as these we wouldn't be able to help tell the exciting story of amateur radio public service.

Do you have a story to tell? Drop me a note to my e-mail address at the beginning of this column or my callbook address. Until next month...

73, Bob, WA3PZO

Clarification

The segment on ham radio in Kosovo that appeared in this column in the August issue was written and provided by Martha Underwood, NU5N. While we acknowledged her contribution, along with that of others, at the end of the column, we should have more clearly identified her as the author of that segment. We apologize for the oversight.

—the editors

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"As I got older, my high frequency hearing loss was destroying my ham radio for me . . ."

-- Martin F. Jue, K5FLU
President and Founder
MFJ Enterprises, Inc.

I know I'm not the only ham who can't understand all the speech in a QSO caused by high frequency hearing loss. I developed a solution that I want to share with my fellow hams.

I almost gave up my ham radio hobby

I have been a passionate ham radio operator for over 40 years ever since I was a teenager. I loved every minute of it. Still do, but I almost had to give it up.

As I grew older (I'm 56 now) I found myself asking "*What did you say?*" so often it got downright embarrassing. I can hear pretty good most of the time. I just can't always understand what people are saying and my left ear is weaker than my right ear.

It got to where I was having trouble carrying on QSOs. I could hear, but I just couldn't quite make out all the words.

My hearing problem almost put a stop to my lifelong hobby.

There was no way I was going to give up ham radio . . .

Research showed me what to do

I searched the literature and spoke to hearing and speech experts.

According to their research on the intelligibility of speech in hearing English words:

1. The frequencies important for speech intelligibility are the consonant sounds from 500 to 4000 Hz. They contribute 83% of word intelligibility.

Frequencies from 500 to 1000 Hz contributes 35% of word intelligibility and 35% of sound energy.

Frequencies from 1000 to 4000 Hz contributes *48% of intelligibility* but has *only 4% of sound energy!*

2. In contrast, frequencies from 125 to 500 Hz contributes 55% of sound energy but only 4% to word intelligibility.

***In** other words, nearly half the speech intelligibility is contained in 1000 to 4000 Hz frequency range with only 4% of the speech sound energy.*

On the other hand, the low frequencies 125 to 500 Hz have most of the speech energy but contribute very little to intelligibility.

How I improved my ability to hear and understand QSOs

The research showed me what to do.

First, drastically increase the speech energy above 500 Hz where 83% of intelligibility is concentrated.

Second, drastically reduce the speech energy below 500 Hz that contributes only 4% of intelligibility.

Amateur radio communications limit audio to about 300 to 2700 Hz.

I split the audio band into four overlapping octave ranges centered at 300, 600, 1200, 2400 Hz.

I could boost or cut each range by nearly 20 db to give me full control. This let me maximize speech intelligibility for most kinds of frequency loss.

My left ear is weaker than my right ear so I split the output audio into left and right channels with separate 2½ watt amplifiers. A balance control lets me equalize the perceived loudness to each ear. *Now both ears help in improving speech intelligibility!*

I couldn't believe my ears!

I built one and hooked it to my rig.

I boosted the high frequencies, cut the low frequencies, set the volume and adjusted the balanced control so I could hear each side equally loud.

I couldn't believe my ears! Speech that I could hear but barely understand before was now highly understandable. I got my ham radio back!

With this concept, you'll *understand* QSOs better and enjoy ragchewing and contesting more, even if you don't have high frequency hearing loss.

It helped me so much I wanted to share this with my fellow hams

I developed this into an accessory that any ham can use.

I made it immune to RFI, added a front panel phone jack, on/off speaker switch, two selectable transceiver inputs, a bypass switch for in/out comparison and built it into 10Wx2½Hx6D inch aluminum enclosure. Needs 12 VDC.

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Slopers—The Lowest Cost Directional Antennas? Part II

As solar cycle 23 nears or reaches its peak, many of you surely are thinking about how to add new antennas for the 21 to 50 MHz range in order to benefit from what we expect to be better HF propagation. If you are on a tight budget, here are a few variations on the ever-popular sloper antennas which are easy to build and install, and which provide excellent performance with minimum cost.

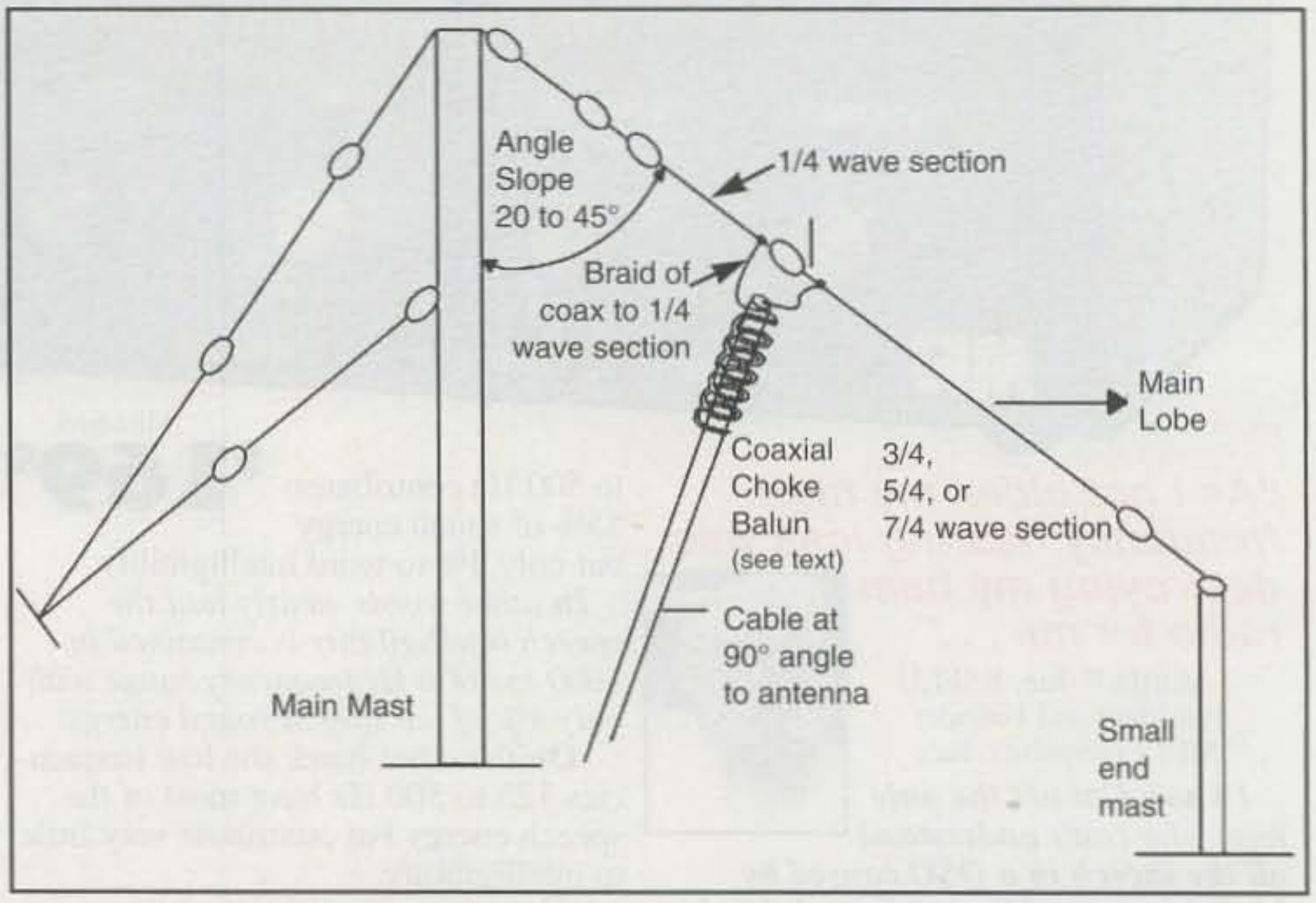

Fig. 1– The ASD, or Asymmetrical Sloping Dipole, consists of a 1/4-wave section, to which the shield of the coax connects, and a longer section—3/4, 5/4, or 7/4 wavelength for your band of choice. Your signal will be concentrated in the direction in which the larger segment is pointing. (Illustrations by Olga Dalmau)

Arnie's ASD for 6 Meters (and other bands, too)

The *Asymmetric Sloping Dipole* (ASD) antenna evolved from a very effective 7 MHz "single wire beam" designed by my good friend CO2DC. His antenna consisted of a 1/4-wave wire, a center insulator, and a 3/4-wave or 5/4-wave wire. This is essentially an *asymmetric* system, providing a very good match to 50 ohm coaxial cable (don't forget the choke balun at the feedpoint!) and a rather sharp main lobe in the direction of the longer arm of the antenna.

CO2DC's AD (asymmetric dipole) was really an ASD, or asymmetric *sloping* dipole, as the antenna is installed with a 30-degree slope angle, which certainly adds to its directivity, while also providing a lower take-off angle (TOA) than an all-horizontal system.

After testing a version of this antenna for the 15 meter band at my home QTH, I was so pleased with the results that the experimental system was taken down and replaced by a permanent one, which is again a 1/4-wave wire, the center insulator and, at my downtown location, a 3/4-wave wire sloping gently toward Europe (see fig. 1).

I soon found out that the ASD concept was something to keep working on, because this antenna is a definite improvement over the standard half-wave or quarter-wave slopers!

Testing on 50 MHz

Using my 5-element, 0.75 wavelength boom Yagi as a reference, I decided to try an ASD antenna for 6 meters. Instead of making the long leg of the ASD just 3/4-wavelength long, though, this one was extended to 5/4 wavelengths, and sloping toward the north at a 30-degree angle.

Several summer sporadic-*E* openings proved that the 6 meter ASD provided good signals at the very fringe area of the single-hop *E*-skip. Then, when working at my rooftop installation, I changed the azimuth of the 50 MHz ASD to 300 degrees in order to make room for another experimental antenna. This proved to be very fortunate, as one day in July, suddenly out of nowhere what was obviously *F2* propagation brought several US 7th call area stations from Washington and Oregon for what proved to be a unique test. The ASD 1/4 to 5/4 antenna was switched in and out , comparing the signals with the 5-element Yagi, and the ASD produced very rewarding results.

As a result, here is conclusion number one: If you need a low-cost 6 meter antenna, install an Asymmetrical Sloping Dipole, or even two or maybe three around your tower or mast, and don't forget the coaxial choke baluns at the feedpoint. (Yes, you can also use ferrite toroids to decouple antenna currents from flowing down the coax shield, but they are much more expensive than a simple eight turns of coaxial cable air-wound with a 6 inch or 15 cm diameter.)

The ASTCD Antenna is Born

After the very successful experiments with ASDs, a more elaborate antenna was developed. I named it the *Asymmetric Sloping Terminated Counterpoised Dipole,* or ASTCD (fig. 2). This one is as easy to build and install as the regular ASD, but shows more directivity and what appears to be a cleaner horizontal radiation pattern (yet to be tested at the antenna range).

This version of the ASD uses the same 1/4 wave on one arm of the dipole, and either 3/4, 5/4, or even 7/4 wavelengths of wire on the other arm. However, I prefer to stay at the 5/4 arm length, because the antenna will otherwise show a very sharp main horizontal lobe in the radiation pattern, something that might not be a very good idea when chasing DX on 6 meters!

The ASTCD includes two more elements, a terminating non-inductive re-

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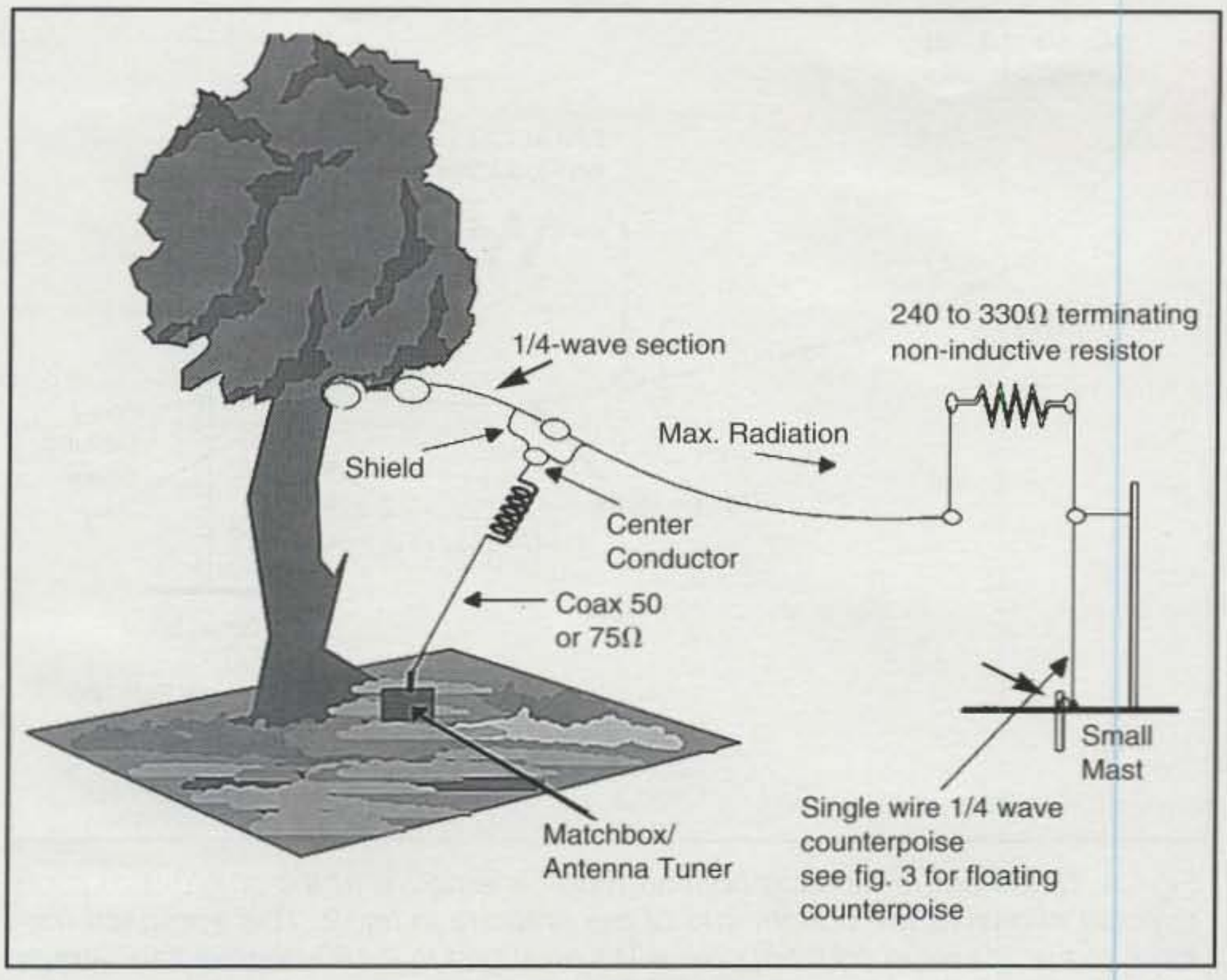


Fig. 2– The Asymmetric Sloping Terminated Counterpoised Dipole, or ASTCD, is a more elaborate version of the ASD, showing greater directivity in the direction in which the longer segment is pointing. Main differences are the addition of a terminating resistor and counterpoise at the far end of the antenna.

sistor and a 3- or 5-wire 1/4-wave counterpoise fanning out at the end of the antenna to which the other side of the resistor is connected (fig. 3). These radials slope toward ground from the support pole at a 45-degree angle (fig. 4).

The 270 ohm terminating resistor for the 50 MHz version of the ASTCD was made from ten 2 watt carbon resistors of 2700 ohms each, connected in parallel (The ideal theoretical value for the resistor is 240 ohms, but any value between 200 and 300 ohms will work here.). One side of the terminating resistor is connected to the antenna's long arm, and the other side goes to the group of 1/4-wave radials described above.

This ASTCD antenna is certainly a very lightweight system for portable use, and it can use a tree or a not-too-tall mast or other structure as the high-end support, while the lower end needs only a very short 3 foot (or 1 meter) high mast. The whole antenna—wire, coax, terminating resistor and counterpoise—plus the small mast can easily be carried inside a backpack! Also, it will weigh much less than a 3- or 4-element Yagi or quad.

Field installation of this antenna is a

Tips For Installing The ASD and ASTCD Antennas

- Keep the 1/4-wavelength element ("top" side of the antenna) at least 1 meter (3.28 feet) away from the supporting structure.
- The coaxial cable should include a decoupling choke at the feedpoint, either a coaxial choke balun (see main text), a ferrite bead decoupler, or a 1:1 balun.
- The coaxial cable should depart from the antenna at a 90-degree angle in order to reduce coupling from the radiating element.
- Select a tilt angle between 25 and 45 degrees; experiments showed that a 30- degree tilt provided excellent directivity and a reasonable front- to-back ratio.
- Performance of both antennas will be very dependent on the surrounding objects, so try to have the long leg extending down into as clear an area as possible and pointing in the desired direction of radiation.
- Final tuning for minimum SWR involves carefully pruning the length of the long side of the antenna. I found that once you set the short side to a resonant 1/4 wave at the center operating frequency, final adjustments can be done by trimming the long sloping element.
- Whenever possible use an antenna tuner, even if you achieve a 1.4 or 1.5 to 1 SWR without the tuner!

cinch! Just decide the main direction toward which you want to try to work DX, hang the antenna with the long leg facing that direction, connect the coaxial cable to your antenna tuner (yes, it does help to use the tuner), and that's it! You can use the antenna without the tuner, as it will provide a very nice low SWR all across the 50 MHz band, but I do recommend using a simple Pi network tuner, which we will soon discuss here in this column.

My experiments with these antennas were on 6 meters, but the design will also work very well on any upper-HF band (see sidebar for details).

What About the ASTCD At Home?

You can install not only one, but two or even three, ASTCDs at home, beaming in the most wanted directions, and provide for switching between them. This antenna seems to have not only a rather low TOA (take-off angle) in the direction at which it is pointing, but also a useful higher TOA, which explains why it works so well with *E*-skip signals.

If there is not enough space in one specific direction, then install the shorter version 1/4–3/4 wavelength system. Best results will be obtained, though, with the 1/4–5/4 or the 1/4–7/4 antennas with the terminating resistor and counterpoise.

Again, extending the antenna more than 7/4 wavelengths on the long arm of the dipole will make the horizontal pattern too sharp, something that may prove to be not a very good idea if you want to bring in DX from as many places as possible.

Any questions? Want to share your antenna experiment results with other *CQ* antenna column readers? Then send your comments via e-mail to <co2kk@cq-amateur-radio.com> or to the magazine's postal address.

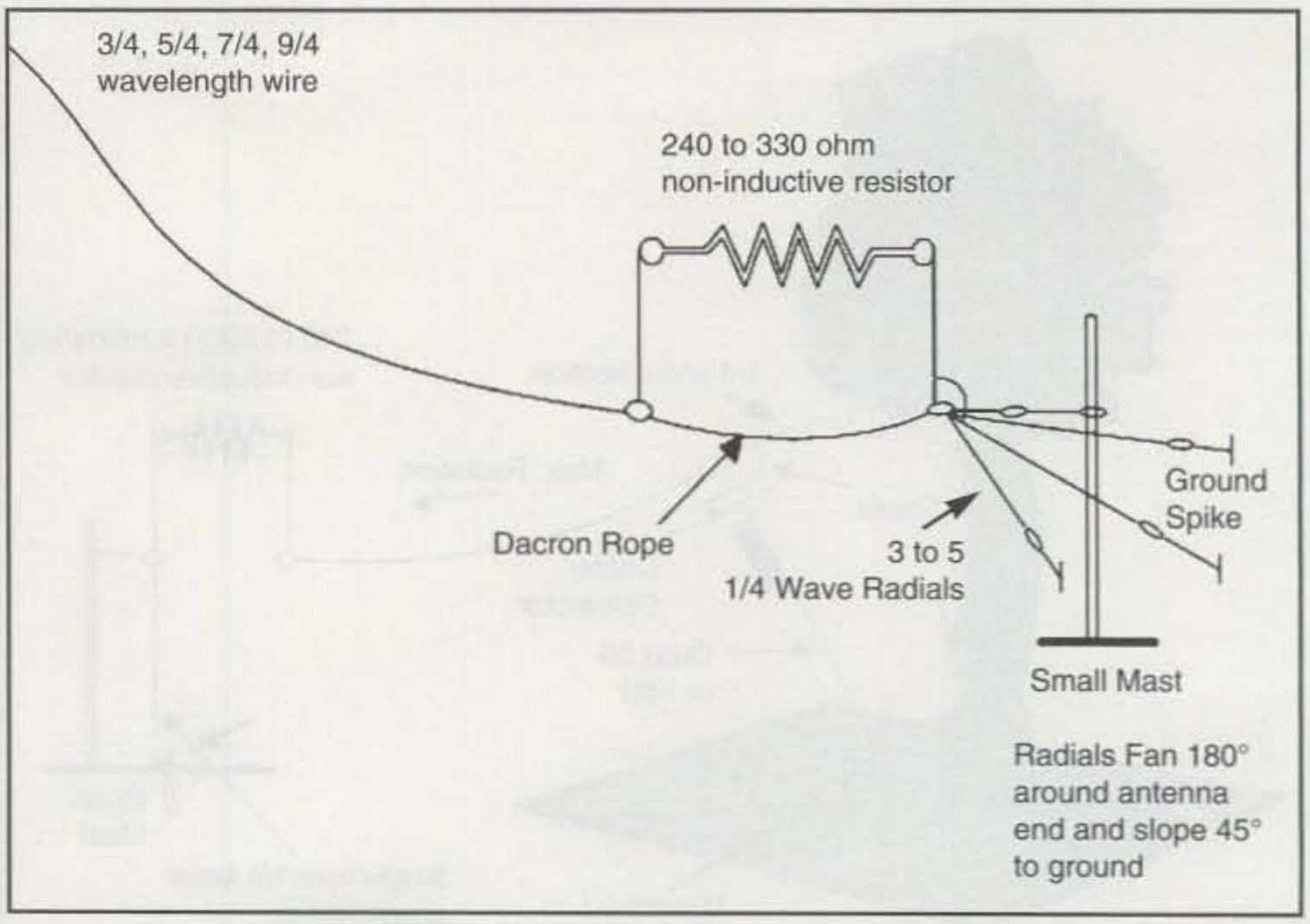


Fig. 3– Detail of the "floating counterpoise" alternative to the single-wire counterpoise shown at the bottom end of the antenna in fig. 2. This approach uses three to five 1/4-wave counterpoise wires arranged in a 180-degree "fan" around the end of the antenna.

Reader Q&A

Reader Jim Kin, K8KN, writes:

Thanks for the articles. I am interested in all things relating to antennas, especially homebrew. My question is regarding an application from your most recent series, the sloper. I use 4–6 wavelength longwires on 10–20 meters. These are fed at 1/4 wavelength with a 4 to 1 balun and a ferrite bead choke just below that. These antennas are tilted so as to lower take-off angle as per several articles and the *ARRL Antenna Book*.

Will I benefit from running a vertical wire from the feed point as with the reflector of the 1/4-wave sloper you describe? I was thinking of extending the 1/4-wave end to about 50 ft. on all, since the feed points of these antennas are at approximately 60 ft.
Will this help with either gain or F/B ratio? Arnie, thank you again. I anticipate the second article in this series.

CO2KK Responds:

Jim, if you already have a 0.25 wavelength section sloping at a 30 to 45 degree angle because your antenna is an ASD (asymmetric sloping dipole), adding a *tuned* 0.25 wavelength vertical reflector alongside the mast will, in my opinion, enhance the front to back ratio of the system. The existing quarter wave to which you connect the braid of the coax does not provide any effective contribution to forming a directional pattern.

But, when adding the *reflector*, be sure it is a *tuned* element, not just a 0.25 length of wire coming down from the top of the tower, which in most cases *will not resonate* as a quarter wavelength without very careful tuning (it is easy to make the wire a little shorter than needed and tune it to resonance with a coil provided with taps).

You will probably get a little extra gain, too, and of course an improved F/B ratio! *But...* why not try the ASTCD in this issue by converting one of your asymmetric slopers by adding the terminating resistor and counterpoise? The ASTCD offers a better front to back and a you will also obtain a little more gain from the same length of wire. The terminating resistor's power dissipation should be around 20 percent of your transmitting power to be on the safe side for SSB; for CW, I would increase it to 33 percent.

If you know a young person who's interested in becoming a ham but is turned off by page after page of text and tables in the usual license manuals, you might want to check out K6YB's license manual written with kids in mind.

CQ Book Review:

"Riding the Airwaves With Alfa and Zulu"

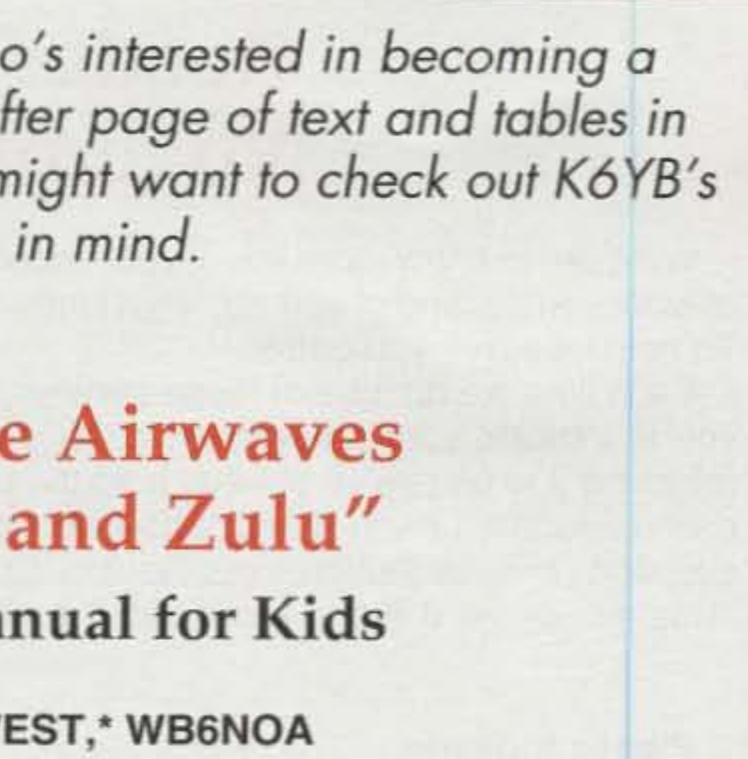
A License Manual for Kids

BY GORDON WEST,* WB6NOA

If you are teaching your own kids how to understand and pass the Technician Element 2 examination, or giving a class for kids on Technician licensing, *Ride the Airwaves With Alfa and Zulu* by John Abbott, K6YB, may be the book for you! Kids will love seeing every page filled with animated Morse Code characters that explain everything from the ionosphere to inductors.

"This is my seventh year writing and publishing *Alfa and Zulu*," comments the author. John works as a volunteer "gifted student" ham radio instructor at his teacher-wife's school, and he knows exactly what it takes to keep kids interested in reading the book.

"Hopefully, the simplified Element 2 Technician class license will allow more people to become hams and upgrade in the hobby. It is very rewarding to receive letters from kids and YLs telling me that without the book, they wouldn't have become interested in ham radio," adds Abbott.



A Coded Cast of Characters

John's unique code characters explaining the theory do double duty as Morse Code reminders. Whiskey resembles a cat with a short head, long body, and long tail for the letter W. Oscar is another fun animal with equally spaced long segments of his body, and X-ray is sometimes seen standing up and sometimes sitting down, with a perfect long top and long bottom with two short midsections to make up the letter X.

The 180-page book is divided into 77 lesson plans, plus many pages on learning the international Morse Code, learning about ham radio and the internet, learning how to construct simple antennas, and a terrific chapter entitled "So Now You Are A Ham—What Next?" K6YB also lists a selection of ham dealers, ham manufacturers, ham internet addresses, and phone numbers on how to arrange to take an examination.

Best of all, the book is *fun* and superillustrated on every page. John has provided so many hints on how to teach amateur radio to kids that I quickly tuned into many of his demos found on almost every page. If you're teaching ham radio to kids, check it out.

Riding the Airwaves With Alfa and Zulu is $14.95, including shipping and handling, and quantity discounts are available. To order contact John Abbott, K6YB, Abtronix, P.O. Box 220066, Newhall, CA 91322 (phone 661-222-7384; fax 661-222-7385). The book is also available from <barnesandnoble.com>, <amazon.com>, Ham Radio Outlet, Jun's, and other stores.

In addition, John has the "Dit & Dah" phoneticode card and dice games played on your own or with up to six players. You learn the code while having fun! The price is $9.95, again including shipping and with quantity discounts available. For more information, see the Abtronix web site at: <http://home.earthlink.net/~abtronix>. ■

Reader Survey November 2000

We'd like to know more about you—about who you are, where you live, what kind(s) of work you do, and of course, what kinds of amateur radio activities you enjoy. Why? To help us serve you better.

Each time we run one of these surveys, we'll ask a few different questions and ask you to indicate your answers by circling numbers on the Reader Service Card and returning it to us (we've already paid the postage). As a bit of an incentive, we'll pick one respondent each month and give that person a complimentary one-year subscription (or subscription extension) to *CQ*.

This month, we'd like to know about your ham radio reading habits.

Please indicate... **Circle Reader Service #**

1. Please indicate how you got this copy of *CQ*...

In the mail (subscriber) 138
Purchased at newsstand 139
Purchased at radio store 140
Borrowed /shared 141
Other 142

2. If you are a subscriber to *CQ*, for how many years have you been a subscriber?

Less than one 143
1–5 144
6–10 145
11–15 146
More than 15 147

3. If you buy *CQ* on the newsstand or at a radio store, how often do you buy an issue?

First-time buyer 148
4 or fewer times a year 149
5–8 times a year 150
More than 8 times a year 151

4. Which ham radio magazines (including *CQ*) do you read regularly (circle all that apply)?

Amateur Radio Trader 152
ATV Quarterly (*ATVQ*) 153
CQ 154
CQ Contest 155
DX magazine 156
National Contest Journal 157
Nuts 'n Volts 158
Popular Communications 159
QEX 160
QST 161
RTTY Journal 162
73 163
The Canadian Amateur 164
WorldRadio 165
Other (non-US/Canada) national ham journal 166
Other (non-US) independent ham magazine 167

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

MFJ Contest Voice Keyer

Brand New design . . . Microprocessor controlled

Transformer-coupled -- No RFI, hum or feedback . . . 75 seconds total, 5-messages . . . Can be computer-controlled by CT, NA, etc . . . Records received audio . . .

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The MFJ-434 is transparent to your microphone -- your mic's audio characteristics do not change when your MFJ-434 is installed. Dual controls make it easy to tailor audio level to match your voice.

All audio lines are RF filtered to eliminate RFI, audio feedback and distortion. An audio isolation transformer totally eliminates hum and distortion caused by ground loops.

It's easy to use -- just plug in your 8 pin microphone cable and plug the MFJ-434 shielded cable into your transceiver's mic connector. Internal jumpers let you customize it to Kenwood, Icom, Yaesu, Alinco or Radio Shack rigs. Use your station or built-in microphone for recording.

Built-in speaker-amplifier lets you monitor stored messages. 3.5 mm speaker/headphone jack. SMT technology. Use 9 Volt battery, 9-15 VDC or 110 VAC with optional MFJ-1312B, $14.95. 6½Wx2½Hx6½D inches.

MFJ-73, $29.95. Remote Control Head with cable for MFJ-434.

MFJ *Professional grade* Boom Mic Headphones

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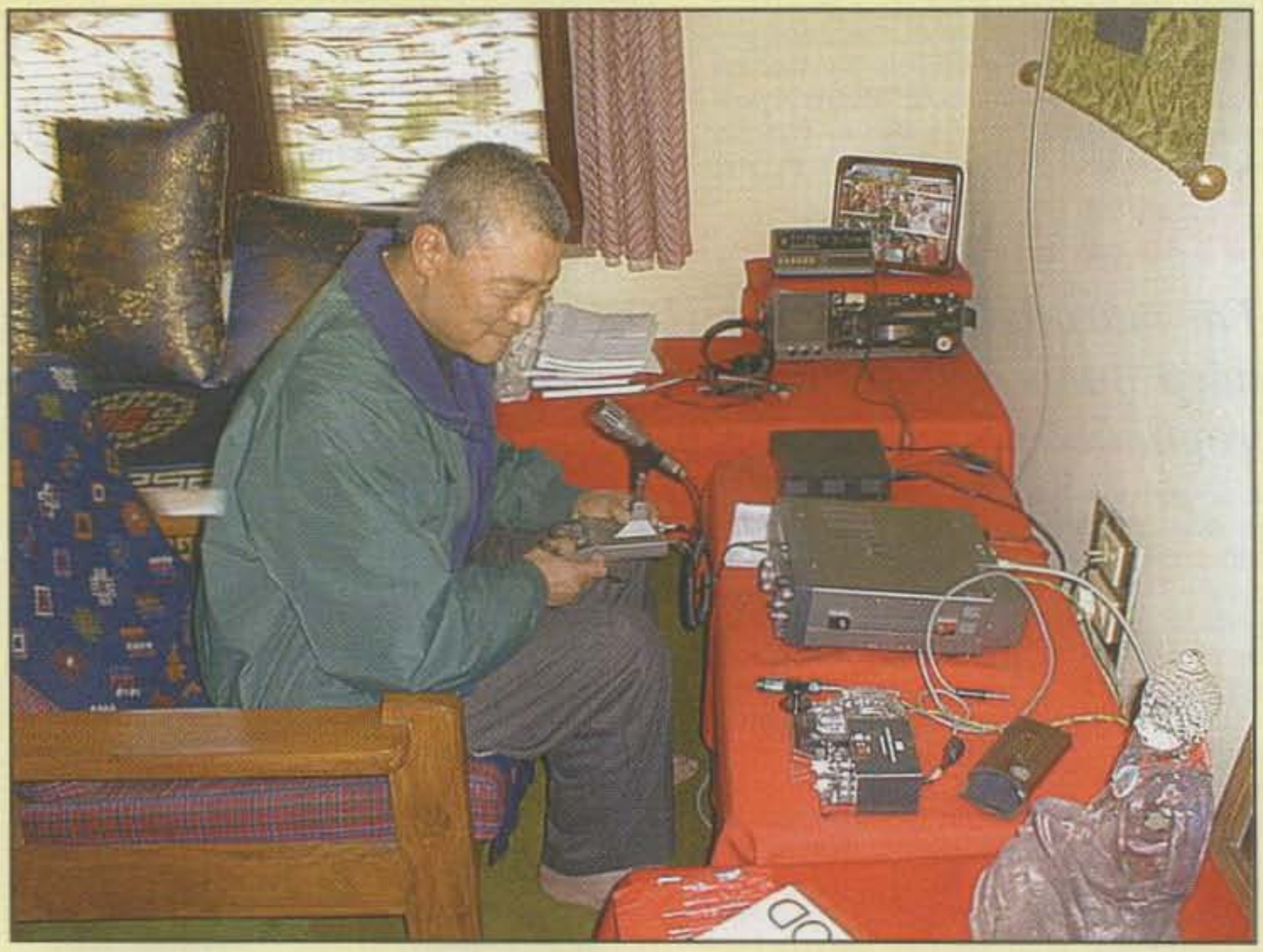
If you worked the major DXpedition to Bhutan last spring, you probably have your QSL card, but you probably don't know the story of how amateur radio was able to return to the kingdom after a nearly 20-year absence. Here, from a ham who helped make it happen, is ... the rest of the story.

Bhutan
The Story Behind the Story

BY JIM SMITH,* VK9NS/A52JS

The introduction of the Bhutan Telecommunications Act 2000 opened the country to the outside world in one giant leap. From being an isolated location of little over one-million inhabitants relying solely on a simple internal telephone system of 1900 telephones, 22,000 radio sets, and 200 TV sets receiving foreign broadcasts as recently as 1998, the country was suddenly opened up to national television and international communications with internet, e-mail, et. al. That was not all, however. The legislation also permitted the re-introduction of amateur radio in Bhutan, with licensing, band allocations, band usage, callsign structure etc., all in place. Now everyone, foreigners and nationals alike, is able to operate amateur radio from the Kingdom of Bhutan, provided they meet the licensing criteria, of course.



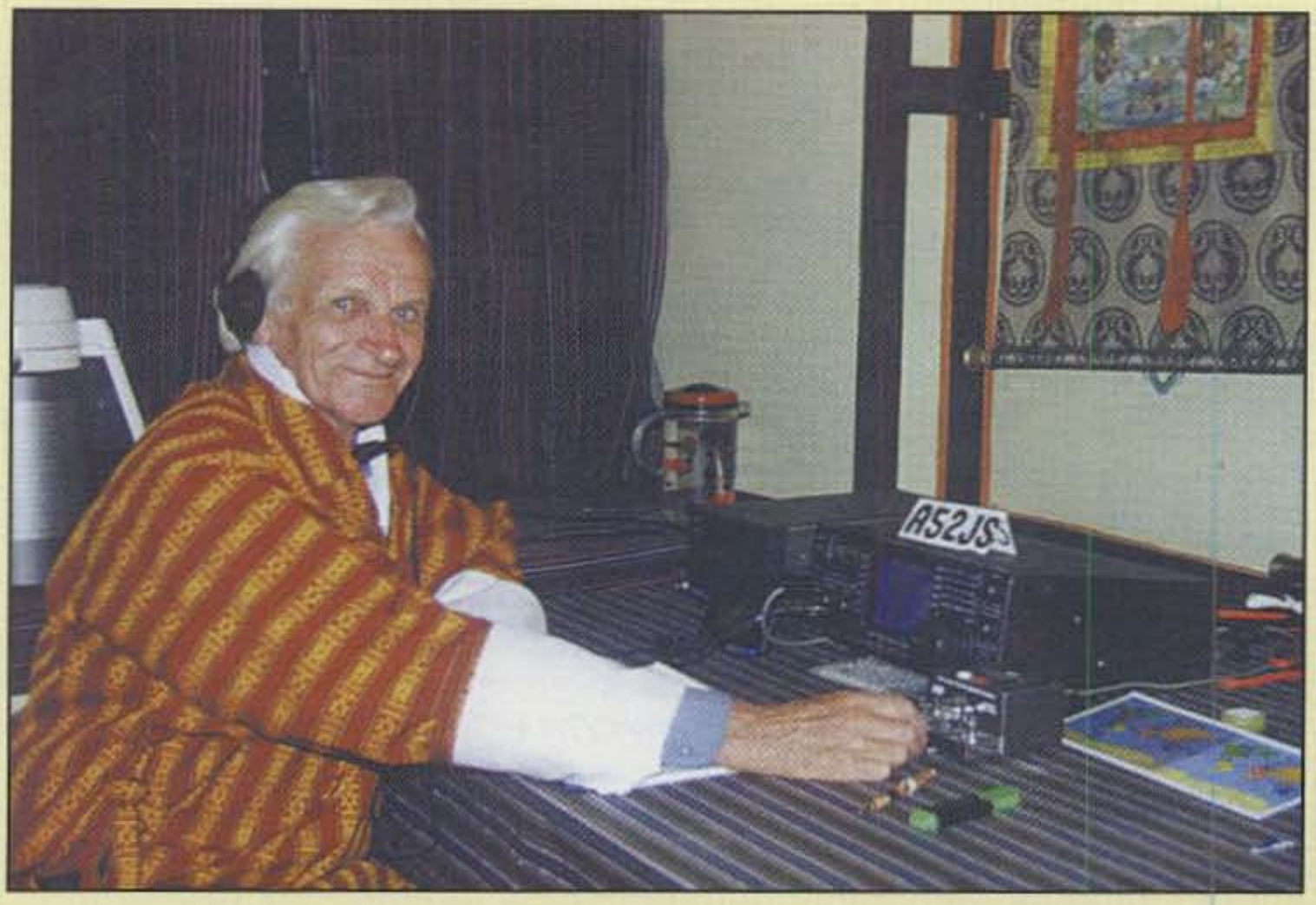
Dasho Tuji Yonten, A51TY, returned Bhutan to the amateur bands for the first time in nearly 20 years. This photo shows Yonten during a QSO with Ram, VU2BK, on his first day of operation. (All photos courtesy of the author)

A Ten-Year Process

Having been involved with the "amateur radio" aspect of the legislation for the past ten years, I was able to follow the often painstakingly slow process which took place to make sure everything would be done according to international standards. The authorities had no intention of going back to the "old days" when there was no legislation in place and amateur radio was permitted on an "ad hoc" basis—e.g., the visits of the late Gus Browning in the 1960s, and ongoing operations by Yonten, A51TY, until the early '70s, when the pressure of work saw him gradually cease to operate. We then had Prahdan, A51PN, on the air until the early '80s, when such "ad hoc" permission was discontinued. As the years slipped by, it did not take long for Bhutan to move up on the DXers' "Most Wanted" list.

In 1990 I was invited to go to Bhutan for "amateur radio purposes" and was issued the call A52JS in order to operate and demonstrate amateur radio. There was considerable interest among the staff at the Wireless Division of the Ministry of Communications (MOC), and it appeared that there would be no shortage of prospective amateur radio operators. Bhutan's internal communications traffic was handled by proficient CW operators (with SSB skills) in an effective point-to-point HF station network. In my undying optimism, I saw the problem as one of assisting with amateur radio equipment for a possible future club station and providing the outlines of an amateur radio administration, to get things started.

* *P.O. Box 90, Norfolk Island, NOR 2899, Australia*
e-mail: <jimkirsti@ni.net.nf>



The author operating A52JS from his hotel room. He noted, "I am wearing the national dress which Yonten gave me as a gift during my stay. Very comfortable but hard to put on."

As we now know, it was to be ten years before everything fell into place. During those ten years Bhutan went through a period of internal problems, and amateur radio therefore was not considered to be an urgent matter. I visited the country on several occasions, and as early as 1991 the H.I.DX.A. (the Heard Island DX Association) donated a substantial amount of equipment for the club station. I also kept in constant touch with the MOC by telephone and letters, so was always kept up to date on how things were moving along. By 1999 everything seemed to be coming together, and I visited Bhutan in October that year, carrying 80 kg (176 lbs.) of amateur radio equipment which would form the base for the station for Yonten, A51TY. Yonten had been one of the early operators back in the '70s, and now retired, he was eager to get back on the air—a ready-made Bhutanese radio amateur!

By a strange quirk of fate, the introduction of cable television in Bhutan proved to be a delaying factor in dealing with the amateur radio section of the new legislation. Several major administrative matters had to be attended to, thus occupying the time of the MOC staff. The legislation dealing with amateur radio, the final part, was therefore still one or two steps away.

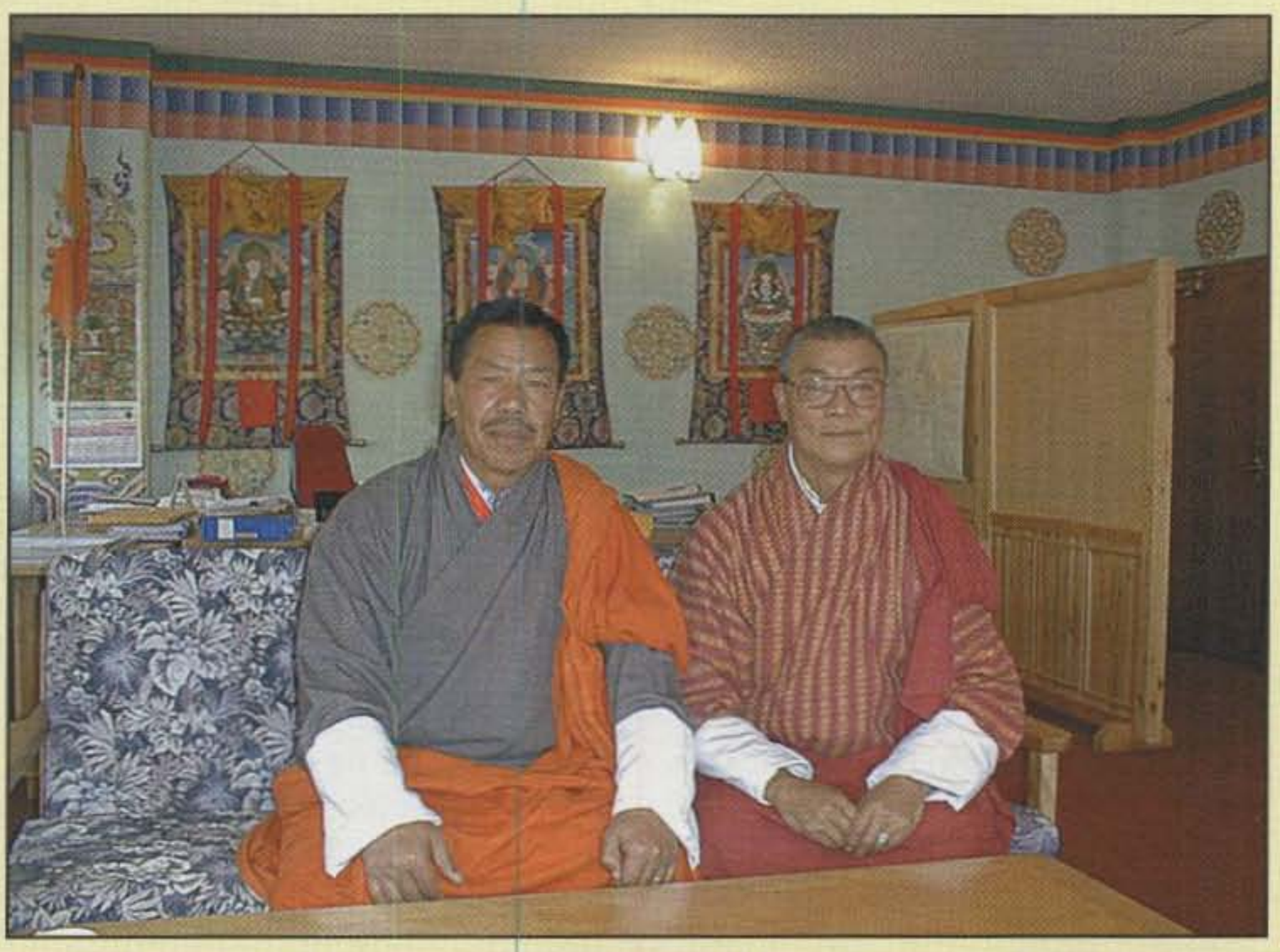
Not to be discouraged, Yonten and I assembled the station and became SWLs for the duration of my stay. This proved to be a golden opportunity for Yonten to become familiar with current amateur radio operating and activity. He also learned his way around the donated TS690S and was able to practice his CW by using the rig's sidetone, proving that he had not lost his skill!

I returned home to Norfolk Island with a "draft copy" of what was to become the Bhutan Telecommunications Act 2000 and the task of writing suggested guidelines for amendments to the amateur radio section. A few weeks later the various papers were faxed directly to MOC/BTA (Bhutan Telecommunications Authority). Barely into the new millennium, my wife Kirsti, VK9NL, and I were issued new invitation visas to Bhutan, where upon we lodged formal licensing applications with the BTA. The legislation was in place in March, needing only the final approval, and I telephoned MOC Deputy Minister Dasho Leki Dorji to convey our congratulations and a promise of a bottle of champagne to celebrate the occasion.

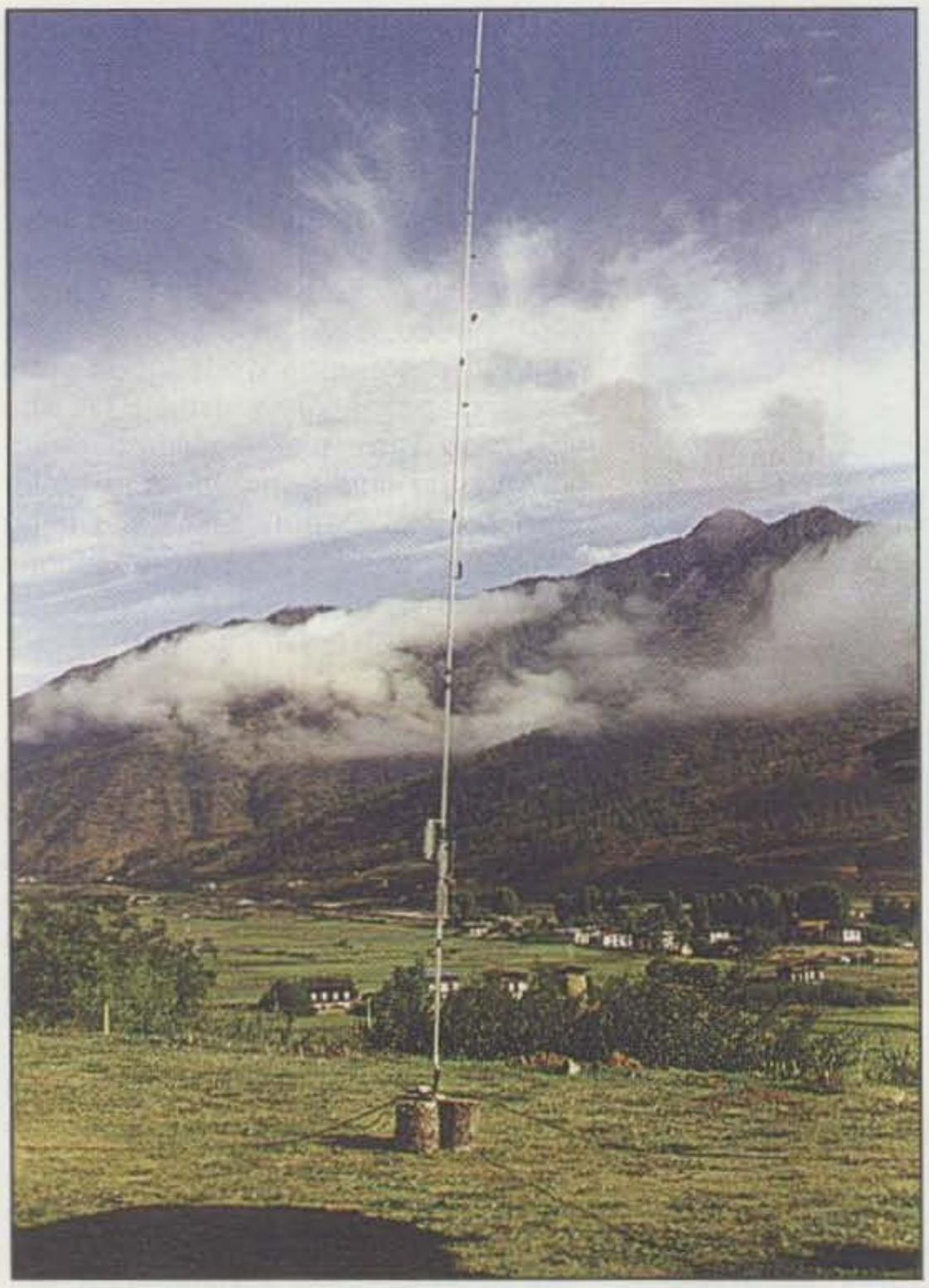
Getting A51TY On the Air

As it turned out, Kirsti decided to stay at home this time, so I set out on my own, carrying the usual 80 kg of radio equipment, antenna, and coaxial cable. I was met at Paro Airport in Bhutan on April 26th, and was cleared through customs with my equipment under the conditions of the amateur radio legislation. After motoring to the capital city of Thimpu, a couple of hours journey away, I finally met up again with Yonten, and we paid a visit that afternoon to the MOC and BTA.

As promised, our authorization certificates for A51TY and A52JS were available the following morning. The Director of the BTA, Thinly Dorji, personally presented our certificates, the



Deputy Minister Dasho Leki Dorji and Dasho T. Yonten, A51TY, in the Ministers' office at the Ministry of Communication.



When you're in the Himalayas, you don't need a whole lot of antenna to put out a big signal. This is the author's HF6V on the front lawn of the hotel, where it had a superb take-off angle. A52JS also used a large wire antenna, which worked very well.

first two issued under the brand new legislation—rather a nice touch. It was a big day for us both, and especially for Yonten, whose call (A51TY) had been well known 25 to 30 years ago and who then had a wide and international circle of amateur radio friends. In my own case it was also a special moment. After more than ten years of involvement with the Bhutanese MOC, amateur radio was now a reality.

Yonten and I headed back to his home, where we now could fire up the TS690S (left on my last visit) in earnest. We listened in the CW section of the 20 meter band and found a good, clear signal from RWØJR, Pavel, who was calling CQ. Yonten called him using his own call, and a solid QSO took place with exchange of report, name, QTH, rig, and antenna. There followed some queries from Pavel: "Where is Thimpu?" "What is A51?"

Had Pavel realized the significance of this QSO, that he was the first to have a QSO with Bhutan under the new legislation? That it should be him was the luck of the draw, as he just happened to be in the right place at the right time, and with a good signal. The pile-up was ready and waiting at the end of the QSO, but Yonten moved to 14222 kHz to make his first SSB QSO with Kirsti, VK9NL. This was a tough and marginal QSO due to heavy QRM from another huge pile-up which was quickly building on the frequency.

I then asked Yonten to acknowledge a VU (India) station calling. Imagine his surprise when Ram, VU2BK, came back and in perfect English said, "How nice to hear you back on the air again, Yonten, after all these years!" That truly made my day, as they say, and Yonten was grinning from ear to ear. He was still remembered on the bands! A solid QSO followed, and another of my dreams had come true—amateur radio for the Bhutanese. All too often, foreigners can operate from a country, yet there is no sign of a national on the air. This would not be the case in Bhutan.

On the Air as A52JS

I stayed in Thimpu for three days, helping Yonten and making some QSOs on both CW and SSB using my own IC-756 rig and my own call, A52JS. Then for a couple of reasons I decided to move my QTH to Paro. The multi-op A52A DXpedition operation was due to start soon from a hotel not far away in Thimpu. I also knew that Paro offered a much better radio location than Thimpu, having had the opportunity to travel around during my previous visits. Thus, I moved to Paro and was soon in a hotel overlooking the airport and with no obstructions in the way for my signals. I ran my IC-756 barefoot of course, power being restricted to 100 watts in Bhutan. But with my 100 watts and a vertical antenna, I logged several thousand QSOs over the next few days.

Once the A52A operation got under- way, all the usual DX slots were quickly occupied by them. These days, however, with the Packet Cluster system in place, one is soon spotted and a few kHz either side of the "usual" frequencies makes no difference.

It is remarkable what can be done with even low power, a reasonable antenna, and a good location. On DXpeditions I always bring along what I call "my secret weapon"—those two hi-tech pieces of plastic called the DX Edge. It is a valuable operating aid, alerting me to daylight, darkness, sunrise, and sunset all around the world. It therefore comes as no surprise when the PYs start calling in from Brazil in the midst of a JA (Japan) pile-up. In that case I have been expecting them, because the DX Edge has kept me informed about possible openings. It is such a simple device, pure magic and easy to carry. I would not leave home without it!

During my stay in Bhutan I operated on all bands, including the WARC bands (30, 17, and 12 meters). It was somewhat disappointing to often find 10 meters almost unusable due to CB QRM, which is particularly noticeable in Asia. Still, many QSOs were made on this band. It was good to take a break from operating now and then, go for a walk, and look over the magnificent Paro valley. During my QSOs with Kirsti, she would often ask, "Do you hear any cuckoos?" They had been prominent during her visit back in 1991, and I was able to assure her that they were still in fine form, singing out to each other over the width and length of the valley. Ah, the peace and quiet! But, back to the bands!

Yonten, A51TY, had also been busy making QSOs back in Thimpu. We had a couple of skeds on 20 meters SSB during my stay in Paro. Yonten will soon get more equipment, such as a beam antenna with a rotator. This will help him pull out signals from the QRM areas, and we can expect to hear Yonten more often over the coming months, making his impression on the DX scene.

My son Stuart (who is not a radio amateur) came out from England and joined me for my last week in Bhutan. I

had to take time off to show him around, so my activity on the bands dropped off somewhat during that last week. However, I am satisfied that with 20,300 QSOs in my A52JS log, my operation during my four weeks stay had been successful.

Looking to the Future

The Bhutan Telecommunications Act 2000 provides for the country to look after its young people with provisions for Novice-style licensing, which should also encourage school children to take up amateur radio as a hobby. English is the main language in the schools, and amateur radio will offer an excellent opportunity to practice their language skills. There are plans for a club station to be established in the near future, something which should help the children "learn the ropes"and help keep our hobby alive.

I am proud to have played a tiny part in this great story of the rebirth of amateur radio in Bhutan—for all qualified Bhutanese, young and old, male and female, and ditto for foreigners.

The author's operating location in Paro, the Hotel Gangtey Palace, overlooked the airport and had no obstructions blocking his signals.

I acknowledge here with gratitude the courtesy and friendship always shown by the MOC staff and, in recent years, Deputy Minister Dasho Leki Dorji; Dasho Tuji Yonten, A51TY; the Director of BTA, Thinly Dorji; and Phub Tshering, Head of Frequency Management for the BTA. I also wish to extend my thanks to the members of H.I.DX.A. for their support over the years. Finally, to my extended family in Bhutan, thank you for the fun and for having me back to your country! *Tashi Dalek* (may your journey be a safe one). ■

What do you get when you mix a radio friendship, a hard-to-find crystal calibrator for a vintage radio, and a ham who loves nothing more than finding ways to make our hobby more fun and interesting? Why, a Cali-Kit, of course!

Merry Christmas, Little Tim or, The Cali-Kit That Could!

BY JAMES "JeRB" BUCHANAN,* K8WPI

"Wanted, one spinner knob for a Viking II." — Tim Martin, WA1RGS

"Tim: I have a knob which meets your requirements. What's it worth to you?" —JeRB, K8WPI

"JeRB, does $5 sound okay?"— Tim

"Tim, forward your address with your check; consider it yours." —JeRB

Using the least desirable mode of communication ever invented, the internet, so begins the saga of Tim and JeRB. Tim lives in Vermont atop his own private "mountain-ette." I live in Michigan, deep in the woods. We are of the same generation, but not the same age. We share a common interest in our hobby, and as we learned over the following year, many common elements of philosophy, politics, humanity, humor, music, and the arts and sciences.

Tim was becoming interested in vintage AM gear after many years of dependable service on SSB/CW with his trusty Drake twins. A Valiant was acquired at a swapmeet, and with determination and effort it was slowly making its way towards an on-the-air appearance. My station was already vintage—CW only, however. I hadn't really gone out of my way to acquire a vintage station, but at age 52, being licensed for 40 years and never throwing anything away, I realized it was vintage by default. (Someday I'll tell you about the pilgrimage my father and I took to Cedar Rapids, Iowa, to tour the Collins factory and audition a 75A4 and 32V2. Although Dad planned to purchase these rigs for me—a really way-cool novice station, eh?—I decided I wanted to build something and passed on the "gold dust twins." Perhaps Dad should have kicked me!)

Tim and I continued our conversations over the air, he quite handsomely mastering an old bug to join in on CW, and on the loathed internet. Tim's further acquisitions included a National NC-300 "dream receiver." The NC-300 was not in great shape, but it is a noted performer, especially on AM. Although the receiver's famous glass slide-rule dial was still intact, there was no crystal calibrator. I have never considered a calibrator to be an *accessory* to a radio, even if it is an option. It just isn't safe to operate a rig of this vintage without one.

An "Eyeball" QSO

On the return trip from visiting our daughter on Long Island this spring, Pam and I decided to throw on another 600 miles and visit Tim and Mary up in Vermont. Putting a face on a personality is always pleasant, and seeing how and where he lives, even more common elements surfaced to further cement our relationship.

Tim and I tossed around the availability of a calibrator in a number of conversations, and agreed we both would look at hamfests for the elusive XC-300. Now if you have spent any time looking at vintage gear, you know that finding accessories is almost impossible. Any strays are put into a receiver and sold as a package. At Dayton 1999, I saw two totally trashed NC-300s. These units had water damage, rust, fire damage, smoke damage, dented cabinets, broken dial glass, fried meters, and of course no tubes! Both units, however, contained the coveted XC-300 calibrators. I tried to talk the vendor out of a calibrator at a reasonable price, explaining he would still have the carcass to sell to someone else who was looking for a power transformer, choke, tuning cap, whatever. No, the receiver was to be sold complete, "as-is" for $150. He

A completed prototype of the "Cali-Kit" crystal calibrator kit. See the text and additional photos to learn how it all started out and came together. (Photos by the author)

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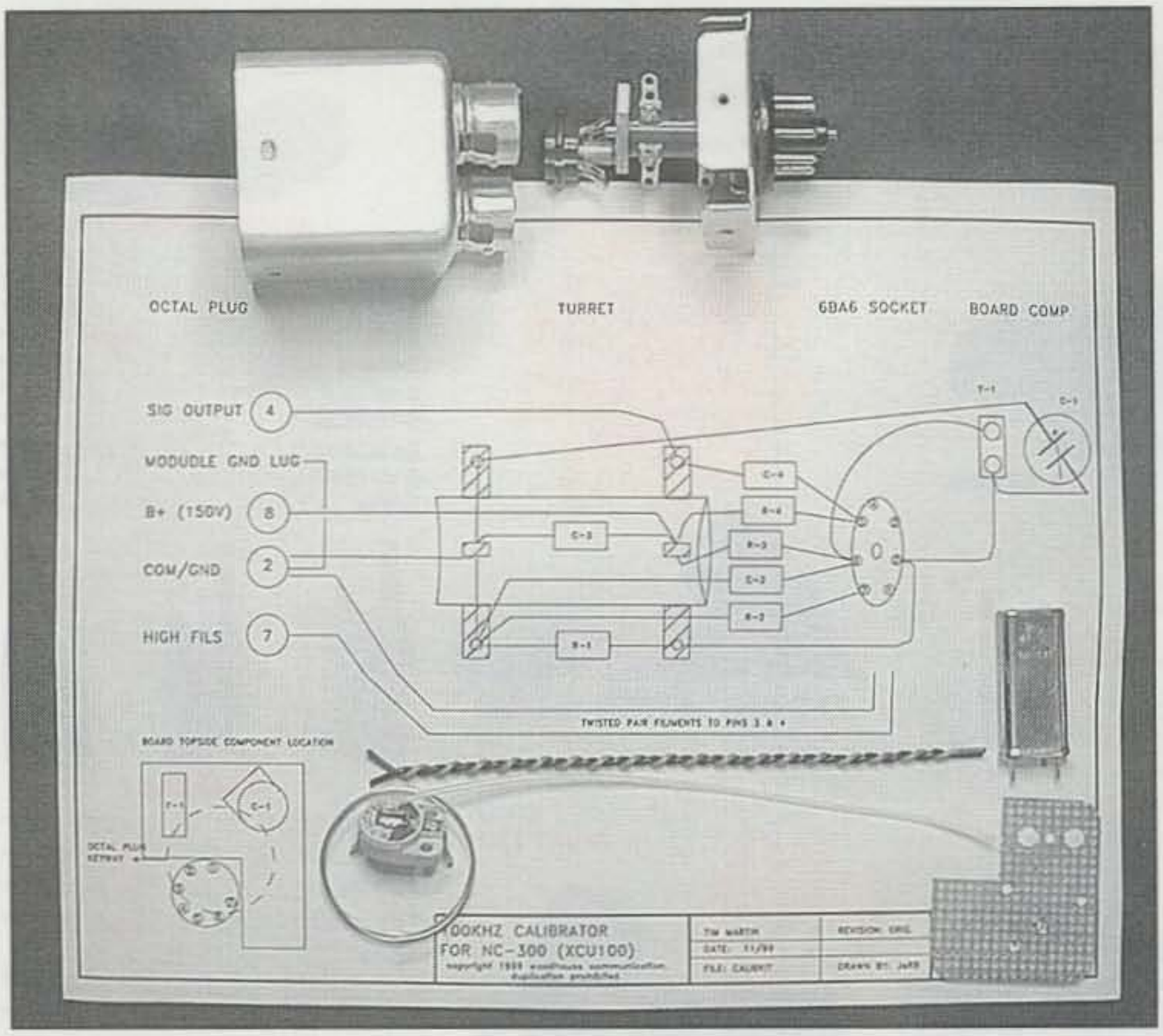


Pictorial diagram and major components of the finished Cali-Kit. Just to be sure nothing is overlooked, orientation of the perf board on the turret assembly is indicated at the lower left, and all octal pins are labeled. Parts mount between the tube socket, turret, perf board, and the plug to the NC-300 calibrator socket.

did make me a splendid offer of $250 for both units. I decided to pass, and wondered about his logic. For reference, I saw the same vendor and same two rigs nearly four months later at yet another hamfest. Ha!

I decided to spend no more time trying to find a calibrator, but would instead cruise the fleamarkets looking for parts. Such a simple device as a one-tube crystal-controlled oscillator should be duck soup, but as you probably know, parts are becoming harder to find. In my normal parts-buying frenzy, I also picked up anything that looked like it could be used to further the cause of the calibrator. Probably the biggest find was a pair of Vector turret chassis. These units were NIB (*New In Box, for the uninitiated—ed.*), and I knew they would be ideal. Not that I have anything against National using such a huge chassis to enclose such a small circuit, but I am certain I can find a better use for a true chassis.

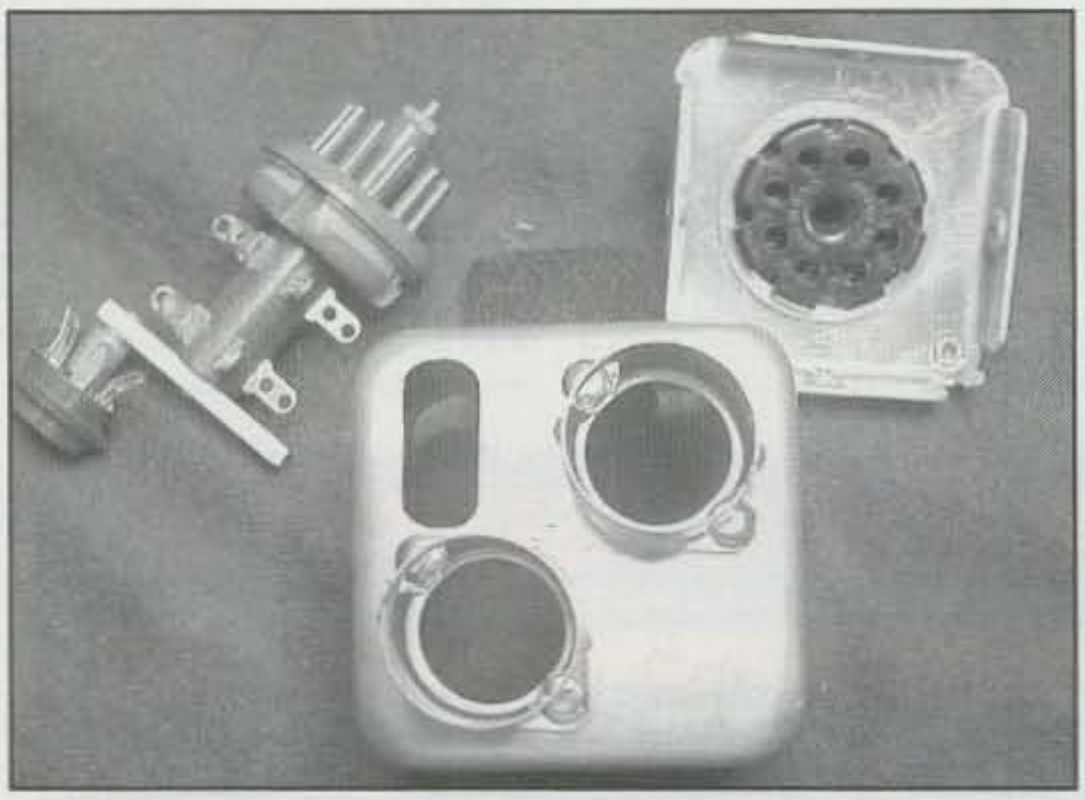
As summer projects in both Michigan and Vermont took up valuable radio time, the calibrator project was set on the back burner. Tim is also involved with vintage automobiles, and while he was off to Warren, Ohio to drive in the Packard parade celebrating the 100th anniversary of the legendary vehicle, I was on 40 meters working W8P, the special event station set up for the weekend. I couldn't find Tim at the station; he was too busy playing with cars.

As fall set in, Tim suggested that as he and Mary would be visiting her sister in Clarkston, Michigan for Thanksgiving, he would like to arrange a day trip to "the woods." Great! I could hardly wait to see him again, and advised him that 300 miles of Michigan roads were about equal to 600 miles of Connecticut, Massachusetts, and Vermont roads, so it would be a draw!

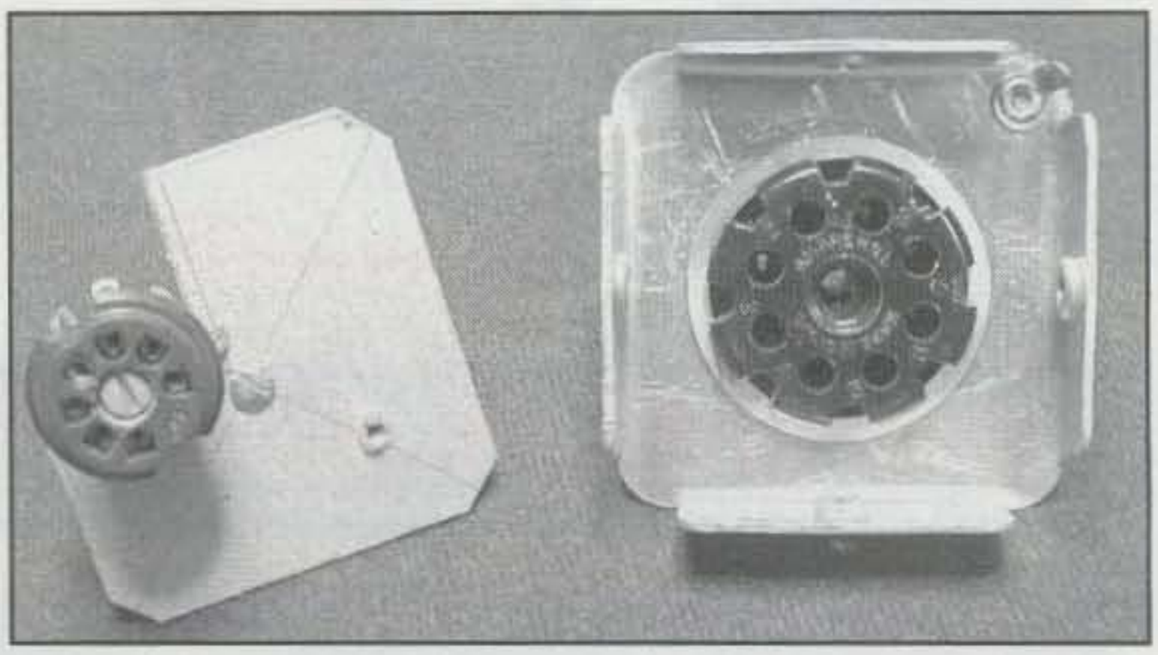
A Plan...

I suddenly realized the calibrator was still sitting in parts around the shop, and I would have to get my act together. I hadn't mentioned to Tim I had the parts, but I knew he had not found a calibrator or any parts. I needed a plan.

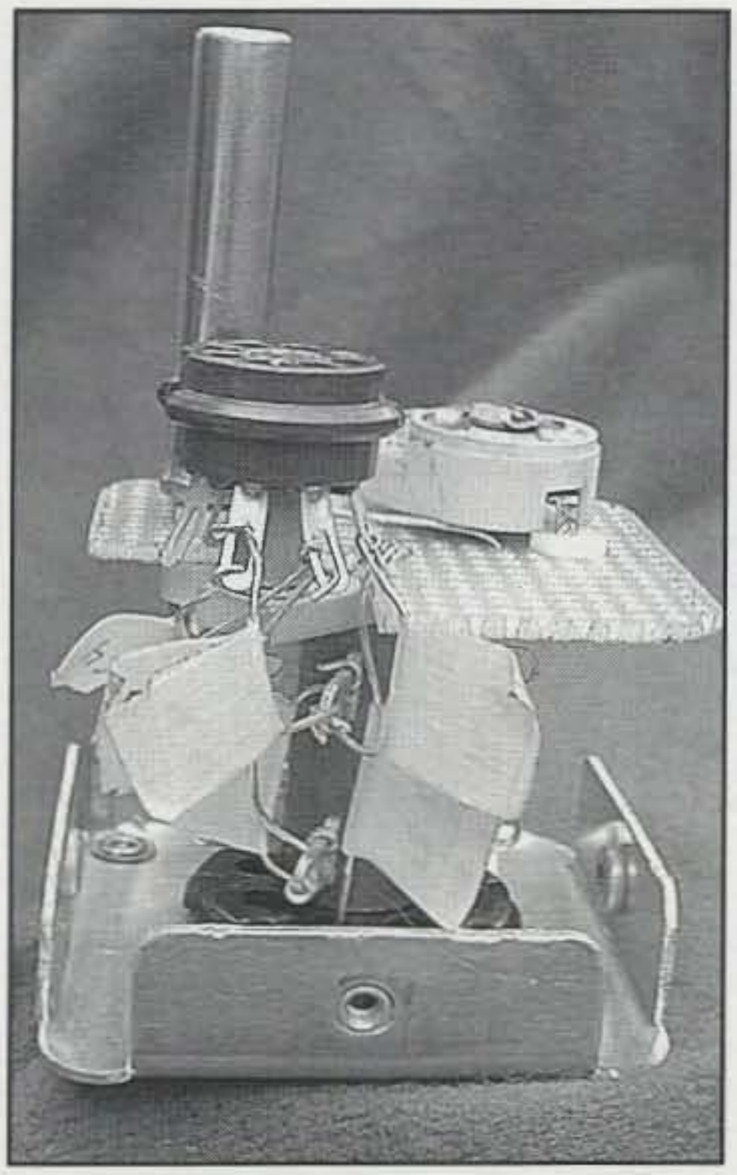
I quickly determined just building the calibrator and giving it to him would be far too easy for me, and no fun for him. A *Cali-Kit* came to mind. I could prepare



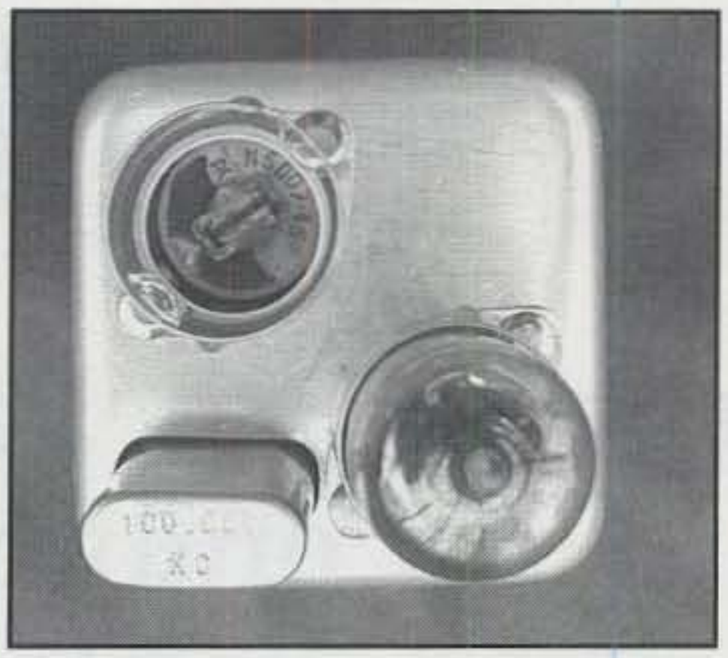
"Major" components of the Cali-Kit: The original turret with one tube socket removed. The base has a new 8-pin octal plug installed. The top case has the two original tube socket holes, and a new crystal clearance hole.



A paperboard template was cut to assure all components would fit where desired. This simple step makes it easy to accurately locate components, such as "through" the unused tube socket opening. Spotting all components also assures they will actually fit within the enclosure.



Artificial parts were used to confirm the wiring and the fit. Simple tape-on buss wire duplicates the too-valuable-to-risk, real parts.



Overhead view shows the trimmer capacitor does line up inside the unused tube socket hole, and the crystal is securely held in the new opening.

a custom kit for an NC-300 calibrator, he could build it, and a number of solutions would be had.

I looked at the original XC-300 circuit in the manual for my NC-300, and determined that although it was no doubt a great circuit, the specific tube used would be too difficult and too expensive to acquire today. Cruising the handbooks of the day offered a number of variations using more common tubes. A circuit was selected, and a schematic drawn which would let the oscillator mate with the accessory socket in the NC-300.

The next item on the list was to mate the schematic with the Vector turret and enclosure, which I could double check for physical alignment with my XC-300. The existing 11-pin octal-type plug on the turret was replaced with an 8-pin unit; this was a simple procedure which required only drilling a mounting hole straight through the center of a new octal plug. The turret was made for two 7-pin miniature tubes. I needed one tube, one crystal, and a trimmer cap. I decided I might be able to mount the trimmer in line with the unused tube socket hole. I made a paperboard template of the perforated board I planned on using for the circuit. Cutting paperboard and working with a pencil is much less expensive and damaging than working with real components, especially if you make a mistake or are just plain wrong!

I eventually determined that I could mount the trimmer and crystal on the perf board as desired, and it all would fit. The next items were the discrete components. The turret socket offers tremendous flexibility, which is why it was so popular, but I had to make sure all parts would actually fit, and at the same time determine a good layout. I couldn't spare parts to bend leads to double check the fit, so I made little pieces of masking tape with the component written on it—C1, R4, etc.—and secured them around a piece of solid buss wire. This would allow me to have a "part" of the correct size, which I could actually wire (but not solder) to the various locations necessary. Not only could I check the wiring from the board to the turret and on to the socket, I could confirm it all would fit within the size of the enclosure. About the only thing more embarrassing than having a circuit not work is having it not fit within the enclosure!

When everything was determined to fit, I used the model in front of me to make a pictorial using Auto-Cad to aid Tim with assembly. When all was said and done, I had a parts list, a schematic, and a pictorial. With a little polish it would become an instruction manual.

I separated the parts by type and fragility, and placed them in separate small, brown parts envelopes. Now I was tempted to put the whole pile in an old Heathkit box, but the manual wouldn't fit without being folded, and I just couldn't do that. I found a Quaker Oats container which, if you don't remember, was an important component as a coil form in the early days of radio. I used the round container, with only slight modification, for the kit.

Tim arrived as scheduled. We played radio for the entire day and had a great time. I gave him the Cali-Kit as he was getting ready to head back to Clarkston. Needless to say, he was as thrilled with the kit as a kid with a new toy, and of course that was almost as much fun for me as making it for him had been.

It is now the dead of winter. Tim's NC-300 is next up on the bench, so I trust the Cali-Kit will be put to good service soon. I'll check out his wiring on our next visit to his mountain retreat, which is scheduled for April. ■

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Low-Impedance, Parallel, Square-Conductor Transmission Lines

BY GEORGE MURPHY,* VE3ERP

Open-wire transmission lines of less than 83.1 ohms impedance are not physically possible with round conductors because the space between the conductors theoretically would be zero or less. However, impedances of less than 83.1 ohms are possible if the line is constructed using square conductors.[1] Theoretically, square conductors can produce open-wire lines of any impedance using the equation

$$Z_0 = 120 \log_n (A + \sqrt{A^2 - 1})$$

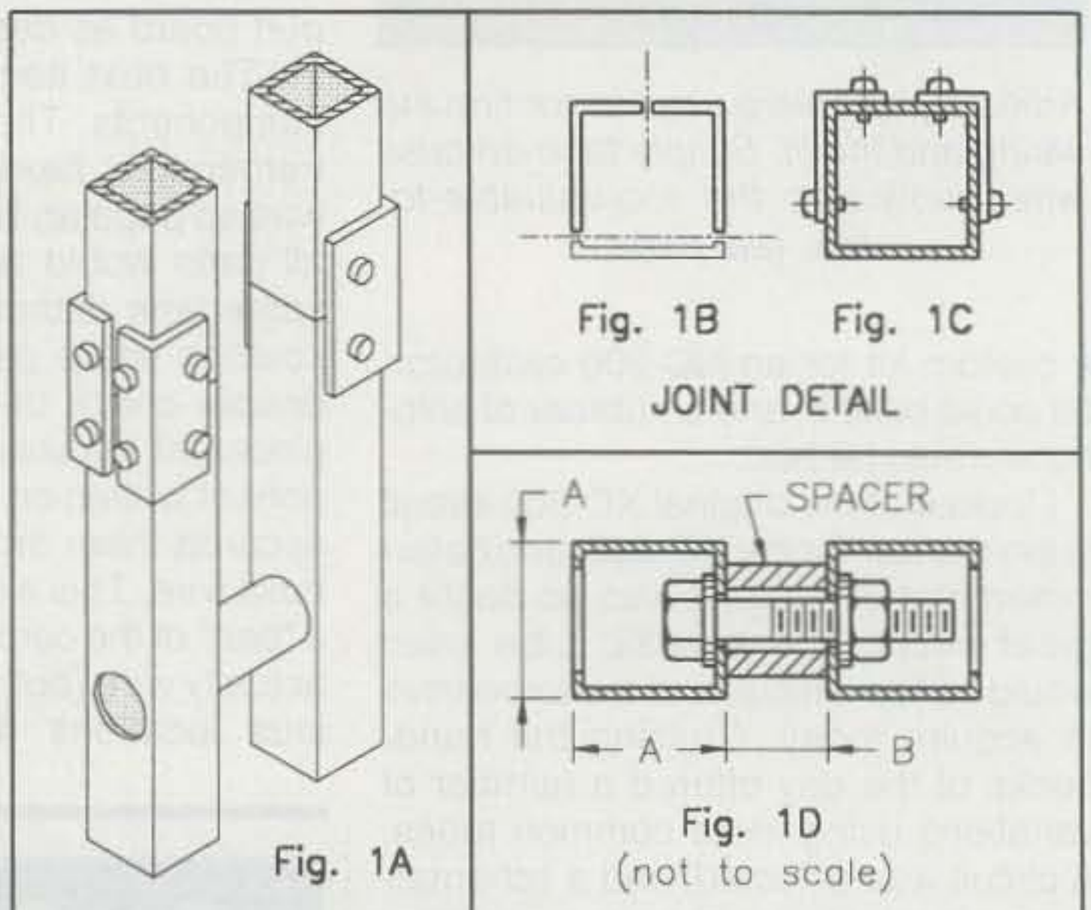
where:

Z_0 = characteristic impedance in ohms
W = width of face of square conductor
D = 1.8 × W
S = center-to-center distance between conductors
A = D/S

This equation is accurate for impedances at least as low as 70 ohms. For lines of below 70 ohms or above 120 ohms, the impedance should be confirmed by test measurements of a sample length of line. You will probably never want a square conductor line over about 120 ohms impedance because conventional open-wire lines with round conductors are cheaper and easier to build.

Fig. 1 illustrates the construction of a parallel, square-conductor line, and gives dimensions for lines of typical impedances commonly associated with amateur radio applications. Aluminum square tubing is recommended for the conductors. Lengths of tubing can be connected using joiners made from the same size tubing.

Cut 50 mm (2 inch) lengths and saw into three pieces as shown in fig. 1(B). Discard the U-shaped piece and use the two L-shaped pieces as joiners, installed as shown in figs. 1(A) and 1(C). Assemble with stainless-steel, self-tapping screws. Cutting the joiners from the tubing material prevents the inevitable corrosion due to electrolytic action when two contacting surfaces are of dissimilar metals. For this same reason, avoid the use of steel lockwashers under the screw heads.



A (inches)	B (inches)					
	70 ohms	80 ohms	90 ohms	100 ohms	110 ohms	120 ohms
0.25	0.097	0.113	0.132	0.154	0.178	0.205
0.50	0.193	0.226	0.264	0.307	0.356	0.410
0.75	0.290	0.339	0.396	0.461	0.534	0.616
1.00	0.387	0.452	0.528	0.614	0.711	0.821

Fig. 1– Construction of a parallel square-conductor line and dimensions for lines of typical impedances commonly associated with amateur radio applications.

*77 McKenzie Street, Orillia, ON L3V 6A6, Canada
e-mail: <ve3erp@encode.com>

[1]*Personal correspondence with L. B. Cebik, W4RNL, who discovered the equation in a previous algorithm by Roger Cox.*

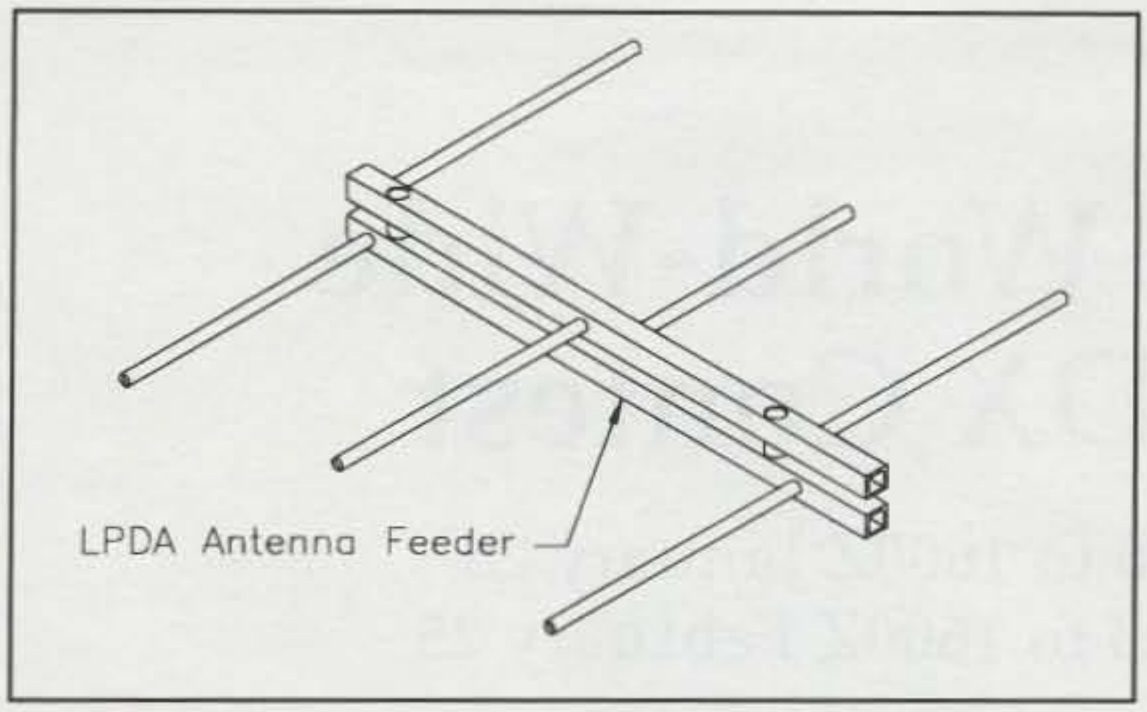


Fig. 2– Low-Z parallel conductor line used as a phasing line feeder for a log periodic dipole array.

Spacers can be cut from any type of rigid plastic pipe or tubing. One-quarter inch (13.7 mm/.540 inch O.D.) CPVC schedule 80 hot-water pipe (available in most hardware stores) has an I.D. of 7.7 mm/0.302 inch, which nicely accommodates 6 mm/1/4 inch bolts. The dielectric effects of CPVC at RF frequencies are unknown to me, but I suspect any deleterious effect would be minimal at the relatively large distances between spacers in this application. Polycarbonate (for example, Lexan™ or Plexiglas™) tubing may be superior as spacers, since it has known good performance at RF, but it may be difficult to find and relatively expensive.

Assemble the parallel line using Nylon™ or Teflon™ bolts, nuts, and washers. Since the spacing between conductors is critical, it is advisable to devise some kind of jig for cutting all the spacers to exact length. Install spacers at intervals of approximately 20 times the width of the conductor face (dimension *A* in fig. 1).

At each spacer, drill a clearance hole in the inner face of each conductor for the bolt, and in the outer face drill a hole to clear a nut driver or socket wrench. Install the spacers as shown in fig. 1(D). When installing the bolts, washers, and nuts, coat the mating faces of each with a silicone sealant in lieu of using lockwashers. Lockwashers rust; silicone caulk does not!

Connect all wires by forming a loop in the end of the wire and encapsulating the loop in solder. Fasten to the conductor with stainless-steel, self-tapping screws and smother the entire connection in silicone sealant.

When assembly is complete, you may, if you wish, close all openings with plastic or stainless-steel snap-in caps, or simply cover the openings with duct tape. If the line is installed vertically, leave the bottom ends of the conductors open to allow drainage of any condensation. Attaching the line to a tower or other supporting structure is left to the ingenuity of the builder!

Anyone interested in receiving a BASIC program for designing square-conductor transmission lines of any impedance can do so by e-mailing a request for SQLINE.BAS to <ve3erp@encode.com>.

This article should be of special interest to designers of LPDA (log periodic dipole array) antennas (see fig. 2) and to those of us who just picked up a bargain truckload of square aluminum tubing at a fleamarket and don't know what to do with it. ■

Announcing:

The 2001 CQ World-Wide 160 Meter DX Contest

CW: 2200Z January 26 to 1600Z January 28
SSB: 2200Z February 23 to 1600Z February 25

The objective of these contests is for amateurs around the world to contact other amateurs in as many U.S. states, Canadian provinces, and countries as possible on the 160 meter band.

Classes: Single and multi-operator only. Use of packet, a spotting net, or logging assistance makes an entry multi-operator. Multi-operators should show the actual operator for each QSO. Under single operator there will be a designation of power level: H = power over 150 watts, L = power under 150 watts, and Q = 5 watts or less. There will continue to be only listings per state or country, but if there is sufficient activity or if a high enough score is made, then a separate certificate will be issued. Minimum score for the separate certificate is 5,000 points! Multi-operators will all be considered high power.

Exchange: RS(T) and state for USA, province for Canada, and either prefix or country abbreviation for DX. Contacts without some location indicator will be ruled invalid.

Scoring: Contacts with stations in own country, 2 points. Contacts with other countries on same continent, 5 points. Contacts with other continents, 10 points. *Maritime mobile contacts count 5 points. There is no longer any multiplier value for a maritime mobile contact.*

Multiplier: Each continental U.S. State (48), USA District of Columbia (DC), Canadian area (13), and DX country. KL7 and KH6 are considered DX and not states for this contest. DX countries are DXCC plus WAE (IT, GM Shetland Islands, et al). Canadian areas include VO1, VO2, NB, NS, PEI, VE2, VE3, VE4, VE5, VE6, VE7, NWT, and Yukon. Do not count States and Canada as separate countries. Remember that maritime mobiles no longer count as a multiplier.

Final Score: Total QSO points times the sum of all multipliers (states, VE, DX countries).

Penalties: Three additional contacts may be deleted for each unacknowledged duplicate or unverified contact removed from the log.

Disqualification: A log may be disqualified for violation of amateur radio regulations, unsportsmanlike conduct, or claiming excessive duplicate/unverified contacts or false multipliers.Logs that shrink more than 5% are subject to disqualification or warning. The calls of those warned or disqualified may be printed with the results.

Awards: Certificates will be awarded to the top scorers in each class by state, Canadian area, and DX country. Runners-up with high scores over 100,000 may also receive certificates. Low power or QRP entries may also receive certificates if there is sufficient activity or the score is outstanding. The following plaques, with donating sponsors as indicated, will be awarded for exceptional efforts.

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Zone 5 USA	N4XMX	K4ODL
Europe	K9UWA	N4NX
Africa	(TBA)	WB4ZNH
Oceania	(TBA)	K4IS
Asia	K4SX	AH2BE/NT4TT
Japan*	W4ZV	—
S. America	W4NU	K4EA
N. America**	CQ	CQ
	N4IN Memorial	K2EEK Memorial

MULTI-OPERATOR

World	N4RJ	SE DX Club
USA	W8UVZ, WØCD, K8GG	WB9Z
Zone 3	4X4NJ	4X4NJ

**There is no SSB operation allowed in Japan at the present.*
***North America outside USA and Canada.*

The plaque procedure is the top scorer in the indicated area wins the plaque. However, a station can only win one plaque per contest section. The plaque is then awarded to the next highest scoring station. For example, WX8ZZZ wins top World Multi-Operator. Then the next station in the U.S.A. wins the U.S.A. plaque.

Intercontinental DX Window: 1830 to 1835 kHz should be left clear for DX stations for intercontinental QSOs in both contests. This is still voluntary but essential if the contest is to continue to attract rare DX as entries. **USA, Canadian, and European stations should refrain from using the window for local contacts.** Please stay away from the window edges, too. This is a gentleman's contest and band, so let's help make intercontinental contacts happen.

Computer Logging: The preferred logging format is the Cabrillo format, which combines the log and summary into one entry. If your logging program cannot produce Cabrillo, you may send the older format log and summary (.log, .prn, .all, and .sum). E-mail is the preferred route for log submission. If you print out a computer log, you must also send a diskette. The diskette must be clearly labeled with the call of the entrant, the mode (CW or SSB), and the category. **Do not** send .bin files, database files, or other non-conforming files. Failure to follow these directions may lead to penalties or disqualification.

Manual Logs: Sample log and summary sheets may be obtained from *CQ* by sending a large SASE with sufficient postage to cover your request. You can make your own with 40 contacts per page with columns for GMT, exchanges, multiplier, and points. Paper logs with over 200 QSOs must include a dupe/check sheet with all calls in alpha-sort order.

For All Logs: If you are not submitting your log in the Cabrillo format, follow these rules:

Show the multiplier only the first time it is worked. Each page must have sub-totals for multipliers, contacts, and points. A running total below the sub-total on each page is recommended. Dupe or check sheets with every entry are requested and are required with over 200 QSOs. Include a summary sheet with your entry showing the scoring and other essential information. Include a printed name/ mailing address and a signed declaration that all rules have been observed. Please put the summary sheet at the front of the log. All logs should clearly indicate total multiplier, W/VE multiplier, and DX multiplier.

Club Competition: Any club that submits at least three logs can enter the Club Competition. The name of the club must be clearly identified under club competition on the summary sheet. Club competition is a "for fun" competition to foster more activity. There is a separate listing for the club sores.

Log Submissions: Mailing deadline for CW entries is Feb. 28, 2001; for SSB entries the deadline is March 31, 2001. *Exception:* You may send both logs in one package as long as the CW log is received by March 31, 2000. Try to mail early to assure receipt. For a return receipt enclose an SASE or SAE with postage or 1 IRC. Avoid the registered postal route, as this delays getting the log until someone can sign the receipt! For non-Cabrillo and paper logs, proofread your log before submission. Each year many errors are corrected that you should catch! Logs or sections of a log that are unreadable will be disqualified.

Send e-mail logs to: <**cq160@kkn.net**>.

Send all other logs to CQ 160 Meter Contest, 25 Newbridge Road, Hicksville, NY 11801 USA. **Indicate CW or SSB on envelope or e-mail header.**

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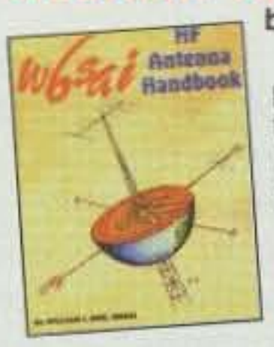

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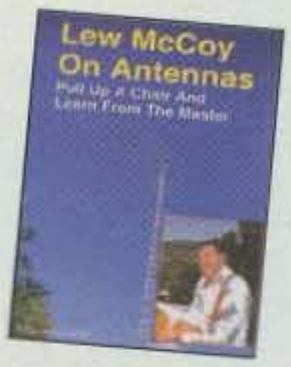

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Radio Classics

BY JOE VERAS, N4QB

Vintage Gear and Its History

VHF/UHF Gear

That credit-card-size, multiband, VHF/UHF transceiver in your shirt pocket has an interesting lineage. The first commercially-made, portable amateur VHF equipment made its debut in the mid-1930s; shirt pockets weren't necessarily any larger then, but the radios certainly were.

Exercising a pioneering spirit, amateurs of that day ventured into nearly unexplored territory in the world above 50 MHz. Some early experimenters called the UHF bands "optical frequencies," believing these wavelengths behaved more like light than those lower in the electro-magnetic spectrum. Even 10 meters was considered part of this exotic landscape when allocated by the Federal Radio Commission in March of 1928. Once a sufficient number of amateurs got equipment to work in the new 28–30 MHz band, they quickly discovered its capacity for supporting cross-country and intercontinental communication. Within the next decade, most communications receivers expanded their HF coverage to include 10 meters.

The 5 meter band (56–60 MHz) remained the jumping-off point for both serious experimentation and strictly local communication. With the equipment and antennas then in use, 15 miles or so was considered the practical limit for reliable coverage on this band, an attribute that was deemed a virtue in terms of not interfering with distant stations when one desired to talk only across town. Occasionally, propagation phenomena not then generally understood produced cross-country contacts that tended to be regarded as "big fish that got away" stories by those not party to the QSO.

U.S. amateur regulations, in a state of flux during the late 1920s, were chiseled into stone by the Department of Commerce's Radio Division on January 1, 1929. A part of its Happy New Year greeting was the plain-spoken intent to keep an eye, or at least an ear, on amateur radio's compliance with the new regulations. In general, bands had been narrowed, and the quality and stability of amateur signals became forefront issues. Five meters now furnished an attraction not then widely available on the HF bands—phone operation. Forty, 20, and 10 meters were strictly CW, and a thin, 50 kHz slice of the 80 meter band was allocated to phone. The voice mode was permissible anywhere on 160 meters, then 285 kHz wide.

Even in the early days, the nature of 5 meter work made it compatible with portable, compact equipment. Simple modulated oscillator circuits could be paired with an equally straightforward regenerative receiver. Battery-powered, they provided the ham-on-the-go a means of taking his hobby with him. The quality, stability, and selectivity of these circuits were inversely proportional to their simplicity, however. Only the 4 MHz width of the band and the short range of the signals kept these rigs' owners from running afoul of the new regulations.

The Super-Regenerator

In June of 1922, the famed Edward H. Armstrong presented a paper on a detector circuit before the Institute of Radio Engineers. He called his new development the *super-regenerator,* a term which indicated both its regenerative roots and novel operating principle. Armstrong lectured on the same information, in a format tailored to his audience, at an amateur radio gathering later that same month. One of his most striking claims was that the super-regenerator was a *million* times more sensitive than an ordinary regenerative circuit. In the initial presentation before broadcast engineers, hams, who had been assigned back-of-the-room status, could clearly hear signals coming from headphones placed on the table beside the receiver. In comparison, an ordinary regenerative set tuned to the same station produced audible signals for just the person wearing the headphones. The commercial broadcasters envisioned wider coverage areas and larger audiences, while the hams dreamed of DX. The new circuit attracted much attention in the radio hobbyist press.

The Abbott TR-4 debuted in late 1941. It sold for $65, less tubes and power supply. (Photos by Joe Veras, N4QB)

The regenerative detector is most sensitive at the point where it is just about to break into oscillation. An increase in regeneration causes the circuit to self-oscillate. In this region, CW signals may be copied, with the detector supplying its own beat note. Sensitivity suffers as the oscillation becomes stronger. AM signals are received by zero-beating the signal or by reducing the regeneration enough to stop the oscillation.

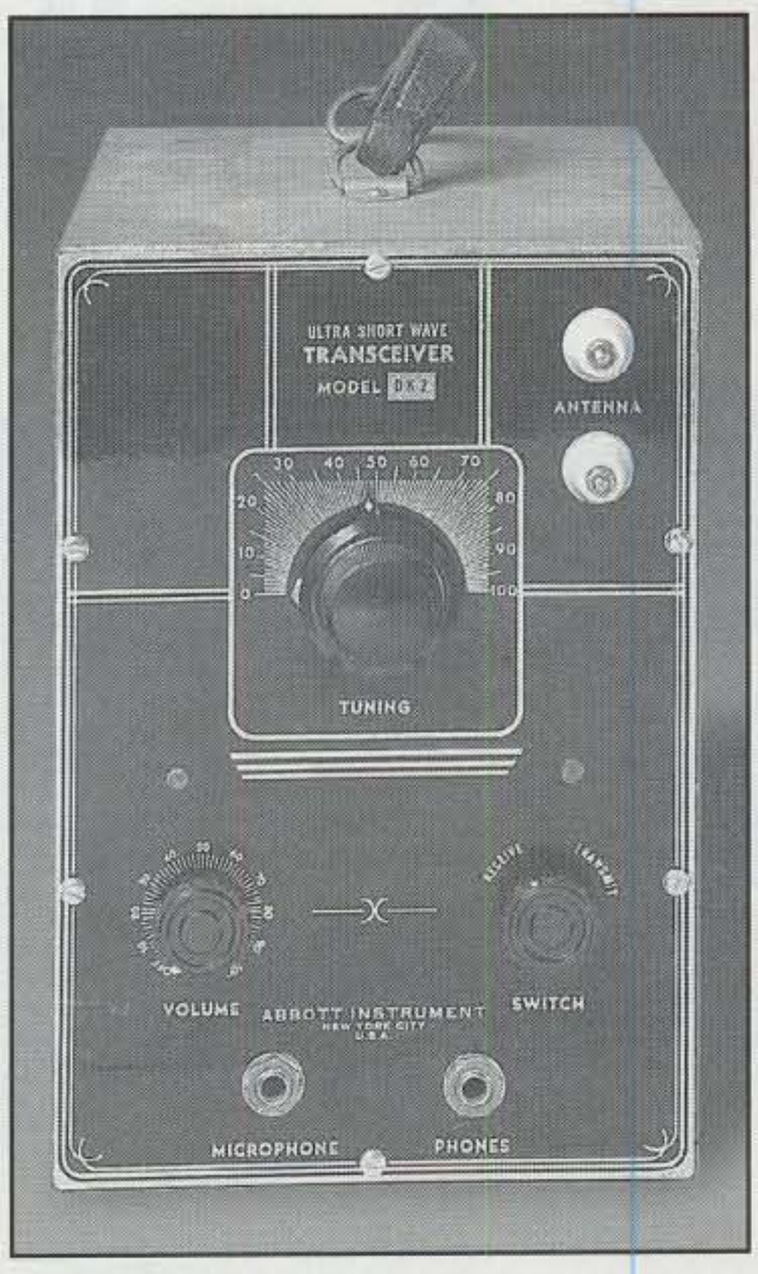
P.O. Box 1041, Birmingham, AL 35201
e-mail: <n4qb@cq-amateur-radio.com>

The super-regenerator functions by allowing the oscillation to begin, then, just as quickly, stopping it. The rate at which it does this is governed by a secondary circuit called a *quench* oscillator. The basic idea is to run this quench circuit at a frequency above the range of human hearing—a *super-audible* frequency. You can bet that those RCA dogs didn't think much of Armstrong's invention.

Ideally, the frequency of the quench oscillator should be in the 20–200 kHz range, with the lower frequency producing greater amplification in the detector and the higher one allowing better quality. It is also desirable to have the greatest ratio possible between quench frequency and the frequency to which the receiver is tuned. This leads to complications where use of super-regeneration at broadcast or HF frequencies is concerned. It is difficult to maintain the desired high ratio while keeping the quench signal super-audible. Not doing so means the quench signal will appear in the audio output along with the desired signal—not a pleasant thing to listen to for long. As a result, the circuit did not catch on among the commercial broadcast crowd. Even amateurs showed no more than experimental interest until they realized that the circuit's virtues could be exploited at UHF.

Along with greatly increased sensitivity, the super-regenerator offers immunity to atmospheric noise and displays an *automatic volume control* type action at no additional cost or complexity. Its amplification factor varies inversely with the square of the wavelength; the higher the frequency, the greater the gain. When not receiving a signal, the magnified noise pours from the super-regen set's speaker with a hissing sound. It wasn't long before amateurs began calling them *rush boxes*. The hiss diminishes in proportion to the strength of the received signal, with strong stations producing a full-quieting effect.

Negative baggage travels with the super-regenerative receiver. It is not selective, having an extremely difficult time when a number of strong stations are on the band. The receiver also radiates a rough signal that is often strong enough to cause interference to nearby stations. Careful shielding and an RF stage ahead of the detector provide a partial remedy, but it is difficult to suppress the spurious signal entirely. Nevertheless, rush boxes became the norm for amateurs experimenting with 5 meters, and commercial manufacturers followed suit when their first 5 meter products appeared.



Abbott Instrument's DK-2 might be called a 1940 handie-talkie. When introduced that year, it sold for $27.50, batteries not included.

The early 5 meter transmitters were hardly more elaborate. At a minimum, they consisted of a free-running, modulated oscillator and, perhaps, a speech amplifier. A few designs featured a more sophisticated audio chain but still employed the self-excited oscillator, which is subject to frequency shifts, as the changing load of the audio circuits causes the power supply voltage to vary. The resulting frequency modulation of the transmitted signal turns the super-regenerative receiver's lack of selectivity into an unintentional benefit. Equipment designed for fixed-station use evolved beyond these shortcomings, but in the interest of portability, these same drawbacks were overlooked in the simpler gear.

The Transceiver Emerges

The early 1930s saw the emergence of the modern HT's most distant ancestor. Given the simplicity and relatively low component count of the equipment, it was not long before someone hit upon the idea of putting a 5 meter receiver and transmitter in the same box. The first such units were constructed for

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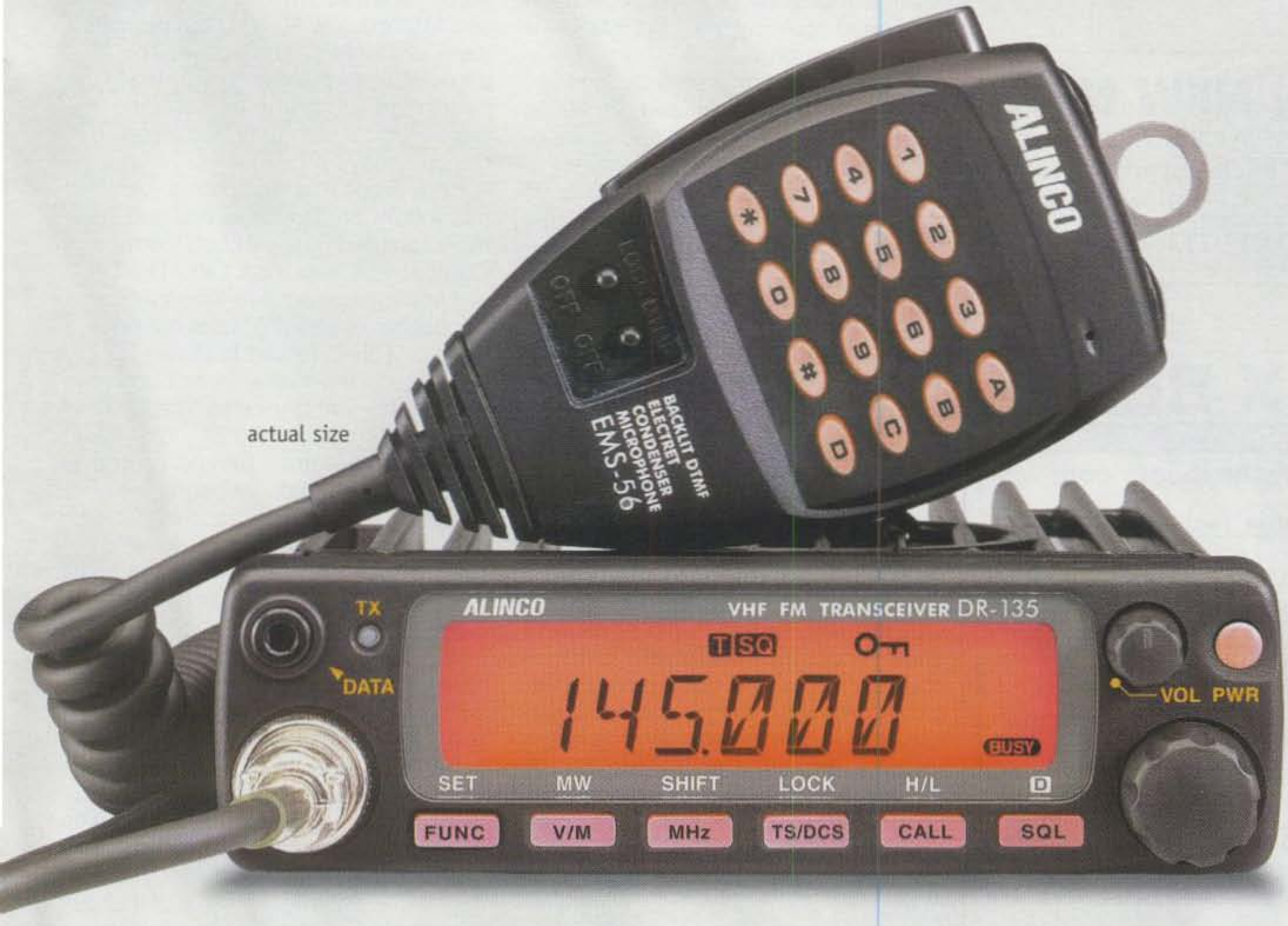

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experiments with duplex phone operation. Discrete receiving and transmitting units were installed in separate, shielded compartments in the same case and tuned to opposite ends of the band. A second station, similarly constructed but with the transmitter and receiver frequencies flip-flopped, completed the circuit. If receiver overloading from one's own transmitter could be overcome, it was possible to both talk and listen at the same time. Net operation and roundtable ragchews remained a problem, though.

By 1933 true *transceiver* circuits appeared, with sending and receiving functions sharing tubes and components. Commercially-manufactured 5 meter gear made its appearance at about the same time. Harvey Radio Laboratories of Brookline, Massachusetts entered the portable market in June of 1933. The two-tube transceiver was the first product of a company that, as Harvey-Wells, produced amateur equipment through the 1950s. Its founder, Clifford Harvey, W1RF, had also been a principle in the Hartford, Connecticut firm of Hendricks & Harvey, a manufacturer of communications receivers.

On New York City's famous Radio Row, Gross Radio sold the Natico TR-1 5 meter transceiver. Across the Hudson in Maple Shade, New Jersey, Haigis Laboratories manufactured its portable 56 MHz set, and up in Malden, Massachusetts, National joined the UHF crowd with the TR transceiver. These sets, as well as the Harvey, are nearly identical designs, based upon circuits published in the amateur press of that time. They function with only two tubes, thanks to another super-regenerative detector development. The introduction of the *self-quenching* circuit eliminated the need for a secondary oscillator, further simplifying an already uncomplicated design.

The two-tube circuit often used a 30 and a 33 tube. Variations of the circuit had different tube line-ups to take advantage of the filament and plate voltages available in a particular application. While receiving, one tube acted as a self-quenched super-regenerative detector, with the second tube amplifying the detected audio for a loudspeaker or headphones. In the transmit mode, the roles reversed, with the audio output tube functioning as a speech amplifier for the microphone, the audio being used to modulate the other tube which now functioned as an oscillator. More sophisticated 56 MHz equipment evolved for both home station and port-able use, but simple two- or three-tube rush-box transceivers remained popular for local communication until late 1938.

A Time of Great Change

On December 1, 1938, hams acquired a new band at 112–118 MHz, or 2½ meters. Phone operation was permitted in the entire band by all license classes. At the same time, revised regulations outlawed the use of modulated oscillators below 60 MHz but permitted them at 112 MHz and above. The simple rush- box equipment migrated to the new band as amateurs retraced the technological path they had followed in the early days on 5 meters.

Both pieces of equipment pictured this month are from this era and were manufactured by the Abbott Instrument Company of New York City. The DK-2 is a straightforward two-tube transceiver capable of about 6 watts out on 2½ meters. Three 45 volt batteries supply the B+ and the filaments are powered by four 1.5 volt dry cells. The DK-2 is housed in an 11.5" × 9.5" × 6.5" case. That sturdy leather handle on top is meant for hefting its 12 pound weight.

Abbott's TR-4 advanced the 2½ meter state-of-the-art with discrete receiver and transmitter units housed in its cabinet. Frequency control of each is independent, and the set design minimizes radiation from the super-regen receiver. Transmitter input is 20 watts, with power furnished either by connection to a car battery or external 110 VAC supply. The TR-4 has four tubes and was introduced on the eve of World War II.

In the 1928–1933 period, the evolution of equipment played out against a backdrop of spectrum, regulation, and license-class changes. Hams of that day faced concerns remarkably similar to our own. Ten meters became an amateur band in 1928, and the 14.1–14.3 MHz portion of 20 meters was opened to Extra Class licensees for phone operation in late '29. In 1933, phone privileges expanded to include 500 kHz of 10 meters, and two years later it was increased to a full megahertz. The voice allocation at 75 meters became 3.9–4 MHz. The Federal Radio Commission even waged a pitched battle against bootleggers operating on 10 meters. Whether it involved enforcement of the Volstead Act or the Radio Act, the federal government was ever vigilant.

On the same date that phone operation became permissible on 10 meters, Temporary, First Class, and Extra First Class licenses gave way to a letter-graded system for new tickets and exist-

ing licenses as they came up for renewal. Class A licenses took the place of Extra First Class. Those holding the top ticket were accorded all amateur privileges, along with the exclusive right to operate phone on 20 and 75 meters. Class B licensees had the use of all remaining modes and frequencies and, along with the A group, sat before a federal examiner at test time. The Class C license carried privileges identical to Class B, except that it was issued to those living more than 125 miles from an F.R.C. examining point. Class C applicants took the exam by mail, with a local ham administering both the written and code tests.

Amateur radio operation ceased with the beginning of World War II, but communications technology continued to expand. This was particularly true at UHF, where the development of radar drove the useful frequency spectrum ever higher. At first implemented as a ground-based aircraft detection tool, the use of higher frequencies (therefore smaller antenna arrays) soon made radar deployment aboard ships and aircraft feasible.

By the end of the war, equipment was operating as high as 50 GHz. When amateur operation resumed, it didn't immediately take advantage of this quantum leap in technology, but definitions changed to better fit the expanded radio spectrum. We were still Megacycle-speaking citizens in those days, and adopted a convention designating 3–30 MHz as HF; 30–300 MHz, VHF; and 300–3000 MHz, UHF, the latter range blending into the microwave region above it. At any rate, one could no longer expect to find much information on UHF operating in an article written about 10 meters.

Summary

The two items in the photos in this month's column are from the seemingly inexhaustible N4CH collection; my thanks again, Herman! If you have any VHF/ UHF equipment from the era covered in this column, I would enjoy hearing from you. As always, I am on the lookout for pieces of vintage gear to photograph. Speaking of photographs, the 2001–02 edition of the *CQ* "Radio Classics" calendar should be on sale by the time you read this. Copies are available directly from *CQ*, as well as through a number of other vendors.

The next column will follow the VHF trail from the post-war years into the 1950s. I'll look forward to seeing you back here then. 73, Joe, N4QB

Nets are one of the most popular aspects of amateur radio. Here are some do's and don'ts that will make the activity more successful and enjoyable for all.

Ham Net "Netiquette"

BY BOB SHRADER,* W6BNB

Those who have operated as a member of an amateur radio net, one of the most popular activities in ham radio, know that it can be quite interesting. Unfortunately, nets do not always run smoothly, and there are reasons for this. The suggestions which follow have been gleaned from nearly 50 years of operating both as a member of CW, SSB, AM, FM, and RTTY nets, and as a Net Control Station, or "NCS."

There are several different kinds of nets. Some are of the more formal, "directed" types, such as traffic nets, which are discussed later. Some amateur radio nets are fairly informal, perhaps made up of members of a radio club and any visitors. Still others are made up of hams who are interested in some particular subject, such as computers, skiing, antennas, and the like. They may meet daily or weekly on a certain frequency at a specified time to discuss topics related to their interests. Informal discussion nets may be slightly regimented, assigning numbers to members as they check in, or they may operate from a known list of members who are called in order.

Nets designate a member as the NCS to oversee net activities. Some are come-one, come-all nets that meet at some specified time and frequency with an assigned NCS who determines who will talk and when. An unregimented discussion net may have an NCS who only maintains order on the net. Any member can break in whenever he or she has something to add to whatever topic happens to be under discussion.

It is easy to understand why, in the case of the last type of net in particular, it is imperative that all net stations, and the NCS in particular, operate with break-in ("QSK") if on CW, or with voice-operated transmission ("VOX") on radiotelephone, to prevent "doubling." Doubling occurs whenever two stations start sending or talking at the same time. With CW, if another station is heard when your key opens, stop sending and find out what the other station wants to say. With SSB or other phone nets, operators should use VOX and pause a second or so after every few sentences to see if anyone is trying to attract their attention as the transmitter shuts down and the receiver turns on before resuming transmitting. Such break-ins are usually a follow-up to something that is being discussed at that time.

One of the really important things to do in all types of nets is to wait one or two seconds after it has been turned over to you before you start transmitting. This allows someone else to break in to join the net, to make some comment on what has just been said, or to tell you something before you start transmitting. Break-ins that do not require immediate action should probably be held until the next station turn-over, rather than breaking in during the station's transmission, which may interfere with the transmitting operator's train of thought.

Always be dead sure that the other station has stopped talking before you start transmitting! It may be necessary to query a station to determine if it is standing by. To prevent this, when turning over to another net station it is probably best on phone to send the next station's callsign followed by, "This is," then your callsign, and then "Over." On CW send the callsign of the next station to transmit, followed by "DE," your callsign, and "K." Sometimes names are used instead of callsigns, but names may be confusing to someone who is just tuning in, or if there happen to be two or more operators with the same name on the net. If there are only three or four stations on the net, or in any multi-station QSO, only use the callsign of the next person, because he or she will sign over to the station that follows, and so on. This eventually will allow all stations to sign their callsigns as required by federal regulations. Don't clutter the band with unnecessary verbiage!

Improper tuning procedures can be quite disruptive of a net's activity. Prior to a scheduled starting time of a net it is permissible to tune up for a short period of time on the net frequency, provided no one is using it. Always identify your station when you transmit any RF signals—tune-up or any other kind. If there is activity heard on the net frequency, transmitter and antenna tuning should be done on a free spot somewhere near the net frequency. In any case, always tune up as rapidly as possible and then ID your station. Next tune the transmitter to the net frequency and await net functions. If you have to zero-beat someone on the net frequency, do it as rapidly as possible. Moving a few kilohertz does not make any difference in the operation of most antenna systems, so retuning of the antenna will not be necessary.

Never tune up on a frequency being used by other CW, RTTY, FM, or AM stations. However, with SSB nets you know you are exactly on frequency if the other net members' voices sound normal, assuming your RIT is off. In this case you can tune your transmitter and antenna while on an SSB net frequency using CW. You will only be transmitting a carrier on the frequency of the suppressed carrier of the other station, so you will not interfere with their transmitted sidebands. You will be producing an SSB-with-carrier signal for anyone who might be listening with an AM or SSB receiver! (This is exactly what your SSB receiver does: It generates a carrier internally to beat against the sidebands of received stations to make them readable.)

Many established nets operate from a call list that rarely changes. Usually the first call on the list is that of the oper-

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ator who has been on the net the longest. The last call probably will be the latest member to have joined. In other nets the listing of stations on the net may be alphabetical, listings by letters following the district call number, or when two or more districts are involved, the list may start with the lowest numbered district stations.

Often the operating list for the day is developed by the NCS as stations check in. Several minutes before net time, the NCS may call CQ for check-ins and begin listening for responses from members, giving each station an identification number. At net time the NCS announces the list of stations by their check-in numbers. Net members should copy this list of stations so they know who precedes them and who follows them and to put into a log if one is kept. If the NCS has any bulletins of general interest for the net, they should be transmitted after reading the list. A call should also be made for any bulletins from any member stations. With these formalities over, the net can be started by having the first station on the list begin transmitting. Some nets begin CQing and checking-in at the designated starting time for the net. Depending on the operating procedure of the net, the first person on the list may sign back to the NCS, although on many nets the first person will turn it over to the second person on the list, and so on.

Some nets, particularly if they have many members checking in, may have only one go-around. Smaller nets may have two or more go-arounds. At the end of most nets the NCS should always ask if there are any further comments from members before signing the net off.

No amateur or group of amateurs has any more right to use any particular amateur frequency than any other amateurs. Often there will be a QSO in progress on what some group normally uses as its net's frequency. About 5 minutes before the net's starting time the NCS should break in to explain the net situation to the amateurs who are in QSO, asking them if they would mind moving to some other nearby frequency. If they do not wish to do this, the NCS should ask permission to make a short announcement on the frequency to advise net members where the net will be operating. Just prior to contacting the QSOing group, the NCS should survey nearby frequencies to find one which apparently is unused at the time. Actually, the amateurs who are in QSO usually will do the moving. (Amateur

QN Signals

QN**A***	**Answer** in prearranged order
QN**B***	Act as relay **Between**...and...
QN**C**	All net stations **Copy** this message
QN**D***	**Directed** net by NCS
QN**E***	**Entire** net stand by
QN**F**	**Free** net now (no longer directed)
QN**G**	Am **Going**...take over as NCS
QN**H**	You are **High** in frequency
QN**I**	Net stations report **In**. *or* I am reporting **Into** the net (followed by QRU, or a list of traffic you have for the net)
QN**J**	Can you copy me? *or* Can you copy...?
QN**K***	Transmit messages for...to...
QN**L**	You are **Low** in frequency
QN**M***	You are QR**M**ing the net. Stand by
QN**N**	**NCS** is.... *or* Who is the **NCS**?
QN**O**	Going **Out** of net
QN**P**	Copy is **Not Possible**
QN**Q***	**QSY** to...and wait for...to finish traffic. Then send traffioc for...
QN**R***	Answer...and **Receive** his traffic
QN**S**	**Stations** in the net are...
QN**T**	Request **Time out** of net...minutes
QN**U***	There is traffic for **yoU**. Stand by.
QN**V***	Try to contact...on this frequency. Then move to...and handle traffic to...
QN**W**	How do I route traffic for...?
QN**X**	**EXcuse** me from the net. *or* *You are **EXcused** from the net.
QN**Y***	Shift to another frerquency (or to...kHz) to clear traffic with...(Same as QSY)
QN**Z**	**Zero-beat** your signal with mine.

**Signals used by the NCS only*

radio is an amiable fraternity!)

When a station in a net finds it imperative to check out of a net suddenly, it should be done by first trying to break the station that is transmitting. If the break-in is made, the station can advise the NCS that he or she is leaving. The NCS should acknowledge and tell the broken-into station to resume its transmission. If a break-in cannot be made, the departing station should make a short call to the NCS and advise of the departure, hoping either to override whoever is on the air or that the information will be relayed to the NCS by someone at the next station turn-over.

The FCC rules require stations to identify by transmitting their callsign at least once every ten minutes during long transmissions, which usually means at sign-overs. Nets having many members will not be able to have everyone sign every ten minutes, but the sign-over of each station in its turn should take care of the ID requirement. Normally, with short transmissions during a QSO, stations will not have to ID on every turn-over. For example, a question is asked of a station which requires a back and forth exchange of short sentences from both stations. Such short transmissions do not require IDs. However, stations must ID every ten minutes if making long transmissions for any reason.

It should be remembered that the NCS is supposedly the "boss" of the net. Only the NCS should direct net operations. If others start to take over the work of the NCS, doubling will begin to occur and confusion will result. On the other hand, the NCS should be attentive at all times so that it will never be necessary for some other net member to step in and do the NCS's job. Always give the NCS a second or two to respond to needed activities.

With all types of CW contacts it is common to use the internationally recognized Q signals, such as QRU ("I have nothing more for you.") and QRU? ("Do you have anything for me?"); QSY ("Shift to another frequency.") and QSY? ("Shall I shift to another frequency?"); etc. Directed amateur radio traffic nets use QN signals (see table).

In the early days of ham radio, relaying messages was a fundamental activity of amateurs. Messages were relayed either station to station, or by nets, across the country. Amateur Radio Relay League members developed their own QN signals. Unlike the international Q signals, QN signals do not use question marks after the signal even though the meaning may be interrogatory.

While the use of Q signals in radiotelephone operations may be frowned upon by some operators, there are a few Q signals which may properly be used with voice communications.

Following the net basics outlined in this article should result in enjoyable, smooth-running amateur radio nets. ■

Digital Wireless

BY STEVE STROH, N8GNJ

Packet Radio and Beyond

Why I Like Linux, and Other Tales

Right up front I'll state that I'm just barely getting started in Linux. Linux, for the uninitiated, is an operating system for personal computers that gives you an alternative to Windows or the Macintosh Mac OS. A variant on the Unix operating system, many computer buffs are drawn to its "open architecture," which encourages development and experimentation. I have a lot of learning to do, but I finally am on my way to getting it running full time in my office/shack. For the time being, Windows is my primary "productivity" environment. My fingers have imprinted on them the most common WinWord keystroke shortcuts; after more than ten years of writing with WinWord (beginning with version 1.0) I don't even have to think about these shortcuts.

The way to learn Linux that makes the most sense to me, which is also the method I've advocated and employed, is to have a completely separate PC for Linux. As you learn about Linux, you'll find out about "boot loaders," which allow Linux to coexist on a PC with Windows. When you start your PC, you're given the choice of which environment you want to start. I don't recommend this, however, because older, less capable PCs can be found for so little money and you won't endanger your primary system (you know, the one with financial records, the e-mail address book not duplicated anywhere else, all the photos from your digital camera, etc.).

Fortunately, finding a suitable PC for Linux doesn't take much these days. For example, at an internet auction site I was able to bid successfully on three name-brand PC's that had 166 MHz Pentium processors with reasonable amounts of RAM and hard disks. I think the price was $130 each. One was purchased to be a Linux box, another a dedicated Windows for Amateur Radio system (including WinAPRS), and the third possibly a web server to be run off my DSL line. That's not to mention the other boxes in my office—a server for my writing work, my main Windows writing work station, and various other boxes being built for test or evaluation.

The solution for keeping all of this PC stuff sane was a device called a KVM Switch—Keyboard, Video, Mouse. It does just what it sounds like. Mine happens to be a Belkin OmniView Pro 8-port unit. There are other manufacturers, and it's unlikely that you'll need eight ports. Four-port units are reasonably priced and will allow you to use your comfortable keyboard (I use old, "very clicky" IBM keyboards, and have several in reserve *if* my current one dies.), your expensive mouse (I actually use a Kensington ExpertMouse trackball.), and best of all, your big monitor (You *do* have a big, ergonomic 17 inch or preferably 19 inch monitor, don't you? If not, shame on you for abusing your eyes. Get one soon, as they are very reasonably priced now.).

When I'm working, my KVM is switched to my primary writing computer. When I'm working APRS or other amateur radio activities, I'm on the ham computer. When I'm trying to "get" Linux, I'm on the Linux box, and best of all, I'm doing it from my good keyboard, trackball, and big monitor, instead of having the clutter of many monitors and keyboards in my office.

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OK, so why Linux? Basically, because it's a universal amateur radio software toolkit that will also teach you an incredible amount about internet technologies and networking. For example, APRS is *very* well supported in Linux, with a number of capabilities in APRS that can only be done in Linux and have no counterparts in other environments, mostly because those other environments simply aren't up to the task. One of the most compelling points about Linux to hams is that amateur radio networking devices such as TNCs, PI cards, and a lot of interesting packet radio hardware from Europe all are treated like "just another networking device" in Linux. That means all the support in the operating system (and applications) will (in theory) work equally well over a TNC as a modem. Another point is the incredible array of tools included in Linux. Last, if you ever want to do some of your own programming or scripting to make things happen the way *you* think they should, all that capability is there and is growing daily.

Here are some impressions I've gained from long exposure to Linux, but with very little actual hands-on experience.

- The best Linux distribution for hams is Debian, likely at version 7.0 by the time you read this. I'm told by my Seattle-area brain trust that Debian has the best support for amateur radio devices of all the distributions.
- Get "Linux for Dummies" if you're not the least bit familiar with Linux, and when you're ready to upgrade your instructional material, check out the Linux titles from O'Reilly and Associates (<www.ora.com>).
- There are countless, and growing, web pages about Linux. A good starting point is <www.linux.com>. Doubtless you'll find others.
- Find out if there's a Linux User Group in your area. Such groups often hold periodic "installfests" to help you get Linux on your PC.
- I can recommend *Linux Journal* as a good magazine. It's not a getting-started magazine, but it will grow on you a bit, and they do run articles showing the incredible uses Linux is being put to, including periodic stories about various facets of Linux use in amateur radio. *LJ* is published by Specialized Systems Consultants— SSC (<www.ssc.com>).

I'll feature periodic updates on my Linux experiences in future columns.

TCP/IP Without Tears

True story: On the strength of what I learned using Phil Karn, KA9Q's NET and NOS TCP/IP software for DOS in the late 1980s and early '90s, I qualified for my first Network Administrator job (Yes, they needed someone with TCP/IP experience that badly.). In fact, the things I did on my home amateur radio TCP/IP system were considerably more sophisticated than what I was doing at work.

I never considered that experience "easy." These days it's not very well known that NET and NOS were intended by their original creator to be *routers*—that is, that they were intended to be small and efficient "converters" between amateur radio devices such as TNCs and "real" TCP/IP application software such as Telnet, FTP that were running on "real"

Wouldn't It Be Cool If...

There was an internet search engine that searched (pretty much) only sites relating to amateur radio? That way you'd have a much greater chance of success at finding the ham-radio-related information you're looking for. But then again, maybe it's already been done. If so, please let me know.

computers—Sun work stations, for example. Somewhere along the line, NOS (which succeeded NET) gained a number of applications and additional services. Some of the applications were intended just to "get things started," the most famous example of which is BM, or Bdale's (Garbee, N3EUA) Mailer, which survives to this day, far, far outliving the originally conceived period of use by the author. More years passed, and more and more "stuff" was added to NOS. And although NOS works well, it's a hard struggle to understand it well enough to make it do useful things.

In 2000, for "server" applications in amateur radio TCP/IP, Linux pretty much wins. Linux is more stable, doesn't have the problems that NOS does with limited memory, and best of all, is far more reliable than NOS typically is (with two or three "extra" things compiled into it).

In 2000, for "client" or "user" applications in amateur radio TCP/IP, Windows 95 or 98 pretty much wins. There's amazing software available for use with TCP/IP—mail programs (no more BM, at least until some smarty ports BM to Windows...), web browsers (which also make dandy FTP clients), news readers, ping utilities, etc. The trouble is that Windows doesn't recognize a TNC or other packet radio hardware as being a network device . . . Oops.

In 2000, TNCs aren't the best devices for higher-level networking. TNCs running KISS was another creation that persists far longer than its creators had ever intended. For one, most of the "intelligence" present in the TNC is ignored in KISS mode. For another, since that "intelligence" isn't used, a simpler device more equivalent to a true modem is better suited to TCP/IP.

In 2000, even though there are a number of radios claiming to be 9600 capable, they are only partially so. The biggest problem is that radios with 9600 capability are expensive. Another is that they have poor turnaround time. It's far better to buy a small, crystal-controlled, low-power radio. The latter are cheap, have fast turnaound time, and you don't feel bad about leaving them in your shack all the time. The best known of this type of small, crystal-controlled radio is from Tekk, Inc. Other vendors are Motorola (tough to find sometimes) and MFJ.

In my opinion, in 2000 a good amateur radio TCP/IP system consists of the following equipment for the hub of the system:

• A 9600 baud bit regenerative repeater. This allows all the users to hear each other and work each other easily. If you are used to 1200 baud simplex operation, 9600 on a repeater seems like magic.

• A full-time, always-on internet connection with a static IP address (DSL works great) somewhere on the network (doesn't have to be at the hub).

• A Linux server—configured for web server, mailing list, ftp, etc.—ideally located with the hub.

On the client/user side:

• Windows 98, preferably running on a PC dedicated to amateur radio use.

• Tekk/Motorola Radius/MFJ crystal-controlled data radio, crystalled for repeater system mentioned above.

• Yet Another Modem (YAM) for the serial port, available for order at <http://www.microlet.com/yam/>, or the Tigertronics BayPac Model BP-96A available at <http://www.tigertronics.com/bp96.htm>.

• The TCP/IP Win98/NT Driver available from SV2AGW at <http://www.elcom.gr/sv2agw/>.

Of the two modems, I tend to prefer the BP-96A because it is available domestically (few shipping hassles) and I rate it as a bit more stable because it draws its power from the parallel port, from which there is some real power available. The YAM, in contrast, is designed to connect to the serial port, and while this works most of the time, drawing power from a serial port can be problematic at times. Both of these are *modems,* not TNCs. By themselves, they do nothing. Such modems are ideal for TCP/IP.

Last, the primary creation that hangs all of this together is the SV2AGW TCP/IP Win98/NT Driver. There is a small charge for it, but you can pay by credit card and then download it. Basically, the driver makes the supported amateur radio device into "just another network device" under Windows 98.

Resources

• *Home Power Magazine* <www.homepower.com> does not have very good representation in amateur radio, despite the publishers being hams and mentioning that fact frequently in *HP*. I cannot recommend *HP* highly enough. It is an ongoing education in everything related to generating electricity "off the grid," including heavy emphasis on solar systems and batteries. If you have any interest in powering your shack (or your entire home) with alternative energy, or just want a reliable backup system, *HP* is *great* reading.

• I'll rarely discuss products or services that don't have some connection to amateur radio, but this is one of those exceptions. My current ISP is Speakeasy Networks (<www.speakeasy.net>), headquartered in Seattle, but with DSL service nationwide through Covad. Speakeasy is, in a phrase, "a pretty cool ISP." For one thing, they don't have a problem with you running servers *(per se)* from your DSL line (but don't saturate —read the terms and conditions). For another, they're relatively easy to get additional static IP addresses, which are great for iInternet interconnections such as APRS iGates. I've had few problems with Speakeasy, and they seem like nice folks to deal with.

• Last, TAPR's Networking SIG mailing list has been a bit quiet of late. NetSIG never was a high-volume list, but of late there's been virtually no activity. I'm the nominal chairman of TAPR's Networking Special Interest Group (NetSIG) and therefore "in charge" of the NetSIG ML. I've been asked "Where do you hang out?" for extended discussions, and my answer at this point is that I'm on NetSIG. If you'd like more information on NetSIG, browse to <http://www.tapr.org/tapr/html/sigf.html>. Feel free to drop me a note there.

Best of all, the SV2AGW software "hooks into" the Windows' TCP/IP stack and "informs" it that the connection is a slow one, and timeout parameters and others should be relaxed.

I saw these pieces (potentially) come together a couple of years ago, but I didn't do much with the idea of combining them. One of those I talked to about the idea was John Ackermann, N8UR, who has begun implementing and documenting this idea in better detail than what I've described here. John's "Cheap (but good...) 9600 baud packet radio" page can be found at <http://www.febo.com/cheap-9k6/index.html>. John also maintains a mailing list on this topic called "9k6cheap." Further details are available at <http://www.febo.com/cgi-bin/majordomo>.

Thanks...

Thanks for all the nice notes I've received via e-mail. Please write to me with your ideas or comments. I'm particularly interested in hearing from groups that are doing "Advanced/Digital" amateur radio activities not just here in the US, but also internationally.

73, Steve, N8GNJ

How It Works

BY DAVE INGRAM, K4TWJ

Theory 'n Practice

An Introduction to Mixers, IFs, and Detectors

Two of this column's main objectives are explaining how various circuits and features in modern transceivers (and related accessories) work and discussing how they are beneficial to you. Some recent columns, for example, introduced you to basic "found in all rigs" circuits such as oscillators and RF, IF, and AF amplifiers.

This month we continue along that same path with a look at frequency converters, or mixers, and signal detectors, or demodulators. Each of these circuits plays an important behind-the-dial role in all types of communications gear (photo A). Since ICs, transistors, coils, resistors, and capacitors that make up mixer and detector stages are electronic rather than mechanical in nature, however, just looking at them having fun on a PC board does not reveal their amazing capabilities (photo B). The most effective way to understand their basic operation is by first studying block diagrams and later focusing on associated circuits and schematics.

Bearing that thought in mind, our discussion will be supported by several quickly sketched "napkin notes" like those we would share during a friendly lunch-time chat. I am sure you will find the information helpful in visualizing performance of rigs, understanding equipment ads or technical specs, and much more. We have some fascinating ground to cover in a limited amount of space, so let's get started!

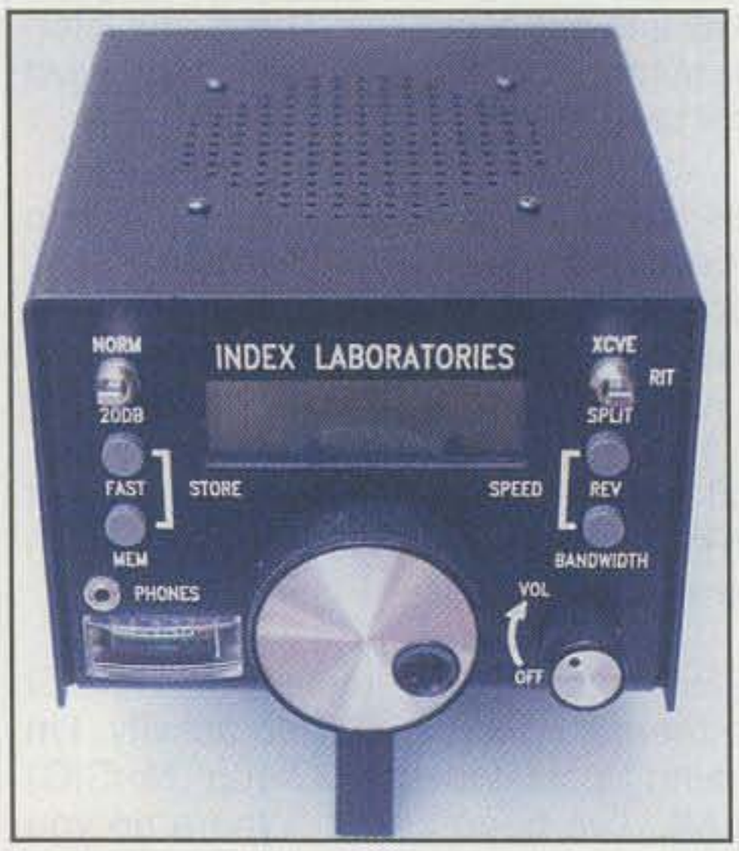


Photo A– Although not apparent at first glance, frequency-converter circuits and signal-detector stages in all transceivers—new, old, 100 watts, or QRP — directly influence how well they pull weak DX signals out of thin air and retrieve transmitted audio intelligence.

Why Mixers and Detectors

Some anxious-to-upgrade hams may be reading this column for the first time and asking what role mixers and detectors play in communications equipment. That's a good question, and it also makes an ideal starting point for this month's discussion. The explanation also requires some "background info," so be patient and read on.

Sounds in the normal voice range cannot be transmitted over the air in audio form; they must be superimposed on a radio signal. By transmitting each radio signal on a particular frequency, numerous stations can operate within the same band. Let's use the famous old AM broadcast band to illustrate that point (fig. 1). Here, an AM transmitter generates a signal on a pre-assigned frequency such as 610 kHz (a randomly picked frequency). Simultaneously, microphone-acquired audio is amplified to a high level and used to vary the transmitter's RF output at an audio rate. The concept of modulation is illustrated "amplitude style" in inset A of fig. 1 and "frequency analysis style" in inset B of fig. 1. The sidebands in B, incidentally, appear or are produced only when the transmitter's main signal, or "carrier," is modulated by sounds. The sidebands are also mirror images of each other and extend above and below the carrier's frequency according to modulating tones (±1 kHz for a 1000 Hz tone, ±2 kHz for a 2 kHz tone, etc.). AM broadcast band stations are restricted to a maximum bandwidth of 10 kHz, so the highest pitch audio tones they can transmit are 5 kHz.

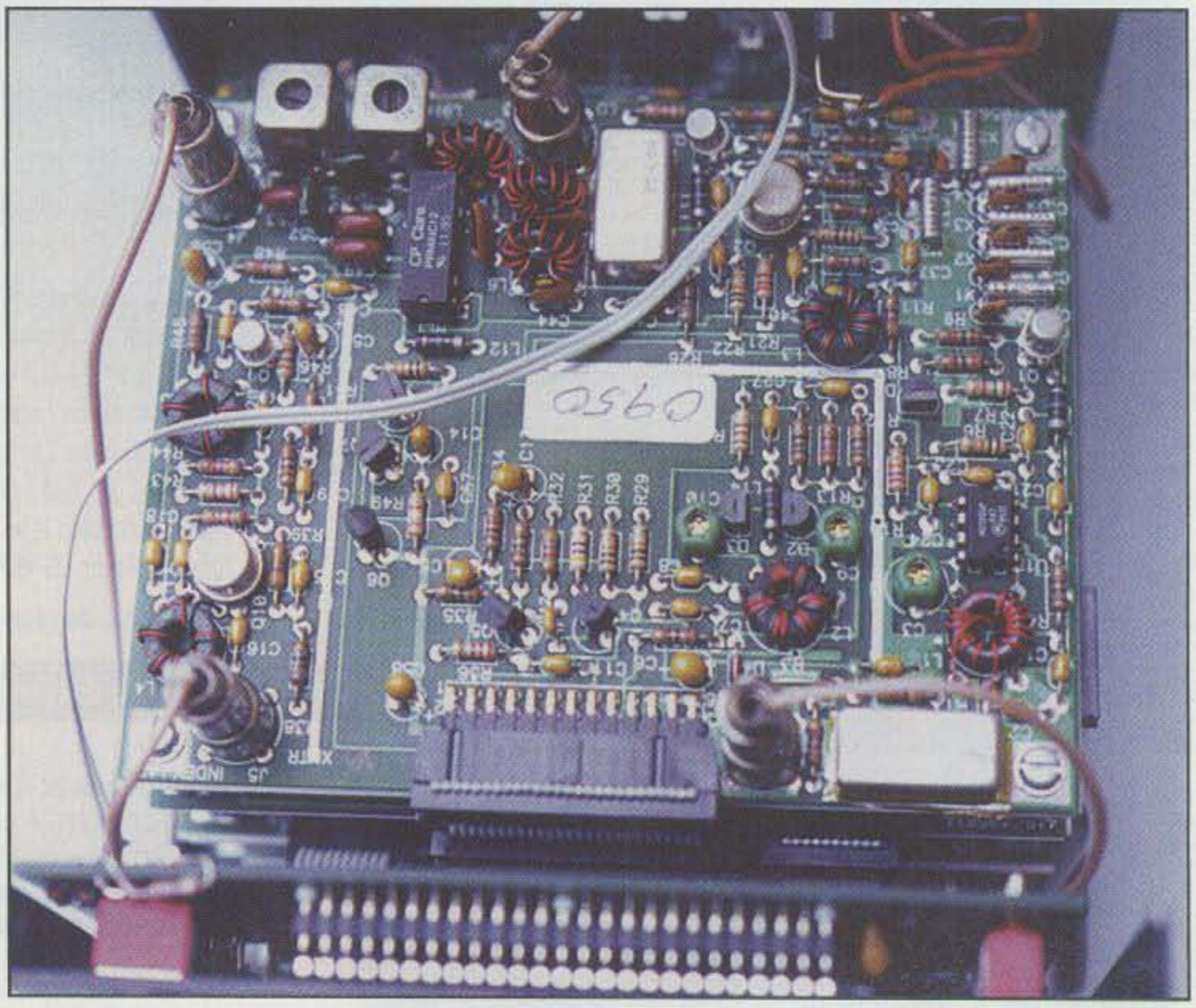


Photo B– Simply looking at mixer, IF, and detector stages on a transceiver's PC boards gives only a mere hint of their amazing capabilities. Studying their block diagrams and circuit schematics is the key to understanding how they work.

4941 Scenic View Drive, Birmingham, AL 35210
e-mail: <k4twj@cq-amateur-radio.com>

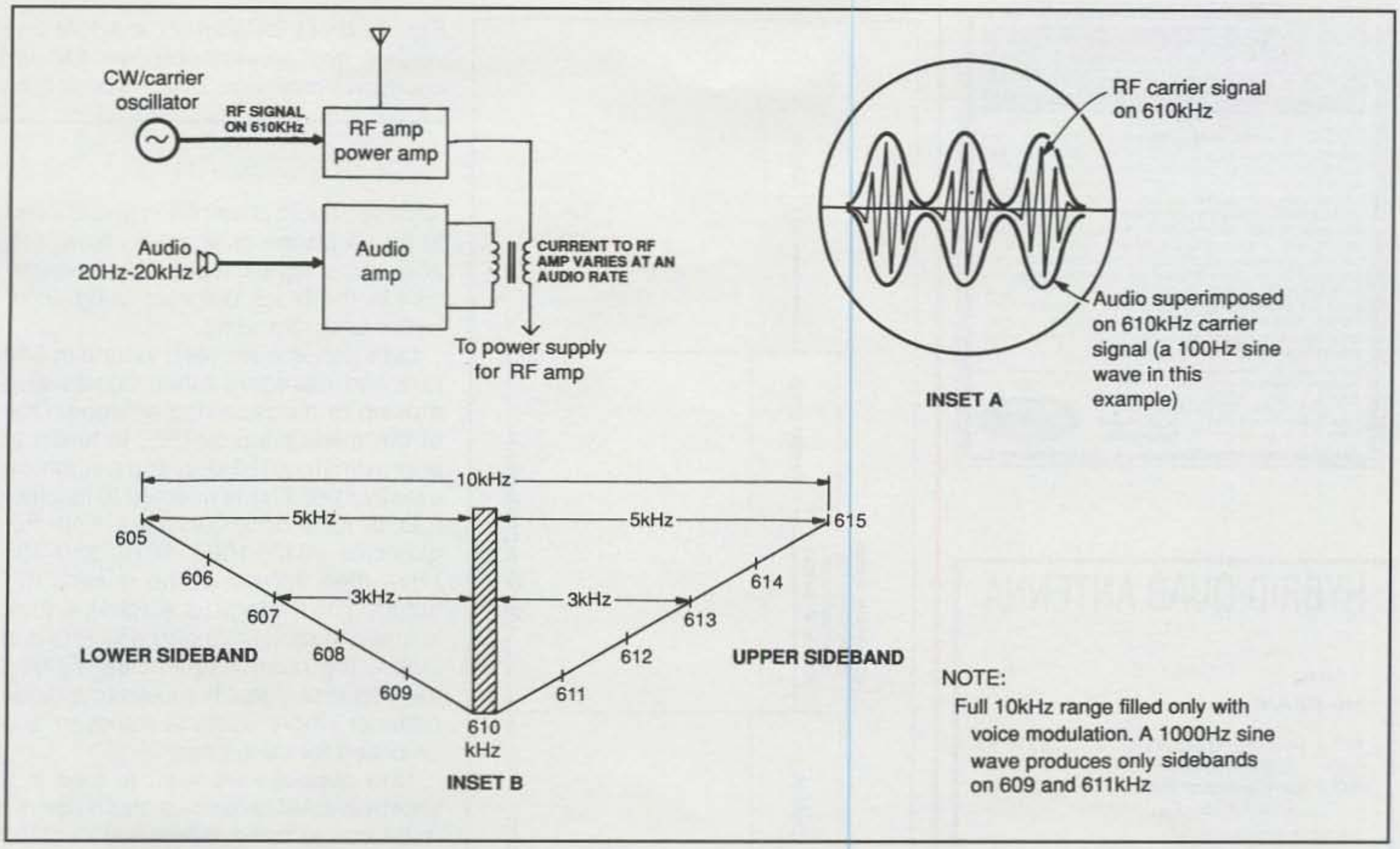


Fig. 1– Outline of how an AM signal is produced and transmitted. As described in the text, output of the RF amplifier is varied at an audio rate and thus produces sidebands extending above and below the unmodulated carrier's frequency. Inset A—modulation pattern of AM signal as seen on a wideband oscillator. Inset B—frequency analysis of AM signal showing location of sidebands and carrier.

Now shifting to the "receive end" of this story (fig. 2), one of several incoming signals is "tuned in," and its audio information is extracted from the carrier signal by a diode detector. Resultant audio is then amplified and/or applied to an earphone or speaker for us to hear.

Did we miss something in that overview, you ask. What about mixers, frequency conversions, and IF amplifier stages, right? Okay. Hold your thoughts on detectors for a few minutes and let's backstep a couple of spaces.

Basic Concepts of Frequency Conversion

Back when radio was young and there were only a few stations on the air, directly "tuning in" a desired signal on a basic crystal set or two-tube 'regen receiver was a fairly easy process. As the number of stations on the air increased and single-signal reception became more challenging, frequency-conversion techniques (which required adding local oscillator, mixer, and IF stages) were included in receivers. This *single conversion* concept is shown in fig. 3. The mixer converts incoming signals to an intermediate (between RF and AF) frequency, which is then amplified and detected; then

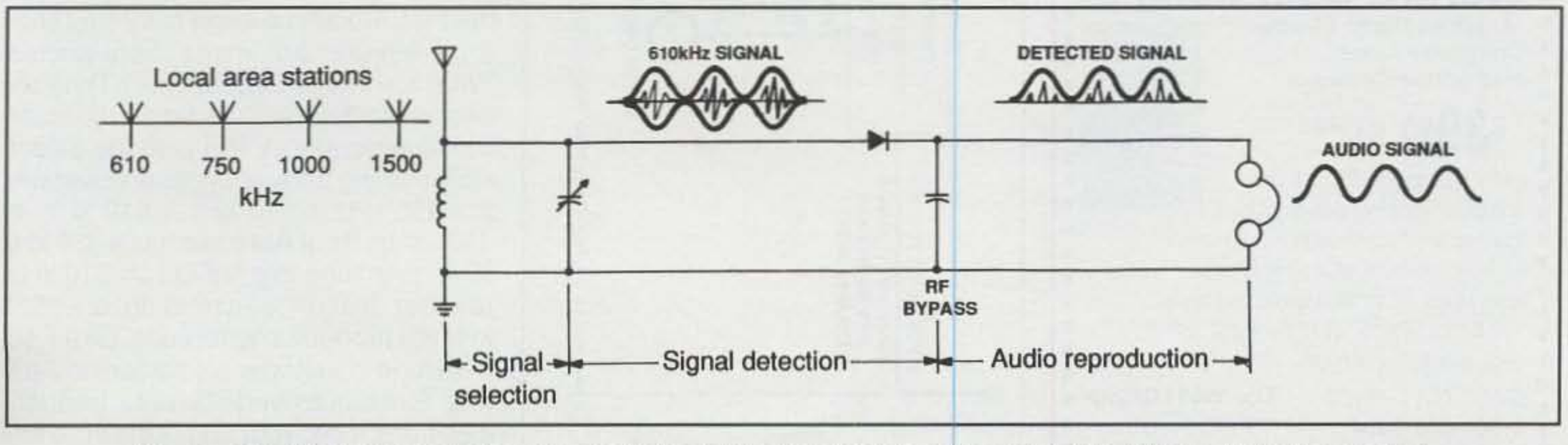


Fig. 2– Circuit diagram of an early crystal-set-type receiver used to copy AM signals. Note waveforms.

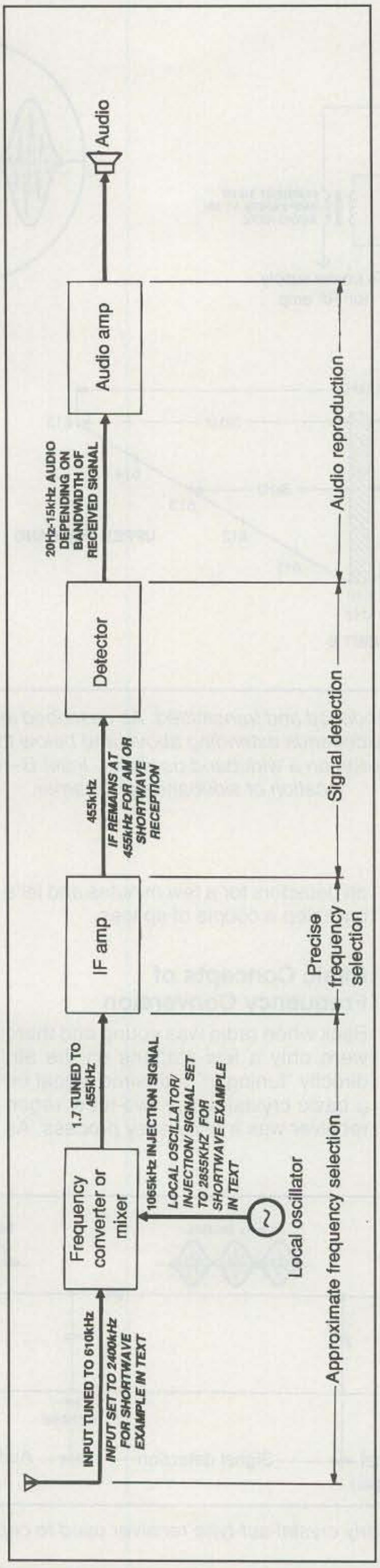


Fig. 3– Block diagram of a single-conversion and general-purpose AM and shortwave receiver. (Discussion in text.)

retrieved audio is amplified and applied to an earphone or speaker. Now let's add some typical operating frequencies in the block diagram of fig. 3 for better understanding.

Let's assume we wish to tune in 610 kHz and disregard other signals also arriving at our receiving antenna. One of the mixer's inputs (RF) is tuned to approximately 610 kHz, and a signal on exactly 1065 kHz is directed to its other (LO, or local oscillator) input. Four frequencies—610, 1065, 1675, and 455 kHz—then appear at the mixer's (IF) output. The IF stage (or stages), in turn, is tuned to recognize only 455 kHz and ignore the other frequencies. Finally, the 455 kHz signal is routed to a diode detector where audio is retrieved and amplified for us to hear.

Now suppose we want to tune in a shortwave AM broadcast station on the mid-tropical band frequency of 2400 kHz and follow a second example. In this case, we reset the mixer's RF input to 2400 kHz and reset the local oscillator to 2855 kHz. The mixer's four output frequencies are now 2400, 2855, 5255, and 455 kHz. Again the IF stage responds to only 455 kHz and ignores other signals. Did you catch that main point, friends? Tuning in signals involves adjusting a receiver's local oscillator to a frequency that when combined with or subtracted from a desired frequency at a mixer's input, produces or equals an IF amplifier's input frequency. The IF stage then handles selectivity and amplification needs to receive only the desired signal.

Two additional factors enter the picture at this point. First, traditional heterodyning or *single conversion* techniques are effective and economical, but they are also subject to interference from signals on image frequencies. What are image frequencies? They are best described as two times the intermediate frequency (IF) plus the selected/incoming frequency. As an example, 2 × 455 kHz = 910 kHz + 610 kHz, or 1520 kHz. If our AM radio has a 455 kHz IF and we tune in a station on 610 kHz, another station transmitting on 1520 kHz will produce interference. Likewise, if we tune in a shortwave station on 2400 kHz (substitute your favorite frequencies here, if desired) and our radio's first IF is still 455 kHz, we may experience

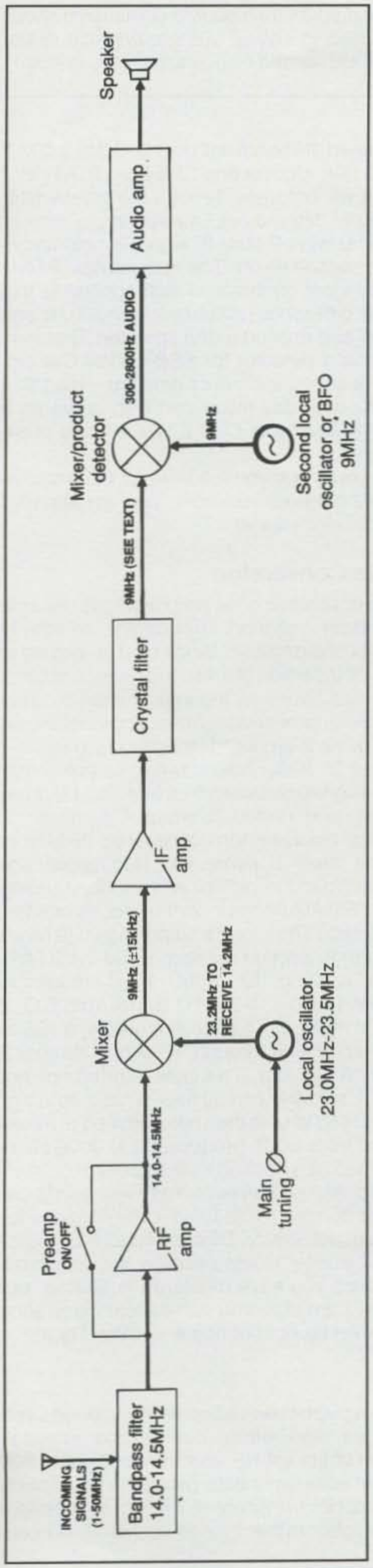


Fig. 4– Simplified block diagram of a modern single-conversion SSB receiver. This is a generic example. Various makes and models of receivers utilize different IFs and filter bandwidths.

image interference from a shortwave "utility" station on 3310 kHz. Sidestepping images and other spurious signals was not a serious problem during eras past, but it has become an important consideration with today's heavily populated HF spectrum. We will discuss some modern receiver solutions presently.

Rather sharply tuned input circuits that mechanically tracked with oscillator adjustments were included in RF and/or mixer circuits of radio receivers of the past. Today, however, "front end" RF or mixer states are usually untuned/ broadbanded and preceded by bandpass filters for various frequency ranges. The local oscillator is then responsible for stable and accurate frequency selection, while IF stages are responsible for single signal selectivity. These facts will become clearer as we look at modern shortwave receiver designs.

Mixers, IFs, and Detectors in SSB Receivers

Understanding the basic concepts and frequency relationships in superheterodyne receivers should now be fairly easy (well, at least possible!), so let's use that knowledge for an overview of the operation of a modern SSB receiver. Refer to fig. 4, and let's begin with incoming signals arriving at the antenna. Those signals (which may be on any frequency between 1 and 50 MHz) are first directed to a specific-frequency-range bandpass filter—for example, 14.0 to 14.5 MHz for 20 meters. After pre-amplification (if selected by a front-panel button), the full range of 14.0 to 14.5 MHz will be applied to one of the mixer's inputs, while a local oscillator or "main tuning" signal is injected on the mixer's other input. Using 9.0 MHz as a hypothetical IF, the LO's frequency range will be 23.0 for 14.0 MHz to 23.5 MHz for 14.5 MHz. That produces a constant difference of 9 MHz while tuning. Get the idea?

Taking a closer look, the IF amplifier actually has a bandwidth of 20 or 30 kHz with a center frequency of 9 MHz. In other words, its response is 8.985 to 9.015 MHz—wide enough to pass more than a half-dozen SSB signals. That's

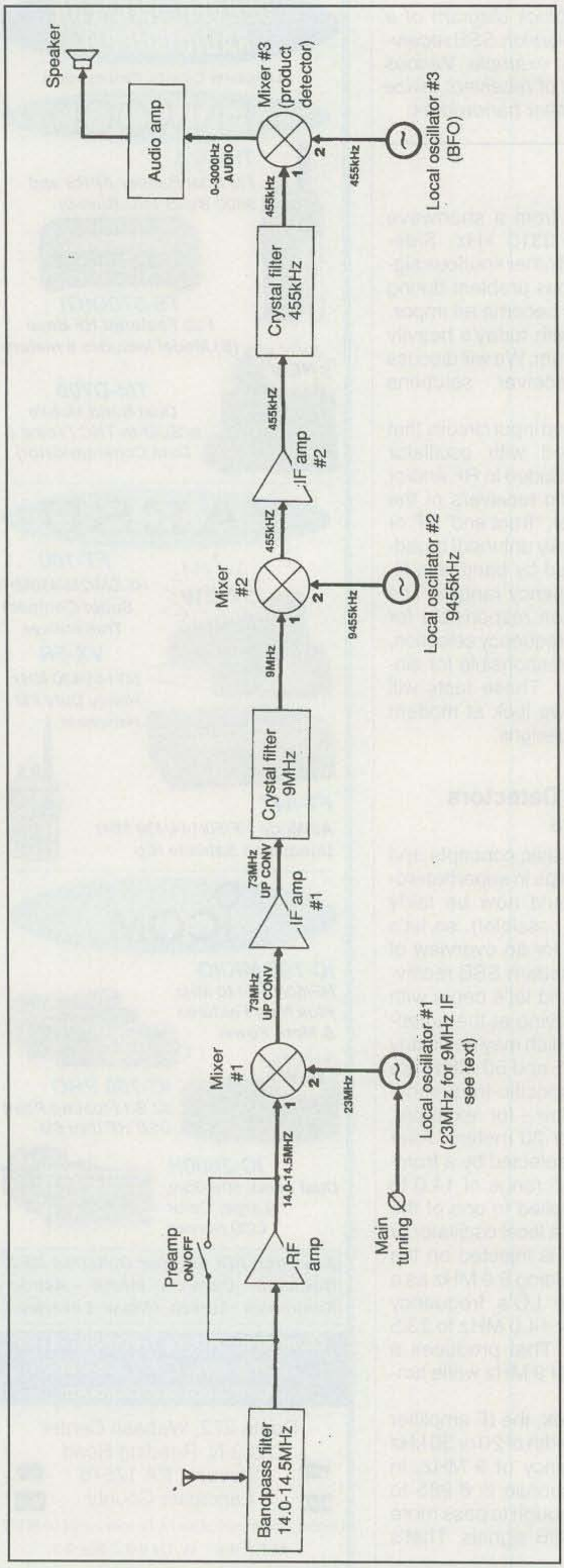


Fig. 5– Generic block diagram of a double-conversion shortwave SSB receiver utilizing crystal filters to improve selectivity. (Discussion of associated frequencies, etc., in text.)

why a crystal filter is used. Its bandwidth is 9.000.3 to 9.002.8 MHz, or 2.5 kHz wide (the width of one SSB signal). All other off-frequency signals will not pass through the crystal filter and are thus dropped or "filtered out," as we say.

The resultant 2.5 kHz wide 9 MHz IF signal is next amplified and directed to a second mixer. The approximate 9 MHz signal from a second local oscillator is also applied to this second mixer, and the difference (audio between 300 Hz and 2800 Hz) is amplified and applied to the speaker. That second mixer functions as a detector for SSB and/or CW signals. Technically, it is called a *product detector*. Read that sentence again. A modern-day mixer can also serve as a product detector for SSB and/or CW: It just outputs audio rather than an IF signal.

Now congratulate yourself if you followed all the frequency relationships in our previous example. You are attentive and have a high IQ for electronics!

Double and Triple Conversion

As our amateur radio population grew and HF bands became more crowded, greater adjacent frequency selectivity became an important consideration. Since best selectivity is obtained at the IF level, inclusion of a second IF section complete with its own crystal filter was the logical solution. This concept is called *double conversion*. An example is shown in fig. 5 and a quick "How It Works" description follows.

Assuming the same 20 meter tuning range as previously mentioned, incoming signals between 14.0 and 14.5 MHz are filtered, preamplified, and routed to input 1 of mixer 1. Simultaneously, a local oscillator/tuning signal on 23 MHz is injected on input 2 of mixer 1. *(Note:* Our frequencies are hypothetical and also "rounded off" for easy understanding without a calculator. Substitute your own transceiver's frequencies here, if desired.) The mixer's output signal (9 MHz) is then passed through IF section number 1 and the 9 MHz crystal filter, then applied to input 1 of mixer 2. Simultaneously, a non-tunable 9455 kHz signal from L.O. 2 is applied to input 2 of mixer 2. That mixer's output, a 455 to 458 kHz signal, is then passed through IF section number 2 where a crystal filter on 455 kHz eliminates interference not removed by the first IF's 9 MHz crystal filter. That output signal (which is still 455 to 458 kHz) is then heterodyned or mixed with a 455 kHz signal from LO 3, producing 0 to 3000 Hz of audio which is amplified and applied to the speaker.

As time progressed, *triple conversion* and even quadruple conversion with more IF mixers and filters came into use for achieving even greater selectivity. Discussing all their associated frequencies obviously would overflow this column's allotted space, but once you have mastered "following" our previous frequencies, I am sure you can handle calculating frequencies in your own rig right at home—really. Try it!

Up Conversion

Remember a few paragraphs back when we mentioned interference from images and other out-of-band signals? Continued population of the full HF spectrum escalated that problem, and the best solution to date (which has also been integrated in modern HF transceivers) is up conversion. Simply explained, a higher rather than lower first IF is used.

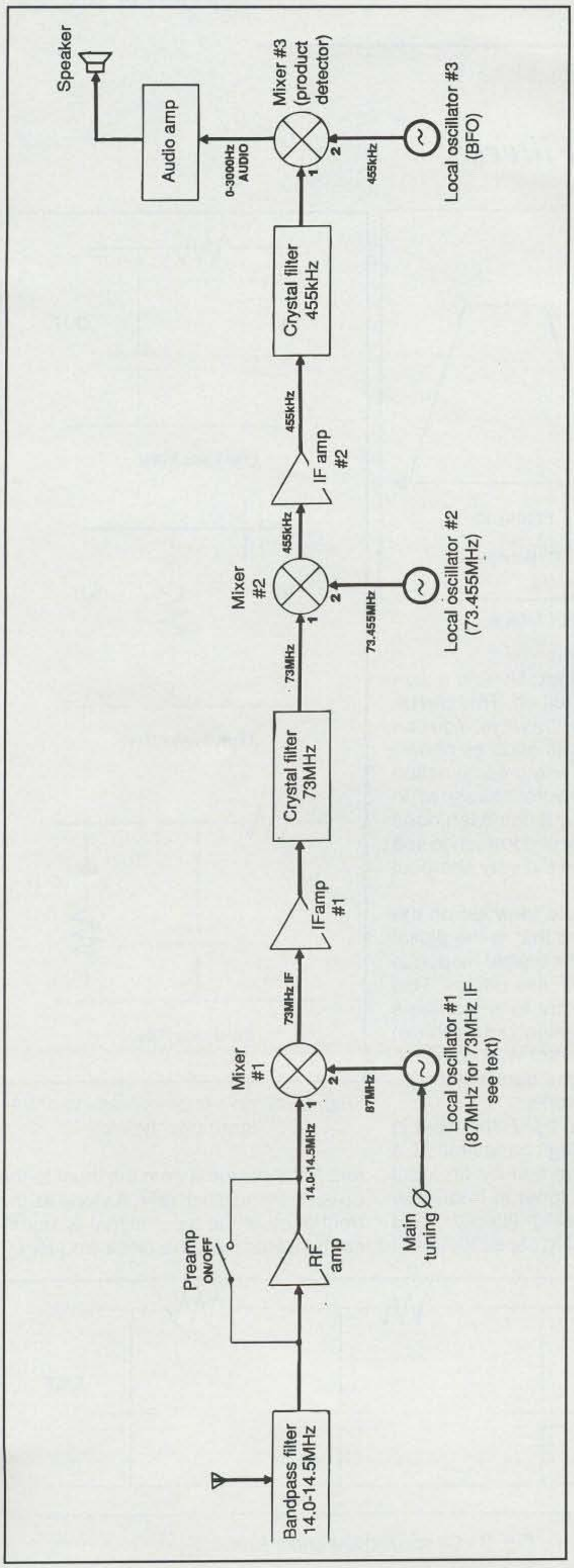


Fig. 6– Block diagram of the same double-conversion receiver as in fig. 5, using up conversion to operate with higher frequency IFs. (See text for details.)

Susceptibility to image interference is then shifted to the VHF range, which is far outside of the receiver's "front-end passband." As shown with a second set of frequencies in fig. 6, up conversion works just like double or triple conversion except the first IF is between 60 and 75 MHz. Again, those are approximate frequencies.

So what is the bottom line of all these multiple frequency studies? First, they give you a foundation for understanding some of the fancy technical talk in rig ads and reviews. Second, it points out that today's transceivers pack a lot of high-tech electronics into a small cabinet (considering what you get for your money, they are a bargain). Understanding filters and bandwidths also helps clarify ad statements such as "brick wall selectivity," and more. Yes, and that "more" is the direction we will continue to follow in future columns on IF shift, passband tuning, DSP filtering, etc. Stay tuned, and take time to enjoy a few minutes on the air every day!

73, Dave, K4TWJ

Math's Notes

What's New And How To Use It

BY IRWIN MATH, WA2NDM

Digital Filters

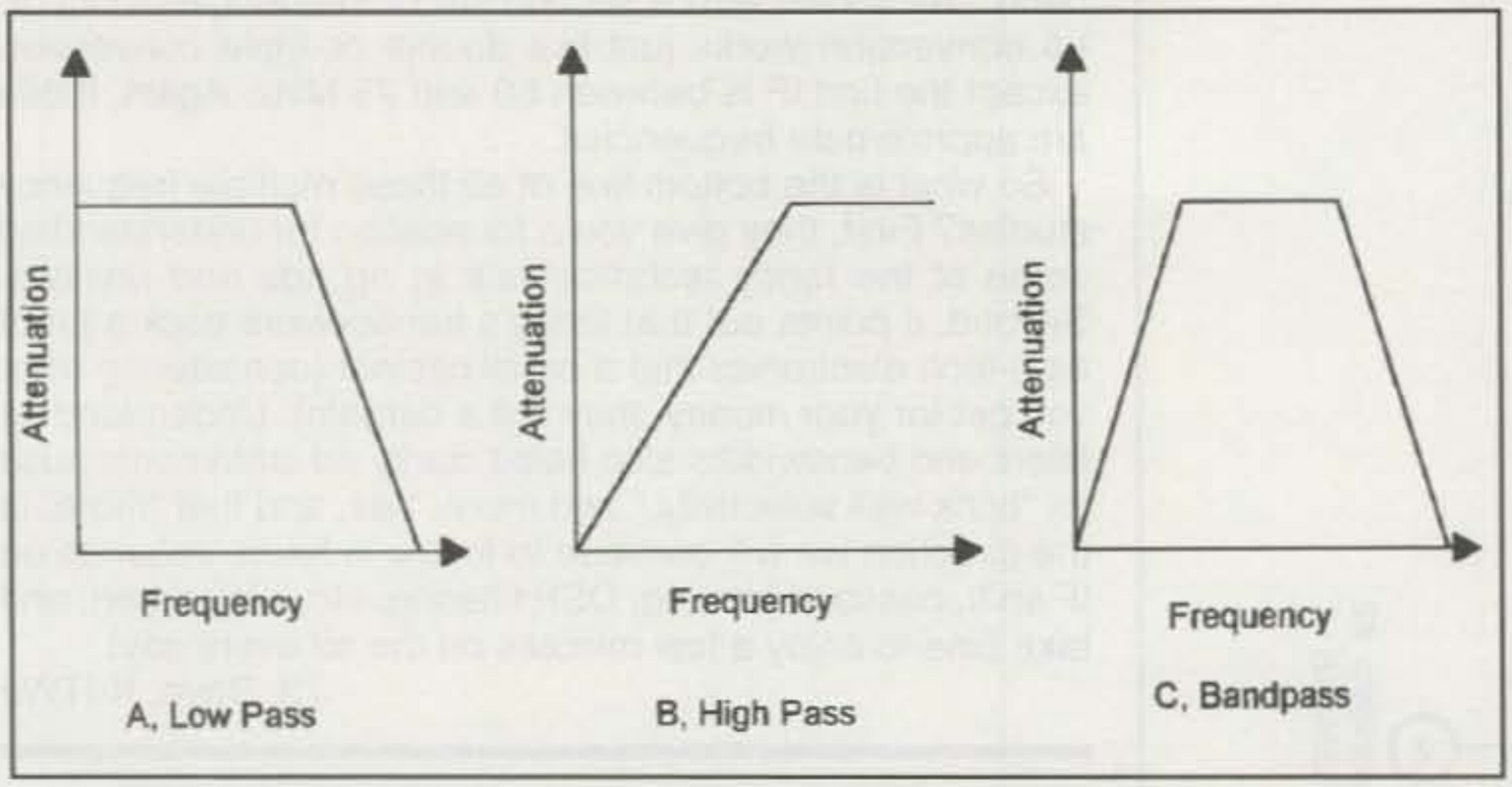


Fig. 1– Response curves of the three basic types of filters.

It is truly amazing how digital techniques are encroaching on all phases of electronic design. This month I would like to introduce you to another technique, that of the digital filter. First, though, a brief review.

As the experimenters in our midst know, the function of any filter is to allow only those frequencies we wish to do so to pass and all others to be rejected. Fig. 1 shows the response curves of the three basic forms of filters. Fig. 1(A) is a low-pass filter. In this configuration all frequencies below a predetermined point are passed and all above it are blocked. Fig. 1(B) is a high-pass filter and the response is the opposite. Here all frequencies above a certain point are passed and all below it are blocked. Fig. 1(C) is the combination of both—the bandpass filter. In this configuration only frequencies between two predetermined points are passed.

Fig. 2 shows the most basic implementation of these filters. In the low-pass filter the reactance of the capacitor decreases as the frequency increases, causing higher loss in the resistor/capacitor divider. In the high-pass filter the same happens, but now since the capacitor is feeding the resistor, the output signal increases. The bandpass filter is simply a combination of both.

If you do the math, you quickly will see that the roll-off, or change in attenuation as a function of frequency, occurs rather slowly. For sharp filtering action you need a sharper roll-off. This can be accomplished in several ways. You can simply stack elements such as shown in fig. 3, or you can use a combination of inductors and capacitors as shown in fig. 4. This is the way it has been done for years, and it is not uncommon to see ten or more stages in the very sharpest filters.

There is a relatively "new kid on the block," however, and that is the digital filter. Fig. 5 shows the typical response you can achieve with this device. This response is equivalent to a ten-stage component-laden design, but as shown in fig. 6, the circuit is not very complex. Before we get into the details, though, let's look at how it works.

As you can see in fig. 7, the input is applied to a "holding" capacitor at a speed that is determined by an input clock that is much higher in frequency than the signal being filtered. This means that the holding capacitor transfers "bits" of signal from the input to the op-amp at the clock rate. As long as the frequency of the input signal is significantly lower than the clock frequency,

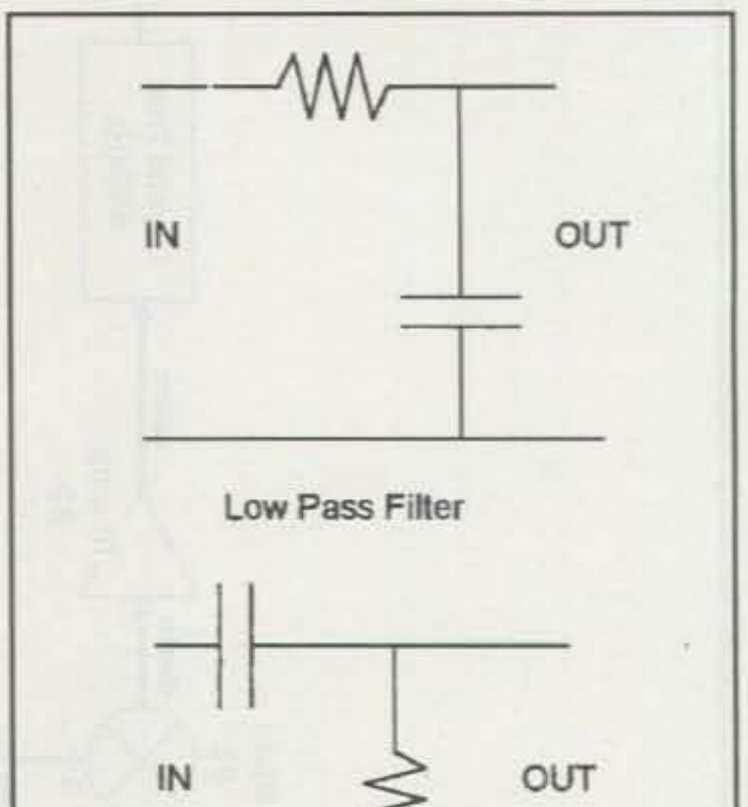


Fig. 2– Simple implementation of the three filter types.

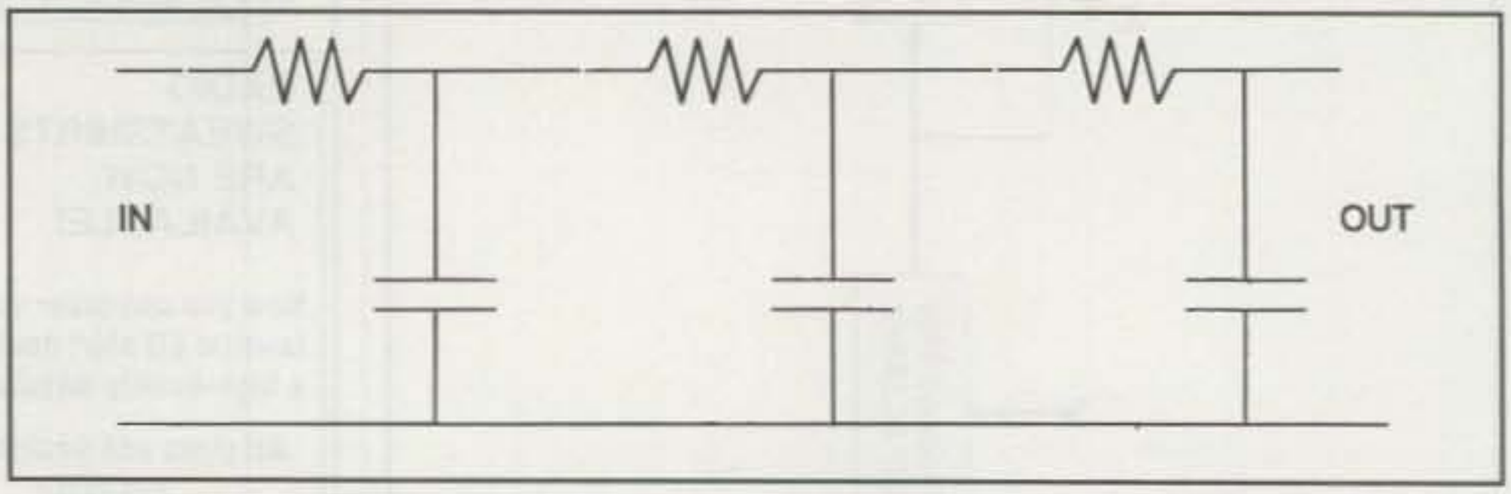


Fig. 3– Cascaded low-pass filter.

c/o CQ magazine

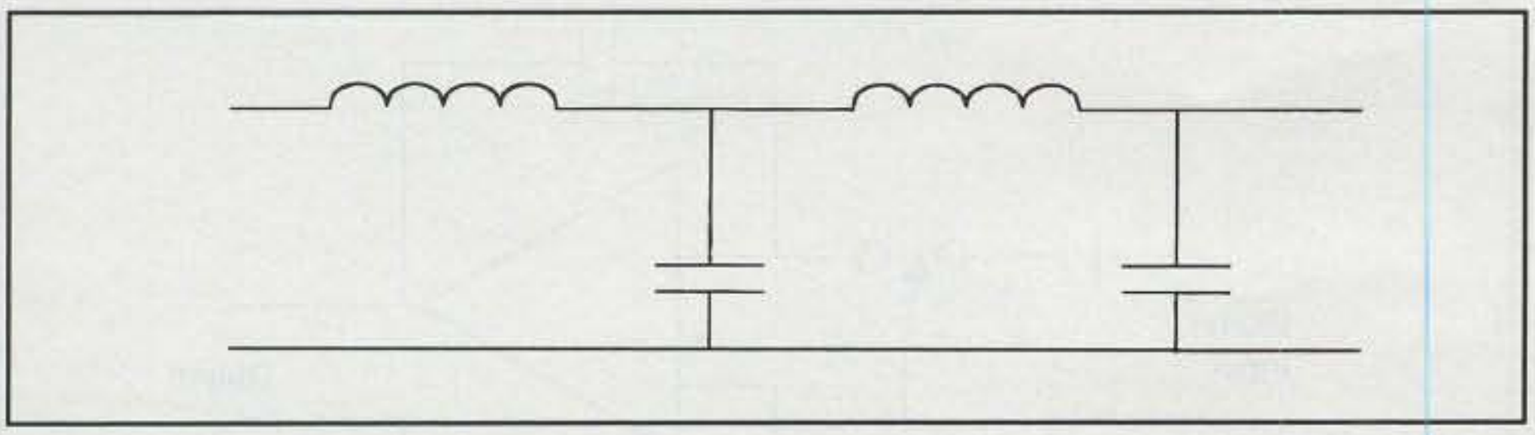


Fig. 4– Simple cascaded L/C type low-pass filter.

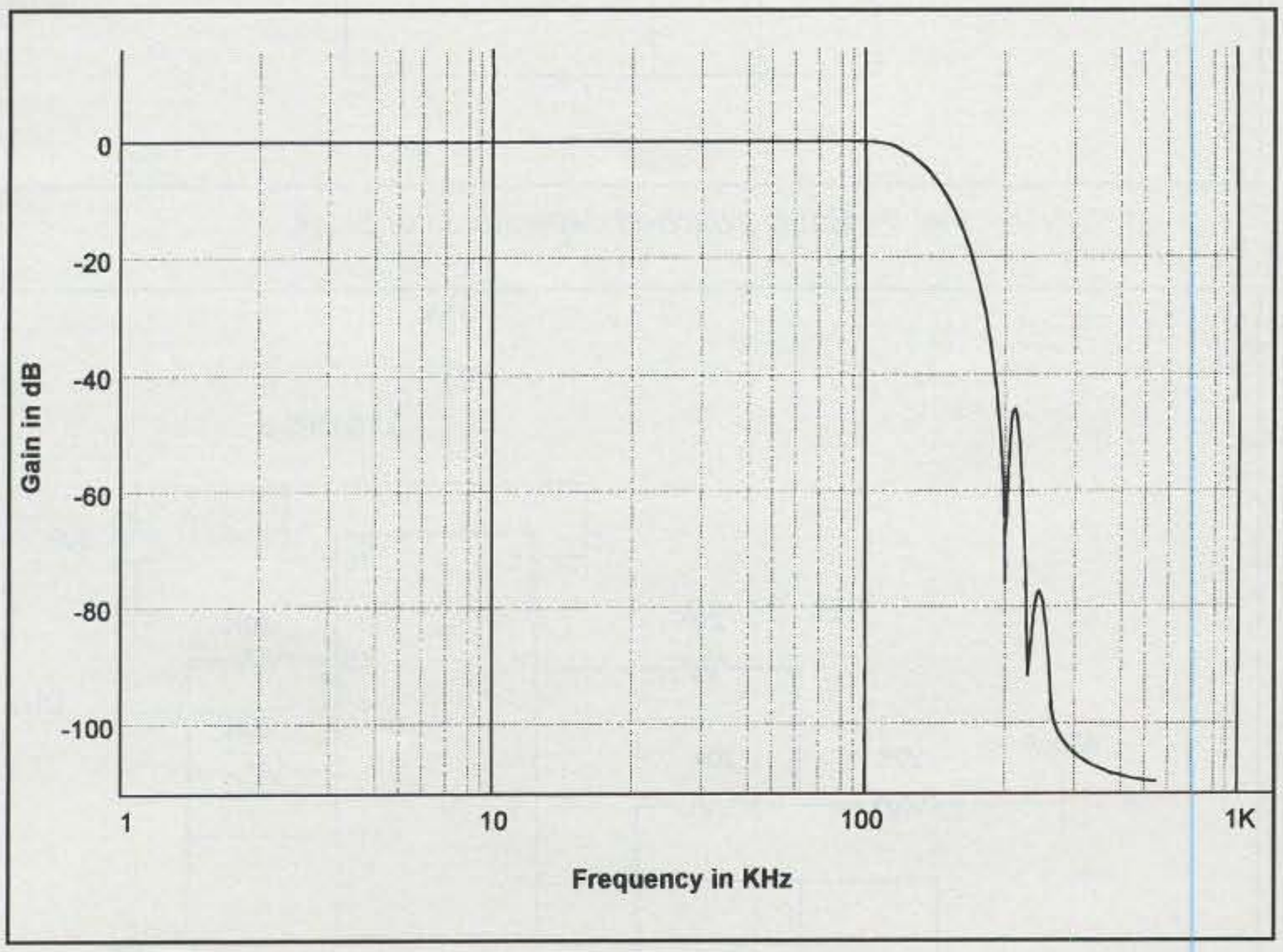


Fig. 5– Typical response of a tenth-order digital filter.

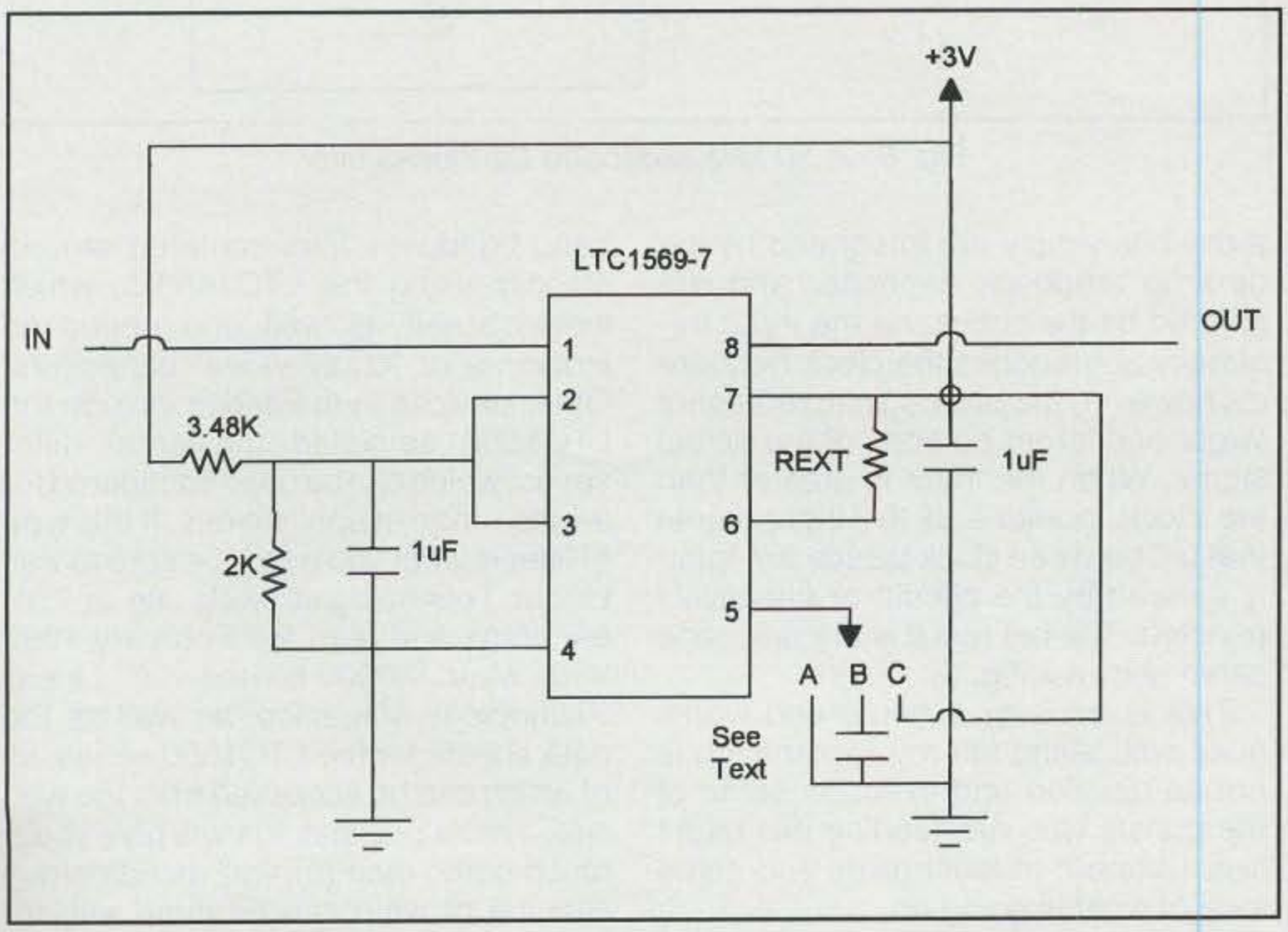


Fig. 6– Schematic diagram of a digital filter.

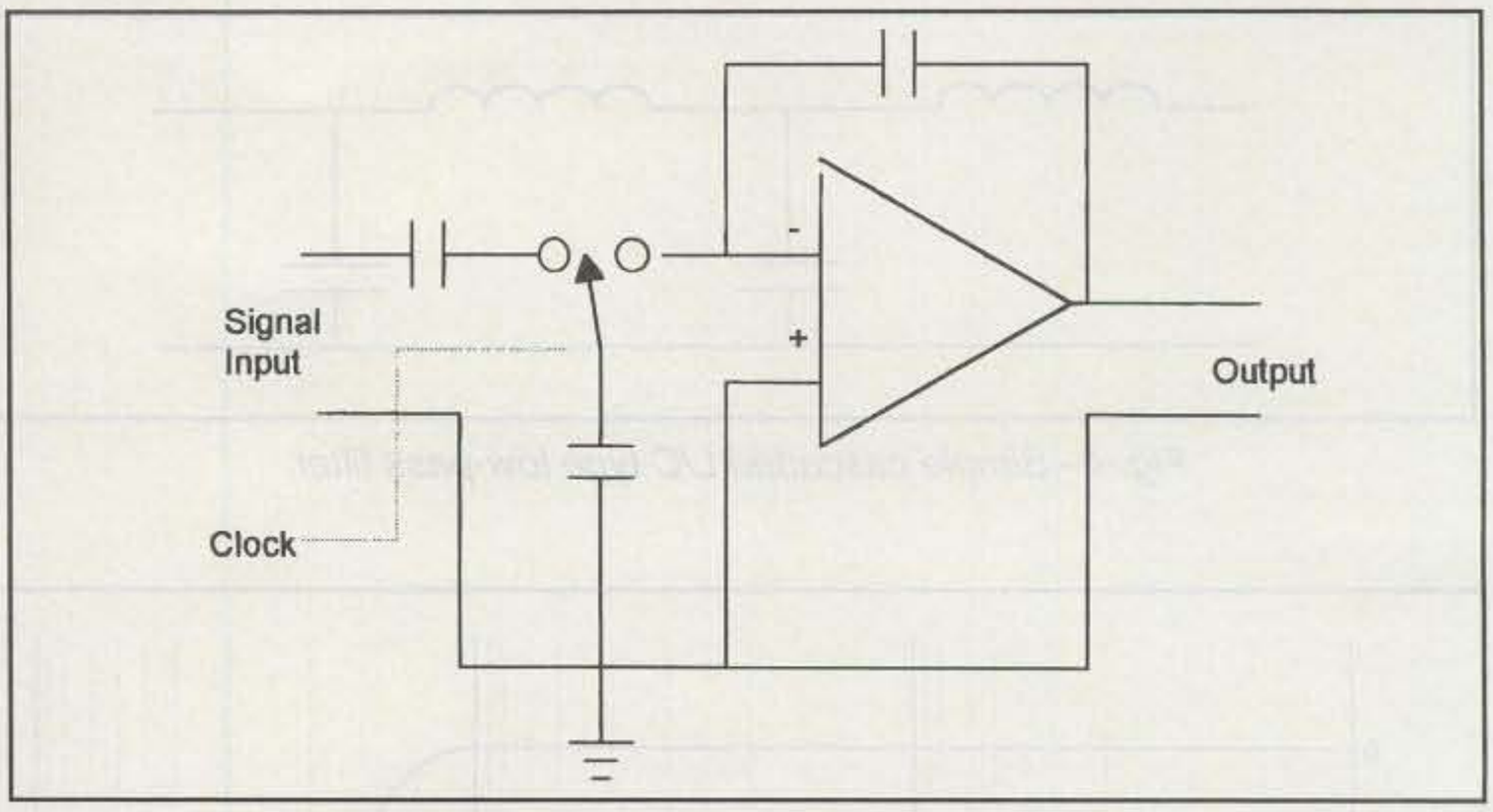


Fig. 7– Basic switched capacitor filter block.

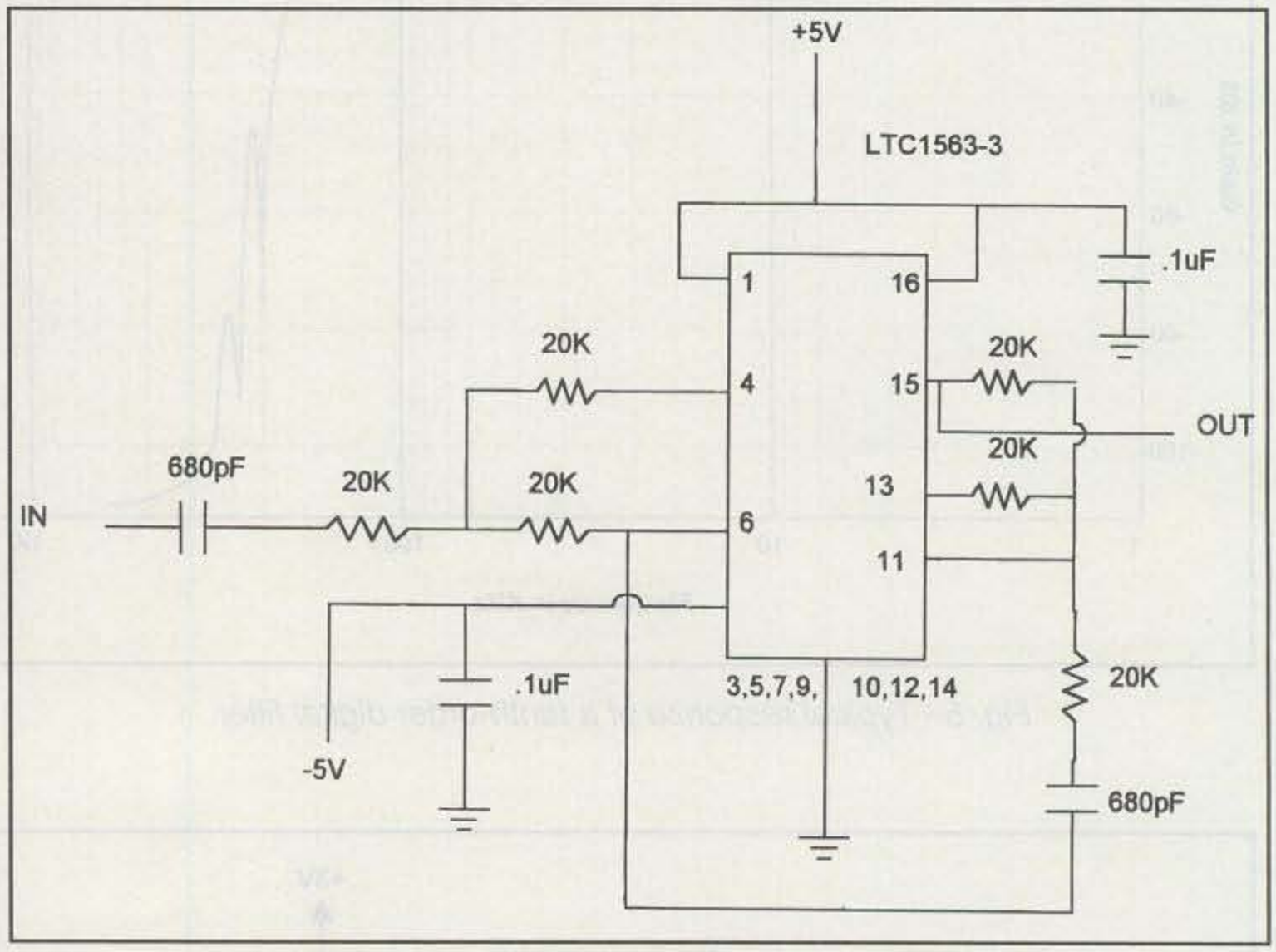


Fig. 8– A 50 kHz wideband bandpass filter.

these bits simply are integrated by the op-amp feedback capacitor and are ignored by the circuit. As the input frequency approaches the clock frequency, however, the bits begin to represent larger and larger portions of the actual signal. When the input is greater than the clock, portions of the input signal that fall between clock pulses are totally ignored by the circuit, or effectively rejected. The net result is the response curve shown in fig. 5.

This is a clever scheme and works quite well. Although my explanation is not as detailed and exact as some of the purists who are reading this might like, I hope it at least gives you some idea of what is going on.

You are not limited to low-pass filters, however. Fig. 8 is a schematic of a wideband bandpass filter centered around 50 kHz using the LTC1563-3, which works about as well and needs no inductors or "crazy value" capacitors. Other devices in the series include the LTC1562 so-called "universal" filter series, which can be user-configured for a wide range of applications. If this type of filter is what you need, be sure to visit Linear Technologies' web site at <linear.com> and read the February 1999 and May 2000 issues of *Linear Technology Magazine,* as well as the data sheets for the LTC1560 series, all of which can be accessed from the web site. These publications will give you a much better idea (as well as numerous circuits) of what can be done with today's modern filter components.

73, Irwin, WA2NDM

What's New

BY KARL T. THURBER, JR., W8FX

A New Column for A New Century

More Fall Goodies

This month in your "What's New" column we'll focus on more fall goodies. We'll examine some radio gear, antennas and antenna accessories, and software and computers. We'll also catch up on some reader mail. Are you ready? Let's begin!

Radio Gear

The ICOM IC-718 All-Band HF Transceiver. Not to be outdone by the competition (especially since the firm's motto is "first in communications"), ICOM recently introduced a compact, all-band HF transceiver, the IC-718. The under-$900 radio is designed to be entry-level, but with a number of most welcome advanced features. Among these features are direct frequency input, a simplified stack band register, voice-activated transmission (VOX), frequency shift keying (FSK), 1 Hz tuning, a large LCD readout, and a front panel uncluttered by a multiplicity of knobs and buttons. Optional digital signal processing (DSP) capability helps sort out real signals from noise.

Whether you use it for two-way communications or just listening, the IC-718 can give you the best of both worlds. Covering .03 to 30 MHz, the radio sports 101 memory channels you can use for scanning or quick recall, and the band stack registers make hopping around the bands a simple, one-button operation. Of course, if you prefer you can go directly to a desired frequency with the numeric keypad.

For more information on the IC-718, contact ICOM America, Inc., 2380 116th Ave. N.E., Bellevue, WA 98004 (425-454-8155; web site: <http://www.icomamerica.com/amateur/hf>). *Note:* If you like, sign up to receive regular e-mail announcements and the latest news from ICOM at its web site.

CTI ComTec Amplifiers. A line of high-quality amplifiers and related products for the amateur radio community is manufactured by CTI ComTec, Inc. The company's ruggedly constructed RF amplifiers are built around the popular and stable 4CX250B tetrodes. Tetrodes were chosen because of their use with a regulated screen grid power supply, which tends to prevent overdriving and resultant splatter without the need for ALC feedback control.

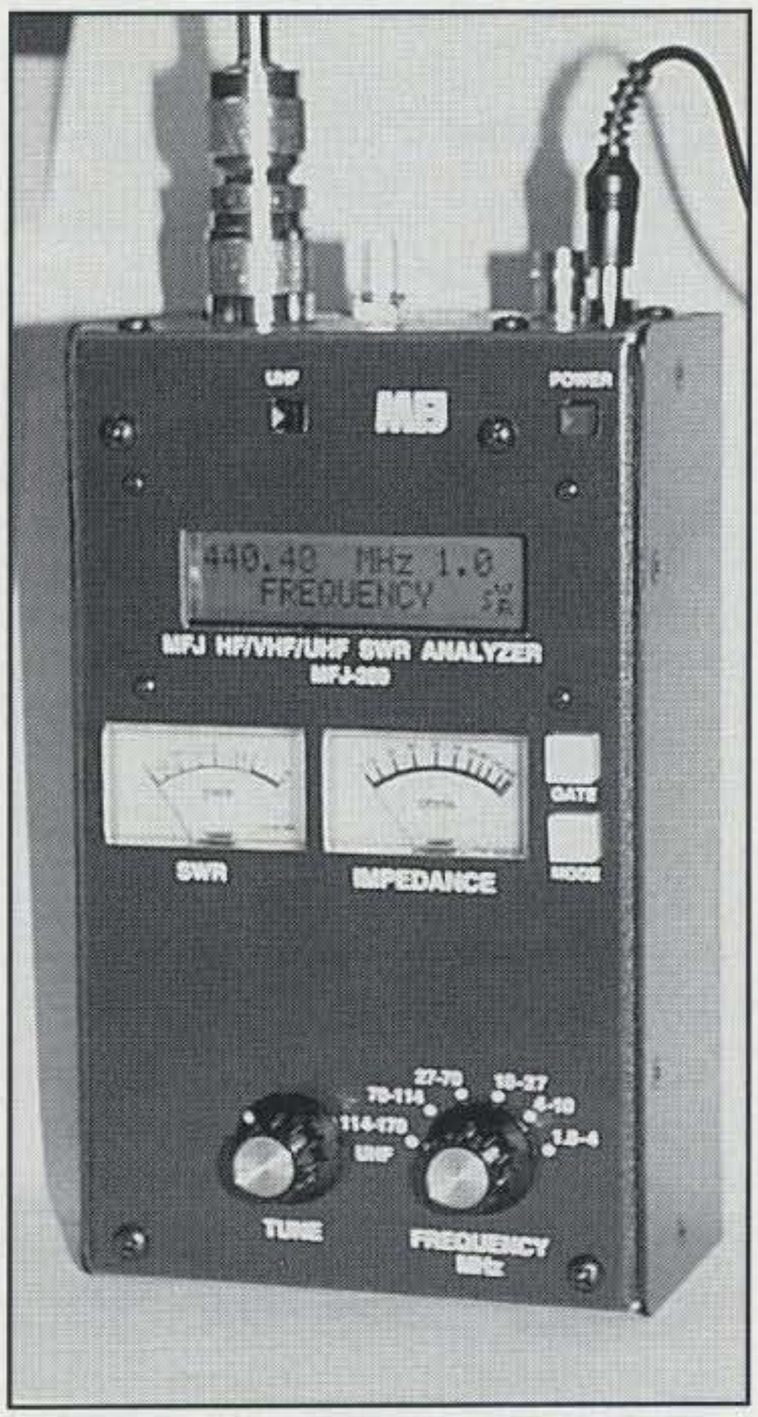
The mainstay of the CTI ComTec product line is the PLA-800 Linear Amplifier, which uses two 4CX250Bs and covers the 160 through 10 meter amateur bands. It's priced at $760 and is rated at 800 watts PEP and 600 watts key-down output. The companion PSL-1000 High Voltage Power Supply is $700 (a combo price is available). The equally rugged ATV-1500 Antenna Tuner ($600) handles 1500 watts continuous power. It features a unique, patent-pending low-loss roller inductor and 6:1 vernier reduction drives for the unit's two tuning capacitors.

Near-term future offerings from CTI ComTec, according to Robert L. Piselli, WA1ZRU, will include both 6 and 2 meter amplifiers. QRP products are on the drawing board.

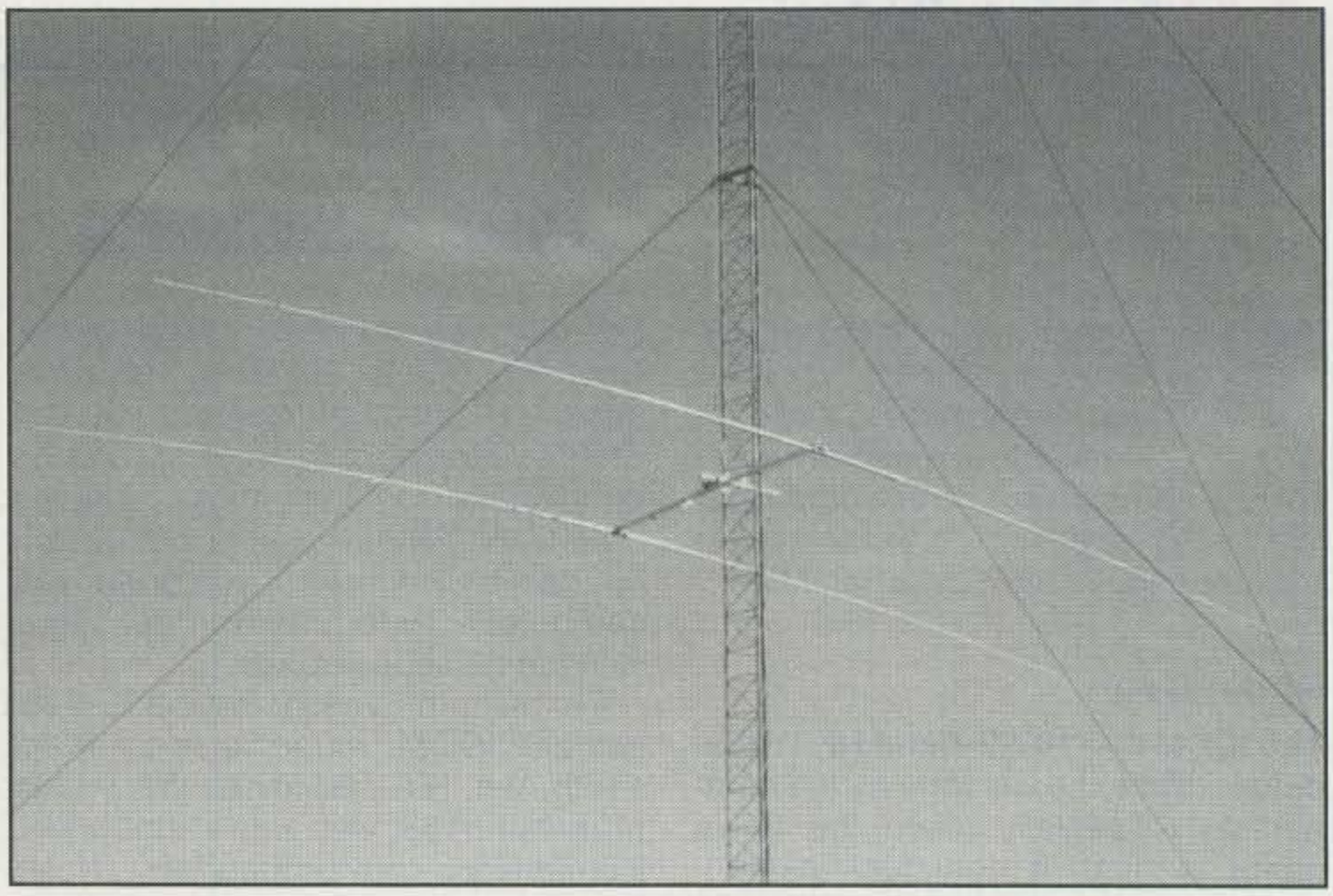
For more information on the new amplifiers and related products, contact CTI ComTec, Inc., 1 Classic Court North, Palm Coast, FL 32137 (904-445-5545; e-mail: <ComTec@aol.com>).

*289 Poplar Drive, Millbrook, AL 35054-1674
e-mail: <w8fx@cq-amateur-radio.com>

ICOM recently introduced a compact, all-band HF transceiver, the IC-718. The under-$900 radio is an entry-level rig, but one with a number of advanced features (see text). (Photo courtesy ICOM America, Inc.)



MFJ's fully portable HF/VHF plus UHF MFJ-269 SWR analyzer covers 1.8–170 MHz and 415–470 MHz and includes all of the features of the popular MFJ-259B. (Photo courtesy MFJ Enterprises, Inc.)



Shown here is the 2D-30 30 meter antenna from CAL-AV Labs. This rugged antenna, which has a 12 ft. boom, includes two full-size driven elements for 30 meters. (Photo courtesy CAL-AV Labs, Inc.)

CQ Website Highlights:

Visit the *CQ* Forums!

If you have questions or want to discuss something that's on your mind, join the Forums on the *CQ* website. You can post questions or comments on a variety of topics and get responses either from *CQ* editors or your fellow readers.

To reach the forums, point your browser to the *CQ* website, <http://www.cq-amateur-radio.com>, click the button on the left that says "The CQ Forums," and then select your forum of interest. Currently we have "Q&A," "Webmaster," "DXing," "Public Service and Emergency," and "Beginner's Corner." You may read current messages, post a reply, or open a new topic within each forum. If there's another forum you'd like to see, talk to us about it. Be careful, though ... we might make *you* the moderator!

The *CQ* Newsletter

To keep up with the latest ham radio news developments, propagation alerts, and special messages from *CQ*, be sure to join the *CQ* Newsletter, our *free* e-mail alert service. This is *not* a once-a-week news service. If something important is happening, we let you know as soon as we've nailed down details. At the same time, there may be weeks that pass without your hearing from us, so we won't be clogging your e-mail in-box. To sign up, just point your browser to the *CQ* website, <http://www.cq-amateur-radio.com>, click the button on the left that says "The *CQ* Newsletter," then follow the sign-up prompts.

Antennas and Accessories

New MFJ-269 SWR Analyzer™. The MFJ success story has long fascinated me, as I remember the company's small ads in the early 1970s when MFJ had but two or three products, such as audio filters and a few other gadgets. Today MFJ is the "accessory king" of amateur radio. (MFJ was formed by Martin F. Jue, K5FLU, in 1972. From a small cottage-shop operation, MFJ has grown to become one of the largest employers in this area of Mississippi.)

As the former *CQ* "Antennas" column editor, I long have been impressed with the number of accessories in MFJ's bag of tricks, especially their SWR analyzers. For some time this product line has been topped by the best-selling MFJ-259B SWR Analyzer. Now MFJ has a new entry that promises to be top of the line, the fully portable HF/VHF plus UHF MFJ-269 SWR Analyzer.

The MFJ-269 covers 1.8 to 170 MHz and 415 to 470 MHz, and it includes all of the features of the MFJ-259B. The many 1.8 to 170 MHz features essentially give you a complete picture of your antenna. With it, you can read antenna SWR, complex impedance, parallel equivalent resistance and reactance, resonant frequency, velocity factor, coax loss, return loss, reflection coefficient, capacitance, inductance, and considerably more. The UHF range features are only somewhat less comprehensive, but you can read SWR, return loss, reflection coefficient, and much more.

The new unit sports a large, easy-to-read, two-line LCD display and side-by-side meters. There's a built-in Ni-Cd/Ni-MH charger circuit, battery saver, low battery warning indicator, and smooth reduction drive tuning. One particularly nice feature of the MFJ-269 is a built-in CoaxCalculator™ that calculates coax line length in feet given coax length in electrical degrees, or vice versa. The MFJ-269 is $359.95, and various accessory packs are available.

For more info, contact MFJ Enterprises, P.O. Box 494, Mississippi State, MS 39762 (1-800-647-1800; e-mail: <techinfo@mfjenterprises.com>; web: <http://www.mfjenterprises.com>).

Note: The MFJ web site has a host of information for prospective purchasers. Most equipment manuals are available for free download, and you can check out the new "reviews page," where equipment users post their own impressions of their purchases. Be sure to check it out!

New 30 Meter Antennas from CAL-AV Labs. In the December 1998 "Digital Dipole" column, we described a couple of then-new interesting and useful products from Ken Hirschberg, K6HPX's CAL-AV Labs (formerly California Avionics Laboratories). These were the Mark V Mobile Spring and the EB-1 Balun. The first product we profiled was for HF mobileers, who know well that their vertical antenna's spring often is the "weak link." The second product was the EB-1 External Bead Balun,

which was designed especially to allow the user to easily connect a balanced load to an unbalanced transmission line, such as coaxial cable.

Today Ken offers several antennas and Morse keys, in addition to the products we previously covered. Of special note is the 2D-30 30 meter antenna. This rugged, new antenna, which has a 12 ft. boom, includes two full-size driven elements for 30 meters for excellent bandwidth, and a front-to-rear ratio that reportedly is an S-unit better than more common two-element parasitic arrays. Heavy-duty construction is featured in the 2D-30, as is an innovative, integral balun-hairpin feed; the overall power rating is 3 KW. Forward claimed gain is 4.5 dBi, with a front-to-rear ratio of 20 dB minimum. No-ice wind survival is rated at 100 MPH. The antenna is $895, UPS shippable.

Ken also offers the DIP-30A 30 meter full-size rotary dipole. This dipole is easily mounted within a stack, parallel to other booms, to add 30 meter capability with minimum interaction. The antenna's heavy-duty construction features multiple sections of 6061-T1 aluminum tubing and rugged mounting hardware. The DIP30A has balun feed and is rated at 3 KW. Price is $295.95. It's also UPS shippable.

For details, contact CAL-AV Labs, Inc., 1802 W. Grant Road, Suite 116, Tucson, AZ 85745 (520-624-1300; e-mail: <info@cal-av.com>; web: <http://www.cal-av.com>). The antennas are available direct or through Ham Radio Outlet (HRO).

Amateur Antennas from Everhardt. We normally don't feature CB antennas or radio gear in this column. Nevertheless, in December 1996 we noted some of Everhardt's rugged 27 MHz mobile antennas. As we mentioned then, some of these appeared to be candidates for adapting to 10 meters—not a bad idea as the sunspot cycle inched upward. Also, we noted that Everhardt offered a wide variety of mobile antenna mounts and accessories intended for use on cars, RVs, boats, vans, and especially fiberglass vehicles. Magnet, trunk, roof, mirror, gutter, threeway, side, and window mounts are available, as are several stainless steel and fiberglass whips.

Recently, Everhardt introduced several attractive mobile antennas covering 148–174 MHz, for both amateur and commercial applications. Four distinct designs are offered (the MM-1041, RD-1045, MM2M, and C-148), with a variety of mount styles and power-handling capabilities among them. Each of the

The catchy ad slogan "plan it, map it, and go!" characterizes DeLorme Map'n'Go 6.0, a complete vacation and travel planner. The program provides city-to-city routing, and it lets you print out itineraries, descriptions, and ratings of accommodations. A portion of a sample printed travel plan is shown here.

four mobile antennas includes a cutting chart and a 17 ft. length of RG-58 coax with attached PL-259 connector.

For a flyer, contact Marvel Communications, 6000-D Old Hemphill Road, Ft. Worth, TX 76134 (1-800-735-0176).

Software and Computers

AAA Map'n'Go 6.0 from DeLorme. Over the past several years we have profiled many of the high-quality mapping and navigation software packages from DeLorme. These have included Street Atlas USA®, the first consumer mapping software; AAA Map'n'Go®; EARTHA™ Global Explorer®; Topo USA™; 3-D Topo Quads™; Phone Search USA®; and others. Delorme also publishes the popular "Atlas & Gazetteer®" recreational atlases, paper editions of which are available for all 50 states.

In November 1999 we profiled AAA Map'n'Go 5.0, a very comprehensive family-oriented travel planning software package bearing the American Automobile Association's logo and including a massive amount of proprietary online AAA TourBook® data.

Now DeLorme has come up with AAA Map'n'Go 6.0, which boasts a host of new features. We won't rehash our previous review other than to note that the program is indeed a complete vacation and travel planner. We will, however, mention that the latest edition includes some 1 million miles of "routable roads" in the United States, Canada, and Mexico; over 240 detailed urban area maps; the built-in 2000 AAA TourBook information, with access to over 66,000 facilities rated by the American Automobile Association; and provisions for associating your travel and vacation photos or photo slide shows with customized maps, which you can share with friends.

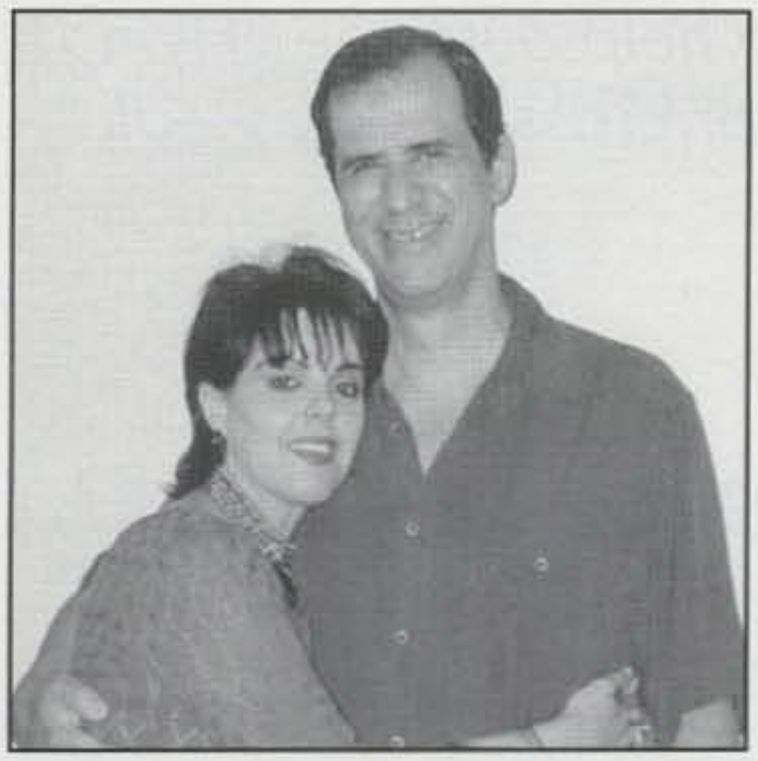
The program provides city-to-city routing, and it lets you produce itineraries, descriptions, and ratings of accommodations along your route. AAA Map'n'Go 6.0 also is compatible with Global Positioning System (GPS) receivers and handheld computers. Furthermore, the program's built-in Time/Travel Planner has been updated to allow fuel estimation in addition to estimated arrival times, based on how many hours or miles per day you plan to drive. This feature essentially eliminates the guesswork in determining where you'll need to insert stops along the way. The new version has an estimated $29 street price.

For more info, contact DeLorme, Two DeLorme Drive, P.O. Box 298, Yarmouth, ME 04096 (1-800-452-5921; e-mail: <info@delorme.com>; web: <http://www.delorme.com>).

Oh, yes: Just in case you're a fly-fisherman or golfer, we shouldn't close without noting that DeLorme recently introduced two other products. One is Topo USA Fly-Fishing Edition; the other is Golf Digest Places to Play Travel Planner. Some of you outdoorsmen and duffers might be interested!

Final Edition of the Brazilian Amateur Radio CD-ROM. In February 1999 we noted the ambitious pilot edition of the Portuguese language Projeto Radioamador 2000 CD-ROM, offered by Ronaldo "Rony" Reis, PS7AB. Rony told us that the CDROM is designed to document the history of hams and amateur radio in Brazil. The pilot edition was mostly in Portuguese, although a few items on the disc were in English. By the time you read this, the final edition should be available, with many more articles translated into English.

According to Rony, the noncommercial project is under continuous development by Brazilian radio amateurs



Shown are Ronaldo "Rony" Reis, PS7AB, and his XYL, Maria Luisa. Rony is the author of the Portuguese language Projeto Radioamador 2000 CD-ROM, which is designed to document the history of hams and amateur radio in Brazil.

such as himself. Information is continually being added to the CD-ROM to ultimately amass a great deal of material about hams and the hobby in Brazil.

For more information on final edition availability and pricing, contact Ronaldo Reis, PS7AB, P.O. Box 2021, Natal/RN Brasil 59094-070 (e-mail: <ps7ab@yahoo.com>; web: <http://pessoais.digi.com.br/~ps7ab>).

Log Windows Update. Recently, we noted that Rick Ruhl's firm, Creative Services Software (CSS), had assembled the popular TNC, WeFax, and Log Windows logging programs into a single package, the Digital Trio, designed for the support of AEA/Timewave TNCs. As we pointed out, the new $129.95 package included the current versions of the CSS software on CD-ROM.

Now Rich advises that the popular logging program component of the Digital Trio, Log Windows, has been updated to version 3.07. This update is quite significant in that it represents the first major functional upgrade for the product in almost two years. Impressive new features include Telnet DX Cluster access, support for several new radios, new logging mode options, IOTA support, WinQSL QSL Manager support, WSLMaker 2.3 QSL Printing Program support, and much more. The new product retails for $69.95, and the updated version will appear on the Digital Trio CD we previously noted.

Incidentally, CSS advises that it will donate a copy of Log Windows to any school club that wants a copy. The same offer applies to PKTerm99 and PacTerm 98. Finally, MultiComm Host for Packet for MFJ TNCs now is available; however, MultiComm Host sales are made through MFJ Enterprises.

Contact Creative Services Software, Inc., 503 West State Street, Suite 4, Muscle Shoals, AL 35661 (256-381-6100; e-mail: <sales@cssincorp.com>; web: <http://www.cssincorp.com>).

We Get Letters

Once again we're just about out of space in this month's "What's New" column. Before wrapping up things this time around, however, we would like to acknowledge some of the good folks who corresponded with us.

A tip of the W8FX hat goes to Travis McKee, N5MQY (with a long and interesting handwritten letter); Frank Rohl, VE7TR; Phillip Walker, KØVX; Mike Greenway, K4PI; Joe Bushel, W2DWR; D. Brent Walton, KF6FGB; Ken Hirschberg, K6HPX; Marshal Emm, N1FN; and Ronaldo "Rony" Reis, PS7AB.

So, gang, keep the cards, letters, and e-mails coming, and let us know what "new stuff" you'd like to see in your "What's New" column. We'll try our best to accommodate your wishes.

Wrap-Up

That's all for this time, gang. Next time, more "What's New." See you then.

Overheard: In 45 years of hamming, I've learned that on the air or off there is little you really can control except your attitude—and that's what counts.

73, Karl, W8FX

Need to test some cables, but can't get anyone to help out? The "Flying Solo" tester may be used to check opens, shorts, or crossed wires—all by yourself!

The "Flying Solo" Cable Tester

BY GARY PALAMARA,* KB2YTN

How many times have you done this or something like it? You pull all of the coax cables off the antenna switchbox at the tower, knowing you'll remember what went to where. The project continues, and before you know it, night sets in. One thing leads to another, and then two weeks later, when you finally get back to working on the project, it's all just black wires with connectors on them! Sound familiar?

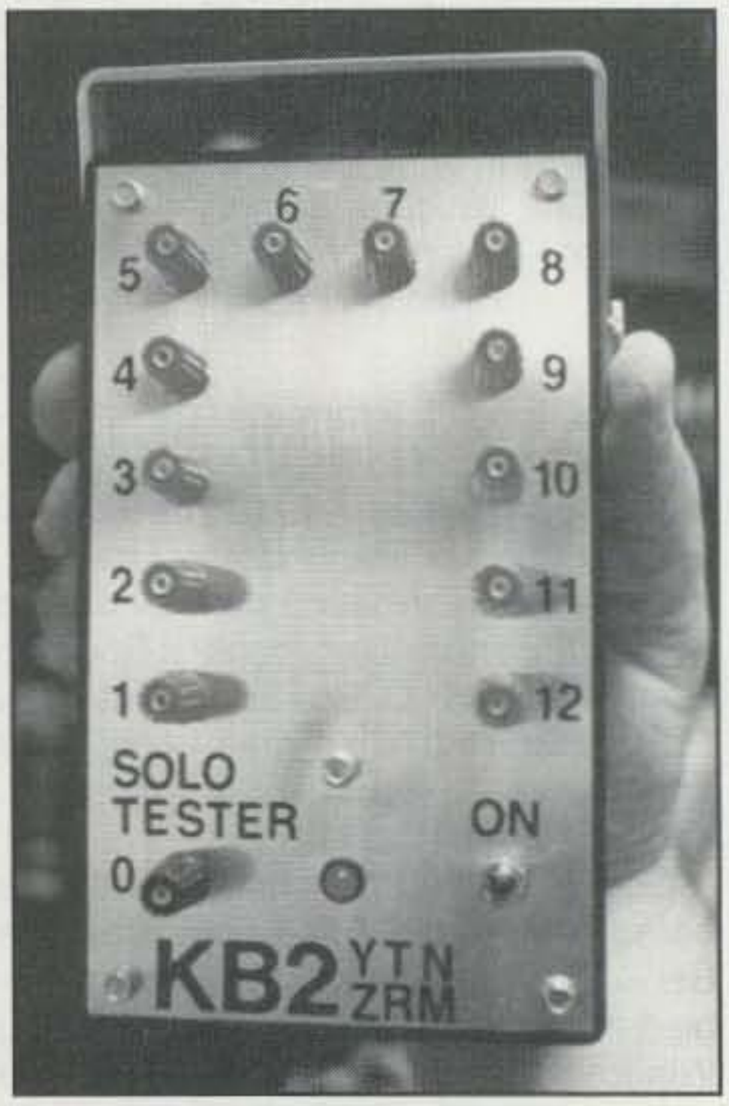
Every now and then around the shack the need arises for testing continuity of control or other multi-conductor communications cables over long distances. For the purpose of this project I will define "long distance" as any cable where you can't reach both ends with both hands. I was thinking in terms of rotor control cable or multi-conductor cable for a coax switch. Even cabling for the shack computer and TNC might need to be checked. With every passing year we're finding more of that type of wiring in our shacks. Runs of coax cable need to be checked for continuity, and sometimes we just have to identify and sort one wire run from another.

Maybe you're the type of person who insists on going it alone for the testing of long wires. You'll probably find yourself climbing up and down the tower at least a few times. The traditional way of performing a continuity check on a long cable run is to enlist the aid of a ham buddy. Maybe the XYL, or even one of the harmonics may be pressed into service to assist. With an HT in hand and some back and forth discussion (and perhaps a few frayed nerves), the task gets done. In truth, there might still be times when this method of testing is preferable. After all, no machine can take the place of chatting with a friend about the latest propagation conditions. And no tester is going to help a youngster get interested in the hobby, while at the same time building a sense of fellowship. Sometimes, though, you really do need to check something when nobody is around or willing to help, or if you're like me, at times you just want to do it yourself!

With that in mind, I've come up with a small tester that will allow you to identify wires over long distances and test for continuity all by yourself! Simply connect the tester to one end of a wire and then go to the far end and check the lines for continuity. You can even check multiple lines at the same time!

I don't know if this is a great idea, but like most ideas it was born out of necessity. Also like most ideas you struggle with for a long time, the solution ended up being very simple. I thought I'd share it with you.

*28 Norse Drive, Howell, NJ 07731
e-mail: <kb2ytn@arrl.net>



The "Flying Solo" tester allows you to identify wires over long distances and test continuity all by yourself!

Basic Theory

Before we look at the completed circuit of my tester, let's discuss the basic theory behind the circuitry. It's more important that you understand how the tester works and adapt the idea to fit your own situation than to build an exact replica of my circuit. For many of you reading this article, I'm sure this explanation may be rather simplistic. No matter. The neat part about the tester theory is how it is applied to an everyday situation.

Fig. 1 shows a very simple circuit. Basically, we have a DC voltage source of exactly 3 volts. Placed in series across the 3 volt source are three equal-value resistors. In my circuit I used a resistor value of 2.2 K ohms, but the idea is the same for any resistor value. The important thing is that the resistors be of the *same* value. As we know from basic theory, three equal-value resistors in series across a 3 volt source means that each resistor develops 1 volt across it. The exact voltage drop is controlled by the match of each resistor to the others in the string. You could use precision resistors at a greater cost. I just used 10% resistors that were checked with a digital multi-meter, until I found several that were close to each other in value.

Now let's extend our idea a little further. In fig. 2 we've taken our circuit and attached "long" cables to the junction of each resistor. Let's imagine that our cables run from the shack to the tower. By attaching the cables to the junction of the resistors, we will of course be able to measure at the far end of the wires, the same voltages that we measured at the source end. This idea is the basis

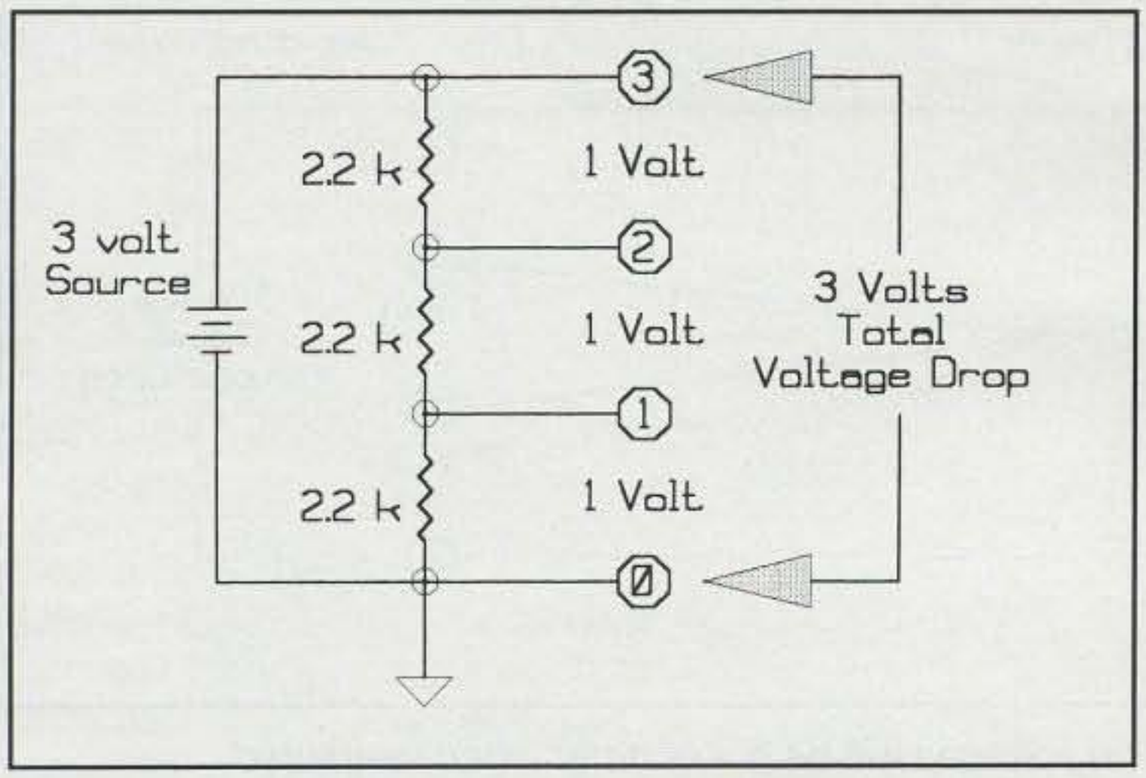


Fig. 1– A very simple tester circuit.

of our wire tester. There's nothing really earth-shaking here; as I said, this is a simple concept.

Let's say that we need to test several wires that run from the shack to the tower. We need to identify which wire is number 1, which wire is number 2, etc. If we connect each of our long test wires to a different point on the resistor string, if all is well we clearly can go to the far end of the wires and differentiate one wire from the other. If everything is normal, then we can measure the same voltages at both ends.

Fig. 3 shows what happens if two wires are crossed. As you might expect, the voltages on the tower end will be out of order when we measure them. Rather than the voltages continuing to rise as we go from wire to wire, the voltage will jump up and down as we measure it.

If as in fig. 4 two wires are shorted together, several interesting things happen. The voltages on both shorted wires at the far end will be at the same potential. Also, the voltage of the remaining wires will no longer be 1 volt. The reason for this is simple: Even with long runs of wires, the short circuit at the far end of the line looks to the tester like zero ohms. It effectively removes one of the 2.2 K resistors from the line. With 3 volts now being divided by only two resistors instead of three, the voltage drop across each resistor will be around 1.5 volts, not 1 volt as before.

We could go on and on with examples of wiring mishaps, but remember the following: The only way that all of the voltages can emerge at the far end of our cable reading exactly the same as at the source end is if all of the wires are in good condition and hooked up correctly. With a little practice you can quickly spot most faults using the tester.

To give me the ability to test several wires at one time I needed to expand the basic circuit of fig. 1 a little. Since my rotor control box uses eight wires, I designed the circuit to test up to 13 lines at once (0 plus 1 to 12). Fig. 5 shows my completed tester circuit.

In fig. 5, two 9 volt batteries in series provide the source voltage. The approximately 18 volt source is regulated down to a constant 12 volts by a three-pin positive DC voltage regulator. Any 12 volt regulator will do the job, but my exact regulator is a TO-220 style. It was in my parts drawer and happens to be capable of 1 amp of current. Since current is not important here, you can use any regulator you can find (more on that later). A 1.5 K ohm resistor and a red LED are placed across the output of the regulator. S-1 turns on the power to the tester.

Twelve "equal" value 2.2 K ohm 1/2 watt resistors are used to divide the source voltage. You can also build the wire tester without a regulated DC supply. If you choose to do that, however, the voltage drop across each resistor will vary depending on how weak your batteries are at the time of testing. With two fresh 9 volt batteries the series voltage will approach 19 volts. If you divide 19 volts by 12 resistors, you end up with 1.583333333 volts per resistor. That voltage changes as the battery voltage changes.

I like knowing that wire number 1 is "exactly" 1 volt and wire number 2 is 2 volts and so on down the line, so I chose to use the regulator to lock in a constant 12 volt source. Having an 18 volt source regulated down to 12 volts means your batteries can get pretty weak before you will ever see a voltage change across your resistors.

You can make this circuit using any value resistors. Remember, since the resistor string is across the source voltage, current is being drawn whenever S-1 is closed. If you change this circuit to suit your own needs, do not use low ohm resistors for the resistor string, if you want the batteries to last more than a minute or two. In my circuit, with twelve 2.2 K ohm resistors in series you have a resistive load of 26.4 K ohms across the 12 volt regulator output. From Ohm's law we know that I = E/R. 12 volts divided by 26.4k ohms of resistance gives us a current drain of .00046 amps. This means

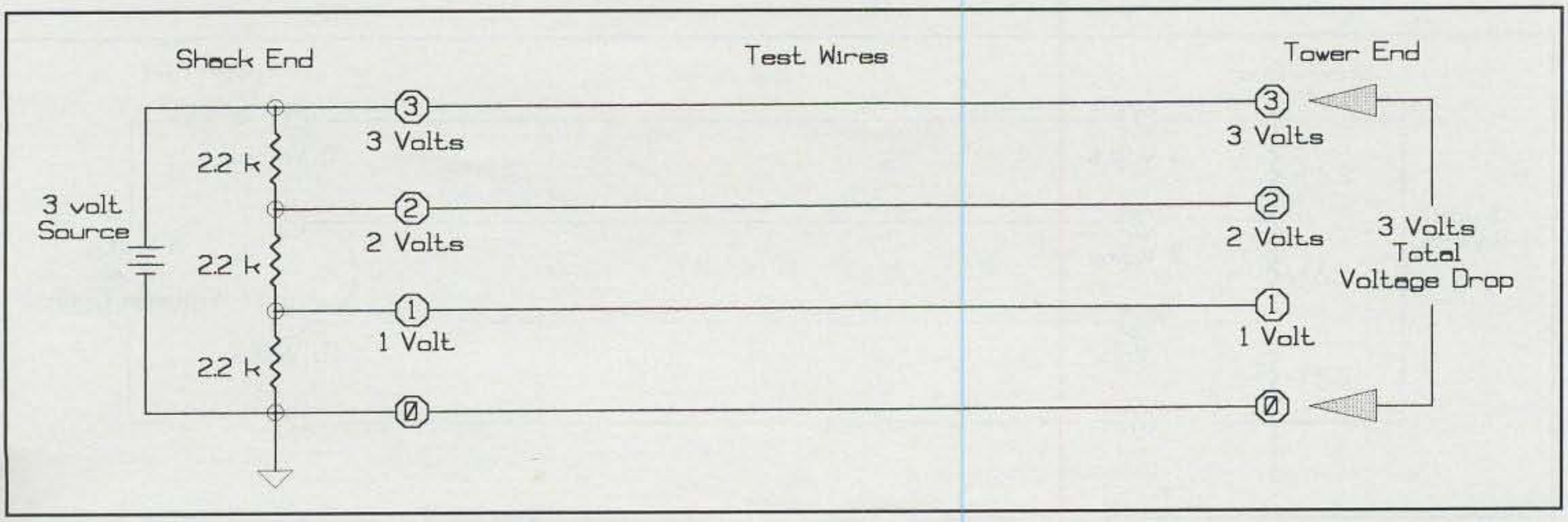


Fig. 2– The circuit with "long" cables attached to the junction of each resistor. All four wires are normal. The tower end mirrors the source end in the shack.

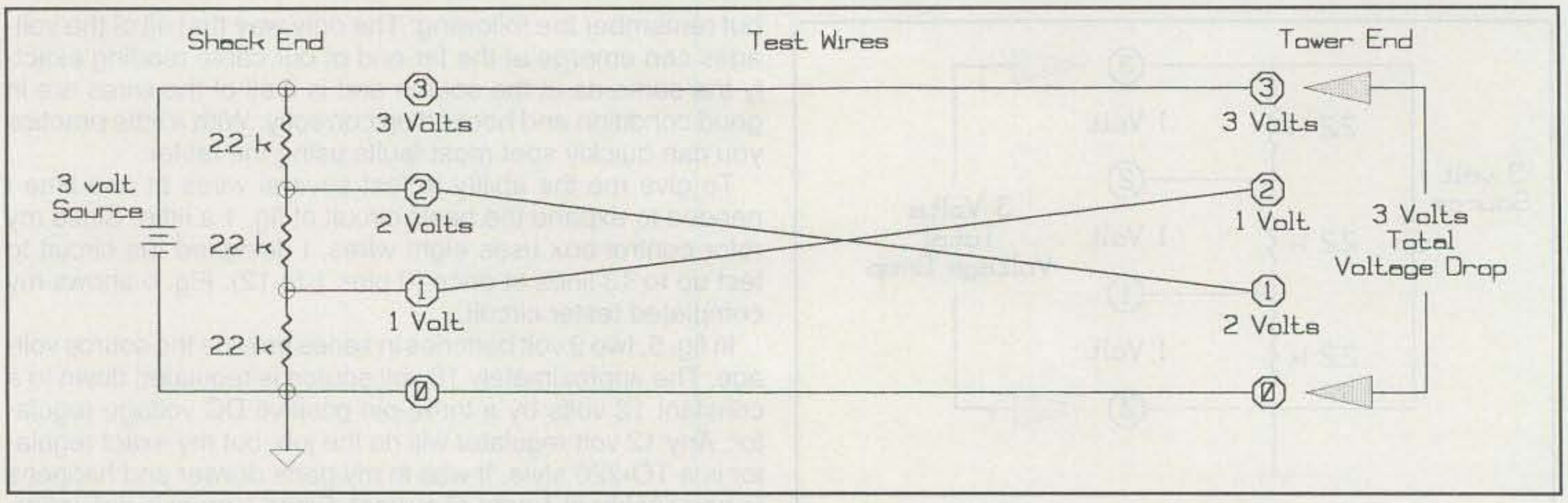


Fig. 3– What happens if two wires are crossed. The voltages will be out of order when measured.

that the only real drain on the two 9 volt batteries comes from the red LED and any internal resistance of the regulator.

Construction

The construction of the wire tester is pretty straightforward. All of the parts are commonly available at most electronic supply stores. Any size enclosure capable of fitting all of the parts will do the job. The box, as well as the resistors I used, came from local hamfests. My box also has a neat little handle on it, which makes the tester perfect for traveling or attaching to a tower leg.

The 12 resistors were suspended between 13 mini-binding posts. One black binding post denotes the common, or zero voltage, point. The spacing between each binding post is not critical, but 3/4 inch seems to be a standard.

Since the tester only gets intermittent use, the batteries should last for quite a while. If you plan to use the tester infrequently, you may even want to remove the batteries until you need to test something. I used double-sided foam tape to secure the two 9 volt batteries to the inside of the plastic cabinet.

The 12 volt, 1 amp, TO-220-style regulator I used was one I had in my parts drawer. It can be ordered from Mouser Electronics (Part No. 511-L7812ACV). You can use a regulator of any current rating or style. I like the TO-220, 3-pin regulators because of the metal tab, which acts like a heat sink. Even though no significant current flows in the tester, with the metal tab secured to the metal front panel of the enclosure, in all likelihood the regulator won't blow up if wires get crossed while testing. Besides, the metal tab provides a convenient mounting position for the regulator. Make sure to use a dab of thermal grease to ensure the proper heat transfer. Also try to be extra careful when soldering the regulator pins and the leads to the LED indicator. Too much heat can ruin these devices. A good technique for heat sinking these parts is to attach a clip lead between the device and the side you'll be heating with a soldering iron.

In practice, the tester can be used to check for opens, shorts, or crossed wires. There is one caution about using the tester, however: With 12 volts of energy from one end of our resistor chain to the other, care should be taken when connecting the tester. The tester is made for testing wires, not circuitry. If you hook up the tester to wires at one end of a cable while the other end is connected to, let's say, a rotor control box, irreparable damage could occur to sensitive meters or electronics.

Let's say you suspect that your eight-wire rotor control cable might have an intermittent connection. With the tester, you can hook up all eight wires in the shack and then climb the tower to check out the results at the other end. As mentioned above, you might want to have a friend turn on S-1 after you climb the tower and disconnect the wires from the rotor box. Some rotors have a plug on the tower end of the cable. The plugs are usually numbered pin 1, 2, 3, and so forth. If you attach the tester to the control box end of the line, you should be able to go to the rotor end and watch as each voltage you measure with your DMM increases by exactly 1 volt as you

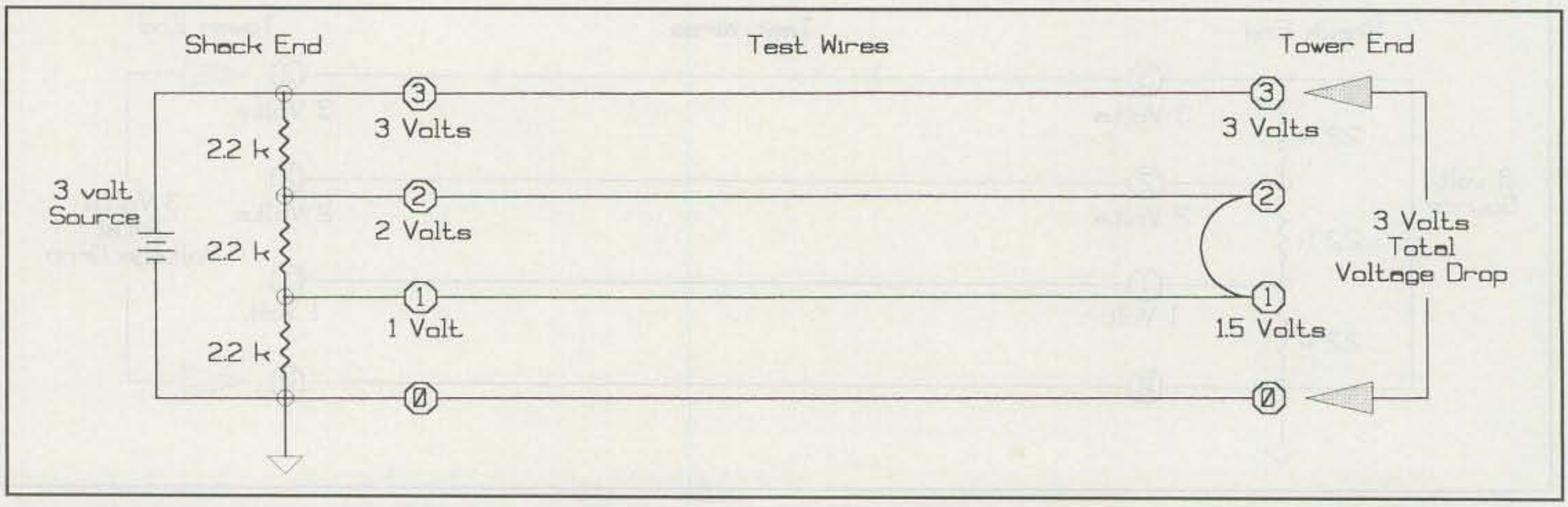


Fig. 4– With two wires shorted together, wires 1 and 2 read the same voltage. The shorted wires effectively remove one of the resistors from the string. Now 3 volts is divided by two equal resistors. Each resistor drops 1.5 volts.

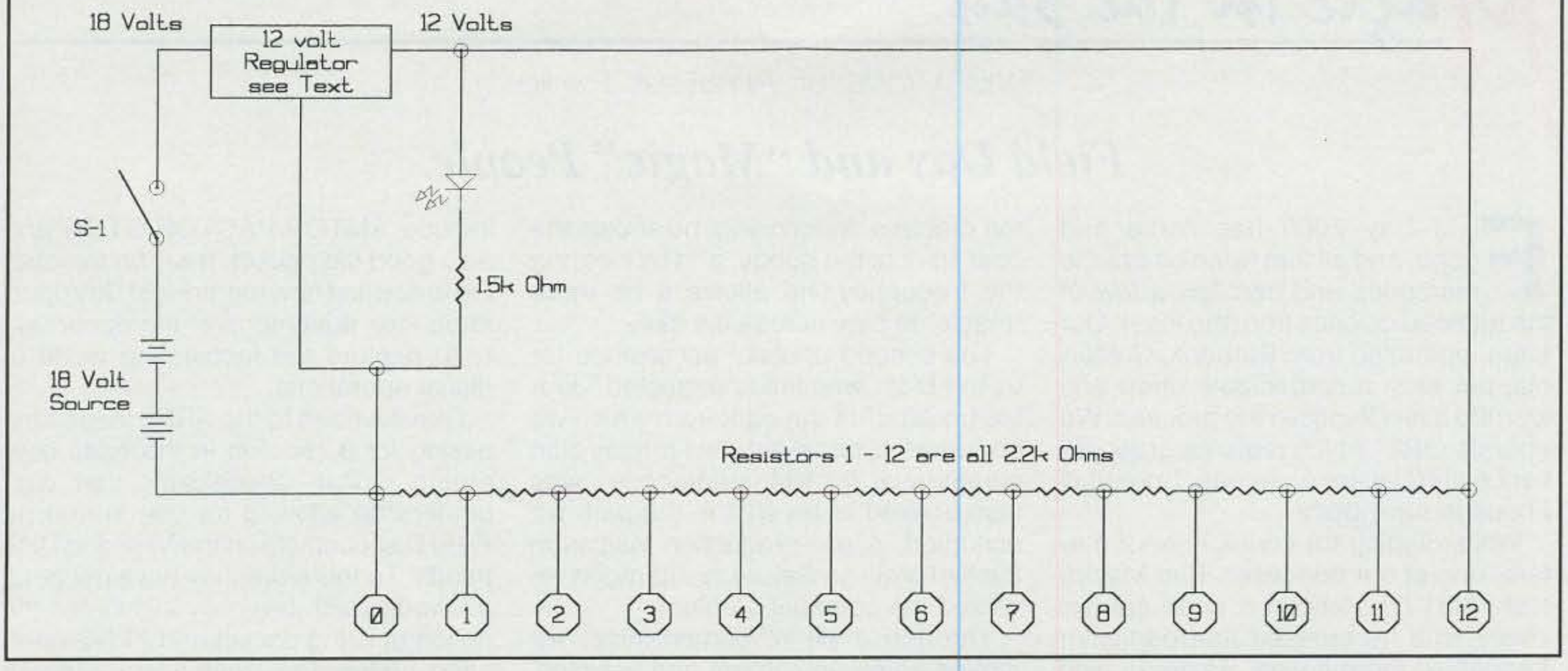


Fig. 5– In the completed cicuit 12 volts is divided by 12 equal resistors. A voltage drop of 1 volt is measured at the junction of each resistor. Thirteen wires may be checked using this method. The "Flying Solo" tester may be used to check opens, shorts, or crossed wires without the aid of an assistant.

go from pin to pin. Of course, you have to attach the wires in the correct order to get the correct results.

That brings up another point worth mentioning: If you do find a problem with a cable or connector, double-check your hookup to the tester before unsoldering anything. I must confess that I've made a mistake or two in my haste to check out things.

A Few Final Thoughts

The "Flying Solo" tester is not the most complicated thing to build. You can finish it in a few hours. The circuit certainly is not limited to 12 volts and 13 wires. If you have a specific need to make repetitive tests using the same multi-pin connector, you can incorporate a mating plug for that connector into your tester design. That way you are not struggling with lots of loose ends.

This reminds me of the time I tried to test a 25-pin D-sub connector for my printer. It was all I could do to hold both connectors in one hand and juggle the meter leads in the other.

You could build a 24 volt version of this same tester using a 24 volt regulator and 24 resistors (25 wires total). In that design you could make pin 25 the common lead and measure 1 to 24 volts on each pin of the connector. I even envisioned a tester with every type of D-sub and multi-pin connector I could imagine, all mounted on the panel. D-subs, Octals, 4- and 8-pin microphone connectors—everything! Every pin 1 would be tied to resistor 1 and every pin 2 would be tied to resistor 2, and so forth. In that way you could check all the types of control cables you have in the shack. I admit, that may be just a passing fantasy, but you get the idea.

I'm sure with a little imagination you will find new and different schemes for your own unique version of the "Flying Solo" tester. Let me know how you make out; you can drop me a note at <kb2ytn@arrl.net>. ■

Magic In The Sky

BY JEFF REINHARDT, AA6JR

New Views of Amateur Radio

Field Day and "Magic" People

Field Day 2000 has come and gone, and all that remains are the memories and perhaps a few of the retained calories from the feast. Our team, operating from Burbank, California, put forth a respectable effort and learned a few things in the process. We operate QRP, which requires great patience and decent antennas. Someday I hope to have both!

While digging for contacts on 2 meters, one of our operators, Kirk MacIntosh, N6TVH, noticed a dead carrier. Every time he crossed that particular frequency, there it was. Being an avid hidden-transmitter hunter, he and another ham jumped in his truck and started seeking the source. After a brief search, they came upon a home with an antenna that seemed to be emitting the offensive signal. The culprit was a wireless home telephone, reportedly imported from Armenia, operating dead square in the U.S. 2 meter band. With some diplomacy, our hero received assurances the owner would cease using the foreign equipment.

This incident makes one wonder how many other such devices are depriving hams of using frequencies. And here's a salute to Kirk, who took it upon himself to do something in terms of solving the problem. In so doing, he shows the best spirit of the hobby, and by clearing the frequency, he allows a bit more "magic" to play across the sky.

The second unusual occurrence for us in FD 2K was the unexpected "double booking" of the park from which we operated. It turns out that a television commercial for KIA automobiles was also booked to be shot in the park we occupied. A pre-production visit from the film crew on Saturday afternoon revealed the potential problem.

Through a bit of compromise, we moved some equipment and vehicles, and thus we were treated to a Sunday morning breakfast from the film crew's portable commissary. (Let me add, those Hollywood folks eat quite well!) So while making contacts in the concluding hours of Field Day, we watched the filming of a bridal party chasing a little dog that had stolen the figurines from atop a wedding cake. What that has to do with selling cars is still a mystery to me (and I'm in the advertising business!). I guess I'll have to see the finished product on TV sometime.

Field Day and Digital

This was the first year the ARRL classified digital operations as a separate mode for Field Day contacts. There seemed to be a good number of operators using PSK 31 and RTTY on HF, but what about the others? That would include AMTOR/PACTOR/GTOR and also good old packet. It will be interesting to see just how many Field Day operators took advantage of the opportunity to explore the fascinating world of digital operations.

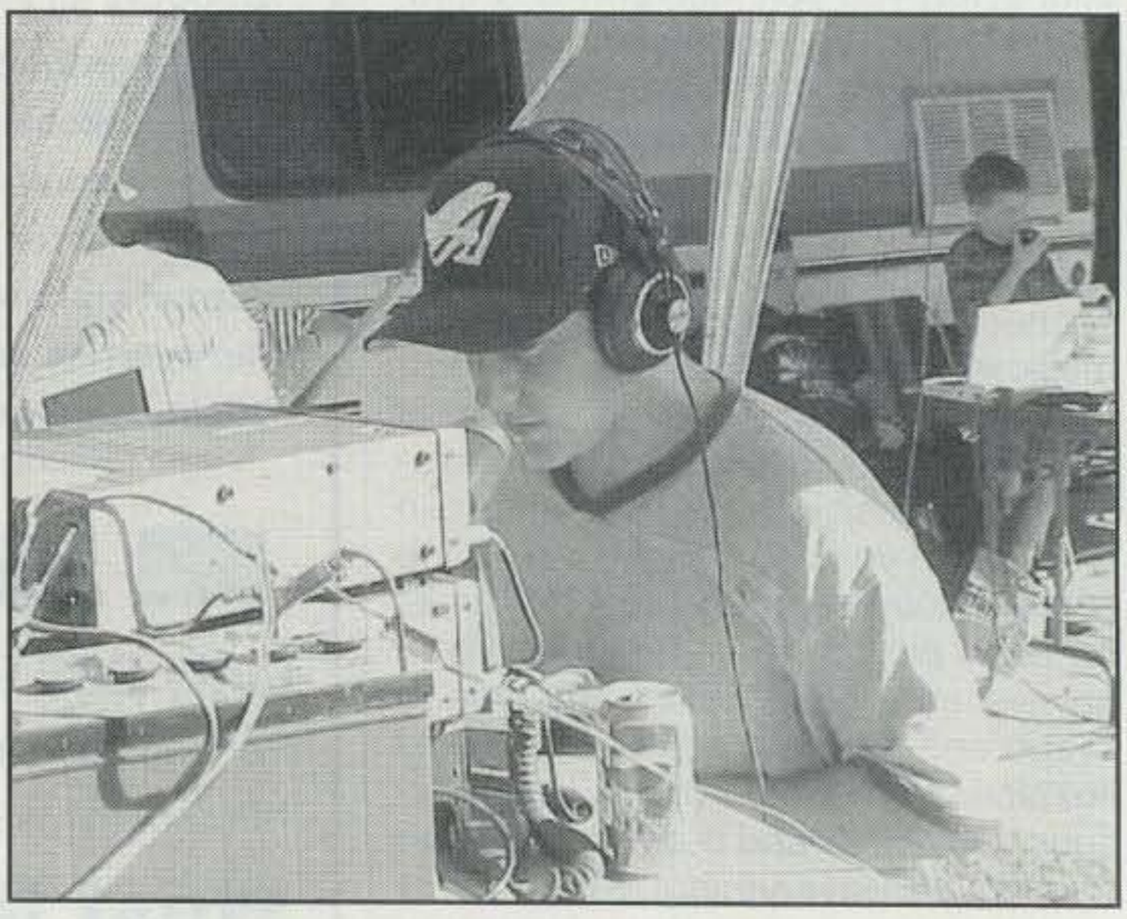
I have written to the ARRL leadership asking for a revision in the rules governing digital—specifically, that digipeaters be allowed for use in making Field Day contacts on the VHF and UHF bands. To this point they have not been allowed, which basically eliminates the notion of using packet and APRS operating modes. The argument for allowing the use of digipeaters is that these modes are normally operated in this fashion. They rely on digipeaters to overcome the limitations of terrain and line-of-sight. It can also be said that a digipeater is not a repeater; even the FCC recognizes the difference in its rules.

Those arguing against the above proposal might say Field Day is an exercise that simulates emergency operating conditions and the use of existing digipeaters takes away the "emergency" operating angle. Also, if you allow digipeaters, why wouldn't you allow voice repeaters? In response I would say that many, if not most, digipeaters already have backup power systems in place, and they fulfill the spirit of Field Day communications.

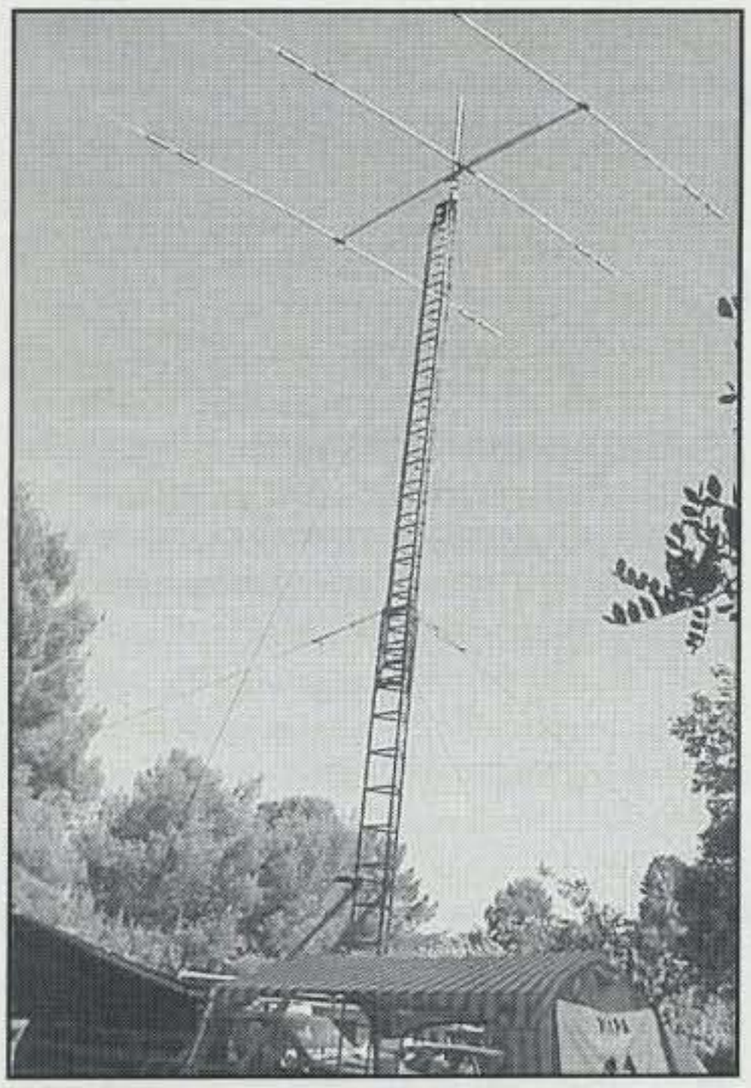
Having been through several fires, floods, earthquakes, and power out-

59045 Lake Lindero Drive, Agoura Hills, CA 91301
**e-mail:<aa6jr@cq-amateur-radio.com>*

The W6APA Field Day team is shown here putting together a beam: "I thought you brought along the wrench!" (All photos by KD6BIT)



The W6APA FD team had several kids on the air.



A tower on a trailer is a big advantage.

Kirk MacIntosh, N6TVH, and his trusty hidden-transmitter-hunting SUV. Note the antenna near the right-hand door.

ages in southern California, I can also say that few communications emergencies are "total" wipeouts. It is reasonable to assume some of our communications infrastructure will survive an emergency intact. That would include digipeaters.

Finally, I do not advocate the use of voice repeaters for Field Day contacts, as it would likely take away a resource that could be needed by others who are *not* Field Day participants.

To ignore APRS and the use of VHF/UHF digital modes in this age of digital developments seems to fly in the face of our stated position as hams in terms of "advancing the radio art." My opinion is that young people are more likely to be attracted to digital technology than any other form of communications.

"Magic" People

I have received several letters and e-mail messages about a few of the people whose names have been mentioned in this column. I wish I could publish them, but space limitations keep me from doing so. Thank you for sharing your thoughts; I read every message. If you know of a person you think should be recognized for helping place some "Magic in the Sky," please send a note to me telling why and I'll try to work it into a future column.

This month I want to thank a person who no longer shows up in the FCC license database—Jim Welch, ex-WB2DEI. Jim and I went to high school together. He was a ham; I was not. Someone gave Jim an old mechanical teletype machine, and Jim said we could use it to send and receive radio-teletype messages.

I worked at a library and had access to *QST* archives, which included a simple circuit to decode RTTY signals. A few dollars in parts and some melted solder later, and darned if the machine didn't spring to life! We were amazed beyond words. One problem: We didn't have rolls of teletype paper. Imagine, if you will, two sophomore high-school students, elated with this clanking machine, rapidly taping together sheets of looseleaf notebook paper that was being drawn through a paper-eating monster with a ravenous appetite. Soon we were tearing off the paper that had been used on one side and printing on the other. As so often happens, I lost touch with Jim after high school, but I owe him my enduring interest in data communications.

On a broader scale, I'd like to acknowledge a whole bunch of hams—dedicated county hunters—who regularly go out of their way to give other hams the chance to share in their achievements. I won't get into the agony and ecstasy that is county hunting, as that activity is chronicled elsewhere in this journal (*see K1BV's "Awards" column—ed.*). What is amazing to me, however, is how many county hunters will go out of their way, sometimes hundreds of miles, to put a "rare" county on the air or to pick up a needed "last one" for an operator who is trying to close out a state.

For the uninitiated, there are 3076 counties needed for *CQ*'s prestigious USA-CA Award, and not all of those counties are populated by hams. Putting some of those counties on the air requires what amounts to a small DX-pedition. Here's a salute to those unselfish operators willing to go out of their way to help another ham, in the best spirit of our hobby. Remember, whenever any of us helps someone get more out of ham radio, we are adding more "Magic in the Sky."

73, Jeff, AA6JR

VHF Plus

BY JOE LYNCH, N6CL

All About The World Above HF

Still More Aurora Activity

VHF Plus operators in North America were again treated to aurora, this time on the evening of 17 September (17–18 September UTC). Thanks to at least three Earth-directed coronal mass ejections (CMEs)—two faint ones on 15 September and a brighter one on 16 September—amateurs experienced mid-month aurora-stimulated propagation for the third month in a row. The brightest of the three flares occurred at approximately 0500 UTC Saturday morning. It was associated with a powerful M6-class solar flare.

The Space Environment Services Center classifies X-ray type flares into three types: C, M, and X. The C-type flares are the most common. The M-class flares are larger and more rare. The X-class flares are even less common and are considered to be major events. The number following the letter designation indicates the intensity of the flare.

The 3-hour estimated planetary *K*-index rose to 5 at 1800 UTC on 17 September, then rose again to 7 at 2100 UTC, remaining there through 0300 UTC on 18 September. It dropped to 5 at 0600 UTC and then to 4 at 0900 UTC.

To give some perspective on how far south the aurora extended, **Larry, WD4MBE** (EM96), reported that he heard the aurora around 2300 UTC on his Hustler vertical antenna, as his Yagi antenna was inoperative. **John Butrovitch, W5UWB** (EL17), reported working K4QI in FM06 on 2 meters.

Lloyd Ellis, NE8I, reported that while he was operating rover in the 10 GHz contest (in EN62, 63, 72, and 82), he noticed aurora activity as high as 432 MHz. He started hearing the aurora around 1800 UTC, while in EN63. He reported hearing other rover and home stations on 144.260 with the aurora buzz. He stated that it got really strong, even considering the 8-element Yagi on his 2 meter rover station.

Lloyd also reported that some of the rovers running halos on 2 meters were hearing it strong. He indicated that the peak was well to the east and west of geomagnetic north. Around 1000–1100 UTC seemed the strongest for him. Mostly heard by him were W1-2-3-4 land.

Lloyd reported that this was the most mobile activity that he has heard during an aurora. "Must have been all of the 10 GHz rover mobile stations!" he said.

Al, K7IEY (CN88), reported that he worked W7HAH (DN47) and W7FHI (CN96) with no problem on 432 MHz. He urges operators who observe that the aurora is strong on 2 meters should then make noise on 432.1 MHz CW. "A lot could be worked on that band if operators took the time to get on," he stated. For him, the peak on 432 MHz seemed to be around 0000–0030 UTC.

Paul, K7CW, made the following fascinating 6 meter report: "Jim Costello, W7FI, came on frequency during the Au to tell me that the ZLs were in the DX window. I went down, and sure enough, I worked ZL3NE and ZL2AGI. The band sort of faded and I went back up to work some more aurorae. I struggled a little to work a station in Utah. But when I finished with him I got a call from VK4BRG, who had Au flutter on his signal. We exchanged 57 signal reports. My antenna was pointed toward the aurora curtain.

"I checked my other antenna, which was on VK, and heard nothing. So it appears his signal was propagated via *F2* to the aurora curtain and then reflected to us. Very strange, but exciting.

"A few of the guys here worked him before his signal faded out. Later, I discovered the KH6HI beacon was coming in very loud. I announced that on the calling frequency and some of us went down to work KH6HAK and AH6TM. That was at about 0330 or so UTC.

"Two ZLs, a VK, and two KH6s in one evening. Just had to brag a little!"

Corey, KF3DY, reports, "I must say this was my first real aurora (because of not listening much on my part). I loved it. I have used 100 watts in the past with 11 elements, but never heard it like this. A fellow ham, N3HSY, and I tried stacking two of my 11-element beams today. An hour or so after completing the project, here came the signals. It couldn't have been better timing."

Chris Cox, NØUK, reports, "The aurora was particularly good this evening on both 144 and 222 MHz. Very notable was that many of the Midwest aurora 'regulars' were not heard.

"On 144 MHz from here in EN34JV, I worked as far west as W7SAO/DM59, south to WØEKZ/EM17, and east to K9MRI/EN70 (although I was still looking west on that last one). On 222 MHz, I worked W9UD/EN41 for my first QSO in the aurora, W6OAL/DM59, and NØKQY/DM98—those last two being all new grids—thanks, Dave and Gary."

Richard Ewing, KO7N (CN84), reported hearing VE7SL very loud on 2 meters during the aurora.

VHF Plus Calendar

Oct. 27-29	AMSAT Symposium (see text)
Nov. 3	*Moon apogee*
Nov. 4	First quarter moon
Nov. 5	Poor EME conditions
Nov. 11	Full Moon
Nov. 12	Moderate EME conditions.
Nov. 15	Moon perigee and highest declination
Nov. 17-18	Predicted peak for *Leonids*
Nov. 18	Last quarter moon
Nov. 18-19	Second weekend of ARRL EME Contest
Nov. 19	Very good EME conditions
Nov. 25	New moon
Nov. 26	Very poor EME conditions
Nov. 29	Lowest moon declination

• *EME conditions courtesy W5LUU*

Space Opportunities This Month

Amateur Radio aboard the ISS. The International Space Station's Expedition I is scheduled to begin on October 30, with the launch of the Russian *Soyuz* Rocket. The three-man crew will include William Shepherd, KD5GSL, Sergei Krikalev, U5MIR, and Yuri Gidzenko, whose callsign was pending at press time. It will take two days for the crew to get on board the space station.

These three crew members will plan to operate as soon as practical after they are moved in to their new quarters. However, don't expect any operations for at least several days after they are finally settled for their four-month stay. The crew of the shuttle *Atlantis* (mission STS-106), which included three hams —Ed Lu, KC5WKJ; Dan Burbank, KC5ZSX; and Richard Mastracchio, KC5ZTE—stowed the first load of ama-

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teur radio equipment in the Functional Cargo Block, where it will remain temporarily until next year, when it will be relocated in a more permanent location in the Service Module.

The station will be using an antenna that has been adapted for 2 meter use but not 70 cm. Therefore, do not expect any operations on 70 cm until after the station has been moved. Two meter operations are expected to include both FM and packet.

In an extensive *CQ* magazine exclusive interview that was published last month, Amateur Satellite columnist Phil Chien, KC4YER, reported that while Shep is licensed, he does not use his ham radio license on the ground, and that basically he obtained his license for his activities in space. His wife, Beth Stringham, is obtaining her license so that she can talk to Shep.

Sergei, on the other hand, is most used to the hobby, having made many contacts during his combined 15-month stay aboard the *Mir* space station and his week-long operation on board STS-60. Sergei is looking forward to getting on the air from the space station and renewing old acquaintances he made during his days on board *Mir*.

Some of Yuri's amusing operating experiences are documented in Phil's column.

As of press time, operating information is sketchy. The latest information may be found on the internet at <http://ariss.gsfc.nasa.gov>. Bulletins issued by the ARRL and AMSAT and press releases issued by the ARISS team also will keep us up to date.

Refer to KC4YER's "Amateur Satellite" column elsewhere in this issue for more information on the proper procedure for working the occupants of the International Space Station and other important information about the ARISS operations.

Phase 3D Launch Watch Begun

According to the AMSAT News Service, an Arianespace Ariane 5 launch vehicle successfully delivered a pair of communications satellites into Earth orbit. "AR-506 placed the Astra 2B and GE-7 satellites into the desired geostationary transfer orbit after a spectacular launch from the European Spaceport in Kourou, French Guiana. The launch took place Thursday, September 14, 2000 at 22:54 UTC."

Following this successful launch, Arianespace and AMSAT-DL jointly

announced that the next launch of an Ariane 5 launch vehicle, V-507, is scheduled not to occur before November 3, 2000. The good news for us amateurs is that onboard this flight will be the AMSAT Phase 3D communications satellite.

As of press time, a lot of hurdles must be overcome before the launch. Therefore, for the latest information stay tuned to AMSAT News Service for additional bulletins from AMSAT, the official source for information on the Phase 3D Launch. You may also check their URL at <www.amsat.org>.

More *Perseids*-Aurora Reports

Phil, NØKE (DM69), reported, "At 0745 UTC August 12, 2000, I began a 30 minute 2 meter MS SSB schedule with NJØM EN34. In the first sequence from NJØM I heard both calls several times. In the next several sequences I was copying him almost the whole 15 seconds. It was obvious that he was not hearing my 500 watts. I tried peaking the antenna and noticed some minor auroral growl on him. As I moved to about 15 degrees it was obvious that this was aurora. He was quite strong on 2 meter SSB but very easy to copy and probably the best copy I've ever had on 2 meter aurora SSB. We completed on CW on aurora. It is the first time I've started a MS QSO and finished it on aurora! Because of the easy copy on 2 meter SSB I thought possibly it was Auroral E. Others have suggested maybe FAI.

"As for the *Perseids*, I completed only two of eight schedules and no random MS QSOs. One of the completed skeds was the above-mentioned 2 meter one that was actually completed on AU. The other completion was KA9CFD EN40 on 222 for a new state and grid.

"The aurora lasted from 0745 UTC to about 1430 UTC. On 222 MHz, I worked W7XU EN13, KMØT EN13 (new state), W7FHI CN96 (new state and grid), K7ND CN87 (new grid). On 2 meters, new grids were K7AD DN06 and W7YM DN57. At times when listening to an aurora signal, I'd hear some meteor enhancement."

Doug, WØAH (DM78lx), reported: "Colorado Meteor scatter schedules and random activity on SSB/CW seemed down from recent years, especially considering that two of the three days fell on a weekend. Maybe everyone got tired out working the aurora and put in less of a meteor scatter effort. Maybe many of the ping jockeys moved HSCW.

"I ended up with the fewest number of meteor scatter contacts I have made in many, many years of operating *Perseids*. On the other hand, I made 27 aurora contacts Saturday morning, the second highest number of aurora contacts from here in Colorado."

Larry Lambert, NØLL (EM09), reports, "Staying up late nights this summer has really been a problem, as I missed some good VHF propragation. On 8-12 I set the alarm for 5 AM and woke up before the alarm went off so came down to the shack to see what the meteors were like. There was a good aurora and it was 1 1/2 hrs later before I heard any meteor enhancement. The following is my log. Except as noted, all contacts are on 2 meters: W6OAL DM79, W7HAH DN26, KØGU DN70, KAØPQW EN33 (6 meters), KØMQS EN31, KMØT EN13, NØPB EM39, WA9JML EN51, K9MRI EN70, VE3AX FN02 new grid on 125 cm), K2TXB FN02, KE8FD EM89, WØETT DM79, KØYW DM67 (meteors on 6 meters), WØAH DM78, WØTM DM69, KK6IT EM11 (tropo), and K5IUA EL29 (tropo)."

Lance Collister, W7GJ, reports the following: "I want to share with you the very exciting time I had on 6 meters on August 11 (GMT). I only had a chance to get on for about an hour before going to bed, but I participated in my first real coast-to-coast auroral *Es* opening on 6 meters. Wow, what an exciting hour! Usually, aurora from here is not very exciting (especially on the higher frequencies) because it is usually the same 'local' contacts east or west 500 miles from here. *But* that night, there was a *fantastic* auroral *Es* opening on 6 meters, which really made it worth getting on! Here is my logbook that Thursday night (August 10 local time) beginning at 0413 UTC: VE3JJX, EN29SS, VA3DPB, EN58, VE4UD, EN19KV, KIØLS, EN17LV, W1AIM, FN34SE, KDØYZ, EN42GL, KC8MGR, EN57RA, KØKP, EN36VW, W9RPM, EN43JS, KB9PJL, EN44DV, W9BLI, EN64DP, WØEOZ, EN06PV, N9YJJ, EN44GS, KA1PRD, FN43QP, KB1DFE, FN42ES, WØMTW, EN24SH, W9GA, EN53, KL7NO, BP64DU, and NL7Z, BP51DL.

"As you can see, New England was in on double hop at the same time the upper Great Lakes was in on single hop, and to the northwest, Alaska! I didn't work anything new during the opening, but it sure was exciting and lots of fun! It was really late back east (1:30 AM EST), so most ops were in bed. However, I sure hope more folks stay up on the watch for this during this coming fall.

This is the kind of excitement I am looking for from aurora!"

Pete, N6ZE (DM04), reports that the *Perseids* conditions were poor there for the second year in a row. He also reports that there was no aurora noted during his operating times. Of three skeds he attempted, he heard nothing in two days of trying between him and CN88 and DN16. Between him and W5UWB in EL17, he heard two full calls but John heard nothing from him.

AMSAT Space Forum

The annual AMSAT Space Forum will be held October 27–29 at the Holiday Inn in Portland, Maine. For more information and a meeting agenda, check the AMSAT URL at <http://www.amsat.org/amsat/symposium/agenda.html>.

Leonids Meteor Shower

According to the International Meteor Organization, recent stream evolution studies suggest high to storm-level *Leonid* activity may occur this year or even through 2002. They indicate that newer material from the most recent (the 1965 and 1932 perihelion passages of the comet) is likely to cause enhanced activity near the closest approach to the comet's node on around 0800 UTC on November 17. However, they also indicate that an older trail from 1733 suggests a peak as late as 0800 UTC on November 18. A third possibility is a peak of 0345, again on November 18.

With the last quarter moon causing some problems for visual observances, the IMO is again interested in radio activity. The two 0800 UTC predictions favor North America, while the 0345 UTC prediction favors Europe and North Africa. Look for further updates on the IMO's URL of <www.imo.net>.

ARRL EME Contest

The second weekend of this year's ARRL EME Contest will be held on November 18–19. Conditions are forecast to be very good. The rules were in last month's issue of *QST* and are on the ARRL web page at: <http://www.arrl.org/contests/announcements/rules-eme.html>.

And Finally . . .

This time of the year and time of the sunspot cycle is probably the best time for watching for *F2* openings. This cycle has not been very cooperative to date. However, by most calculations we are now on the downward slope of the peak. Historically, many openings do occur during this part of the cycle. Therefore, it is a good idea to keep your radios (and computer) on during this month and next.

They have been a long time coming, but both the Expedition I on board the ISS and the Phase 3D satellite will usher in new opportunities for us on the VHF-plus frequencies. I hope you have a chance to take advantage of them. Please let me hear from you about your successes with them.

Within this month in North America are several days for us to take a moment away from our hobby for reflection and thanksgiving. Among them are Veteran's Day in the U.S., Remembrance Day in Canada, and Thanksgiving in the United States.

Until next month...

73, Joe, N6CL

BY CARL SMITH, N4AA

News Of Communication Around The World

Comoros, D68C

First we have some DXpedition activity to report. The Tromelin DXpedition has come and gone. In the process, the team handled over 50,000 QSOs, making a lot of DXers happy. As I write this column, the DXpedition to Bhutan (A52FH) is underway, which should further reduce the need for this one. Bob, ZD9ZM, will be handing out much-needed Q's from Tristan da Cunha for the next few weeks. TRØA/p comes along later in September, and a major effort from East Timor (4W) is scheduled for early October, along with the operation from Agalega (3B6).

As of this writing, mid-October will find us looking for the major DXpedition from Kingman Reef (KH5K) by the Kingman Reef/Palmyra DX Group. One of the ops with that group, Mike Gibson, KH6ND, has been on Palmyra for several weeks and is very active on all bands. Something over 20,000 Q's have most certainly dropped the need for Palmyra around the world due to Mike's super effort. As if all of the above is not enough, an operation from Eritrea (E3) is scheduled for the last two weeks of October.

Can you count all of the major DXpeditions and rare/new ones that have !been on the air this year? Not many years in recent memory could even come close to everything that has happened in 2000. Could 2001 offer anything, anywhere, for a DXpedition? Well, yes. As a matter of fact, there are a number of those in the works right now.

Club station SKØUX, near Stockholm, Sweden, was founded in 1993. With 35 members interested in all aspects of amateur radio, they have put together this impressive station. Many visitors have operated from the station. Access to the station is restricted, so it is wise to contact Henryk, SMØJHF, if you would like to visit. E-mail him at <smØjhf @chello.se> or send a message to the club's reflector, <skØux@sk7do.te.hik.se>. The station is just above Ullnasjon (Ullna Lake), some 30 km north of the center of Stockholm. In this photo Fabian, DJ1YFK, is outside the clubhouse. Many of the club's impressive antennas are pictured here.

Comoros D68C

The following was provided by Don Field, G3XTT, NK1G, <g3xtt@lineone.net>, D68C Publicity Officer:

The Five Star DXers Association, closely linked to the CDXC (Chiltern DX Club), the UK DX Foundation, was formed from the core group who organized the very successful 9MØC DXpedition to the Spratly Islands in February 1998.

The association will undertake a major expedition to the Comoros, D68, next February. The callsign D68C has already been assigned, and the plan is for an operation encompassing almost three weeks of operation, including three weekends. The first members of the team will arrive in D68 on Tuesday, 6th February, and they expect to spend the first two to three days installing antennas and equipment. Operations will commence before the weekend. Station breakdown will start on Monday 26th February, although operations may continue for a day or two after that.

There are two main objectives:

• To provide the possibility for every amateur radio station in the world—even those running QRP or very simple antennas—to make at least one contact with D68.

• To enable top DXers to put D68C in their logs on as many bands and modes as possible. It should be possible for top DXers active on all bands and on all three modes to work D68C on close to 20 band/mode slots. We expect to substantially exceed our 9MØC score of 65,524 QSOs.

The Comoros stand at number 59 in the *DX Magazine*'s 1999 worldwide listing of "Most-Wanted" DXCC entities (up from 72 the previous year). However, many of the countries ranking higher on the list—including Bhutan, Tromelin Island, Clipperton Island, Tristan da Cunha, Palmyra Island, Palestine, Agalega and St. Brandon, the Sovereign Military Order of Malta, and Libya—have been very active since the survey was carried out, so in reality the standing of the Comoros is much higher. In any case, the Comoros rank considerably higher (at number 36) in the USA Central zone in the same survey.

The multi-national team, still being formed, already includes many well-known operators, as well as some up-and-coming DXpeditioners. So far members include 5B4AGC (George), 5B4WN (Marios), 9H1EL (Jeff), GØOPB (Tony), G3NUG (Neville), G3OZF (Don), G3SED (Mike), G3VMW (Steve), G3WGV (John), G3XTT (Don), G4JVG (Steve), G4KIU (Nigel), G4TSH (Justin), GU4YOX (Bob), JA1RJU (Kazu), JA3AER (Taizo), MØBJL (Shaun), MØDXR (Mark), SM5AQD (Hawk), W3EF (Maury), and W3WL (Wes). Many of these callsigns will be familiar from other DXpeditions, but we are especially delighted to have along Mark, MØDXR, who is the UK Young Amateur of the Year for 1999–2000.

We will be seeking contributions from sponsors to cover the very significant logistics costs of this DXpedition. Details of our bank accounts in the UK and US will be announced shortly.

Phil, G3SWH, has kindly agreed to be our QSL manager, and QSLing will be via the bureau, direct or by e-mail. Phil's address is 21 Dickensons Grove, Congresbury, Bristol, BS19 5HQ, England.

P.O. Box DX, Leicester, NC 28748-0249
e-mail: <n4aa@cq-amateur-radio.com>

The WPX Program

SSB

2756	IZ8AJQ	2760	VE3XK
2757	WA1ECF	2761	KB9ALG
2758	IK4ZGX	2762	N2PN
2759	K1JE	2763	W4LLP

Mixed

1861 ..... N2PN

CW: 500 E4/G3WQU. 550 E4/G3WQU. 700 JH8MWW. 750 JH8MWW, WA2VQV. 1750 JN3SAC. 1800 JN3SAC. 4100 N6JV.

SSB: 350 WA1ECF, K1JE, KB9ALG, N2PN, KU4BP, W4LLP. 400 WA1ECF, KB9ALG, N2PN, KU4BP, W4LLP. 450 KB9ALG, KU4BP, W4LLP. 500 KU4BP, W4LLP. 600 AE5DX. 1650 JR4NUN. 1700 I3ZSX. 1750 I3ZSX.

MIXED: 450 N2PN. 950 JH8MWW. 1000 JH8MWW. 1150 WZ4P. 1350 VE6FR. 1450 KØKG. 1500 KØKG. 1700 ON4CAS. 1750 ON4CAS. 1900 HP1AC. 1950 HP1AC. 2000 HP1AC. 2050 HP1AC. 3450 WB2UQH. 4750 W2FXA.

10 meters: ON4CAS, W4LLP

Asia: N2PN, E4/G3WQU, JH8MWW
Africa: K1NU, E4/G3WQU
N. America: JH8MWW, N2PN, W4LLP
Europe: N2PN, JH8MWW
Oceania: K1NU, JH8MWW

Award of Excellence Holders: K6JG, N4MM, W4CRW, K5UR, K2VV, VE3XN, DL1MD, DJ7CX, DL3RK, WB4SIJ, DL7AA, ON4QX, 9A2AA, OK3EA, OK1MP, N4NO, ZL3GQ, W4BQY, IØJX, WA1JMP KØJN, W4VQ, KF2O, W8CNL, W1JR, F9RM, W5UR, CT1FL, W8RSW, WA4QMQ, W8ILC, VE7DP, K9BG, W1CU, G4BUE, N3ED, LU3YL/W4, NN4Q, KA3A, VE7WJ, VE7IG, N2AC, W9NUF, N4NX, SMØDJZ, DK5AD, WD9IIC, W3ARK, LA7JO, VK4SS, I8YRK, SMØAJU, N5TV, W6OUL, WB8ZRL, WA8YM, SM6DHU, N4KE, I2UIY, I4EAT, VK9NS, DEØDXM, DK4SY, UR2QD, ABØP, FM5WD, I2DMK, SM6CST, VE1NG, I1JQJ, PY2DBU, HI8LC, KA5W, K3UA, HA8XX, K7LJ, SM3EVR, K2SHZ, UP1BZZ, EA7OH, K2POF, DJ4XA, IT9TQH, K2POA, N6JV, W2HG, ONL-4003, W5AWT, KB0G, NB9CSA, F6BVB, YU7SF, DF1SD, K7CU, I1PO, K9LNJ, YBØTK, K9QFR, 9A2NA, W4UW, NXØI, WB4RUA, I6DQE, I1EEW, I8RFD, I3CRW, VE3MC, NE4F, KC8PG, F1HWB, ZP5JCY, KA5RNH, IV3PVD, CT1YH, ZS6EZ, KC7EM, YU1AB, IK2ILH, DEØDAQ, I1WXY, LU1DOW, N1IR, IV4GME, VE9RJ, WX3N, HB9AUT, KC6X, N6IBP, W5ODD, IØRIZ, I2MQP, F6HMJ, HB9DDZ, WØULU, K9XR, JAØSU, I5ZJK, I2EOW, IK2MRZ, KS4S, KA1CLV, KZ1R, CT4UW, KØIFL, WT3W, IN3NJB, S50A, IK1GPG, AA6WJ, W3AP, OE1EMN, W9IL, S53EO, DF7GK, I7PXV, S57J, EA8BM, DL1EY, KØDEQ, KU0A, DJ1YH, OE6CLD, VR2UW, 9A9R, UAØFZ, DJ3JSW, HB9BIN, N1KC, SM5DAC, RW9SG, WA3GNW, S51U, W4MS, I2EAY, RAØFU, CT4NH, EA7TV, W9IAL, LY3BA.

Award of Excellence with 160 meter Endorsement: K6JG, N4MM, W4CR2, N5UR, VE3XN, DL3RK, OK1MP, N4NO, W4BQY, W4VQ, KF2O, W8CNL, W1JR, W5UR, W8RSW, W8ILC, G4BUE, LU3YL/W4, NN4Q, VE7WJ, VE7IG, W9NUF N4NX, SMØDJZ, DK3AD, W3ARK, LA7JO, SMØAJU, N5TV, W6OUL, N4KE, I2UIY, I4EAT, VK9NS, DEØDXM, UR1QD, AB9O, FM5WD, SM6CST, I1JQJ, PY2DBU, HI8LC, KA5W, K3UA, K7LJ, SM3EVR, UP1BZZ, K2POF, IT9TQH, N8JV, ONL-4003, W5AWT, KBØG, F6BVB, YU7SF, DF1SD, K7CU, I1POR, YBØTK, K9QFR, W4UW, NXØI, WB4RUA, I1EEW, ZP5JCY, KA5RNH, IV3PVD, CT1YH, ZS6EZ, YU1AB, IK4GME, WX3N, WBØDD, IØRIZ, I2MQP, F6HMJ, HB9DDZ, K9XR, JAØSU, I5ZJK, I2EOW, KS4S, KA5CLV, KØIFL, WT3W, IN3NJB, S50A, IK1GPG, AA6WJ, W3AP, S53EO, S57J, DL1EY, KØDE1, DJ1YH, OE6CLE, HB9BIN, N1KC, SM5DAC, S51U, RAØFU, UAØFZ, CT4NH, W1CU, EA7TV, LY3BA.

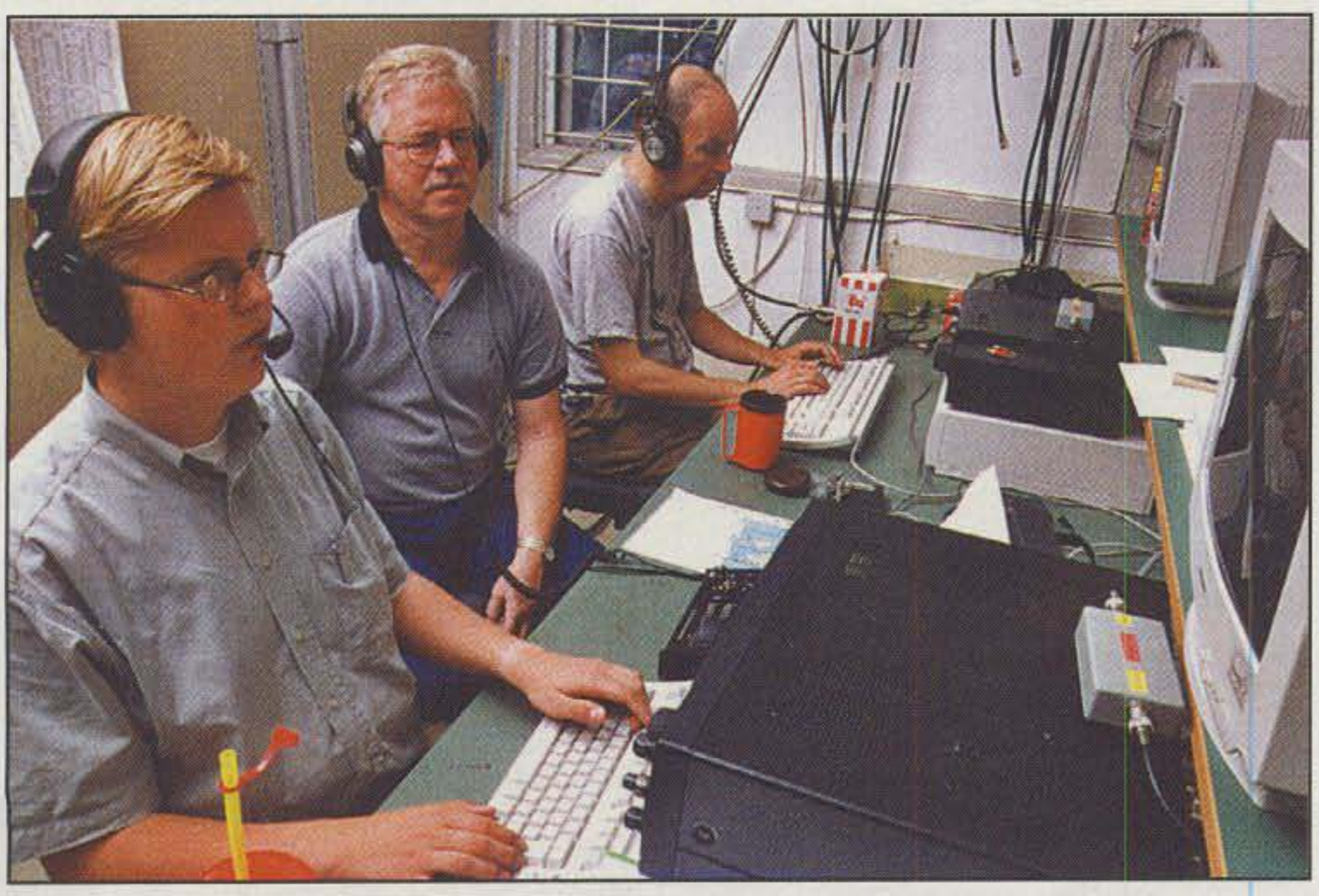
Complete rules and application forms may be obtained by sending a business-size, self-addressed, stamped envelope (foreign stations send extra postage if airmail desired) to "CQ WPX Awards," P.O. Box 593, Clovis, NM 88101 USA.

Pilot stations will be appointed for the major geographical regions, and details will be announced later.

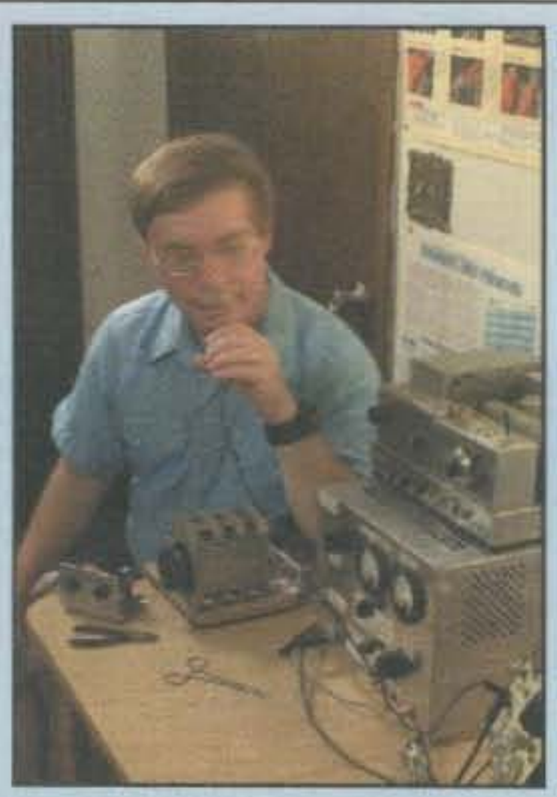
The CQ Awards Program

Last month I talked about the CQ Awards program and gave you some of the information about the various awards available. I recently ran across Paul, K5RT, on 20 meters SSB and we talked about those "boxes" in this column. Paul was kind enough to provide some additional information (the WAZ boxes are his area of responsibility), and I share that with you this month.

Each month our WAZ Award manager, Paul Blumhardt, K5RT, provides a



Inside the SKØUX clubhouse, left to right: SMØWKA, MØAXP, and SMØDRD.



On the Cover

Who says hams don't build equipment anymore? Randy Henderson, WI5W, of Oklahoma City, not only built every piece of equipment in his station, including the microphone, he designed it all, too!

The centerpiece of Randy's station is at the bottom right of our cover photo—a 9-band, synthesized, microprocessor-controlled HF transceiver that boasts many of the features normally found only on commercially-built gear. For example, his rig operates SSB or CW, has 14 tunable memories, will operate split frequency for those 40 meter DX contacts, displays frequency and mode, and even has a diagnostic mode that lets you check on some of the internally-generated frequencies. Its power output is variable from less than 1 watt to 50 watts.

Between Randy and the transceiver is more homebrew gear—an 800 watt tube-type amplifier on the table that also covers the nine HF bands, and a multiband solid-state CW transmitter on top of the amp, which Randy says saw more use before he built the transceiver. And yes, there is a mic in Randy's hand (no, he's not talking to his hand). It's a noise-canceling electret mic that he built into an old pill bottle!

In ham radio's truest tradition, Randy has shared his plans for the transceiver in a book he's written, entitled, *Build Your Own Intelligent Amateur Radio Transceiver* (ISBN #0-07-028264-1(p)). It's published by McGraw-Hill and is available from most major bookstores, including Amazon.com. Randy says designing and building gear is "a way to keep my interest up. If I lose interest in operating for a while, there's always another project to build." (Cover photo by Larry Mulvehill, WB2ZPI)

The WAZ Program

Single Band WAZ

10 Meter SSB

509 ..... K6YUI

12 Meter SSB

20 ..... KF2O 21 ..... G4BWP

15 Meter SSB

541 ..... K6YUI 542 ..... JI3CWB

17 Meter SSB

20 ..... KF2O

20 Meter SSB

1066 ..... K6YUI

12 Meter CW

20 ..... KF2O 21 ..... OH2DW

15 Meter CW

282 ..... G3LPS 283 ..... K8IU

30 Meter CW

37 ..... KF2O

40 Meter CW

212 ..... AB5EU

12 Meter Mixed

23 ..... KF2O

17 Meter Mixed

35 ..... KF2O

160 Meters

135 ..... IK1GPG (endorsement 36 zones)
158 ..... UAØACG (endorsement 36 zones)
159 ..... DL5XU (40 zones)

All Band WAZ

All CW

190 ..... W6XK 195 ..... NØSL
191 ..... RU9TOY 196 ..... F5MAE
192 ..... DS5IPL 197 ..... 9A3GO
193 ..... KF2O 198 ..... IK8TPJ
194 ..... N7WO 199 ..... ZL2GEO

SSB

4583 ..... W6XK 4587 ..... AA3JL
4584 ..... RU9TU 4588 ..... G4URW
4585 ..... EA7CFU 4589 ..... IK3OYY
4586 ..... F6FYD

Mixed

7971 ..... W2UP 7975 ..... W6VRK
7972 ..... RX9TX 7976 ..... N6QS
7973 ..... EA5DZI 7977 ..... SMØFWW
7974 ..... IK1NLZ

RTTY

122 ..... W5BPT

SSTV

001 ..... ON4VT 002 ..... SM5EEP

Rules and applications for the WAZ program may be obtained by sending a large SAE with two units of postage or an address label and $1.00 to: WAZ Award Manager, Paul Blumhardt, K5RT, 2805 Toler Road, Rowlett, TX 75089. The processing fee for all *CQ* awards is $6.00 for subscribers (please include your most recent *CQ* mailing label or a copy) and $12.00 for nonsubscribers. Please make all checks payable to Paul Blumhardt. Applicants sending QSL cards to a *CQ* checkpoint or the Award Manager must include return postage. K5RT may also be reached via e-mail: <k5rt@cq-amateur-radio.com>.

5 Band WAZ

As of June 30, 2000, 535 stations have attained the 200 zone level and 1154 stations have attained the 150 zone level.

New recipients of 5 Band WAZ with all 200 zones confirmed:
N8GZ

The top contenders for 5 Band WAZ (zones needed, 80 meters):

N4WW, 199 (26)
W4LI, 199 (26)
K7UR, 199 (34)
WØPGI, 199 (26)
W2YY, 199 (26)
VE7AHA, 199 (34)
IK8BQE, 199 (31)
JA2IVK, 199 (34 on 40m)
ABØP, 199 (23)
KL7Y, 199 (34)
NN7X, 199 (34)
OE6MKG, 199 (31)
IK1AOD, 199 (1)
DF3CB, 199 (1)
F6CPO, 199 (1)
W3UR, 199 (23)
KC7V, 199 (34)
GM3YOR, 199 (31)
VO1FB, 199 (19)
KZ4V, 199 (26)
W6DN, 199 (17)
W6SR, 199 (37)
W3NO, 199 (26)
K4UTE, 199 (18)
K4PI, 199 (23)
HB9DDZ, 199 (31)
N3UN, 199 (18)
K4IQJ, 199 (23)
K3NW, 199 (23)
UA3AP, 199 (6)
OH2VZ, 199 (31)
K2UU, 199 (26)
W1FZ, 199 (26)
K9GX, 199 (26)
NT5C, 199 (18)
UT4UZ, 199 (6)
EA5BCX, 198 (27,39)
G3KDB, 198 (1,12)
KG9N, 198 (18,22)
KØSR, 198 (22,23)
UA4PO, 198 (1,2)
JA1DM, 198 (2,40)
9A5I, 198 (1,16)
K4ZW, 198 (18,23)
LA7FD, 198 (3,4)
K5PC, 198 (18,23)
VE3XO, 198 (23,23 on40)
K4CN, 198 (23,26)
KF2O, 198 (24,26)
W6BCQ, 198 (37,34on40)
G3KMQ, 198 (1, 27)
DL3JJ, 198 (19&31 on 10)
W5BOS, 198 (18,23)

The following have qualified for the basic 5 Band WAZ Award:

UA9SG (176 zones)
W6XK (163 zones)
EA3ALV (181 zones)
N5ORT (157 zones)
K6YUI (188 zones)
HK3NTI (172 zones)
DJ9RR (192 zones)

Endorsements:
OK1DWC (197 zones)
K6FG (191 zones)

****Please note: Cost of the 5 Band WAZ Plaque is $80 ($100 if airmail shipping is requested).**

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summary of the applications processed in that month. Actually, the info is two months old due to publication deadlines. Whenever possible, Paul processes WAZ applications in the month they are postmarked, so things stay very current.

Paul prepares two reports for each issue of *CQ*. Within one box, the "5 Band WAZ Award," is the "Top Contenders" section. This is a listing of all the stations within two zones of completing the prestigious 5B WAZ award (200 band/zones). It includes the station, zone total, and zones/bands needed to complete the 5B WAZ award. This box also lists new 5B WAZ award winners with all 200 zones confirmed and endorsements to existing 5B WAZ awards.

The 5B WAZ award is issued when a station reaches the 150 zones plateau. Reaching the 200 zones point takes most folks at least one sunspot cycle. Eighty meters is (for most) the final fron-

CQ DX Honor Roll

The CQ DX Honor Roll recognizes those DXers who have submitted proof of confirmation with 275 or more ACTIVE countries. With few exceptions, the ARRL DXCC Countries List is used as the country standard. The CQ DX Award currently recognizes 331 countries. Honor Roll listing is automatic when an application is received and approved for 275 or more active countries. Deleted countries do not count and all totals are adjusted as deletions occur. To remain on the CQ DX Honor Roll, annual updates are required. All updates must be accompanied by an SASE if confirmation of total is required. The fee for endorsement sticker s is $1.00 each plus SASE. Please make checks payable to the awards manager, Billy F. Williams. All updates should be mailed to P.O. Box 9673, Jacksonville, FL 32208.

CW

K2TQC 331	W2FXA 331	KZ4V 329	I1JQJ 327	I5XIM 325	I2EOW 324	SM5HV/HK7 317	W3II 312	F6HMJ 296
K2FL 331	N4MM 331	K2JLA 329	I4LCK 327	WA8DXA 325	N4AH 324	YU1AB 317	K1FK 311	WG7A 295
K6JG 331	PT2TF 331	K4CN 329	N5FG 327	N5FW 325	LA7JO 324	G3KMQ 317	OZ5UR 311	N7WO 285
N4JF 331	W4OEL 331	K6GJ 329	I4EAT 327	IK2ILH 325	W6SR 323	K7JS 317	n4ot 311	W9IL 282
K9BWQ 331	W2UE 330	W7CNL 329	DL8CM 327	9A2AA 325	K7LAY 323	w4uw 317	WG5G/QRPp 307	EA3BHK 282
K2ENT 331	W6DN 330	K9IW 329	SM6CST 327	OK1MP 325	9A2AJ 323	YU1TR 316	W6YQ 305	F5OIU 282
K6LEB 331	G4BWP 330	WB5MTV 329	N4KG 327	W4LI 325	KUØS 322	K8JJC 315	W7IIT 305	YC2OK 282
N7FU 331	EA2IA 330	IT9QDS 329	WØJLC 327	K3JGJ 325	HA5DA 321	IKØADY 315	KE5PO 304	KD8IW 279
K3UA 331	W7OM 330	K4IQJ 328	NC9T 326	K1HDO 325	K6CU 321	HB9DDZ 314	LU3DSI 302	XE1MD 278
YU1HA 331	WØHZ 330	W1WAI 328	IT9TQH 326	K5UO 325	N5HB 321	N1HN 313	PY4WS 302	EA2CIN 278
K9MM 331	W8XD 330	PAØXPQ 328	4N7ZZ 326	DL3DXX 324	VE7DX 320	CT1YH 313	YU7FW 301	I3ZSX 276
WA4IUM 331	F3TH 330	DJ2PJ 328	VE7CNE 326	N4CH 324	HA5NK 319	W4UW 313	KH6CF 300	G3DPX 275
K2OWE 331	N7RO 330	K8PV 327	K2JF 326	WB4UBD 324	K4JLD 319	K9FYZ 313	K9HQW 299	
F3AT 331	K4CEB 330	W4QB 327	KA7T 326	K8LJG 324	NØFW 317	K9DDO 312	KF8UN 299	

SSB

K4MZU 331	DU9RG 331	KØKG 330	VE7DX 329	IT9TGO 327	KC4MJ 325	EA1JG 320	XE1MDX 305	F5RRS 284
K2TQC 331	VE3XN 331	WØYDB 330	K4CN 329	WD8MGQ 327	K3JGJ 324	EA7TV 320	EA5OL 305	CT1CFH 284
K2FL 331	K9MM 331	WA4IUM 330	W3AZD 329	I1EEW 327	IØSGF 324	F6BFI 319	WB2AQC 305	WØIKD 283
EA2IA 331	W4UNP 331	YV1KZ 330	PAØXPQ 328	I1ZV 327	AC7DX 324	N6RJY 319	K6CF 304	EA3CYM 283
W6EUF 331	PY4OY 331	YV1AJ 330	VE2WY 328	SV1ADG 327	KØHQW 324	CT1EEN 319	KC4FW 304	K7ZM 282
K2JLA 331	N7BK 331	W4NKI 330	VE2PJ 328	DL8CM 327	VE4ROY 324	WA4DAN 319	EA5GMB 304	WN6J 281
K6JG 331	N7RO 331	I4LCK 330	W2JZK 328	KE4VU 327	W2FKF 324	CE1YI 318	YC2OK 303	CP2DL 281
K6GJ 331	ZL3NS 331	4N7ZZ 330	YV1JV 328	I1JQJ 327	EA3BKI 323	ZL1BOQ 318	WB2NQT 303	F5JSK 281
K2ENT 331	I8LEL 331	W4UW 330	KZ4V 328	XE1MD 327	I8KCI 323	YV4VN 317	VK3IR 303	YU1TR 280
N4JF 331	OE3WWB 331	YV1CLM 330	WDØBNC 328	KF8UN 327	K4JDJ 323	CT1AHU 316	W5GZI 302	KK5UY 280
VE1YX 331	IK8CNT 331	K8CSG 330	K1HDO 328	W2CC 327	W9IL 323	N5HSF 316	N5QDE 302	EA3CWT 278
K5TVC 331	DL9OH 331	W2FXA 330	VE4ACY 328	W5RUK 327	WW1N 322	K6RO 316	KD4YT 302	N1KC 278
K6YRA 331	N4MM 331	W8ZET 330	K5UO 328	W4QB 326	F6BFI 322	K7TCL 315	SV3AQR 302	9A9R 277
YU1AB 331	EA4DO 331	VE7WJ 330	N5ZM 328	K6BZ 326	LU7HJM 322	WB8ZRV 314	LU3HBO 301	VE2DR 277
W7OM 331	K9FYZ 331	LA7JO 330	W6SHY 328	K8PV 326	K5NP 322	K9YY 313	YT7TY 300	SV2CWY 276
K4MQG 331	PT2TF 331	W9SS 330	K9PP 328	W6SR 326	NI5D 322	NØMI 313	K3LC 300	W6UPI 276
VE3MR 331	OZ3SK 331	K4JLD 330	K9HQM 328	W4LI 326	PY2DBU 322	KD5ZD 312	WA4ZZ 300	KE4SCY 275
K7LAY 331	XE1VIC 331	OE7SEL 330	VE2GHZ 328	DL6KG 326	YZ7AA 321	VE3CKP 311	LU5DV 300	VE2AJT 275
IK1GPG 331	W6DN 330	WS9V 329	I4EAT 327	N4KG 326	W8AXI 321	CT1YH 311	SV2CWY 300	Z31JA 275
K5OVC 331	XE1L 330	W7FP 329	CT1EEB 327	KD8IW 326	EA8TE 321	W5OXA 311	K6GFJ 299	KA5OER 275
DJ9ZB 331	ZL3NS 330	N5FG 329	W9OKL 327	WA4WTG 325	XE1CI 321	HA6NF 310	SV1RK 295	
NØFW 331	XE1AE 330	OE2EGL 329	F9RM 327	KE5PO 325	W6MFC 321	K3LC 310	4X6DK 295	
KZ2P 331	VK4LC 330	I2EOW 329	AA6BB 327	N2VW 325	KØFP 320	W4WX 310	YT1AT 294	
K1UO 331	WB4UBD 330	K2JF 329	SM6CST 327	IKØIOL 325	N4CSF 320	WR5Y 310	OA4EI 292	
OZ5EV 331	K3UA 330	WB3DNA 329	W3GG 327	YV5AIP 325	N4HK 320	K7HG 309	KØOZ 291	
W6BCQ 331	K9BWQ 330	ZL1AGO 329	CX4HS 327	K9IW 325	DL3DXX 320	EA3BHK 307	EA5GMB 287	
YV5IVB 331	VE3MRS 330	I8KCI 329	KX5V 327	WA4JTI 325	AE5DX 320	WZ3E 306	KK4TR 286	
K7JS 331	N4CH 330	4Z4DX 329	IT9TQH 327	W8KS 325	KB1HC 320	N1ALR 305	VE7HAM 285	

RTTY

K2ENT 327	W2JGR 316	NI4H 305	G4BWP 287	W4EEU 284	YC2OK 280	I2EOW 278	KE5PO 274	PAØXPQ 272
WB4UBD 320	K3UA 313	I1JQJ 289	EA5FKI 284	W4QB 280				

SKØUX club members with visitors (left to right): SMØTTV, SM5XW, EA4YL, SMØWLN, and SMØJSM/EA8TY.

tier, as propagation and antenna size are usually the limiting factors.

The other WAZ box is a summary of the 40 zone WAZ awards for the month. The listing is by award type, number, and callsign. There are many different types of WAZ awards available to suit various interests. This box also lists 160 Meter WAZ endorsements and new 160 Meter WAZ awards. The 160 Meter WAZ award is issued when a station reaches the 30 zones confirmed level.

If you are interested in the WAZ program, go to the WAZ web pages at the *CQ* web site. The URL is <www.cq-amateur-radio.com/wazrules.html>. These pages also contain everything needed for applying for the WAZ award. Rules are available in PDF format in several languages; application forms are there, too. Take a minute and check it out. It's interesting reading.

As of 1 June 2000 a total of 534 sta-

CQ DX Awards Program

SSB

2315.....W5IBZ

SSB Endorsements

320.....OZ3SK/331
320.....K4JLD/330
320.....OE7SEL/330
320.....W4UW/330
320.....K6BZ/326
310.....YV4VN/317
275.....F5JSK/281

CW Endorsements

320.....K4CEB/330
310.....K4JLD/319
310.....W4UW/317
310.....HB9DDZ/314
310.....N4OT/311

RTTY Endorsements

320.....K2ENT/329

The basic award fee for subscribers to *CQ* is $6. For non-subscribers, it is $12. In order to qualify for the reduced subscriber rate, please enclose your latest *CQ* mailing label with your application. Endorsement stickers are $1.00 each plus SASE. Updates not involving the issuance of a sticker are free. Rules and application forms for the CQ DX Awards Program may be obtained by sending a business-size, No. 10, self-addressed, stamped envelope to CQ DX Awards Manager, Billy Williams, N4UF, Box 9673, Jacksonville, FL 32208 U.S.A. Currently we recognize 331 active countries. Please make all checks payable to the award manager.

QSL INFORMATION

3B8ST to DL1BDF
3D2RK to W7TSQ
3D2SQ to W7TSQ
3DA0/ZS6WPX to ZS6KTT
3DA0WPX to ZS6WPX
3V8BC to F5LAJ
3W7CW to SP5AUC
3W7TK to OK1HWB
3Z60W to SP2BNJ
4B1AC to XE1BEF
4L26MAY to 4L1DA
4S7UB to KJ6UB
4S7YSG to JA2BDR
4W6SP to 9A2AA
5C8A to EA5XX
5R8DS to PA3BXC
5V7MD to K7PT
5V7MN to DF8AN
5X1Z to SM6CAS
6V6U to K3IPK
6W1QV to F6FNU
6Y5MM to W4YCZ
6Y8A to WA4WTG
7S2E to SM2DMU
7Z1ZZ to 7Z1ZZ
8M2000 to JARL
8P9JL to OH6RX
8P9V to OH6RX
8Q7LA to OM3LA
8S7A to W3HNK
8S7IPA to OZ5AAH
9E1C to IV3OWC
9G5MD to G3OCA
9G5ZW to OM3LZ
9J2FR to IK2RZQ
9K2SS to KB2MS
9M2TO to JA0DMV
9M2XA to JF4WPQ
9M6CT to G4JMB
9N1VJ to JA9VJ
9N7EK to JR8FEK
9N7IP to JG5CIP
9N7RN to IK4ZGY
9N7SZ to JA9LSZ
9N7VJ to JA9VJ
9N7VN to K3VN
9N7WU to JA8MWU
9N7YT to JJ2NYT
9V1XE to DL4DBR
A45ZN to GØDBX
A51GJ to WØGJ
A52A to WØGJ
A52JS to VK9NS
AH6PW/KH0 to JN1HOW
AJ2U/VP9 to KQ3F
AN6IB to EA6IB
AP2MY to OM2SA
AP2WAP to IK4ZGY
AY0N/X to LU2NI
BI4L to BY4RSA
BT0QGL to KQ6PS
BV9G to BV8BC
3F1BYS to Elio Salinas, Box 10745, Panama 4, Panama
3F3A to Louis N. Anciaux, PSC 2 Box R3197, FPO AA 34002 USA
3F3XUG to Louis N. Anciaux, PSC 2 Box R3197, FPO AA 34002 USA
4S7WN to Dr. Nihal G. Wijesooriya, 44-1/1 Ward Place, Columbo 7, Sri Lanka (use oversize return envelope; big card)
4W6MM to Thorvaldur Stefansson, PO Box 3699, Darwin, NT 0801, Australia
5B4AGX to Mike Potter, Box 60195, CY-8128 Paphos, Cyprus
5N0WFU to Box 1509, Wiesbaden, Germany
6K5SSR to Lee Jong-Min, Box 65, Taegu Susung 706-600, South Korea
7O1YGF SSB and RTTY to Hans Hannappel, Eschenbruchstr. 1, D-51069 Koeln, Germany
7P8/ZS5CDF to PO Box 401219, Redhill 4071, S. Africa
7P8/ZS5LF to PO Box 401219, Redhill 4071, S. Africa
8J1RL to Feb 2000, via JG3PLH, Takumi Kondoh, 1-23 Shinke-cho, Sakai City, Osaka 599-8232, Japan
8P6GH to Kelvin Went, Box 150E, St. Michael, Barbados
9M6XXT North America only to Kiyoshi Endo, K4ST, 8 Amlajack Blvd. Suite 362, Newnan, GA 30265 USA
9N1AA JA's to JM1HBO; all others to N4AA
A41LK to Fahad, PO Box 509, Sohar 311, Oman
A41MD to Jeifar Abdullah al-Habsy, Box 1823, Seeb 111, Oman
A43IB to The Royal Omani Amateur Radio Society, Box 981, Muscat 113, Oman
A51TY to T Yonten, Headquarters Royal Bhutan Wireless, Post Office Thimphu, Bhutan
AP2ARS to Pakistan AR Society, PO Box 1450, Islamabad 44000, Pakistan
AP2ARS May 13/14, 2000 to ON5NT, Ghislain Penny, Lindestraat 46, B-9880 Aalter, OV, Belgium
AP2N to KU9C, Steve Wheatley, PO Box 5953, Parsippany, NJ 07054 USA
BD4AGN to Room 403, No. 35, Village 14 of Tianlin, Xuhui, Shanghai 200233, China
BD6QH to Ruan, Box 60003, Wuhan 430060, China
BD7KU to Yi Quan, 131 Xian Lie Dong Road, Guangzhou 510500, China
BD7YC to Dick Hisan, Box 59, 16 Datung Avenue, 570102 Haukou, Hainan, China

tions have completed the 5B WAZ award. Following are some interesting statistics about the stations that have completed this award.

Awards By Year

1979	1	1990	47
1980	4	1991	32
1981	20	1992	15
1982	25	1993	22
1983	20	1994	32
1984	16	1995	24
1985	22	1996	23
1986	24	1997	23
1987	26	1998	13
1988	42	1999	19
1989	54	2000 (to date)	30

There is a definite correlation between the sunspot peak and the number of completed 5B WAZ awards!

Awards By Continent

North America	130	24.3%
Europe	303	56.7%
Asia	60	11.2%
South America	13	2.4%
Australia/Pacific	14	2.6%
Africa	14	2.6%

Awards By Country
(more than 10 awards)

USA	115	21.5%
Japan	46	8.6%
Germany	40	7.5%
Italy	39	7.3%
Sweden	22	4.1%
Spain	17	3.2%
Russia	15	2.8%
Britain	14	2.6%
Belgium	12	2.2%
Finland	12	2.2%
Czech Republic	12	2.2%
Poland	12	2.2%
Yugoslavia	11	2.0%
France	10	1.9%

Awards By USA Call Area

W1	12	W6	12
W2	10	W7	10
W3	4	W8	10
W4	17	W9	13
W5	12	W0	14

Contest Season

By the time you read this, the contest season will be well underway. With the improved (although sometimes erratic) propagation, we can look forward to lots of activity in the various contests from now through next spring.What better way to add to your country totals than in a contest? A large number of contest DXpeditions will also be active, and these operations seem to QSL somewhat better than individuals.

Many thanks for the feedback you have been providing. A number of comments have been received concerning my thoughts on operating habits, etc. It seems to me there was a bumper sticker at one time that said something like "Courtesy is Contagious." Chasing DX, or driving a car on a busy roadway, this saying seems quite appropriate.

Until next month . . .

73, Carl, N4AA

Awards

BY TED MELINOSKY, K1BV

News Of Certificate And Award Collecting

Last month we answered some common questions we have encountered regarding the USA-CA award program. Here are some more questions received by e-mail concerning the USA-CA rules.

Q: Is the USA-CA Record Book still required, or can printouts from Quickwin be used?

A: The USA-CA program now allows the use of any kind of computer printout of a data base as long as it includes the same information as shown in the book. Contacts should be by state and by county within state. Note that a complete list of counties worked must be submitted with each application, not just the new ones since the last endorsement.

Q: As I earn various levels, do I have the cards verified each time or only at the highest level?

A: While the custodian may request cards at any level, it has been customary to require a small sampling of cards when applying for the 3076 top level. The program has long relied on the honesty and forthrightness of the county hunter, and there is no evidence that this needs to be changed.

Q: I have a regular QTH and a summer QTH. When operating at the summer QTH, I mark my QSL to show the county where it is located. Will county hunters be able to submit the QSL card for the summer QTH if that is what is checked?

A: Yes, even though your specific vacation location isn't shown, you have positively identified the county from which you were operating. However, I'd suggest making it even clearer next time you reprint the cards by including the phrase: "Operating Portable in" together with the county name.

Q and A: Band/Mode endorsements, a modest change of direction. Although the program recognizes such endorsements while the award is still being earned, after the highest level is earned, endorsements are not officially issued. There is a small but enthusiastic group of county hunters who continues to compete among themselves on a band and/or mode basis. I'll agree to issue written certification of their achievement and even to prepare un-numbered homemade endorsements on my color printer to satisfy this need. There is *no* charge for these endorsements, other than the requirement that you provide return postage and suffer with my amateurish printing efforts.

65 Glebe Road, Spofford, NH 03462-4411
e-mail: <k1bv@cq-amateur-radio.com>

USA-CA Special Honor Roll

Charles T. Traylor, KD5CXO
USA-CA All Counties #1004
August 14, 2000

Marilyn Kay Yohe, N9QPQ
USA-CA All Counties #1005
August 16, 2000

Jerold L. Mertz, WØGXQ
USA-CA All Counties #1006
August 18, 2000

USA-CA Honor Roll

500		2000	
KD5CXO	3123	KD5CXO	1192
N9QPQ	3124	N9QPQ	1193
WØGXQ	3125	WØGXQ	1194
KN6ZB	3126	KN6ZB	1195

1000		2500	
KD5CXO	1552	KD5CXO	1116
N9QPQ	1553	N9QPQ	1117
WØGXQ	1554	WØGXQ	1118
KN6ZB	1555	KN6ZB	1119

1500		3000	
KD5CXO	1292	KD5CXO	1023
N9QPQ	1293	N9QPQ	1024
WØGXQ	1294	WØGXQ	1025
KN6ZB	1295	KN6ZB	1026

The total number of counties for credit for the United States of America Counties Award is 3076. The basic award fee for subscribers is $6.00. For nonsubscribers it is $12.00. To qualify for the special subscriber rate, please send a recent CQ mailing label with your application. Initial application may be submitted in the USA-CA Record Book, which may be obtained from CQ Magazine, 25 Newbridge Road, Hicksville, NY 11801 USA for $2.50, or by a PC-printed computer listing which is in alphabetical order by state and county within the state. To be eligible for the USA-CA Award, applicants must comply with the rules of the program as set forth in the revised USA-CA Rules and Program dated June 1, 2000. A complete copy of the rules may be obtained by sending an SASE to Ted Melinosky, K1BV, 65 Glebe Road, Spofford, NH 03462-4411 USA. DX stations must include extra postage for airmail reply.

Tim Traylor, KD5CXO USA-CA #1004

Tim, KD5CXO, became interested in ham radio in the 1940s. He went to a few club meetings, but did not get his license until 1997!

In the 1950s Tim was an airborne communications repairman for the Air Force. He spent the 1960s with IBM, working on office equipment and some of the early computers. The 1970s were spent working on his PhD in cartography at the University of Kansas. His interest in amateur radio was dormant for most of the 1970s,'80s, and '90s while he taught geography and cartography at the University of Southern Mississippi and the University of Memphis.

When Tim retired from the university in 1997 and moved to Arkansas, he decided to get his license. He passed the Technician test in November 1997 and the General in April 1998. His first HF contact in the log was on April 13, 1998 with Jim, KZ2P, the net control operator for the Emergency Mobile and County HUnters Net on 14.336 MHz, and Tim was hooked immediately. Two years and four months later, all 3076 counties in the U.S. had been worked using only SSB.

As of now, DX has not been an area of much interest to Tim. However, he has collected QSLs from operators in 16 countries on five continents who worked him as a mobile in various counties of the U.S. Maybe someday with a better antenna his interest will change.

Tim's equipment includes a Yaesu FT-1000MP base unit running at 100 watts through a tuner to a G5RV antenna at 35 feet. The mobile unit is a Yaesu FT-900AT, also 100 watts, with a 40/20 meter "Hustler" type antenna mounted on a trailer hitch for the car or the front mirror bracket on a mini-micro motorhome.

Tim and his wife, Faith, travel quite a bit and enjoy putting out counties for others to collect. He finds that's as much fun as collecting counties. He has transmitted from over 400 different counties in the U.S.

Congratulations, Tim, on becoming USA-CA #1004!

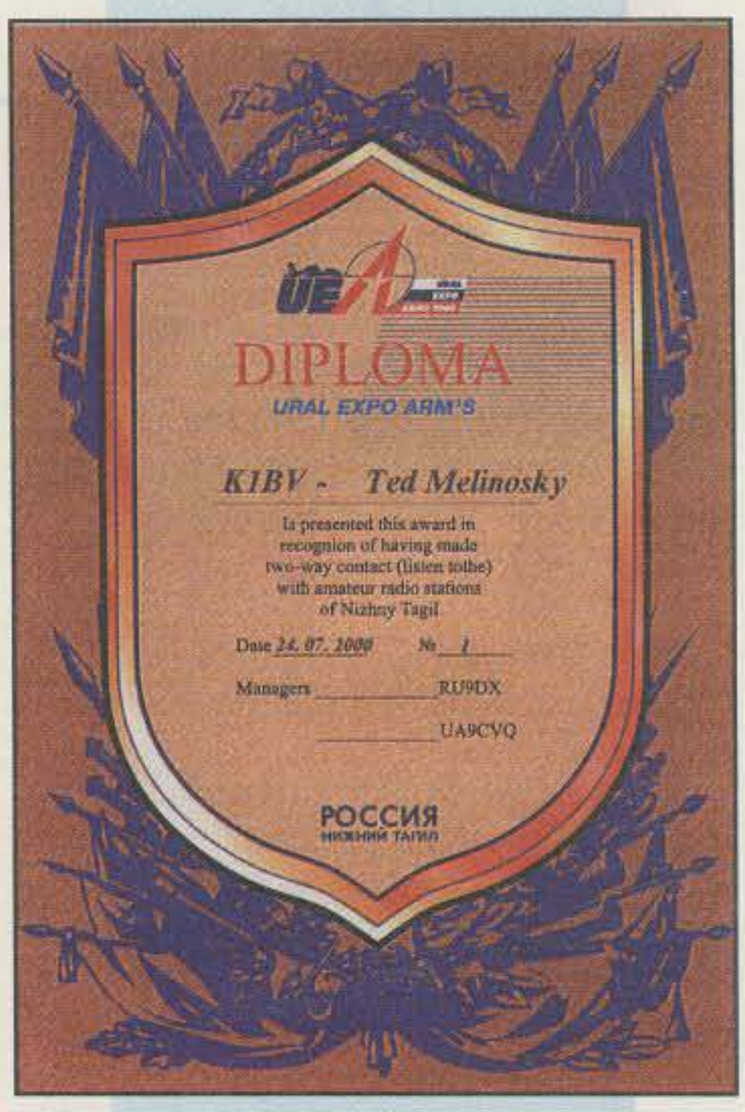
Awards Available

Ural EXPO Arms Award. Here is a short-term award which will give you about 60 days to earn a certificate sponsored by the "Yupiter" Club located in

Nizhnij Tagil of the Ural Mountains region of Russia. In November and December it's always a treat to turn the beam directly north to work Siberian stations. There's nothing like a fluttery signal coming across the North Pole! This award will give you another good excuse to do this.

Contact five stations in Oblast 154 (UA9C, D) during the period 1 July 2000 to 1 January 2001. The same station may be contacted on different bands or modes for credit. All bands and modes may be used. On 160 meters only two contacts are needed; on VHF only one is needed. SWL okay. Send GCR list and fee of 10 IRCs to: Vlad Koroljov, UA9CVQ, Club "Yupiter," P.O. Box 86, Nizhnij Tagil, 622022 Russia.

The following special calls will be active during this international exhibition of Military and Arms in Nizhnij Tagil: UE9CAA, UE9CAB, UE9CAC, UE9CAD, UE9CAE, UE9CAF, UE9CAG, and UE9CAH. (QSL via UAØCVQ.)



The Ural EXPO Arms Award is issued for contacting five stations in Oblast 154 from July 1, 2000 to January 1, 2001.

Noorderkempen Award (NOK). Here is a club-sponsored award basically aimed at encouraging contacts with members, but allowing you to use any other Belgian station to complete the requirements.

Contact or hear members of this group or other stations in Belgium. Points needed: ON = 50, other Europe = 40, all others = 30. Each contact with a member is worth 10 points; other Belgians = 1 point. Members' cards will be marked "Member NOK." See the club's www page for the list of members: <http://users.pandora.be/uba.nok>. SWL okay. No band or mode limitations. Send GCR list and fee of $4US or 5 IRCs to Marcel Sterkens, ON4ASW, Moerenweg 6, B-2310 Rijkevorsel, Belgium; <on4asw@pi.be>.

The Noorderkempen Award is a Belgian club sponsored award.

West Flanders Windmill Award. Well, it was bound to happen. It started with working islands, even those which didn't count for DXCC. Then the craze expanded to castles, lighthouses, fortifications—and now windmills. In case you didn't know, Holland doesn't have a monopoly on windmills; neighboring Belgium has its own collection of these reminders of the past, and this award depicts several of them in full color. There is a separate award class for those stations which activate windmills for the award.

Contact at least 30 different officially listed windmills of Belgium. SWL okay. Note that only windmills with a reference number can be used for the award. A complete list of these windmills can be found at: <http://www.qsl.net/on6ck> or can be obtained from the sponsor by regular mail for an SASE. Send GCR list with windmill reference and fee of BEF 300 (about $US7) to: Buyse Gilbert, ON4CBV, Kuurnsestraat 35, B-8860 Lendelede, Belgium; <on4cbv@skynet.be>.

The West Flanders Windmill Award is issued for contacting at least 30 different officially listed windmills of Belgium.

The Halmstad-Helsinge Award is a hand-painted plaque.

Halmstad-Helsinge Award. This award from Denmark is in the format of a hand-painted plaque, not a paper certificate. It is certainly a neat item for your shack, or to be used to hold refreshments and goodies during the long hours of a contest! It requires contact with 52 stations as indicated below:

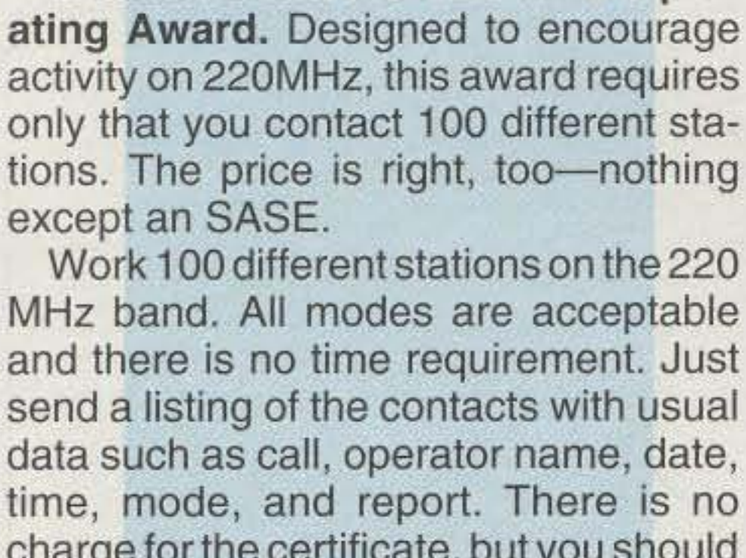
1. Contact 25 Swedish stations and make one QSO with club station SK6SP.

2. Contact 25 Danish stations and make one QSO with OZ9HEL.

Submit a GCR list and fee of 200DKK or the equivalent (about $24US) to: Bente Jodbjerg, Tisvildevej 3, DK-3210 Vejby, Denmark.

Weathersfield RC 220 MHz Operating Award. Designed to encourage activity on 220MHz, this award requires only that you contact 100 different stations. The price is right, too—nothing except an SASE.

Work 100 different stations on the 220 MHz band. All modes are acceptable and there is no time requirement. Just send a listing of the contacts with usual data such as call, operator name, date, time, mode, and report. There is no charge for the certificate, but you should at least send a certificate-size SASE to cover the sponsor's mailing costs. No endorsements are available yet, but the sponsor is open to suggestions. Apply to: Weathersfield Radio Club W9CYT, Award Custodian Klaus Spies, WB9YBM, 815 Woodland Heights Blvd., Streamwood, IL 60107.



Work 100 different stations on 220 to earn the 220 MHz Operating Award.

URL of the Month

EI7GL's web page provides links to all of the popular Irish awards: Worked All Ireland, Worked EI Counties, Worked All Mayo and Cork Radio Club Awards. Navigate to <http://www.qsl.net/ei7gl/> for the Irish experience.

Wanted: Your club or organization's award for future publication in this column. Enjoy the widest awards publicity provided by any American amateur radio magazine.

73, Ted, K1BV

World Of Ideas

BY DAVE INGRAM, K4TWJ

A Look At The World Around Us

Helpful Tips for New HFers

This month's column is dedicated to our newly HF-licensed friends, and it contains numerous "ground floor" notes and tips for getting started in HF-band operations—ideas you can put to good use every day. You could learn these "beyond the exam" details by reading a few tall stacks of radio books or magazines and tuning all the bands at different hours, but why lose time when you can be having a ball on the air? We are presently amidst the peak years of a fresh, new sunspot cycle and worldwide DXing is great. Come on in and join the fun!

You say you don't have a helping "Elmer" to show you the ropes (cables?) in station setup and guide you through initial on-the-air operations? That's understandable. Many old pros are having so much fun dinking with exciting new rigs and working our famed "low bands" of 160 through 10 meters that they can't stop long enough to help newcomers. I am sure they all agree with me, however, in welcoming next-generation amateurs into our proud society and realize that regardless of age or background, our new colleagues are very special folks. They also understand that the more we guide new hams today, the better we all will be tomorrow.

There is a hitch, however. Only a limited amount of information can be squeezed into each month's column. In fact, we need ten or twelve columns to accurately tell this story. That's why I am presently writing another new book. Yes, and this one is a winner! It is filled with seldom (if ever!) found in print details on understanding unique aspects of various transceivers and antennas, putting together a great first station, visualizing power needs, selecting appropriate AC outlets, avoiding RFI, and more. It also includes numerous success-proven tips for DXing, contesting, and operating like a pro. The book is like an Elmer in print! Estimated printing time is next month—a week or two before Christmas, if all goes as planned. Estimated price is $16 plus $2 U.S. postage ($3 priority mail). If you would like to reserve a first copy, just mail me an SASE and I will send you a flier when the book is ready.

That's enough good news hype for this time. Now let's talk about getting you started in HF fun!

4941 Scenic View Drive, Birmingham, AL 35210
e-mail: <k4twj@cq-amateur-radio.com>

How and Why HF Signals Skip

One of the special wonders and fascinating aspects of HF-band operations is how our signals reflect off the Earth's ionosphere and reach into distant lands. No satellites, telephone lines, or internet connections are required between

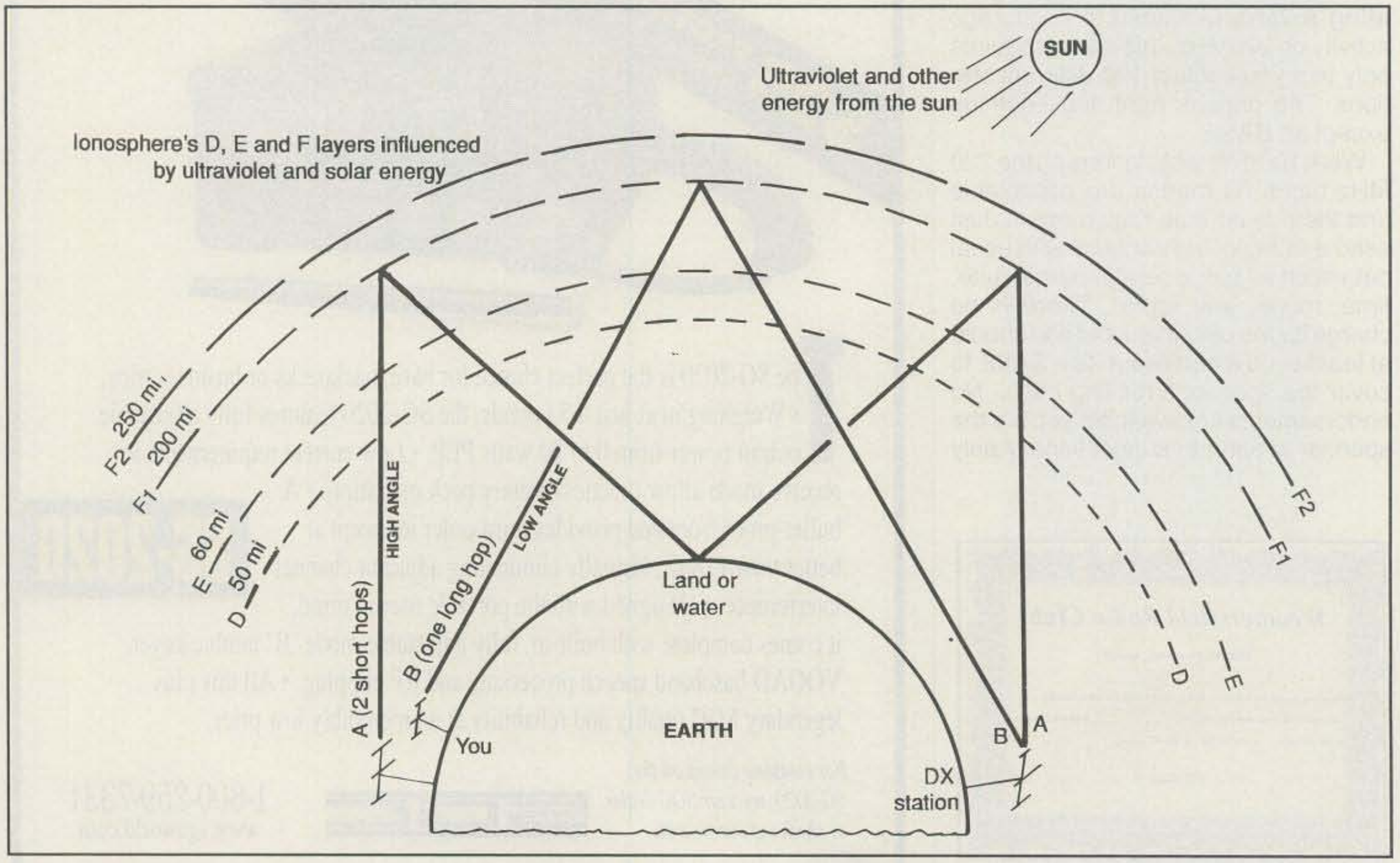


Fig. 1– Outline of the ionosphere and how it reflects HF radio signals over long distances. Wave A depicts the signal from a dipole installed at fairly low height, and wave B depicts the signal from a vertical installed in a fairly clear area. (Discussion in text.)

"Kate"

While tuning 20 meter SSB one Sunday afternoon a few months ago, the voice of a very young lady signing "/AG" and named Kate caught my attention. (Sorry, Kate. I missed hearing your call letters.) Kate sounded like a real ham and an Elmer's pride, describing her rig as an ICOM 751 at 90 watts and a G5RV antenna up 35 feet. The station she was working was congratulating her on upgrading. I sensed "first 20 meter QSO nervousness" in Kate's voice. The QSO ended and then several stations called simultaneously with positive encouragement, welcoming Kate into HF radio. Kate was overwhelmed. It was great! I wish everyone could have been on frequency listening along with me. It would have made you proud to be a ham, and I am sure it produced a positive feeling that will stay with Kate for many years to come. Listen carefully when you are on the air, friends; you can hear the next generation of operators starting up, and they are going to be terrific!

Band (meters)	Frequency (MHz)	
160	1.800–2.000	↑ open nights ↓
80/75	3.850–4.000	
40	7.225–7.300	
20	14.225–14.350	↑ open days ↓
17	18.110–18.168	
15	21.300–21.450	
12	24.930–24.990	
10	28.300–29.700	

Fig. 2– "Clip and use" guide to General class SSB frequency ranges on our nine HF bands. A full guide with CW and data ranges also was included in the May 2000 column.

"Points A and B," just air and radio waves. Using the ionosphere for globe-spanning communications is an art and a skill you easily can master with some "what's involved, how to" guidance.

As illustrated in fig. 1, the ionosphere is a layer of gases located between 50 and 250 miles above the Earth's surface. It acts like an invisible mirror to HF radio signals, with its reflectivity determined by ultraviolet and other energy emitted from the sun. When daytime solar energy heats the ionosphere, it typically reflects upper band signals between 20 and 10 meters, while attenuating or absorbing lower band signals. During hours of darkness, the ionosphere cools and attenuates or absorbs upper band signals while reflecting lower band signals between 160 and 20 meters. Yes, 20 meters was listed twice above. It is both a daytime and nighttime band. Also, stating exact day/night dividing lines between bands is not always possible: it depends on seasons, solar energy, sunspots, etc.

What are sunspots? They are fiery explosions on the face of the sun. Watch the introduction to *Star Trek* on TV, and you can see how they look in action. The larger the number of sunspots per day, the better our ionosphere reflects radio signals—usually, that is. Occasionally, massive explosions or solar flares (or magnetic storms) upset the ionosphere's delicate balance and cause it to absorb almost all HF-band signals. Everyone starts wondering if their rigs are working right, then (usually within one or two days) conditions return to normal. Actually, band conditions are usually above normal a day or two after flares, and that is also a very good time for DXing. Two more good propagation times occur each day at around sunrise and sunset, when the ionosphere is experiencing temperature changes. Want to stay informed about good and poor times and bands for HF hamming and DXing each month? Follow the "Propagation"

column by W3ASK here in *CQ* and monitor daily reports from WWV on 5, 10, 15, and 20 MHz at 18 minutes after each hour.

Another interesting point in fig. 1 relates to the transmitted signal's angle of radiation, or signal takeoff angle as it is called on exam questions. The higher that angle (as depicted by wave A), the shorter the signal's most important first hop distance. The lower that angle (as depicted by wave B), the farther the first hop distance. If an ionosphere-reflected signal hits water, it can continue for more hops without serious attenuation. If it hits land, attenuation is much greater. If one or two hops rather than a half-dozen hops occur, signals into (and out of) distant lands are obviously stronger. Now add the following thoughts to those facts.

If a horizontal-type antenna is used, its signal take-off angle depends on its height above ground. The higher it is installed, the better it is for DXing (although lower antennas work well for in-country QSOs). If a vertical is used, its signal take-off angle is naturally low (20 degrees "up" on your far horizon). Verticals are easy-to-handle antennas and are capable of good DX performance, but they must be mounted in a clear or "open sky" area. Mounting an antenna beside a house blocks its radiation and "RFs the shack." Raise it above roof levels or obstructions, however, and it works better than expected. Remember our previous points when selecting and installing antennas, and you will enjoy successful HFing right from the start.

Which Band(s) to Use

At this point, new HFers are probably asking which bands best fit their particular needs and interests. Everyone has a different opinion here, and limited column space necessitates brief discussions, so I will "hit a few high points" and then you can make your own decision. I assume you are mainly interested in voice/SSB operations to start, so refer to fig. 2 as we continue.

Ten, 12, 15, and 17 meters are good "daytime" bands that like sunshine and sunspots (but not solar flares!). All four bands are good for working stations farther away rather than closer in to your QTH. In other words, they are attractive for DXing with only a modest setup, but their signals usually skip over areas in a 300 mile radius of your QTH.

Ten and 12 meters usually "open" to DX areas east of your QTH a couple of hours after sunrise, shift to favor north/south paths around midday, and then skip into western DX areas during late afternoons (you can almost feel that warm sunshine midway of their DX paths!).

Fifteen and 17 meters are similar except these two bands usually open a couple of hours sooner and close a couple of hours later than 10 or 12 meters. Also, both 15 and 17 can act like 20 meters at times and host some surprise (and terrific) DX openings in unexpected directions.

The so-called WARC bands of *12 and 17 meters* (plus 30 meters if you like CW) are especially attractive for newcomers and/or low power stations, as many U.S. stations overlook these bands or do not have antennas for them and everyone with a half-good signal is a "star."

Twenty meters is unquestionably the heartbeat of HF activities and big-time DXing. It is continuously abuzz with DX pile-ups, high and low power signals, SSTV and packet operations, equipment info and collector nets for all brands of rigs, maritime and vehicle mobileers, and more. Twenty meters is typically open into both stateside locations over 300 miles from your QTH and exotic DX areas somewhere in the

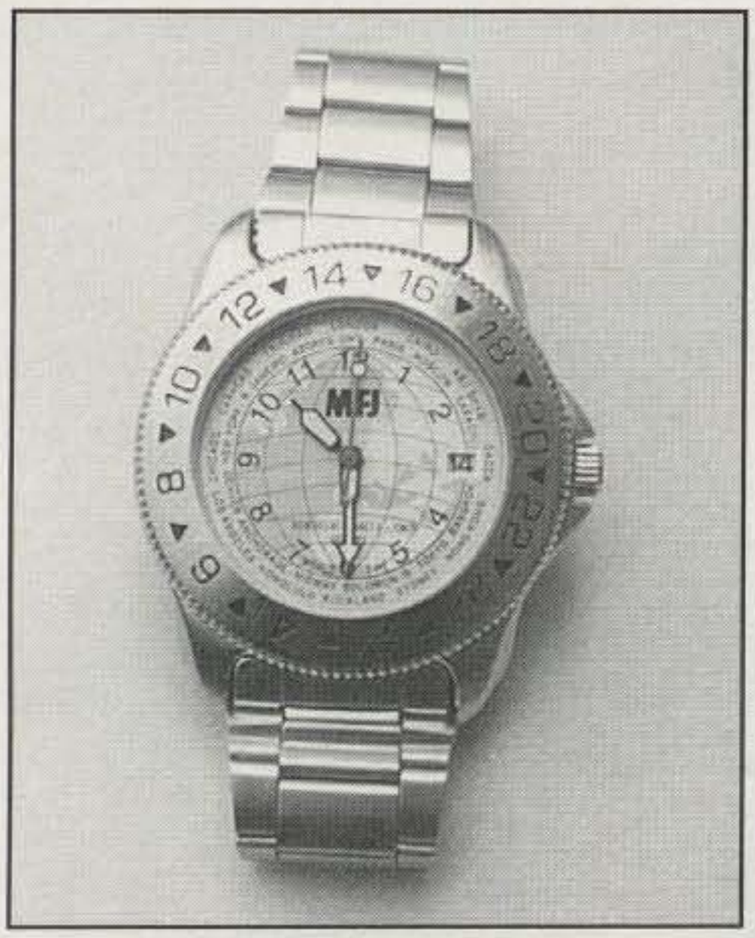


Photo A– Like DXing? You will love this new MFJ DX watch. Just rotate its outer bezel to your present time and then read equivalent times in cities throughout the world around its face. By comparing hours around the bezel with cities around the face, you can also visualize day or night signal paths plus estimate which bands may be open into various areas. (Discussion in text.)

world almost any hour of the day or night. Like most other bands, however, the prime time for working 20 meters is around sunrise and sunset.

Forty, 80, and 160 meters are generally good "nighttime" bands that like darkness and seasons with cooler temperatures. They are good for working stations closer in rather than farther away from your QTH. Being closest to 20 meters, 40 meters is also open into DX areas when darkness is midway of a path and interference from shortwave broadcast stations is acceptable. *Eighty meters* is often filled with state emergency nets and other groups that meet nightly on specific frequencies. Check with your local club to learn where your state's net meets; it's good to know during inclement or violent weather. The 160 meter band is especially known for its classic old-time aire. Some old-pro hams can tell fascinating tales from radio's past, stories I am sure you would enjoy hearing and passing on to future generations later on. Just listen for older call letters and then ask the operators when they started in radio and what their first rig was. Now use our tips and start having fun with us on HF!

Time is Paramount

Study a globe or ARRL world map, and you will notice the Earth is divided into

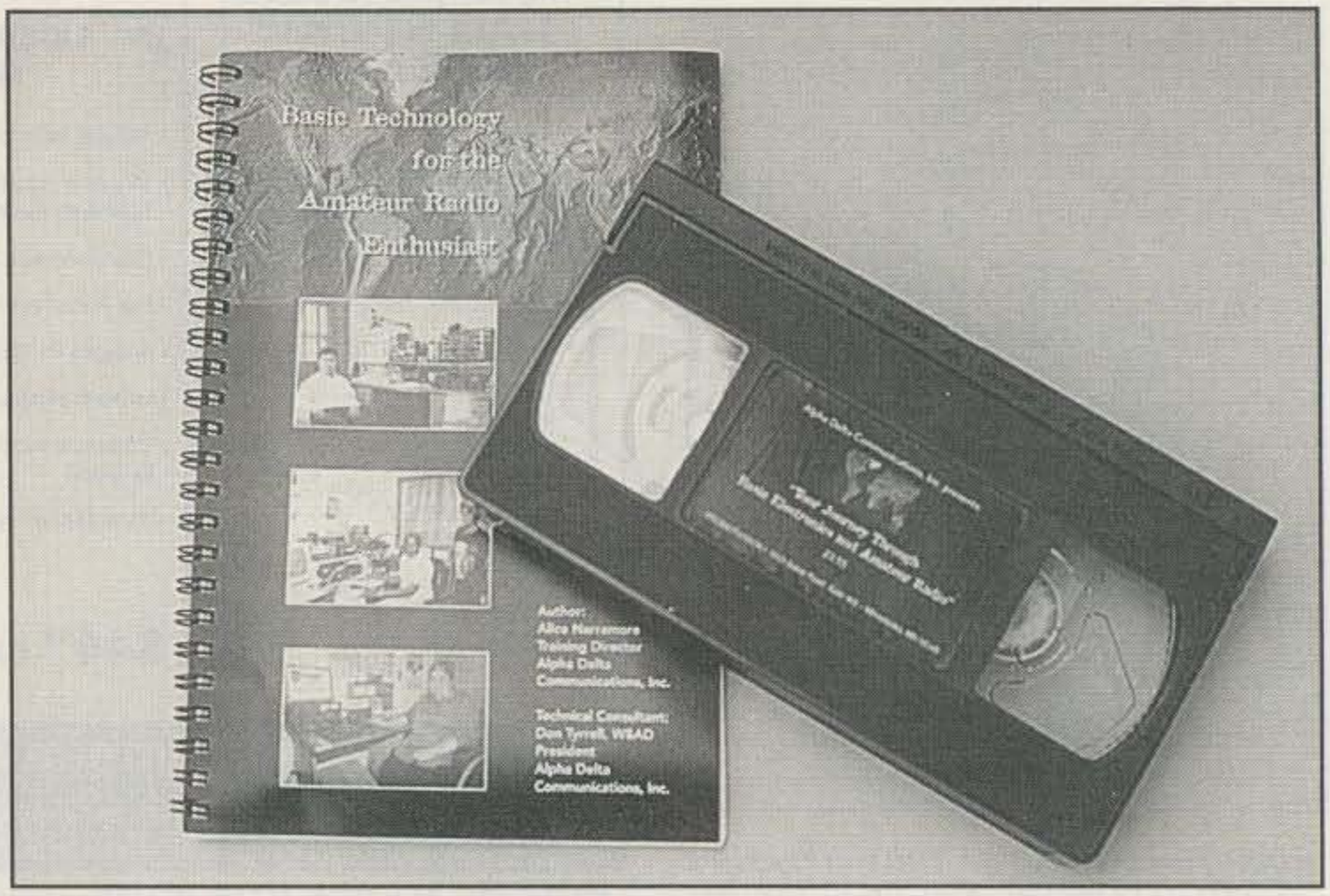


Photo B– Here is a neat pre-Christmas gift any new amateur or soon-to-be-amateur will thoroughly enjoy. It is the new knowledge-expanding book and video package entitled "Basic Technology for the Radio Amateur Radio Enthusiast." It is available from Alpha Delta Communications. (Details in text.)

24 time zones—one for each hour of the day. Look closely and you will also notice each time zone east of your QTH is one hour ahead of your local time and each time zone west of your QTH is one hour behind your local time. How do the previous notes apply to happy DXing? Low-frequency bands such as 40 meters open toward areas in darkness with the ionosphere coolest near mid-path, while upper bands such as 10 meters open toward sunlit areas with maximum ionospheric heating around mid-path. Ahh, but prime times of DX openings are not the full story here. You may be on the air, but foreign amateurs may be sleeping or away from home working (or vice versa). A globe is handy for visualizing times around the world, but it is difficult to carry or use while mobiling.

A neat alternative is the MFJ DX wristwatch shown in photo A. The outer bezel on this watch can be rotated to align a selected time with one of the 24 well-known world locations around its face. Then you can look around the dial to read GMT, times in other areas, and note which areas are in darkness/night or sunlight/day. If you align 7 (AM) on the bezel with Hong Kong, for example, the corresponding Central Standard Time in Chicago is 1700 (5 PM). Maximum sunlight will occur around Midway Island and 12 noon, producing a possible good DX path between the two areas. Twenty, or possibly 15, meters would be a good band to check at this time. Looking toward the east of Chicago (clockwise on bezel), midnight will be near Paris. Forty meters might be open into Hong Kong if we are amidst long winter nights.

Conclusion

It is a true pleasure sharing views and ideas with you, but we have run out of space and must sign off for another month. Before wrapping up, however, a new horizon-expanding book and video package from Alpha Delta Communications warrants favorable mention (photo B). The approximately 100- page book and 25-minute video package is entitled "Basic Technology for the Amateur Radio Enthusiast," and it does a superb job of quickly explaining ham radio's main attractions in non-technical terms. It peeks into our proud history and philosophy; our favorite interests, such as DXing, contesting, and FMing; plus it describes modes, antenna, and signal propagation. The video is quite interesting, especially when the narrator shrinks down to the size of an IC and gives a quick behind-the-dial tour of a modern transceiver. The overall concept is like those professional self-improvement videos for high achievers. Nice!

Packages are available from Alpha Delta Communications, P.O. Box 620, Manchester, KY 40962 (telephone order line 888-302-8777 or 606-598-2029, or <www.alphadeltacom.com>). Check it out, have a ball on HF, and listen for me Sundays between 14.200 and 14.260 MHz.

73, Dave, K4TW

Beginner's Corner

BY PETER O'DELL, WB2D

For the Newcomer to Ham Radio

Contests

One aspect of ham radio operation that generates a great deal of controversy is contesting. Why are so many hams passionate about contesting? What is the excitement? What causes other hams to hate it with equal passion? Whether you love it or hate it, here's the inside scoop.

Human society is built around the concept of competition. You see it on Wall Street with companies always trying to push their stock prices higher. You see it in the movies with the industry tracking the weekend sales totals for newly released movies. Of course, you see it in sports; by their very nature, sports are competitive at every level, from the highly organized professional football teams to a couple of "club" players batting a tennis ball back and forth on a Saturday morning in Omaha. It is human nature to compete.

Ever think about competing? What holds you back? Maybe you are out of shape physically. Ham radio contesting is a form of competition in which physical fitness is of negligible importance. Is it expensive? No. Do you need special equipment? No;. an average station will suffice for entry-level competition. Is it hard? No. Is it fun? YES! Can I boost my country total? YES!

Contesting goes back to almost the very beginning of ham radio. Just after WW I, the push was on to explore the "vast wasteland" of shortwave radio and to make contacts over greater and greater distances. Certain time periods were set aside to attempt transatlantic contacts. Success soon came, and these special time periods eventually evolved into the ARRL DX Contest. Of course, in the 80 or so intervening years things have changed, and the rules have been adapted to grow with them.

All contests follow a generic form. It is just the specifics that vary and give each its individual flavor. In general, the idea is to make as many contacts as possible, while at the same time working as many multipliers as possible. What is a multiplier? It is whatever the contest rules say it is. For DX contests it is usually countries, as defined by the ARRL DXCC program. In the case of the CQ WW DX Contest, one of the major contests, the multipliers consist of the country total added to the zone total. Or, for something that gives the contest a really different flavor, the CQ WPX Contest uses different prefixes for multipliers. Then you have the little specialty contests, where the world gets rewarded for working the hams of one particular country, such as Bermuda.

Whatever the exact format, you are going to have a certain number of contacts and some sort of multiplier. Once the total number of contacts and the total number of multipliers are determined, you get your final score by multiplying these two numbers together. Simple. Right? Wrong. We'll get into strategy in a minute.

You also should note what constitutes a valid contact. In general, you must exchange a minimum of callsigns and signal reports as well as acknowledgments—usually "roger the 59" or "QSL 59 Florida" suffices for the phone acknowledgment. The specifics vary somewhat depending on the contest. For instance, the ARRL's Sweepstakes is modeled after traffic-handling procedures. The exchange thus becomes more complicated, but it is still a contest. One way to make more contacts is to speed them up. As a result, contest exchanges become models of communication brevity and efficiency.

This is Ari, OH1EH, who operated single-op, single band from Finland in a recent CQ WPX Contest.

The major contests tend to run for a weekend (48 hours). The good ones are competitive—very competitive. Therein lies the rub. The bands quickly fill up with people operating the contest—competitive people in a hurry, competitive people looking to maximize their score by minimizing "wasted" time. The contacts are fast and furious; there is no time for casual civilities. The slow-moving rag chewer just wants a little chunk of the band where things are quiet and sedate. Good luck on a contest weekend. The battle lines are drawn. Mostly, it is just a lot of good-natured complaining, but once in a while it degenerates into some very un-ham-like behavior. There is room on the bands for contester and noncontester alike. A little tolerance and understanding should go a long way.

Where To Start

Suppose you do have a sense of adventure and have decided to check out contesting. Where do you start? First, do your homework. If your approach is "I'll just tune in on Saturday morning and

*123 NW 13th Street, Suite 313, Boca Raton, FL 33432
e-mail: <wb2d@cq-amateur-radio.com>

have some fun," chances are you will be disappointed or frustrated. You know how computer jocks are always telling novice users to "RTFM"—read the fine manual. Well, the same can be said to would-be contesters: Read the rules! You'll find them printed in the sponsor's publication a couple of months before the event. If you have a computer, you usually can log on to the organization's web site and find the contest rules there. For instance, log onto the *CQ* web site (www.cq-amateur-radio.com) and you will find the rules for all *CQ* contests. The rules are not that long—usually the equivalent of a magazine page or two—and they are packed with information.

Next start reading the contesting columns in *CQ, QST,* and any other ham magazine you can find. You will also find results of the various contests in these magazines from time to time. In many ways it is like reading the sports section of your newspaper on Monday morning during football season. Much can be gleaned from these pages. The regular columns list upcoming contests, some minor ones as well as the majors. Although you may not want to enter the "Outer Slobovia World Challenge," you can often pick up potentially useful information. Also, there are the single-band contests, such as the CQ 160 Meter Contest. There are specific mode tests, the CQ/RJ RTTY Contest being an example, and very specialized contests such as the ARRL's EME Contest. You may not be ready for one of these contests yet, but it is always good to know what's out there.

Major Contests

Jan.	CQ WW 160 Meter CW ARRL VHF Sweepstakes
Feb.	CQ WW 160 Meter Phone ARRL DX CW
Mar.	CQ WPX Phone ARRL DX Phone
May	CQ WPX CW
June	ARRL Field Day
July	IARU HF Championship CQ WW VHF Contest
Aug.	Worked All Europe CW
Sept.	Worked All Europe Phone
Oct.	CQ WW DX Phone
Nov.	CQ WW DX CW ARRL Sweepstakes CW ARRL Sweepstakes Phone
Dec.	ARRL 10 Meter Phone & CW

The columns and rules may not make a lot of sense to you the first couple of times you read them, because contesting has a jargon all its own. However, you soon will start to make sense of it. It is pretty simple and logical, for the most part. (To get a jump on the learning curve, just visit the CQ Bookstore and order a copy of the video "Getting Started In Contesting." It is an excellent introduction and reference tool.)You probably will encounter terms such as "single op," "multi-op," and "multi-multi." Sounds rather crazy until you look at the rules. Then you learn it is just shorthand for different categories of entries. A "single op" is a single operator—the lone gun, the cowboy out on his own, Pete Sampras on Center Court at Wimbledon. No coaching. No help. No spotting networks. No packet clusters. Totally on your own. A "multi-op" is usually an entry from a group of operators taking turns operating one transmitter (or at least having only one transmitter on the air at any given time)—"multi-single." "Multi-multi" is short for multi-operator, multi-transmitter; these are usually very serious competitors.

Go to your local club meeting and ask around to see if there is anyone interested in contesting. If there are some, make friends and "pick their brains." There is nothing like the voice of experience. Assuming that you have not made too much of a pest of yourself, you might want to ask to watch the next time your friend operates in a contest. If he (or she) is a single op, I do not know of any rule that prohibits him from allowing you to watch what he is doing as long as you do not become involved in the operation or supply him with an "extra set of ears." If you do show up to watch, just remember the situation. In all likelihood, this person has an adventurous and competitive spirit, and he is in the middle of a competition. No matter how much of a bore someone might be, I cannot imagine anyone walking up to Tiger Woods during the Masters to ask him how he is going about lining up his putt. If questions come up in your mind, jot them down and ask them later, after the contest is over.

Perhaps you are dealing with someone who is part of a multi-single or multi-multi effort. Here the same rules apply pretty much: Maintain a low profile and stay out of the way. One difference is that you may find some of the operators "off duty" in a gab session. This is a good time to ask your questions. The potential is there to learn a lot by just hanging out with experienced operators.

Go back to your own station and spend a couple of hours just listening. Check out what is happening on the different bands at different times during the day and night. For instance, in a DX 'test you probably are not going to find any activity on 75/80 meters during the daylight hours. That is just common sense. However, you might find that 15 meters is outperforming both 10 and 20 meters. That could be very useful.

Strategy

Now it is time to start thinking about how you can enter a contest and get the maximum out of it. This is the strategy part. What antennas do you have available? Maybe you have a multi-band beam ("tribander") for 20 meters and up and wire dipoles for the lower bands. Some contests, such as the CQ WPX, have special entry categories for low power (100 watts or less) and limited antennas. Some have special QRP competition. Study the rules (and last year's results if available), figure out where you have the best chance of placing, and start gearing up for that contest(s).

As you gain experience, and if your living conditions permit, you may want to think about adding special antennas. For example, many East Coast stations

have beams fixed on Europe at a lower height than the rotating unit on top of the tower. Sometimes propagation favors the lower antenna. Or, you might be able to electrically connect them (stack them) so that they give you added power. Topics such as this are probably too advanced for the first time out, but keep them in the back of your mind for possible use later on.

So far we have more or less implied that we are talking about phone operation. Virtually everything said applies to CW operation, too. "Oh, but I don't do CW," I heard you say. Well, guess what? Contests provide a perfect opportunity for you to practice your CW under fire and start accumulating a bunch of countries (or states if you are working Field Day, Sweepstakes, or the WPX 'tests). There is a secret to doing this, and it has been used by hams who went on to become big guns. Maybe it is a little sneaky, but it works.

Here is the secret: You need a memory keyer (or keyboard). Figure out what the exchange is going to be and load it into one of the memories. Start tuning around until you find a nice loud station that is sitting on a frequency and "running" stations. He probably will make two or three contacts—maybe more—and then call CQ until more stations show up. No matter how fast he is going (usually about 30 to 35 wpm for contest stations), you can decipher his callsign because he is going to be sending it over and over again. Once you know his call, use your memory keyer to send your call. Now all you have to do is recognize your own call when he answers you. Once you hear your call, go back with "R 599" and send him whatever the contest demands of you—usually 599 also, or maybe it will be something such as 599 FL.

Oh, you didn't know? All reports on phone are 59 and all reports on CW are 599, regardless of what the signal is really like. Want to be thought of as an idiot? Easy. Just give some other report during a contest. Remember the point of the contest is to make as many contacts and work as many multipliers as quickly as possible. You will never find any mention of giving an honest signal report in any contest rules sheet.

Be sure that you log the contact using GMT. If you are logging on paper, use the official log format/sheet specified by contest sponsor. Even for a casual operation, though, you probably will want to go to computer logging. There are a number of excellent logging programs on the market. Several of them have modules for all the popular contests. Using a good logging program eliminates any possibility of messing up the score calculation. Most do an excellent job of eliminating duplicate contacts—before they occur if you are doing real-time logging. Check out the ads (including the classifieds) in *CQ* for the different programs available.

Contesting is fun. The only way you will know for sure if you like it is to try it a couple of times. It's not so scary. As the Nike ad says, "JUST DO IT!"

73, Pete, WB2D

Call for Photos and Stories

We'd like to hear from you about your experiences as a newcomer. If you have questions, we'll try to incorporate them into future columns. If you have photos (color prints or slides okay) of your station or antennas, please send them along and we'll publish the best ones. If you have a solution to a common problem that new hams experience, we'd like to hear about it so we can pass it along. You can contact me at <wb2d@cq-amateur-radio.com> or Peter O'Dell, WB2D, Beginner's Corner, 123 NW 13th St., Suite 313, Boca Raton, FL 33432.

Contesting

BY JOHN DORR, K1AR

News/Views Of On-The-Air Competition

2000 CQ Contest Survey Results—What's on Your Mind?

November's Contest Tip of the Month

If you're into the multi-single operating game, you probably suffer from a common problem. What does one do with the operators when they're not operating? There's a common myth that a multi-single operation is comprised of two stations—run and mult. However, nothing prevents you from setting up one or more additional stations that can be used for tuning other bands (or the same band for that matter, using a different antenna) for needed QSOs and multipliers. The next time you dive into the multi-single game, try adding a few additional listening stations to the mix. It will keep your spare operators busy *and* improve your score!

Calendar of Events

Oct. 21-22	JARTS WW RTTY Contest
Oct. 21-22	Worked All Germany Contest
Oct. 22-23	Illinois QSO Party
Oct. 28-29	**CQ WW DX SSB Contest**
Nov. 4-5	Ukrainian DX Contest
Nov. 4-6	ARRL CW Sweepstakes
Nov. 10-12	Japan Int'l SSB DX Contest
Nov. 11-12	Worked All Europe RTTY Contest
Nov. 11-12	OK/OM DX Contest
Nov. 18-19	LZ DX Contest
Nov. 18-20	ARRL SSB Sweepstakes
Nov. 25-26	**CQ WW DX CW Contest**
Dec. 1-3	ARRL 160M Contest
Dec. 2-3	TARA RTTY Contest
Dec. 9-10	ARRL 10M Contest
Dec. 16-17	Croatian CW Contest
Dec. 31	RAC Winter Contest

I always enjoy reporting on *CQ*'s Contest Surveys, as each and every year I learn something new about the contest community and what's inside your head. This year is no exception. For the first time, this year's survey was conducted almost exclusively on the web. Over 90% of the responses came in that way, with 68.5% arriving in the first week of the survey announcement. In fact, I had several responses before the web link was even announced in the magazine!

While there was nothing especially controversial in this year's version *per se*, it was interesting to see how you feel about the future of contesting and where you like to focus your energy and imagination. We'd all like to operate from the best locations with the largest antennas, and your answers reflect that dream. Interestingly, some of you are quite content with what you have and simply operate contests for the sport of it. Now there's a refreshing playback to the 1950s and '60s, eh?

In general terms, you are an optimistic lot. The results tell us that you are excited about the future of contesting and are confident in its development and growth. Frankly, I was surprised at how overwhelming the results were in this area. Well done, contesters!

Enough of the preamble. Let's get right to the results. As always, I appreciate the time you took to submit your responses, and you can count on this input to be the source of future "Contesting" columns in *CQ*.

2 Mitchell Pond Road, Windham, NH 03087
e-mail: <K1AR@contesting.com>

The Results: 2000 CQ Contest Survey

We start off with the average number of years of contesting experience of our respondents—20.53 years. Now to the actual questions and responses.

1. What is your occupation?

Well, this one is always fun to look at. It's not that there's anything monumental in the results, but it is interesting to learn what we do to occupy our time outside of contesting. A few thoughts do come from the results:

• Any ideas how the rest of us can join the 14.4% retired club?

• Between the lawyers, accountants, postal workers, and others, I'm going to think twice about trying to take someone's frequency this contest season!

• We do have an impressive number of CEO/CTO/CFO constituents, don't we (2%)?

• Our veterinarian may come in handy in calming the animals in some of the bigger pile-ups (as will the peace officer) during this contest season!

911 Dispatcher – 1
Accountant – 2
Automotive Repair – 1
Broadcast Engineer – 3
Buyer – 3
CFO – 1
Chaplain – 1
Courier – 1
CTO – 1
Customer Service – 2
Dentist – 1
Doctor – 9
Electrician – 2
Engineering (all flavors) – 93 (22.4%)
Government Worker/Military – 7
Heavy Equipment Operator – 1
Human Resource Manager – 1
Information Technology – 18
Insurance Agent – 2
Journalist – 3
Lawyer – 7
Machine Shop Operator – 1
Mailer – 1
Marketing – 8
Medical Transcriptionist – 1
Peace Officer – 1
Pharmacist – 1
Photographer – 3
Physicist – 1
Pilot – 1
Postal Worker – 2
President/CEO – 8
Product Manager – 2
Railroad Conductor – 1
Real Estate Broker – 2
Regulatory Compliance Specialist – 1
Restaurant Owner – 1
Retail Store Owner – 1
Retired – 60 (14.4%)
Sales – 17
Social Security Administrator – 1
Stock Broker/Investment Advisor – 8
Student – 13
Teacher – 15
Technician – 12
Telecommunications – 5
Veterinarian – 1
Web Designer – 3

2. We are at the peak of the current solar sunspot cycle. Do you believe that this cycle will prove to be the beginning of the end for contesting, or will activity continue to increase for years to come? (Choose one answer.)

a) This cycle is the beginning of the end. Yes – 32 (7.7% of total answers)

b) Activity will continue to increase. Yes – 236 (57.3% of total answers)

c) There will be little change as time goes on. Yes – 144 (35.0% of total answers)

Well, if true, this is certainly good news isn't it? I think many of us are concerned about this very question as we evaluate the results from a relatively under-whelming sunspot maximum. Tuning the bands during the day often yields large areas of inactivity on the bands, forcing us to consider whether or not activity is heading south. How-

Call Area	# Responses	Call Area	# Responses
WØ	20	W6	20
W1	67	W7	22
W2	29	W8	26
W3	25	W9	13
W4	33	VE	15
W5	32		

DX Country	# Responses	DX Country	# Responses
9K2	1	OH	2
4F/DU	1	OK	1
5B4	2	ON	2
A6	1	OZ	2
DL	6	P4	1
EA	3	PA	2
WF	1	PY	8
G	5	UA	2
GW	1	S5	1
I	3	SM	1
VJA	2	T9	1
KL7	2	VK	3
LU	4	VU	1
LX	1	YB	1
LY	1	YU	1
LZ	1		

USA/Canada responses: 302
DX responses: 63 (31 countries)
None indicated: 51
Total responses: 416

Table I– Survey geographic response analysis.

Question	Total Responses	Yes	No	%Yes	%No
1	N/A				
2A	32	32	7.7		
2B	236	236	57.3		
2C	144	144	35.0		
3	410	243	167	59.2	40.8
4A	297	297	72.2		
4B	20	20	4.9		
4C	94	94	22.9		
5	408	111	297	27.2	72.8
6	409	316	93	77.3	22.7
7	N/A				
8	N/A				
9A	91	91	22.2		
9B	226	226	55.5		
9C	49	49	12.1		
9D	41	41	10.1		
10	N/A				

Table II– Summary of survey results.

ever, when you look at any major contest, all indicators are heading towards positive territory and your answers reflect that reality. With less than 10% falling into the pessimist crowd, it's safe to say that contesting has impressive staying power and will be around for years to come.

3. Do you feel that the FCC's recent licensing restructuring actions will have a positive impact on contesting?

Yes – 243 (59.2% of total answers)

No – 167 (40.8% of total answers)

When I wrote this question, my first thought was some concern over whether or not our international readers would understand the significance of the FCC's actions. Surprisingly, they did, as many of the DX responses included written commentary on the subject as well as their answer. As you can see from the responses, the debate is hardly black and white. Fortunately, the majority of you feel as I do, that the bottom-line result of more HF operators is a good thing for contesting.

4. How would you rate the overall quality of contest operating compared to years past?

a) Improving. Yes – 297 (72.2% of total answers)

b) Declining. Yes – 20 (4.9% of total answers)

c) No change. Yes – 94 (22.9% of total answers)

To be perfectly honest, the answers to this question surprised me (note my reference to learning something new in each annual survey). I wasn't shocked by the trend towards improved operating as much as I was by the overwhelming majority of you who feel that way. I'd like to hear more from those of you who feel that operating is improving, not so that you can justify your answer, but to let us know your experiences with how this is happening and what contesters/organizations are doing about it.

To further illustrate the point, there were a number of examples given in defense of the above responses. They included:

- Improving logging accuracy by contest participants
- Higher QSO rates, indicating that operators are getting better/faster and so are those who are calling them in contests
- Higher scores and QSO totals

5. There has much discussion in recent years about equalizing the field in contesting. Do you feel that contest rules should be changed to make competing more fair across all geographies and types of stations?

Yes – 111 (27.2% of total answers)

No – 297 (72.8% of total answers)

I debated whether or not to include this question in the survey, as it has been a thoroughly discussed topic of late on the internet and other venues. However, this was an opportunity to get a broad response to the subject, as the dominance of certain geographical locations (including my own) has been troublesome to many contesters in recent years. You probably will not be surprised that the vast majority of positive responses to this question came from geographically challenged areas of the world in contests (over 70% came from W6/7/9/Ø). Also, there was no lack of strong opinions on the issue in your comments as well.

6. Do you feel that a contester is at a strategic disadvantage if he or she is not technically oriented when competing in contesting?

Yes – 316 (77.3% of total answers)

No – 93 (22.7% of total answers)

Welcome to the world of the technical ham. In days of old, we were a group who had a soldering iron in one hand and a bag of parts in the other. Now we spend much of our contest preparation time hooking up serial cables and trying to get software configured and running. The simple fact is that those of us who have some technical acumen have an advantage in today's contesting climate, and your responses support that theory. I was encouraged, however, to see that there are a significant number of you who feel you can brute force your way through technical challenges and don't see it as hurting your scores in a meaningful way. My guess is that the technical issues of contesting will increasingly go away as more of us gain even greater knowledge about today's technologies—computers, advanced transceivers, antenna switching, etc.

7. If someone was starting out as a new contester, how much money and time (or experience) would it take to be a world-class competitor?

Average $$: $29.8K (USD)

Average Time: 4.7 years

Well, to be honest, I didn't know what to expect with this question. Obviously, starting out in contesting (at least in a big way) is an expensive proposition. In today's world of instant gratification, we sometimes forget that the vast majority of seasoned contesters didn't build their inventories of contest gear overnight. Rather, it came from decades of shrewd accumulation and skillful horse-trading. So is $30K the right answer? Who knows? There are some "poor man's" contest stations that have done very well for much less. In contrast, one respondent suggested that you need $500K to get it done!

I found the subject of required experience to be interesting. For those who leaned towards the lower number of years, the argument was that you either have it or you don't, and practice/experience has diminishing returns. Others felt that there is no substitute for decades of operating experience. My feelings are actually quite simple. There are certain abilities (e.g., the skill of quickly processing information) that are God-given personal attributes. In other words, you can't "learn" how to run guys faster *per se*. However, deciding which bands to operate and when to look for multipliers is an experience thing. So, the net result is that everyone is right to an extent. You can look for more on this subject in a future column.

8. If you could operate from any station or location in the world in the next contest, what would be your first choice?

As you might expect, there was a wide range of responses to this one, but a quick spin through contesting's top ten results will give you the majority of the answers. Some of the leading responses included:

- P40V (number one choice)
- EA8BH (number two choice)
- K1EA/KC1XX/New England
- Iceland ?? (only one response, hi)
- A61AJ
- CN8WW
- 5B4
- Anywhere outside of the US!
- HC8N
- P5

9. What is your dream contest location? (Check one or suggest your own.)

a) Mountaintop. Yes – 91 (22.2% of total answers)

b) 360° water view. Yes – 226 (55.5% of total answers)

c) Rare callsign; location irrelevant. Yes – 49 (12.1% of total answers)

d) Other. Yes – 41 (10.1% of total answers)

Well, water wins the prize in this one. Clearly, we are a group who feels that "loud is good." I suppose I have to agree that operating from a loud QTH is always better than having a loud callsign. You can probably recall many times in contests where a weak, but rare multiplier is calling CQ with no answers, while a KP2 has a Texas-size pile-up calling them just a few kHz up the band.

10. How many contesters do you know who are less than 30 years old?

Average Number: 9.2 operators

I guess I'm surprised and pleased to see that the result is as high as it is. In looking at the answers to this question, I was left wondering if we all know the same 9.2 guys, or if in fact there is a greater universe of young contesters out there. Well, empirical data suggests that there are at least 18 of you out there, based on the proclaimed student population in this survey. It is also interesting to note that many of the higher level of numerical responses to this question came from overseas. The youth movement, especially in Europe, is alive and well. Our challenge is to be proactive and seek out young hams, introducing them to the world of contesting. It's a task that is never-ending and one on which we can not let up. Which nine young hams do you know who are *not* contesters?

Final Comments

Again, thank you for your commitment to the survey being reported on this month. I especially appreciate your patience as I got the results together. We'll be running another survey in one of the months to come. If you have ideas for a theme, I'd like to hear from you.

As a reminder, we are now posting all contest rules on *CQ*'s web site, allowing more editorial space for reporting such as what you've read this month. However, I still need you to send me your announcements as in the past. Soft, electronic copy is always best. Please include a link to your organization's web site where appropriate.

See you next month!

73, John, K1AR

OpEd

By James G. Alderman,* KF5WT

One Reader's Opinion

It's Time for Another Preemption

It's long been said, "There is no free lunch." Occasionally, however, we can partake of the next best thing—an "almost-free lunch." That's what the FCC gave us four years ago when it preempted local ordinances and covenants, allowing anybody to receive television programming using a small dish, wireless cable antenna, or ordinary TV antenna. What a great law it has been!

Homeowners, renters, and even apartment dwellers who were once captive to the high prices and poor service of the local cable company finally had the right to get their TV programming from whatever source they chose. Finally, total competition was introduced into the market. The cost of programming came down and our programming options increased (competition is always good for the consumer). Now you can get a small dish for free if you sign up for programming.

The satellite industry boomed, jobs were created, and the cable companies had to improve their product to keep customers. The preemption didn't take away anybody's individual rights; in fact, it gave people more rights. It didn't take away any jobs; in fact, it created more jobs, bigger profits, and healthier stock portfolios as the satellite TV industry flourished. All this, and it didn't cost the taxpayers any money. The preemption was truly the closest thing we'll ever see to a free lunch.

Yes, the FCC preemption of 1996 has been an overwhelming success. The Commission correctly ruled that it (the FCC), and only it, has the authority to regulate the RF spectrum *and* who can use it. If we are to have a useful nationwide telecommunications system of any kind, that system must be regulated by a central authority or there will be chaos on the airwaves. Every state and one-horse town can't be cooking up its own rules to regulate the use of the RF spectrum.

The Next Step

Now, fellow amateurs, it's time for another ruling on a matter that has profound implications for our hobby and our nation. It's time for the FCC to preempt all local and state regulations pertaining to cellular phones. Several states are considering laws that would ban the use of a cell phone while driving. A few cities have already done it. There is even a move afoot by a group calling itself the Advocates for Cell Phone Safety to pass a federal law outlawing *all* cell phones in *all* cars nationwide—even cars equipped with hands-free speaker phones!

This proposal wouldn't make our nation a safer place, and laws of this type stand to have both direct and indirect effects on amateur radio—none of them good. Although proponents of phone bans would have us believe that lives would be saved due to reduced traffic fatalities (a premise that is yet unproven), the cost of a ban would be more than our nation could pay.

How so? First, there would be an immediate negative effect directly on amateur radio. If it becomes illegal for a driver to make a cellular phone call, it's certainly possible (and probable) that hams would be stopped and at least questioned by police for making an autopatch call over the radio, or even for using a radio while driving.

Would a 21-year-old rookie police officer really understand an explanation of the difference between a "cellular" call and an "autopatch" call? Or the difference between a cell phone and a talkie? Probably not. If he were knowledgeable about such matters, he would be working in the wireless industry for three times the money. Most likely the police would simply ticket the ham and make him explain it all in court, a court that may be several hours journey from home.

Do we need this kind of threat hanging over us while traveling to that out-of-state hamfest? How many of us can afford to take time off from work and travel to a distant city for a court date to explain the intricacies of wireless telecommunications? How many of us can afford to have our auto insurance go up if we simply elect to avoid the hassle and pay the ticket?

The possibility of being swept up in the wide dragnet set to snare cellular phone customers is reason enough for the over 600,000 hams in the US to actively oppose these new proposed laws. Some unscrupulous jurisdictions may even set up "sting" operations on the route to major hamfests to ticket out-of-town hams who would be unlikely to travel back to town to defend a traffic ticket. It's all a cash cow to them.

Beyond Ham Radio

But there's an even more urgent reason why the proposed phone bans must be stopped. A ban on the use of cell phones in vehicles would have a widespread indirect effect on the ham community because the whole of society would be harmed. Our economic prosperity and personal safety would suffer greatly—and that's a price too high to pay!

There are some 94 million cellular phone subscribers in the US, with 45,000 new ones signing up for service every day. That's a huge chunk of the population. If these proposed laws pass, a large portion of those customers will go away. Who will pay $40–50 per month for a mobile phone they can't use while mobile? The phone would be of little use to most ordinary customers. Many would downgrade their service plans or drop the service entirely. Many would just stop paying the bill, let the phone be cut off, and use it only to dial 911 when needed. (Even a wireless phone that is not activated will reach 911.That's the law.)

When customers go away, jobs go away. Look at how many industries besides the wireless companies themselves would be hurt by a downturn in the wireless industry. Companies that make transistors, microchips, antennas, towers, feed-lines, cell site equipment, optic fibers, etc., all would lose revenue. The people who work for them would face job cutbacks, hiring freezes, and mandatory early retirements.

Many of us who enjoy amateur radio as a hobby work in the electronics, radio, and wireless industries. How many of us can afford to lose our jobs to satisfy the misguided wishes of a few do-gooders? How many clubs can afford to lose their repeater trustees when these guys no longer work in the industry and have access to expensive equipment needed to maintain a repeater? They're the guys who keep us on the air, you know. I say we can't afford to lose even one of them.

Even people who think they have no financial stake in the wireless industry will have an unpleasant surprise when

*2015 Via Miramonte, Carrollton, TX 75006

Looking Ahead in CQ

Here are some of the articles that we're working on for upcoming issues of *CQ:*

- "Weathernode Paging," by KC5RTH
- "Repeaters and RF Exposure," by KD4DSX
- "A Fuel-Cell Powered Ham Station," by W3IA

Plus:

- "An Earth-Moon-Earth Primer," by WB2AMU
- "Restoring an HW-16," by WB8VGE
- "A BASIC Stamp Serial Converter for ACC Controllers," by AH6LE

Do *you* have a ham radio story to tell? See our writers' guidelines on the *CQ* website, <www.cq-amateur-radio.com>.

they open that next 401K statement. Any kind of diversified retirement portfolio has investments in the NASDAQ, the wireless industry, and related companies, whether we know it or not. How many of our retirement dollars can we afford to see vanish before our eyes? I say none—not one dollar!

The proliferation of wireless phones has had an enormous impact on our nation's productivity and efficiency. That benefits us all. The nurse may call in our prescription while driving across town with an urgently needed set of X-rays. The doctor might consult with a specialist about our illness while en route to the hospital. The plumber, cable guy, roofer, and insurance adjuster all use their wireless phones daily to set up appointments with us while on the road. Some salesmen work exclusively from their cars; for them, no phone means no job. Less productivity and fewer jobs in our country means less tax money is paid in. There goes that federal budget surplus. There goes prescription-drug coverage for seniors.

The list of people using wireless phones for our benefit while in motion is endless. I ask you, should we pass a law making all these things take longer, or do these things take too long now? Should the doctor, nurse, electrician, butcher, baker, and candlestick maker be able to get more done in a given day, or less? The answer is obvious. Better productivity benefits us all whether we're in the work force, receiving service of some kind, or living off our retirement funds that grow because of increased productivity.

But the most important reason why cell phone bans should be preempted by the FCC is that much of the low crime rate we see today is a result of so many people having such ready access to 911 via cell phones. Every day, 118,000 emergency calls originate from wireless phones. How many of them can we do without because fewer phones are out there? I say none. In fact, since seconds often mean the difference between life and death in an emergency, we as a country need *more* emergency calls coming from wireless phones, not fewer.

We all can relate stories of how we have used amateur radio in an emergency to save lives, protect property, and serve our communities. That's one of the purposes of amateur radio. But I would like to relate to you my most rewarding use of my cell phone in an emergency. Many of you have equally inspiring stories.

One afternoon I was on my way to the home-improvement store when I noticed a young early-grade-school boy walking along the side of the road here in Dallas...all alone! I thought that situation looked a bit unusual, but when he was still walking when I came back from the store, I knew something was wrong. This kid had walked over a mile all by himself while I had been in the store buying paint.

When we were kids, we could walk anywhere without fear, but not today. It's just too dangerous, especially in a big city. I had to do something. I didn't want to approach and ask if he needed help. That might scare the kid into running away, so I called the police from my wireless phone.

To make sure this event came to a good end, I pulled off into a parking lot and kept the kid in sight as he walked along the road, constantly updating dispatchers of his exact location. I was able to give them an extremely detailed description of the boy, his location, and exactly what he was doing, even down to what color shoelaces he had. After several minutes, and after I had moved discretely through several parking lots, the police arrived and took the boy safely away.

If there was any question in my mind about whether I had done the right thing, all doubt was removed when I got home and turned on the news. A child had been abducted a few miles away and a missing child alert was being issued. That child was later found dead. The killer has never been found.

That killer could easily have snatched up the boy I saw and been gone if circumstances had turned out a little differently—and if I hadn't had my wireless phone within reach.

Even the proponents of the phone bans say that emergency calls would be allowed under their proposed laws. But with fewer phones out there, fewer emergency calls will be made. That's just the reality of it.

With millions fewer eyes and ears out there in the world having ready access to the police, criminals will be on easy street. Crime will be easier to get away with. Make no mistake; if cell phone use in vehicles is outlawed or even restricted, more stores will be robbed, more children will be abducted, and so on. Again, is this a price we can afford to pay? Absolutely not!

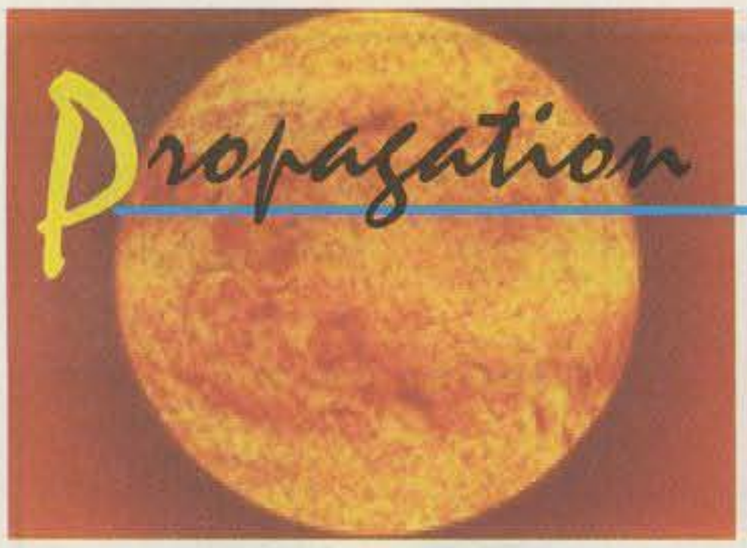
There's no doubt that distracted drivers are more prone to accidents. Those possible distractions are numerous, the most common of which occurs when adults take their eyes off the road to scold unruly children in the car. (I learned that in the driver's safety class I took to get an insurance discount.)

I've seen women putting on makeup, people reading newspapers and maps, and a host of other distractions out there—and I saw these activities years before cell phones were available. We have reckless driving and mandatory liability insurance laws, and courts, to deal with accidents caused by distracted drivers and provide remedies for anybody harmed in such an accident.

We don't need more restrictions that would harm our hobby and our country. We don't need to see crime go up. We don't need to lose our jobs, our repeater trustees, or our retirement plans. We don't need the doctor taking longer to see us because he can't call his nurse from the car and get his messages.

We can't have states and cities trying to regulate who can use the RF spectrum and regulate the legally licensed telecommunications devices which operate on the airwaves. As a nation and as a ham fraternity, we just can't afford it. That's why the FCC must preempt now! And just think, with all its benefits, a preemption doesn't even cost the taxpayers a penny. Why, it's almost like a free lunch!

The opinions expressed in this column do not necessarily reflect the opinions of CQ magazine or its publisher, CQ Communications, Inc. Well-reasoned, well-written opinion pieces relevant to amateur radio are welcome. If we publish your Op-Ed, we will give you a complimentary one-year CQ subscription.



BY GEORGE JACOBS, W3ASK

The Science Of Predicting Radio Conditions

CQ WW DX CW Contest Weekend
Mostly Low Normal

CQ WW SSB Contest Bulletin Forecast Looks Good

Since this issue of *CQ* should reach most subscribers prior to the start of the CQ World-Wide SSB DX Contest weekend of October 28-29, here is an updated forecast made at press time for the general propagation conditions expected during the SSB contest weekend. Based on the 27- and 54-day recurrence tendencies of solar and geomagnetic conditions, it continues to look like High Normal HF conditions during the first day of the contest, with a good chance for Above Normal conditions over paths to lower and equatorial latitudes. On Sunday at least Low Normal conditions are expected, with periods of High Normal conditions for openings to lower and equatorial latitudes. Some HF radio storminess is expected towards the end of the SSB contest weekend, which is likely to reduce conditions to Below Normal on circuits passing through the auroral and polar regions.

Daily 10.7 cm solar flux levels are expected to soar above the 170 mark during the contest weekend, with corresponding sunspot counts likely to exceed 130. The geomagnetic planetary *A*-index is expected to remain below 16 for most of the time during both days of the SSB contest period.

Barring any sudden solar flares or radio storms, propagation conditions during the 2000 SSB contest weekend could well exceed those of the record-breaking 1999 SSB contest, particularly on the 20, 15, and 10 meter bands.

To maximize scores be sure to check the DX Propagation Charts discussed in last month's column.

LAST-MINUTE FORECAST

Day-to-Day Conditions Expected for November 2000

	Expected Signal Quality			
Propagation Index.....	**(4)**	**(3)**	**(2)**	**(1)**
Above Normal: 7, 14, 16, 24	**A**	**A**	**B**	**C**
High Normal: 5-6, 8-9, 12 15, 22	**A**	**B**	**C**	**C-D**
Low Normal: 2-4, 10-11, 13, 17, 19-20, 23, 25, 28-30	**B**	**C-B**	**C-D**	**D-E**
Below Normal: 18, 21, 26	**C**	**C-D**	**D-E**	**E**
Disturbed: 1, 27	**C-D**	**D**	**E**	**E**

Where expected signal quality is:

A—Excellent opening, exceptionally strong, steady signals greater than S9.

B—Good opening, moderately strong signals varying between S6 and S9+, with little fading or noise.

C—Fair opening, signals between moderately strong and weak, varying between S3 and S9, with some fading and noise.

D—Poor opening, with weak signals varying between S1 and S6, with considerable fading and noise.

E—No opening expected.

HOW TO USE THIS FORECAST

1. Find the *propagation index* associated with the particular path opening from the Propagation Charts appearing on the following pages.

2. With the *propagation index,* use the above table to find the expected signal quality associated with the path opening for any given day of the month. For example, an opening shown in the Propagation Charts with a *propagation index* of 3 will be poor (D) on November 1st; fair-to-good (C-B) on the 2nd, 3rd, and 4th; good (B) on the 5th and 6th; excellent (A) on the 7th, etc. Fair-to-good (C-B) conditions are expected on the first day of the 2000 CQ WW DX CW Contest, November 25th, and fair-to-poor (C-D) conditions on the 26th.

The CW weekend of the 2000 CQ World-Wide DX Contest will take place on November 25–26. Based on a long-range forecast made at the time of writing this column, we are expecting mainly Low Normal HF propagation conditions on November 25, with periods of High Normal likely towards middle and low latitudes. Some radio storminess looks possible on November 26, with generally Low Normal, but variable conditions expected. Conditions are likely to drop to Below Normal for paths passing through the Earth's auroral zones. Daily solar flux levels in excess of 170 and corresponding sunspot counts in excess of 130 are expected during the CW contest weekend.

We will have a more up-to-date forecast as a bulletin at the beginning of next month's column. Check on-the-air conditions on October 29 and 30, which would be just one 27-day cycle prior to the CW contest weekend, for a more probable recurrence pattern.

Check the "Last-Minute Forecast" for the day-to-day conditions expected throughout the month of November.

Special DX Propagation Charts for use during the CW weekend appeared in last month's column, along with valuable tips and suggestions for increasing scores. Be sure to refer to last month's column if you plan to participate in the CW contest weekend. Additional tips are discussed this month.

Sunspot Cycle Progress

Dr. Pierre Cugnon at the Royal Observatory of Belgium, the world's official keeper of sunspot indices, reports a monthly mean sunspot number of 169 for July 2000. This results in a 12-month running smoothed sunspot number, upon which the cycle is based, of 113 centered on January 2000. This is an increase of two since the previous month.

The highest daily value observed during Cycle 23 to date took place on July 19, when the count soared to 246. The low value for July was recorded on the 31st with a count of 93. A smoothed sunspot count of 114 is forecast for November 2000.

According to the solar scientists at the National Geophysical Data Center (NGDC) in Boulder, Colorado, Cycle 23 reached its peak with a count of 117 during this past August and is now on the decline. Scientists at other institutions are not in agreement with the NGDC. We will discuss this in more detail in a future column.

A corresponding 10.7 cm monthly mean solar flux index of 200 was reported for July by the Dominion Radio Astrophysical Observatory at Penticton, B.C. This results in a smoothed solar flux value of 175 centered on January 2000. A smoothed level of 179 is expected this November.

Updated Propagation Data

Last month's column contained a detailed review of sources of updated and real-time ionospheric, solar, geomagnetic, and propagation information that could prove to be invaluable during the CQ WW DX Contest. As a convenience I am providing the following single web

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e-mail: <george@gjainc.com>

PST Time	UT Time	Areas to which good openings are expected
00-03	08-11	SE Asia, Far East, South Pacific, New Zealand, Australasia, Antarctica
03-06	11-14	South Pacific, New Zealand, Australasia
06-09	14-17	Central and South Asia, SE Asia, Far East, South Pacific, New Zealand, Australasia, Europe, Caribbean, Central America, and Northern Countries of South America
09-12	17-20	Far East, Caribbean, Central America
12-15	20-23	Western & Central Europe, North Africa
15-18	23-02	Europe, Africa, Caribbean, Central America, South America
18-21	02-05	Africa, Central & South Asia, South Pacific, New Zealand, Caribbean, Central America, South America
21-24	05-08	Far East, South Pacific, New Zealand

Table I– Sample 20 meter single-band work plan for western USA QTH.

site, <http://www.gjainc.com>, which has links to the NOAA, the Solar Terrestrial Dispatch, the Australian IPS, the Royal Observatory of Belgium, the DX Listeners Club, and the very informative N6RT sites.

Karl Kruger in England has called to my attention another web site which contains a treasure of useful propagation data. Managed by Tomas Hood NW7US, its URL is: <http:hfradio.org/propagation.html>.

The site contains current sunspot and solar flux information, geomagnetic indices, aurora alerts, solar flare alerts, geomagnetic conditions, worldwide propagation conditions, and more. It also contains excellent reference material and a comprehensive propagation primer. This is another web site well worth visiting.

CW Contest Work Chart

Table I is a example of a single band (20 meters) contest plan for a western USA QTH (PST). It was devised from the DX Propagation Charts that appeared in last month's column. For each three-hour period throughout the day it shows the areas of the world for which 20 meter propagation is expected to be optimum. Similar plans can be made for other time zones and for selected single bands or for multi-band operation.

CW Contest Tips

Look for excellent DX conditions on 10, 15, and 20 meters during most of the daylight hours from shortly after sunrise until sunset.

From sundown to midnight DX honors should be shared between 20 meters, for openings towards the south and west, and 40 meters, for openings towards the east, north, and south. Good DX openings to the same areas of the world as 40 meter openings should also be possible on 80 and 160 meters during this period.

Between midnight and sunrise the best DX band should be 40 meters, with 80 meters not far behind. Openings on both bands should be possible to most areas of the world, with conditions peaking towards the south and west. Some fairly good 20 meter openings are also expected during this period, mainly towards the south and west. Be sure also to check the 160 meter band for DX openings. Propagation patterns should be similar to those observed on 80 meters, but with somewhat weaker signals and higher noise levels.

The best propagation aid for expected 160 meter DX openings (and for 80 and 40 meters as well) is a set of sunrise and sunset curves, since DX signals tend to peak when it is local sunrise at the easterly end of the path.

For up-to-the-minute information on Topband propagation and DX, and a grayline sunrise-sunset map check <http://www.spacew.com>.

VHF Ionospheric Openings

6 meter DX. Solar activity is at a high enough level to permit 6 meter DX openings during November. Conditions should peak towards Europe and in a generally easterly direction before noon. Openings should improve towards Africa shortly after noon and continue to swing in a clockwise direction during the early afternoon hours.

Expect openings towards the Caribbean and Central and South American areas from late morning until shortly after noon. By late afternoon start looking for openings towards the south and southwest. For the most part, 6 meter DX openings may be erratic, and the band may remain open for only short periods

HOW TO USE THE SHORT-SKIP CHARTS

1. In the Short-Skip Chart, the predicted times of openings can be found under the appropriate distance column of a particular meter band (10 through 160 meters) as shown in the left-hand column of the chart. For the Alaska and Hawaii Charts the predicted times of openings are found under the appropriate meter band column (10 through 80 meters) for a particular geographical region of the continental USA as shown in the left-hand column of the charts. An * indicates the best time to listen for 80 meter openings.

2. The propagation index is the number that appears in ( ) after the time of each predicted opening. On the Short-Skip Chart, where two numerals are shown within a single set of parentheses, the first applies to the shorter distance for which the forecast is made, and the second to the greater distance. The index indicates the number of days during the month on which the opening is expected to take place, as follows:

(4) Opening should occur on more than 22 days
(3) Opening should occur between 14 and 22 days
(2) Opening should occur between 7 and 13 days
(1) Opening should occur on less than 7 days

Refer to the "Last Minute Forecast" at the beginning of this column for the actual dates on which an opening with a specific propagation index is likely to occur, and the signal quality that can be expected.

3. Times shown in the charts are in the 24-hour system, where 00 is midnight; 12 is noon; 01 is 1 AM; 13 is 1 PM, etc. In the Short-Skip Chart appropriate *standard* time is used at the path midpoint. For example on a circuit between Maine and Florida, the time shown would be EST, on a circuit between New York and Texas, the time at the midpoint would be CST, etc. Times shown in the Hawaii Chart are in HST. To convert to standard time in other USA time zones add 2 hours in the PST zone; 3 hours in the MST zone; 4 hours in the CST zone; and 5 hours in the EST zone. Add 10 hours to convert from HST to GMT. For example, when it is 12 noon in Honolulu, it is 14 or 2 PM in Los Angeles; 17 or 5 PM in Washington, D.C.; and 22 GMT. Time shown in the Alaska Chart is given in GMT. To convert to *standard* time in other areas of the USA subtract 8 hours in the PST zone; 7 hours in the MST zone; 6 hours in the CST zone; and 5 hours in the EST zone. For example, at 20 GMT it is 15 or 3 PM in New York City.

4. The Short-Skip Chart is based upon a transmitted power of 75 watts CW or 300 watts PEP on sideband; the Alaska and Hawaii Charts are based upon a transmitter power of 250 watts CW or 1 KW PEP on sideband. A dipole antenna a quarter-wavelength above ground is assumed for 160 and 80 meters, a half-wave above ground on 40 and 20 meters, and a wavelength above ground on 15 and 10 meters. For each 10 dB gain above these reference levels, the *propagation index* will increase by one level; for each 10 dB loss, it will lower by one level.

5. Propagation data contained in the charts has been prepared from basic data published by the Institute for Telecommunication Sciences of the U.S. Dept. of Commerce, Boulder, Colorado 80302.

CQ Short-Skip Propagation Charts
November & December 2000
Local Standard Time at Path Mid-Point
(24-Hour Time System)

Band (meters)	Distance From Transmitter (miles)			
	50-250	250-750	750-1300	1300-2300
10	*Nil*	*Nil*	07-09 (0-1) 09-11 (0-2) 11-15 (0-3) 15-16 (0-2) 16-18 (0-1)	07-08 (1) 08-09 (1-2) 09-11 (2-3) 11-15 (3-4) 15-16 (2-4) 16-18 (1-4) 18-19 (0-3) 19-20 (0-2) 20-21 (0-1)
15	*Nil*	08-10 (0-1) 10-16 (0-3) 16-17 (0-2) 17-18 (0-1)	07-08 (0-1) 08-09 (1-3) 09-10 (1-4) 10-16 (3-4) 16-17 (2-4) 17-19 (1-4) 19-20 (0-3) 20-21 (0-1)	07-08 (1) 08-09 (3-2) 09-19 (4) 19-20 (3) 20-21 (1-2) 21-00 (0-1)
20	09-11 (0-1) 11-15 (1-2) 15-17 (0-1)	07-09 (0-2) 09-11 (1-4) 11-15 (2-4) 15-17 (1-4) 17-18 (0-4) 18-19 (0-3) 19-20 (0-2) 20-07 (0-1)	07-09 (2-3) 09-18 (4) 18-19 (3-4) 19-20 (2-4) 20-21 (1-4) 21-23 (1-3) 23-02 (1-2) 02-07 (1)	07-09 (3) 09-12 (4) 12-15 (4-3) 15-21 (4) 21-23 (3-4) 23-02 (2-3) 02-06 (1-2) 06-07 (1)
40	07-08 (0-2) 08-09 (1-3) 09-19 (4) 19-21 (2-3) 21-00 (1-2) 00-07 (0-1)	07-08 (2-4) 08-09 (3) 09-15 (4-3) 15-19 (4) 19-21 (3-4) 21-00 (2-4) 00-02 (1-3) 02-06 (1-2) 06-07 (1-3)	07-08 (4) 08-09 (3-2) 09-15 (3-1) 15-17 (4-2) 17-00 (4) 00-02 (3-4) 02-06 (2-4) 06-07 (3-4)	06-07 (4-3) 07-08 (4-2) 08-09 (2-1) 09-15 (1-0) 15-17 (2-0) 17-19 (4-3) 19-06 (4)
80	08-15 (4-3) 15-02 (4) 02-04 (3-4) 04-07 (2-3) 07-08 (3-4)	08-09 (3-2) 09-15 (3-1) 15-18 (4-3) 18-04 (4) 04-07 (3-4) 07-08 (4-3)	08-09 (2-1) 09-15 (1-0) 15-18 (3-1) 18-06 (4) 06-07 (4-3) 07-08 (3-1)	08-09 (1-0) 09-15 (0) 15-18 (1-0) 18-20 (4-1) 20-05 (4) 05-06 (4-3) 06-07 (3-1) 07-08 (1)
160	07-09 (3-2) 09-11 (2-0) 11-17 (1-0) 17-19 (3-2) 19-07 (4)	07-09 (2-1) 09-17 (0) 17-19 (2-1) 19-04 (4) 04-07 (3-2)	07-09 (1-0) 09-17 (0) 17-19 (1-0) 19-21 (4-2) 21-04 (4) 04-06 (2) 06-07 (2-1)	07-19 (0) 19-21 (2-1) 21-04 (4-3) 04-06 (2-1) 06-07 (1-0)

ALASKA
November & December 2000
Opening Given in GMT

To:	10 Meters	15 Meters	20 Meters	40/80 Meters
Eastern USA	17-18 (1) 18-20 (2) 20-22 (3) 22-00 (2) 00-01 (1)	15-16 (1) 16-17 (2) 17-21 (3) 21-23 (4) 23-00 (3) 00-01 (2)	12-16 (1) 16-18 (2) 18-21 (1) 21-23 (2) 23-02 (3) 02-03 (2) 03-05 (1)	06-12 (1) 07-11 (1)*
Central USA	17-18 (1) 18-20 (2) 20-00 (3) 00-01 (2) 01-02 (1)	15-16 (1) 16-17 (2) 17-20 (3) 20-23 (4) 23-01 (3) 01-02 (2) 02-03 (1)	12-16 (1) 16-18 (2) 18-20 (1) 20-22 (2) 22-00 (3) 00-02 (4) 02-03 (3) 03-04 (2) 04-06 (1)	06-08 (1) 08-13 (2) 13-14 (1) 07-12 (1)*
Western USA	18-19 (1) 19-20 (2) 20-21 (3) 21-23 (4) 23-00 (3) 00-01 (2) 01-02 (1)	16-17 (1) 17-18 (2) 18-20 (3) 20-01 (4) 01-02 (3) 02-03 (2) 03-04 (1)	12-16 (1) 16-18 (2) 18-22 (3) 22-02 (4) 02-04 (3) 04-05 (2) 05-07 (1)	02-03 (1) 03-05 (2) 05-14 (3) 14-15 (2) 15-16 (1) 04-06 (1)* 06-14 (2)* 14-16 (1)*

HAWAII
November & December 2000
Openings Given in Hawaiian Standard Time#

To:	10 Meters	15 Meters	20 Meters	40/80 Meters
Eastern USA	06-07 (1) 07-08 (2) 08-13 (4) 13-14 (3) 14-15 (2) 15-16 (1)	06-07 (1) 07-09 (4) 09-12 (3) 12-15 (4) 15-16 (3) 16-17 (2) 17-18 (1)	12-14 (2) 14-17 (4) 17-21 (3) 21-00 (2) 00-06 (1) 06-08 (3) 08-09 (2) 09-12 (1)	17-18 (1) 18-20 (2) 20-02 (3) 02-03 (2) 03-04 (1) 19-20 (1)* 20-01 (2)* 01-03 (1)*
Central USA	06-07 (1) 07-08 (3) 08-15 (4) 15-16 (3) 16-17 (2) 17-18 (1)	06-07 (1) 07-09 (4) 09-13 (3) 13-17 (4) 17-19 (3) 19-20 (2) 20-21 (1)	08-13 (2) 13-14 (3) 14-20 (4) 20-00 (3) 00-02 (2) 02-05 (1) 05-06 (2) 06-08 (3)	17-18 (1) 18-20 (2) 20-21 (3) 21-01 (4) 01-03 (3) 03-04 (2) 04-05 (1) 19-20 (1)* 20-22 (2)* 22-01 (3)* 01-03 (2)* 03-04 (1)*
Western USA	07-08 (1) 08-09 (2) 09-16 (4) 16-17 (3) 17-18 (2) 18-19 (1)	06-07 (1) 07-08 (2) 08-12 (3) 12-18 (4) 18-20 (3) 20-21 (2) 21-22 (1)	08-10 (4) 10-15 (3) 15-22 (4) 22-01 (3) 01-04 (2) 04-06 (1) 06-08 (3)	17-18 (1) 18-19 (2) 19-20 (3) 20-03 (4) 03-05 (3) 05-06 (2) 06-07 (1) 19-20 (1)* 20-21 (2)* 21-04 (3)* 04-05 (2)* 05-06 (1)*

#See explanation in "How To Use Short-Skip Charts" in the box at the beginning of this column.
*Indicates best time to listen for 80 meter openings. Openings on 160 meters are also likely to occur during those times when 80 meter openings are shown with a propagation index of (2) or higher.
For 12 meter openings interpolate between 10 and 15 meter openings.
For 17 meter openings interpolate between 15 and 20 meter openings.
For 30 meter openings interpolate between 20 and 40 meter openings.
Note: The Alaska and Hawaii Propagation Charts are intended for distances *greater* than 1300 miles. For shorter disatances use the preceding Short-Skip Chart.

of time. The best days to look for 6 meter DX openings are those expected to be either High or Above Normal.

Meteor Showers. A major meteor shower, the *Leonids*, is expected during November. It should be active between November 14 and 21 and should peak at approximately 13 UT on November 17 with an intense shower which should produce significant ionization for VHF openings.

Trans-Equatorial (TE) Openings. Some trans-equatorial (TE) type 6 meter propagation may also occur during November. The best time to check for such conditions is between approximately 8 and 11 PM local standard time. TE openings favor locations in the southern tier states and generally take place to South American countries south of the equator. At best, TE openings are very erratic, with weak signals subject to intense flutter fading.

Auroras. November is usually a month of fairly intense and widespread auroral activity, which can result in short-skip propagation on the 6 and 2 meter bands for distances up to approximately 1200 miles. Auroral activity is often associated with periods of radio storminess and is most likely to occur on those days shown as Below Normal or Disturbed in the Last-Minute Forecast.

Summary

This month's column contains short-skip propagation data for use between distances of approximately 50 and 2300 miles, and between the states of Hawaii and Alaska and the continental areas of the United States.

Good luck in the CW section of the CQ World-Wide DX Contest, and be sure to let me know how these special contest propagation forecasts work out.

73, George, W3ASK

Our Readers Say

(from page 24)

An "Age Old Question"

This letter was addressed to the editors of both CQ *and* Popular Communications*:*

Dear Editors:

First of all, I would like to say that I read your magazines almost every month. I am not a licensed amateur radio operator (yet), although I plan to become one in the future. Your magazines are really insightful and enjoyable to read. I especially like to learn more about how to make my hobbies (CB, scanning, and amateur radio) work better. Now for my question: When the FCC took the 11 meter band away from the amateur radio operators and made it into the Citizens Band, why didn't the ARRL just incorporate the new band into its fold instead of turning against it?

First thing, the Citizens Band is out of control (which is one of the arguments brought forth by amateur radio operators). But if the ARRL had stepped in and taken it under its wing, then they could have helped to keep it in line (they still could). There are some people out there who would like to see CB cleaned up. But we can't do it ourselves. With the backing of the ARRL and the amateur radio operators, we could accomplish this task.

Secondly, I am willing to bet that a strong minority (if not a majority) of the amateur radio operators either own a CB or got their start using one. I for one have used a CB for the last 10 years and will continue to use one for a lot longer. I have started to venture into SSB, which I believe is a version of ham radio. Sometime in the future, I would like to get my Technician or Novice license. I have read a lot of letters in *Popular Communications* from ham operators who also have a CB in their shacks or in their vehicles with them.

Third, with the possibility of the 155 mile rule being eliminated, then the Citizens Band is actually a good place for DXing (or shooting skip). CBers could make and send out QSL cards like the amateur operators do. And the best way for people to get into DXing is to see a person doing it. The hams could teach the CBers a thing or two about shooting skip. It just might attract more people into the amateur bands also (legally, that is). After all, the CB is a starting point for amateur operators.

Finally, it seems pointless to me that the amateur radio operators are using the Citizens Band as an example of what will happen if they don't utilize their bands more. Instead of saying that the band was "ripped" away from them, they should consider the possibility of it being a new form of communication for them. This would be the perfect example of QRP (low power), since the maximum legal power is 4 watts (12 watts PEP). You could use the experimentation found in amateur radio to find out how to get the most out of a legal radio.

Patrick Dickey
via e-mail

Patrick: There's really little to be gained by trying to rewrite history. Whether or not the ARRL should *have embraced CB when it began over 40 years ago is irrelevant today. The question is what can be done in the future to bring all radio hobbyists together to protect and promote their common interests. You are definitely correct that many, if not most, hams today got their start in CB or continue to operate CB as well as ham radio. As for the possibility of legalizing "shooting skip" on CB, the FCC has turned down that petition, essentially telling CBers who want to work DX to get their ham licenses.*

I have a feeling that most CBers would resent a bunch of hams coming onto 27 MHz and trying to "show them how to use their radios better." I think the approach you're taking is an excellent one — reading CQ *as well as* Pop'Comm *and learning tips and techniques that can help you make the most of your CB operating while you work on eventually getting a ham license. Good luck and have fun! — W2VU*

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Ham Radio News *(from page 4)*

ber of Extra Class hams has increased by 20% since restructuring took effect, while the increase in the number of Generals has been almost as dramatic, with nearly 18,000 more Generals on the FCC database today than a year ago. Meanwhile, Maia reports, the number of hams holding Advanced and Tech Plus licenses has dropped, and the total number of licensed hams has increased just one half of one percent since the new licensing rules went into effect on April 15.

More Canadian LF Progress

Last month we reported on the first 136 kHz QSO completed in Canada, where the band is available to certain amateurs on an experimental basis. Now, the *ARRL Letter* reports that LF signals from Great Britain have been copied in Nova Scotia. John Currie, VE1ZJ, on Cape Breton Island, copied 136 kHz signals sent from West London by Dave Bowman, GØMRF, on September 9 and 10. The signals were "solid copy" on the 10th, and Currie was able to conduct a crossband, two-way QSO with Bowman by transmitting on 20 meters while listening on LF. A two-way LF test between Canada and Great Britain is scheduled for this month (Nov. 10–27).

In the United States, AMRAD has been conducting tests on 136.75 kHz under a Special Temporary Authorization (STA) from the FCC. The ARRL has petitioned the FCC for allocation of two LF slots for amateur use. For further information, visit these web sites: <http://www.g0mrf.freeserve.co.uk/>, <http://www.rac.ca/vlftest.htm>, <http://www.amrad.org>.

FEMA Weighs In on Beverly Hills Repeater Case

The Federal Emergency Management Agency has made its position clear in an ongoing dispute over the apparent use of an amateur repeater by the Beverly Hills (California) Police Department for what the FCC contends is regular police business. The hams involved, and the police department, deny any improper use of the repeater. Since the net in question is apparently operating as a RACES net, FEMA (which runs RACES nationally) was asked for its input.

Paul Reid, RACES Program Manager at FEMA, responded bluntly: "The Federal Emergency Management Agency (FEMA) does not have the authority to authorize amateur radio operators or the city of Beverly Hills to operate in violation of FCC rules and regulations. I'm sure the FCC will take any action that is appropriate in this situation." Translation: "Don't get us involved in this!"

RF Safety Rules Apply to All Hams

We'll bet you didn't know this, but up until September 1 of this year, the only hams required to comply with the FCC's "new" (circa 1998) RF safety rules were those who had to file license applications with the Commission and thus certify they were in compliance. Now, according to the ARRL, *everyone* has to comply with the rules regarding RF exposure and routine station evaluations. Since most hams are in compliance anyway, and those who were going to conduct station evaluations probably have already done so, this probably won't have much effect on anyone.

But just in case you haven't read the rules or the FCC's technical bulletin and checked to see if you're in compliance, you're in violation of FCC rules if you're not. For more info, go to the ARRL's RF safety web page at <http://www.arrl.org/news/rfsafety>.

TV Group Produces New Ham PSA

There's a new ham radio public service announcement (PSA) available, thanks to video professionals at the San Francisco chapter of the International Television Association (ITVA). The group produces a PSA each year as a community service, and decided this year to focus on amateur radio. The chapter president is a ham — Ken Alan, K6PSI. The announcements include a 10-second "hole" at the end into which ham clubs may insert local contact information.

The 30-second "spot" is available for a nominal fee to clubs and hams able to place it on local TV stations and cable systems. It may be viewed on the San Francisco ITVA website at <http://www.itvasf.com>, and professional-quality Betacam tapes may be ordered from the group for $20 to cover the cost of tape, copying and shipping. At press time, discussions were under way to secure time to transmit the announcement by satellite to any station or cable system willing to downlink and record it.

Additional and updated news is available on the Ham Radio News page of the CQ website at <http://www.cq-amateur-radio.com>. For breaking news stories, plus info on additional items of interest, sign up for CQ's free online newsletter service. Just click on "CQ Newsletter" on the home page of our website.

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I. IDBT: Interlocked Digital Bandwidth Tracking System

The IDBT feature greatly simplifies operation by matching the bandwidth of the DSP (Digital Signal Processing) system to the net bandwidth of the 8.2 MHz and 455 kHz IF stages. The IDBT system accounts for the settings of the IF WIDTH and SHIFT controls, and automatically sets a DSP bandwidth which matches the analog IF bandwidth.

IDBT: A Breakthrough in Selectivity!

II. VRF: Variable RF Front-End Filter

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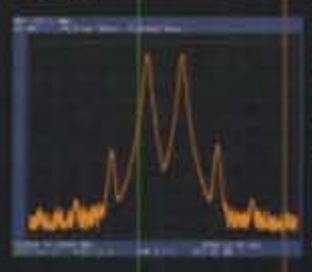

Class A 75 W PEP IMD

IV. Class-A SSB Operation

Exclusively available on the MARK-V FT-1000MP , a press of a front-panel button engages Class-A SSB operation of the transmitter, at a power output level of 75 Watts. Class-A operation produces incredibly clean signal quality, with 3rd- order IMD suppressed 50 dB or more, and 5th- and higher-order products typically down 80 dB or more!

V. Multi-Function Shuttle Jog Tuning / Control Ring

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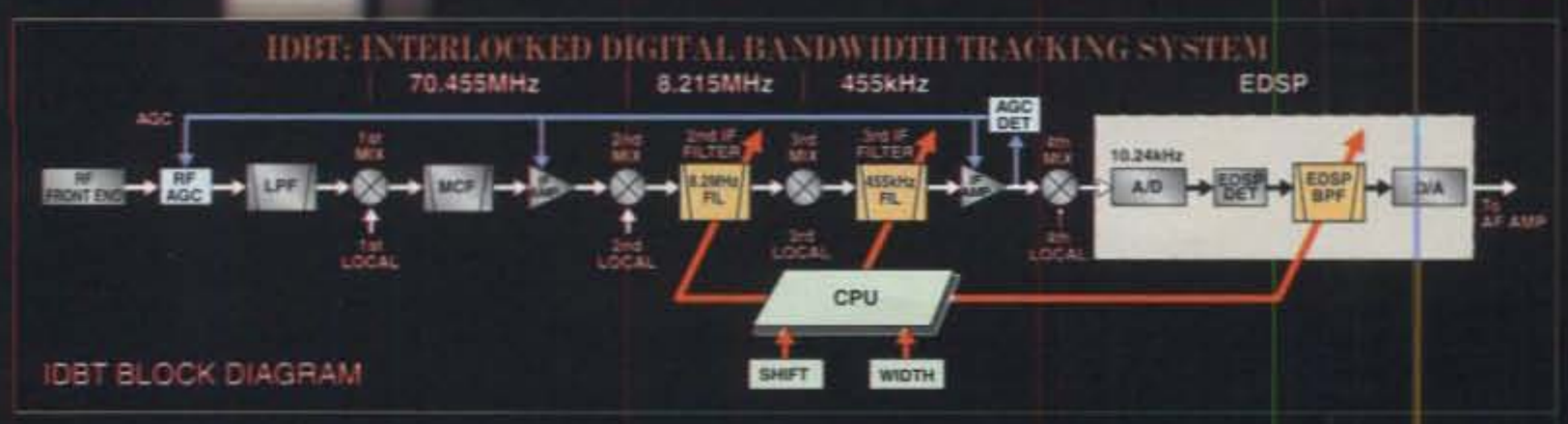
HF 200 W All-Mode Transceiver

MARK-V FT-1000MP



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