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COMMUNICATIONS & TECHNOLOGY

MARCH 2001

CQ

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On the cover: *CQ* Propagation Editor George Jacobs, W3ASK, sful prediction as he celebrates gation column. Details on page 108.

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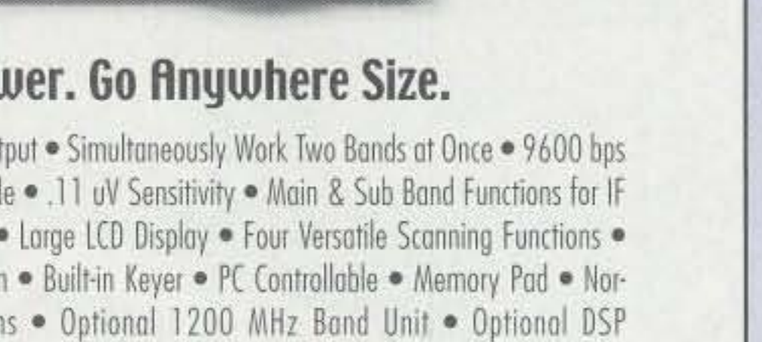

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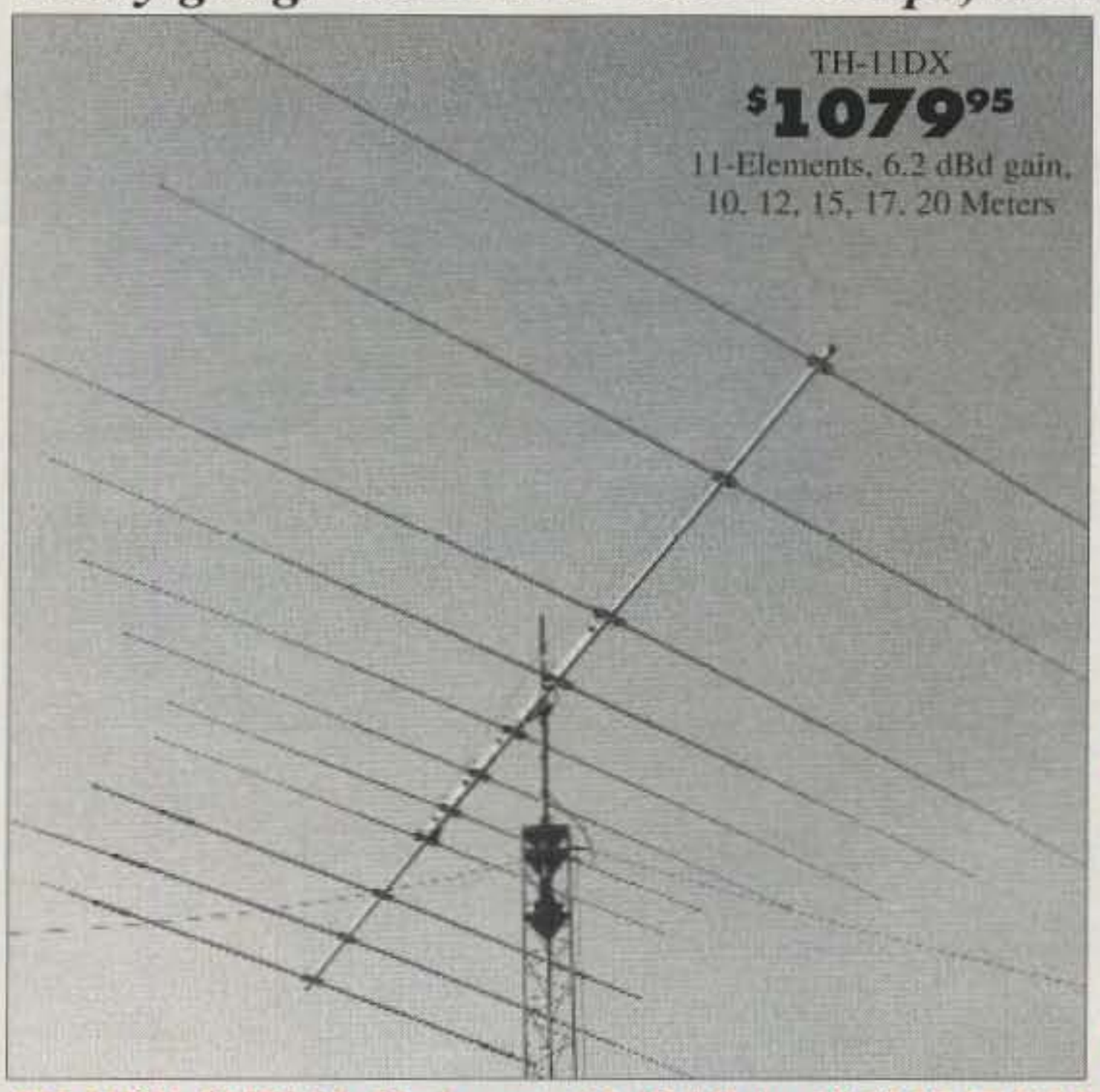

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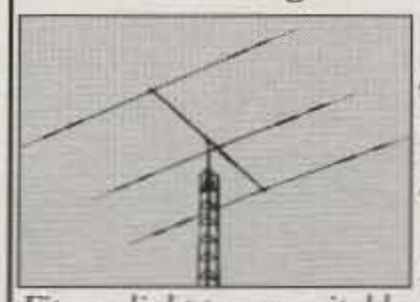

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TH-7DX	**7**	**6.57**	**21**	**1500**	**10, 15, 20**	**9.4**	**100**	**24**	**31**	**20**	**75**	**1.5-2.5**	**HAM-IV**	**$819.95**
TH-5MK2	5	6.1	20	1500	10, 15, 20	7.4	100	19	31.5	18.42	57	1.5-2.5	HAM-IV	$699.95
TH-3MK4	**3**	**5.8**	**25**	**1500**	**10, 15, 20**	**4.6**	**95**	**14**	**27.42**	**15.33**	**35**	**1.9-2.5**	**CD-45II**	**$439.95**
TH-3JRS	3	5.8	25	600	10, 15, 20	3.35	80	12	27.25	14.75	21	1.25-2.0	CD-45II	$329.95
TH-2MK3	**2**	**3.4**	**15-20**	**1500**	**10, 15, 20**	**3.25**	**80**	**6**	**27.3**	**14.25**	**20**	**1.9-2.5**	**CD-45II**	**$339.95**
EXP-14	4	5.9	25	1500	10,15,20 (QK-710 30/40)	7.5	100	14	31.5	17.25	45	1.9-2.5	HAM IV	$549.95

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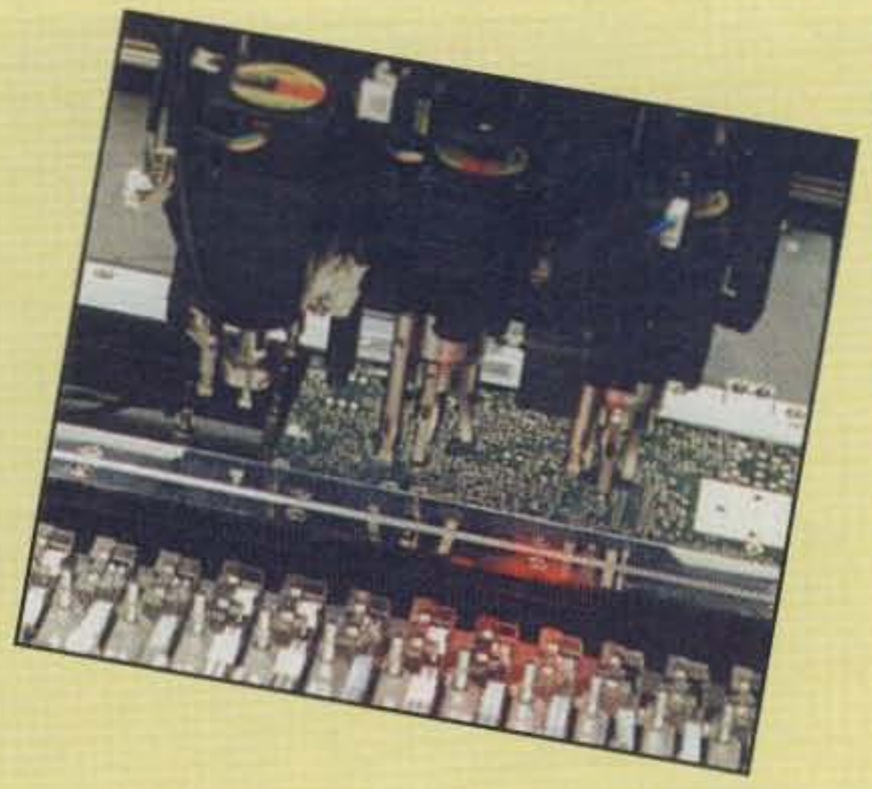

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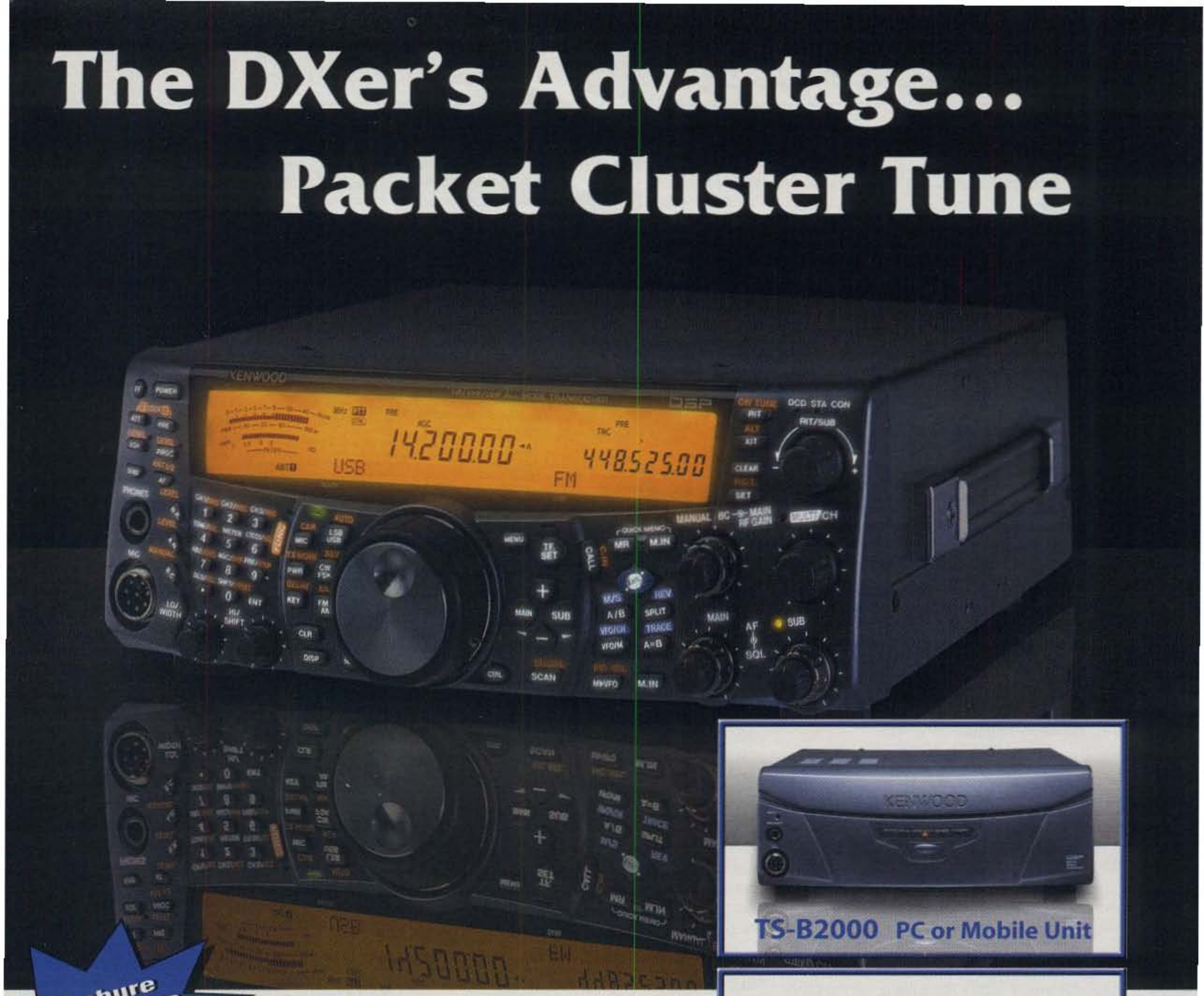
The DXer's Advantage... Packet Cluster Tune



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Ham Radio News

From The CQ Newsroom

ARRL Shifts Gears on Code

The ARRL Board of Directors has voted to support a motion to eliminate the international requirement for Morse code proficiency as an HF licensing requirement at the International Amateur Radio Union (IARU) Region 2 conference later this year. Region 2 covers North and South America. Last year the ARRL cast the only "no" vote on a similar motion at an IARU Region 3 (Pacific area) conference, in accordance with long-standing board policy.

At its January meeting the ARRL board voted nine to six that it "recognizes and accepts" the reality that the international code requirements will likely be repealed at the next World Radiocommunication Conference, in 2003, and will not oppose it. However, it pointed out that individual governments will still retain the right to keep code requirements in place. "Just because (the international requirement) is being reviewed by WRC-2003 and will likely be eliminated," said ARRL President Jim Haynie, W5JBP, "doesn't necessarily mean that all the governments in the world will do this, including the U.S." Haynie also noted that 2003 is still two years away and speculated that any change made by the WRC may not take effect immediately.

Two other recent developments regarding code requirements: In late December Germany replaced its 12 wpm code requirement for an HF license with a 5 wpm exam; and Canada appears likely to follow suit, issuing a proposal in January to drop its top code test speed from 12 to 5 wpm as well.

ARRL to Raise Dues $5

The ARRL's second major action at its January board meeting was a decision after lengthy debate to raise dues by $5 per year, effective July 1, 2001. This will bring the basic dues rate to $39/year and the senior citizen rate to $34. League President Jim Haynie, W5JBP, noted that the ARRL in recent years has tried to become "all things to all people," providing a large number of services that are not paid for in full by current dues and fees. He pointed out that the League will spend over $3.5 million this year on membership services, including the volunteer Field Organization, the DXCC program, and the outgoing QSL Bureau, plus another $1 million representing amateur radio's interests in Washington. "What do we cut out?" Haynie asked.

The ARRL board also voted to reorganize the headquarters staff, providing a clearer chain of command. Dave Sumner, K1ZZ, is now Chief Executive Officer, while Publications Manager/*QST* Editor Mark Wilson, K1RO, moves into the newly-created position of Chief Operating Officer, and Barry Shelley, N1VXY, remains Chief Financial Officer. The board created two new top-level managerial positions: Development Director, whose primary job will be "to find places and ways to raise money," according to Haynie; and Advocacy Director, whose responsibilities will encompass all government and public-relations activities. Haynie says he expects to fill the position of Development Director within about six months, and Advocacy Director sometime after that.

The League board also decided to seek member input on possibly "refarming" the current HF Novice bands, in light of the elimination of the Novice license in last year's restructuring decision and the steadily decreasing number of current Novices renewing their licenses. An ad-hoc committee, whose members had not been named at press time, is being set up to receive and process this input.

ARRL Seeks Full FCC Review Of PRB-1 Ruling

The ARRL has requested a review by the full Federal Communications Commission of a staff refusal to reconsider an earlier denial of its request that the FCC's limited pre-emption of amateur antenna ordinances (PRB-1) be extended to include so-called CC&Rs, restrictive covenants that often bar all outdoor antennas or transmitting antennas of any kind (see "Ham Radio News" and "Zero Bias" in January *CQ* for details on the FCC ruling).

The ARRL said it felt that its original petition for reconsideration had not been afforded a thorough review or fair analysis the petition was reviewed by the same FCC staff member who had issued the original denial —and asked the full Commission to review and hopefully reverse the ruling.

There's no indication of whether the petition's chances will be better or worse with a new Chairman at the FCC. Michael Powell, a Commissioner since 1997 and son of Secretary of State Colin Powell, was named Chairman by President Bush on January 22, succeeding William Kennard, who left office at the end of President Cinton's term.

Hams Help Out in El Salvador, Alabama

January's earthquake in El Salvador cut off most normal communication routes into the country, and amateur radio has once again come to the forefront. Most health-and-welfare messages between El Salvador and the United States were being handled by the Salvation Army Team Emergency Radio Network (SATERN), according to the *ARRL Letter,* which said the Salvation Army is a key player in relief efforts in the Central American country, serving more than 18,000 hot meals a day and providing medical treatment to earthquake victims. The quake, which measured 7.6 on the Richter scale, killed more than 700 people and caused widespread damage.

Closer to home, hams were in the middle of the action when an F-4 tornado swooped down on Tuscaloosa, Alabama on December 16. *CQ* Public Service Editor Bob Josuweit, WA3PZO, has complete details in his "Public Service" column in this issue, on page 13.

Riley: Hazards of "Radio Rage"

FCC Special Counsel for Amateur Radio Riley Hollingsworth, K4ZDH, says "radio rage" could become a greater danger than actual rule-breaking to the future of amateur radio. He told the *ARRL Letter* that "the infighting and arguments and juvenile spats (will) come back to haunt us if we don't just grow up."

In similar comments to *CQ* Contributing Editor Jeff Reinhardt, AA6JR, whose "Magic in the Sky" column this month tackles the topic of on-air behavior problems, Hollingsworth noted that "(e)very time a licensee carries on like that on the air, that person takes the Amateur Radio Service one step closer to extinction. Spectrum is worth a fortune and we will never keep it by making fools of ourselves in using it." More of Riley's comments will be found in Jeff's column (p. 94), which Hollingsworth says should be "required reading for every Ham Operator in America."

OSCAR-40 Controllers Tracking Fuel Leak

Controllers of the AMSAT-OSCAR-40 satellite (formerly Phase 3D) believe they've found out why the spacecraft is spinning faster than they'd expected—a fuel leak that apparently is also pushing the satellite closer to Earth on each orbit. In addition, they've concluded that the satellite's omnidirectional antennas on 432 MHz and 1296 MHz do not work, and the 2 meter omnidirectional antenna is questionable. Plus, they've had no luck bringing back to life either the 2 meter or 70 centimeter transmitter, according to the AMSAT News Service.

On the other hand, high-gain antennas and receivers for all three bands are working, as are efforts to bring the spin rate into control and possibly use the fuel leak to provide thrust for raising the satellite's orbit. AMSAT-NA President Robin Haighton, VE3FRH, has called for a formal inquiry into what went wrong with AO-40's various systems after launch. At press time there had been no response from the AO-40 team leaders in Germany. Please watch the "OSCAR-40 News" page on the *CQ* website for updates.

Meanwhile, there are two new OSCARs in orbit; actually, they're not all that new. Two Saudi satellite —Saudisat 1A and 1B—were launched last September, but only recently requested official OSCAR designators. They have been renamed OSCAR-41 and OSCAR -42. Both contain 9600-baud digital and FM repeater capability, and are not yet open for amateur use.

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 information 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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The TH-D7A(G) and the TM-D700A are the only radios ever produced that have both built-in TNC and APRS™ operating software, allowing you to send and receive exact GPS positions. You can even send text messages over 144.390 MHz, an international APRS™ frequency. Position reports and two-way messaging can also be achieved over the Internet, across the country or around the world. Street level mapping can also be employed using a PC, palm device or GPS. And yes, the TM-D700A is great for receiving satellite packet!

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Zero Bias

BY RICH MOSESON, W2VU

An Editorial

Let's Make History . . . Together

This issue of *CQ* marks a major milestone in this magazine's history, and perhaps in publishing history. Fifty years ago this month, George Jacobs, W3ASK (then W2PAJ), began writing his "Propagation" column for *CQ*, which was itself only six years old at the time. Every month since then George has been there, helping amateurs around the world understand the mysteries of HF propagation and decide which band will be best when for what sort of DX. George's unique propagation charts and tables help hams know what to expect when, and he has always put an extra-special effort into making predictions for October and November, the months of the *CQ* World-Wide DX Contest weekends.

Those of you who are long-time *CQ* readers will remember that George also spent several years as our Space Communications Editor, and was the first to write a regular column about amateur satellite communications. Not only that, but he was an active member of Project OSCAR, the group that got the first ham satellites built and into orbit.

Fifty years is a long time to do anything. Fifty years of writing a monthly magazine column—in any sort of magazine—just might be unprecedented. If that turns out to be the case, don't be surprised to see George's name turn up sometime soon in the *Guinness Book of Records*. All of us here at *CQ* congratulate George on this incredible accomplishment, thank him for choosing to be part of the *CQ* family longer than anyone else so far, and welcome him to his second half-century as our Propagation Editor. You'll find George's photo on our cover this month, and some of his reminiscences of the past 50 years in his column (in its familiar location in the back of the magazine, because we know how many of you turn there first to see what to expect from the bands in the month ahead).

The happy occasion of George's 50th anniversary with *CQ*, coupled with the sad news of the passing of two pioneers of modern technology—Al Gross, W8PAL (see this month's "Washington Readout"), and William Hewlett, co-founder of Hewlett Packard (see this month's "VHF Plus")—makes one realize that the generation that pioneered electronics and telecommunications is aging, and that each month we lose a few more of these pioneers. Unless their accomplishments and recollections have been recorded, important parts of our history, and of ham radio history (since many are/were hams), are lost with them. I think back to conversations I have had with people such as Al Dorhoffer, K2EEK, Lew McCoy, W1ICP, and Don Stoner, W6TNS, about amateur radio history and their roles in it, and regret that I never recorded those conversations or even took notes. Their stories are gone now, as are these friends. I remember talking on a local repeater with a ham who worked with Thomas Edison in his lab in West Orange, New Jersey. His stories are gone now, too.

It's been said that "youth is wasted on the young," and the same can be said of history, as well. It's too bad that most of us learn history in our youth, before we have a chance to live through very much of it. And it's also too bad that in many cases history is taught not as "his story" (sometimes her story), real stories of real people doing real things, but as a string of dates, names, and remote events that need to be memorized—until the test—and then generally are forgotten.

If you are reading this magazine, there's probably a good chance that you have had the opportunity to live through a fair amount of history, and perhaps to help make some. Hams and ham radio have played a major role in the development of our wired and wireless telecommunications infrastructure, yet our role is often overlooked or minimized. Our creation earlier this year of the *CQ* Ham Radio Hall of Fame is one effort to bring recognition to the important contributions of hams and ham radio to our society. Here is step two: We invite each and every one of you to join us in creating a tapestry of first-person ham radio history.

This month George Jacobs, W3ASK, celebrates 50 years as CQ's Propagation Editor. He is shown here with the tools of his trade. (Photo by Larry Mulvehill, WB2ZPI)

So many of us have stories to tell. The response has been overwhelming to K4IJS's January article, "A 20-Meter 'Bootlegger' Fesses Up," about his experiences with ham radio at the end of World War II. Ted says he's gotten dozens of letters and phone calls from readers who said his story brought back memories of their own experiences, and who started telling their own stories. We invite you to share those stories with us.

The CQ Oral History Project

If you've been involved in a large or small way in the development of amateur or commercial wireless communications technology and techniques, we want to hear about it. If you know a ham who's been involved in these activities, arrange to sit down over some coffee with a tape recorder and/or pen and paper. Ask the question that nearly everyone loves to answer: "Tell me about yourself." Ask about activities and accomplishments, noteworthy associates ("Do you remember any stories from your days working with Einstein?"), reminiscences of stories passed down from previous generations, etc. Find out how ham radio has affected this person's life and how his/ her activities and accomplishments may have affected ham radio. If you're doing this on your own, ask yourself these questions.

Our primary means of accepting, storing, and sharing your stories will be via our website, in a special section of the CQ Forums that will be set up exclusively for this project. Since most of what's there will be written, it won't really be an *oral* history project, although we may have limited space available for digital audio files of recorded interviews (pick out the most interesting parts to send

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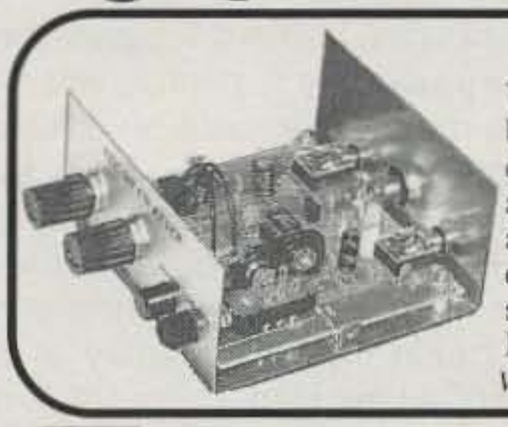

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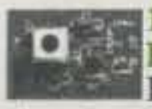

144/220/440 MHz Low-Noise Preamp Kits soup up your antenna system. Helps pull in weak signals. Works wonders for scanner or ham-band receiver. Gives great low-noise performance and immunity from damaging electrostatic discharge. 1x1½ in. *Simple skill level.* Order **VEC-1402K** (144 MHz),**VEC-1422K** (220 MHz), **VEC-1444K** (440 MHz), **$17.95.**

Vectronics kits feature a professional quality epoxy glass PC board with solder mask and component legend, simple step-by-step instructions and highest quality components.

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High-performance 2 Meter Preamp Kit pulls weak signals out of noise. Solves three reception problems -- boosts signals using a 1-dB noise figure microwave transistor, provides razor-sharp bandpass filtering, eliminates unwanted electrical noises with built-in balun. Uses 9-14 volts DC. Tiny 1½x3x1 in. fits in any size box. *Intermediate skill level.* Order **VEC-1402DK, $59.95.**

2/6/10 Meter FM Receiver Kits let you tune into the world of ham radio. Catch all the action! Each covers the entire FM sub-band and runs off your 9 volt battery. Plug in speaker or headphones for loud clear reception. 1¾x4x3½ in. *Intermediate skill level.* Order **VEC-1002K** (2 Meters), **VEC-1006K** (6 Meters), **VEC-1010K** (10 Meters), **$34.95 each.**

2 Meter Monitor Kit receives 144-148 MHz. Low noise, high gain RF preamp gives you excellent 0.1 uV sensitivity. Air variable tuning capacitor has 8:1 reduction. Dual conversion superhet provides selectivity and stability. Automatically eliminates squelch tails. Built-in speaker, squelch, tone, volume controls. 19¼ in. telescopic whip. 9V battery. 2x4¼x4 in. *Intermediate skill level.* Order **VEC-104K, $79.95.**

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Ni-Cad/Ni-MH Battery Charger Kit safely quick charges expensive batteries -- no overcharging -- many in less than an hour. HTs, cell phones, camcorders, lap top computers. Handles 1 to 12 cells. Charging status LEDs. Discharge before charge function reconditions batteries. Also removes memory effect. Runs on 12-15 VDC. 1¾x4¾x5¼ inches. *Moderate skill level.* Order **VEC-412K, $49.95.**

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Shortwave Receiver Kit lets you listen to the world! Covers 75/80, 49, 40, 30, 31, 20, 25, 22, 19, 17, 16, 15 and 13 Meter bands. Explore AM, SSB, CW, WWV, RTTY and Packet signals. Vernier reduction drive, smooth regeneration control, RF stage. *Includes all metal cabinet.* 2 earphone jacks. Use 9V battery. 2½x7x6 in. *Intermediate skill level.* **VEC-102K, $59.95.**

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Great introduction to QRP, the hottest and fastest growing activities in ham radio. With this tiny *transceiver*, you'll discover what thousands of QRP enthusiasts already know -- you don't need a $1000 radio to get on the air and communicate worldwide. All it takes is some simple circuitry using less energy than a pen-light bulb! You get VXO frequency control, broad-banded transmitter circuitry, solid one Watt plus output, shaped keying, .3 uV sensitivity, direct conversion receiver. Includes crystal for popular QRP calling frequency. 1¾x4¾x5¼ in. *Intermediate skill level.* Order **VEC-1380K** (80 Meters), **VEC-1340K** (40 Meters), **VEC-1330K** (30 Meters), **VEC-1320K** (20 Meters) **$59.95 each.**

Super CW Audio Filter Kit gives you three bandwidths: 80, 110, 180 Hz. Eight poles gives super steep skirts with no ringing. Pull CW QSOs out of terrible QRM! Plugs into phone jack to drive phones. QRM down 60 dB one octave from center frequency (750 Hz) for 80 Hz bandwidth. Improves S/N ratio 15 dB. Use 9V battery. 1¾x4x 3½ in. *Simple skill level.* Order **VEC-820K, $19.95.**

AM Radio Transmitter Kit lets you set up your own AM station and broadcast crystal clear programming from your studio with *you* as the disc jockey or talk show host. Play music from CD player, tape deck or other source. Choose clear frequency from 530-1750 KHz. Standard line level or microphone input. Easy CD, tape deck or mike mixers connect. Audio level adjustment. 1¾x4x3½ inches. *Simple skill level.* Order **VEC-1290K, $29.95.**

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us). We'd like to publish particularly interesting stories in *CQ*, and consider the possibility, if the response is good enough, of collecting these first-person recollections into a ham radio history book sometime in the future. If you don't have access to the internet or to digital recording (meaning plugging the output of a tape recorder into a computer sound card), send us your typed or taped stories and we'll do what we can to add them to the collection. If you want to share your stories with your fellow hams on our website but do not want us to publish them (for example, if you're already planning to publish your memoirs), please make note of that in your material.

The history of ham radio is not well-documented. Virtually the only source of early ham history is Clinton DeSoto's classic book, *200 Meters and Down*, from the 1930s. And the only post-war (WW II) history of our hobby is in the pages of the 50th Anniversary edition of *CQ* magazine, in January 1995. There's much more to tell, and it will be all the more interesting if it's told in the voices of the people who were there and who had parts in making our history happen. We can't afford to let our history slip away. Please join the effort to preserve and collect it.

"Required Reading"

While most of what hams do is positive and laudatory, we are a microcosm of society. This means we have our share of misfits and miscreants. The "misfits" part isn't necessarily bad. Many people who have difficulty fitting in with other people often find a comfortable home in ham radio, behind the anonymity of a microphone or a key. Ham radio offers a place to fit in. The "miscreants," on the other hand, are by definition "unscrupulous wretches" and "evildoers." They don't fit in, even in ham radio. And they are a tiny—but often loud—minority. However, their on-air behavior gives us all a bad name.

It's funny how several of our writers can decide to tackle the same topic at the same time, often without even talking to each other. This usually means that the topic is one of widespread significance. The topic this time is bad behavior on the radio. Contributing Editor Jeff Reinhardt, AA6JR, tackles the issue head-on in his "Magic in the Sky" column this month, a column the FCC's Riley Hollingsworth says should be "required reading for every Ham Operator in America." In addition, DX Editor Carl Smith, N4AA, turns his attention to poor behavior by DXers, and Contest Editor John Dorr, K1AR, devotes part of his column this month to on-air behavior by a minority of contesters that gives contesting a black eye among some hams. When three of our editors, without consulting each other, pick up on the same theme in the same month, it means there's a problem out there that needs to be recognized and addressed. Of course, our society as a whole is starting to recognize and try to deal with the growing problem of out-of-control anger, from "road rage" to "going postal." We hams have always prided ourselves on being a little more civil than the average person, on being one-to-one "ambassadors" of personal goodwill, even in contacts with hams in countries whose governments don't get along with ours. We're slipping, say John, Carl, and Jeff.

Recognizing the problem is the first step in resolving it. So do as Riley says and read Jeff's column. Then read Carl's and John's (we arranged them in just that order to make it easy for you). And then, most important, think about what you're saying on the air, how you're saying it; how you're perceived by someone listening, and how you (yes, you!) represent amateur radio to the rest of the world. Will you help or hurt our future history?

73, Rich, W2VU

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Announcements

• **3-Land Special Event** – The Baltimore ARC will operate a special event station *(no call given)* fromTimonium, Maryland 1200 Z March 31 to 2000Z April 1 on 7.260 and 14.310 to celebrate the 30th anniversary of The Greater Baltimore Hamboree & Computerfest. For certificate send QSL and SASE to BARC, c/o Awards Manager, P.O. Box 120, Reisterstown, MD 21136.

• **N2UL from Nutley, New Jersey** – The Robert D. Grant United Labor ARA will be on the air with the call N2UL from 1300–2400Z March 3 on 28.420 and 14.240 to honor Walter Reuther and the UAW. For certificate send name, address, and QSL to WA2VJA, RDGUL ARA, P.O. Box 716, Nutley, NJ 07110-0716.

• **Special Event Station W4U** – W4U will be on the air from March 18 to April 1 for the 69th Carolina Cup Races at Camden, South Carolina (March 31), CW up 40 kHz; 3.905, 7.235, 14, and 21.328. QSL to Leon M. Morgan, Jr., N4LM, 2304 Moultrie Rd., Camden, SC 29020.

• **W4BKM from Macon, Georgia** – The Macon ARC will operate W4BKM from 1500–2200Z on March 17 at the 19th annual Cherry Blossom Festival, phone 14.240, 21.335, 28.390. For certificate send QSL and 9 × 12 SASE to Macon ARC, P.O. Box 4862, Macon, GA 31208.

• **W6LY Special Event** – The Leisure World ARC will be on the air as W6LY to celebrate the second birthday of The City of Laguna Woods, California, 1400Z March 24–25 on 7.25, 14.250, 21.380, 28.380. For QSL send SASE to Ernie Senser, 3031 Calle Sonora Unit B, Laguna Woods, CA 92653.

• **The following hamfests, etc., are scheduled for March:**

Mar. 3, **North Jersey Hamfest**, PAL Building, Parsippany, New Jersey. Contact Splitrock ARA, P.O. Box 610, Rockaway, NJ 07866; Mark Turner, 1-888-511-SARA; <Splitrock@worldnet.att.net>; <http://www. ham.hsix.com/sara>.

Mar. 4, **Western Canada Amateur Radio Fleamarket** (Burnaby ARC), City of New Westminster B.C. armories building. Contact Bob Kungl, VE7KW, 604-524-9177, <VE7KW@rac.ca>. (Talk-in 145.35– VE7RBY)

Mar. 4, **SEWFARS ARC Swapfest & Computer Expo**, Waukesha County Expo Center, Waukesha County, Wisconsin. Contact SEWFARS, P.O. Box 102, Delafield, WI 53018 (1-262-835-7035). (Exams; Talk-in 146.820, PL 127.3)

Mar. 10, **2001 Kerbela Hamfest**, Kerbela Temple, Knoxville, Tennessee. Contact Kerbela ARS, Kerbela Temple AAONMS, 315 Mimosa Ave SE, Knoxville, TN 37901. (Talk-in 144.83[T], 145.43[R])

Mar. 10, **Scottsdale Hamfest**, Scottsdale Community College, Scottsdale, Arizona. Contact Roger Cahoon, KB7ZWI, 8501 E. Edward, Scottsdale, AZ 85250 (480-948-1824; mobile 602-725-7256; fax 602-943-7651; e-mail:<rgcahoon@msn.com>). (Exams; Talk-in 147.18)

Mar. 10, **Hambash 2001**, Ararat Shrine, Kansas City, Missouri. Contact Steve Dowdy, WJØI, 12411 Olive, Kansas City, MO 64146 (816-941-3392; e-mail: <sdowdy@kc.rr.com>). (Exams: Send form 610 to Exam Registration, P.O. Box 47067, No. Kansas City, MO 64188; fax 816-941-0620. Talk-in 145.13)

Mar. 10, **Mike & Key ARC Electronic Fleamarket**, Pavilion Exhibition Hall, Western Washington Fairgrounds, Puyallup, Washington. Table info 425-867-4797 days; 253-631-3756 eves; <mwdink@eskimo.com>. VE exam info 206-824-9039; <k7yh@worldnet.att.net>. (Talk-in 146.82/22; PL 103.5)

Mar. 10, **Linda, CA Swapmeet**, American Legion Post 807, Linda, California. Contact Ron, W6KJ, 530-674-8533, or Clara, KC6JPP, 530-742-2674.

Mar. 10, **North Arkansas ARS Hamfest**, Harrison Junior High School, Harrison, Arkansas. Contact Bill Rose, N5VKF, 870-741-6968, <billrose@ cswnet.com>. (Exams; Talk-in 147.000 [–600 kHz])

Mar. 11, **Mt. Tom ARA Amateur Radio & Electronics Fleamarket**, Amherst Regional Middle School, Amherst, Massachusetts. Contact Cindy Loiero, K1ISS, 413-568-1175, <n1fi@arrl.net. (Exams 10 AM; Talk-in 146.94)

Mar. 17, **Stuart, FL Hamfest**, Martin County Fairgrounds, Stuart, Florida. Contact Wil Schartel, 561-546-2428; <http://ecqual.net/~millard/hamfest.htm>. (Talk-in 147.060)

Mar. 17, **Charleston, WV Area Hamfest & Computer Show**, Coonskin Armory, Charleston, West Virginia. Contact Jim Damron, N8TMW, <n8tmw@arrl.net>. (Exams 12:30 PM; Talk-in 145.35)

Mar. 17–18, **Midland ARA St. Patrick's Day Hamfest**, Midland County Exhibit Building, Midland, Texas. Contact Midland ARC, P.O. Box 4401, Midland, TX 79704; or Larry Nix, N5TQU, <oilman29@home.com>; <http://www.w5qgg.org>. (Exams 1 PM Saturday)

Mar. 18, **Toledo Mobile RA Hamfest/ Computer Fair**, Lucas County Recreation Center, Maumee, Ohio. Contact Paul Hanslik, N8XDB, TMRA, P.O. Box 273, Toledo, OH 43697-0273 SASE (419-385-5056); <www.tmrahamradio.org>.

Mar. 18, **Tri-County ARC Hamfest 2001**, Jefferson County Fairgrounds Activity Center, Jefferson, Wisconsin. Contact TCARC, 213 Frederick St., Fort Atkinson, WI 53538 (920-563-6381 phone evenings; 920-563-9551 fax; <tricountyarc@globaldialog.com>).

Mar. 24, **ARC of Parket County, TX Hamfest**, National Guard Armory, Weatherford, Texas. Contact Elizabeth Hunkele, N5ONE, 1507 Old Garner Rd., Weatherford, TX 76088 (817-594-1700; <eliz@mesh.net>). (Exams; Talk-in 147.04/T 110.9)

Mar. 25, **Lake County ARA Hamfest/Computerfest**, Madison High School, Madison, Ohio. Contact Roxanne, 440-257-0024; or Lake County ARA, P.O. Box 868, Painesville, OH 44077.

Mar. 25, **Two Rivers ARC Hamfest, Computer Fair**, Palace Inn, Monroeville, Pennsylvania. Contact Two Rivers ARC, Roxane Gaal, 312 Lawrence Ave., N. Versailles, PA 15137 (412-823-6613; <gaal@pgh.net>).

Mar. 25, **Framingham Fleamarket**, Framingham High School, Framingham, Massachusetts. Contact Bev Lees, N1LOO, FARA, P.O. Box 3005, Framingham, MA 01705 (508-626-2012). (Exams W1EQW, 508-435-6487)

Mar. 31, **RAS of Norwich, CT Ham Radio Auction**, Waterford Senior Center, Waterford, Connecticut. Contact Mark, KE1IU, 860-536-9633; <www.rason.org>. (Talk-in 146.730–)

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Public Service

BY BOB JOSUWEIT, WA3PZO

Public Service and Emergency Communications

Hams at Ground Zero in Alabama Twisters

Just five weeks before one of last year's deadliest tornados, Tuscaloosa, Alabama's amateur radio operators tested their equipment and preparedness to provide important communication to the National Weather Service, local emergency management agencies, and the American Red Cross. The drill was a standard roll-call net from the local Red Cross Chapter. When each station responded, they knew their equipment was working and they could maintain radio contact.

Little did they know that this drill was to be just weeks before a deadly F-4 tornado touched down in Tuscaloosa County killing 11 and injuring at least 65. This was the strongest tornado recorded in the United States last year. "The ham radio operators are our eyes and ears out in the county," Ron Hampel, director of the Tuscaloosa County Emergency Management Agency, told the *Tuscaloosa News*. "They are very, very important people. In this age of the internet and cell phones, it may seem as though ham radios are out of favor." Hampel, who was recently licensed as KG4KRH, said, "Phones and electricity are often the first things to fail in a storm. Callers can clog cellular capabilities, and weather can damage cell towers. So radio operators are extremely valuable."

Spotters KG4EER and KG4DMH were just ahead of the tornado, which was estimated to be 750 yards wide at its maximum intensity with winds from 207–260 mph. (Screen capture of video filmed by Chuck Beams, KG4EER)

Not December weather ...

The West Alabama Emergency Net was activated at approximately noon on the Tuscaloosa Amateur Radio Club's W4KCQ repeater, with Cal Davis, KF4LAR, as Net Control. It was just too warm for a mid-December day—time to be on the lookout for severe weather.

The first eyewitness to the storm was Chad Sanders, KE4ZZY, from Hazel Green, Alabama, who was visiting relatives near Ralph in the extreme southwestern part of the county. He reported a wall cloud to Davis, confirming the seriousness of the situation. A wall cloud is the area of the cloud where tornado development is likely.

The net operated from the Tuscaloosa Emergency Management Agency's Emergency Operations Center at Tuscaloosa City Hall. Davis spent nearly ten hours serving as primary Net Control on the Tuscaloosa ARC's 146.820 MHz repeater. Throughout the afternoon Davis and nearly 40 other hams helped organize emergency responses by relaying vital information to and from disaster officials, and even assisting with some rescues of storm victims in the field. According to David Black, KB4KCH, the tornado was unlike any disaster Davis had assisted with because he was able to watch live video of the storm using a closed-circuit television system installed to monitor traffic flow while getting real-time reports.

"We watched the tornado," Davis said. "It's the spookiest feeling I've ever had, to sit in the basement of City Hall in the Emergency Operations Center and watch a tornado and know I have 10 to 15 spotters around, hearing them describe damage. I will never forget the sight of that.

"I managed to get several mobile [stations]. I had them to the south and west of the city, and I set up a line and set up a secondary line for the storm that got past that. It worked beautifully. It was a perfect textbook example of how to set up your spotters."

Placing hams in key spots to better monitor approaching storms is part of an important strategy spotters follow.

As reports came in, Davis told the net that there were reports of "major structural damage." With damage reports coming in from several areas of the city, Davis requested that reports be limited to injuries only. It was important to get help to the victims.

This was confirmed by Michael Townsend, KF4YPK, minutes later as the tornado crossed Interstate 20/59. First reports of damage were in the Hinton Place and Englewood subdivisions along Alabama Highway 69. The storm then passed farther east over the Springhill Lakes, Woodland Forrest, Cottonwood Park, and Canyon Lakes areas. Most fatalities and injured were in the Bear Creek Mobile Home Park. Many of the severely injured also came from the Hinton Place subdivision.

Some of the first reports of fatalities from the tornado came from radio amateurs, Davis said. "We had a couple of hams who saw things I'm pretty sure they wish they could forget." Most of the deaths came from the Bear Creek mobile home park, which was obliterated. Hams also helped with establishing a medical triage center near the damaged neighborhoods, Davis said.

Field Rescues

"We had a couple of hams who did get in and actually pull folks from some collapsed houses. We have a couple of hams who are either EMTs or paramedics and they were in the area. They were able to render some assistance. With so many trees down and other damage, access to the hardest hit areas was possible only by walking in," Davis said. "We had hams who went in with handy talkies.

If they found injuries, they reported them to me and we passed that on and had crews walk in to where those injuries were."

Chuck Beams, KG4EER, and Trip Harris, KG4DMH, were about an eighth of a mile from the tornado when it was first spotted. "We were the first ones there," said Beams, describing what they saw. "Water blowing up in the air from what used to be fire hydrants, gas escaping from broken gas pipes. There was just nobody there," he said. When asked where he was, Beams answered, "I'm standing in a pile of rubble." He wished he had had a GPS unit.

As they got into the area, they heard cries for help. They found James Fitts and a friend under four to five feet of rubble —what used to be his house. His

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The Fitts house was just past the sheriff's car on the right side of the street. (Photo courtesy KG4EER)

KC4ZMP and KG4EER represented the Tuscaloosa EMA at the scene. All of the vehicles with yellow placards belong to hams. (Photo courtesy KG4EER)

wife, Carol, lay nearby. She was one of the 11 victims. In recalling the experience Beams said, "I was a friend to Mr. Fitts, not just an amateur. In a matter of minutes he lost his wife and his home. Because of the extensive damage it took a good 10-15 minutes for anyone to get to where we were. We found numerous people who were severely injured and we relayed and requested medical assistance through our Hams to the Net Control station at the Tuscaloosa County EMA."

Tuscaloosa Emergency Coordinator Kirk Junkin, KC4ZMP, immediately established a communications link with the Tuscaloosa Fire Department's Incident Commander on the scene and relayed information to the EOC through Davis. "Many of these people probably would have died if we had not been there to get them medical attention," said Beams. "The Sheriff, fire, and medical frequencies were all jammed. Luckily we had a few hams who were EMTs and paramedics." According to Beams the hams found three or four of the fatalities.

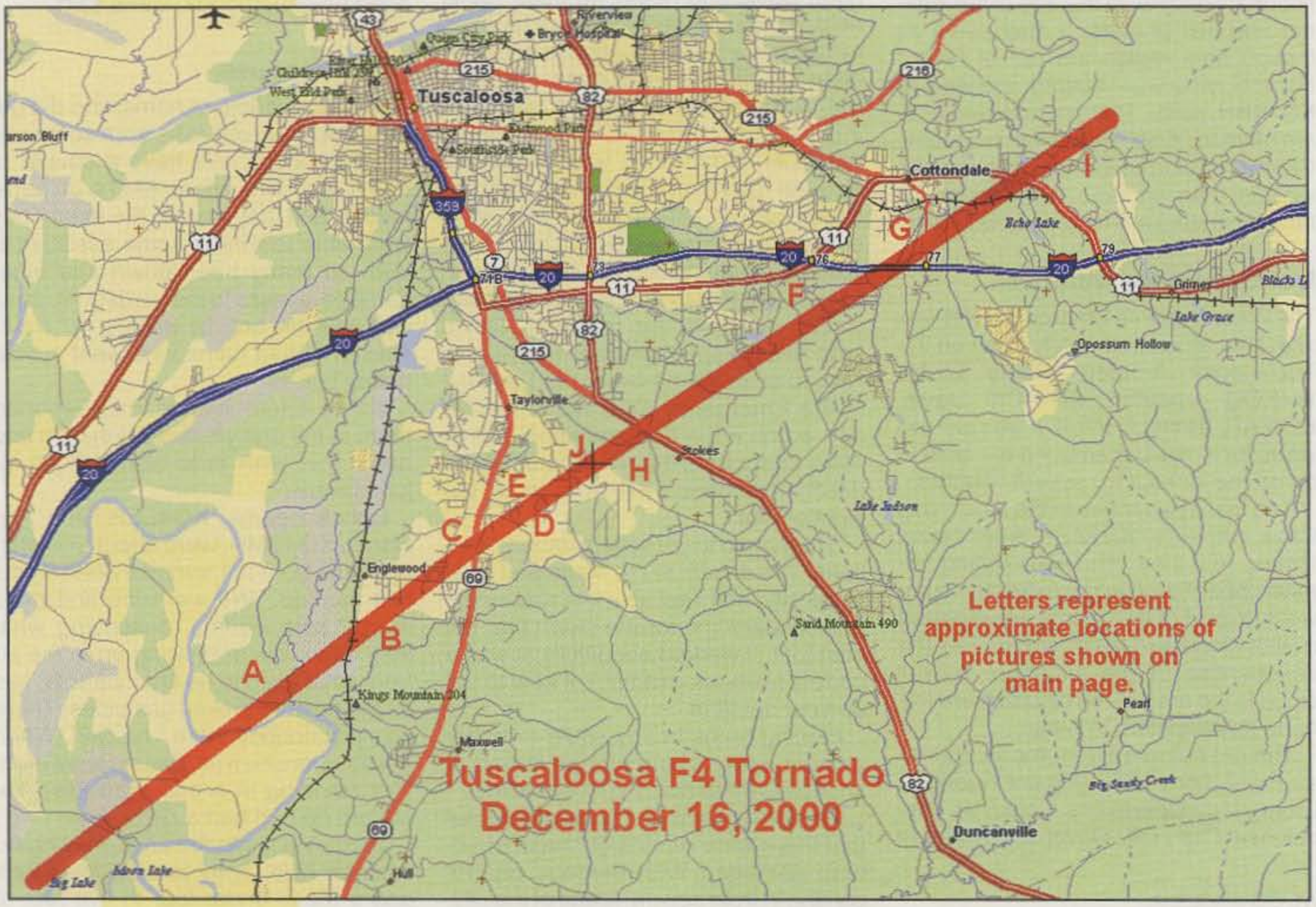
"Blessed to be alive..."

A member of Alabama's Emergency Response Team (ALERT) happened to be near the tornado's path as the storm hit. David Reed, KF4DFR, ALERT's Public Information Officer, had travelled to Tuscaloosa to attend a birthday party at Englewood Baptist Church.

"I saw the tornado touch down near the church," Reed said. "I first saw the wall cloud coming...it was as classic as it gets. Then the funnel appeared, and we went for cover inside. It touched down and passed within 150 yards of our location. We are blessed to be alive today. Praise God."

The Aftermath

Once the storms ended, the workload for hams didn't stop. Tuscaloosa ARC members assisted the West Alabama Chapter of the American Red Cross with shelter communications services. Other amateurs activated the West Alabama Amateur Radio Association's W4WYN repeater and the Druid Amateur Radio Association's WS4I repeater. The agency initially estimated as many as 500 people were assisted. A large shelter was established at Shelton State Community College, within sight of the stricken Hinton Place subdivision. All but two TARC members were released from duty by 10 PM Saturday,



The National Weather Service provided this map showing the path of the tornado.

Hams reported major structural damage in several areas of the city. (Photo courtesy the National Weather Service)

Davis said. One ham remained at the Red Cross chapter house and a second stayed on-site at the shelter. Davis said hams were also preparing to begin damage assessment team work starting Sunday morning, when Mother Nature was delivering a different challenge: Up to three inches of snow was reported in neighboring Walker County, and the wind-chill factor was expected to remain below zero all day.

Both the WAARS and DARA repeaters remained active until Wednesday providing Red Cross support as Damage Assessment Teams covered the stricken areas. The Red Cross reported that 124 homes were destroyed, 102 suffered major damage, and 220 suffered minor damage. The TARC repeater was active through Monday, providing communications to and from the Emergency Operations Center.

One amateur from Indiana, Robert Osborne, KB9HFJ, simply was passing through the area and volunteered to help. Davis assigned him to provide communications at Pleasant Hill Baptist Church. Beams said that one of the reasons he got into ham radio public service was because he felt he could help with an important role. After being directly involved with this emergency he is convinced that hams do play an important role. The spotters were able to provide an 18-minute warning before the tornado hit populated areas. Unfortunately, many residents did not have a radio turned on to get the warning.

Ham "Shadows"

One of the most valuable lessons Davis says his group learned was something they had never considered previously. Black explained that reports indicated a ham was assigned to DCH Medical Center to help relay information involving storm victims.

"Luckily, the hospital administrator had a good working relationship with the EOC. And though he didn't know a lot about amateur radio, he knew that if the EOC sent someone to him, then he could trust them. Davis explained that person managed to glue himself to the administrator's hip and walked around the hospital for a couple of hours with a good handy-talkie, passing along information. We set up a couple of places where we could relay information."

One ham stayed with the Tuscaloosa Fire Department's Incident Commander throughout the day "and basically became his shadow," Davis said. That ham relayed reports from the Commander to Davis at the EOC, who then notified other agencies as needed.

In addition, "I think the main thing is to establish a really good working relationship with your public-safety agencies. I think we'll drill more in the future on what I call shadow communications

—finding a public-service official and sticking to him like glue."

Amateur radio was especially useful when the Tuscaloosa County Sheriff's Department encountered coverage problems using its new SouthernLinc 800 MHz digital radio system. "It did not work well in certain areas," Davis said. "Amateur radio came in very handy and was a good back-up." In the Tuscaloosa area alone 35 amateurs played a role in stormspotting, with many more assisting in disaster recovery operations.

Entire State Busy With Severe Weather

Members of ALERT were providing emergency communications to assist forecasters at the National Weather Service's Birmingham Office. To the north of Birmingham, members of ALERT exchanged reports with amateurs in the North Alabama Skywarn Net, using a UHF link system connecting Birmingham with the Tennessee Valley. In east Alabama ALERT maintained contact with the Salem Hill Skywarn Net using the 224.500 MHz repeater in Shelby county. More than 30 severe weather reports of either damage or large hail, as well as funnel cloud and tornado touchdowns, were reported to the National Weather Service. In all, Alabama was struck by at least three tornadoes that day which killed twelve people.

Publicize Your Public Service

CQ asked Cal Davis, KF4LAR, about establishing a successful public relations program for an ARES/RACES/Skywarn type group. Davis wrote a series of press releases on amateur radio public service during the storm. In addition, David Black, KB4KCH, provided audio clips of the amateurs reporting information on 2 meters, and video of the tornado was provided by KG4EER and KG4DMH. This information was posted on the ALERT website. These early reports provided valuable information. My thanks to all involved.

Here's Cal's story:

I became an ARRL Public Information Officer only in November. What a way to get my feet wet. I have handled PR for the Tuscaloosa Amateur Radio Club for the past couple of years by default. Getting a foot in the door is the first step. I started out by approaching the meteorologist on the staff of the only television station actually in Tuscaloosa. (We are in the Birmingham market and most of the stations are there, about 60 miles away.) He knows the value of the storm spotters. First, I invited him to speak to our club at a monthly meeting. This made *him* the center of attention, and had the added advantage of giving his channel publicity. Most stations insist their on-air talent attend such things. It's amazing how easy it is to get *them* to come to *you*.

I also was sure to give him a list of repeater frequencies, especially the main and back-up weather net frequencies. I encouraged him to have someone listening while severe weather was in progress. Most stations have police scanners, and programming in the ham repeaters takes only seconds. I also got a friend who is really into scanning to give me a couple of his "special" catches, such as a police frequency that apparently is used as a tactical channel and isn't in any listing. That got the attention of the news director. And it just so happens that at this particular station, the news director is the meteorologist's wife!

When the tornado of April 8, 1998 struck it all paid off. The meteorologist was passing along information directly from the spotters. As a matter of fact, you could hear the scanner in the background. After that, the spotters *were* the news. The next couple of days the phone rang off the hook with people calling me. I was on the news at least four different days. At the next club meeting we had three television reporters (and cameramen) show up.

Now here is the hard part. You've got to be careful which people you let them interview. Pick and choose the ones you trust to represent amateur radio the way you want it to be represented.

Finally, when our annual awards banquet was held several months later, I contacted the station again. We were presenting several hams with ARRL Emergency Communications Certificates for their actions that night. They also gave a certificate to the meteorologist for speaking at the club meeting. Of course, a camera was there. Some footage was shot of our spotters receiving their certificates, giving them well-deserved recognition. And mention was made that we gave the meteorologist a certificate too.

Finally, don't get upset if they get the little things wrong. Invariably, our storm spotters are called "storm chasers" . . . a sore point with them. "Sometimes the video shows a 2 meter rig while the reporter is talking about communicating with Australia. But consider the overall picture the story painted of amateur radio. If you looked better coming out than you did going in, you did your job right."

Do you have a story to tell of hams serving in the public interest? If so, send us a note.

73, Bob, WA3PZO

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

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

- The **CA-UHV** is a 6M/2M/70cm triband antenna. Add 2-3 of the stock or optional coils for 5-6 band operation.
- HF-70cm all in one economical easy to mount antenna.
- Fold-over hinge built in.
- Select the correct duplexer or triplexer for your specific radio (s).
- CF-706A, CF-530, CFX-514N (Ask your dealer)

NEW CA-UHV • HF/6M/2M/70cm Mobile Antenna40"/20"/17/15/10/6/2M/70cm **40M Thru 70cm!**
Gain & Wave: HF-6M 1/4 wave • 2M 3.4dBi 5/8 wave • 70cm 2.15dBi 1/2 wave • VSWR: HF 1.6:1 or less • 6M-70cm 1.5:1 or less • Length: 6'2" •
Max Pwr: HF 120W SSB • 6M 200W SSB/100W FM • 2M/70cm 100W FM • "L-14 Optional 20M coil • "L-18 Optional 17M coil

* **NEW MSG-1000C** • Dual-band 146/446MHz w/spring whip and fold-over
Gain & Wave: 146MHz 2.15dBi1/2 wave • 446MHz 5.5dBi 5/8 wave x 2 • Length: 39" • Conn: PL-259 • Max Pwr: 120W

* **NEW MSG-1100C** • Dual-band 146/446MHz w/spring whip and fold-over
Gain & Wave: 146MHz 3.5dBi1/2 wave • 446MHz 6.0dBi 5/8 wave x 2 • Length: 43" • Conn: PL-259 • Max Pwr: 150W

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NCG™ COMPANY

CQ's market survey returns for 2001 with a new look at what's available in the HF amateur market.

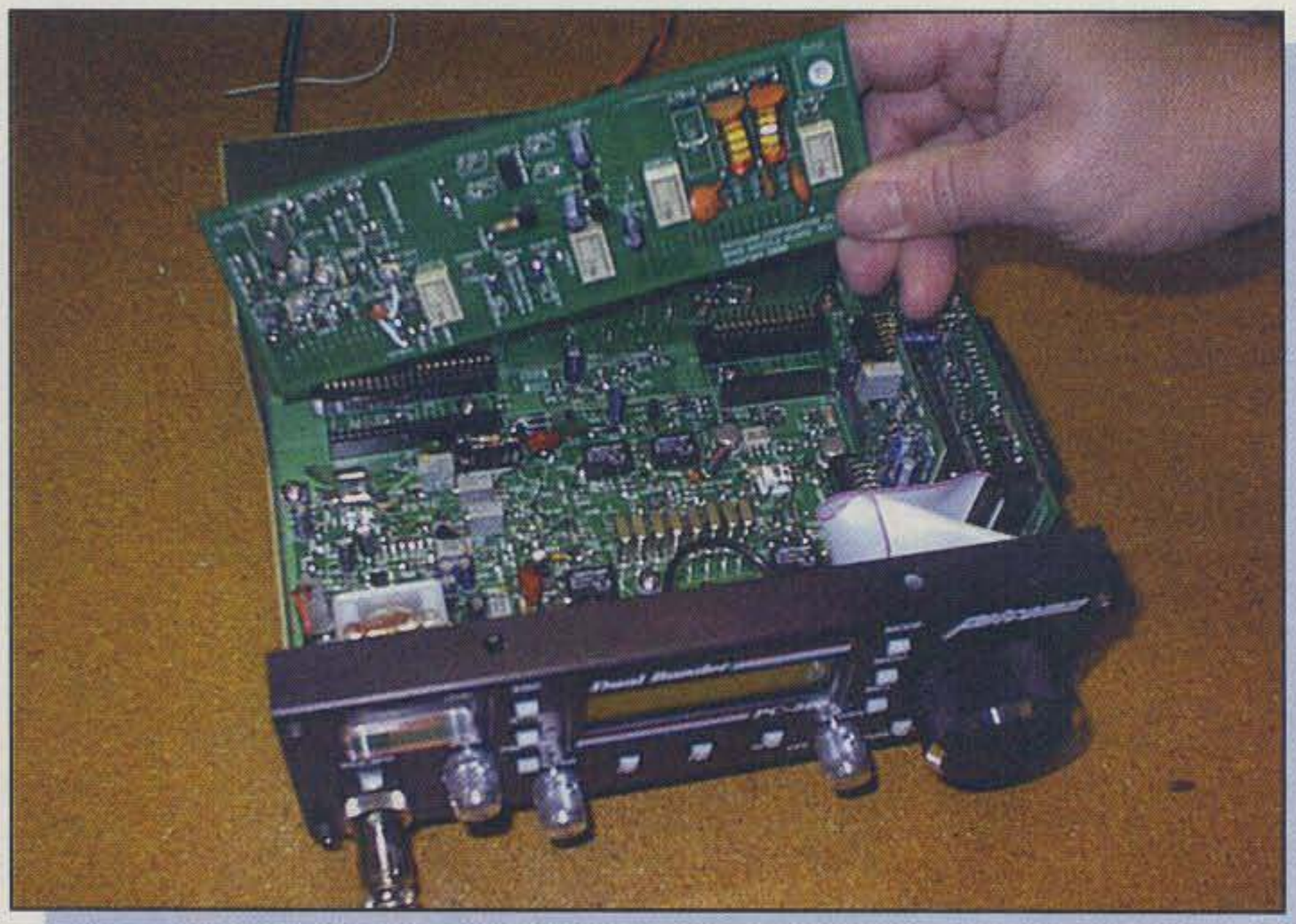
CQ Market Survey:

High-Frequency Transceivers for 2001

BY GORDON WEST*, WB6NOA

It has been almost a year since the FCC lowered the maximum code speed for an amateur license to 5 words per minute, and thousands of hams have upgraded both their licenses and their stations. That process continues, and the great DX available due to peak sunspot conditions is prompting other hams to upgrade their equipment as well.

Our market survey takes a comprehensive look at today's marketplace for HF ham gear—that is, equipment built to operate on the ham bands between 3 and 30 MHz. Virtually all of these radios also include 160 meters (1.8–2.0 MHz), and many include the VHF and UHF bands of 6 meters, 2 meters, and 70 centimeters. In addition, most of these radios are suitable for mobile as well as base operation, although some are a bit big for tucking under your dashboard!



Patcomm offers any two bands of your choice between 160 and 6 meters in its $400 PC-500 dual-band transceiver.

Topping 2000

Last year's offering of HF equipment at modest price levels is going to be hard to top for 2001. This year I was really hoping to see some new mobile HF entries with a truly adjustable noise blanker that could be operator-tuned for pulse intensity, pulse length, pulse interval, and pulse repetition rate to somehow magically knock down annoying sparkplug hash that most newer cars are putting out. If they can come up with effective adjustable noise blankers on step-up CB radios, why the heck can't we have a better ANL (automatic noise limiter) and NB (noise blanker) circuits in our ham rigs, especially the tiny go-anywhere models that can expect to see a lot of mobile use? Now I realize that the Yaesu FT-100 and ICOM 706 Mark II G each have menu items and push buttons for blanking out the hash, but I still think there is a lot more that could be done to track the sparkplug noise and kill the clatter.

* CQ *Contributing Editor, 2414 College Dr., Costa Mesa CA 92626*
e-mail: <wb6noa@cq-amateur-radio.com>

So How Much To Get Started?

The dollar-to-yen ratio has remained relatively stable, so there has been no major price increase in 2001 models. A good 100 watt, 100-memory, 12 volt mobile that covers high frequency plus maybe the 6 meter band will be in the $700–$800 area. However, if you want a 100 watt, 100-memory mobile with 6 meters, 2 meters, and 440 MHz included, you're now up to around $1000. Think about this, though: These are multi-mode, HF-plus-VHF-plus-UHF transceivers, and if you were to purchase them separately, you would be spending around $2000. Also, I have not detected *any* compromise in performance by squeezing them into a tiny chassis such as the FT-100 from Yaesu or the ICOM 706.

Thus, getting started doesn't necessarily mean you have to break the piggybank and spend a couple of thou. The $700's will get you a nice 100 watt, 100-memory, HF mobile that's just as much at home on your bench when hooked up to a 20 amp, 12 volt DC power supply. However, we're going to start our survey at an even lower price level—under $500!

Under $500?

Yes, you *can* purchase brand new HF equipment for below $500. Some of my favorites are the completely assembled MFJ CW and SSB low-power single-band transceivers. For around $250 you can put out 12 watts on either 15,

The new Elecraft K1 kit is a dual-band HF transceiver that runs 5 watts and measures only 2" × 5" × 5½".

The Alinco DX-70 is now sold with high power (100 watts) on the 6 meter band as well as HF. The new rig is designated the DX-70TH.

20, 40, or 75 meters, or 20 watts on the 10 meter band. If you enjoy CW, MFJ has single-banders for all of the HF bands including the WARC bands (30, 17, and 12 meters) for under $190. MFJ also has kits, for even greater savings. Keep in mind, though, that these are single-band transceivers; if you want 10 through 75 meters, they do add up!

Patcomm offers any two bands of your choice between 160 and 6 meters in its $400 PC-500 dual-bander. It features variable power output between 1 and 15 watts in CW, SSB, or digital modes; a digital variable filter system in the receiver for excellent selectivity; and like Patcomm's other radios (see below), it has a built-in interface for a CW keyboard. Additional band units may be purchased for $35 each. The PC-500 is PSK-31 ready with the addition of the VOX (voice-operated switch) option. The microphone is also an option, letting you save on that in case you already have a mic you'd rather use.

Looking for absolutely phenomenal craftsmanship in a kit? Check out Elecraft's all-band K2 HF transceiver kit which runs 10 watts output and is a pleasure to inspect after you have carefully followed all of the detailed instructions on putting together this equipment. The new Elecraft K1 is a backpacker's dream. This dual-band HF transceiver kit runs 5 watts and measures only 2" × 5" × 5½". The Elecrafts sound just as good on the air as they look on the inside.

Ten-Tec and Ramsey Electronics also offer extremely low-priced transceivers as kits, and both companies attend the major ham radio shows to get direct feedback from their valued kit-builders/customers. The design engineers for Ten-Tec are usually right there at the show to answer any questions kit-builders may have, and their help line is also available when you may have a question on what goes where.

There are also many QRP (low power) clubs such as Nor Cal and the New Jersey QRP Club that may offer HF kits that might be put together as a club project. In addition, there are single-banders from Small Wonder Labs, Red Hot Radio, Oak Hills Research, Wilderness Radio, and Emtech.

Also in the under-$500 range are two dual-band HF mobile rigs from Ranger Communications, the 25 watt RCI-2950DX and the 150 watt RCI-2970DX. Both operate multimode on 10 and 12 meters only, offering CW, SSB, AM, and FM, including provisions for repeater splits on 10 meters. The lower power model sells for less than $300, while the high-power version is in the mid-$400s.

In The $700s

We now enter the 100 watts out, 100-memory line-up of "entry level" transceivers but with "major level" features. All of these new sets offer general-coverage receive, so if you get tired of plying the ham bands, you can listen to international broadcasters or your local United States Coast Guard high-frequency station.

The Alinco DX-70TH is now sold with high power (100 watts) on the 6 meter band as well as HF (or for $599, a 10 watt version from RadioShack.com). Many people don't realize the head of the DX-70 may be detached from the body. The cable is somewhat large, but nonetheless, you can hide the body under the seat and mount the head up on the dash where you can see it. If you don't want 6 meters, you can save a little bit with the Alinco DX-77T. However, this is a much larger radio and looks more at home on the bench than it does in a vehicle. I prefer the DX-70, spending only about $40 more and getting the 6 meter band, too. CTCSS is a little awkward on the 70TH, but if you're good with dip-switch dithering, you'll do just fine running tone on 6 meters or 10 meters FM.

ICOM has replaced the IC-707 with the new and very popular IC-718, which I once spotted being sold retail for under $699. This is not necessarily a small box, nor does it do 6 meters, but it does offer 100 watts output on HF, 101 memory channels, and a huge LCD display that makes this a good-looking set on your operating desk.

Continuing in the $700 market is the Kenwood TS-50. Holy cow! How long can a manufacturer continue to stay with one hard-working model and not make any changes to it? Actually, I really can't think of any changes necessary because it is such a great set for voice, CW, PSK, and Pactor. If you run it in the digital modes, however, be sure to add some sort of external cooling, because this little TS-50 can really get hot. There are also menu settings to knock down the power output to keep it cool on prolonged data transmissions. The TS-50 is a real workhorse, and my anticipation that Kenwood would soon offer a TS-50 with a remote head never arrived. They say why change something that is doing just fine without anything else to take it out of the $700 class. I agree.

Yaesu says the same thing about its FT-840—100 watts out, 100 memory channels. Why change a solid per-

The ICOM IC-718 is not necessarily a small box, nor does it do 6 meters, but it does offer 100 watts output on HF, 101 memory channels, and a very large LCD display.

former? The 840 has a dandy little feature for those of you taking advantage of hot 10 meter FM activity—10 meter repeater offsets that don't require a lot of push-button selection. There is also selectable CTCSS for 10 meter band operation. Sorry, there is no 6 meters on the FT-840.

Yaesu also offers the FT-600, a cross between their commercial/military radios and ham equipment. The FT-600 has an alphanumeric display, so it might be just the rig to choose for an emergency communications center or radio command post with many different operators coming in to operate on specific channels. If you get a chance, look at some of the workmanship inside the FT-840 and FT-600 and see what "Mil Spec" (military specification) quality is all about.

SGC continues to sell plenty of its "built in the USA" SG-2020 HF transceivers, also with Mil Spec insides. The SG-2020 has a generally unknown feature that makes it a good emergency field radio, and that is its capability *not* to shut down power output with an elevated SWR. Although it only puts out a maximum of about 40 watts, this is safe enough heat dissipation such that you can run the equipment into almost a dead short and still get nearly full power output without damaging the final. Other radios operated in the field may have overly sensitive SWR shutdown circuits, which will dramatically attenuate your transmitted signal when the radio is trying to protect its sensitive finals. You won't have that problem with the SGC-2020.

Ten-Tec is also doing well with its 100 watt Pegasus transceiver. You tie it into your computer and an image of the radio comes up on your computer screen. If you absolutely must have a tuning dial, Ten-Tec can give you one to go along with it (as an option) just to keep your fingers busy. The Pegasus really has a smooth-sounding receiver and excellent transmit reports.

New from Yaesu in the $700s is the FT-817, a 160 meter through 2 meter, plus 440 MHz, *multimode*, 5 watt, backpack transceiver. Its modes include digital AFSK packet at 1200/9600 baud FM. It also works quite nicely as a VHF or UHF SSB portable to work the bands when tropospheric ducting or other band openings bring in DX signals on these bands. Despite its micro-size, the FT-817 actually can take batteries right on the inside. However, don't expect those AA batteries to last very long if you are playing around with the equipment in the field and have no other power source; this is a lot of radio with a lot of receiver, and if you add just a little bit of FM talking, you'd better have a spare set of batteries handy. On the other hand, if you turn the equipment on and off checking for band openings and maybe use it with a small, flexible solar panel, you will be all set for a full day of backpacking with a terrific transceiver. You would be surprised how far 5 watts goes on HF, too, when hooked up to a lightweight dipole or better yet, a small beam. Watch for a full review of the FT-817 in an upcoming issue of *CQ*.

Yaesu's FT-817 is one of the hottest new rigs on the market today. Designed as a backpacking-QRP radio to operate from anywhere, the rig puts out 5 watts on all HF ham bands plus 6 meters, 2 meters, and 70 cm, in CW, SSB, FM, and AFSK for digital modes.

Around A Grand

At the $1000 level, new HF equipment usually includes the 6 meter band plus sometimes a whole lot more. You might be buying a small radio with a detachable head, but plan to spend another $100 for the cable kit and mounting bracket that goes along with the detached head.

The ICOM IC-706 Mark II G is quite a rig, and it generally sells for about $1100 (I once saw it selling *below* $1000, but I am sure that was part of some promotion). The 706 Mark II G covers all of the high-frequency bands, plus multimode capability on 6 meters, 2 meters, and 70 cm. It operates FSK for RTTY operation, plus FM, SSB, and CW, and has jacks to take many of the data modes. It will even give your traveling companion wide AM television audio reception, as well as wide FM music reception. Sorry, there is no TV screen nor FM stereo!

The 706 stores up to 101 memories, along with 9 alphanumeric characters for each memory. A dot- matrix display gives you all of the popular menu fea-

Ten-Tec's new Jupiter is an HF-only rig which features 34 built-in IF-DSP (digital signal processing) receive filters and 18 DSP-generated transmit bandwidths. The Jupiter's secret is that virtually every parameter is in software, and the radio is fully controllable from your computer.

tures, frequency, and multi-function meter data. Even a spectrum scope displays band activity at a glance, but during the band scope operation the receiver mutes. About the only thing that I would have them change is the polarization of the LCD screen so that I could see it when wearing polarized dark glasses. Other than that, it is a knockout in this price category.

The Yaesu FT-100-D sells for a couple of hundred bucks more, but offers 200-plus memories with full encode/decode capabilities, allowing you to store all of those 2 meter and 440 FM memories along with your favorite HF frequencies. This is also an HF/VHF/UHF rig, with coverage up to 450 MHz, plus extended receive up to the 800 MHz band in case you have some local public-safety departments you work with. The FT-100-D is front-panel field programmable with extended menu items to which qualified Yaesu dealers may turn you on. This could allow you to electronically set and change sensitivity on any band, power output, ALC, and make a host of other internal "adjustments" for which we normally would need to take the cover off. On the Yaesu FT-100-D everything can be reprogrammed right on the menu.

Speaking of radios on which everything can be reprogrammed, check out Ten-Tec's new Jupiter, an HF-only rig which features 34 built-in IF-DSP (digital signal processing) receive filters and 18 DSP-generated transmit bandwidths. The Jupiter's secret is that virtually every parameter is in software, and the radio is fully controllable from your computer. Not only that, but since the operating parameters are stored in Flash ROM, owners may download software upgrades from Ten-Tec's website and instantly upgrade their radios!

Also in this price category is the Kenwood TS-570D(G). This radio is a dramatically larger set and is more at home on your radio bench than under the dash. In fact, I'm not sure there is a dash these days big enough to easily hold the TS-570! I like the 570's DSP, and I would encourage everyone to spend a couple of hundred bucks more to get the (G) version of the 570, because it offers all of the great excitement of 6 meters along with HF. It's also a full 100 watts out on 6 meters with a very sensitive and selective receiver.

This Kenwood also is big enough to include a built-in automatic antenna trimmer. Notice I say "trimmer" as opposed to tuner. Manual automatic tuners can tune virtually anything, from a wet noodle to a dipole cut to the wrong band. Equipment with built-in automatic "trimmers" will help flatten out the SWR if you are operating on a portion of the band for which the antenna is not necessarily cut. The tuner on the 570 works beautifully on any mismatch well below 3:1. Just keep in mind that anything above 3:1 puts a lot of standing waves on your feedline.

The Yaesu FT-920 has been seen selling for around $1300, and this is also a big rig with a fully automatic antenna trimmer built in. It's a big radio for a rather small price, including electronic memory keyer which stores CW messages and incremented imbedded contest numbers. There are jacks on both the front and rear, allowing you to connect keyer paddles as well as a computer or a straight key. The FT-920 uses a DSP-based receiver, with automatic notch filters and noise reduction. The front end includes ten input band-pass filters, and an extremely hot RF preamplifier with little problems of intermod. It does the 6 meter band, too, with full power output.

Also in the $1300 range is the ICOM IC-746 transceiver. Now we are really getting into a large-format rig, capable of operating mobile, but probably more at home in the shack. The IC-746 has a large multi-function LCD screen, and this one *can* be seen with polarized glasses. The multi-function screen includes band scope, memory names, key assignments, twin pass-band tuning settings, and split-frequency readouts. The 746 not only covers high frequency plus 6 meters, it also offers multimode capabilities on 2 meters, with a mighty 100 watts output on all bands. This is a great rig for 2 meter mountaintopping as well as home use!

You should look at the USA-made Patcomm PC16000 radio with a built-in digital converter that decodes Morse Code as well as RTTY. Patcomm is also planning on a decoder for AMTOR and Pactor. The PC-9000 is also designed around data off a keyboard that is attached directly to the transceiver. If you are looking for some unique equipment, check out what Patcomm has been doing for several years, and doing quite successfully!

Around $1700 is the Yaesu FT-847, another real favorite of mine. This is an all-purpose HF+6 transceiver, plus 2 meters and 440 MHz that handles satellite operation full duplex. It offers direct frequency keyboard entry, a shuttle/jog tuning dial, built-in encode and decode, plus a hot receiver for VHF and UHF in addition to all it does on the low bands. If you are heavily into satellites, the FT-847 is a terrific base-station-type rig you need to look at, but it could run mobile as well because it is fairly small and works off a 13.8 volt DC input.

Another satellite-ready rig in this price class is ICOM's brand-new IC-910, one of a disappearing breed of VHF/UHF-only multimode rigs. The 910 is designed specifically for satellite use and covers only 2 meters and 70 cm, with an optional module available for 1296 MHz. It's been selling in the $1500 range.

Just below $2000 is the Kenwood TS-870S, a big-sized, big-featured rig with DSP in the IF stages, and computer operation with a built-in RS232C port and Microsoft Windows® software included. Most interesting, the set does

Tomorrow's Technology - Today.

THE PROFESSIONAL STANDARD

The compact desk-top VR-5000 is Yaesu's most versatile Communications Receiver ever! With ultra-wide frequency coverage and a host of operating features, you'll be on top of the monitoring action with the VR-5000!

● CONTINUOUS FREQUENCY COVERAGE: 100 kHz ~ 2.6 GHz!

The VR-5000 provides continuous coverage from 100 kHz to 2599.99998 MHz (cellular frequencies are blocked) on all popular operating modes: LSB, USB, CW, AM-Narrow, AM, Wide AM, FM-Narrow, and Wide FM. The "Auto Mode" feature automatically presets the operating mode and frequency steps for the frequency range you have chosen!

● 2000 MEMORY CHANNELS!

The extensive memory capability of the VR-5000 includes 100 Memory Groups, allowing you to partition the Memories for easy recall. And you can add an Alpha-Numeric label to both Memories and Memory Groups, to make channel identification easy and quick!

● DUAL RECEIVE!

When monitoring on the "Main" displayed frequency, you can simultaneously listen to a second station (on the AM and FM modes) operating within 20 MHz of the Main frequency. This can be especially helpful while monitoring public safety communications.

● DIGITAL SIGNAL PROCESSING (OPTION)!

The optional DSP-1 Digital Signal Processing Unit provides leading-edge selectivity, and it includes (1) a Bandpass Filter for razor sharp selectivity on SSB/AM/FM, (2) a Noise Reduction Filter, (3) a seeking Automatic Notch Filter to eliminate heterodynes, and (4) a narrow CW Peaking Filter, for weak signal reception of Morse Code signals.

● REAL-TIME SPECTRUM SCOPE!

To aid in finding band activity, the VR-5000's Real-Time Spectrum Scope will sweep the band in user-defined steps, displaying the received signals graphically according to frequency and signal strength.

● WORLD CLOCK WITH UTC/LOCAL SETTINGS!

The World Clock feature of the VR-5000 includes an atlas with 66 geographical references, and it also provides a Program Timer (with automatic switching to a designated frequency), an Alarm Timer (wake up to a Shortwave Broadcast), and a Sleep Timer (drift off listening to your favorite FM station).

● PRESET SHORTWAVE BROADCAST STATION MEMORY BANK!

Featuring a handy world map showing station locations, the special Shortwave Broadcast Station Memory Bank includes several different operating frequencies for a number of popular shortwave stations, including Voice of America, the BBC, Radio Japan, and the Voice of Russia. The operating frequencies may be changed by the owner, to keep up with changing station schedules!

● EXTENSIVE SCANNING CAPABILITY!

Scan the band, the memories, or a band segment with the VR-5000's versatile scanning system. And Yaesu's exclusive Smart Search™ system will scan the band, looking for activity, and will automatically load active channels into a special Smart Search™ memory bank!

AND MUCH, MUCH MORE. . .

● "RF Tune" Front-end Preselector (1.89-1000 MHz). ● 20 dB Attenuator for strong signal environments. ● IF Noise Blanker. ● DVS-4 Digital Voice Recorder (option) with two memories of up to 8 seconds each. ● FVS-1A Voice Synthesizer (option) for audible announcement of the operating frequency. ● 10.7 MHz IF Output Jack. ● Field Strength Meter. ● Audio Tone Control. ● All-Mode Squelch Control for silent monitoring. ● Password-protected Panel and Dial "Lock" feature. ● Display Dimmer/Contrast Control. ● Clone Capability for copying memory information from one VR-5000 to another.● Personal Computer Interface Port (4800/9600/57600 bps). ● Two Antenna Ports. ● Audio Wave Meter provides display of incoming signal's wave characteristics.

COMMUNICATIONS RECEIVER
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0.1~2599.99998MHz*
LSB/USB/CW/AM-N/AM/
WAM/FM-N/WFM
*Cellular blocked

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Real Performance for the Real World!

Today's elite-class operators demand the best RF weaponry available. Yaesu's exciting new MARK-V FT-1000MP answers the call, with an expanded array of receiver filtering, 200 Watts of power output, and Class-A SSB operation capability for the cleanest signal on the band. Enhanced front-panel ergonomics on the front panel save you seconds in a pile-up or a contest "run," and Yaesu's HF design and manufacturing know-how ensures that no short-cuts have been taken in our effort to bring you the best HF transceiver money can buy. For more QSOs in your log, and more awards on your wall, there is only one choice: the MARK-V FT-1000MP from Yaesu!

I. Interlocked Digital Bandwidth Tracking System (IDBT)

The IDBT feature greatly simplifies SSB 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. Variable RF Front-End Filter (VRF)

Protecting the MARK-V's receiver components from strong out-of-band signals, the VRF system acts as a high-Q "Preselector," located between the antenna and the main bandpass filter networks, providing additional RF selectivity on the 160-20 meter Amateur bands for multi-operator contest teams, DX-peditions, or for operation near MW/SW broadcast stations.

VRF Features Large, High-Q Coils and High-Quality Relays

VRF Typical Bandpass Response (3.5 MHz)

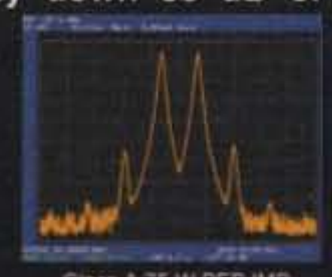
III. 200 Watts of Transmitter Power Output

Utilizing two Philips® BLF147 Power MOSFETs in a 30-Volt, push-pull configuration, the MARK-V's transmitter puts out up to 200 Watts of clean output power, thanks to the conservative design of the PA section.

T-Configuration Heat Sink

IV. Class-A SSB Operation

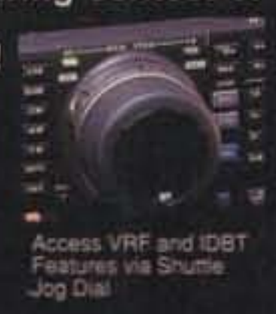
Exclusively available on the MARK-V FT-1000MP, a press of a front-panel button engages Class-A SSB operation of the transmitter, at a power output level of 75 Watts. Class-A operation produces incredibly clean signal quality, with 3rd-order IMD typically suppressed 50 dB or more, and 5th- and higher-order products typically down 80 dB or more!



Class A 75 W PEP IMD

V. Multi-Function Shuttle Jog Tuning/ Control Ring

The immensely-popular Shuttle Jog tuning ring, which is concentric with the Main Tuning Knob, has a new look in the MARK-V: it now includes the activation switches for the VRF (left side) and IDBT (right side) features, so you don't have to move your hand position to activate these important circuits during contest or pile-up situations!



Access VRF and IDBT Features via Shuttle Jog Dial

Features

■Frequency Coverage: (RX) 100 kHz–30 MHz; (TX)160–10 m Amateur Bands ■Dual In-band Receive w/Separate "S" Meters ■Ten Pole Collins® Mechanical Filter Built-in ■RX DSP Noise Reduction and CW Peaking Filter ■High-speed Automatic Antenna Tuner ■Two TX/RX Antenna Jacks plus RX-only Jack ■TX Microphone Equalizer ■RF Speech Processor ■Direct Digital Synthesis ■CW Spot and Two Key Jacks ■Two Headphone Jacks (1/4" and 3.5 mm) ■Low-Level Transverter RF Drive Jack ■Separate FP-29 Power Supply (30 V/13.8 V DC Output)

Photo shows optional MD-100A8X Deluxe Desk Microphone

HF 200 W All-Mode Transceiver

MARK-V FT-1000MP

EXPAND YOUR DX HORIZONS WITH THE FTV-1000 50 MHz TRANSVERTER!

- 50 MHz Transverter with 200 W PEP Power Output
- Class-A Bias Selection for Low TX IMD (PO: 50 W)
- High-Performance Receiver Front End
- Automatic, Effortless Operation with MARK-V FT-1000MP
- Upgrade to High Power with VL-1000 Linear Amplifier

Specifications

Frequency Range: 50-54 MHz
Antenna Impedance: 50 Ohms
Power Output: 200 Watts PEP
Spurious Emissions: At least 60 dB down
Power Source: DC 30 V and 13.8 V
(supplied by FP-29 Power Supply of MARK-V)
Dimensions: 9.6" x 5.4" x 13" WHD (243.5 x 136.5 x 331 mm)

FTV-1000
200 W 50 MHz Transverter

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http://www.vxstd.com

Specifications subject to change without notice. Some accessories and/or options may be standard in certain areas. Frequency coverage may differ in some countries. Check with your local Yaesu Dealer for specific details.

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not do 6 meters, but what it does do well is HF, with more than 100 watts output. It can also take an optional voice synthesizer for the visually impaired. Yes, it too has an automatic antenna tuner—or should I say trimmer—built in. It also comes with a 60 second digital recording unit option.

$2000—The Big Boys

The new Kenwood TS-2000, with a price tag slightly higher than its model number, has just come on the market, offering HF, 6 meters, 2 meters, and 440, all multimode, with an optional 1200 MHz band unit that fits on the inside. This is also a full-blown satellite rig, so we probably would make a comparison between the TS-2000 and the popular Yaesu FT-847, as well as the ICOM IC-910 if satellite operating is your main goal.

The TS-2000 also has a built-in packet-cluster mode that operates totally on its own without the need to drag in your laptop or home computer system, or even a TNC. You can monitor your favorite packet-cluster channel silently on the 2 meter side of the equipment, and as soon as an exciting DX station is listed, the unit will not only sound a beep, it can also switch the main unit over to the DX frequency. It even shows the DX station's callsign! Thus, whether you are an avid HF operator, VHFer, or satellite operator, the new Kenwood TS-2000 deserves your serious consideration.

Soon Kenwood will be offering this same radio as a "black box" to go along with your home computer, and they can also offer the radio with an extremely small remote head that allows you to put the operation right at eye level in your mobile. Or, if you are like me and like big detachable heads, the TS-2000's main head is detachable, too.

About the only drawback I see is the sub-band monitors only VHF and UHF, and only AM and FM (except, say the folks at Kenwood, in satellite mode, the subband will receive in SSB!). Kenwood indicates that a sub-band multimode capability would add considerable expense to the transceiver, and they wanted to keep it priced at around $2000. This could be an ideal rig not only for satellite operators, but also for DXers and contesters who (within contest rules) don't want to miss any DX on a packet cluster, but don't want to devote an external computer or TNC to packet-cluster capabilities.

Also in the low $2000s is the Yaesu FT-1000MP, a contester's delight with an enhanced DSP system that provides four random-noise-reduction settings, selectable band-pass filtering, EDPS notch filters that are fully automatic, and two VFO knobs that allow for individual adjustments to the main and sub-VFOs. The power output is listed as 100 watts, but I have seen as much as 150 watts come out of a 1000MP. The Yaesu uses Collins mechanical filters, and also has a transverter jack for satellite as well as other VHF/UHF/microwave operation.

The price of the ICOM IC-756PRO has just dropped into the high two's category. This is the rig with that fabulous transreflective color LCD display that reads out frequencies from the bottom of the HF band all the way up to 6 meters, and has a 32-bit floating-point DSP digital IF filter with 51 selectable bandwidths.

The new Kenwood TS-2000 offers HF, 6 meters, 2 meters, and 440, all multimode, with an optional 1200 MHz band unit that fits on the inside. It is also a full-blown satellite rig.

The color display is 5 inches wide and has a very wide viewing angle for you to see dual frequencies, memory frequency, and alphanumerics. It holds 101 memory channels, along with an 8-channel digital voice memory function, alphanumerics, and a real-time spectrum scope that constantly monitors band activity as you are listening to audio. In other words, the spectrum scope does *not* mute the audio.

The dual-watch mode on the ICOM-756PRO can receive two signals on the same frequency band simultaneously, and triple band-stacking register allows you to jump from one band to another without missing a beat. Although this is a 12 volt DC radio, I don't think you'll find many of these in a mobile, but it looks just great in your home station.

The JRC JST-245 is another terrific-sounding rig on both transmit and receive, and it has a step-up power of over 150 watts output and 200 memory channels. The JRC transceiver covers HF along with 6 meters, and has one of the coolest looking color displays you have ever seen. The tuning is so smooth you would think you're tuning a giant capacitor. However, like all of the other rigs, the VFO is really an optical shaft encoder.

Another popular HF transceiver is the radio computer from Kachina, Model 505-DSP. When you unpack it, it looks just like a computer. However, when you see the PA (power amplifier) heat sinks, you know it is a radio, built to commercial and military specs. That's where Kachina comes from—providing military equipment for years, and now getting back into some exciting amateur radio products built on their military designs. Also, for those of you who really must have "the big knob" for tuning, Kachina offers it as an option.

Speaking of options, the powerful computer built into the Kachina system has so many options that you can really design exactly what is happening in the receiver section of your equipment. However, the equipment is not so complicated that it couldn't be understood by those doing Field Day or a ham radio booth at your local fair. All you need to

Table 1– Under $800

Make/Model	DC or AC?	RX coverage	TX bands	Power Output (*tested)	RX circuitry	Mem. Chs.	Remote Head	DSP?	Built-in Keyer?	Built-in Tuner?	"Street Price"
Alinco DX-70TH	DC	.15-30 MHz + 50 MHz	All HF + 6m	110*	Dual Conv.	100	Yes	No	No	No	$750
Alinco DX-77T	DC	.15-30 MHz	All HF	120*	Dual	100	No	No	No	No	$699
Elecraft K1	DC	Ham band	Any two	5*	Dual	VFO	n/a	No	Yes	Option	$269
Elecraft K2 Kit	DC or built-in battery	1.8-30 MHz	All HF	10*	Dual	10	No	No	Yes	Option	$600
ICOM IC-707	DC	.5-30 MHz	All HF	105*	Dual	32	No	No	No	No	$650
ICOM IC-718	DC	30 kHz-30 MHz	All HF	100	n/a	101	No	Option	No	No	$799
Kenwood TS-50	DC	.15-30 MHz	All HF	110*	Dual	100	No	No	No	No	$750
MFJ 9xxx series	DC	Ham band	Single banders for 10, 20, 40, 80m	14*	Dual	VFO	No	No	No	No	$250 each
Patcomm PC-500	DC	Any two ham bands ($35 for additional band units)	—	15 (adjustable)	Dual	4	keyboard control	No	Yes	No	$390
Patcomm PC-9000	DC	Ham band	All HF + 6m	40 (HF), 20 (6m)	Single	1 per band	No	No	Yes	No	$600
RadioShack HTX-10	DC	28-29.7 MHz	10m.	31*	Dual	5	No	No	No	No	$150
Ramsey QRP-RX	DC	Single banders for 20, 30, 40, 80m	(Rcvr only)	n/a	n/a	—	No	No	No	No	$30/kit/band; $15 case+knobs
Ramsey QRP-TX	DC	(Xmtr only)	Single banders for 20, 30, 40, 80m.	1 CW only	n/a	—	No	No	No	No	$30/kit/band, $15/case+knobs, $10 power supply
Ramsey SX-20	DC	20m.	20m.	10	n/a	n/a	No	No	No	No	$300 kit, $370 wired/tested
Ranger RCI-2950DX	DC	24.8-24.9, 28-30 MHz	12 & 10 m.	25*	Dual	10	No	No	No	No	$400
Ranger RCI-2970	DC	28-30 MHz	10m.	100*	Dual	10*	No	No	No	No	$550
RF Limited 357DX	DC	28-29.7 MHz	10m.	150*	Dual	5	Yes	No	No	No	$400
SGC 2020	DC or battery pack	1.8-30 MHz	All HF	40*	Triple	20	No	No	No	No	$675
Sierra Kit	DC	1.8-30 MHz	All HF	3*	Dual	—	No	No	No	No	$369
Ten-Tec Scout	DC	Ham modules	Ham modules	49*	Dual	—	No	No	No	No	$549
Yaesu FT-600	DC	.5-30 MHz	All HF	140*	Triple	100 w/ alphanumerics	No	No	No	No	$900
Yaesu FT-817	DC or battery pack	.1–1000 MHz (no cellular)	All HF + 6/2m +70cm	5*	Dual	208	n/a	No	Yes	External	$769
Yaesu FT-840	DC	.1-30 MHz	All HF	125*	Dual	100	No	No	No	No	$749

Table 2– $1000–$1500 Range

Make/Model	DC or AC?	RX coverage	TX bands	Power Output (*tested)	RX circuitry	Mem. Chs.	Remote Head	DSP?	Built-in Keyer?	Built-in Tuner?	"Street Price"
ICOM IC-706 MkII-G	DC	.2-470 MHz	All HF + 6/2m + 70cm.	125*	Triple	100	Yes	Yes	Yes	No	$924
Kenwood TS-570D(G)	DC	.1-30 MHz	All HF	120*	Dual	100	No	Yes	Yes	Yes	$989
Kenwood TS-570S(G)	DC	.1-54 MHz	All HF + 6m	120*	Dual	100	No	Yes	Yes	Yes	$1349
Patcomm PC-16000A	DC	.1-30 MHz + data readout	All HF	110*	Dual	90	Keyboard	Yes	Yes+reader	No	$1295
Ten-Tec Jupiter	DC	.5–30 MHz	All HF	108*	Dual	100 + computer	n/a	Yes	Yes	External	$1189
Ten-Tec Pegasus	AC+DC	.5-30 MHz	All HF	104*	Dual	Comp. control	Yes/Comp.	Yes	Yes	No	$900
Yaesu FT-100D	DC	.1-1000 MHz (cellular blocked)	All HF + 6/2m +70cm	128*	Dual	200	Yes	Yes	Yes	No	$1300
Yaesu FT-920	DC	.1-30 / 48-56 MHz	All HF + 6m	145*	Dual	110	No	Yes	Yes+memory	Yes	$1400

Table 3– $1500–$2400 Range

Make/Model	DC or AC?	RX coverage	TX bands	Power Output (*tested)	RX circuitry	Mem. Chs.	Remote Head	DSP?	Built-in Keyer?	Built-in Tuner?	"Street Price"
ICOM IC-746	DC	.3-60 / 108-174 MHz	All HF + 6/2m.	121*	Quad conv.	100	No	Yes	Yes	Yes	$1349
JRC JST-245	DC	1.8-30 / 50-54 MHz	All HF+6m	180*	Triple	200	No	No	Yes	Yes	$2500
Kachina 505 DSP	AC+Comp. DC	1.1-30 MHz	All HF	110*	Dual	Comp. memories	Yes/Comp.	Yes	Yes	No	$2000
Kenwood TS-870	DC	.1-30 MHz	All HF	135*	Quad	100	No	Yes	Yes	Yes	$2300
Kenwood TS-2000	DC	.1–500 MHz + 1200–1300 MHz	All HF + 6/2m + 70cm and 1.2 GHz option	HF 130*	Triple con.	100 + computer	Yes	Yes	Yes	Yes	$2250
SGC-2000 w/ADSP	DC	1.8-30 MHz	All HF + marine	170*	Dual	100	Yes	Yes	No	No	$1850
Yaesu FT-847	DC	.1-30/ 50-54/ 144-148/ 430-450 MHz	All HF + 6/2m + 70cm	119*	Dual	100	No	Yes	Yes	No	$1399

Table 4– Top of the Line ($2500+)

Make/Model	DC or AC?	RX coverage	TX bands	Power Output (*tested)	RX circuitry	Mem. Chs.	Remote Head	DSP?	Built-in Keyer?	Built-in Tuner?	"Street Price"
ICOM IC-756 Pro	DC	.1-60 MHz	All HF+6m	170*	Triple conv.	100	No	Yes	Yes	Yes	$2799
ICOM IC-775 DSP	AC	.1-30 MHz	All HF	175*	Quad	100	No	Yes	Yes	Yes	$3500
ICOM IC-781	AC	.1-30 MHz	All HF	195*	Quad	100	No	No	Yes	Yes	$7000
Kenwood TS-950SDX	AC	.5-30 MHz	All HF	110*	Quad	100	No	Yes	Yes	Yes	$4000
Signal One 1030E-DSP	DC	.1-60 MHz	All HF + 6m	200*	Triple	100 + computer	Option	Yes	Yes	Yes	$14,500
Signal One 1030CI	AC	.1-30 MHz	All HF	200*	Quad	100 + computer	n/a	Yes	Yes	Yes	$10,000
Ten-Tec Omni VI	DC	Ham bands	All HF	105*	Triple	100	No	Yes	Yes	No	$2500
Yaesu FT-1000D	AC	.1-30 MHz	All HF	200*	Quad	100	No	Yes	Yes	Yes	$4100
Yaesu 1000MP Mark-V	AC supply	.1-30 MHz	All HF	200	Triple	100	No	Yes	Yes	Yes	$3299

run it is your own home computer, the supplied interface software, and a simple cable connection.

Our final entry in the 2K category is the US-built Ten-Tec Omni VI-Plus, an all-band HF transceiver with new DSP capabilities added to those built into the original Omni VI. Features include a choice of four different bandwidths for the 6.3 MHz IF and three choices for the 9 MHz IF (two are standard; others may be added to suit your operating style), and three different types of DSP noise reduction. This rig retails for just under $2600.

Top of The Line

If your budget is not an obstacle, consider the ICOM IC-775, or the big ICOM IC-781, and keep track of Signal One, which is now back into the ham business, offering some "souped up" ICOM products with a Signal One design and expanded operating capabilities in its Mil Spec 1030E-DSP and Mil Spec 1030CI radios. The 1030E has a Pentium-class computer built into the radio!

Kenwood continues to feature its TS-950 SDX as the ultimate base station, running on household power with a built-in power supply. At Yaesu the FT1000D and the relatively new FT1000MP Mark-V (different from the "regular" FT1000 MP; the Mark V has interlocked digital bandwidth tracking, variable RF front-end filters, 200 watts output, class-A SSB, and a feature that we all liked, the multi-function shuttle/ jog tuning ring inside the main tuning dial) are true contest rigs that have enough receiver horsepower to hear through the pile-ups the faintest of signal that you are trying to detect.

Get Your Hands On These Radios!

All of the different radio dealers I interviewed for this article say that the best way to pick your rig is to actually play one on the air. Review the enclosed specification tables. We have highlighted the important points that make each of these high-frequency transceivers stand out. However, while the specs may say one thing, nothing beats a hands-on, ears-on listen. Locate a local dealer or a friend who has one of the rigs under consideration and try it. Talk it. Feel it. Adjust it. Work all of the different buttons, and then decide which rig in your price range will give you the greatest HF (and in some cases VHF, UHF, and microwave) enjoyment. ■

Manufacturers' Contact Info

Most manufacturers say the best way to get up-to-date information is via their websites, and that e-mail is best for getting quick responses to questions.

Alinco, 438 Amapola Ave., Suite 130, Torrance, CA 90501 (telephone 310-618-8616; fax 310-618-8758; web: <www.alinco.com>).

Elecraft, P.O. Box 69, Aptos, CA 95001-0069 (telephone 831-662-8345; web: <www.elecraft.com>).

Emtech, 1127 Poindexter Ave. W., Bremerton, WA 98312 (telephone 360-405-6805; e-mail: <emtech@steadynet.com>; web: <http://emtech.steadynet.com>).

ICOM America, Inc., 2380 116th Ave. NE, Bellevue, WA 98009-9029 (telephone 206-454-8155; fax 206-454-1509; web: <www.icomamerica.com>).

Kachina Communications, Inc., P.O. Box 1949, Cottonwood, AZ 86326 (telephone 520-634-7828; e-mail: <kachina@sedona.net>; orders on-line at: <www.kachina-az.com/factory.htm>).

Kenwood Communications Corp., 3975 Johns Creek Ct., Suwanee, GA 30024 (telephone 310-639-5300; fax 310-537-8235; web: <www.kenwood.net>).

MFJ Enterprises, Inc., Box 494, Mississippi State, MS 39762 (telephone 662-323-5869; fax 662-323-6551; web: <www.mfjenterprises.com>).

Oak Hills Research, 2460 S. Moline Way, Aurora, CO 80014 (telephone 303-752-3382; 24 hr. fax 303-745-6792; orders 800-238-8205; e-mail: <qrp@ohr.com>; web: <http://www. ohr.com>).

Patcomm, 7 Flowerfield M100, St. James, NY 11780 (telephone 516-862-6511; fax 516-862-6529; e-mail: <patcomm1@aol.com; web: <www.qth.com/patcommradio>).

Ramsey Electronics, Inc., 793 Canning Pkwy., Victor, NY 14564 (telephone 716-924-4560; web: <www.ramseyelectronics.com>).

Ranger Communications, 401 W. 35th St., National City, CA 91950 (telephone 877-536-0772; e-mail: <rci@rangerusa.com>; web: <http://www.rangerusa.com>).

Red Hot Radio, 14730 Charmeran Ave., San Jose, CA 95124-3571 (telephone 408-390-6805; fax 800-881-6120 or 831-401-2657; e-mail: <sales@redhotradio.com>; web: <http:// www.redhotradio.com>).

SGC, P.O. Box 3526, Bellevue, WA 98009 (telephone 425-746-6310; fax 425-746-6384; e-mail: <sgc@sgcworld.com>; web: <www.sgcworld.com>).

Small Wonder Labs, c/o Dave Benson, NN1G, 80 East Robbins Ave., Newington, CT 06111 (e-mail: <dave@smallwonderlabs.com; web: <http://www.smallwonderlabs.com>).

Ten-Tec, 1185 Dolly Parton Pkwy., Sevierville, TN 37862 (telephone 865-453-7172; fax 865-428-4483; e-mail: <sales@tentec.com>; web: <www.tentec.com>).

Wilderness Radio, P.O. Box 734, Los Altos, CA 94023-0734 (telephone 650-494-3806; e-mail: <qrpbob@datatamers.com>; web: <http://www.fix.net/jparker/wild.html>).

Yaesu (Vertex Standard), 17210 Edwards Road, Cerritos, CA 90703 (telephone 562-404-2700; web: <www.yaesu.com>).

YAESU

FT-1000D Transceiver

tx: 160–10m **rx**: 100kHz-30MHz • 200w • 100 mem. • Dual receive • Antenna tuner • Dual bandpass filter • Temp. compensated crystal oscillator • 2.4kHz & 2kHz SSB filters, 500Hz CW crystal filter 6"h x 16"w x 15"d, 58 lbs.....**Special $3699.99**

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Last month VK6VZ explained grey, dark, and black lines. This month in Part II he describes how to practically exploit these modes of HF propagation in the 1.8 to 30 MHz HF spectrum.

Go Surf the Grey and Dark Lines

The Art of Low and High HF Band DXing

Part II

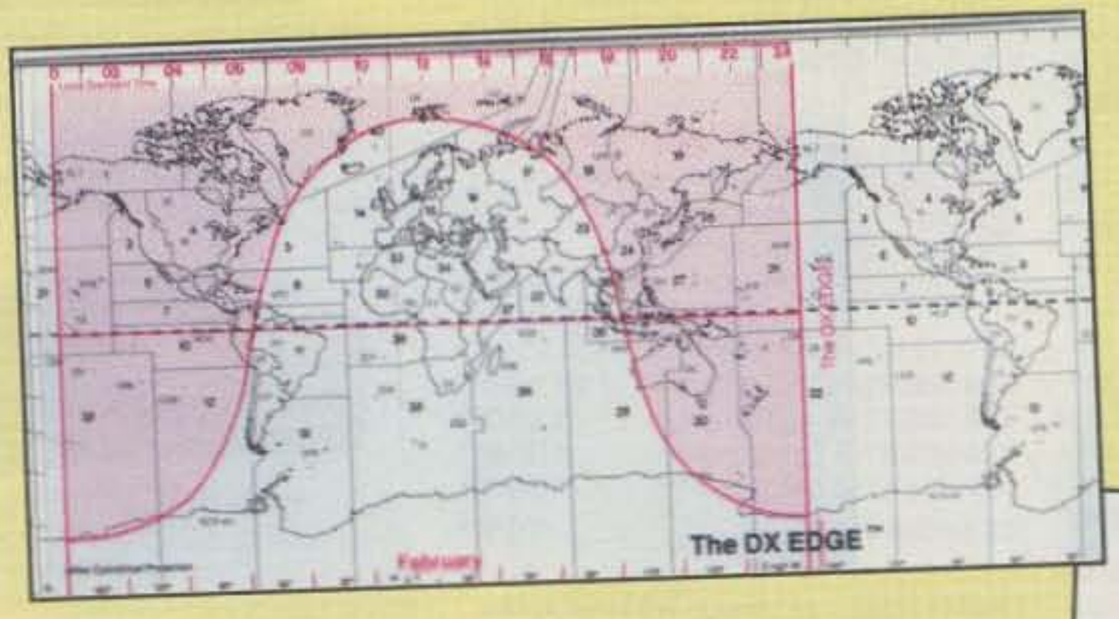
BY STEVE IRELAND,* VK6VZ

With sets of both local and DX sunrise/sunset tables, you are nearly ready to surf the grey line. However, there is another almost equally useful tool that is required, something that actually *shows* the grey line and those areas of the world that are in darkness and those that are in daylight at any time of the day, at any month of the year.

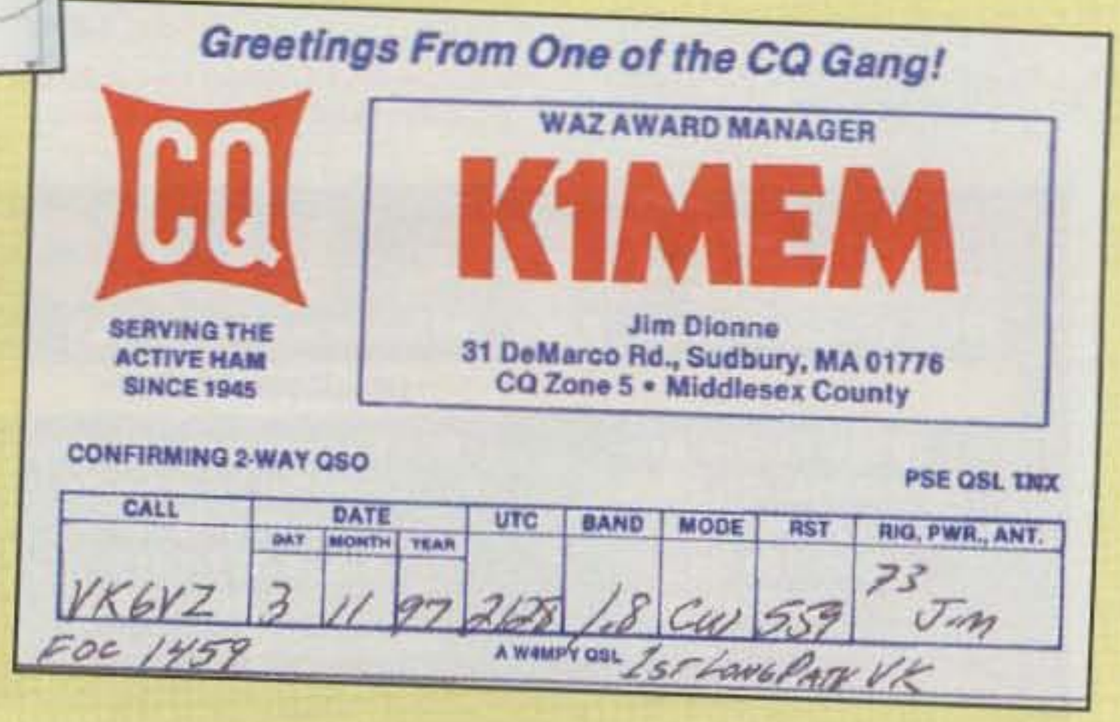
This tool can either be in the form of a software program such as GeoClock (see below), or a slide-rule device such as the DX Edge,[1] the latter available for just $19.95. I have been using a DX Edge for almost 20 years—that's a cost of $1 a year!—and rate it as one of the most useful pieces of radio-related equipment I own.

The DX Edge is made up of a map of the world that is printed twice on a long, narrow piece of plastic. Over the top of the map case go one of twelve clear plastic slides—one for each month of the year—which show the grey line and the areas of light and darkness around the middle of each month with a 24-hour time scale at the top of each. The clear-plastic slides fit into two grooves in the DX Edge map case, one at the top of the case and one at the bottom. The areas of the world in daylight are shown by the unshaded area of the slide, while those in darkness are shown by the shaded area. The dark (red) curved line that

*P.O. Box 55, Glen Forrest, Western Australia 6071, Australia



Xantek's DX Edge has been a useful tool for DXers since the early 1980s. Although best known for its use by low banders, it is also extremely useful for those interested in the amateur bands in the 14–30 MHz part of the spectrum.


Greetings From One of the CQ Gang!

CQ

SERVING THE ACTIVE HAM SINCE 1945

WAZ AWARD MANAGER

K1MEM

Jim Dionne
31 DeMarco Rd., Sudbury, MA 01776
CQ Zone 5 • Middlesex County

CONFIRMING 2-WAY QSO

PSE QSL VIA

CALL	DATE			UTC	BAND	MODE	RST	RIG, PWR., ANT.
	DAY	MONTH	YEAR					
VK6VZ	3	11	97	2128	1.8	CW	559	73 Jim

FOC 1459 A W4MPY QSL 1st Long Path VK

The longest "long path" 1.8 MHz QSO yet at VK6VZ was with the late Jim Dionne, K1MEM, former CQ WAZ manager, in November 1997, using the grey line. Jim only used an inverted-Vee dipole at 58 feet, but had an amazing 252 countries confirmed on 1.8 MHz at the time we worked one another.

separates the shaded and unshaded areas is the grey line, or terminator.

Using the DX Edge you can see at roughly what local time the sun rises and sets both at your location and any location in the world. To find out the rough sunrise time for a particular location, you move the slide in the map casing until the the left-hand side (western side) of the grey line crosses the location. The rough sunrise time at the desired location at your QTH can then simply be read off the DX Edge.

Note that the DX Edge's accuracy (+/–15 minutes) is fine for 3.5 MHz and above, but has its limitations for working 1.8 MHz, when a sunrise/sunset opening may only last a couple of minutes. If you become interested in working 1.8 MHz, the DX Edge definitely needs to be supplemented with sets of sunrise/sunset tables.

For those who like to use PCs in the radio shack, there is a terrific shareware program called Geoclock which is a sort of computerized DX Edge. As I use computers all day during my work, I actually dislike them for hobby/radio purposes and prefer the old-fashioned convenience of simple devices such the DX Edge (a sort of slide rule for the low-band DXer!) and sunrise/sunset tables.

The basic version of Geoclock can be downloaded for about $25 from <http://home.att.net/~geoclock/index.html#contact>. This web site also has excellent demonstration facilities. Apparently, Geoclock can either be updated in real time or you can set times and dates and accelerate the rate of time passing.

Using the Tools

True grey-line openings on the low HF bands (i.e., 1.8, 3.5, and 7.0 MHz) can easily be found using the DX Edge by looking for DX stations who are going through sunset as you are going through your sunrise. If your main interest is the high HF bands of 14, 18, 21, 24, and 28 MHz, at the same times as there is a grey-line opening on the low HF bands to a particular DX location, you can often also find a *long-path* opening on the high HF bands to the same place. I have found these long-path openings that occur on the HF bands at grey- line times to be very useful in contests, as not every contester is aware that they occur. Unfortunately, I have just given away the secret.

Don't forget that if you have an HF beam and want to take advantage of a long-path opening, the beam is usually pointed in the direction opposite to the "short path" one.

Here's an example: Imagine it is just about sunrise on November morning in Western Australia and I want to know where I am likely to get a contact on the 28 MHz band (which is predominantly a daylight band). If I look at the DX Edge or Geoclock or a similar product, I can see the whole of the Pacific is in daylight, as is most of North America, including Alaska. If conditions (and the sunspot level) are good, contact should be possible with these areas.

However, perhaps the most interesting propagation phenomenon during November is that the grey line is running from Western Australia eastward, eventually passing through the middle of Brazil. This means that a "long path" QSO with Brazil should be possible on the upper HF bands, or a direct QSO possible on the lower HF bands along the grey line itself.

Using the DX Edge and some good radio propagation, last November I worked my friend Egon, PY2BW, in Sao Paulo, Brazil on all bands from 7–28 MHz, when my sunrise and his sunset coincided. We used the grey-line conditions to give us a true *grey-line* QSO

on 7 MHz (with signals peaking 579) and long-path QSOs on 14, 21, and 28 MHz. On 14 MHz signals peaked at a comfortable S9!

Let's take another case of how we can use grey-line, sunrise/sunset times. What if we are an eastern seaboard, North American low-band operator looking for a QSO with a rare Asian country—say, Mongolia (JT)—during November? The obvious time to look for a QSO is in the period around our local sunset, but another time would be to look at around the DX station's local sunrise. It is easy to work these times out using sunrise/sunset tables, Geoclock, or roughly with the DX Edge. In the past, I have found this opportunity for *two* shots a day at a DXpedition on the low HF bands, rather than one, can make all the difference in actually working them.

Note that in the example above of the W1/W2 to JT path on the low bands there are likely to be signal peaks at W1/W2 sunset and JT sunrise, but there may also be a peak at the midway point between these two "limits." I find that this scenario sometimes occurs when working European/North African stations on 40/80/160 meters—i.e., a peak occurs midway between their sunset and VK6 sunrise times.

So far we have looked at using grey-line times to work long-path HF openings, true grey-line paths on the low bands (i.e., when it is sunset at one end of a path and sunset at the the other), and dark-line conditions (when it is sunset at one end/darkness at the other, or sunrise at one end and darkness at the other), which occur on both low and high HF bands. There is one final and really testing type of grey-line opening that I haven't described—long-path openings on the low HF bands, in particular on 3.5/1.8 MHz. These are perhaps my favorite type of radio propagation to surf, particularly on the latter band, because they occur during a very short time of the year and are the toughest surf to ride I know, usually lasting only a maximum of a couple of minutes.

Long-path openings on the low bands take place when sunrise at one end of the path happens shortly after sunset at the other, or when sunset at one end of the path happens shortly before sunrise at the other. On 7 MHz they are relatively common, but on 3.5 MHz they are much less so, and on 1.8 MHz they are pretty unusual.

During the past five years I have had perhaps eight long-path contacts on 1.8 MHz with the USA. These only happen when my sunrise occurs shortly after sunset at the other end—during November, December, January, and February—and are a terrific buzz. My farthest 1.8 MHz long-path QSO so far is to Sudbury, Massachusetts, and the late, great Jim Dionne, K1MEM, the former manager of the CQ WAZ program. Note that K1MEM and I both were only using simple antennas for this QSO in November 1997—no four-square arrays or big verticals with loads of radials! Jim had an inverted-Vee dipole at 58 feet, while I had an inverted-U dipole at 50 feet.

Conclusions

If you are feeling a bit jaded about radio and don't find it challenging anymore, go surf the grey and dark lines. Those radio amateurs who have come into the hobby via computing, VHF, and packet radio may like to try something that will both test their brain and be a real blast.

All you need are a radio, an average antenna, a set of sunrise/sunset tables, and the DX Edge or Geoclock, and you can work DX that a less-well informed soul will struggle to work with lots of expensive gear and a large beam. You can ride the grey and dark lines across the world on any band from 1.8–28 MHz—when the radio surf's up, of course.

Enough of this writing. I'm off to bed for an early night, to get ready for a dawn ride on 1.8 MHz. I wonder where the surf will take me tomorrow? Woooohoooo.

Reference

1. The DX Edge is currently available from Universal Radio Inc. (6830 Americana Parkway, Reynoldsburg, OH 43068-4113. You can e-mail them at: <dx@universal-radio.com> for current prices/postage. ■

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Do you know a young amateur who has made a significant contribution to ham radio or to his/her community through ham radio? Nominations are open for the 2001 Young Ham of the Year Award.

Announcing:

The 2001 Newsline Young Ham of the Year Award

Nominations are open for the 2001 Newsline Young Ham of the Year Award (YHOTY), of which *CQ* magazine and Yaesu (now Vertex Standard) are proud co-sponsors. This is the 16th year of the YHOTY program, with the first award issued in 1986 to Shawn Alan Wakefield, WK5P, then of Bartlesville, Oklahoma. (Shawn is now 30 and living in Norman, Oklahoma.)

The award is the brainchild of "Amateur Radio Newsline" Producer Bill Pasternak, WA6ITF, who realized that, besides scholarships, there was no program anywhere within amateur radio to recognize and acknowledge the numerous contributions made by young hams. Bill believes that providing this recognition can encourage the winners, and others by their example, to use ham radio as a gateway to technology-based careers (see "YHOTY's Long-Lasting Impact" for one example of this philosophy's success). Originally, the program was sponsored by the Westlink Report, but it has been under the "Newsline" banner since 1995.

Over its 15-year history the award has been given ten times to male hams and five times to female hams, proof of the growing interest of young women in amateur radio. The winners have demonstrated a tremendous range of accomplishments, from running emergency nets during major disasters to setting up websites to introduce young people to ham radio. One of its long-standing foundations is that winners must have made a significant contribution to amateur radio or used ham radio to make a significant contribution to their communities. Simply becoming an Extra Class ham at age 18 months has never been considered a significant enough accomplishment to earn the award.

The Young Ham of the Year Award is presented each August at the Huntsville (Alabama) Hamfest. Winners receive a plaque, a radio prize from Yaesu/

Shawn Alan Wakefield, WK5P, was the first Young Ham of the Year Award recipient in 1986. Shawn is now 30. (WA6ITF photo)

1989 YHOTY winner Erin McGinnis, KAØWTE, of Topeka, Kansas, is congratulated by Yaesu's Chip Margelli, K7JA, at her award presentation ceremony. (WA6ITF photo)

YHOTY Award founder Bill Pasternak, WA6ITF, presents the 1991 plaque to award winner Sam Garrett, AAØCR. See Sam's update in this article on what the award has done for him. (WB6MQV photo)

A beaming Allison Zettwoch, KD4CKP, of Louisville, Kentucky, the 1994 YHOTY winner, is congratulated by "Westlink Report" Publisher Burt Hicks, WB6MQV. (KR4IF photo)

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More hams use MFJ SWR Analyzers™ than any others in the world!

1994 YHOTY winner Allison Zettwoch's father, US Airways Captain Larry Zettwoch, KR4IF, was so impressed by the value of the award to young people that he now chairs the YHOTY judging committee. Other judges include CQ Editor Rich Moseson, W2VU; the ARRL's Rosalie White, K1STO; former ARRL President George Wilson, W4OYI; and 1997 award winner Brian Mileshosky, N5ZGT. (WA6ITF photo)

Standard-Vertex, a trip to Space Camp from *CQ*, and other gifts from several other "additional gift participants," including the ARRL and Rosewood Communications.

Do You Know a Potential Winner?

Do you know a young ham, age 18 or younger, who's making a significant contribution to our hobby, or to his/her community through amateur radio? If so, we encourage you to submit a nomination on his/her behalf. The nomination form is available on the *CQ* website at <http://www.cq-amateur-radio.com> as well as the Newsline website at <http://www.arnewsline.org>. If you can't download the form on the web, send an SASE to CQ, 25 Newbridge Road, Hicksville, NY 11801 and we'll send one to you. Nominations and supporting documentation must be submitted before May 30 to be considered. ■

Sam Garrett, AAØCR, as he appears today, just slightly "grown up" from the 1991 photo seen elsewhere in this article. (Photo via AAØCR)

YHOTY's Long-Lasting Impact

By Sam Garrett, AAØCR

Sam Garrett, AAØCR, of St. Louis, Missouri, was the 1991 Young Ham of the Year. He shares with us a look back at how receiving the award has shaped the past decade of his life.

Virtually every major success I have had in the last ten years is due in some way to receiving the Young Ham of the Year Award. The award's benefits and lessons have carried me far beyond amateur radio, and far beyond my hometown of St. Louis. Most of those lessons and experiences have been rewarding. Others have been difficult. But all have helped me become a better, more well-rounded person.

When I received the award as a seventh-grader in 1991, I was awe-struck by amateur radio's potential. I saw a world full of opportunities for young people and enjoyed working to strengthen their role in the service through speaking and writing for *Westlink Report and Worldradio*. Those efforts would have been impossible without unwavering support from my parents, Walt, NØMAL, and Martha Ann, NØOZF. The award therefore allowed me to see my family's great dedication to each other, which has been the other pillar of all my successes since receiving the award.

The opportunity to polish my public- speaking and writing skills literally made me who I am today. Those skills, combined with amateur radio's focus on public service and communication, fostered my interest in journalism and public affairs, through which I found my home of the last five years, American University in Washington, DC. Last year, I received my BA in interdisciplinary studies and political science. Much of my coursework focused on communication, including in-depth research on amateur radio policy. My research in telecommunications continues as I pursue my PhD.

Those larger successes would have been impossible without the foundation the award provided. Through the award, I learned to network, made lifelong friends, bolstered my self-confidence, learned to succeed and fail, and discovered my strengths and weaknesses. Like amateur radio itself, those lessons and the opportunities they bring will remain with me always.

Young Ham of the Year Award Nominating Rules For Year 2001

Mission Statement:

This award is not a contest for a prize. Any prizes given are secondary in nature. A person selected "Young Ham of the Year" is judged on his/her contributions to society through amateur radio. For example, a youngster whose only claim to fame is that of being licensed as an Extra at age four would not necessarily be judged as having made a significant contribution to the Amateur Radio Service. On the other hand, a 14-year-old Novice or Technician running a net during a major disaster or crisis would definitely be given consideration.

Rules:

1. Fill out the nominating form completely.

2. Any FCC-licensed radio amateur, age 18 or younger, residing in the 48 contiguous United States is eligible to be nominated for this award.

3. ***Extremely important:*** You are required to supply full and complete verification of any claims made regarding your nominee's qualifications. The more documentation that you supply, the easier it will be for our judges to reach a decision. Nominations without this documentation will be returned without being given consideration.

Restrictions:

1. Decision of the judges is final.

2. The Amateur Radio Newsline (Newsline) sponsors the award program and guarantees that the winner will receive a plaque noting that honor. All other gratuities are provided at the option of any corporate underwriter. An underwriter may, at its choice, provide the winner with a trip to an amateur radio convention or hamfest of our selection.

3. If awarded, this trip will be limited to transportation for the winner to the venue, hotel accommodations, convention and banquet tickets, and a prize. Not covered are any miscellaneous costs such as local transportation, incidental meals, locally made purchases, or the costs incurred by a relative or guardian traveling with or accompanying the award winner to the convention city. (A parent, relative, or guardian is free to share accommodations with the winner based on their personal arrangements.)

4. In the event that a winner is unable to travel to the convention, Newsline will attempt to arrange a special award ceremony where the recipient resides—i.e., in his/her school, before his/her radio club, etc. In this case, the trip to the convention will be forfeited by the recipient, but all other aspects of the award will remain.

Please mail the nominating form along with all substantiating materials before May 30, 2001 to: The Newsline Young Ham of the Year Award, 28197 Robin Ave., Santa Clarita, CA 91350, or e-mail to: <newsline@arnewsline.org>.

Here is an update to CQ's prestigious WAZ Awards program rules, including some changes and new awards.

The CQ WAZ Awards Program

BY PAUL BLUMHARDT, K5RT
CQ WAZ Award Manager

It's been almost a year since we published the revised, updated rules for the WAZ program. During that time we've had quite a few changes in the list of CQ Awards Checkpoints plus requests for a few new awards. Added to these matters, the US Post Office enacted a rate increase effective 7 January 2001.

New for 2001 is a 6 Meter WAZ and an EME (moonbounce) WAZ plus revisions to the Satellite WAZ. We've set the bar a bit lower on these most challenging awards to encourage activity and technology growth on the VHF and UHF bands.

The list of CQ Awards Checkpoints is included here to assist you in locating a checkpoint near you so that you can save the postal expense. We are in need of more checkpoints, particularly in New England and the Bay area of California.

To make sure we get the news of these changes out to as many DXers as possible, we are printing the revised rules here. Be sure to check the WAZ web pages at <www.cq-amateur-radio.com/wazrules.html> frequently.

Interest in the WAZ program is very high. Most months we average around 40 new applications or endorsements being processed. Your involvement in the WAZ program is really appreciated!—*Vy 73, Paul, K5RT, WAZ Awards Manager*

Section 1. Introduction

The CQ Worked All Zones (WAZ) Award and its variations are issued to any licensed Radio Amateur presenting proof of contact with all 40 CQ zones. This proof consists of proper QSL cards, which in many cases may be checked by any of the authorized checkpoints or sent directly to the WAZ Award Manager. (The list of CQ Checkpoints is included elsewhere in these rules.)

The WAZ program is one of the longest running award programs in Amateur Radio, having been started prior to WW II. While it involves the use of "DX entities," the WAZ program does not rely on any particular entity's status as a country. The WAZ Award is geographically focused, which is where its challenge lies.

WAZ Award correspondence should be directed to the WAZ Award Manager: Paul Blumhardt, K5RT, 2805 Toler Road, Rowlett, TX 75089 USA (e-mail: <k5rt@cq-amateur-radio.com>), or it may be mailed directly to *CQ* magazine at: CQ Communications, Inc., 25 Newbridge Road, Hicksville, NY 11801 USA. The WAZ application form, rules, and CQ Zone Map are available in .PDF format from the CQ Magazine WAZ Rules web page: <www.cq-amateur-radio.com/wazrules.html>. This information is also available from either the WAZ Award Manager or *CQ* magazine in hardcopy. Mail your request for WAZ information to either of the addresses shown above. Please include a business-size SAE with *two units* of postage (for US stations) or $2.00 with your request. Foreign stations should supply a return mailing label and 3 IRCs. Please indicate on the back of your envelope "WAZ Info Request" so we can spot your letter more easily and reply quickly.

Section 2. General Rules

All QSOs must be made by a licensed Amateur Radio operator, from a licensed Amateur Radio station, using only modes of emission and transmitter output power as permitted by the local licensing authority. QSOs with stations other than Radio Amateur (such as MARS, Commercial, or Military) are ineligible for the WAZ award.

All QSOs must be conducted within the radio spectrum as authorized for that licensee by the local licensing authority. Any WAZ applicant found to be operating outside the bounds of his or her license may be disqualified from the WAZ program.

All contacts must be made from within the same DXCC entity. QSOs made by the same applicant using previous callsigns from that same DXCC entity are acceptable. Proof of holding those previous callsigns is requested.

The Official CQ WAZ Zone Map and the printed CQ zone list are used to determine the zone in which a station is located.

If a problem is found with your application or QSL cards, we will attempt to contact you via e-mail to inform you of the issue and attempt to resolve it with you. We *really* don't want to return your application if we don't have to.

The submission of any WAZ award application acknowledges consent to abide by the decisions of the CQ WAZ Manager and the CQ Awards Committee. Decisions of the CQ DX Advisory Committee on any matter pertaining to the administration of this award are final.

Section 3. QSOs and QSLs

All QSOs must be two-way with both stations using the same mode of emission.

QSL cards must include:

1. Callsigns of both stations
2. Date of QSO
3. Time of QSO (UTC preferred)
4. Band or frequency of QSO
5. Mode of QSO
6. The QTH of the station worked (country, state, city). Indication of the CQ zone is optional.

QSL cards not including the information above may be returned to the applicant for replacement and not credited towards the WAZ award.

Ineligible QSOs:

Cross-Band
Cross-Mode
Aeronautical Mobile
Maritime Mobile
Stations located on floating ice
Ships anchored in port

Any altered or forged confirmations submitted by an applicant for WAZ credit may result in permanent disqualification. The

WAZ Manager may request the resubmission of certain confirmations. While a QSL card is normally accepted as proof of a contact, the final proof is an entry in the DX station's logbook for the listed QSO.

The failure to resubmit QSLs in a timely manner when requested by the WAZ Manager may result in the recall of the award in question.

Section 4. WAZ Award Types

WAZ By Mode

Mode	Bands	QSLs on or After	Field Checking	Notes
Mixed (any combination)	Any	14 Nov. 1945	Yes	See Note 1
AM	Any	14 Nov. 1945	Yes	—
SSB	Any	14 Nov. 1945	Yes	—
CW	Any	14 Nov. 1945	Yes	Revised QSL date
RTTY	Any	14 Nov. 1945	Yes	—
SSTV	Any	1 Jan. 1973	Yes	—
Digital	Any	1 Jan. 2000	No	New WAZ award–see Note 2

WAZ By Band

Band	Mode	QSLs on or After	Field Checking	Notes
160 m	Mixed Only	1 Jan. 1975	No	See Note 3
80,40,20, 15,10 m	Any Single Mode	1 Jan. 1973	Yes	No Mixed Mode
30 m	Any Single Mode	1 Jan. 1991	Yes	Rule Change No Mixed Mode
17 m	Any Single Mode	1 Jan. 1991	Yes	Rule Change No Mixed Mode
12 m	Any Single Mode	1 Jan. 1991	Yes	Rule Change No Mixed Mode
Satellite	Mixed Only	1 Jan. 1989	No	**Rule Change See Note 4**
6 Meters	Mixed Only	1 Jan. 1973	No	**New WAZ Award See Note 4**
EME	Mixed Only	1 Jan. 1973	No	**New WAZ Award See Note 4**

Note 1: The process of endorsing a CW/Phone WAZ award has been discontinued. The old CW/Phone WAZ Award is now named *Mixed Mode* WAZ. The existing CW/Phone WAZ award numbering sequence will be continued in support of this change.

Note 2: This is a new WAZ award designed to encourage activity and experimentation using any of the digital modes available to amateurs. This list includes, but is not limited to PSK-31, AMTOR, PACTOR, and Spread Spectrum. QSL cards must indicate the specific mode used for the QSO. RTTY does not count for this award, as it has its own award. This award will not be endorsed for any specific digital mode. You may elect to use a single digital mode or different digital modes in working toward this new WAZ award.

Note 3: The 160 Meter WAZ Award requires that the applicant submit QSL cards from at least 30 zones. Endorsement stickers are issued at the 35, 36, 37, 38, 39, and 40 zone levels.

Note 4: The Satellite and 6 Meter WAZ Awards require that the applicant submit QSL cards from at least 25 zones. Endorsement stickers are issued at the 30, 35, 36, 37, 38, 39, and 40 zone levels. The Satellite and EME Awards are not band specific; you may apply QSOs from multiple bands.

Special Endorsements

WAZ awards (except 5 Band WAZ and 160 Meter WAZ) may be endorsed for unique situations, such as all QRP or all mobile, provided the QSL cards clearly indicate the situation.

5 Band WAZ

Applicants who succeed in presenting proof of contact with the 40 zones of the world on the 80, 40, 20, 15, and 10 meter bands (for a total of 200) receive a special certificate in recognition of this achievement.

Note: A prerequisite for 5 Band WAZ is that the applicant must already be a holder of any 40 zone WAZ. *The number, date, and award type must be indicated on the 5B WAZ application.*

The first plateau is a total of 150 zones across any combination of the 5 bands listed above. A certificate will be issued with a unique award number, indicating the initial number of zones confirmed. After reaching the 150 zone plateau, each 10 zones requires the submission of QSL cards and the application fee.

Upon reaching 200 zones confirmed, the applicant will be issued a 200 zones endorsement sticker to affix to his or her 5B WAZ certificate that was previously issued. *No other endorsement stickers are issued.*

Upon reaching the 200 zone level, the applicant may wish to purchase an engraved plaque to acknowledge the achievement.

The 5 Band WAZ award is available *Mixed Mode only.* It is not available for any single mode.

QSLs accepted: Contacts must have been made after 0000Z January 1, 1979.

Rule Change: Checking of 5 Band WAZ award applications by CQ checkpoints is available starting 1 June 2000 *for initial applications of 190 cards or less.* Initial applications of greater than 190 cards must be presented to the WAZ Award Manager. *All QSLs to endorse a 5 Band WAZ award must be presented to the WAZ Award Manager.*

Note: For multi-band QSLs please include a summary sheet indicating the callsign and bands for each particular card. This will aid in checking of QSL cards.

Application Form: CQ form 1479 or a facsimile must be used. A separate application form is required for each band.

Note: For multi-band QSLs please include a summary sheet indicating the callsign and bands for each particular card. This will aid in the checking of QSL cards.

Section 5. Applying for the WAZ Award

Application Form: CQ form 1479 or a facsimile must be used for all submissions. This form must include the following:

1. Callsigns used by the applicant, as shown on the QSL cards
2. Name of applicant
3. Complete mailing address of applicant
4. Date of application
5. Type of WAZ Award being applied for (Mixed, SSB, Single Band)
6. Zone of contacted station
7. Callsign of contacted station
8. Date of QSO
9. Time of QSO
10. Band or frequency of QSO
11. Mode of QSO

Submitting the Application Form: Complete the application form using BLOCK LETTERS, or type the application. *The information must be legible.* Include your e-mail address (if you have one).

Submit for only *one* award per application. Each application must be accompanied by the appropriate application fee or it will not be processed (see the Processing Fee Schedule). If you are a *CQ* subscriber, include the mailing label (or photocopy) from your most recent issue of *CQ* magazine with your application.

QSL "credits" for use in other WAZ Award Applications: In order to save time and reduce postal expenses (and risk), an applicant may wish to include a note with the original submission indicating plans to apply for a future WAZ award. This intention must be clearly indicated by including a note with the original submission. The WAZ Award Manager will sign and date the completed application and return a photocopy to the applicant.

When the time arrives to submit the "future" application, this signed copy plus the new application and the balance of the QSL

cards (as required for that award) must be supplied. In other words, we don't need to look at the same QSL cards from the same applicant provided we have the proof that we've seen them for a previous application.

Plaques and Certificates: WAZ certificates and plaques are mailed 60 to 90 days after processing of your application. Plaques and certificates are processed from *CQ*'s office in New York, not by the WAZ Award Manager or checkpoints. See the Processing Fee Schedule for expedited shipment costs.

Section 6. Postage Suggestions

Return Postage: Be sure to include sufficient return postage with your application. Suggestions for mailing *from* the USA are provided below:

Continent	First Class 40 Cards	First Class + Registered 40 Cards	Express Mail 40 Cards
North America	$1.50	$9.00	$12.25
Europe	$4.00	$11.50	$19.00
Asia	$4.40	$11.90	$19.00
South America	$4.00	$11.50	$22.25
Africa	$4.00	$11.50	$28.50

Continent	First Class 200 Cards	First Class + Registered 200 Cards	Express Mail 200 Cards
North America	$ 4.00	$11.50	$16.00
Europe	$13.00	$20.50	$27.50
Asia	$15.00	$22.50	$27.50
South America	$14.00	$21.50	$28.00
Africa	$14.00	$21.50	$35.50

If insufficient funds (or no funds) are provided, QSL cards will be returned by the appropriate route. This may mean that QSL cards will be returned via third-class mail or sea mail. It is up to the applicant to indicate the method of returning his or her QSL cards. It is the responsibility of the applicant to pack the QSL cards in such a way that they will not be damaged or lost in the mail. The WAZ Awards Manager is required to pack all returned QSLs in accordance with US Postal and US Customs Regulations.

Certificate Mailing: Your WAZ (5 Band WAZ) certificate can be *airmailed* (not overnight shipped) for an additional $5.00. Certificates are normally mailed via surface mail.

Section 7. Processing Fees

Fees may be paid by the following methods:

1. US currency
2. Cashiers check or money order (US or Canadian banks only, US funds only)
3. Bank draft (US or Canadian banks only, US funds only)
4. Personal checks (drawn on US banks only) made out to *Paul Blumhardt* (*not* to WAZ Awards Manager, or *CQ* magazine)
5. IRCs will be accepted at an exchange rate of $.50US per IRC

Processing Fee Schedule

Award	*CQ* Subscriber	Non-*CQ* Subscriber
Any "40 QSL" WAZ Award (including 160 meters)	$6.00	$12.00
"Basic 5BWAZ" application fee	$10.00	$15.00
5B WAZ endorsement application fee (each additional 10 zones)	$2.00	$5.00
160 Meter endorsement application fee	$2.00	$5.00
160 Meter endorsement stickers (35,36,37,38,39,40 zones)	$2.00 each	$2.00 each
WAZ Certificate Replacement (due to loss/damage)	$20.00	$30.00
WAZ Certificate Replacement (due to callsign change)	$40.00	$50.00
5B WAZ Plaque	$80.00	$80.00
5B WAZ Plaque with Air Shipment	$100.00	$100.00
Airmailing of WAZ Certificate	$5.00	$5.00

Section 8. WAZ Zone/Country List

Zone 1. *Northwestern Zone of North America:* KL (Alaska), VY1V/E8 Yukon, the Northwest and Nunavut Territories west of 102 degrees (includes the islands of Victoria Banks, Melville, and Prince Patrick).

Zone 2. *Northeastern Zone of North America:* V02 Labrador, the portion of VE2 Quebec north of the 50th parallel, the VE8 Northwest and Nunavut Territories east of 102 degrees (includes the islands of King Christian, King William, Prince of Wales, Somerset, Bathurst, Devon, Ellesmere, Baffin, and the Melville and Boothia Peninsulas, excluding Akimiski Island).

Zone 3. *Western Zone of North America:* VE7, W6, and the W7 states of Arizona, Idaho, Nevada, Oregon, Utah, and Washington.

Zone 4. *Central Zone of North America:* VE3, VE4, VE5, VE6, VE8 Akimiski Island, and W7 states of Montana and Wyoming. WØ, W9, W8 (except West Virginia), W5, and the W4 states of Alabama, Tennessee, and Kentucky.

Zone 5. *Eastern Zone of North America:* 4U1UN, CY9, CYØ, FP, VE1/VE9, VY2, VO1, and the portion of VE2 Quebec south of the 50th parallel. VP9, W1, W2, W3, and the W4 states of Florida, Georgia, South Carolina, North Carolina, Virginia, and the W8 state of West Virginia.

Zone 6. *Southern Zone of North America:* XE/XF, XF4 (Revilla Gigedo).

Zone 7. *Central American Zone:* FO (Clipperton), HKØ (San Andres), HP, HR, TG, TI, TI9, V3, YN, and YS.

Zone 8. *West Indies Zone:* C6, CO, FG, FJ, FM, FS, HH, HI, J3, J6, J7, J8, KG4 (Guantanamo), KP1, KP2, KP4, KP5, PJ (Saba, St. Maarten, St. Eustatius), V2, V4, VP2, VP5, YVØ (Aves Is.), ZF, 6Y, and 8P.

Zone 9. *Northern Zone of South America:* FY, HK, HKØ (Malpelo), P4, PJ (Bonaire, Curacao), PZ, YV, 8R, and 9Y.

Zone 10. *Western Zone of South America:* CP, HC, HC8, and OA.

Zone 11. *Central Zone of South America:* PY, PYØ, and ZP.

Zone 12. *Southwest Zone of South America:* 3Y (Peter I), CE, CEØ (Easter Is., Juan Fernandez Is., San Felix Is.), and some Antarctic stations (see notes below).

Zone 13. *Southeast Zone of South America:* CX, LU, VP8 Islands, and some Antarctic stations (see notes below).

Zone 14. *Western Zone of Europe:* C3, CT, CU, DL, EA, EA6, EI, F, G, GD, GI, GJ, GM, GU, GW, HB, HBØ, LA, LX, ON, OY, OZ, PA, SM, ZB, 3A, and 4U1ITU.

Zone 15. *Central European Zone:* ES (UR), HA, HV, I, ISØ, LY (UP), OE, OH, OHØ, OJØ, OK, OM, S5, SP, T7, T9, TK, UA2, YL (UQ), YU, ZA, 1AØ, Z3, 9A, 9H, and 4U1VIC.

Zone 16. *Eastern Zone of Europe:* UR–UZ, EU–EW, ER, UA1, UA3, UA4, UA6, UA9 (S,W), US, UC, UO, and R1M (M. V. Island).

Zone 17. *Western Zone of Siberia:* EZ, EY, EX, UA9 (A, C, F, G, J, K, L, M, Q, X), UK, UN–UQ, UH, UI, and UJ–UM.

Zone 18. *Central Siberian Zone:* UA8 (T, V), UA9 (H, O, U, V, Y, Z), and UAØ (A, B, H, S, U, W).

Zone 19. *Eastern Siberian Zone:* UAØ (C, D, F, I, J, K, L, Q, X, Z).

Zone 20. *Balkan Zone:* E4, JY, LZ, OD, SV, TA, YK, YO, ZC4, 4X, 5B.

Zone 21. *Southwestern Zone of Asia:* 4J, 4K, 4L, A4, A6, A7, A9, AP, EK, EP, HZ, UD, UF, UG, YA, YI, 7O, and 9K.

Zone 22. *Southern Zone of Asia:* A5, S2, VU, VU (Laccadive Is.), 4S, 8Q, and 9N.

Zone 23. *Central Zone of Asia:* JT, UAØY, BY3G–L, BY9A–L, BY9T–Z, and BYØ.

Zone 24. *Eastern Zone of Asia:* BQ9 (Pratas), BV, BY1, BY2, BY3A–F, BY3M–S, BY3T–Z, BY4, BY5, BY6, BY7, BY8, BY9M–S, VS6, VR, XX.

Zone 25. *Japanese Zone:* HL, JA, and P5.

Zone 26. *Southeastern Zone of Asia:* HS, VU (Andaman and Nicobar Islands), XV (3W), XU, XW, XZ, and 1S (Spratly Islands).

Zone 27. *Philippine Zone:* DU (Philippines), JD1 (Minami Torishima), JD1 (Ogasawara), T8 (KC6) (Palau), KH2 (Guam), KHØ (Marianas Is.), V6 (Fed. States of Micronesia), and BS7 (Scarborough Reef).

Zone 28. *Indonesian Zone:* H4, P2, V8, YB, 4W, 9M, and 9V.

Zone 29. *Western Zone of Australia:* VK6, VK8, VK9X (Christmas Is.), VK9Y (Cocos-Keeling Is.), and some Antarctic stations (see notes below).

Zone 30. *Eastern Zone of Australia:* TXØ, VK1, VK5, VK7, VK9L (Lord Howe Is.), VK9 (Willis Is.), VK9 (Mellish Reef), VKØ (Macquarie Is.), and some Antarctic stations (see notes below).

Zone 31. *Central Pacific Zone:* C2, FO (Marquesas), KH1, KH3, KH4, KH5, KH6, KH7, KH9, T2, T3, V7, and ZK3.

Zone 32. *New Zealand Zone:* A3, FK, FO (except Marquesas and Clipperton), FW, H4Ø (Temotu), KH8, VK9 (Norfolk Is.), VP6, YJ, ZK1, ZK2, ZL, 3D2, 5W, and some Antarctic stations (see notes below).

Zone 33. *Northwestern Zone of Africa:* CN, CT3, EA8, EA9, IG9, IH9 (Pantelleria Is.), SØ, 3V, and 7X.

Checkpoints for The CQ Awards Programs

These appointed CQ checkpoints can verify your QSL cards and sign the application for all CQ awards except 160 Meter WAZ, 5 Band WAZ endorsements, and new 5 Band WAZ applications with 190 or more zones. Please contact the checkpoint before mailing QSLs. All approved applications should be sent to the appropriate ward manager with the award fee. For WAZ Awards: Paul Blumhardt, K5RT, 2805 Toler Road, Rowlett, TX, 75089 USA.

Checkpoints in the U.S. and Canada

W1AM	Durham, NH	KD5ZD	Arlington, TX	WS7W	Casper, WY
WB2CJL	Tonowanda, NY	N5HB/N5BV	San Antonio, TX	W7XN	Portland, OR
W2RQ	Newton, NJ	W5LLU	Houston, TX	N7YL	Las Vegas, NV
K2FL	Palmyra, NJ	WA5MLT	Houston, TX	W8AH	Charleston, WV
AA2X	Long Beach, NY	WN5MBS	El Paso, TX	N8BJQ	Springfield, OH
KE2UK	N. Bellmore, NY	N5FG	Gulfport, MS	WB8LFO	Lorain, OH
W3GG	Derwood, MD	NW5K	Napoleonville, LA	K8LJG	Flint, MI
WB3DNA	Harrisburg, PA	WN5N	Clovis, NM	K8BTH	Livonia, MI
K3UA	Coraopolis, PA	K5TVC	Springdale, WA	W8EG	Livonia, MI
K4SE	Jonesboro, TN	K5PP	Mounds, OK	AA8R	Swartz Creek, MI
AA4DO	Mt. Juliet, TN	K5UR	Little Rock, AR	AA9DX	Wood Dale, IL
K4XO	Germantown, TN	KG6AR	San Gabriel, CA	AI9L	Braceville, IL
W4DF	Lynchburg, VA	N6AW	Rancho Palos Verdes, CA	K9UWA	Leo, IN
W4FRU	Suffolk, VA	W6DPD	Fresno, CA	W5YH	Jeffersonville, IN
N4MM	Boyce, VA	K6NA	San Diego, CA	W9NT	Bemidji, MN
WA4PGM	Farmville, VA	W6RJ	Danville, CA	K9ZV	Salina, KS
W4ZYT	Virginia Beach, VA	K6BZ	Igo, CA	WØIJR/KAØCDN	Aurora, CO
K4UU	Bowling Green, KY	K6ZZ	California City, CA	KBØU	Overland Park, KS
W3AZD	Miami, FL	K3EST	Davis, CA	NGØW	Cedar Rapids, IA
N6AR	Windermere, FL	N7MQ	Eugene, OR	VE3XN	Toronto, ON
N4UF	Jacksonville, FL	KC7V	Cave Creek, AZ	VE6HAM	Edmonton, AB
W2LZX	Delray Beach, FL	W7YS	Flagstaff, AZ	VE7SMP	Kitimat, BC
W4WJ	Miami, FL	W7CNL	Boise, ID	VO2AA	Labrador
WA4YLD	Hollywood, FL	K7ABV	Great Falls, MI	KL7PJ	Anchorage, AK
WA4FFW	Burlington, NC	WS7I	Spokane, WA	KP4L	Puerto Rico
KU4BP	Winston-Salem, NC	W7OM	Seattle, WA	KP4P	Puerto Rico
N4NO	Huntsville, AL	K7CU	Bountiful, UT	KH6DD	Honolulu, HI
WA4CLU	Mableton, GA	K7JS	Ogden, UT		

Checkpoints Overseas

3A2LF	Monaco	I2MQP	Italy	SP6BOW	Poland
4S7DA	Sri Lanka	JARL	Japan	SV2YC	Greece
9H4H	Malta	LA7JO	Norway	TF3ACW	Iceland
A92BW	Bahrain	LU3BU	B.A. Argentina	TI4SU	Costa Rica
CE3GN	Santiago, Chile	LU4AH	B.A. Argentina	VK1BH/VK4LC	Australia
CE6EWT	Temuco, Chile	LU6DDF	Pergamino, Argentina	VK3AKK	Victoria, Australia
CT4NH	Portugal	OA4O	Peru	VK5IE	S. Australia
CX2CS	Uruguay	OA4QV	Peru	VK6JS	West Australia
CX4HS	Uruguay	OE1FQS	Austria	VU2DVP	India
DJ8OT	Velbert, Germany	OH2PQ	Finland	XE1AE	Mexico
DJ8SW	Bringhausen, Germany	OH3RM	Finland	XE2FL	Mexico
DU1JZ	Philippines	OK1MP	Czech Rep.	YCØEBS	Jakarta, Indonesia
DU1SAN	Philippines	ON5KL	Belgium	YC3HCM	Surabaya, Indonesia
EA3AJW	(Spanish *CQ*)	OZ1DXX	Denmark	YC7DF	Sanggau, Indonesia
F6HMJ	Villeneuve-Loubet, France	PB7CW	Netherlands	YL2MU	Latvia
GM3YTS	Scotland	PT2VE	Brazil	YU1AB	Yugoslavia
G4BWP	England	PY2YP	Brazil	YV5IVB	Venezuela
HA5WA	Poyyos, Hungary	UA3AB	Moscow	Z21JE	Zimbabwe
HA8UB	Tiszakecske, Hungary	UXØUN	Kiev (zone 16)	Z32KV	Rep. of Macedonia
HB9ATA	Switzerland	UA9CBO	Sverdlovsk (zone 17)	ZL3GX	New Zealand
HC1RF	Ecuador	RA9YD	Barnaul (zone 18)	ZS5DX	Bloemfontein, RSA
HK3DDD	Colombia	UWØMF	Vladivostok (zone 19)	ZS6EZ	Pretoria, RSA
HL1AS	Korea	S58MU	Slovenia	4X6UD	Israel
HL5AP	Korea	SM6DEC	Sweden	9A9R	Croatia

Zone 34. *Northeastern Zone of Africa:* ST, SU, and 5A.
Zone 35. *Central Zone of Africa:* C5, D4, EL, J5, TU, TY, TZ, XT, 3X, 5N, 5T, 5U, 5V, 6W, 9G, and 9L.
Zone 36. *Equatorial Zone of Africa:* D2, TJ, TL, TN, S9, TR, TT, ZD7, ZD8, 3C, 9J, 9G, 9Q, 9U, and 9X.
Zone 37. *Eastern Zone of Africa:* C9, ET, E3, J2, T5, 5H, 5X, 5Z, 7O, and 7Q.
Zone 38. *South African Zone:* A2, V5, ZD9, Z2, ZS1–ZS8, 3DA, 3Y (Bouvet Is.), 7P, and some Antarctic stations (see notes below).
Zone 39. *Madagascar Zone:* D6, FT–W, FT–X, FT–Z, FH, FR, S7, VKØ (Heard Is.), VQ9, 3B6/7, 3B8, 3B9, 5R8, and some Antarctic stations (see notes below).
Zone 40. *North Atlantic Zone:* JW, JX, OX, TF, 4K2 (Franz Josef Land).
Antarctic notes: The boundaries of CQ zones 12, 13, 29, 30, 32, 38, and 39 converge at the South Pole. Stations KC4AAA and KC4USN are at the South Pole and will count for any one of the listed zones.

Most Antarctic stations indicate their zone on the QSL card.

A few stations and their zones are 4K1A 39, 4K1B 29, 4K1C 29, 4K1D 36, 4K1E 29, 4K1F 13, 4K1G 30, 4K1H 32, 4K1J 13, 8J1RL 39, CE9 13, DPØ 36, FT–Y 30, HFØPOL 13, HL5BDS 13, KC4AAC 13, KC4AAD 13, KC4AAE 29, KC4USB 32, KC4USV 30, LU–Z 13, VKØGM 29, VP8ME 36, YB8ANT 38, and ZL5AA 30. The list changes frequently. Questions regarding the zone of a particular Antarctic station should be directed to the WAZ Manager.

Section 9. List of CQ Awards Checkpoints

These appointed CQ checkpoints can verify your QSL cards and sign the application for all CQ awards (WAZ, WPX, and CQDX). Field checking is *not* available for 160 Meter WAZ, 5 Band WAZ endorsements, initial (first) 5 Band WAZ applications with over 190 zones, and Digital Mode WAZ. Please contact the checkpoint before mailing QSLs.

All approved applications should be sent to the appropriate award manager with the award fee. For WAZ Awards: Paul Blumhardt, K5RT, 2805 Toler Road, Rowlett, TX 75089 USA. ■

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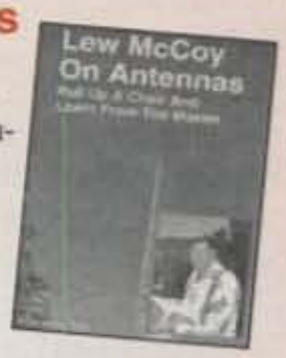

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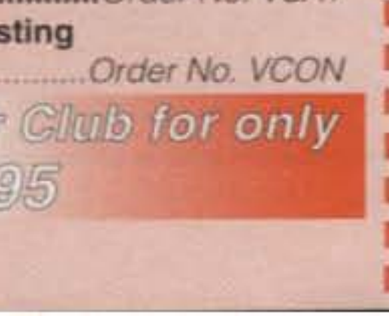

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Reader Survey March 2001

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 adjacent survey card and mailing it back to us. If the card is missing, just write your response numbers and the date of this issue on a postcard and mail it to CQ Reader Survey, 25 Newbridge Road, Hicksville, NY 11801. We'll pick one respondent to each survey for a complimentary one-year *CQ* subscription (or renewal).

This month three of our columnists felt the need to write about bad behavior on the air. We'd like to hear your views on the extent of the problem and best ways to deal with it.

Please indicate... **Circle Survey Card #**

1. Before reading this month's "Magic in the Sky," "DX," and "Contesting" columns, were you aware of the on-air behavior described (e.g., inconsiderate operators, on-air obscenities and bigotry, hate "nets")?
- Yes 31
- No 32
- Not sure 33

2. Have you encountered any of the following behavior first-hand? (circle all that apply)
- Inconsiderate operators 34
- On-air obscenities 35
- On-air bigotry 36
- Hate "nets" 37
- Other inappropriate on-air behavior 38
- No first-hand experiences 39

3. Has this type of behavior affected your enjoyment of amateur radio or its perception by visitors to your station?
- Yes 40
- No 41

4. Have you ever engaged in such behavior on-air?
- Yes 42
- I plead the Fifth 43
- No 44

5. How would you rate the severity and extent of this problem?
- Severe and widespread 45
- Severe but limited in extent 46
- Moderate but widespread 47
- Moderate and limited 48
- Benign but widespread 49
- Benign and limited 50
- No opinion 51

5. Which statement most closely matches your feeling of the best way to respond to such behavior? (choose one)
- Ignore it; responding only encourages them 52
- Change frequency or shut off your rig 53
- Report illegal behavior to the FCC 54
- Confront participants off-air, tell them their behavior is unacceptable 55
- Confront participants on-air, tell them their behavior is unacceptable 56
- Respond in kind—e.g., curse at them, jam them, etc. 57
- No opinion 58

Thank you for your responses. We'll have more questions for you in our next reader survey.

What You've Told Us...

Our January survey asked about your views on amateur satellites. An encouraging 25% of you have used ham satellites at least once, although only a third of that group (8% of the total respondents) consider yourselves to be regular or frequent users.

Among those who have never operated amateur satellites, a majority says the main reason is that it requires equipment you don't have or can't afford, and less than one-third responded "no interest." In addition, 57% of those who have never operated satellites say it's something they would like to try in the future.

Asked about attitudes toward amateur satellites, 53% of you said, "I'm not a user, but feel they're important for ham radio's future." Another 17% responded, "I'm not a user, but understand why other people enjoy them," while 13% said, "I don't know enough about them to choose," and only 5% said "real radio signals bounce off the ionosphere." A majority also feels that satellites are "a great educational tool" (56%) and "a fun way to make contacts" (55%), while 44% see them as "a great way for VHF-only hams to work DX," 41% say they're "OK but require equipment I don't have," and 33% view satellites as "the future of amateur radio." Finally, nearly three-fourths of our respondents actively support the amateur satellite program, either directly, through AMSAT membership (15%), or indirectly through membership in the ARRL or other national associations (57%).

This month's winner of a free 1-year *CQ* subscription is C. W. Eldridge, WA4PLR, of Rock Hill, SC.

CQ takes you behind the scenes at the headquarters of one of America's best-known amateur radio equipment manufacturers.

MFJ—A Little Bit of Everything

BY RICH MOSESON,* W2VU

This is the second in a planned series of CQ photo-tours of amateur radio manufacturing facilities around the world. Digital Editor Steve Stroh, N8GNJ, got us started in the January issue with his visit to PacComm. Most of us don't get the chance to see first-hand where and how our radios and accessories are built, so we hope you'll enjoy these vicarious visits with the people who make it possible to enjoy ham radio without having to build absolutely everything from scratch.

—W2VU

It was 10 o'clock at night. The headquarters of MFJ Enterprises in Starkville, Mississippi was dark and empty except for four people: MFJ President Martin F. Jue, K5FLU, and three visitors from *CQ*—Publisher Dick Ross, K2MGA; Advertising Manager Jon Kummer, WA2OJK; and yours truly, W2VU. As Martin and Dick compared notes on running their own businesses, Jon and I had a chance to reflect on the tour we'd just finished. The main thought that came to me was this: "They make everything, a little bit of everything."

MFJ is perhaps the only company in the amateur radio industry that makes in some form virtually every component of an amateur station (except towers and feedlines). Think about it—power supplies, transceivers, microphones, keyers, speakers, data controllers, outboard audio filters, antenna tuners, SWR/power meters, linear amplifiers, rotators and antennas, and I'm sure I missed some other categories. MFJ or one of its divisions (Ameritron, Mirage, Vectronics, and Hy-Gain) makes something for each of them. It would be possible—again with the exception of feedline and a tower—to assemble an entire amateur station with equipment from just this one company. I don't think any

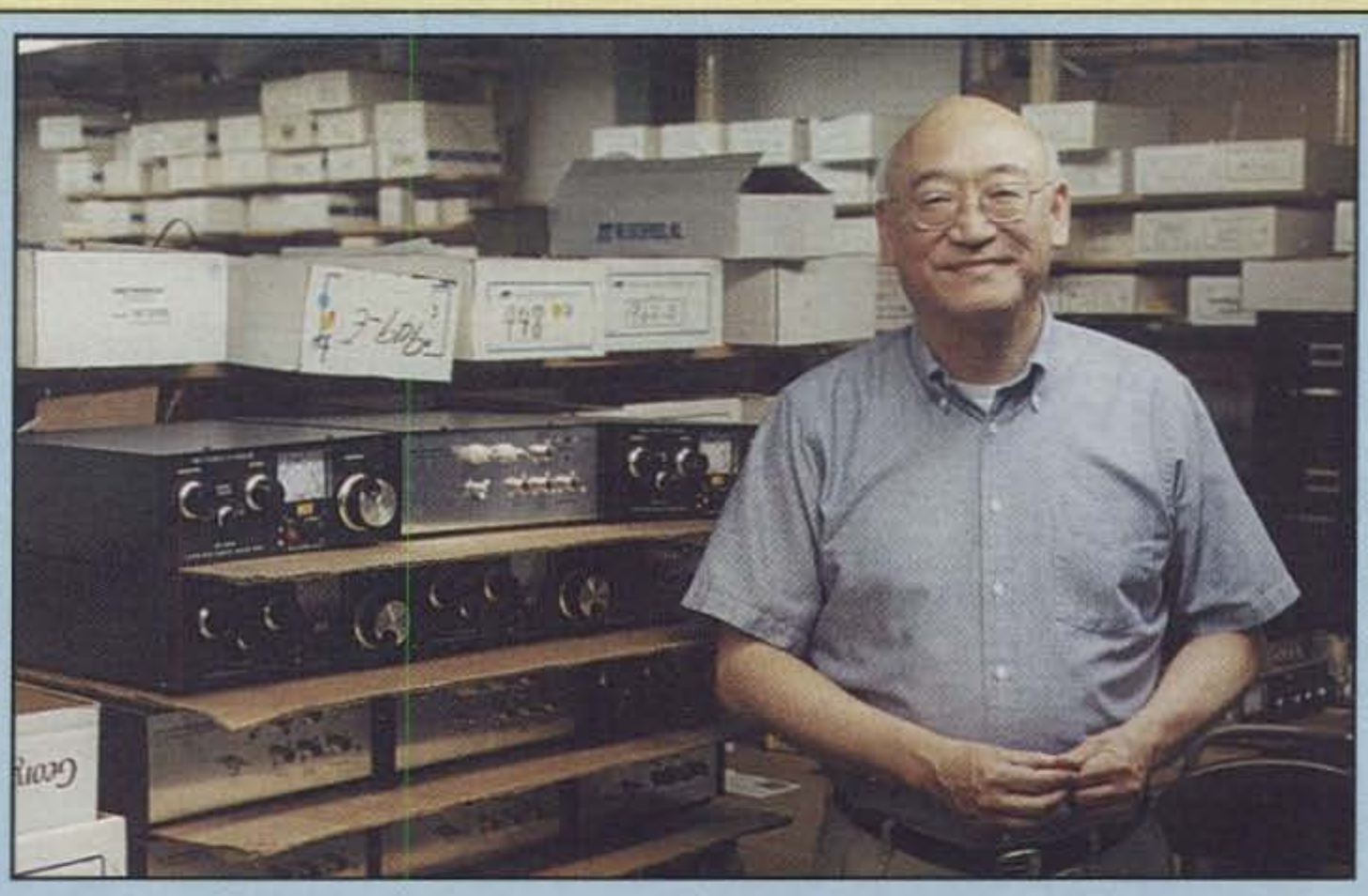

Photo 1– MFJ founder and president Martin F. Jue, K5FLU, with some of the hundreds of products his company produces. (W2VU photos)

An American Success Story

It's hard to write about MFJ, the company, without also writing about the man behind the initials, company founder and president Martin F. Jue. A descendent of Chinese workers who came to America in the mid-1800s to build the transcontinental railroad, Jue's family settled in the Mississippi Delta, where his parents owned a grocery store (a beautiful drawing of the store, by one of Jue's relatives, sits on an easel in his office).

Martin was born in Vicksburg and came to Starkville in the early 1960s to earn his electrical engineering degree at Mississippi State University. He earned a Masters degree at Georgia Tech in 1967, and after a few years "off" to design and build electronics for the military, he returned to MSU to work on his PhD. In 1972, working out of an apartment, he began building and selling amateur radio accessories. The business grew into MFJ Enterprises, which today occupies five buildings in four separate locations in Starkville, including the brand names Jue has added to the company through acquisition—Ameritron, Mirage, Vectronics, and most recently, Hy-Gain. By the way, Martin never did finish his PhD. While it took him only three semesters to complete the coursework, his growing business, along with teaching electrical engineering at MSU, kept him from having the time to write his dissertation.

Jue is very much a hands-on manager and engineer, in touch with every aspect of his business and proudest of his electronic innovations, such as the MFJ "Air Core" roller inductor and a dual tuning capacitor, both used in his company's antenna tuners. Totally unpretentious, he drives a 10-year-old car with over 100,000 miles on it, and his office is small and cluttered with boxes. On the other hand, the walls are covered with bookshelves housing a magnificent collection of old radios and electronics magazines. And then there's Jue's engineer's hideaway—a personal workbench behind a row of bookshelves where he can try out new ideas, work on projects that may turn into products, and briefly leave behind the day-to-day worries of business management.

The manager in Martin gets most of the time these days, though, as his staff of engineers does most of the product development, and he puts his primary focus on running the business. From its start as a one-product company in an apartment, to a multimillion dollar company with four separate manufacturing facilities, MFJ—and Mr. MFJ—are unquestionably an American success story.

** Editor, CQ*

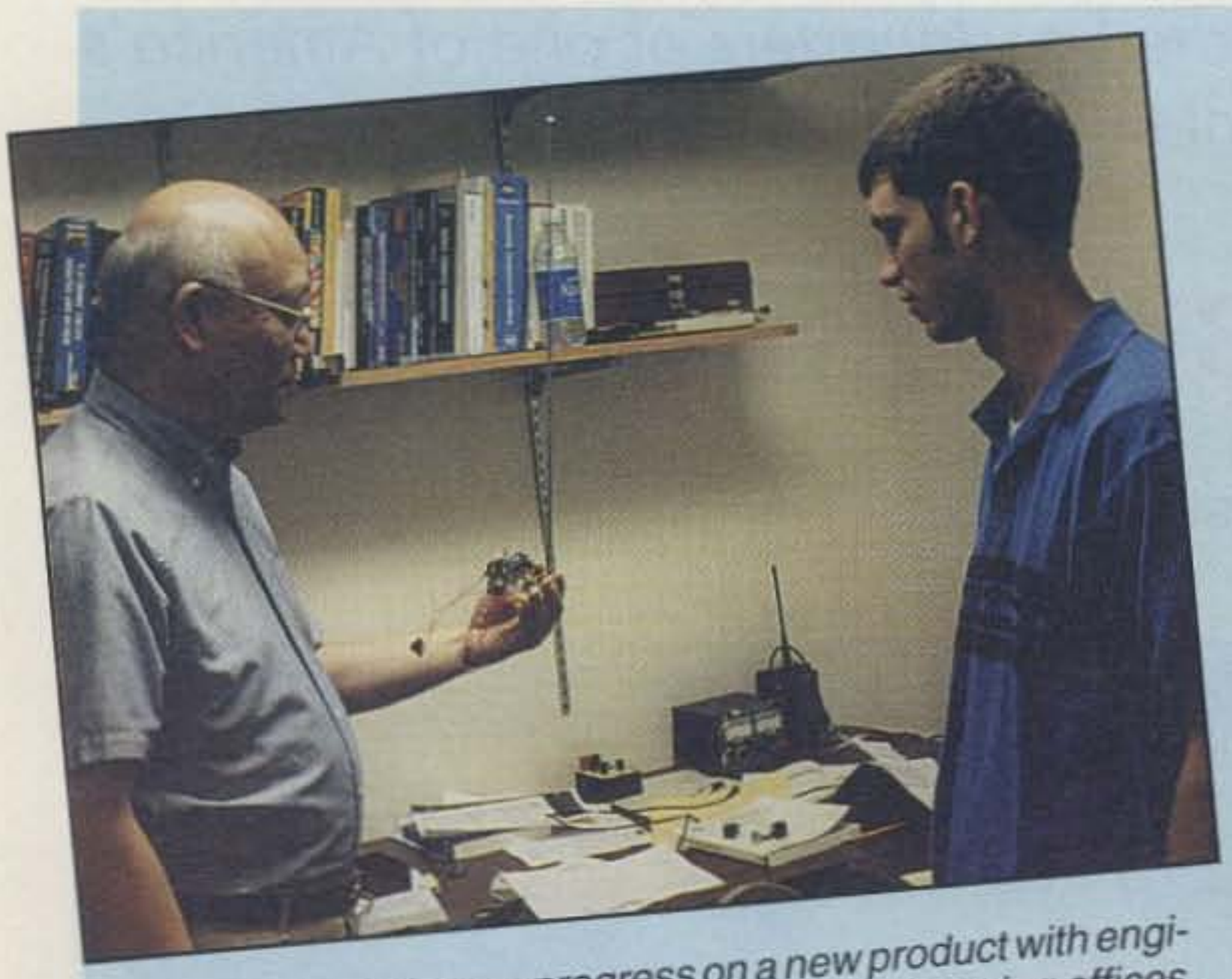

Photo 2– Jue discusses progress on a new product with engineering student Brian Molen in the MFJ engineering offices.

Photo 3– Aluminum chassis, metal covers, and face plates for MFJ products are punched into shape, with holes for components, by one of two Amada CNC punch machines in MFJ's metal shop. The machine follows a pattern uploaded into a computer by designers.

Photo 4– K5FLU with a piece of punched sheet metal. It will become a case for an MFJ-269 SWR Analyzer.

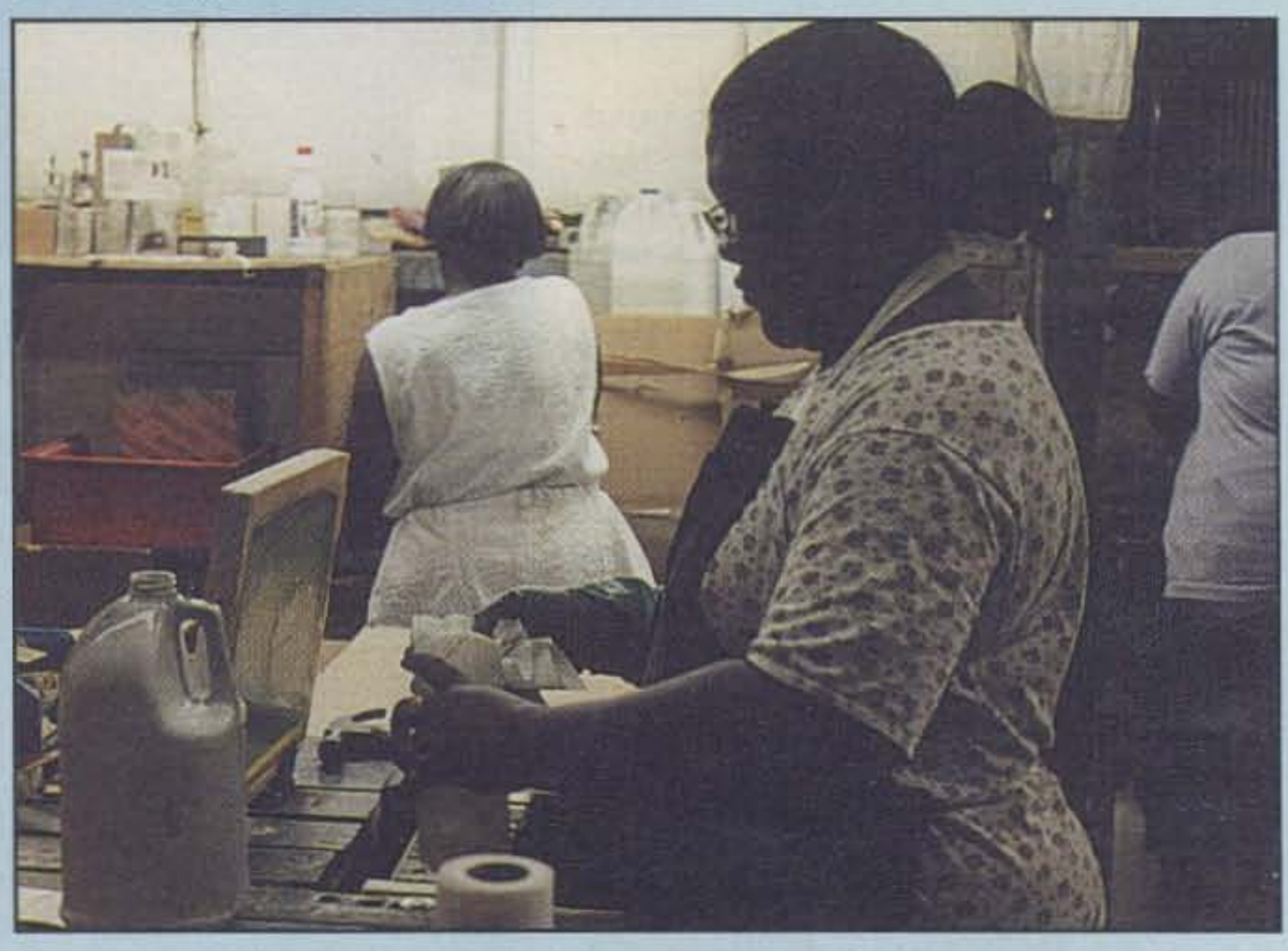

Photo 5– MFJ worker Azzie Weaver prepares a silk screen for printing labels onto newly cut, bent, and painted equipment enclosures.

other company in our industry can make that claim.

The second thing that impressed me during my tour is the extent to which MFJ makes the components that make up its products. Rather than depending on outside suppliers, MFJ does as much as possible on its own, from building its own inductors and capacitors for antenna tuners to printing its own manuals. As manufacturing operations go, MFJ is small, but it has scaled-down versions of state-of-the-art electronics manufacturing equipment.

Let's Take a Tour

MFJ President Martin F. Jue personally escorted us on our factory tour (photo 1), and I was also impressed with his depth of knowledge about every aspect of his operation. Each product starts out as a prototype in an engineer's office (photo 2), and there are about a half dozen engineers working on new or updated products at any given time. Once the designing and prototyping are done, production can begin (Some items, such as clocks and weather stations, are built overseas and imported.

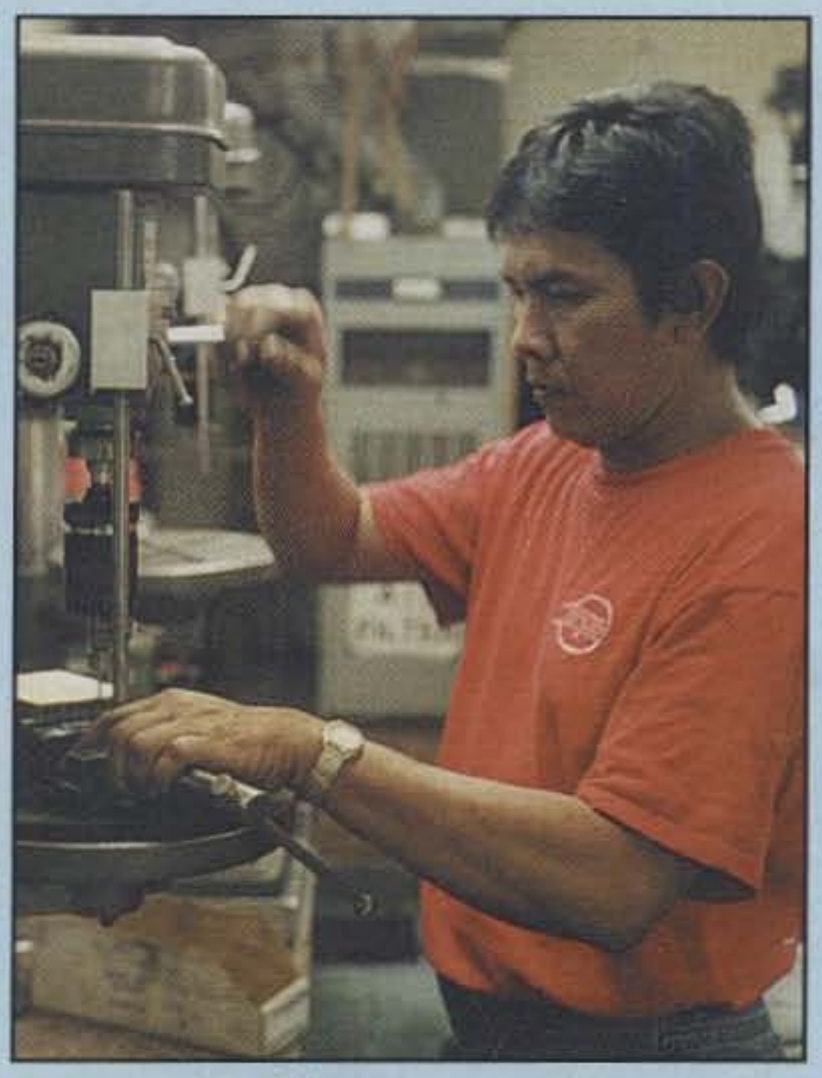

Photo 6– Hartono Agustus uses a drill press in the metal shop to tap threads into a block of metal that will be cut into rectangular pieces and used to hold screws that secure circuit boards inside a case.

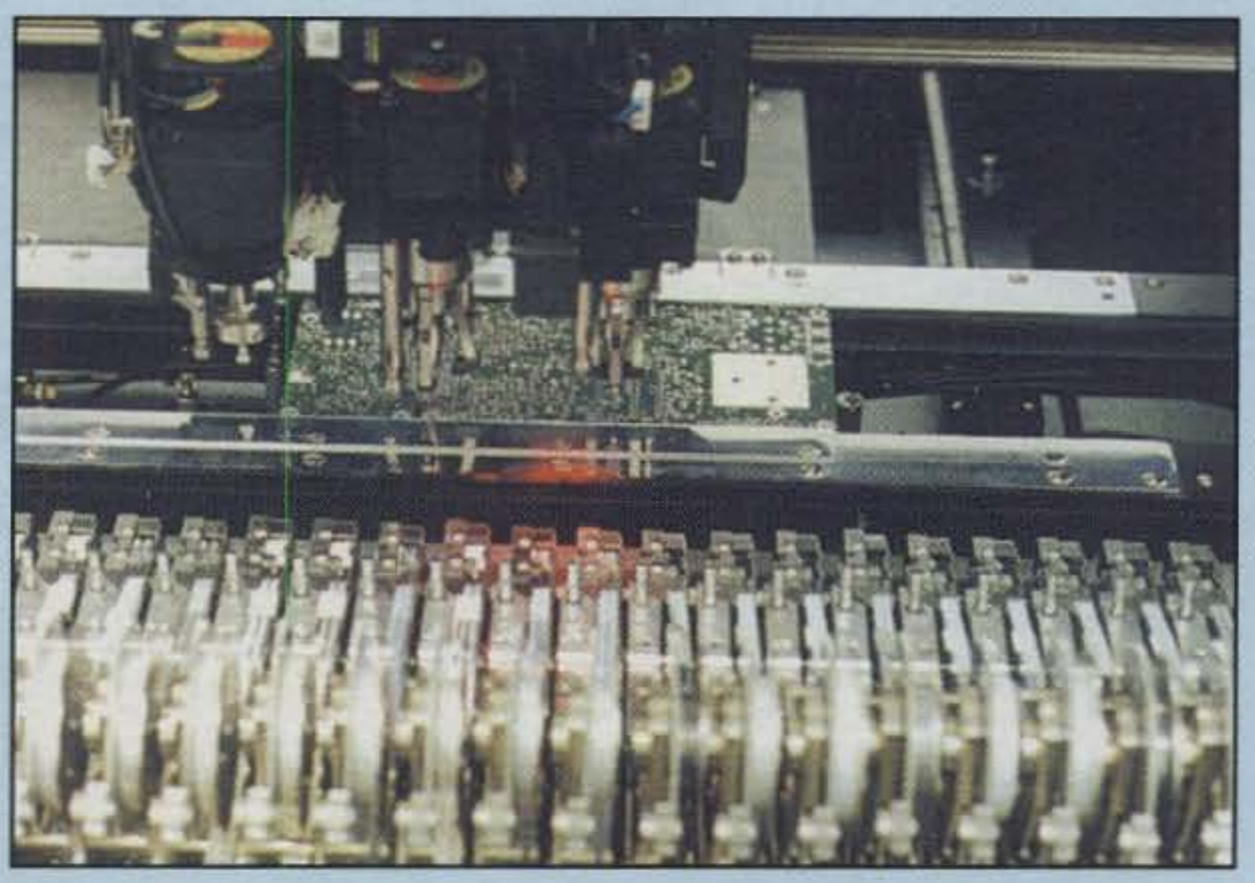

Photo 7– This surface-mount machine automatically selects parts and places them in specified locations on a circuit board in preparation for surface-mount soldering.

Photo 8– The surface-mount "pizza oven." Boards containing components placed on solder paste move slowly through this four-zone oven, where the solder melts and mounts the surface-mount parts to the surface of the circuit board.

Photo 9– Wave soldering machine lays down a thin layer of solder on boards that are not suitable for surface-mount construction.

However, if it inhabits one of those famous MFJ cases, you can be sure it was built in Starkville).

We started our tour in the metal shop, where a computerized machine stamped out sheet metal destined to become equipment cases (photos 3 and 4). As I recall, they were making cases for MFJ-269 SWR Analyzers when we were there. Another machine bent the punched metal into shape, after which it was painted and silk-screened with whatever labels were needed (photo 5). Down the hall, other workers were building parts, such as the little connectors that hold the screws that hold circuit boards in place (photo 6).

In another building circuit boards were being assembled using one of two modern techniques. Boards with surface-mount parts had those components inserted robotically by a machine that had been programmed to take specific components from pre-arranged rolls and drop them onto a certain part on the circuit board (photo 7). The board had been pre-loaded with a solder paste in the locations where solder would be needed. After the parts were plunked into the solder paste, the board was

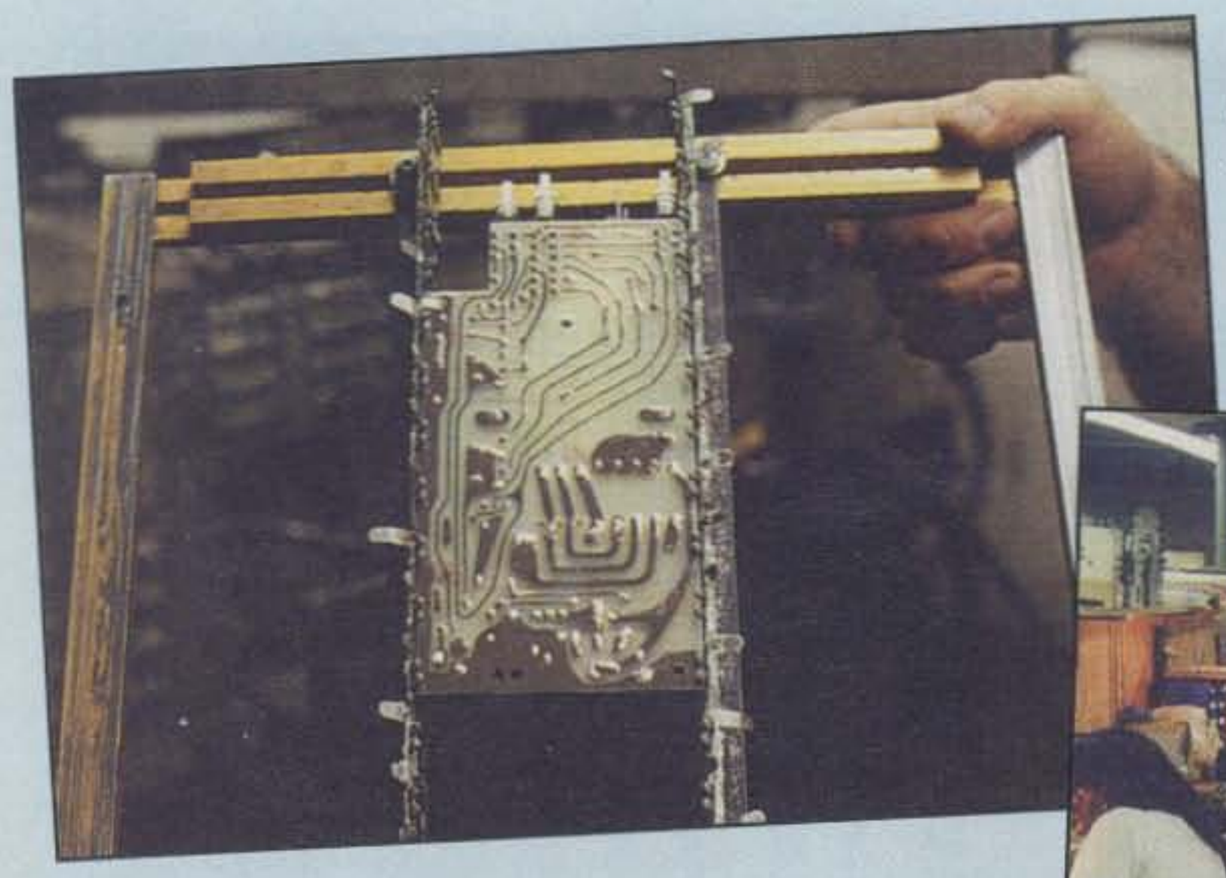

Photo 10– Newly wave-soldered board will cool before moving on to testing and assembly. The solder sticks only to areas that have been treated ahead of time and covered with flux when the board enters the wave soldering machine.

Photo 11– Some of the technicians who perform the final assembly —by hand —on most MFJ products. These workers are building antenna tuners.

Photo 12– Next stop: your favorite ham store? Shipping clerks Lamont Tucker and Lolita Bell prepare a carton of MFJ products for shipping to a dealer. The material under Ms. Bell's arm is packing material made by a machine that scrunches together two sheets of heavy paper.

moved to a "pizza oven" (photo 8), an oven with a conveyer belt that moves the board through four separately controlled temperature zones, providing the control needed for properly melting the solder for each component.

Boards on which components had to be inserted by hand were run through a wave-soldering machine (photo 9), which is really an amazing piece of equipment. At one end the board passes through a wave of liquid flux, which sticks to the parts on which the solder will be applied. Everything is heated as the board passes through to the other end, where it passes through a second wave, this one of bubbling solder that sticks to the flux-coated portions of the board (photo 10). After the board cools, it is ready to be tested and taken to the assembly room.

Final assembly of each product is done by hand (photo 11), with technicians bringing together the various components, connecting them, and mounting them in their cases. Once products are finished, they are packed with manuals into boxes and delivered to the shipping room (photo 12) for the final part of the process—delivery to dealers and customers.

Actually, the process doesn't end there. The MFJ factory also includes a service center, where warranty repairs are performed. According to Jue, customers are routinely telephoned soon before their warranties expire (MFJ is serious about its "No Matter What" one-year warranty.) to make sure their equipment is still operating properly, and give the customers one last chance for free warranty service if there is a problem (and in the process, Jue hopes, helping make happy customers who come back for more).

When we visited MFJ last August, the Hy-Gain antenna division was still in the process of getting moved into its new home, and only limited production was taking place. Even so, for *CQ* Publisher Dick Ross, K2MGA, a long-time antenna enthusiast, walking into the Hy-Gain supply room was like walking into Ham Heaven—shelf upon shelf full of elements of different lengths just waiting to be assembled into antennas and pull DX signals out of the air, and off in the corner, the sacred machines that make Ham-IV and Tailtwister rotors.

Want to know the real reason we were there until 10 o'clock at night? It took us that long to drag Dick away from all that aluminum! ■

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Suggested Retail

New class of *Near Legal Limit*™ amplifier gives you 1300 Watt PEP SSB power output for *65%* of price of a full legal limit amp! Four rugged and powerful 572B tubes. Instant 3-second warm-up, plugs into 120 VAC. Compact 8½Hx 15½Dx14½W in. 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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$2495
Two tubes, 1500 W plus

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These HF linears with *Eimac*® 3CX800A7 tubes cover 160-15 Meters including WARC bands. Adjustable slug tuned input circuit, grid protection, front panel ALC control, vernier reduction drives, heavy duty 32 lb. grain oriented silicone steel core transformer and high capacitance computer grade filter capacitors. Multi-voltage operation, dual illuminated cross-needle meters.

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Suggested Retail

Get ham radio's toughest tube with the Ameritron AL-1200 -- the EimacR 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 no tune Solid State Amplifiers

ALS-500M 500 Watt Mobile Amp

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Suggested Retail

Ideal Mobile amplifier uses 13.8 VDC mobile electrical system, very compact 31/2x9x15 inches, extremely quiet, 500 Watts output, 1.5-22 MHz coverage, instant bandswitching, no tuning, no warm-up, no tubes, SWR protected.

ALS-600 Base 600 Watt Amp

AL-600
$1299
Suggested Retail

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

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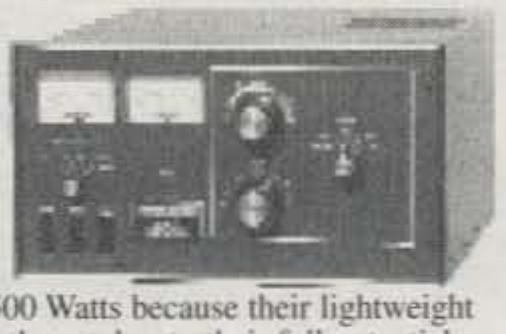
Suggested Retail



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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Having trouble getting your state-of-the-art repeater radios to communicate with an old, but still going strong ACC controller? AH6LE has a solution.

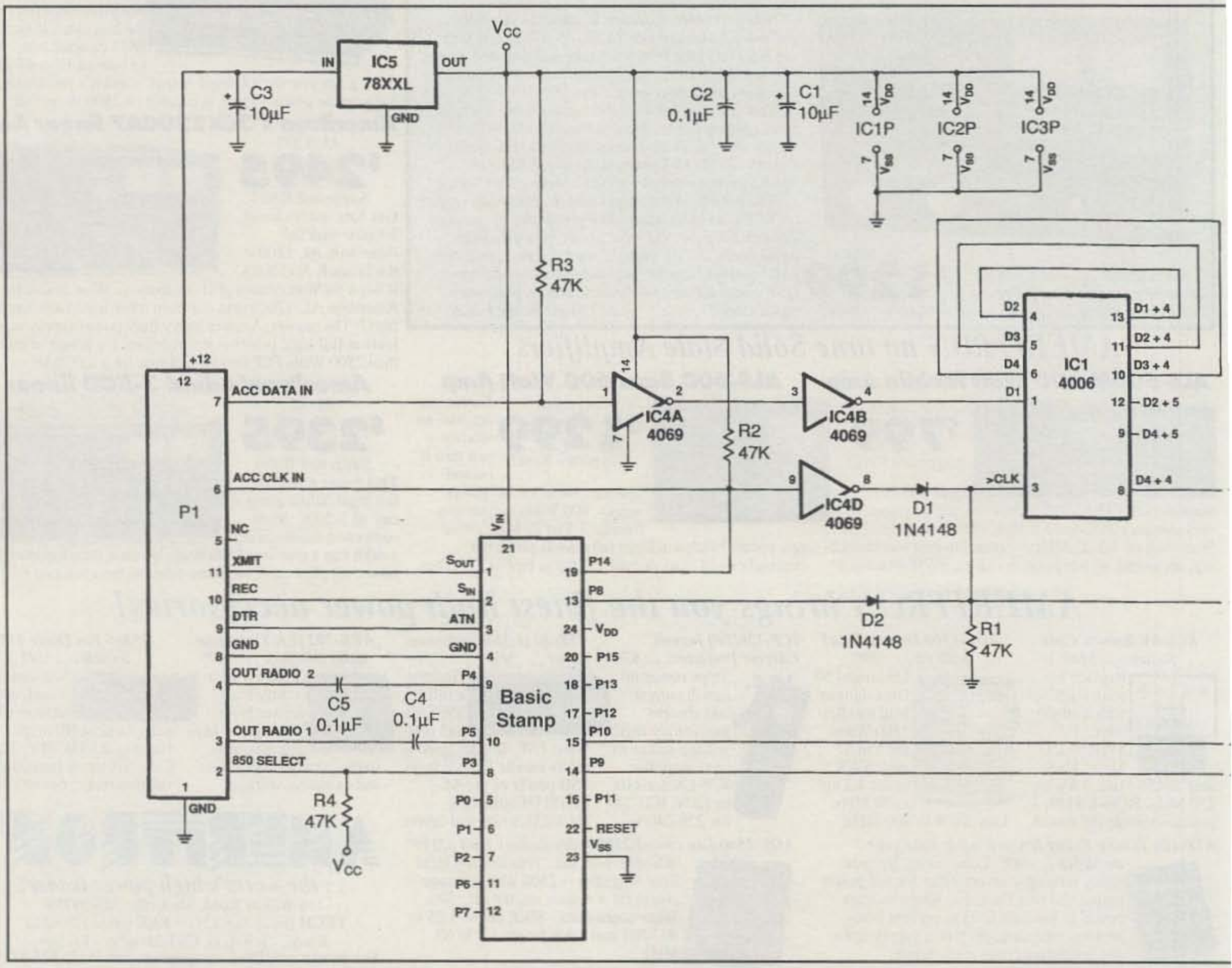
A BASIC Stamp Serial Converter For ACC Repeater Controllers

BY KENNETH ARCK,* AH6LE

Advanced Computer Controls was the leader in repeater controllers during the 1980s, and thousands of their units are still in use today. ACC pioneered the use of synthesized speech and remote programming in amateur repeater controllers, along with remote programming of synthesized remote bases. However, there was a catch: You needed a remote transceiver that was Binary Coded Decimal (BCD) programmable in order to work with the ACC series of controllers. These were easy enough to find in the 1980s, but today it's becoming more and more difficult to find one.

I've used an ACC RC-850 controller in my repeater system for more than 15 years and was fortunate to have found an ICOM IC-22U as my 2 meter remote base back when I built the system. Like

* *c/o CQ magazine*
e-mail: <ah6le@ah6le.net>



many older radios, though, certain repair parts are next to impossible to find, and should the venerable 22U fail, I could be hard-pressed to find the needed parts. This was the inspiration for the design of the Serial Converter.

The converter uses an inexpensive, user-programmable BASIC Stamp to do the necessary data conversion plus a handful of support parts. Note that you don't need an expensive level converter in order to drive your radio of choice, as its output doesn't drive the data port of the controller radio, but rather the microphone input. Depending on how well stocked your junk box is, the converter can be built for under $60.

Concepts

The ACC series of controllers output a *synchronous* serial stream, which simply means that they provide a data stream output, along with a clock signal to synchronize the bits. You could then recover this data by using shift registers to capture the data in parallel form for driving the programmable dividers of the radio you use for your remote base. In the case of the RC-850, this stream also provided PL programming bits, so you could remotely change sub-audible tones as needed.

What I needed was a way to convert the serial stream from these controllers to allow frequency control of today's radios. In my case, I have several Kenwood mobiles on hand, which allow for limited control of frequency and some other functions by applying DTMF tones to their microphone audio lines. Therefore, I needed to take the ACC's serial stream and convert it to the proper DTMF tones needed to control the radio. The use of a BASIC Stamp makes this a piece of cake.

What Are BASIC Stamps?

Stamps are complete microcomputers, with RAM, ROM, a serial interface (for programming and debugging) and a BASIC interpreter all in a small package. They are manufactured by Parallax, Inc.[1] and come in two "models" (a type 1 and a type 2) and are extremely compact (the type 2 is self-contained in a 24-pin DIP size package). For this project I chose a type 2, as it provides for some commands in the BASIC interpreter that the type 1 doesn't. These commands are exactly what we need for our task. Some may ask why I didn't use a PIC for this project instead of the slower and more expensive Stamp. The answer is simple: No special programmer is necessary for a Stamp and the manufacturer even provides free development and programming software. Since Stamps are programmed in a form of BASIC, this makes for easier program development. Stamps also store their programs in flash PROM (programmable read-only memory), so they are easily and rapidly re-programmed (a blessing during program development).

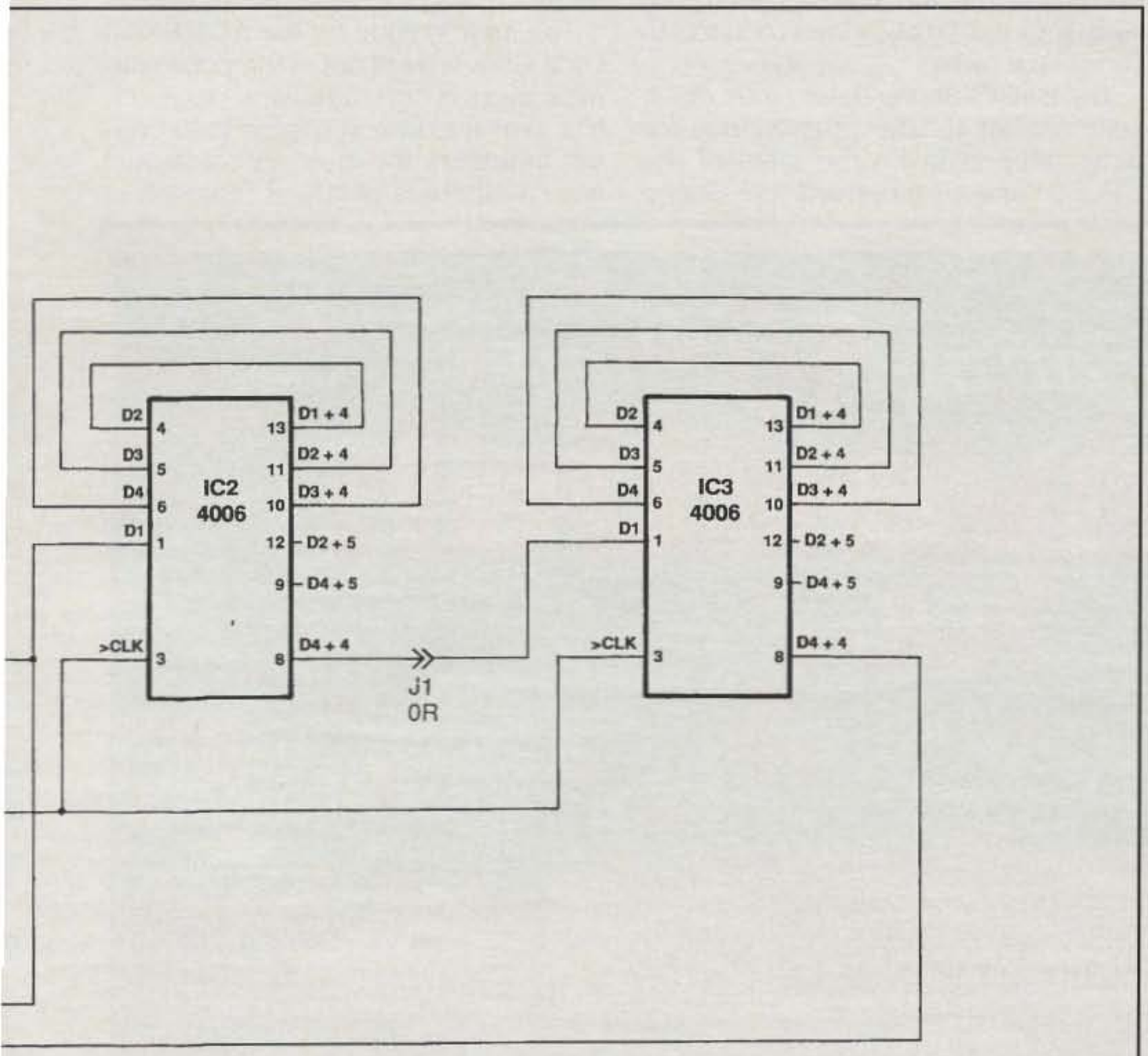


Fig. 1– Schematic of the BASIC Stamp serial converter for ACC repeater controllers. Note that there is no IC4C (only A, B, and D).

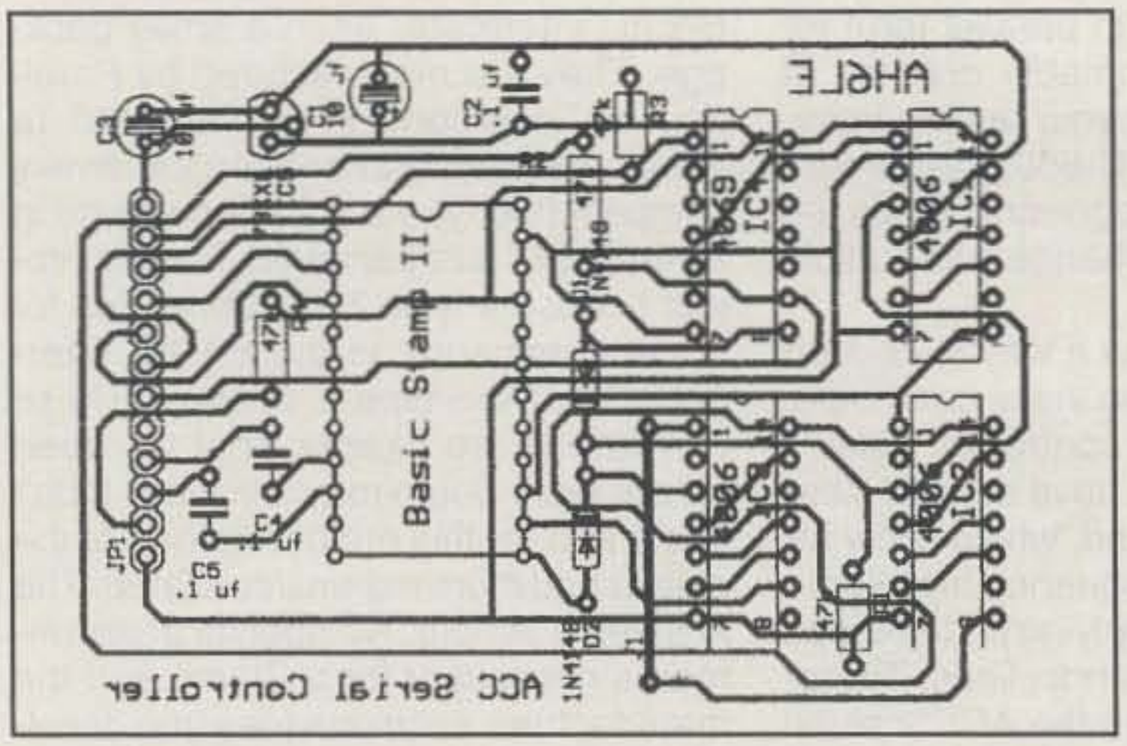
Circuit Description

Looking at the schematic (fig. 1), the trained eye may first notice the use of shift registers, which at first glance seems unnecessary. However, the serial streams from the ACC controllers are approximately 1 to 2 ms in length, which is too fast for the BASIC Stamp to deal with properly (this is because the Stamp is an interpreted language device which imposes some overhead on execution speed).

U1 is a hex Schmidt trigger used to ensure that the data and clock signals from the ACC controller are clean and have rapid rise times. U2, U3, and U4 store the data from the serial stream, allowing the Stamp to read it after the controller has sent it. Each register stores 16 bits of data, and they are cascaded to allow for recovery of the full 48 bits that the RC-850 sends. If you plan to only use the converter with other ACC controllers (such as the ITC-32, RC-85, or RC-96), you can delete U3 and U4,

Parts List

Part	Value or ID #
BASIC Stamp	BASIC Stamp Microcontroller
C1, 3	10 µf
C2, 4, 5	.1 µf
D1, 2	1N4148
IC1, 2, 3	CD4006
IC4	CD 4069
IC5	78XXL
J1	Wire jumper
JP1	12-pin single line header
R1-4	47k, 1/4 watt



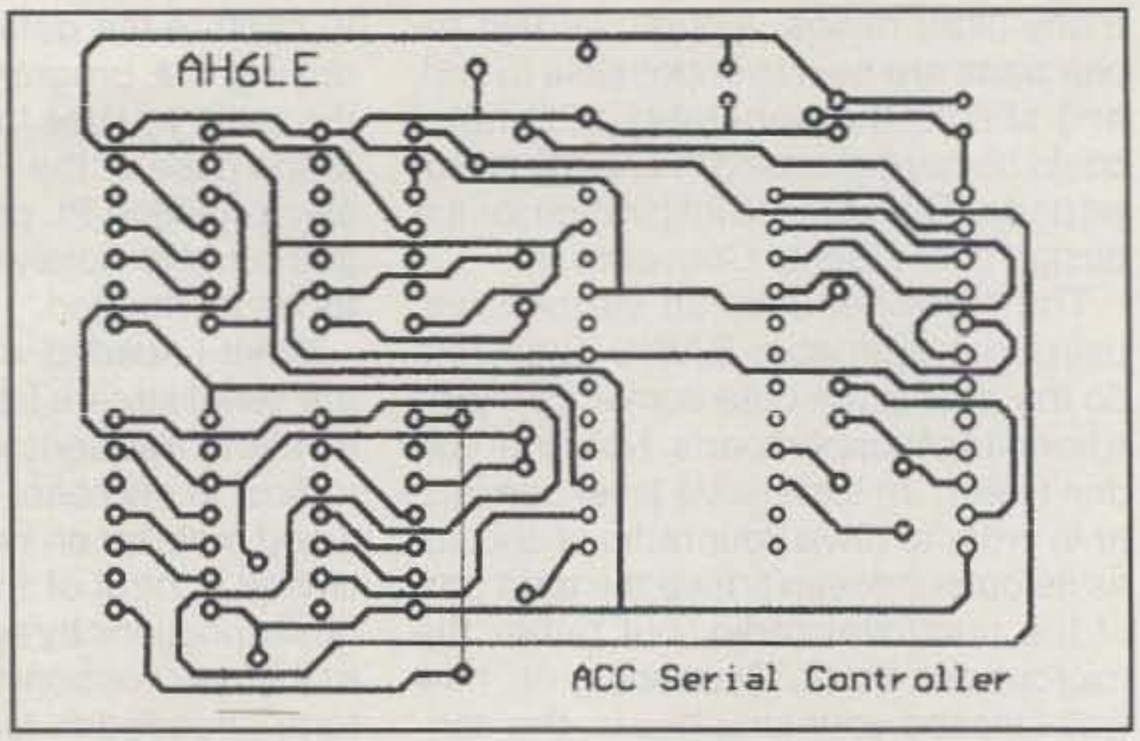


Fig. 2– Serial converter circuit board template, component side.

Fig. 3– Serial converter circuit board template, circuit trace side.

as only 16 bits are provided by these particular controllers. For the RC-850, all three registers are needed in order to recover the complete serial stream.

D1 and D2 are used to "OR" the clock signals—one from the ACC controller while it's sending its data, and the other from the Stamp, when it's reading the data stored in the shift register chain.

Software

The program can best be described as a polled loop, where the Stamp continuously looks for activity on the ACC clock signal line. Once it detects such activity, it delays for 10 milliseconds to allow the ACC controller to completely store its data in the shift register chain, jumps to the appropriate routine to read the data in from the registers, then converts it to the DTMF tones required to control the radio.

The BASIC Stamp determines which shift register to use as its source for data, depending on the state of the SELECT line. If grounded, the Stamp assumes it will be dealing with a 16-bit data stream and ignores the data currently stored in U3 and U4. If the SELECT line is not grounded, the full shift register set is used to recover the full 48 bits of the RC-850 data stream for processing.

The source code for the ACC Serial Data Converter is not in the public domain and it is not shareware. However, it is available free of charge to individual amateurs for their own personal use. As there is plenty of room left in

the ROM of the BASIC Stamp, you may want to add some features I didn't. Feel free to use my source code as a starting point.

Construction Notes

Although I designed a circuit board for the converter, it's actually simple enough to use wire-wrapping techniques or simply point-to-point wiring on a piece of perfboard. Although ready-made boards are not available, I've made the artwork for them available at my website.[2] The source code is available there as well.

There is nothing critical about construction of the converter, other than to observe polarities of the electrolytic capacitors and diodes, and IC orientation. Connection to the outside world is made via J1, which is a 10-pin single inline header.

Applied power can be anything from 6 to 35 VDC, and only 10 ma of current is needed, so you can easily steal power from the controlled radio or the ACC controller itself. I leave it up to you as to where you mount the converter, but it's small enough to fit easily within the ACC enclosure.

You will also need to install some resistance between the output of the converter and the MIC input of the radio you plan to use. A good starting point is around 10K, but this isn't critical. As long as your radio reliably accepts the data, you're in good shape.

Operation

Operation of the converter requires nothing more than hooking up power, the data and clock outputs of your ACC controller, and the output(s) to your radio(s). Don't forget a ground between the controller, converter, and radio!

If you're using the converter with an RC-850, you'll need to ground the SELECT line so the converter knows you want to recover the full 48-bit stream. For all other ACC controllers (ITC-32, RC-85/96), leave the SELECT line unconnected.

When the converter powers up, it will initialize itself and also initialize your radios by setting them to a known frequency, with PL off. This is necessary in order to make sure your radio(s) and the controller are initially synchronized. Once they are, they will remain so.

A Note About the Remote Base Radios

Most Kenwood mobile radios support being controlled by DTMF tones, injected into their MIC lines. Although I wrote the software for the radio I had on hand (a TM-732A), it should work with any radio that supports this method of control. Of course, you may have to make some minor changes to the commands used by the particular radio(s) you plan to use.

This project can give a new lease on life to an old ACC controller, whether you're using it as your main controller and want to be able to use newer radios with it or as a backup or for an additional band. Plus, it can provide an introduction to programming and using a BASIC Stamp microcomputer.

Notes

1. Parallax, Inc., 3805 Atherton Rd., #102, Rocklin, CA 95765 (phone 888-512-1024; on the web: <http://www.parallaxinc.com>. The BASIC Stamp II costs $49.95 plus shipping.

2. Circuit-board artwork appears in figs. 2 and 3 and may also be downloaded from the author's website at <http://www.ah6le.net/bs2.html>, as may source code for programming the BASIC Stamp. ■

Math's Notes

What's New And How To Use It

BY IRWIN MATH, WA2NDM

Optical Parameters

It seems that with the supposedly faster than light propagation of a laser through cesium (see W2VU's editorial in last October's *CQ*) and the response we got from the series on fiber optics and optical communications we did last year, there is a great deal of interest in the topic of light in general. As a result, I felt that it would be a good idea to try to explain a few of the more common parameters used in this branch of physics, as well as indicate where all of this fits in the spectrum.

Light, as we all know, is electromagnetic energy just like RF and microwaves except at a much higher frequency. Just how much higher can be appreciated by using the formula:

$$F = C/\lambda$$

where F = frequency (MHz), λ = wavelength (meters), and C = 299.7925 (the speed of light). Variations of this formula, by the way, are routinely used by antenna enthusiasts to calculate critical dimensions. However, you soon will see why the *exact* number, and not the typical "300" value from the *Radio Amateur's Handbook*, is used in optical calculations. If you plop 80 meters into the formula, you come out with a frequency of 3.75 MHz, or to be exact, 3.74740 MHz (not much of a difference). Any amateur "worth his/her salt" certainly should be familiar with this. (You did pass your test, didn't you?)

c/o CQ magazine

Now let's use 660 nm (nanometers), the wavelength of a typical red LED. If you do the math with C equal to 300 and λ equal to 660×10^{-9} meters, the calculated frequency works out to 454,545,454 MHz, or 454.545 THz (terahertz)! If you now replace the 300 by the exact number, F drops to 454,231,000 MHz, a difference of 314,000 MHz—quite a lot of spectrum! As you can well imagine, one does not want to lose 314 GHz due to a few decimal points. These large numbers are also why light is almost always expressed in nanometers (wavelength) rather than in frequency. It is much easier to say (and probably understand) 660 nm than 454.231 THz.

To measure optical power, watts are used just as for the lower frequencies. In a fiber-optic cable where the normal levels are low and all power is contained within the fiber, the levels are usually measured in dBmilliwatts (abbreviated dBm), which is power referenced to one milliwatt. Zero dBm is equal to 1 milliwatt, –3dBm is 0.5 milliwatt, –10dBm is 1/10 watt, and so on. It is interesting to note that microwaves are often measured by this same method. Higher powered CW lasers are also measure directly in watts, since all power essentially is contained within the narrow beam. In other applications such as light emitting from an LED, however, light radiates at a solid angle from a source, so the "field intensity" is what is important and what has to be measured. This is done in terms of watts per solid angle, or steradian. Fig. 1 shows the typical output from a fiber, a laser, and an LED.

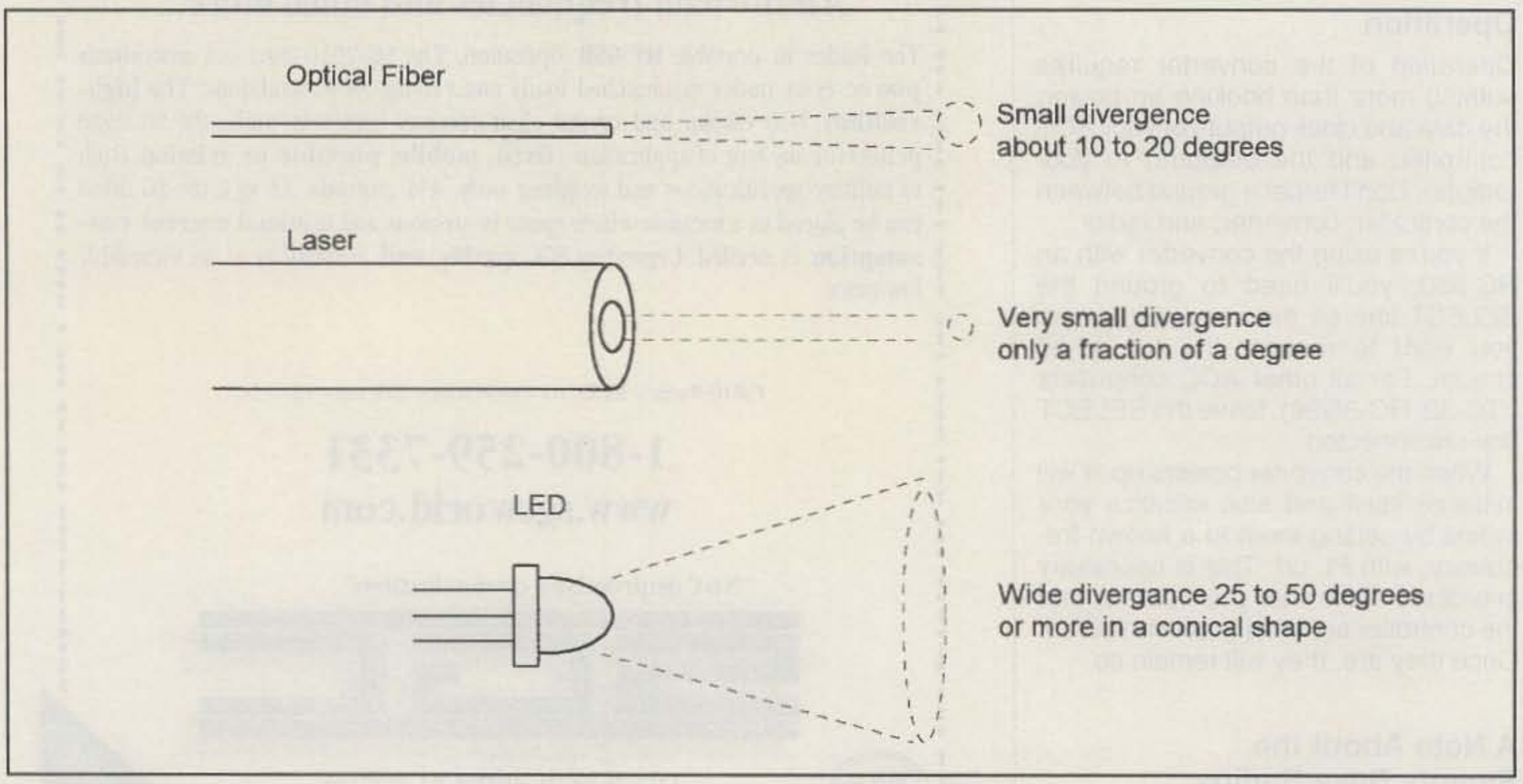


Fig. 1– Divergence from various light sources.

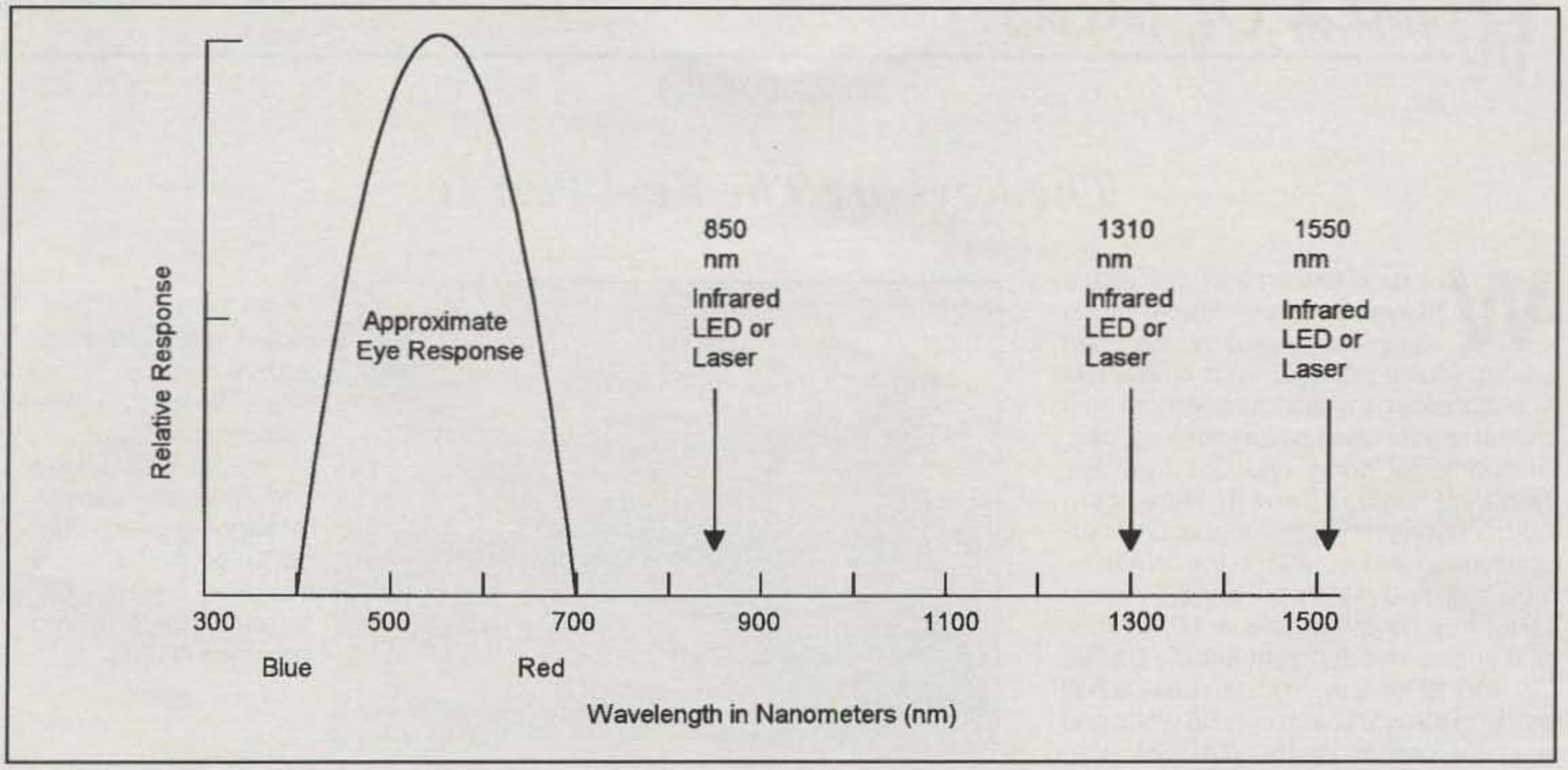


Fig. 2– Several important optical wavelengths.

Frequency, as we have seen, is not used that often, but wavelength is for convenience. It is measured in nanometers, since the wavelength of light is so much smaller than for conventional RF. A nanometer, by the way, is 10^{-9} meters. The graph in fig. 2 is the visible spectrum (in terms of the approximate response of the human eye) along with several key wavelengths used in optical communication systems. You will notice that all optical communications occur in the infra-red region. To date, light sources in the ultra-violet region have not been commercially developed.

To now see where all of this is with respect to the electromagnetic spectrum we all "know and love," refer to fig. 3. This chart shows just how far the optical spectrum is from common RF. What should be obvious is that there are literally thousands of megahertz available for all types of signal transmission, which leads me to my "soap box preaching."

In the early part of the century (the 20th) amateur radio operators played an important and very significant role in the development of conventional RF transmission. When everyone said that 200 meters and down was useless, amateurs were able to communicate over the oceans, discover all sorts of propagation modes, and even move into the VHF and UHF spectrum. A lot of this was done without sophisticated laboratories and research budgets, but with clever ingenuity. I remember hearing of experimenters removing vacuum- tube bases and connecting components directly to the leads at the glass- envelope interface to reduce capacitance and increase operating frequencies. I remember all sorts of circuitry from reflex amplifiers (first amplify at RF, then use the same device to amplify at audio). I also remember switching a single tube between a modulated oscillator (to transmit) and a super-regenerative detector (to receive) in the forerunner of the 2 meter HT.

I believe that the 200 GHz and above (the 21st century unexplored region) offers similar opportunities for the experimenter and that this is where we can "make our mark."

Frequency	Wavelength	Typical Service
DC		Direct current
10 Hz 100 Hz 1 KHz 10 KHz 100 KHz	1000 meters	Sub-Audio, AC Power | Audio | Ultra-sonic
1MHz 10 MHz 100 MHz	1 meter	160 meters | 6 meters Video
1GHz 10 GHz 100 GHz	1 centimeter	Microwaves
1THz 10 THz 100 THz	1 micrometer	Infrared Visible Light Ultra-violet
1000 THz and above		X-rays Gamma Rays Cosmic Rays

Fig. 3– An approximate idea of where everything fits.

So get busy. You don't want to look back in 2099 and say, "Why didn't I think of that?" I'll bet whatever the results, it will not be that radically different from what we now know. It will just be more clever.

73, Irwin, WA2NDM

World Of Ideas

BY DAVE INGRAM, K4TWJ

A Look At The World Around Us

The Keys are The Key! Part II

Welcome to Part II of this year's "Keys Special." Once again some real beauties are lined up for your admiration and study. Did you consider my encouragement last month to gear up with a unique key, bug, or paddle for some real CW fun? Exhilarating feeling wasn't it? Here is another suggestion to make your CW pursuits even better: Work the WARCs. You will find all three bands almost QRM-free, and the ratio of DX to U.S. stations is also more favorable on 30, 17, and 12 meters. You can have a ball working the world with only 50 watts and a dipole, or less, on the WARCs!

In past columns I have told you how Morse has helped paraplegic and/or severely handicapped individuals "talk" with others, about the University of Wisconsin's Morse Outreach Program, and of the benefits of carrying a "Use Morse" Medic Alert card. This month another true tale of Morse use warrants mention. Remember the Russian submarine that went down in the Barents Sea in mid-2000? The last rescurer-reported communication with the submarine's crew was via Morse code. That is how they learned many details of the tragedy. Power aboard the sub apparently was lost, but a crew member held in and tapped out messages on the ship's hull until the final moment. Knowing Morse truly has its merits.

I sense you are anxious to read about this month's featured keys, so let's kick things off with a brief but applicable-to-all note and then jump to the key views!

When you delve into studying keys in a big-time manner, you realize each maker has a particular style or a sort of "signature" which consciously or unconsciously becomes incorporated into his keys. Compare the way adjustment screws, bases, and fingerpieces are cut. Study the polishing and finishing of brass or chrome parts. Some are smooth and fragile; others are more coarse and rugged. Yes, it takes a critical eye to spot such differences, but you can do it, and it is also a good indication of when you are a "key connoisseur." Now let's ge to the key photos!

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

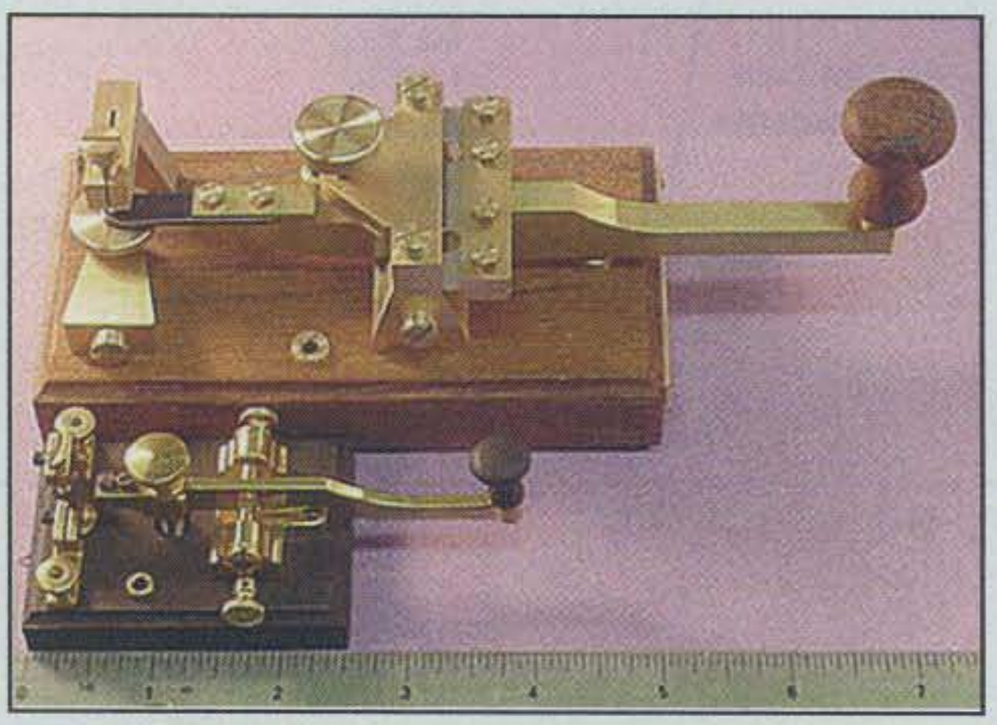


Photo 1– Full- and pint-size versions of the legendary Swedish Pump Key. Both keys are precision-made CW instruments with a long and well-balanced arm for sending great code. Both keys are also available from the Morse Express. (Photo via N1FN)

Photo 2– Smaller size version of the famous Swedish Key sports similar long arm and full complement of adjustments plus travel stop on base between fulcrum and knob. Key is shown atop its felt-lined shipping/storage case. (Photo courtesy N1FN of the Morse Express.)

Photo 3– Close-up view of Swedish Key's rear contact assembly and related adjustments. Note tiny parts and intricate components of mechanism. Very nice!

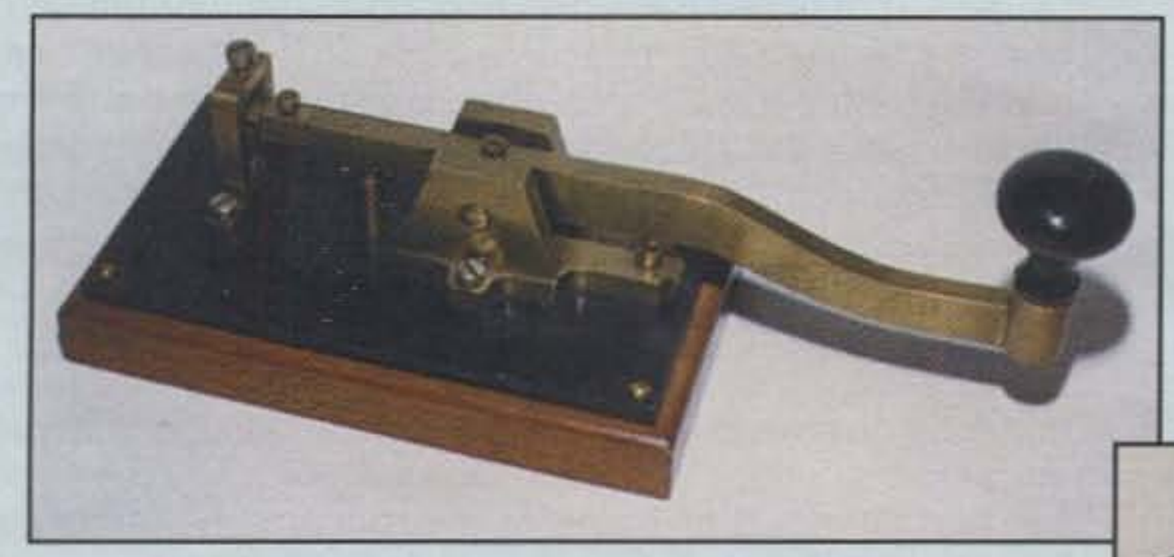


Photo 4– This German "Doorknob Key" is noticeably similar in design to the Swedish Key and is thus interesting to study. Notice, for example, its long arm with step-down curve, inverted rear contacts, and stop for the arm between the fulcrum and knob. (Photo courtesy Gil Schlehman, K9WDY) ←

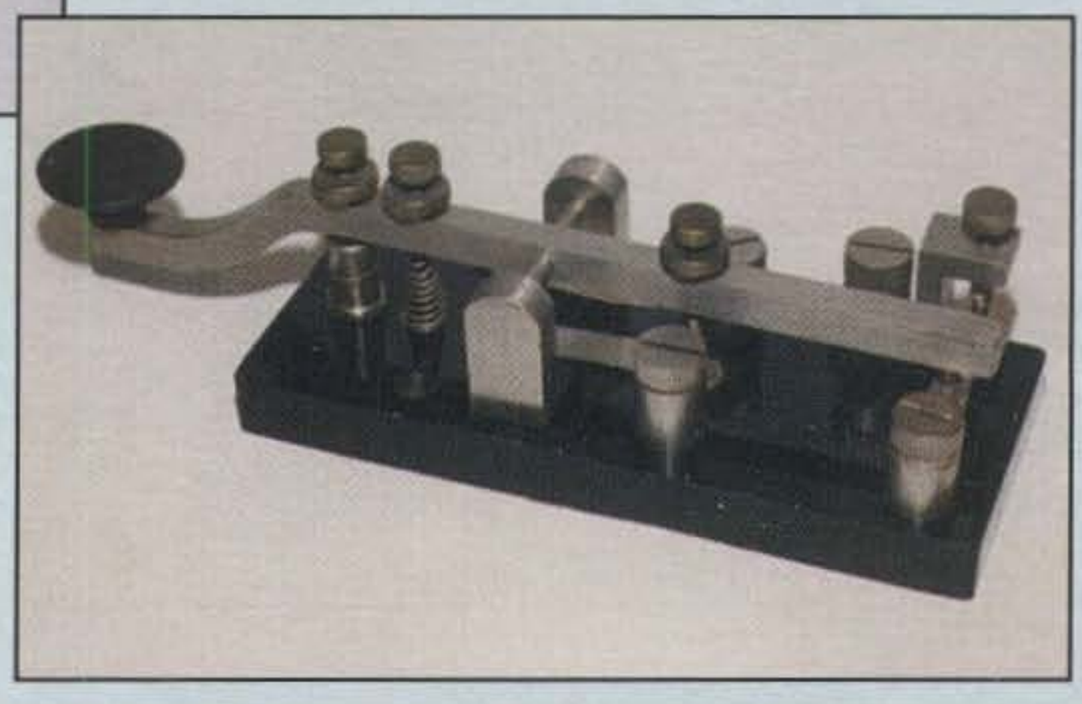


Photo 5– Taking a quite different approach to smooth operation, this J. H. Bunnell spark key has an extra long arm with most of its length at the back rather than at the knob end. Key also features large screw-on terminals which were vital during the era of fire-breathing spark rigs. (Photo courtesy Gil Schlehman, K9WDY) →

World-Class Pumpers

First in the limelight this month are two high-class pump keys you can purchase and use in your own shack right now: the famous Swedish key and its less known, but equally attractive little brother (photo 1). These two Morse marvels are produced by Lennart Pettersson in Hoverberg, Sweden. They both are outstanding CW instruments with a most distinctive feel, and they are presently available in the U.S. from N1FN of the Morse Express. The keys sport a solid-brass mechanism mounted on a teakwood base with lead inserts for "stay put" stability. They have fine-threaded adjustment screws, silver contacts, and an exceptionally long arm that helps them feel smooth and elegant during use. The larger, or original version, Swedish key also has a unique torsion bar spring at its center pivot point for balance. Its base is 4" × 2"; the key's overall size is 2.75"H × 2"W × 7.5" D.

The key's little brother measures 2.5"H × 3.5"W × 5.25"D, and it also sports a long and precisely balanced arm for a unique feel. The key is shown atop its felt-lined wooden shipping and storage box in photo 2. Look closely at the key and you will notice it has a slightly more conventional fulcrum, or center pivot point arrangement, with a "slack" or "drag" adjustment for the arm on its left side. Like "big brother," arm tension is set by a large adjustment screw pulling down on the arm between the fulcrum and rear-mounted leaf-spring-type contact. This differs from U.S.-made keys, which usually push up on the arm near its knob end.

A closer view of the key's contact assembly and tensioning screw is shown in photo 3. The silver contact is set in a flexible relay-arm-type spring, but despite possible sponginess, both keys exhibit solid and positive action. Why? Look back at photo 2, and you will see a brass stop mounted below the arm where keying contacts are usually located on U.S. keys. Both keys have that stop and both handle great. Like to add one of these classic CW delights to your own home, mobile, or portable setup? Contact Marshall Emm, N1FN, of the Morse Express, 2460 S. Moline Way, Aurora, CO 80014 (telephone 303-752-3382; order line 1-800-238-8205; or <www.MorseX.com>).

Long-Arm Keys

In an attempt to replicate the unique feel of a Swedish key, machinists in other countries built similar-style CW instruments. One example of such a key is the German "Doorknob Key" shown in photo 4. This vintage key is part of the incredible Gil Schlehman, K9WDY, collection, and your guess is as good as mine as to why it is called a Doorknob Key. Possibly its knob looks like a doorknob; possibly the whole key mounts vertically to serve as a door knocker at a ham's house. In addition to the long arm, this German-made key also sports inverted rear contacts, a pull-down tension spring, and a stop between the fulcrum and knob for the arm. Look carefully and you will see a small set screw atop the arm at the fulcrum. Prior to the days of adjustable side pinion screws, it secured the pivot bar or pin so it did not slip out the right or left side during heavy use. Needless to say, this old-time key is a collector's pride.

As shown by the J. H. Bunnell Key in photo 5, long-arm keys were also considered during the Golden Days of Spark era. There was an obvious drawback, however. Contacts on a Spark key arced like crazy during use, and the gap on a long-arm key had to be set close for a good feel. Bunnell reversed the arrangement by extending the arm's rear length, but if you visualize using such a key, you surely will agree that its feel is akin to an unbalanced hammer!

The Bunnell Spark Key has some points worthy of mention, however. Spark rigs were notorious for burning key contacts, so the Bunnell included field-replaceable/screw-off contacts. Also, the tension spring pushes up on the arm in traditional U.S. style, and the non-adjustable pivot pin is built into the arm and fulcrum assembly. This classic key is also part of the phenomenal Gil Schlehman, K9WDY, collection.

New Treats

Now returning to the new-key category, two more interesting items warrant favorable mention (photos 6 and 7). These little gems are called "Finger Tapper Keys." They are handmade by Jim Richards, KD6VDH, and are distributed by Marshall Emm, N1FN, of the

Photo 6– This classy brass and wood "Finger Tapper Pump Key" is made by KD6VDH and sold by N1FN of the Morse Express. Key sports adjustments for gap and tension, and includes a unique brass cap atop its knob. Although not visible in the photo, it also has a side nameplate with model and serial number. (Photo courtesy N1FN)

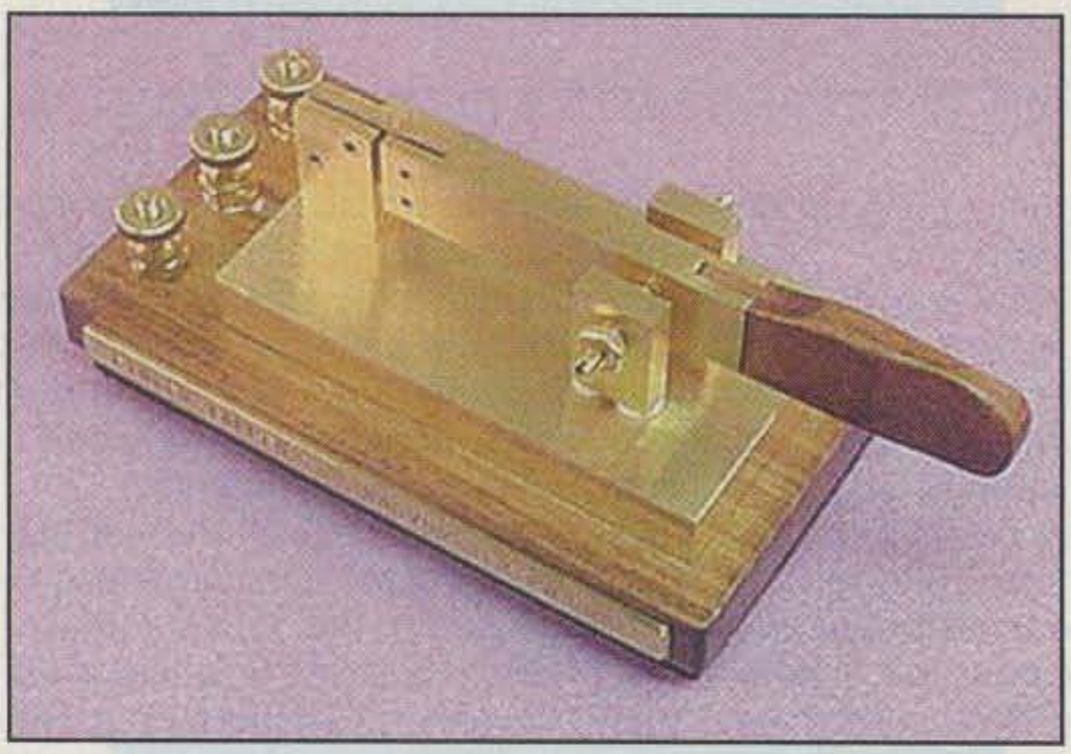


Photo 7– Many amateurs appreciate the fool-proof operation and elegant simplicity of a single-lever paddle, especially when mobiling, and this "Finger Tapper II" fills the bill in high style. It is well built, rugged, and handles well. Paddle can also be used as a sideswiper. (Photo courtesy N1FN)

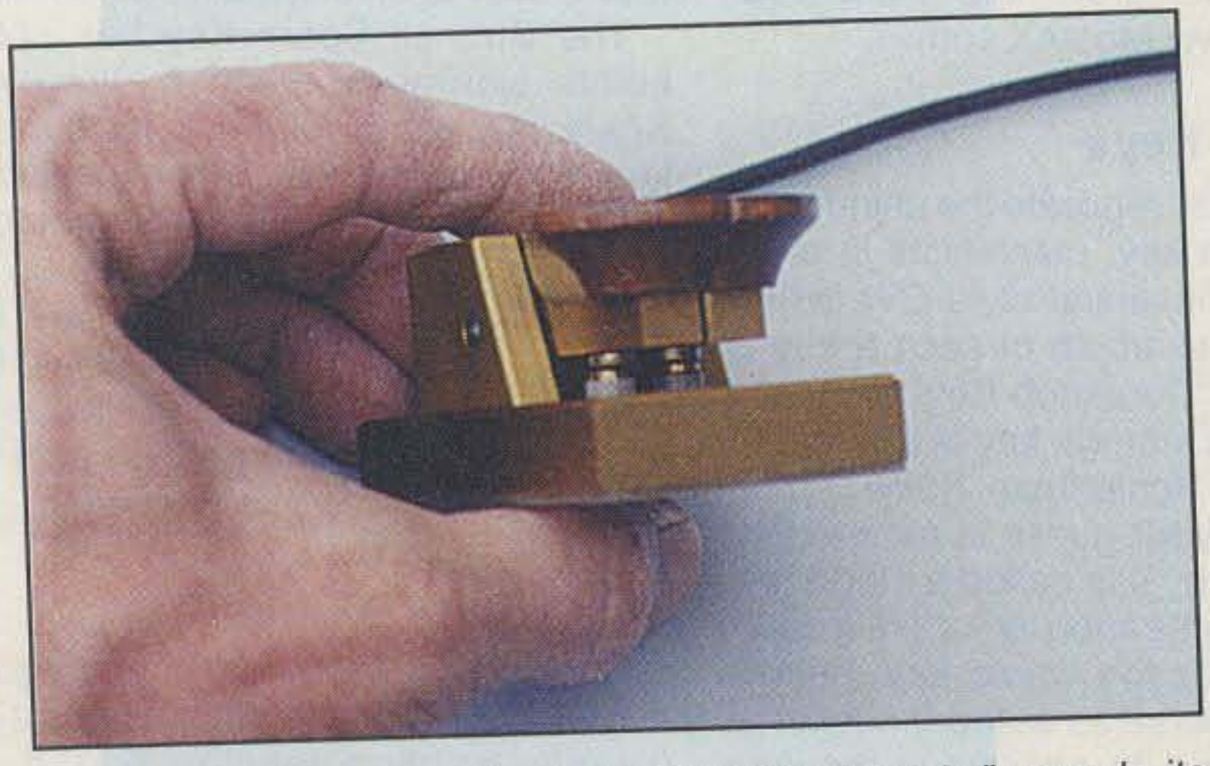


Photo 9– An underside look at DK1WE's "Twinky" reveals its split knob and dual levers with mating contacts set into teflon insulators on the base. It is a real conversation piece.

Morse Express (address and telephone number previously listed). The hand key measures 2"H × 2.75"W × 3.25"D and sports a satin-polished-brass mechanism mounted on a hardwood base with a rubberized bottom for both comfort and "stay put" operation. It has a ball- bearing race assembly at its center fulcrum, adjustments for both gap and tension, and a polished wood knob with skirt plus brass cap atop the knob for a special touch. Nice!

The paddle also has a satin-polished- brass mechanism mounted on a black- walnut base with rubberized bottom for solid footing (photo 7). The lever is supported by a high-tensile leaf spring. It pivots from the rear and has gap/travel adjustments on each side. This paddle also makes a good sideswiper or "Cootie" key. What is a sideswiper? It is a double-contact key with a horizontally-moving lever you use to manually send dots and dashes in an alternating left/right manner. It's an old-time CW technique and it's fun.

Crickets, Crickets, Crickets!

Say you have been studying photos 8 and 9 and wonder why a miniature hand key has two arms or levers? Actually, it is a twin-lever iambic paddle that just looks like a mini pumper—a Cricket key. It is quite functional, handles well, and is presently available direct from Englemar Wenk, DK1WE, Hubenring 4, 88048, Friedrichshafen, Germany. The key is all brass with a special coating to ensure it looks new for many years, and it has rear adjustments for both gap and tension on both levers. You operate it with thumb and index finger or with two fingers as I illustrate in photo 8. The concept may seem a bit awkward, but with practice it works well, especially when operating mobile or from a sleeping bag or lounge chair—times when balancing a horizontally-moving paddle is difficult. Try using a Cricket Key the next time you feel adventurous!

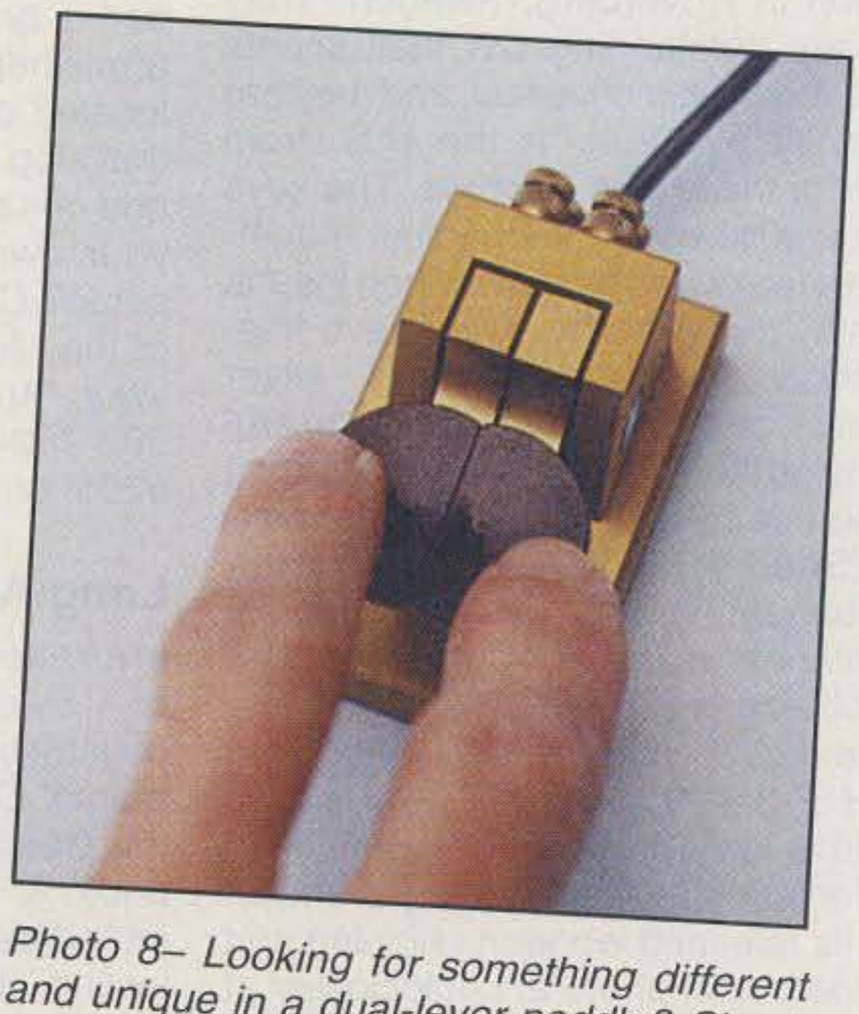


Photo 8– Looking for something different and unique in a dual-lever paddle? Check out this miniature "Twinky" Cricket Key made by Englemar Wenk, DK1WE. It measures 1.5" × 2.5" × 1.5" and has rear adjustments for both gap and tension. As I am demonstrating, you operate a Cricket Key with vertical movements of two fingers.

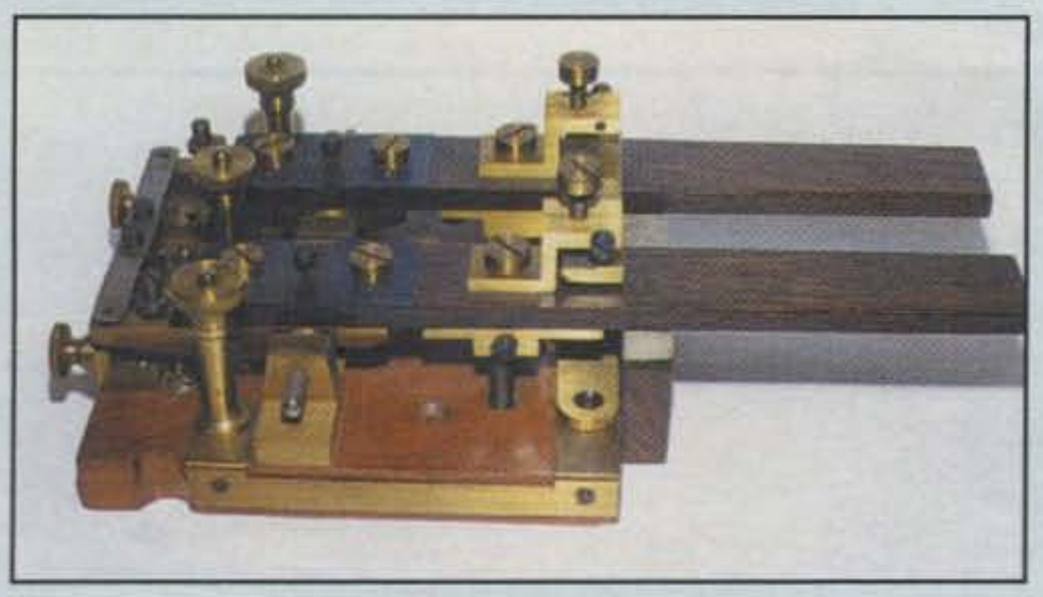


Photo 10– Walters 16k Double Pedal Key is an artistic blend of brass and wood with full adjustments for both levers. Classic key was used on intercontinental telegraph lines of eras past (see text). (Photo courtesy Gil, K9WDY)

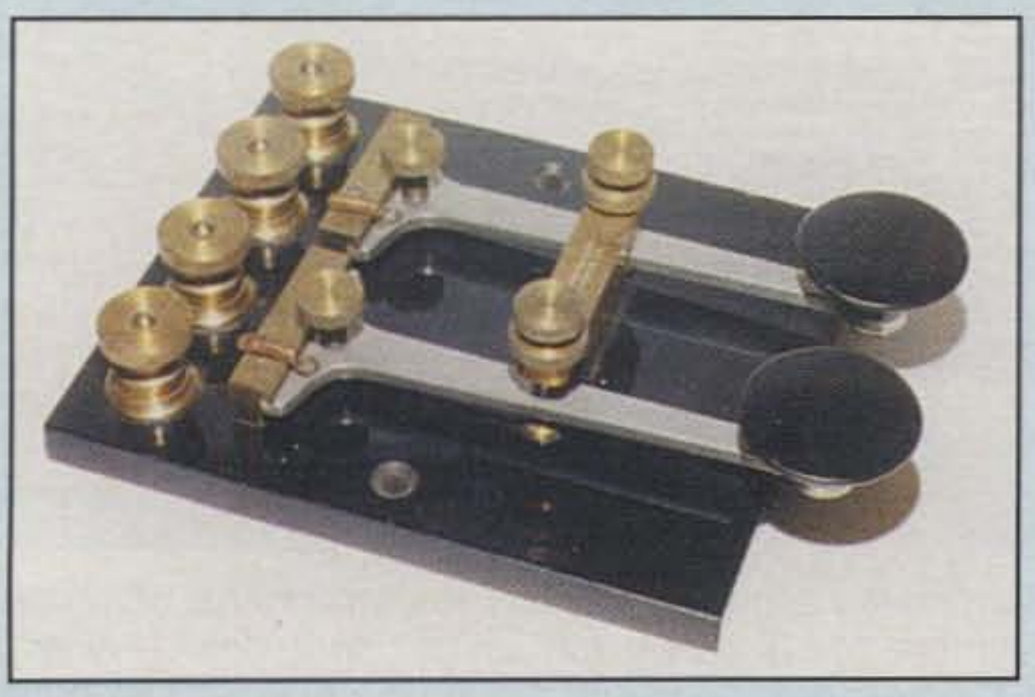


Photo 11– J. H. Bunnell also produced a neat Cricket Key which was called a "Knife Edge Cable Key." It sports separate gap and tension adjustments for each lever, and it is magnificent. (Photo courtesy Gil, K9WDY)

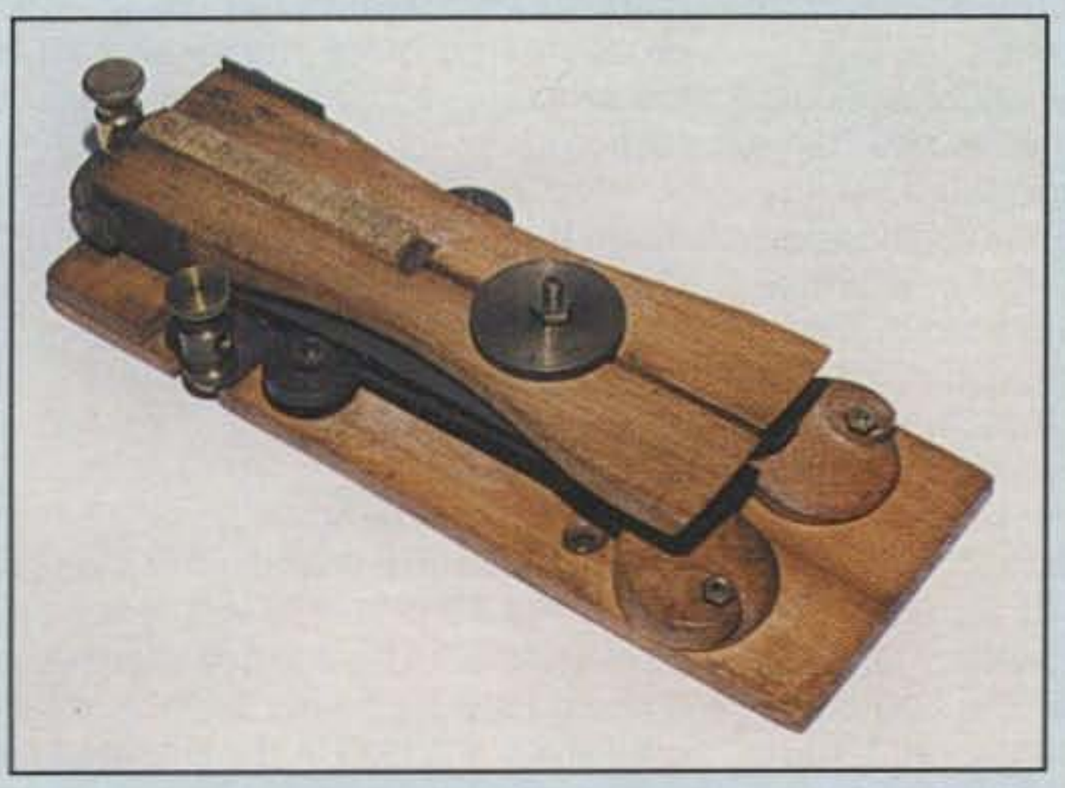


Photo 12– This F. F. Mace Company Cricket Key utilizes a leaf-spring-type mechanism positioned between its dual wooden fingerpieces and base. Two binding posts are visible on the key's left and back side. Looks like a dual-lever version of my Wild Woody WARC Key, doesn't it? (Photo courtesy Gil, K9WDY)

Show Us Your Keys

Do you use or make a special key or paddle fellow amateurs would appreciate seeing and studying? Consider this your personal invitation to contact me with photos and details for inclusion in future "Keys Special" columns. Our column has an extensive following of active and enthusiastic radio amateurs, and we all are anxious to read about you and your key(s). My mailing address is K4TWJ, 4941 Scenic View Dr., Birmingham, AL 35210.

The design and use of vertically-moving dual-lever keys, incidentally, is not new; it can be traced back many years. These keys were employed, for example, on transcontinental cable lines during the early 1900s. Why? Unlike overland telegraph lines, undersea cables were one unbelievably long length of wire without pony relays to refresh voltage levels along their length. The extreme amount of distributed capacity and resultant propagation delay associated with such long lines rendered traditional methods of sending code useless, so an alternate technique was adopted. One polarity of voltage was used for dots and opposite polarity was used for dashes. Sending dual-polarity Morse was perplexing, so dual-lever keys were devised to fill that need. Radio amateurs looked at the keys with curiosity (Can I use one to key two different contest rigs simultaneously?) until electronic keyers became popular. Then the idea of a Cricket Paddle was born. So what did early Crickets look like? Gil, K9WDY, enlightens us with a view of three magnificent examples in photos 10, 11, and 12.

The first item (photo 10) is a Walters 16K Double Pedal Key. Elaborate little gem isn't it? Each lever has its own set of contacts and a full complement of adjustments. Notice the wide copper strap interconnecting the key's contacts and cable terminals. Look carefully and you will see a rather large number of springs in the mechanism. Impressive!

The second treat is a J. H. Bunnell Knife Edge Cable Key (photo 11). The key's dual arms fit into a rear support that, along with four brass binding posts, are mounted on a black phenolic base. Adjustments at the rear of each arm or lever set tension, while adjustments in the middle of each arm set gaps. Look under the left arm and you can see one of the keys contacts. Notice this beauty from yesteryear is in pristine condition. Compliments to the key's owner, Gil, K9WDY.

The key in photo 12 may look homemade, but it was actually a production item made by the F.F. Mace Company. The key sports wooden fingerpieces and a wooden base, both well lacquered and polished. A round disk with adjustment nut between the fingerpieces sets travel of both arms simultaneously. Look closely below the left arm and you can see part of the key's mechanism which resembles leafs or arms apparently adapted from a large relay.

Conclusion

That wraps up this year's "Keys Special," gang, but it does not mean some captivating new or unknown key or paddle will not debut in an upcoming "World of Ideas" or "QRP" column. Keep following our writing! Meanwhile, please join with me in wishing Gordon Crowhurst, G4ZPY, a speedy recovery and good health after his recent bout with heart problems. As you are surely aware, Gordon and his XYL, Brenda, from their home in England produce some of the world's most exquisite keys and paddles, many of which have been featured here in past columns; some will be revisited or featured in future columns. Keep working CW, and here's hoping we meet on 30 meters one week night this month.

73, Dave, K4TWJ

Amateur Satellites

BY PHILIP CHIEN, KC4YER

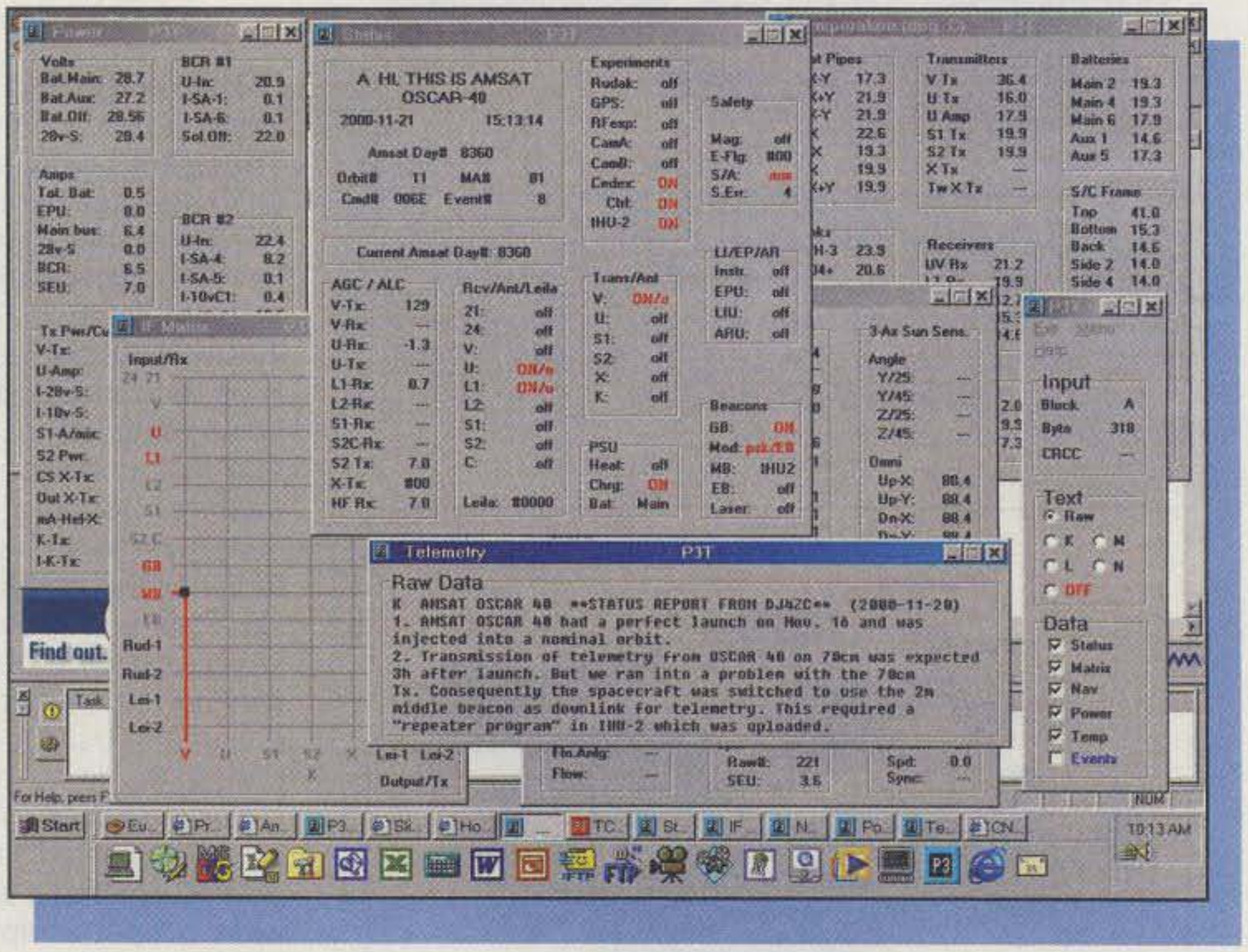
Ham Radio in Space

AO-40's "Christmas Miracle" Recovery

It took nine years from the time the Phase 3D satellite was designed until it was launched on November 16th last year and renamed AMSAT-OSCAR 40 (AO-40). Due to an unexpected long burn from AO-40's engine, it ended up in a much more elliptical orbit than planned. It currently has an apogee of 58,908 kilometers (36,604 miles) and a perigee of 364 km (226 miles). At perigee AO-40 is one of the fastest spacecraft in orbit, traveling at 10,360 meters per second. For the metrically challenged that works out to 23,170 miles per hour! This is just 7% under the Earth's escape velocity. In other words, if AO-40's engine had burned just a little bit longer, it would no longer be in orbit around the Earth and instead would become one of the solar system's handful of artificial satellites in orbit around the Sun.

The 2 meter beacon was turned on shortly after launch last November and AO-40's telemetry was eagerly copied by many amateurs around the world. However, less than a month after launch, on December 13th, as commands were sent to test the malfunctioning propulsion system, AO-40 suddenly went silent.

What happened still isn't very clear. It's certain that a major problem occurred with AO-40's propulsion system, and initially the AO-40 team thought the satellite had blown up. Fortunately, when USSPACECOM (NORAD) found AO-40 in orbit, its radar network detected only one object in space. At least it hadn't blown up into thousands of pieces of space debris. From a ham's point-of-view, however, a silent satellite is just as bad as one which is in several pieces.



Screen shot of the P3T telemetry decoding program showing status of AO-40 on November 21, 2000 (before the 2 meter transmitter shut down). Note the "Telemetry" box showing messages posted by ground controllers. The "Status" box above it shows that 432 (U) and 1296 (L1) MHz receivers are turned on and that the 145 (V) MHz transmitter is active. (Screen shots courtesy N8MH)

Recovery Efforts

The first step in a situation like this is not to panic and send a command which might make the situation worse. A set of built-in backup timers on the spacecraft were designed to run an automatic recovery program if it hadn't received any commands for a preset period. The waiting didn't help, though, so the command team went to the next backup—transmitting hard reset commands to instruct AO-40's computer to turn on a transmitter. Several permutations were tried without any success.

Tension was high with much speculation as to whether or not AO-40 had a catastrophic failure and what, if anything, could be done. Some of the speculation was pretty unlikely. For example, the odds of a micrometeoroid impact large enough to cause any damage are astronomically small. A radiation particle hitting AO-40's primary computer, with its radiation-resistant processor and memory, is also unlikely.

The miracle occurred on Christmas day, when command station Ian Ashley, ZL1AOX, in New Zealand transmitted a reset command on L-band (1296 MHz) which activated one of AO-40's two S-Band (2400 MHz) transmitters. Telemetry began to flow again and ground stations began regaining control of the satellite.

The command team is proceeding cautiously. It's almost certain that there was/is a propellant leak and that AO-40 is spinning faster than before contact was lost. Many of the telemetry sensors have failed. Clearly, too, there was a problem with the 2 meter and 70 cm transmitters, at least on their omnidirectional antennas. Thus, the situation is very dynamic and could change again by the time you read this article. *(Updates are posted on the* CQ *website <http://www.cq-amateur-radio.com> as they become available.)*

What's Ahead?

The propellant leak and other problems mean AO-40 probably will never meet all of its original design goals. However, it should still be a very capable spacecraft even if it isn't in the planned final orbit or if some of the transmitters cannot be used. One thing you can do right now is monitor the telemetry information transmitted on the satellite's S-Band beacon.

When the 2 meter beacon was active, it was extremely strong and many hams

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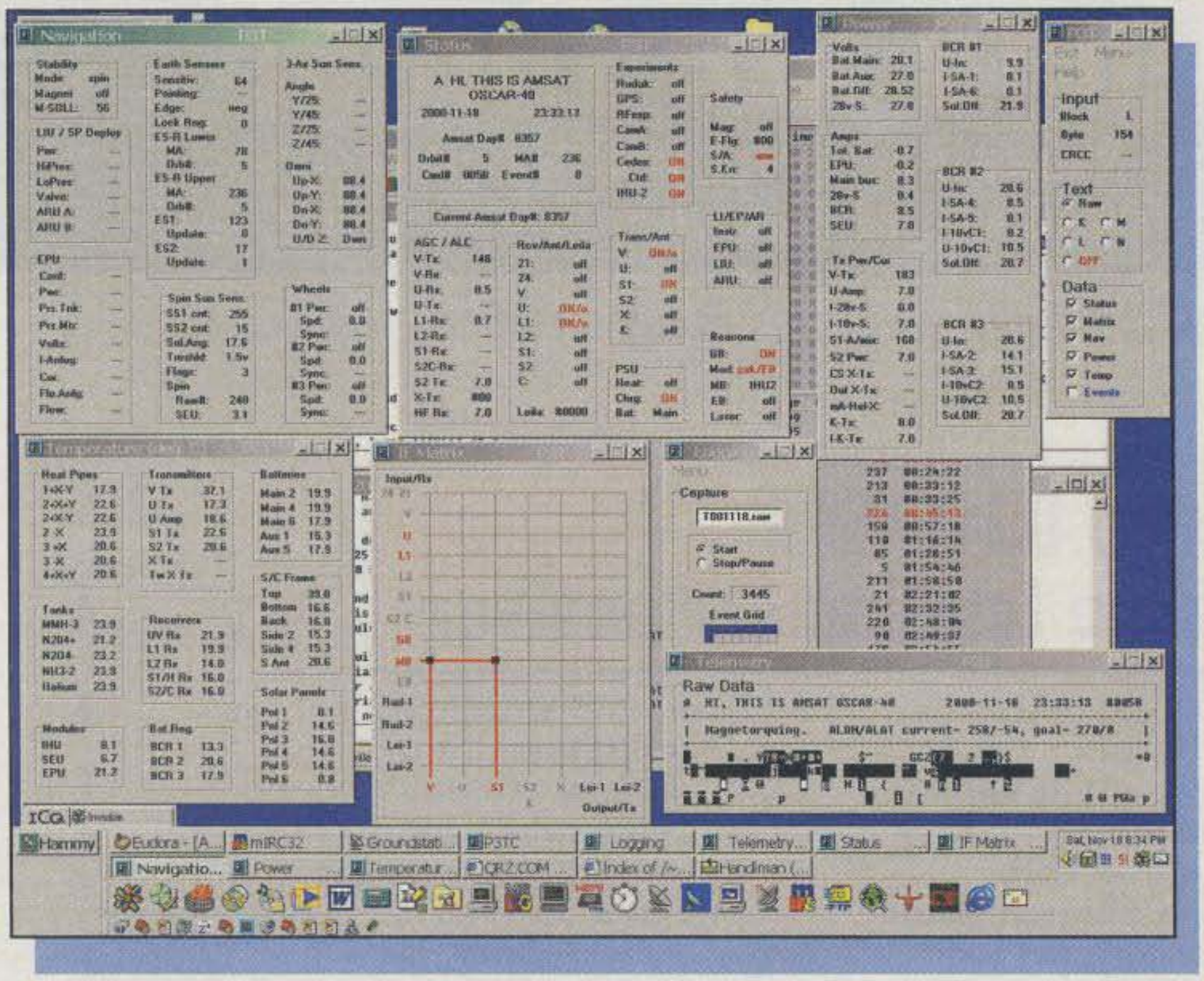

Screen shot of P3T showing the satellite's status on November 18. In this shot a look at the IF Matrix box will show you that both the 2 meter (V) and 2.4 GHz (S1) transmitters are turned on, while the satellite is receiving on the U and L1 bands (432 and 1296 MHz). Once the satellite is made available for general use, hams will be able to use these telemetry programs to see which combinations of bands are in use at any given time.

reported hearing it with handheld radios with whip antennas. The S-Band beacon is also extremely strong, but fewer hams have S-Band equipment. In addition, the S-Band transmitter uses a directional gain antenna, so it can only be heard when the antenna is pointing towards the Earth. After AO-40's recovery, many hams increased their efforts to put together S-Band receivers.

One of the most popular S-Band receivers is a modified wireless cable (MMDS) downconverter. These units are fairly easy to modify to convert the 2400 MHz ham band down to 70 cm or 2 meters. Regrettably, the initial supply of the popular Drake 2880 cable downconverters has dried up, but it is hoped alternatives will become available. A little later on in this column we'll discuss how you can listen in using someone else's receiver!

Decoding the Telemetry

AO-40's design goes back to the late 1970s when computing power was extremely expensive and modems were very slow. The decision was made to use a 400 bits per second PSK modulated beacon. Back then it meant a specialized, often home-built modem. Today inexpensive PC sound cards and home computers comparable in power to the supercomputers in use when Phase 3A was designed have made decoding AO-40's beacon almost trivial. (However, contrary to a myth spread shortly after the launch, the 400 bps PSK mode is *not* the same as or compatible with the popular PSK31 standard.)

Ground-station operator Stacey E. Mills, W4SM, generously has made his telemetry decoding program, P3T, available as freeware. He does suggest a $20 donation to AMSAT to help pay for AO-40's bills, but that's up to you. The Windows® program will display all of AO-40's telemetry and health data—literally the same information used by the satellite's control operators.

Nino Porcino, IZ8BLY, went one step further. He wrote a Windows program that listens to your sound card and demodulates the PSK signal, converting it into ASCII data. It's fairly easy to take the output from Nino's program and port it to Stacey's program for a no-TNC solution in which your $20 sound card does the job of a $400 PSK modem.

Still another real-time Windows software decoder is WPSKDEC by Christophe Mercier and Ghislain, F1HDD.

Macintosh users are not left out in the cold, as Gilbert Mackall, N3RZN, has released MacTLM to decode AO-40 telemetry. LINUX users haven't been

Programs and Websites Mentioned

P3T—Stacey Mills, W4SM: <http://www.cstone.net/~w4sm2/software2/P3t_AP.zip>
WPSKDEC—Christophe Mercier and Ghislain, F1HDD: <http://www.amsat-france.org>
MAC TLM—Gilbert Mackall, N3RZN: <http://www.goldensquare.net/MacTLM/MacTLM.sit>
p3dsetup.exe—Nino Porcino, IZ8BLY: <http://iz8bly.sysonline.it/P3D/index.htm>
p3dtelem i—Thomas Sailer, HB9JNX/AE4WA: <http://www.ife.ee.ethz.ch/~sailer/ham/p3d/>

forgotten either. Thomas Sailer, HB9JNX/AE4WA, has released open-source, multi-platform (Linux, Sparc Solaris, Win32 with DirectX) software under the GNU open-license policy.

No Radio? No Problem

What happens if you don't have an S-Band single-sideband receiver or if you don't have a ham radio license? You can still view AO-40's data on your computer, but you need to use somebody else's receiver. Several hams have started to retransmit AO-40 telemetry on the internet. You can use one of the telemetry decoding programs described above to read the data from their setups via the internet! When you do this, it's important to remember that you can only view the data when AO-40 is over *their* horizon, not yours!

Ron Parise, WA4SIR, a former astronaut, has set up a centralized telemetry server at the Goddard Spaceflight Center Amateur Radio Club. Anybody who receives AO-40 telemetry can transmit the data to the server via the internet, and the data is available in real-time to anybody who connects to the server. At press time, the hams who originally had made AO-40 telemetry available on the internet did not have S-Band receive capability. Hopefully, this will have changed by the time this reaches you. Check the Goddard ARC website <http://garc.gsfc.nasa.gov/www/> or the CQ website for updates.The data is only available when AO-40 is within range of a ground station which retransmits the telemetry it receives to the server. The ultimate goal is to get enough automated stations around the world to permit full-time telemetry for whoever wants to view it. The next logical step beyond that would be a World-Wide Web page with real-time displays that show the status of AO-40.

The telemetry server runs on a Linux machine (garc9.gsfc.nasa.gov). The server listens on UDP port 2121 for packets of AO-40 data. If you've got the capabilities to set up a real-time AO-40 telemetry station, contact Ron Parise for more details.

To receive the data you need a telemetry program that supports TCP/IP, such as P3T. Just specify the address <garc9.gsfc.nasa.gov> with Port 1024.

Stay tuned and be patient. If you're an optimist, then you can always think of the next several months as time to fine tune your ham shack for when AO-40 is declared fully operational.

Special thanks to Mark L. Hammond, N8MH, for permission to use his images.

Digital Wireless

BY STEVE STROH, N8GNJ

Packet Radio and Beyond

Packet is Dead! Long Live Packet!

Is packet radio dead? In December 2000 a posting from Bill Vodall, WA7NWP, got some discussion going on the TAPR NetSIG mailing list, with thoughtful postings from a number of different viewpoints. Bill's question—"Is packet radio dead?"—is a very good one, worthy of some serious thought and discussion. I'll be returning to this theme in future columns. For this month, here's Bill's posting, and below it, my reply. I'll have some other postings in future columns. I'd very much like to hear from readers on this topic via e-mail, especially pointing me to packet (in the most liberal possible sense of "packet"—nearly anything digital) networks that are still operating.

WA7NWP NetSIG Message

Last night I attended a meeting of a local ham club. The discussion was on linked repeaters and IRLP *[Internet Radio Linking Project—N8GNJ]*. One of the presenters made the comment, "There's a packet node also at that site. It's coming down. Packet is dead!"

We have good activity on APRS, but that's a lightweight application making the best of low-bandwidth technology. We have a few BBSes still running.

I have no clue what state the Net/ROM (ish) networks are in around the country. Probably slowly coming apart.

High-speed packet has a few bright spots. N6GN's 2 Megabit system was for sale. The 56K repeater in Ottawa is gone (?). TAPR's data radio was reported on at DCC, but no discussion (or excitement) followed.

Is it true? Is amateur digital "packet" dead? Is it time to finish up the PSK31 soundcard interface and turn off the TNCs? For $160 I can buy 802.11B and do short to medium range networking with no restrictions on content. How can we compete with that?

I have my own answers; just trying to start up a little discussion.—Bill, WA7NWP

N8GNJ NetSIG Message

Packet is dead! Long live packet!

I've made the case in various venues that it's simply not enough to "build the network." There has to be content to make it interesting to use. For better or for worse, the main source of content is now the internet. Building amateur wireless networks to provide some form of internet access is, I think, the wave of the future. For one, you learn (quickly) about TCP/IP and wireless (and why it's tricky to make it work). For another, you're involved in one of the hottest technologies of the moment—wireless internet access.

As to Bill's comment about competing with 802.11 cards, I don't think we *should* think about "competing" with them, any more than we "compete" with the telephone or cell phone, Ethernet, or the internet itself. Do we "compete" with Linux or Windows? Uh, no. We use them as tools. I feel we should do the same with 802.11: Treat it the exact same way as we treat Ethernet.

Ever notice how many laptops there are at many gatherings of hams? Wouldn't it be cool if we could network them easily? You can: 802.11 supports a peer-to-peer mode called *ad-hoc*. Imagine coming into a room, turning on your laptop, and instantly being able to access the internet (someone else in the network has a dialup connection), begin monitoring APRS (someone set up a laptop running Linux and aprsd), connect to the local packet network, send e-mail, print, etc.

Hams should be the ones *integrating* all these cool technologies. Ham radio used to include the very savviest of "techies," and I think it will again. There's *so* much great wireless stuff to play with out there. Our key advantage is that we can *play* with it. We're not just "plug and pray" users. We *understand* the technologies—or at least we *should*. That's not to mention that we have access to technologies that no one else does—the APRS network, HF, etc.

I ought to write a book— no, wait, well, er . . . um . . . never mind. Maybe one of these days . . . real soon now.—*Steve, N8GNJ*

Comments

Now for some "extended" *CQ*-only commentary on the above exchange (and again, other postings on this discussion will occur in future columns).

I'm very serious about the use of 802.11, which is a series of standards for Wireless Local Area Networks that were developed by the Institute of Electrical and Electronics Engineers (IEEE) by its standards groups. Those of you in the computer industry will be hearing a lot about 802.11. If you carry a laptop for your company, it's likely you're already hearing about 802.11, and in 2001 we'll see a lot of laptops with 802.11 capability built-in. I have asked a well-known, very knowledgeable expert on 802.11 to consider writing a primer for amateur radio use of 802.11, and specifically the ad-hoc mode that I mentioned above.

"aprsd" is short for APRS daemon, basically a background process running on a Linux (or other UNIX) system that "gates" APRS data between an APRS node and similar systems in other parts of the country (or world) via the internet. aprsd was written by Dale Heatherington, WA4DSY; more information is available at <www.wa4dsy.net/aprs/index.html#aprsservers>. The same thing can be accomplished with WinAPRS or MacAPRS, because (registered) versions of them include the Igate capability.

In the above exchange I didn't really, directly, answer Bill's question. I think the answer depends on how you define "packet." It really *does* center on the definition, because indisputably, some "packet" networks have folded for various reasons. Others are going strong. *Digital* activity in amateur radio is stronger than ever, but some would argue that's not "packet."

My philosophy of what amateur radio is, and by extension amateur radio digital/packet, has evolved considerably. Basically, I now consider amateur radio to be "hackers who do RF" (and *hackers* as used here is meant to capture the original, relatively noble meaning of *hacker*, which I differentiate from the criminally-minded "crackers"). I mean *hackers* as in non-professionals (in wireless) who are able to make existing equipment do new and different things. The term *hacker* is well understood in the computer industry; there's no equivalent term in the wireless industry for someone who accomplishes similar feats with RF. That amateur radio is "hackers who do RF" is as close as I can come to a good, working description of what place the hobby should be in the 2000s.

I think what's happening is there is a *lot* of bleeding-edge wireless experimentation going on in amateur radio, and awareness of such activities and systems isn't being made prominent enough. When pronouncements are made such as the one Bill quotes, there's ample evidence for that point of view, but not nearly as much evidence

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to the contrary—at least that's easy to find, in one place. Oops . . . shame on us for not trumpeting our successes loudly enough, and double shame on us for allowing the perception to continue in the face of numerous threats to amateur radio such as spectrum grabs.

I think amateur radio is going through an incredibly painful evolution in the early 2000s, and the "symptoms" being described—"packet" nodes being taken down because "packet is dead"—are, in fact, symptoms of that evolution. What Bill didn't mention in his posting, and the person making the "dead" statement apparently didn't know (or have any interest in finding out), was that the Seattle area is home to four operational 9600 baud repeaters—one on 2 meters, three on UHF, and one that's portable on 222 MHz. There are three others in various stages of construction or conversion. There's a very active community of users on these systems—far more activity than what could reasonably be described as "dead."

Linux Update

In my November 2000 column I said that I considered the best distribution to use for amateur radio is Debian, soon to be version 7.0. I mistyped, and because I crowded my deadline a bit too closely, I didn't catch the error. I had *meant* to say SuSE, likely to be at version 7.0 by the time you read that column, and in fact, version 7.0 is now shipping. More information on SuSE is at <www.suse.com>. This isn't to say that Debian isn't a worthy distribution of Linux, but friends I trust have highly recommended SuSE as "most suitable" for amateur radio, and I'm passing along that recommendation. I'm likely to end up trying both and will report on the results in a future column.

Green Bay Professional Packet Radio

After publication of my first "Digital Wireless" column in the September 2000 issue of *CQ,* I received a nice note from Steve Lampereur, KB9MWR, about his organization, Green Bay Professional Packet Radio. Steve said:

> I thought I'd write to you and let you know what we have been experimenting with here in Green Bay, Wisconsin. Our primary investigation has been with Part 15 *[devices that don't require a license to operate—N8GNJ]* wireless Ethernet cards. This includes modifications and full documentation of how to set up a low-cost network. We also have experimented with digital POCSAG paging, and a variety of other little side projects. Please review our on-line information and documentation and see what you think.
>
> • Using Part 15 wireless Ethernet cards for amateur radio: <http://www.qsl.net/kb9mwr/wireless.html>
>
> • Our experimentation with 900 MHz and 2.4 GHz cards: <http://www.gbonline.com/~multiplx/wireless/>
>
> Steve Lampereur, KB9MWR
> <http://www.qsl.net/kb9mwr>
> member of GBPPR research team

I found an "overall" link to GBPPR's projects at <www.qsl.net/n9zia/index.html>. Despite an inexplicable swipe at TAPR (an organization I greatly admire) on this page, I found a lot of interest here. Most important, GBPPR makes note of (at least their interpretation) the legalities of modifying Part 15 devices and operating them under Part 97 (US Amateur Radio) rules. That "detail" is noticeably absent in most other projects to modify Part 15 devices.

APRS at 9600 Baud

During a gathering of APRS users in western Washington late in 2000 I had one of those *déjà vu* moments. One of the issues discussed was modification of beaconing parameters so that high-profile digipeaters on 144.39 would not be so saturated with station beacons and allow some channel time for stations to come into the network and report their position. This is *déjà vu,* because in the early 1990s we were having the same discussion about digipeater networks.

As the discussion at the APRS gathering evolved, it became clear why this is so. One of the most highly prized aspects of APRS is that the infrastructure (digipeaters) is relatively simple, easy to maintain, and cheap. It appeared to be a genuine point of pride that most of the digipeaters in the area are "just a radio and a TNC." While some aspects of simplicity are indeed to be prized, simplicity has its downside, too, as the digipeater users are discovering. Used properly, digipeaters work reasonably well. The "used properly" aspect is that digipeaters simply don't "scale" well as usage increases. I remember that extensive thought was given to this, and my recollection is that there's a certain point at which a digipeater-based system collapses. In heavily congested digipeater systems the digipeater holds off its transmissions because it's hearing too many transmissions. User radios, which generally are not as high up as digipeaters and don't hear as much, keep on sending packets to the digipeater, not realizing that it's already overwhelmed with

signals. These transmissions contribute to the "din" the digipeater hears, and the system approaches the point of congestive collapse so nothing gets through.

One answer to this problem is to begin to migrate from 144.39 and 1200 baud. There's been some discussion of such a migration, and the possibility seems a bit of a stretch for most APRS users.

In theory, it would be possible for an area to agree to a local "deviation" from 144.39 and move local users to another frequency, leaving 144.39 for transient users. The problem is that such a move "breaks" the sharing of position information with all APRS users in an area. Also, the use of 9600 baud equipment has been proposed—not a bad idea, since the Kenwood "APRS" radios include 9600 baud capability as standard. Partially as an experiment, and partially as a rejoinder to a statement made to the effect that it would be many years before APRS was used on 9600, Bill, WA7NWP, got APRS working on 9600 baud before the end of the millennium.

Bill set up an "aprsd" station with the TNC and radio being 9600 baud gear, operating on the 441.825 9600 baud bit-regen repeater in the Seattle area. On the "back end," Bill simply hooked up his internet connection, and now any APRS traffic on the 441.825 repeater is just additional Igate traffic from and to the Seattle area.

Bill's alias is "aprsdRDM" (he lives in Redmond, Washington), and on the air this system is WA7NWP-2.

One key advantage of operating APRS on a 9600 baud repeater is that there aren't any bandwidth constraints; it can take the "full feed" of the Igate system, including international traffic.

Bill's work illustrates one of my key definitions of "Advanced Amateur Radio": He is having fun learning and experimenting.

News from TAPR

One problem at the moment is that there hasn't been much news from TAPR. One of the casualties of the recent reorganization of TAPR's board of directors is there's been a distinct lack of communications about what is going on in TAPR, which the group is working to address. It was revealed on TAPR's "Organizational" mailing list (tapr-org) that Barry McLarnon, VE3JF, has also resigned from the TAPR board of directors, leaving a total of two vacancies with the resignation in late 2000 of Greg Jones, WD5IVD.

As part of the NetSIG message thread mentioned above, John Ackermann, N8UR, TAPR president, had this to say about a future TAPR project:

On the SDR *[Software Defined Radio—N8GNJ]* front, TAPR has committed to help make SDR kits available to the ham community, and to support those who want to develop code to run on these engines. We hope to announce our first kit shortly, and we already host a DSP mailing list where coders have been discussing software modem design techniques for quite a while. TAPR sees the Software Defined Radio as a perfect opportunity for our "enabling technology" philosophy; by making general-purpose SDR engines, and the tools to program them, available, we enable hams to once again become experimenters on the leading edge of communications technology.

New Toys at N8GNJ

A new Kenwood TH-D7AG has come into my life, and the first thing I noticed about it was that it's the first radio I've ever used where I had to read the manual to figure out how to set the squelch. However, it's certainly fun and interesting. Another toy that will be fun to use with the TH-D7AG at some point is my new Palm IIIc (color screen, 8 MB RAM, charges while in the synch cradle). Wireless capability on Palm devices is still evolving, and I prized the utility of color on the Palm IIIc and the price was reasonable. I fully expect to upgrade again in a year or so to a device that includes better wireless capability than what is available currently. Next up, a GPS receiver . . .

<www.packetradio.com>

Buck Rogers, K4ABT, *CQ*'s former packet radio columnist, is still actively maintaining his packet "encyclopedia" at <www.packetradio.com>. It's one of my primary sources of reference when I'm working with packet gear, and Buck offers many unique products on the site, including a number of commercial-grade two-way radios pre-modified for packet use.

Major Events on My Calendar

The Dayton Hamvention, May 18–20, 2001. Attending Dayton annually has become a habit I'm loath to break, even though it now means a plane trip from Seattle rather than a reasonable drive down from Cleveland as it used to be for me years ago. This will be my first Dayton as a *CQ* columnist, and I hope to see and report on new and exciting digital products being shown there, making good use of my digital camera. I plan to be around the TAPR and *CQ* booths for at least part of my time there. A major event, as always, during Dayton is the TAPR PacketBash dinner, and of course the TAPR and other digital forums.

As always, comments and questions on these and other topics are welcome.

73, Steve, N8GNJ

Computers and Internet

Ham Radio's Online Connection

BY DON ROTOLO, N2IRZ

Networking, but Not Packet

If you have more than one computer in your house, this is for you. For my first column of the third millennium, we'll have a look at some of the advantages of setting up a computer network in your house, some details on the hardware and software you'll need, and a few tips on installation.

Most hams have at least one computer in their house or shack. In addition to using these computers for word processing and surfing the internet, we also use them for logging contacts, controlling our radios, and even for making contacts in the various data modes, such as CW, packet, and PSK31.

Nowadays, we often have more than one computer, with the new one for the kid's games and the older one(s) relegated to the shack. Wouldn't it be nice if we could connect those computers together? That way we wouldn't be tied to using a specific machine for a specific task. The main advantage of interconnecting computers is the ability to share files and peripherals. For example, a printer can be used by anyone on the network. One computer—the one with the huge hard disk—can be designated as the file server, where all the large files are kept. That allows the old machine, with a 120 MB hard disk, to remain in service for a few more years. Perhaps the shack PC can be controlled from a warm spot in the family room. Don't forget the excitement of multiplayer games!

This sharing of peripherals can be taken a step further to include modems and other devices. Perhaps you have a DSL (digital subscriber line) line, or like me, your cable TV company has just started offering cable modems for internet access. Having megabit per second (MB/s) access is quite a lot of fun, but imagine if you could share that connection with the rest of the house.

Here are the essentials of how to do it: If you're really interested, read the Windows™ documentation, or buy a book. We're going to look at the relatively simple peer-to-peer networks, which are perfect for small networks. Larger networks need a client-server architecture, but these are way too complex and expensive for most homes.

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Hardware

Let's look at hardware. First, the interface cards: Each computer on the network needs a *Network Interface Card,* or NIC (pronounced "nick"). These cost anywhere from $8 to over $50 for the really good ones and support data rates of 10 or 100 MB/s (or both!). For now, I recommend getting the $15 kind, which supports 10 MB/s—cheap enough, and can be upgraded later. Get NICs that have a "10BaseT" (RJ-45) connector, shown in fig. 1, which is a wide (8-pin) telephone connector.

Wire comes in different types (duh!), but for computer "Ethernet" networks, two styles really dominate: RG-58 and UTP. RG-58, or ThinNet, is well known by hams as thin coaxial antenna wire, often used for mobile antennas, and sup-

Fig. 1– A male (left) and female (right) RJ-45 connector. This is the same connector as used in many newer radios for the microphone connection. Note the "snagless" boot on the male connector, which prevents the release tab from snagging on objects as you pull the wire through walls. For computer networking be sure to use wire, connectors, and accessories certified to meet the Category 5 standard.

Fig. 2– An 8-port 10BaseT hub used by the author. This hub cost only $55 and has been in use for three years. At the rear there are eight RJ-45 jacks. On the front panel, shown, there is a BNC connector for ThinNet and a 15-pin Sub-D AUI connector. These two extra connectors allow older networking equipment to connect into the hub. Also note the eight "Link Status" LEDs, one for each port, and the power jack.

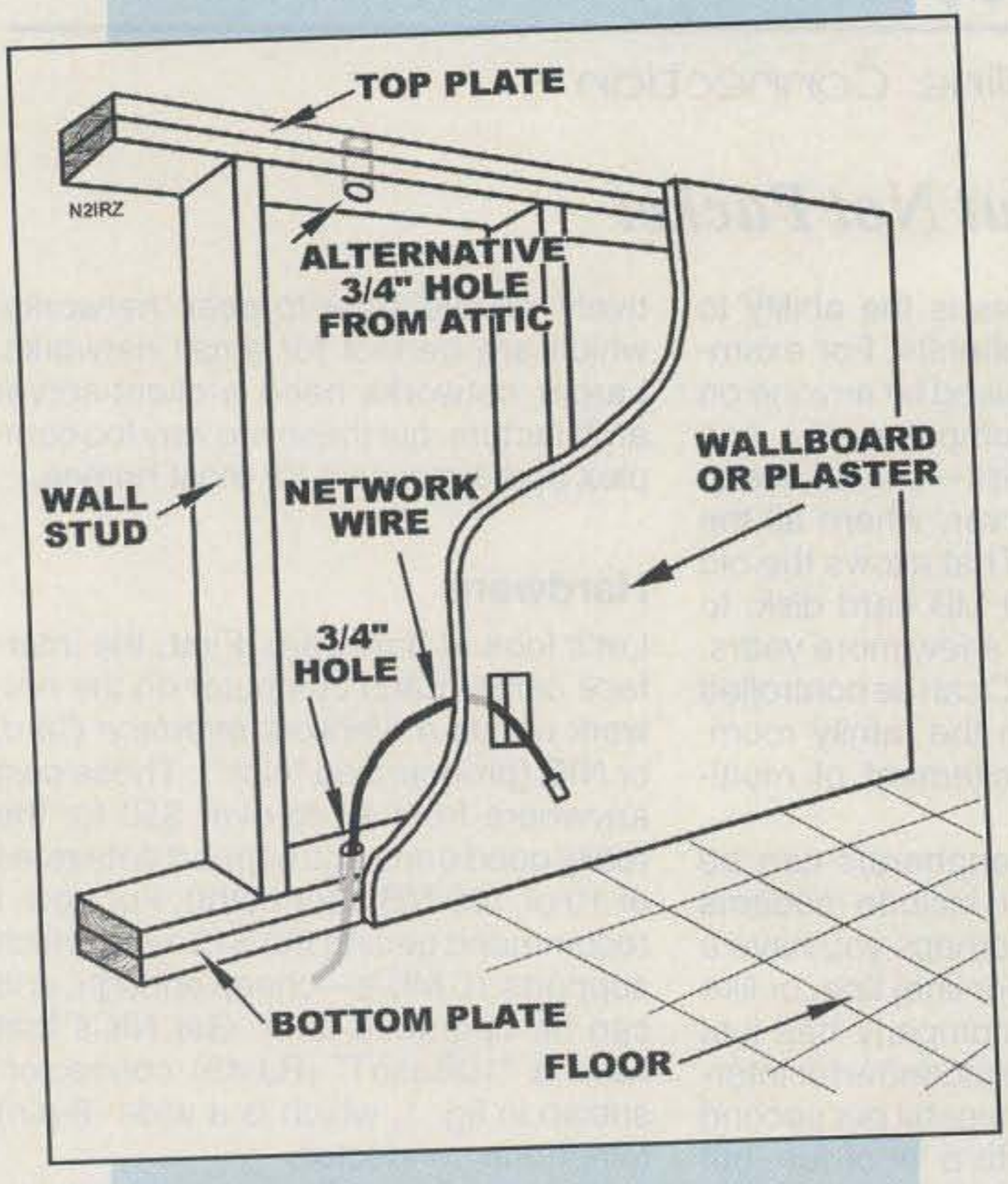


Fig. 3– Typical stud-frame construction. Running a new wire inside a wall isn't as hard as it looks. Cut a small hole into the wallboard (later covered by a wall plate), and drill a hole into the bottom or top plate from the basement or attic. Use a coat hanger to fish the new wire through both holes. See the text for important safety notes.

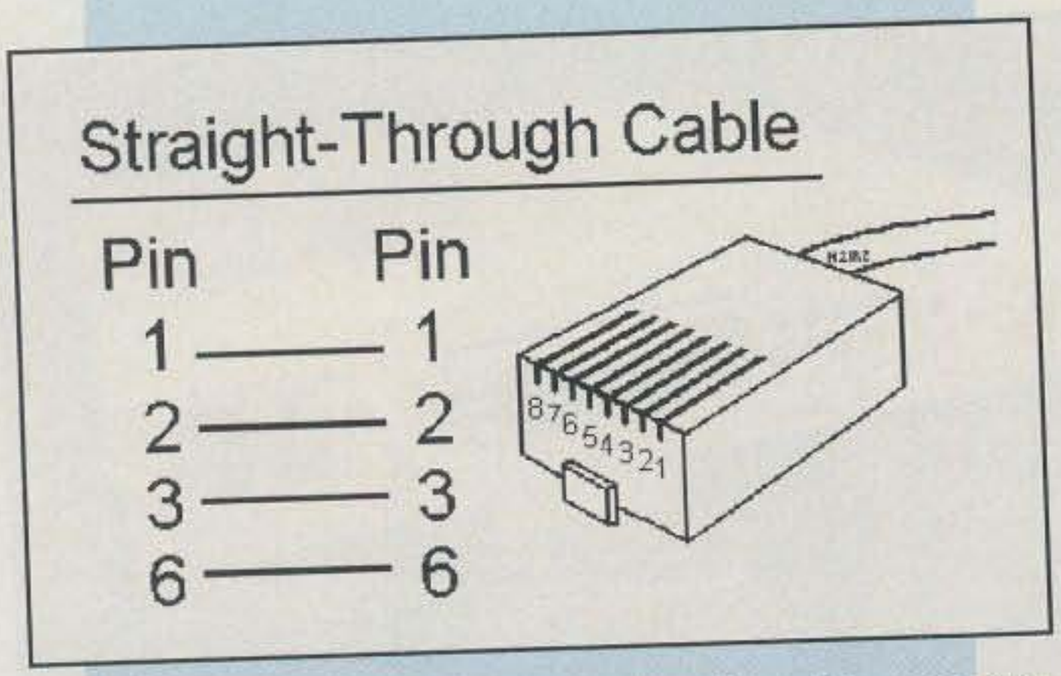


Fig. 4– Proper 10BaseT/RJ-45 cable wiring assignments. When using a hub, use this wiring configuration. Note that four of the wires are not assigned and can be used for your regular telephone line, or other purposes, if you like.

ports the 10Base2 computer network standard. UTP, or *Unshielded Twisted Pair,* is four twisted pairs of 22 or 24 gauge wire, and it supports the 10BaseT and 100BaseT standards. Modern networks almost exclusively use UTP, which can be run for up to 300 feet.

In order to carry data at 10 or 100 MB/s, the wire and connectors must meet a stringent standard, known as *Category 5.* When buying wire, connectors, wall jacks, and other accessories, make sure they meet the Cat 5 standard. Don't skimp here. Regular Cat 5 cable has PVC outer insulation, but you can also get it with Teflon® insulation (known as Plenum grade), which allows you to run it inside heating and air-conditioning ducts, since Teflon doesn't burn easily. Building codes may require plenum cable inside walls, as well. Check first.

To connect all these computers together, you need to use a *hub* or a *switch.* Both are small devices into which the wires from the computer NICs are connected, and come in 10 MB/s and 100 MB/s types, sometimes supporting both speeds. The difference is that with a hub, the 10 MB/s data capacity is shared with all the computers on the network, while a switch speaks to each computer separately, allowing the full speed for each computer. Again, I recommend a relatively inexpensive hub (fig. 2), with five to eight ports, as this will perform adequately in a home network for about $50.

If you want to share a cable, ISDN, or DSL line (so-called *broadband* line) on your network, you need some kind of security so others cannot access your network. Using a *router* ensures that others don't have access to your network unless you specifically permit it. This security function is also called a *firewall* and is essential if you're connected to the outside world. A good quality router, which looks to the broadband line like a single computer with no file or peripheral sharing enabled, costs about $100 or so. The other side of the router is connected into your network, where all the computers have access to it. You can also get routers with hubs built in, as well as dial-up routers with a built-in 56k modem, for plain old dial-up connections. The firewall can also be done in software, requiring a computer with two NICs, but hardware routers are so reasonably priced that they are a better solution.

Software

Now we have to think about software, since the hardware is useless without it. Networking software is sold by Novell, IBM, and others. However, if you're running Microsoft Windows version 3.11 or later, you already have a simple peer-to-peer network application: Microsoft Networks (also called Windows for Workgroups).

The main disadvantage of Microsoft Networks is its relative simplicity, which allows only file, printer, and faxmodem sharing. If you want to share a data modem, TNC, or other device, you'll need to find software or hardware (such as a router!) for that task. However, it is really simple to set up and maintain, supports a wide variety of hardware and remote dial-up access, and best of all, it's included with Windows for free!

While other networking software can support advanced applications better, these networks are quite complex to set up and maintain. Of course, if you take this as a learning experience and really figure out how to care for and feed a Novell 4.x network, you can get a new job with a six-figure salary just about anywhere in the country.

I would be negligent if I didn't mention three alternatives to running a wired network: wireless, phone wire, and power-line devices. Wireless uses Part 15 radios, phone-wire devices

use the existing telephone wires, and the power-line devices use your house's AC wiring. These are not any less costly, nor are they fast, and there are concerns about the security of your data for wireless and power-line devices. However, if you cannot or will not run new wires, they remain an option. For now, though, I'll assume you're going to use a set of dedicated wires for your home network. Thus, let's look at how to get the wiring installed in a safe and professional-looking manner.

Wiring

Running the wires is easier than it sounds. I'll assume you live in a typical American house, which is wood-frame with only two stories and a basement or crawlspace beneath. If you live in Europe, you already know about running wires in solid masonry walls (you can't), and if you live in an apartment, you might need to develop some alternative strategies.

Plan where the computers and hub (and/or switch/router) will go. The hub should be centrally located, to minimize wire runs, and near a source of AC power. You can use more than one hub if it makes it easier; simply connect them together with another wire.

Before you start, remember some safety rules: Drills and AC power wiring or water pipes inside walls don't coexist well. Make sure you know what you're drilling or cutting into. Keep all networking wires well away from AC power wiring, and never, ever allow them into the same enclosure or wall box. Contact a qualified electrician if you're not sure; they do this for a living, and your life might be worth it.

Pick out where the Cat 5 wall plate with an RJ-45 socket in it will go, avoiding any wood studs or other obstacles in the wall. Drill or cut a hole (as large as possible, but small enough to be covered by the wall plate—say, 2" by 3") into the gypsum wallboard or plaster wall. Now locate the spot beneath (or above, from the attic) the center of the wall and drill a 3/4" hole through the "plate" into the wall cavity (see fig. 3).

Push an electrician's fish tape (or a straightened coat hanger) through the 3/4" hole up to the cutout in the wallboard. Using your hand, or another piece of wire, snag the fish tape and pull it out the hole in the wall. Tape the UTP to the end and gently pull it back through and into the basement. From the attic, you might try just feeding the UTP into the 3/4" hole and letting it drop down to the hole in the wall, and snag it directly. Pull the wire all the way to the hub, and leave a few feet of slack.

Finish by installing the RJ-45 connectors onto the wire (or buy cable with the ends already attached—a good idea, in my book) and mounting the wall plates. Plug all the wires into the hub and connect the power.

The Last Bit

Finally, you need to tell each computer that it needs to consider the network: In Windows 95 and later, networking can be plug-n-play, or you can click on the Network icon in the Control Panel. In Windows 3.11, run Setup in the Windows folder to set up the Network. It is best to use the drivers supplied with your NIC, but Windows supports many common types as well.

That's really all there is to it. Each computer sets the permissions for file and printer sharing that others in the network have. I suggest playing with it a while before getting into the advanced features, such as remote dial-up access (which lets you dial into your network from afar). I'll remind you again, too, that if your network is connected to the outside world, such as via a DSL or cable modem, you *must* have a hardware or software firewall to protect yourself from unwanted intrusions.

That's all the space we have this time. In the June issue we will talk about how to build your own new computer, including some thoughts about selecting the parts. Also, a note of thanks to everyone who has written with questions, comments, suggestions, and ideas for future columns. For the rest of you, please remember that this is a two-way, fully interactive column. Don't hesitate to write to me; it's always a treat to hear from readers. Until next time . . .

73, Don, N2IRZ

Resources

Just about any question you may have about networking is answered at the Practically Networking site, <http://www.practicallynetworked.com/sharing/sharingcable.htm>.

Linksys makes hardware for networking, and its small routers and hubs are of good quality and are reasonably priced. The company's networking tutorial at <http://www.linksys.com/faqs/default.asp?fqid=15> is worth a visit.

My hub is made by Addtron. It was very inexpensive and works well. Visit them at <http://www.addtron.com>.

Netgear is yet another networking hardware supplier that comes highly recommended: <http://www.netgear.com>.

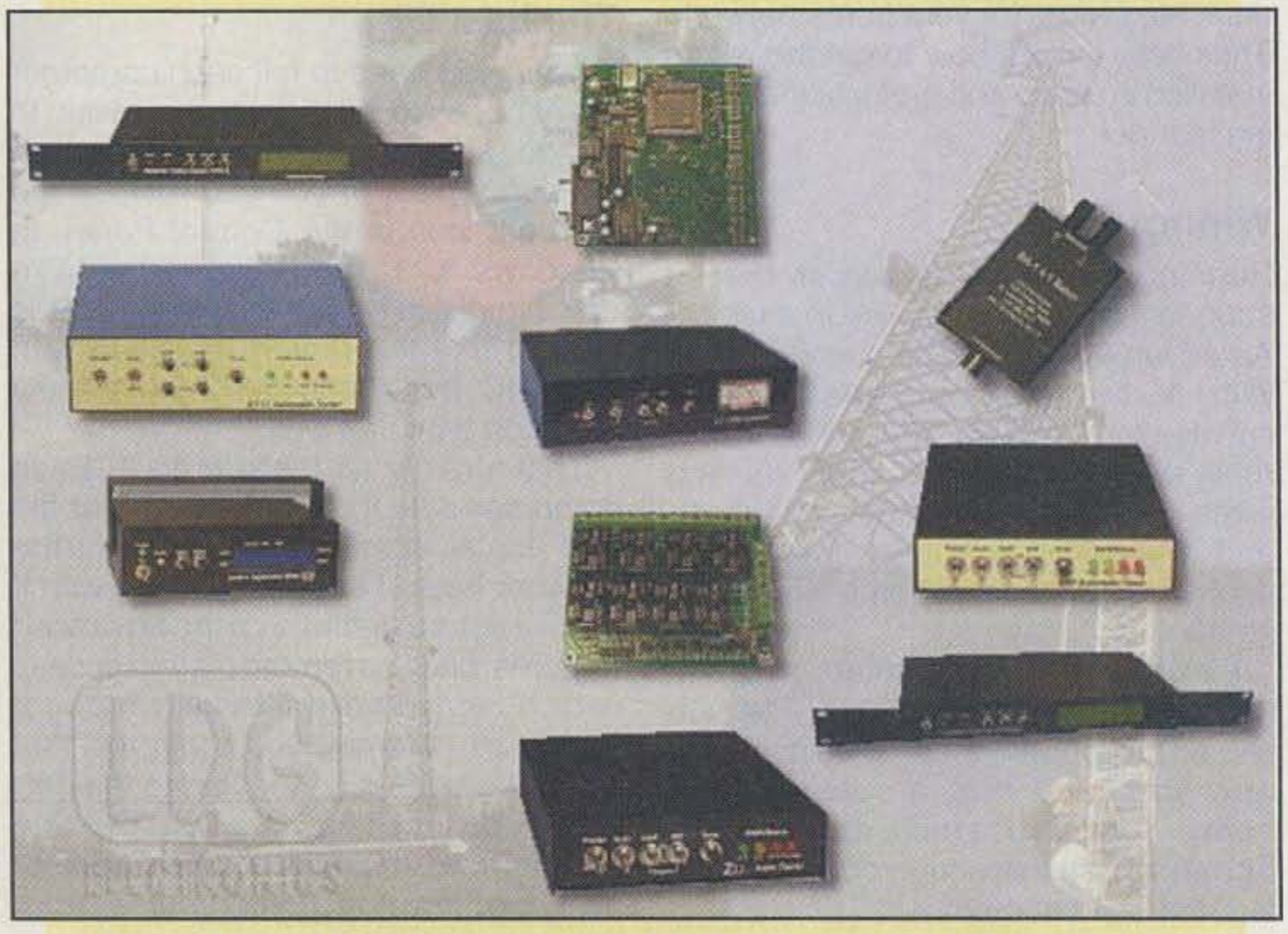
What's New

BY KARL T. THURBER, JR., W8FX

A New Column for A New Century

Super Spring Goodies

Once again the refreshing scent of spring soon will be in the air. With that invigorating thought in mind, we'll first focus on some new radio accessories while saving room for new antennas, portable and mobile goodies, software, and internet happenings before closing out the column. Ready?



A check of the LDG Electronics website shows an amazing variety in the microcomputer- and radio-based products currently offered by Dwayne Kincaid, WD8OYG. A sampling of these products is displayed here. Details and pricing are available on the LDG Electronics website at <http://www.ldgelectronics.com>.

Accessories for The Radio Shack

Idiom Press: Keyers and Rotor Enhancement. Idiom Press is a part-time business operated by Robert C. Locher, Jr., W9KNI, since 1983. In fact, thousands of Logikey CW keyers and kits from Idiom Press have found their way to CW operators worldwide.

Bob offers the Logikey K-3, a fully iambic keyer that can emulate most other keyers. The keyer sports six active messages plus 12 "banked" messages, and it's designed to work perfectly with single-lever, non-iambic paddles. The keyer works over the range 5 to 60 wpm and has adjustable weighting and a sidetone monitor. It's $129.95 plus $7 domestic s&h. The K-3 also is offered as a partial kit, the Super CMOS III Keyer, at $58 postpaid. The HK-3 cable set is available for either keyer.

The legacy continues with the new Rotor-EZ enhancement, which gives hands-free rotor control plus RS-232 communications for the Ham-II, Ham-III, Ham-IV, and all Tailtwister rotors. Rotor-EZ offers a unique Auto-Point feature, which is claimed to be easier to use and more accurate than the "preset" capability offered by competitive rotors and rotor control devices.

The new enhancement also protects the rotor with electronic end stops, and it offers a provision for coasting and start-up jam prevention. Full RS-232 control is an option that allows full compatibility with popular logging and contesting programs.

Rotor-EZ is offered as a circuit- board kit that you add to your rotor control unit; it even provides full support for "offset" antennas that are set at 90 degrees to the main antenna. The Rotor-EZ basic kit is $99.95; the Rotor-EZ kit including RS232 control is $129.95 plus $5 domestic s&h.

For more info, contact Idiom Press, P.O. Box 1025, Geyserville, CA 95441 (e-mail: <sales@idiompress.com>; web: <http://www.idiompress.com>).

Note: The Idiom Press website also offers a tutorial that presents the case against simply relying on the built-in Morse keyers many modern transceivers have onboard. Check it out.

Repeater Maker with Morse Code ID. Midian Electronics has introduced an interesting product that lets you convert two mobile radios into a low-cost repeater with CW ID. The new RM-1 is a cost-effective "Repeater Maker" with built-in Morse Code station ID. The RM-1 incorporates a DTMF decoder to provide remote access and closure. Other standard features include a courtesy tone, PTT time-out timer, two programmable messages or station IDs, and remote enabling/disabling of the repeater.

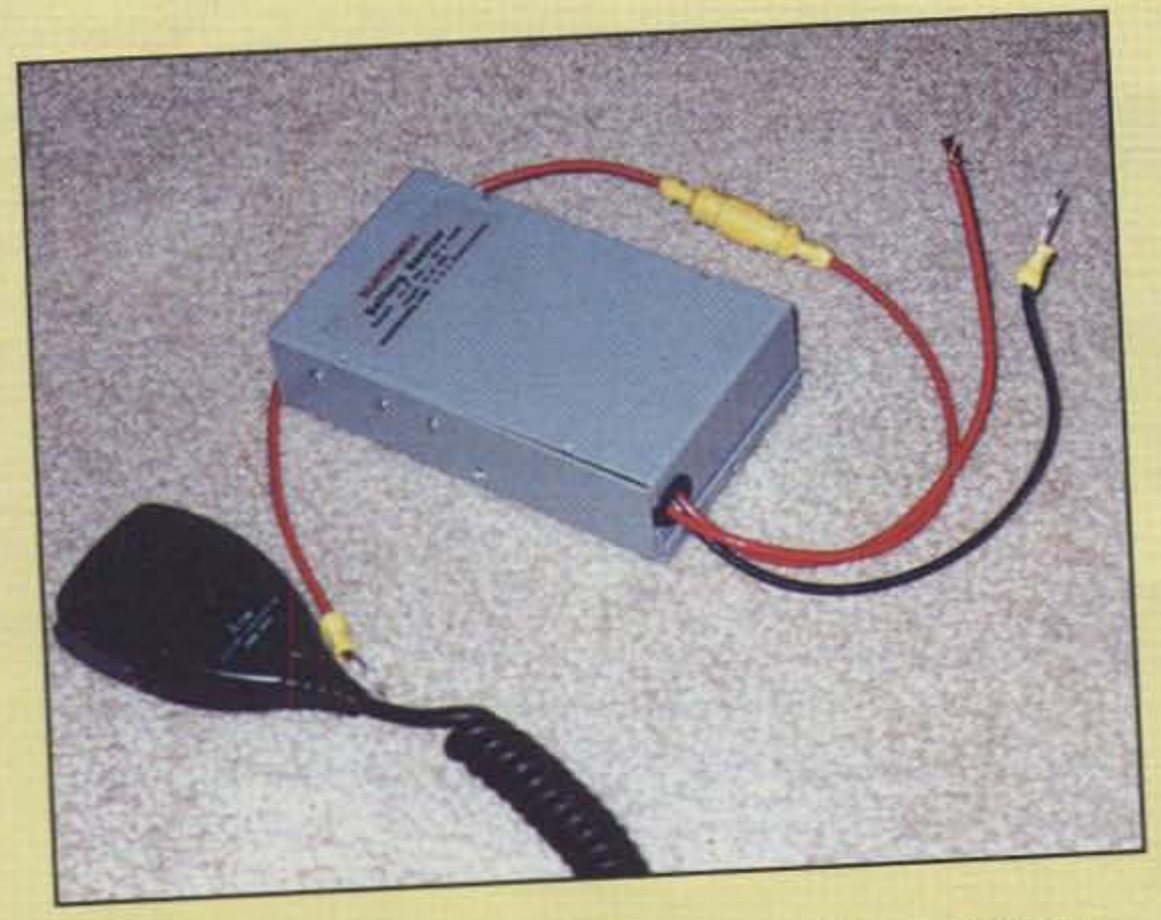
The RM-1 Repeater Maker is priced at $85 plus appropriate s&h. Also available is the ID-1 Keyboard Programmable Morse Code Station Identifier module, at $49.95. The ID-1 is very useful if you already have a repeater and simply need to add CW ID to it.

For more information on the RM-1, ID-1, and Midian's other products, contact Midian Electronics, Inc., 2302 East 22nd St., Tucson, AZ 85713 (1-800-643-4267; e-mail: <sales@midians.com>; web: <http://www.midians.com>).

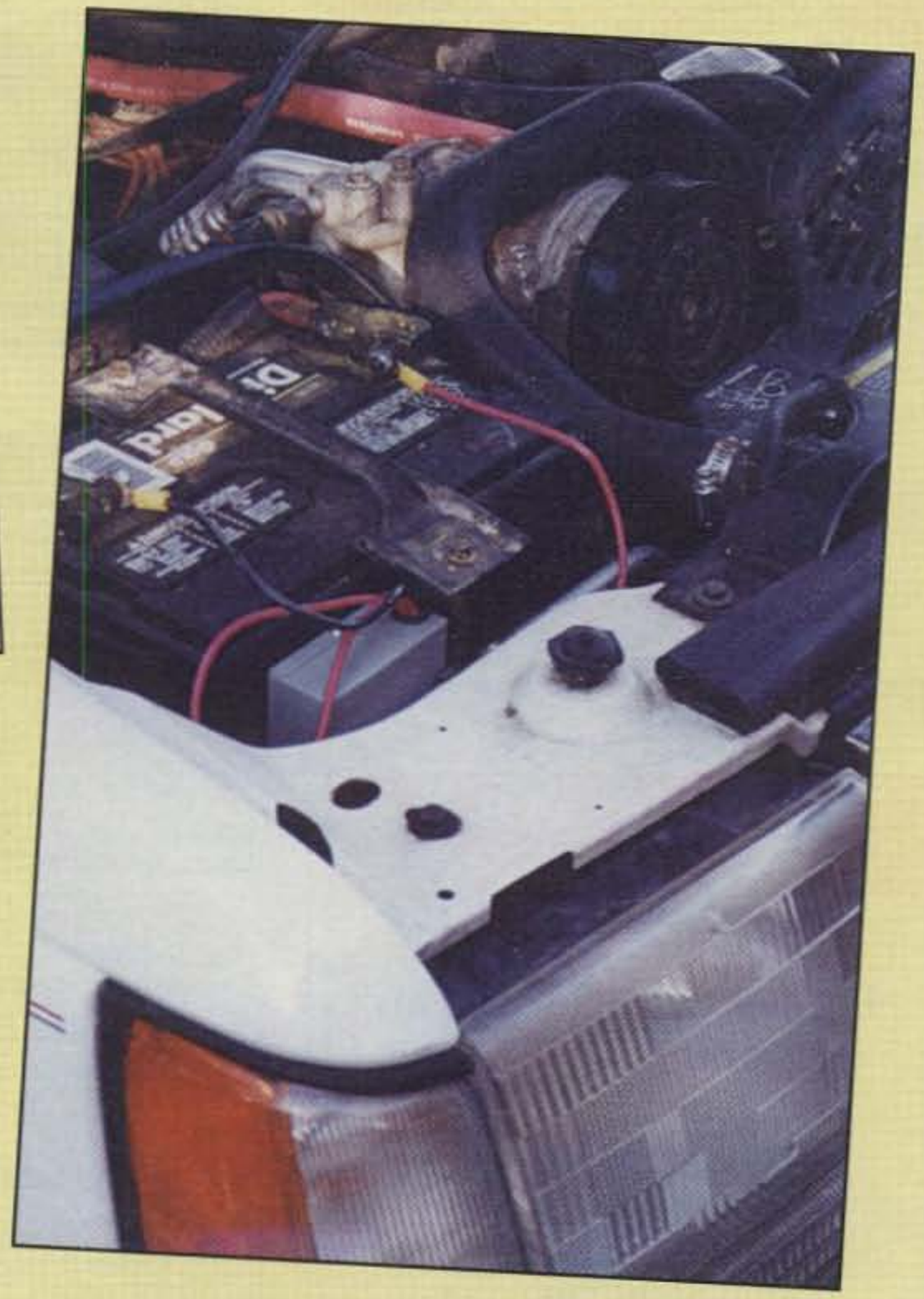
Antennas and Antenna Accessories

LDG Electronics Update. In the past few years we have noted several impressive products from Dwayne Kincaid, WD8OYG, of LDG Electronics. In July 1997 we profiled the fully automatic AT-11 HF Antenna Tuner. We noted at the time that the tuner had the potential to make knob-twisting and roller-cranking obsolete. In the same column

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



Leo Lehner, W4RRY, has developed his Battery Booster to address the fact that newer, high-tech digital radios used in mobile, Field Day, and marine operation can be very sensitive to low battery voltage, such as when the engine isn't running. The unit shown here boosts the battery voltage as though the engine were on. (Photo courtesy Leo Lehner, W4RRY)



You can mount W4RRY's Battery Booster in the cab, next to a headlight, or in front of the car battery. (Photo courtesy Leo Lehner, W4RRY)

we also profiled the similar but flea-power-oriented unit, the QRP Automatic Antenna Tuner.

In January 1999 we examined the BA-1 Balun Box kit, a 4:1 device that allows the easy interfacing of ladder-line-fed antennas and longwires to LDG tuners over the range 1.8 to 30 MHz. Also, in March of last year we profiled the DWM-4 Digital Wattmeter, a handy accessory intended to centralize all your RF power and SWR metering needs over HF, VHF, and UHF.

A check of the LDG Electronics web page now shows an amazing variety in the products currently offered. In addition to the products we already profiled, Dwayne offers the AT-11MP 150 watt Antenna Tuner with Meters; RCA Repeater Controller Accessory; Z-11 30 watt Antenna Tuner; RVS-8 Repeater Voting System; SBC-2A Single Board Computer; RL-8 8-Relay Interface; HD-1 Computer Headphone Director; and TimeCat Repeater Control Utility Software. Details on each item and current pricing are available on the LDG Electronics website, which also profiles attractive specials and closeouts.

For more information, contact LDG Electronics, 1445 Parran Road, P.O. Box 48, St. Leonard, MD 20685 (410-586-2177; e-mail: <ldg@ldgelectronics.com>; web: <http://www.ldgelectronics.com>).

Portable and Mobile Goodies

Battery Booster de W4RRY. Leo Lehner, W4RRY, has developed a mobile power product whose time has come. His Battery Booster was conceived to address the fact that newer, high-tech digital radios used in mobile, Field Day, and marine operation can be very sensitive to low battery voltage. Many of them expect to see a nominal13.5 to 13.8 VDC supply voltage, which only occurs when the engine is running. This means that the rig may not work at all under such conditions, or power output may be reduced dramatically. What was needed is a box to boost the battery voltage to look as if the engine were on.

The Battery Booster uses a small inverter to generate extra power to boost the output voltage to a controlled value, about 13.5 VDC. The total output of the unit is about 270 watts at 20 amperes. The inverter is pulse-width modulated to vary the output power so as to get a regulated 13.5 volts, although you can set the output voltage anywhere between 12 and 15 volts. The Battery Booster is automatic, and it shuts down when the car alternator output exceeds 13.5 volts.

The unit comes with three cables attached to the box. Two are used to connect to the car's battery terminals, one of which is fused; the third one is the "hot" wire to the radio. You can mount the unit in the cab, next to a headlight, or in front of the car battery.

How do you know if you really need a Battery Booster? Leo says that if you can operate mobile for an hour, at full power, with the engine off, you probably don't need a boost. However, you should also have someone in a QSO listen for distortion or signal "breakup,"

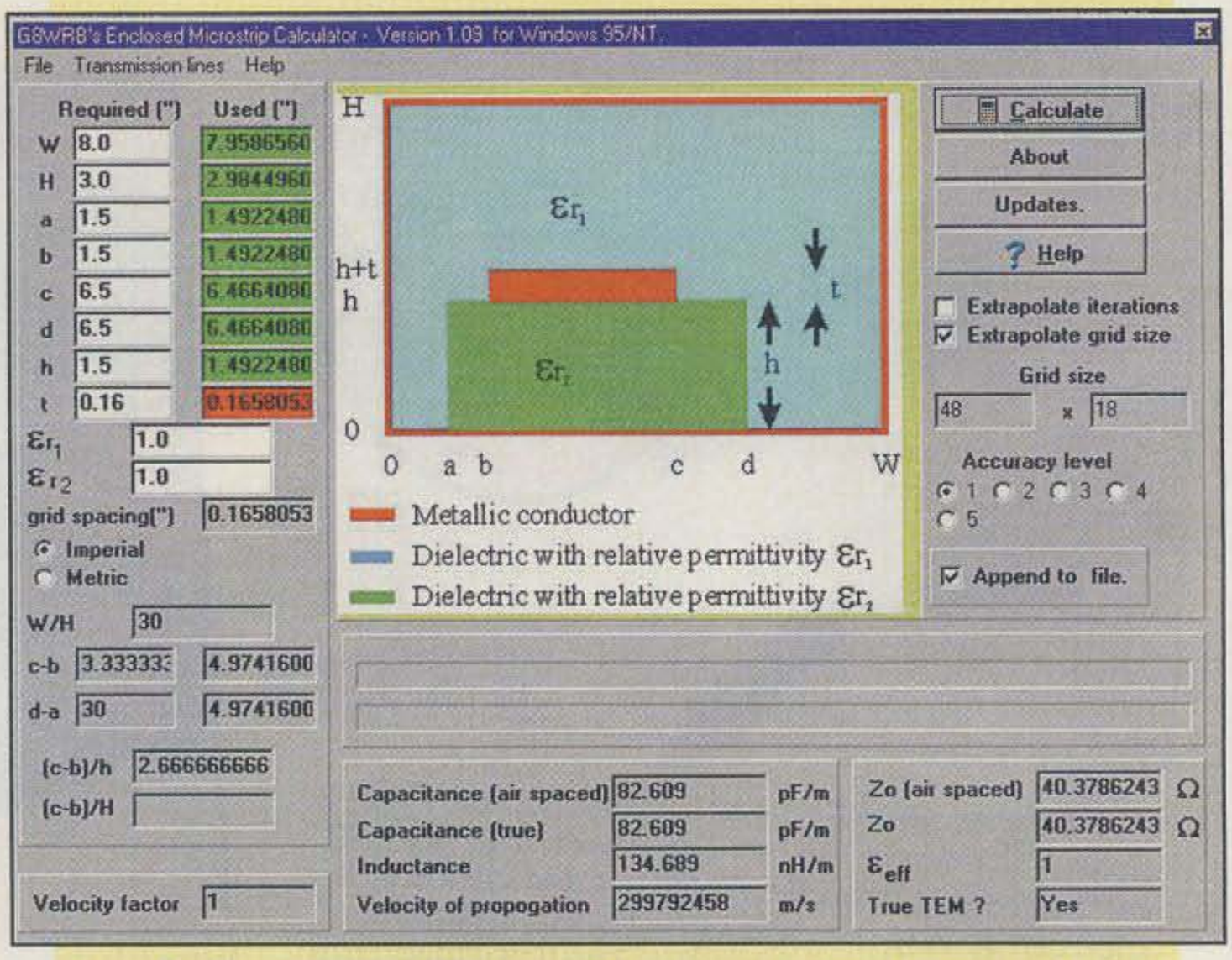


Fig. 1– In December 1996, Dr. David Kirkby, G8WRB, published a paper in QEX on modeling transmission lines using *a finite-difference program. An expanded and revised version of the original program, G8WRB's Enclosed Microstrip Calculator, is available for download from the web page at <http://www.medphys.ucl.ac.uk/~davek/ham>.*

which can indicate your rig may need a voltage boost.

Leo sells the Battery Booster for $83.50 including domestic Priority Mail shipment (make checks out to Leo Lehner). International shipments are $80 plus the actual shipping costs. A kit also should be available by the time you read this, along with a marine unit; the latter version will be sold through marine distribution channels. Contact Leo Lehner, W4RRY, 5811 E. Crocus, Scottsdale, AZ 85254 (602-493-6594; e-mail: <w4rry@fastq.com>; <http://www.fastq.com/~w4rry/index.html>).

Software and Computers

HAManuals—Series 1. Bill Turini, KA4GAV, proprietor of HAManuals, recently sent us a CD-ROM set he has published for Drake aficionados. The CD set contains manuals, historical information, and technical data on R. L. Drake amateur radio equipment and accessories. It's meant to be a technical resource for those who collect or repair Drake radios, but it's also useful for study and enjoyment by others.

Originally published in 1998 and introduced at the 1998 Dayton Hamvention, the package consists of two CDs. The first CD contains manuals for tube-type Drake radios, while the second contains manuals for solid-state Drake radios. When available, both the operator and service manuals are provided in the package. Also included on the CDs are modification and historical information on products from Sherwood, Sartori, Fox Tango, DX Engineering, and others; an updated version of Wayne Montague's repair information for Drake equipment; a bibliography of Drake-related articles; screen-saver images of Drake manual covers; a complete listing of Drake amateur and commercial radios; manuals for Drake tube testers and other test equipment; and much more.

The CDs are viewable on any computer that supports Adobe Acrobat® Reader, which means that users of Linux, Macintosh, UNIX, and Intel PCs are able to use and enjoy the reference CD. The two-CD set is $79.95 plus $3.50 for Priority Mail shipping in the U.S. Foreign purchasers should inquire first regarding s&h.

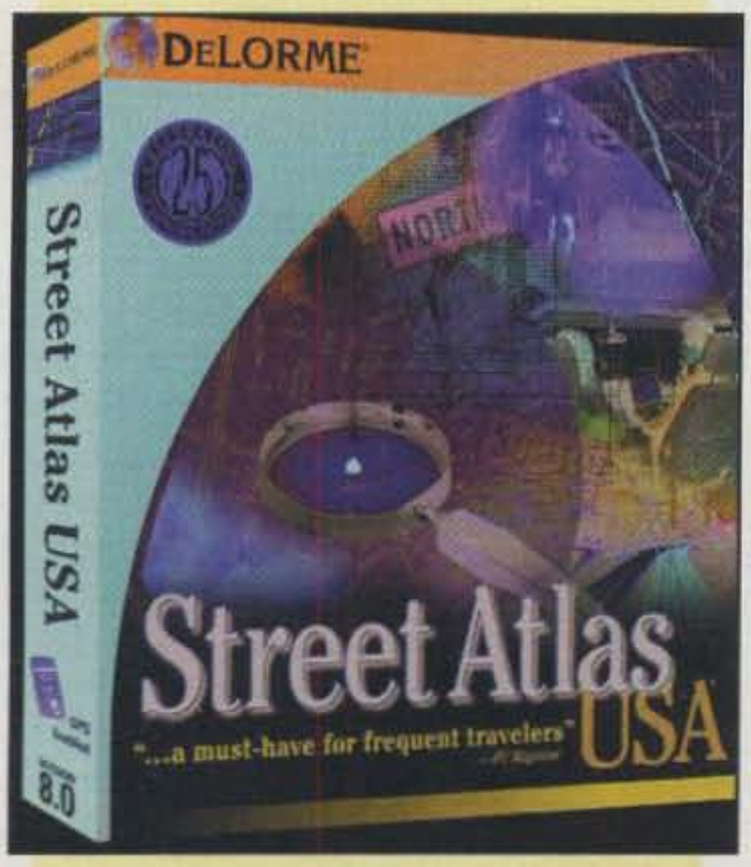
Contact HAManuals, 29926 SE 408th St., Enumclaw, WA 98022-7761 (360-825-1167; e-mail: <Orders@hamanuals.com>; <http://www.hamanuals.com>. You'll find a complete listing of available manuals and a tour of the CD package at the website.

Amateur Software from G8WRB. David Kirkby, Ph.D., G8WRB, writes that he has updated some of his soft-

ware of use to radio amateurs and made the updates available on the internet. One web page, which includes programs for designing, analyzing, and optimizing Yagis, is UNIX-based—sorry, the programs won't run under Windows. You'll find the Yagi-Uda Project page at <http://www.medphys.ucl.ac.uk/~davek/ham/yagi/index.html>.

If you're interested in Windows-based software for analyzing transmission lines, check out G8WRB's page at <http://www.medphys.ucl.ac.uk/~davek/ham/finite.html>. In December 1996 David published a paper in *QEX,* the ARRL's technical journal, on modeling transmission lines using a finite difference program. An expanded and revised version of the original program, G8WRB's Enclosed Microstrip Calculator, for use under Windows 3.1/95/NT, is available for download from this web page (see fig. 1).

Street Atlas USA 8.0® and More. DeLorme is really branching out with new products, offering a variety of street-mapping software for every need, whether that need be business- or consumer-oriented. My favorite product in this arena remains Street Atlas USA, and DeLorme now offers Street Atlas USA 8.0 (we covered Version 7.0 in April 2000). Indeed, DeLorme's flagship software product has seen much



DeLorme's Windows flagship software product, Street Atlas USA, has undergone much improvement over the years. It's easy to find just about anything anywhere in the country with Street Atlas USA 8.0, and recent enhancements make trip planning and real-time navigation more accurate than ever.

← *Al Cook, K2MPE, offers a website to help you troubleshoot your two-way radio gear when it decides to quit. He has accumulated quite a number of common-sense "tricks of the trade" that he uses to speed up the troubleshooting and repair of two-way radio gear. He shares these tips with you at <http://www.ckradio.com>.*

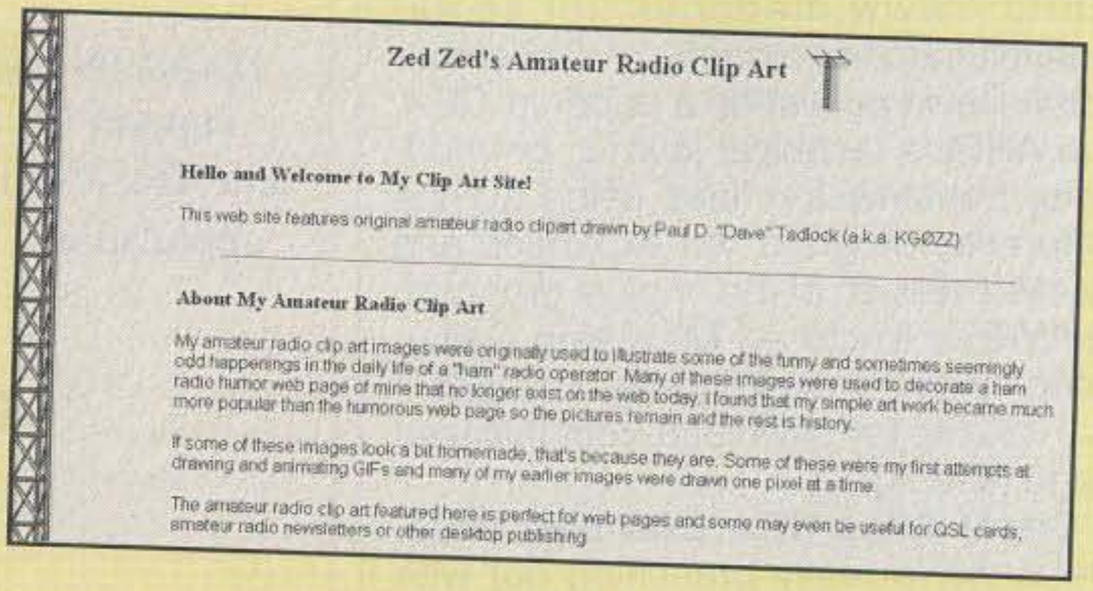


Fig. 2– Dave Tadlock, KGØZZ, hosts the popular Zed Zed's Amateur Radio Clip Art website, which offers a wide variety of free amateur radio graphics especially for your own website. Go to <http://www.qnl.com/~kg0zz/amateur_radio/clipart.htm>. →

improvement over the years. With good reason the publisher boasts it has been the "gold standard" in street mapping and routing software.

It's easy to find just about anything, anywhere in the country with Street Atlas USA 8.0, and recent enhancements make trip planning and real-time navigation more accurate than ever. Data and function upgrades include 500,000 new streets and roads; over 3,000,000 updated "points of interest"; improved address search capabilities; enhanced routing with updated exit and ramp information; and daily mileage and gas-usage planning, which is coupled with a new Travel/Time Planner module. The $44.95 (estimated street price) product includes Solus® Basic 2.0, which allows one route and one map to be transferred to a Palm™ handheld device.

A closely related product, Street Atlas USA® Road Warrior Edition, also is street-priced at $44.95. With built-in voice-command recognition and spoken directions, it's especially for the so-called "road warrior" and so is optimized for use with a Global Positioning System (GPS) receiver and a laptop or Palm™ handheld. With this hardware and software configuration you can track your position in real time as you travel along your route. If your laptop has a sound card, you can tell when turns are approaching, which roads to take, distance and time to your next stop or final destination, and more.

Contact DeLorme, Two DeLorme Dr., P.O. Box 298, Yarmouth, ME 04096 (1-800-452-5931; e-mail: <info@delorme.com>. web: <http://www.delorme.com>.

New on the Net

Radio-Related Web Graphics de KGØZZ. Dave Tadlock, KGØZZ, hosts the popular Zed Zed's Amateur Radio Clip Art website (fig. 2), which offers a wide variety of free amateur radio graphics especially for your own website. Heading for Dave's site undoubtedly will save you a great deal of time and effort searching for usable amateur-radio-theme images online. Dave says that his clip-art images were originally used to illustrate some of the funny and sometimes seemingly odd happenings in his daily life. In fact, many of Dave's images were used to decorate a ham radio humor web page. He found that his simple artwork became more popular than his humorous web page (which no longer exists). The rest is history, as they say.

Dave's online clip art is just right for the web, as it includes animated images, backgrounds, icons and rules, buttons, and various miscellaneous art. The images, most of which are in the popular GIF file format, can be used free of charge for your personal web page, QSL card, amateur radio club web page or newsletter, personal desktop, or other nonprofit use.

Check out Zed Zed's Amateur Radio Clip Art website. You'll find it at <http://www.qnl.com/~kg0zz/amateur_radio/clipart.htm>; e-mail to <kgØzz@qni.com>. The Zed Zed website also has links to general clip art, amateur radio, and MIDI (music) file sites.

Two-Way Radio Troubleshooters Page de K2MPE. Not just for commercial users, Al Cook, K2MPE, of CK Electronics, in Sodus Point, New York provides his website to help you troubleshoot your two-way radio when it decides to "head west."

Al has been in the two-way radio repair business since 1967, and over that 34-year period he has accumulated quite a number of common-sense "tricks of the trade" he uses to speed up the troubleshooting and repair of two-way radio gear. He offers three helpful pages: (1) System Problems, which shows things to look for when the radio equipment checks out OK on the bench; (2) Equipment Problems, which helps you determine whether the problem is in the radio itself, or if a simple misadjustment is involved; and (3) When All Else Fails, which shows you other things to try when it appears to be an equipment problem. Check out Al's Two-Way Radio Troubleshooters page at <http://www.ckradio.com>.

Wrap-Up

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

Overheard: Are you a perfectionist? I've found that the trouble with doing something right is that people don't appreciate just how very difficult it was to do so!

73, Karl, W8FX

Washington Readout

BY FREDERICK O. MAIA, W5YI

Regulatory News In The World Of Amateur Radio

Getting Ham Radio Information from the Web

Your questions are answered there—that is, if you know where to find what you need.

The FCC's Amateur Service Restructuring Order is more than a year old, yet we still get "tons" of questions about the details. There also still seems to be a lot of misinformation about the remaining license classes, question pools, exam credit, and the particulars of upgrading a license.

This month let's cover where to find information on the subjects that seem to be confusing readers the most. Just about every question can be answered by entering the key words of your query into an internet search engine. We think the "Google" seach engine is the best: <http://www.google.com/>.

The FCC recently has updated the web link to its Amateur Service information section. You can find it at <http://www.fcc.gov/wtb/amateur/>. It is arranged in three sections: General Information, Licensing, and Operating Overseas. This is a good place to start when trying to find information about ham radio.

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

General Information Section

This section contains facts about the three current license classes: Technician, General, and Amateur Extra. It also

Communications Pioneer Al Gross, W8PAL, Silent Key

The man who brought the world indispensable wireless communications concepts and devices such as the walkie-talkie (see December 2000 "Washington Readout," p. 44)), pager, and cordless telephone passed away on December 21. Al Gross, W8PAL, of Sun City, Arizona was 82.

Gross's lifelong interest in radio communications began when he was just nine years old. While traveling aboard a steamboat on Lake Erie, the ship's radio operator allowed Gross to listen to the wireless. Gross prevailed upon his father to buy him a crystal radio set, and Al tuned in to the broadcasts of local amateur operators.

By age 12 Gross had converted his family's Cleveland basement into an amateur radio station using equipment he'd salvaged and patched together from junkyards. W8PAL obtained his amateur radio license in 1934 (at age 16), and it was still current at the time of his death.

Gross's first invention was the portable hand-held radio, which had interesting two-way communication features. Developed in 1938 while he was in high school in Cleveland, he christened it the "walkie-talkie."

In 1940 Gross enrolled in the Electrical Engineering program at nearby Case School of Applied Sciences (now a part of Case Western University) and focused his energies on creating a portable short-range transceiver before he graduated. The device caught the attention of the Communications Group of the U.S. Office of Strategic Services (OSS), the forerunner of the U.S. Central Intelligence Agency, which promptly recruited Gross and led to another important invention—a two-way air-to-ground communications system used during World War II. It was used extensively by the military behind enemy lines during the war.

The system, known as "Joan-Eleanor" and classified "top secret" until 1976, allowed OSS agents in occupied countries and Germany to communicate with high-flying aircraft. The ability to gather intelligence and safely communicate it from behind enemy lines helped expedite an end to the war and saved thousands of lives.

In the late 1930s Al also discovered a way to cause miniature vacuum tubes to operate in the unexplored VHF/ UHF region of the radio spectrum. These radios were used to successfully communicate with other ham operators over a distance of 30 miles.

In 1945 FCC Commissioner E. K. "Jack" Jett was the first FCC official to propose extending the use of short-range two-way radio to private citizens. His imagination had been fired by meetings and discussions with Al Gross, W8PAL, a young and avid amateur radio operator who had developed the portable radio and investigated the use of VHF/UHF spectrum for short-range communications. Jett's four-page article on the possibility of UHF personal radio communications, entitled "Phone Me By Air," in the July 28, 1945 edition of the *Saturday Evening Post* is a classic.

After the war the FCC allocated the very first frequencies for the newly formed Citizens Radio Service Frequency Band. Gross left the OSS Communications Group and formed Gross Electronics, Inc., to make 11 ounce walkie-talkie sets for private use. In 1948 equipment made by his renamed company, Citizens Radio Corporation, was also the first to win FCC approval for use in the new "Citizens' Band."

Many of Gross's visionary mobile wireless inventions were far ahead of his generation's ability to make practical use of them. He was the first to come up with the idea of a two-way miniaturized radio, the forerunner of today's cellular telephone. It caught the fancy of cartoonist Chester Gould, who asked Gross if he could use the idea in his comic strip. The result? The "Dick Tracy" two-way wristwatch.

In 1949 Gross also invented the first wireless pager, a device initially intended for use by doctors. Ironically, Gross first introduced his pager at a medical convention, but it was rejected for fear the beeping device would upset patients and interrupt golf games.

In the 1950s Gross tried, again in vain, to interest U.S. companies in his pager. The FCC finally approved the use of the pager in 1960. Today over 300 million pagers are in use. During the '50s and '60s Gross continued to invent mobile personal communications devices, securing 12 patents for various cell and cordless phone devices, while working for his own company and the U.S. government.

Eventually, Gross began working as a communications systems specialist in the research divisions of large companies, including Sperry, GTE Communications Systems, Westinghouse Electric, and AG Communications. Since 1990 he had worked as a senior principal electrical engineer for Orbital Sciences Corporation in Chandler, Arizona. He was still employed there (at age 82!) at the time of his death.

Gross received numerous awards and honors during his distinguished career, including the Radio Club of America's 1992 Fred B. Link Award, the 1997 Marconi Memorial Gold Medal of Achievement from the Veteran Wireless Operators Association, and the 1999 Edwin Howard Armstrong Achievement Award from the Institute of Electrical and Electronics Engineers (IEEE). He was this year's winner of the Lemelso-MIT Lifetime Achievement Award for invention and innovation, and for playing a major role in the wireless personal communications field. In 1981 Gross was given a Presidential Commendation in Telecommunications from Ronald Reagan.

explains "No new Novice, Technician Plus, or Advanced Class operator licenses will be issued. These licenses, however, may be modified or renewed." There is an exception, though.

The No-Code Technician license had its start ten years ago on February 14, 1991, to be exact. These ten- year-term licenses are now coming up for renewal. Many radioamateurs who subsequently upgraded to Technician Plus got a new ticket, but their license terms were not extended another ten years. Instead, their licenses retained the original expiration date. (It used to be that when amateurs upgraded, they got another new ten-year license term, but this was discontinued several years ago.)

The new rules state that all Tech Plus licenses will be renewed as Technician. This is causing a lot of confusion, as amateurs want to know what happened to their Tech Plus ticket which permitted certain HF operation. These privileges are being continued by authority of the CSCE (Certificate of Successful Completion of Examination) that was issued by the VE team when examinees passed the 5 words-per-minute Morse code exam.

You can obtain the full (70-page) copy of the FCC's Amateur Service Restructuring Report and Order (WT Docket No. 98-143) at <http://www.fcc.gov/Bureaus/Wireless/Orders/1999/fcc99412.txt>. We found that website URL (address) through the FCC website search page located at: <http://www.fcc.gov/searchtools.html>.

The Order contains the newest Part 97 regulations. A complete set of the Amateur Service Rules is available online at the W5YI website <http://www.w5yi.org/Part97A.htm> or on the ARRL web pages at: <http://www.arrl.org/FandES/field/regulations/news/part97/>. The Government Printing Office (GPO) also has a set of every U.S. regulation online at <http://www.access.gpo.gov/>, but this is not the best source, since it is updated only once a year.

Looking for operating guidelines? The FCC maintains a list of Amateur Radio Service FAQs (Frequently Asked Questions) at: <http://www.fcc.gov/wtb/amateur/amfaq.html>. We strongly recommend that all amateurs access and read these FAQs. They contain a wealth of information on what you can and can't do in amateur radio, along with other useful material. For example, the text of the 1985 PRB-1 Order "Federal Preemption of State and Local Regulations Pertaining to Amateur Radio Facilities" can be found at: <http://www.fcc.gov/wtb/amateur/prb-1.html>.

Vanity Callsigns

Interested in getting a station callsign of your choice? The FCC has a page entitled "Vanity Call Sign FAQ's" at <http://www.fcc.gov/wtb/amateur/vnityfaq.html>. You can use the FCC filing system (which is somewhat complicated) by going to the Vanity Call Sign Filing Operations page at: <http://www.fcc.gov/wtb/amateur/VanityCS.html>. An easier way is to have the W5YI Group handle getting your new callsign for you. Information on this is located at: <http://www.w5yi.org/vanity.htm>.

Both the ARRL at <http://www.arrl.org/arrlvec/vanity.html> and Michael Carroll, N4MC, at <http://www.carroll-usa.com/vanity/> have excellent online Vanity callsign sections. The Carroll-USA site bills itself as the Vanity Call Sign Headquarters and lists "available immediately" and "soon to be available" preferential station callsigns.

Licensing Information

This section contains general information on how to obtain an amateur radio license <http://www.fcc.gov/wtb/amateur/amhow2.html> and how to renew your license or change your address <http://www.fcc.gov/wtb/amateur/amrenw.html>.

The FCC's procedure for renewing or changing an address is again somewhat hard to use. A much easier way is to access the QRZ License Renewal and Update Service located at: <http:// www.qrz.com/renew.html>. The W5YI-VEC also provides this service at: <http://www.w5yi.org/Secure/Renew.htm>. There is a $6.00 electronic filing fee associated with the QRZ and W5YI renewal service, a portion of which goes to the National Conference of VECs to help defray their expenses. All license information electronically filed immediately appears updated in the FCC's "ULS" Amateur Service database.

The FCC regulations state that you must comply with the new RF Safety rules as listed in OET Bulletin 65. You can find this bulletin at: <http://www.fcc.gov/oet/info/documents/bulletins/ #65>.

In order to file any application in the new Universal Licensing System (ULS) electronically or manually, you must register your Taxpayer Identification Number (an amateur's TIN is his/her Social Security Number) in ULS. You can register your TIN with the FCC at: <http:// www.fcc.gov/wtb/uls>. Click on the "ULS TIN/Call Sign Registration" link.

The fastest way to determine if the FCC has received an application from you, or if your license has been issued, is to access this same URL address, but click on "Application" or "License."

VECs and Examinations

The license exam fee beginning January 1, 2001 was increased by most VECs to $10.00. A Public Notice about this

Looking Ahead in

Here are some of the articles that we're working on for upcoming issues of *CQ:*

- "Results of the CQ World-Wide WPX CW Contest," by N8BJQ
- "The Station Controller," by AF1US
- "Electricity Everywhere," by W6BNB
- "Contesting from A61AJ," by K2RED

Plus:

- "Transforming a Transformer," by VE3ERP
- "Add Scanning to Converted CB Rigs," by WB9YBM
- "The Aviator's Solution to Shack Noise," by KF2LF

Do *you* have a ham radio story to tell? See our writers' guidelines on the CQ website, <http://www.cq-amateur-radio. com>.

fee is posted by the FCC at: <http://www.fcc.gov/Bureaus/Wireless/Public _Notices/2000/da002718.txt>.

You should contact a VEC (Volunteer Examiner Coordinator) if you want to locate a volunteer examiner (VE) to administer an operator license examination to you, or to file other applications for you, or if you are an amateur radio operator and would like to be accredited as a VE. A complete list of all VECs is located at: <http://www.fcc.gov/wtb/amateur/vecs.html>.

Are you a current or previous amateur and want to know what credit you get for examinations you previously passed? You can find this in the exam credit rules in Section 97.505(a): <http://www.w5yi.org/Part97EF.htm#Sec.%2097.505>.

Looking for a nearby place to take a license examination? Both the W5YI-VEC and ARRL-VEC have online lists of hundreds of local testing points. See: <https://www.w5yi.org/vol-exam.htm> and <http://www.arrl.org/exam.html>.

You can get copies of all of the exact, "word-for-word" license exam questions, multiple choices, and answers online. Complete sets of all license examination question pools are located at: <http://www.arrl.org/arrlvec/pools.html>. You can even take sample examinations at the QRZ website at: <http://www.qrz.com/testing.html>.

Need an FCC or VEC (examination) application form? Get these online at: <http://www.fcc.gov/formpage.html> and <http://www.w5yi.org/NCVEC605_Apr.pdf'>. (You need an FCC Form 610-B to apply for or to renew an amateur radio club station.)

Callsign Information

Amateur station callsigns can be obtained in three different ways: through the Sequential, Vanity, and Special Event ("One-by-One") Call Sign systems (see: <http://www.w5yi.org/CallSigns.htm>). You can determine how these systems work by accessing FCC information at: Sequential Call Sign System: <http://www.fcc.gov/wtb/amateur/amatur.html>; Vanity Call Sign System: <http://www.fcc.gov/wtb/amateur/vanity.html>; Special Event Call Sign System: <http://www.fcc.gov/ wtb/amateur/amspevnt.html>

There are several Amateur Service databases online. We particularly like the one located at <http://www.QRZ.com>. There are others at: (ARRL) <http://www.arrl.org/fcc/fcclook.php3)>, (Buckmaster) <http://www.buck.com/cgi-bin/do_hamcall/> and (WM7D) <http://www.wm7d.net/fcc_uls/ulsquery.html>.

International Arrangements

Want to operate your amateur radio equipment in a foreign country? If so, you need to read: <http://www.fcc.gov/wtb/amateur/ceptcountries2.pdf>. FCC-issued Reciprocal Permits for Alien Amateur Licensee are no longer needed by foreign licensed operators. Blanket reciprocal operation in the U.S. is now authorized by rule Section 47 C.F.R. § 97.107. For further information, see the FCC section on Reciprocal Operating Arrangements located at: <http://www.fcc.gov/wtb/amateur/reciparr.html>. For a list of countries with which you can exchange third-party messages over ham radio, go to: <http://www.fcc.gov/wtb/amateur/intarr.html>.

As you can see, there is a wealth of reliable information on the web to answer just about any question you have about amateur licensing. Knowing where to look is a good first step, especially because there's also a lot of unreliable information floating around. If you can't find the answer on your own, from a trustworthy source, log into the Q&A section of the Forums area on the *CQ* website at <http://www.cq-amateur-radio.com>, post your question, and we'll do our best to get you the right answer quickly. 73, Fred, W5YI

Beginner's Corner

BY PETER O'DELL, WB2D

For the Newcomer to Ham Radio

Ham Radio's Garage Sales

Ever drive around Saturday mornings checking out the goodies at garage sales? Or how about flipping through the classifieds in your local newspaper? There are some great bargains out there!

Need a new (more or less) rig? How about a few station accessories? Maybe you are into collecting old rigs. Wouldn't it be wonderful if you could just get up early on a Saturday morning, drive around to a few spots in the neighborhood, and find all kinds of wonderful ham treasures? Well, you probably won't find these treasures in your backyard, but getting up early on Saturday and driving may yield more than you can imagine. However, you won't find this sale advertised in the local paper under garage sales.

There is a garage sale just for hams, but it is not called a garage sale. It's called a hamfest or fleamarket, and the season is upon us. You can find almost anything you might desire in the electronics world if you hit enough hamfests. Some are better than others, too. On the East Coast a handful have become legendary: Rochester (NY), Orlando (FL), Shelby (NC), and Deerfield (NH), just to name a few. There are similar ones on the West Coast and in the Midwest, too. Of course, the Dayton Hamvention is the granddaddy of them all.

For the latest happenings in your area, just check out the "Announcements" section in this very magazine. Other ham publications list them, too. You also might want to keep an eye out for listings on some of the ham-oriented websites if you are set up for that. You also are likely to hear other hams talking about them on the local repeater. The people who have been around for a while know where the good ones are.

Chances are you will find almost anything you could want for your station if you visit enough hamfests. You probably will pay somewhere between 10% and 50% of the "store" price for the item. That's the upside, but there are all sorts of pitfalls to be aware of. The most obvious trap is that you are buying something that is used and probably does not come with any sort of warranty other than the promise of the seller that it "works fine." I have a friend who bought a 6 meter transceiver at a hamfest. The seller advertised that he had used it to win his section of the ARRL VHF contest, which was true. What he did not mention was that he was the only entrant from that section that year for 6 meters. There was this one minor problem with the transceiver: Instead of putting out the specified 50 watts, it only produced about 2. There was a major problem with the final amplifier, and the receiver had these spurs . . .

If you want to do well, you need to prepare in advance on several levels. First of all, you may need to do some homework, researching the going price for the items you are looking for. Read through the classified ads in *CQ, WorldRadio, QST, the Amateur Radio Trader*, and the other ham publications that carry these ads. Even if you do not consciously know what the equipment is, your unconscious mind will set up a database of sorts. Sooner or later you will just get a feel for what things are worth.

Another source of "classified" ads is the numerous websites that offer free or inexpensive ads. Table I has some of the more popular sites listed. Also, keep an eye on the online auctions—such as e-bay—for a really good idea of what things are worth in the real world.

Classifieds and Hamfests
CQ (hamfests only): <http://www.cq-amateur-radio.com>
ARRL: <http://www.arrl.org/>
QRZ: <http://www.qrz.com/index.html>
QTH: <http://www.qth.com/classifieds/>
WorldRadio: <http://www.wr6wr.com/index.html>
Amateur Radio Trader: <http://www.amradiotrader.com/>
K1DWU: <http://www.k1dwu.net/>
Virtual Hamfest: <http://www.vhamfest.com/>

Auctions
e-bay: <http://pages.ebay.com/buy/index.html>
Hamquest: <http://www.hamquest.com/>

Table I– Popular ham websites with classified ads and hamfest listings.

In my glory days of "horse trading," I read the classifieds before anything else in every magazine that came in. Over a period of a couple of years I was able to trade my way up to a pretty decent station on a minimal initial investment. Sometimes I traded one piece of equipment for another, but mostly I bought something, kept it for a few months, and sold it. Buy low, sell high: The motto of the stock market holds true with ham gear, too. One of the things you may notice as you begin to study the classified ads is certain places tend to attract sellers who are motivated to quickly rid themselves of their equipment. Other places tend to attract buyers who will pay more for equipment. Again, buy low, sell high, but you can only do that consistently if you have some idea of the typical price range of equipment.

You may not be interested in doing a lot of trading. Maybe you just want to outfit your station as best as possible while saving a few bucks. Here is what I suggest you do: Start by making a list of everything that you would like to have for your station—everything, reasonable and fantasy. Once you have the list complete, then begin to prioritize it. Number the items or group them into sub-groups (for instance, the "A" list and the "B" list, etc.), or use whatever system makes sense to you. Finally, mark down some prices you would like to pay—say, a fantasy price, an "average" price, and a limit price. The fantasy price is just that—the working computer for $2. The average price is what you think you are likely to have to pay based on your research and your "gut feeling." The limit price is your walk-away price. You have to say to yourself, "No matter how much I want this item, if I cannot negotiate a price lower than my limit price, I will walk away and let someone else have it." Get these prices down on paper.

The power of the walk-away price cannot be overestimated. In any negotiation-type setting there is enormous power in being willing to walk away. It is a belief system—the belief that something better awaits you. All you have to do is spend a little more time looking for it. Think of it as like being behind the counter at a deli. Customers are always coming in. If one

*123 NW 13th Street, Suite 313, Boca Raton, FL 33432
e-mail: <wb2d@cq-amateur-radio.com>

customer is indecisive or wasting your time, just call out "Next!" and move on to the next one.

Now you have to decide your budget. How much can you afford to spend at this hamfest? How much for the whole season? The day before the hamfest, go to the bank and withdraw in cash whatever you have budgeted for the hamfest. Almost no one selling at a fleamarket is going to take plastic, and most do not like taking a check. Cash simplifies things.

For those of us whose bodies function best in the afternoon and evening, this is the painful part. If you are going to do well, you have to be there early. There are two prime times for bargains, and the best one by far is the opening few minutes of the hamfest. The people who organize hamfests seem to be reincarnated torturers from the dark ages. For some reason that is beyond comprehension to me. They set up these things to open at 8 AM or earlier. In fact, 6 AM is not unheard of. I just came across one fleamarket that runs from "dawn to dusk." Just resign yourself to it. These people are not civilized. So be it. You are going to want to be at the gate at least a half hour before the scheduled opening time. The organizer probably won't let you in, but you should be relatively close to the front of the line by getting there at this time.

If you are not familiar with the location, make sure you have a good map and have marked out the route. Prepare something the night before to eat in the car on the way. You are going to get up very early to drive to the location, and you are not going to want to stop for a leisurely breakfast. If you have any respect for your stomach, forget the thought of buying any of the hamfest food. One alternative to consider, depending on the size of the hamfest and the distance from your home, is to spend the night in a nearby hotel. If you are going to do that, you have to factor that into your budget.

When the gates open, it's like feeding frenzy in the shark tank. There is a mad rush up and down the aisles as the buyers search for that rare find. The group dynamics are not unlike that of an auction. Here is where the list you prepared in advance is going to save you money—maybe lots of it. There is a tendency to start thinking that someone else might be "getting a better deal." On what? Better than what? Is it something that you really need? Having that written list will help you maintain your sanity in this situation. Obviously, this scenario applies more to the large hamfests than the small ones, but it applies nonetheless.

Whom are you going to meet on the other side of the table? My experience is that you can put sellers into four or five very general categories. The first is what I call the motivated seller. He wants the stuff out of his house, and he knows the best way to do that is to mark the price down really low. Before moving, we had a couple of garage sales. That's exactly what we did. We "got rid" of almost everything we had for sale because the prices were really low—and there was a minimum of haggling with people over the pricing. *Note:* The dickering is usually good-natured, so don't be afraid to bargain. Experienced sellers expect it. Some of the best bargains are going to come from the motivated seller, and 90% will be within the first hour of the hamfest.

The next category is that of the professional. This person may have a 9-to-5 job as a rocket scientist or something like that, but on weekends he "morphs" into Trader Joe, King of the Fleamarket. You can spot this seller by the fact that he has large quantities of certain identical items, say coax connectors by the bag or cartons of SWR bridges. Trader Joe knows the market. Chances are he

has his merchandise marked a little above average price. Usually there is some room for negotiating with him, but not a lot. Sure, he wants to sell, but he also wants/needs his profit. This is more like dealing with a retail merchant than a motivated seller. Again, your list with the preset prices will be invaluable when dealing with Trader Joe.

Then you have the seller who just decided on a whim to see if he could get rid of a few things and make a few dollars. He hasn't really thought through the value of what he is selling. When dealing with this character, prices can be all over the board. Trust your list.

Finally, there is my ex-wife. She was a packrat who in her early forties still had all her clothes from high school, never mind that they were out of style and wouldn't begin to fit. We had a few garage sales when I was married to her. She put her stuff out, and I put out mine. I usually tended to fall into the motivated seller category—not her. She had paid dearly for that bookend. If someone went out to buy a new one, they would have to pay a lot for it, too. Therefore, she would generously knock off 30% to 50% of the store price, but that was all. She was not open to negotiating either. At our sales I sold most of my stuff and she carried hers back into the house to keep with her high-school clothing. My advice? Next!

How do you negotiate? The expression "honey catches more flies than vinegar" carries a lot of weight. Be friendly. Smile. Breathe calmly. Be casual. If the asking price is higher than you think it is worth, ask the seller if he will take less (very general question) or ask him he will accept some specific figure that you have in mind. Smile when you ask. Make sure that the tone of voice is a friendly one. This is not the time for confrontation or for you to "educate" the seller that he is grossly over-priced on this item. Keep in mind that you are offering him *what it is worth to you*, not what it is worth on the New York Stock Exchange. You've got your list. You've done your homework. There is nothing to prove. You simply have asked him if he will take less. You will quickly find out who you are dealing with. If he is motivated, you probably will settle on some figure about half way between his offering price and your first bid. If you don't come to terms, just be friendly and move on. Next! There's more than one table to look at.

The second best time for getting a good deal is just before closing time. The seller has now realized that there is a very good chance that he will have to pack up whatever is left and take it home. Prices tend to drop. The only problem is that the merchandise tends to be picked over. However, there are still great deals to be had a closing time. Just don't get caught up in a "I have to find something and buy it now" mentality. That's a sure way to lose money.

One final note for those of you who may be concerned that you might buy something less than perfect at a hamfest. Nothing says that you cannot be a seller at the next hamfest. One man's trash is another man's treasure. Sure, you may lose a few dollars, but it's not a marriage contract. If you don't like a piece of equipment . . . Next!

There you have a short primer on buying at hamfests—the garage sales of ham radio. There is not much that I need in the station these days, but I enjoy the thrill of the negotiation. Next month I am going to get a table at the local hamfest and clear out a bunch of stuff from my garage. That will give me room for the stuff that I buy at the following six or seven hamfests. Life goes on. 73, Pete, WB2D

Reader Feedback

The following is from Peter Chadwick, G3RZP:

You might like to think about some comments on QSLing for beginners—and some older hands, too . . .

QSLing 100% for contest QSOs is a bit of a waste of time from the US. An active contester can easily get 50 QSOs in the same year with the same station—repeated year after year. K1DG has a policy of QSL for the first band/mode/QSO, which I figure is right. There are well-known US contest stations who I purposely don't work because I don't want yet another card from them! I know, I can throw the cards away, but they fill the envelope at the Bureau and I pay for that. If you need a card for a particular reason (first GU on 160 meters, say) then *say* so on the card—in big letters. That way the recipient is less likely to glance at it and say "just another W" before filing it.

QSLing 100% from special-event stations is also a waste. About 50% of cards go in a trash bin somewhere in the Bureau system because they are undeliverable. Ask if the guy wants a card.

If you want a card to get to its destination, carefully *print* the callsign. A lot of cards have almost undecipherable callsigns on them.

If you write the call of the addressee on both sides of the card, make sure that it's the *same* call on both sides (you'd be surprised how often they aren't).

These comments result from 18 years of sorting cards as a Bureau sub-manager. . . .

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.

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Operate 10 bands: 75/80, 40, 30, 20, 17, 15, 12, 10, 6 and 2 Meters with one antenna Separate full size radiators . . . End loading . . . Elevated top feed . . . Low Radiation Angle . . . Very wide bandwidth . . . Highest performance no ground vertical ever . . .

Operate 10 bands -- 75/80, 40, 30, 20, 17, 15, 12, 10, 6 and 2 Meters with this MFJ-1798 vertical antenna and get *full size performance* with no ground or radials!

Full size performance gives high efficiency for more power radiated. Results? Stronger signals and more Q-5 QSOs.

Full size performance also gives you exceptionally wide bandwidths so you can use more of your hard earned frequencies.

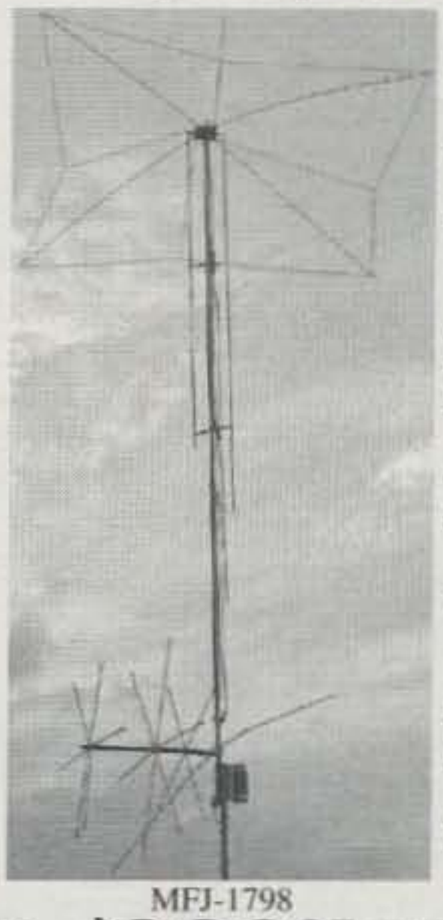
Full size performance is achieved using separate full size radiators for 2-20 Meters and highly efficient end loading for 30, 40, 75/80 Meters.

Get very low radiation angle for exciting DX, automatic bandswitching, omni-directional coverage, low SWR. Handles 1500 Watts PEP SSB.

MFJ's unique *Elevated Top Feed*™ elevates the feedpoint *all the way to the top* of the antenna. It puts the maximum radiation point high up in the clear where it does the most good -- your signal gets out even if you're ground mounted.

It's easy to tune because adjusting one band has minimum effect on the resonant frequencies of other bands.

Self-supporting and just 20 feet tall, the MFJ-1798 mounts easily from ground level to tower top -- small lots, backyards, apartments, condos, roofs, tower mounts.



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Separate Full Size Radiators

Separate *full size* quarter wave radiators are used on 20, 17, 15, 12, 10 and 2 Meters. On 6 Meters, the 17 Meter radiator becomes a 3/4 wave radiator.

The active radiator works as a stub to decouple everything beyond it. *In phase* antenna current flows in all parallel radiators.

This forms a very large equivalent radiator and gives you incredible bandwidths.

Radiator stubs provide automatic bandswitching -- absolutely *no loss* due to loading coils or traps.

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On 30, 40, 75/80 Meters, end loading -- the most efficient form of loading -- gives you highly efficient performance, excellent bandwidth, low angle radiation and automatic bandswitching.

MFJ's unique *Frequency Adaptive L-Network*™ provides automatic impedance matching for lowest SWR on these low bands.

Tuning to your favorite part of these bands is simple and is done at the *bottom* of the antenna.

No Ground or Radials Needed

You don't need a ground or radials because an effective counterpoise that's 12 feet across gives you *excellent* ground isolation.

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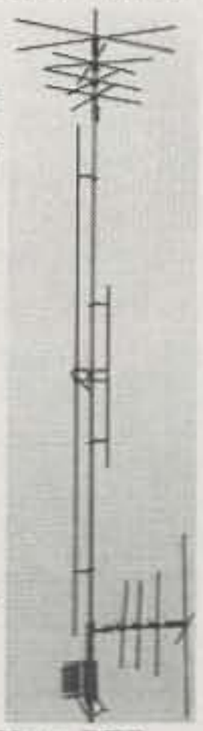

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How It Works

BY DAVE INGRAM, K4TWJ

Theory 'n Practice

A "Keep It Simple" Look at DSP

One of the hottest innovations and big-time radio features of the day is Digital Signal Processing, or DSP, and this new expansion in technology is destined to become even more popular. Exactly what is DSP, how does it work, and how is it beneficial to you? That is the focus of this month's column, and I am sure you will find my plain-language discussion helpful for understanding both DSP units and advertisements highlighting DSP capabilities in rigs.

You may have heard or read some fancy talk or complex descriptions of DSP, so we will begin with a brief, nontechnical look at the most popular types and then consider applications of each one separately. I will strive to maintain a "keep it simple" level oriented especially toward newer amateurs, so get comfortable, grab some equipment brochures to refer to, and read on!

Photo A–DSP capabilities are built in or optional features in an increasing number of modern transceivers. They are used to reduce band noise (NR), cancel beat tones (BC), and dodge QRM by varying the slope of a passband's skirts (DSP slope). Some DSP systems operate at the IF level, while some operate at the AF level. They all work great!

The DSP Scene

As shown in photo A, most of today's equipment manufacturers produce at least one model of transceiver that includes DSP capabilities. Some of those DSP systems are built in and some are optional; some operate at the audio level and some operate at the IF level. Additionally, a couple of well-known companies such as MFJ Enterprises also produce add-on DSP units that work with almost any transceiver. You just connect them in-line between your transceiver and external speaker (photo B). That can be a confusing mix of gear for sure (especially if you are a new amateur joining the game since DSP was introduced). Thus, one may understandably ask why the various types and what are their differences. The best way to answer that question is by first explaining the most popular DSP functions or applications and then considering how each type "fills that bill."

Probably the most familiar, or often-used, function of DSP is automatic noise reduction. Ah, but my transceiver already has a good noise blanker built-in, you say; what is there to be gained by including DSP? A transceiver's noise blanker is designed to reduce impulse-type noises such as automobile ignition noise and intermittent power-line noise. DSP is designed to reduce continuous background and band noises. Also, noise blankers in transceivers typically work at the AF level, whereas DSP Noise Reduction typically works at the AF level. The two concepts thus work well when used in conjunction with each other and are quite helpful for pulling

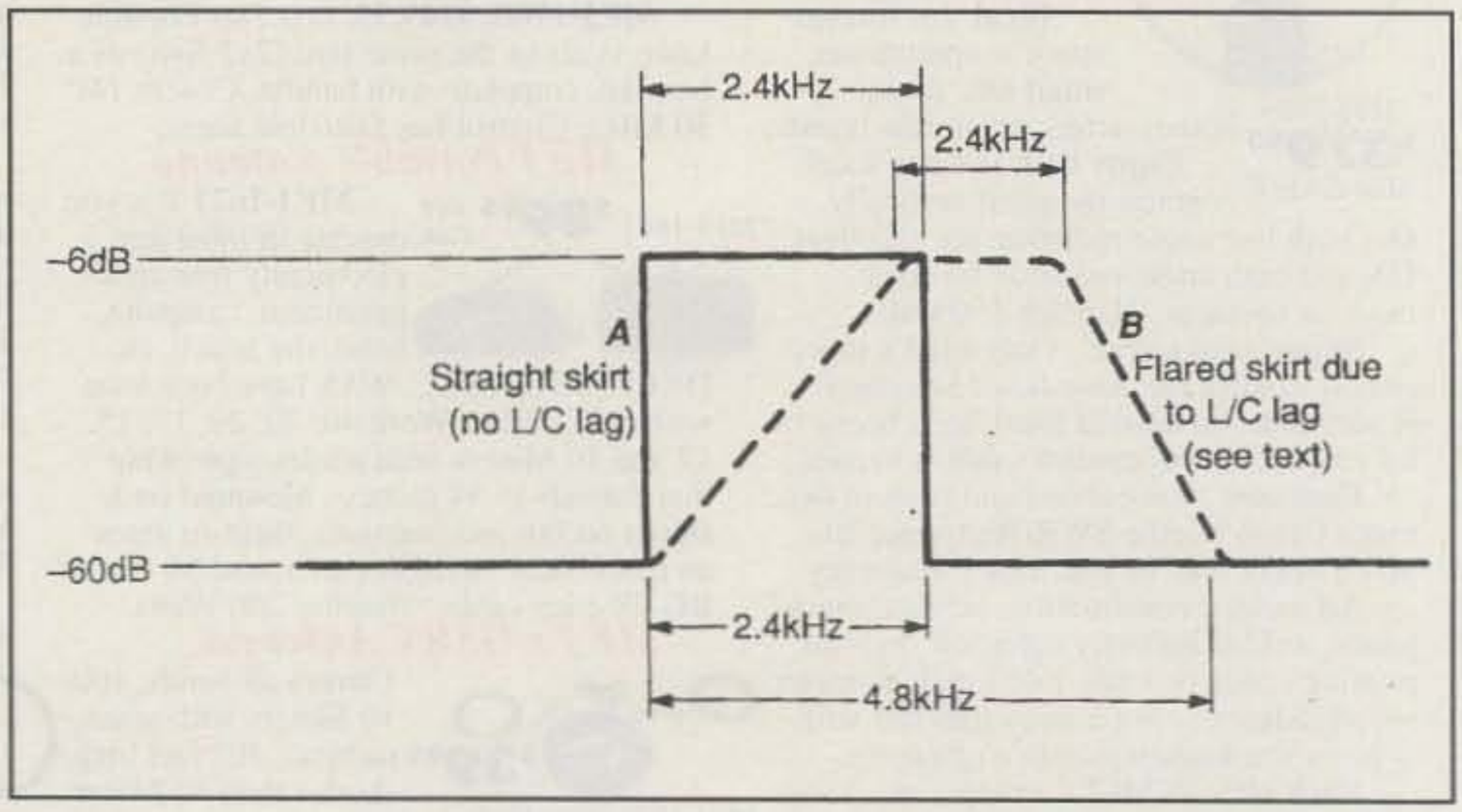

Fig. 1–A theoretically ideal passband response curve like that illustrated by solid-line "A" has strictly vertical sides or skirts to produce the same bandwidth for weak (–6 dB) and strong (–60 dB) signals alike. A conventional passband response curve as illustrated by the dotted line "B" exhibits flared skirts due to charge/discharge time of capacitance and inductance of its internal components. As a result, its bandwidth is narrow for weak signals, but wide for strong signals.

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weak signals "out of the mud." You really should hear DSP noise reduction in action. It's terrific, especially for DXing.

Another function of DSP is automatic heterodyne filtering, or beat-tone canceling. This capability is really cool; it hunts down on-frequency squeals or howls and kills 'em dead. It is similar in concept to the manually-adjustable notch filter included in many high-performance transceivers, except DSP notching usually works at the AF level, plus "deluxe DSP systems" can notch out or remove several heterodynes/howls simultaneously.

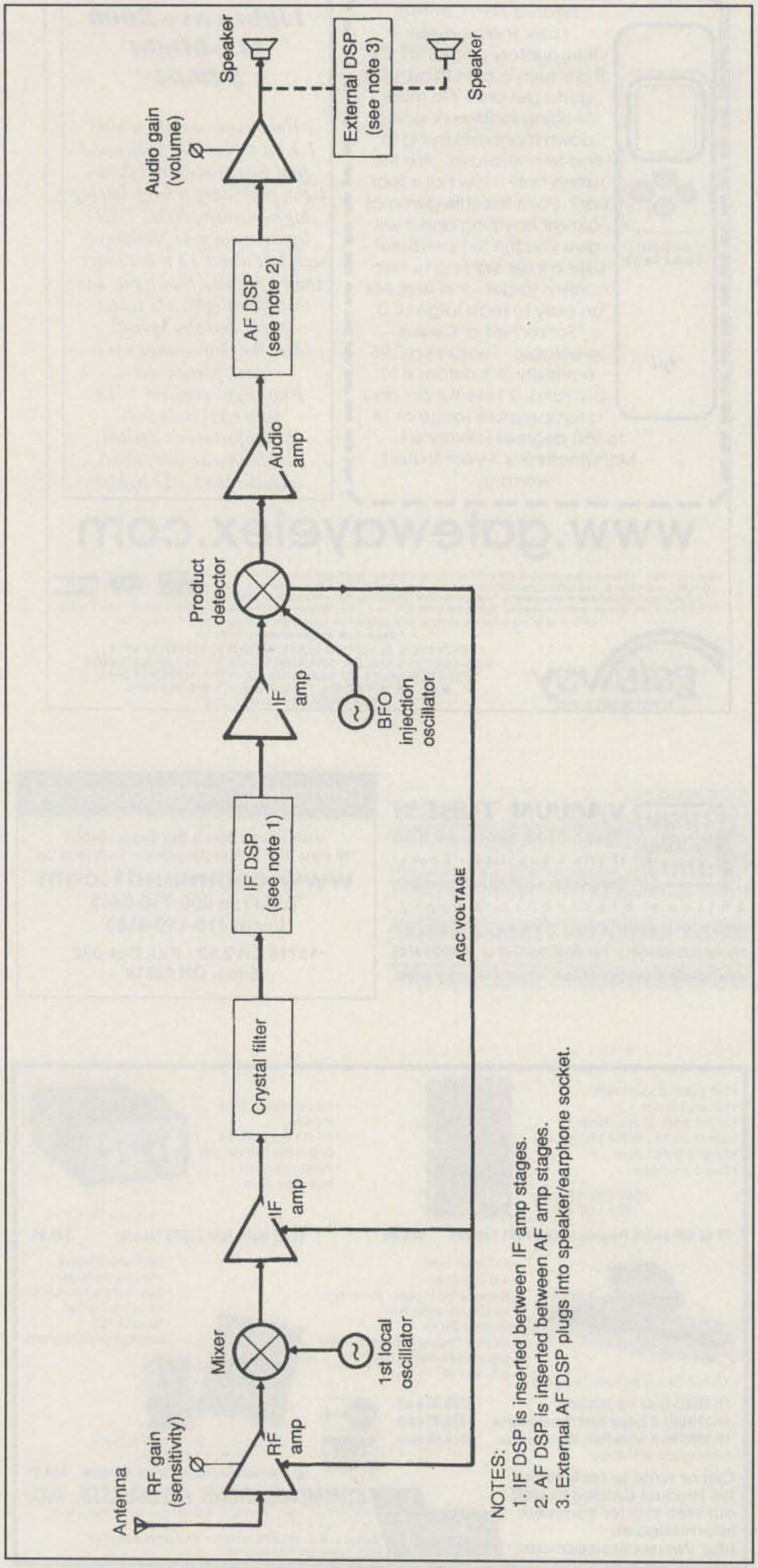
A third function included in "deluxe" DSP units is bandwidth filtering, or skirt/slope shaping, to mate with a favored mode such as SSB or CW. DSP filtering differs from traditional analog-type passband filters in that its response curves can be much more narrow and steep-skirted yet produce less "ringing" and insertion loss of volume than regular crystal filters.

Transmit DSP is yet another function that is very attractive and quite hot for producing great-sounding SSB audio. Forms of transmit DSP vary, and lack of specific details in many transceiver ads often leave us wondering what the transmit DSP is actually doing. More details on this area will be presented later. Now let's take a more in-depth look at the DSP functions.

Noise Reduction DSP

The ability to reduce band or background noise so you can copy weak or fading signals is truly one of DSP's most impressive assets. Even if your transceiver's built-in noise blanker is super-effective and continuously adjustable, DSP still has a noticeable advantage. That is because a transceiver's noise blanker is designed to gate off or reduce IF stage gain during brief bursts of pulse-type noise. It cannot reduce a constant noise however, as a signal cannot pass through a constantly gated off IF stage. In other words, our ears and brain can accept 20 or 40 millisecond "drop outs" of signals and still understand words, but a 20 or 40 second drop out (or more!) does not leave us anything to hear.

How does DSP block constant noise yet pass an incoming signal? First, its microprocessor-based circuitry converts an incoming signal from regular analog form to a continuous group of time-sampled digital equivalents. It then performs a series of mathematical computations or algorithms on the digital data. If data between adjacent time



← Fig. 2– Simplified block diagram of a CW/SSB receiver. Only a single-conversion receiver is shown for simplicity; most modern transceivers/receivers are dual, triple, or quadruple conversion as discussed in previous columns. Note the IF-level DSP is connected within the AGC loop, whereas the AF level is connected outside of the AGC loop. Also note that the AGC voltage varies according to the strength of the received and detected signal(s) and controls gain of RF and/or IF amplifier stages accordingly.

samples varies randomly and without correlation, it is considered random noise and is subtracted or ignored. Comparatively, data that is moderately correlated within a group of digital samples but varies over a few milliseconds of time is considered speech and converted back from digital form to audio for consequent amplification and reproduction. Clever technique, eh?

Notch-Filtering DSP

Automatic elimination of heterodynes or notch filtering is another terrific DSP function performed through a series of mathematical computations or algorithms. In this case, however, the DSP's math processor looks for similar or correlated data between time samples. Such data that remains unchanged between adjacent time samples is considered a continuous beat tone or heterodyne and is subtracted. Remaining data is then converted from digital to analog format and passed on to following stages as previous discussed. I should also point out that if a DSP unit is fast enough in speed and has enough calculating power, it can support multiple notch filters simultaneously—a real asset for serious contesting and DXing.

Bandpass Filtering DSP

Usually, a transceiver's ability to separate desired and undesired signals depends on the bandwidth and shaping factor of its crystal filter(s). Since these filters act like sharp tuned circuits, they exhibit capacitance and inductance which produce phase shifts or time lags. The shifts or lags, in turn, cause the passband to exhibit curved rather than strictly vertical sides or skirts (fig. 1). The more narrow a filter's width and the steeper its skirts, the better the transceiver's selectivity, or ability to reject adjacent frequency interference. This is when DSP bandpass filtering shines.

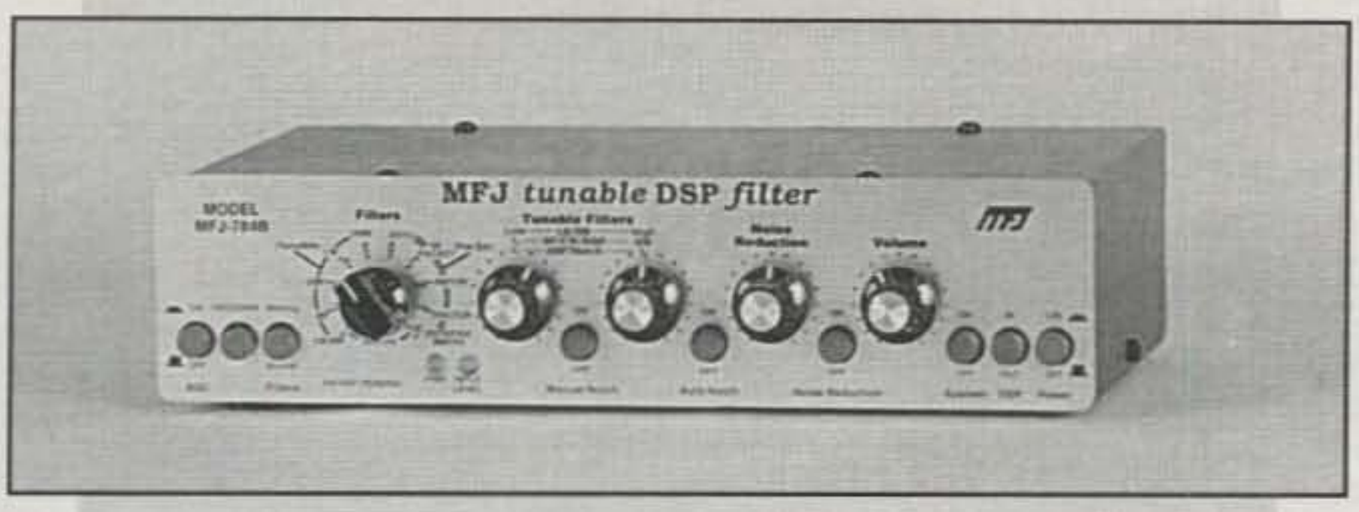


Photo B– Add-on DSP units such as this MFJ-784B are dandy for stepping up performance of economy-model transceivers. They too reduce noise, remove heterodyne tones, and narrow the receiver's passband. Interconnection with your existing gear is a plug-in-cinch. (Photo via MFJ Enterprises)

As previously discussed, DSP works by sampling a regular analog signal at precisely timed or clocked intervals, converting that signal to a digital equivalent, performing a series of computations on the data, then converting it back to an analog signal. Exactly how close that A/D-converted data is to (DSP circuit) timing or clocking speed and how flexible mathematical computations are in determining that proximity dictates the (DSP) filter's width and angle, or curve of its skirts. It can also include adjustments for below clock speed or "low cut," and above clock speed or "high cut" filter width tuning. DSP filters are thus unique because they work in the time domain rather than frequency domain. They also produce less insertion loss and less ringing at narrow bandwidths than crystal filters.

IF vs. AF DSP

The first, least expensive, and most popular type of DSP is audio level, or AF, DSP. The latest, more expensive to implement and somewhat more effective form of DSP is IF-level DSP. What is the difference and how does it influence overall rig performance? Let's use the simplified receiver block diagram in fig. 2 to help answer that question.

First, notice IF-level DSP operates within a receiver's AGC loop circuit, whereas AF-level DSP operates external to the receiver's AGC circuit. So what, you ask? A receiver's overall sensitivity depends on the gain of its RF and/or IF stages. You increase the gain to copy weak signals and decrease the gain to avoid overload or splatter and "buckshotting" from strong signals. A receiver's overall volume (its loudness) can be varied by its AF gain. A receiver's automatic gain control (AGC) measures the strength of a tuned-in signal and controls RF- and/or IF-stage gain accordingly. Exact designs differ here: Some AGC circuits control only IF gain and some control both IF and AF stage gain. Check your transceiver's block diagram to determine which concept your rig employs.

Now let's say you are trying to copy a weak signal almost "covered up" by strong adjacent frequency signals, heterodynes, or power-line noise. If you are using AF DSP, your receiver's gain may fluctuate right along with the interference. In other words, your DSP unit is doing a fine job, but it cannot correct problems of "AGC blocking" in preceding RF and IF stages. If your transceiver has IF-level DSP, it can tailor the IF passband enough to reduce IF overloading and AGC "pumping." Copying weak signals is then much more fruitful. Using digital processing and mathematical algorithms rather than crystal filters may seem unusual (like replacing a classic "muscle car" with a little four-cylinder, front-wheel drive pickup truck) but in the case of electronics and high-tech communications gear, the technique works great.

How can you determine which type of DSP is used in your particular transceiver? Check with its manufacturer's technicians or study its block diagram. Also, watch the rig's S-meter. If QRN and/or QRM continue holding the meter reading high when the DSP system is switched on, it is probably AF DSP. If the meter reading drops, it is probably IF DSP.

Built-in vs. External DSP

Which is more attractive, built-in or external DSP? I would say that depends mainly on your needs, preferences, and budget. As previously mentioned, built-in IF-level DSP is top line, but expensive. An optional AF-level DSP module for your particular transceiver is usual-

ly more affordable, plus it fits inside the rig's cabinet and produces a clean "one box station" (photo C). Check carefully before making a buying decision, however; some DSP modules include only noise-reduction and notch-filtering functions. External DSP units usually offer more functions (including multiple filter widths, etc.), and they can also be used with your present and future rigs. That equates to good economy. I would thus say each has its benefits, and the final choice is your call.

What About Transmit DSP?

An ever-increasing number of transceivers are including DSP-tailored audio in their transmit capabilities, and it can really make a SSB signal sound terrific. Precisely what DSP does to enhance transmitted audio can seem a bit vague or mysterious however, so studying your particular rig's block diagram and/or checking with its manufacturer's technicians is a good idea here also. Basic audio tailoring may involve software or menu adjusting a microphone amplifier's base/treble response. That is helpful for sure, but it is not what I consider DSP. If the audio is converted to digital form, separated into specific ranges, some ranges boosted and others attenuated, etc., then the

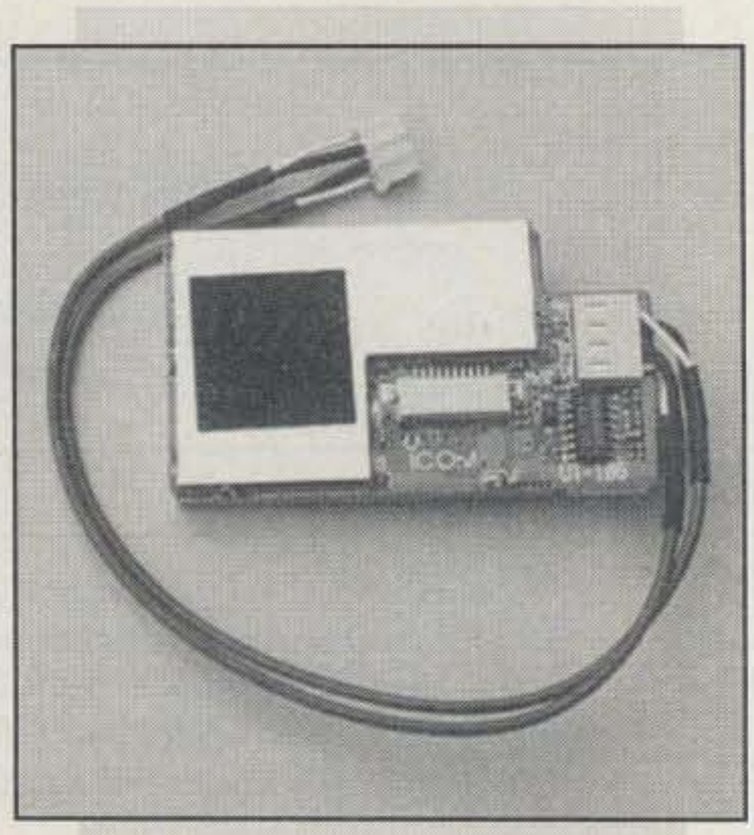


Photo C– Optional DSP modules such as this UT-106 for an ICOM IC-718 are neat because they quickly install inside the transceiver's cabinet and really step up performance.

range is converted back to audio that can be called audio-level DSP—and it works very well. If the exact frequency of the transmit mixer's injection or local oscillator signal is DSP-shifted to move the transmit passband's center frequency (similar to a transmit IF shift adjustment), that can be called IF-level DSP. If the transceiver's transmit filter and bandwidth can be set independent of its receive filter and bandwidth (such as wide for transmit and narrow for receive), that is "deluxe" IF-level DSP—also very good. If a transceiver has both AF and IF DSP, grab it; it's a winner!

These personal observations and notes are brief and generic, I know, but they provide good ground work for understanding transmit DSP in "lightly technical form." Hopefully, you agree with my "keep it simple" philosophy.

Conclusion

In looking at the overall DSP scene, I feel it is the obvious wave of the future, and we can also expect to see DSP integrated into upcoming "Software Defined Radios" such as WA6ITF has discussed in recent articles. As with present rigs, economy-model SDRs probably will lean toward AF DSP, while more expensive models will include both AF and IF DSP. Next-generation transceivers promise to be as glamorous and exciting as tomorrow's ham bands, and like me, I am sure all of our ham friends are looking forward to having a ball operating with them!

73, Dave, K4TWJ

VHF Plus

BY JOE LYNCH, N6CL

All About The World Above HF

EME—Do It Now!

Last month WB2AMU and W5UWB presented "A Moonbounce Primer" (p. 52). This month's "VHF Plus" column expands on that primer, with additional technical and operating details.

—W2VU

In 1986 movie goers were introduced to Stephen Spielberg's first venture into animation with his production of *An American Tail.* The story is about a mouse, Fievel Mousekewitz, and his Rodentia family emigrating from Russia to America at the turn of the 19th century because they are told there are no cats in America. Aboard ship on the way Fievel is swept overboard when he ventures about the deck during a storm.

Separated from the rest of his family, Fievel longs to be reunited with them. However, that is not to be for quite a while into the story. Although other members of his family have all but given up hope of his return, his sister tenaciously clings to the thought that he is still alive "somewhere out there." While separated by distance, but somehow magically together, they sing the haunting duet (voiced by James Ingram and Linda Ronstadt) titled for that sense of unknown distance separating them.

The scene has both mice in their respective locations crooning at the Moon and looking at the stars with Fievel reassuring himself that somehow his family still cares for him and his sister reassuring herself that her brother is still alive and cares for her. What makes this scene and song work is the commonality of the Moon. Both characters can see the same Moon and night sky.

What does this "tail" (as Spielberg uses the word in his title) of two mice wanting to communicate have to do with ham radio? Fundamentally, we are communicators. We in the weak-signal arena like to make contact with each other via exotic methods of communication. One such exotic mode is bouncing signals off the Moon, thereby completing a signal path between the Earth, the Moon, and the Earth—or EME.

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VHF Plus Calendar

March 2	First quarter Moon.
March 4	Poor EME conditions.
March 5	Highest Moon declination.
March 8	Moon perigee.
March 9	Full Moon.
March 11	Good EME conditions.
March 16	Last quarter Moon.
March 18	Lowest Moon declination. Very Poor EME conditions.
March 20	Moon apogee.
March 24	New Moon.
March 25	Moderate EME conditions.
March 31	First quarter Moon.

• EME conditions courtesy W5LUU

What makes EME communications work is the same commonality of the Moon that Fievel and his sister share. For the mice siblings and for us, we both want to communicate with one another over a long distance, albeit we hams want to do so a lot more directly than through the mystical dimension depicted in the movie.

It is interesting, though, that despite the fantasy of the movie, EMEers have something in common with the Mousekewitz family. What drives EMEers to communicate via the Moon is the same venturesome motivation that inspired the Mousekewitz family to pick up and leave Russia and take the chance to come to America. While the driving force behind our motivation is a bit different from that of the Mousekewitz family (they were escaping the fires set by the czar), the desire to take on the adventure is the same for both them and us. The compulsion also is the same—do it now!

Why now? According to Derwin King, W5LUU, who provides us with our monthly EME forecasts, the year 2001 will be a very significant year for EME-type communications. This past February 7th the Moon was at perigee, the closest the Moon is to the Earth, when it passed across the lowest noise part (cold sky) of its path. This passage occurs approximately every nine years. It represents both good news and bad news for EME communicators. The good news is that the EME path degradation is near zero. That is, the degradation of the signal between the Earth and the Moon is minimal as compared to approximately 4 1/2 years from now. The path degradation is dependent on how good perigee is. Last month on 144 MHz the degradation was under 0.05 dB and the Moon was within a day of being full. Hopefully, next month or so we might have some good reports of contacts made during those days.

It was approximately nine years ago when conditions were just right again for EME communications. In the April 1992 edition of this column I reported on one particular QSO that took place during that ideal time—the first EME QSO between Cuba and the U.S. I reported this achievement as follows:

Gary Crabtree, KB8RQ, and Arnie Coro, CO2KK, made the first-ever USA to Cuba EME QSO on 2 meters on January 21, 1992 between 0030–0055 UTC. What made the record so remarkable was that Arnie was running only 21 watts! Arnie used two vertically polarized, 5-element, one-wavelength-long beams (for a total of ten elements). By comparison, Gary was running 1500 watts into a 24 M^2 2M18XXX 18-element array (for a total of 432 elements). Nevertheless, as Gary reported, "It was one of those nights that just clicked."

Three major factors contributed to making the QSO possible. First, the QSO took place during moonrise for both stations. Therefore, they were able to take advantage of ground gain, which is as much as 6 dB. Second, the sky noise registered an incredibly low 171° K during the QSO period, which is about as low (or cold) as is possible for 2 meters. (The 144 MHz sky or cosmic noise in the direction of the Moon is expressed as a temperature, in degrees Kelvin, or K.) Third, perigee occurred the previous day, the 19th (local time). Additionally, they had the advantage of having a nearly full Moon.

Gary first reported hearing Arnie's signal during one of Arnie's two-minute sequences. On the following sequence (Gary's), Arnie reported that Gary's signal sounded like a local station. They completed in short order after those initial receptions.

To put Arnie's station in another perspective, it would be the kind of station one would use to work a repeater in a fringe area with a handheld! Additionally, because of the lack of parts (no radio stores in Havana), Arnie was forced to use very lossy coaxial cable. To date, Arnie's station has the lowest power and the least efficient antenna array ever used to complete a QSO via EME.

Another active EME operator, Bev Cavender, W4ZD, was fortunate enough to monitor the QSO. Bev reported hearing Gary very well. He also reported hearing Arnie sending "Os" to Gary. Bev, who has worked

Arnie via tropo and other terrestrial modes several times, was amazed that on this particular night he could not hear Arnie when he swung his beam directly onto him.

Dave Blaschke, W5UN, provided coordination relaying between Gary and Arnie on 20 meters. Gary ran the QSO sked almost as a lark. He wanted to pique Arnie's interest in EME and agreed to run as a way to heighten that interest. Ultimately, Gary wanted Arnie to follow an unsuccessful QSO with going to his government and voicing the argument, "If I had a higher power limit, I would have been able to make the contact." To their delight, they failed to have an unsuccessful QSO!

Now for some not so good news concerning this present nine-year cycle: This minimum degradation indicates the ending of the nine-year perigee versus right ascension (RA) cycle. The right ascension (in hours) is the east-west position of the Moon against sky background. RA cycle has an average period of 27.321662 days, but can vary from the average by a day or two. With the ending of the present nine-year cycle it also means the end of the steadily improving average conditions we have enjoyed over the past several years.

The degradation, as expressed in dB, shows 144 and 432 MHz EME signal-to-noise ratios because of the excess sky noise (assuming a very narrow beamwidth antenna) plus the Earth-Moon separation distance for the Moon position at each time and date. During a monthly lunar cycle the degradation factor can vary more than 13 dB at 144 MHz and 8 dB at 432 MHz. The degradation is referenced to lowest possible sky noise along the Moon path, with system noise temperatures of 80° K at 144 and 60° K at 432 and the absolute minimum perigee distance. While both 144 and 432 MHz degradations are equally affected by the EME distance, on 432 MHz the sky noise range is smaller.

After February the average minimum degradation during each month will gradually increase for the next four to five years before the trend reverses. Even so, degradation will jump around a bit from month to month even though the average will be tending upward for the next several years. Fortunately, in about five years the degradation once again will be declining. In approximately nine years conditions will be back to where they are now.

Derwin lists other good days for this year. These good days and the 144 MHz degradation (in dB) during 2001 are: Mar. 7 (0.23), Apr. 3 (0.52), May 27 and 28 (0.60), June 24 (0.36), July 21 (0.15) and Aug. 18 (0.11) both near new Moon, Sept. 14 (0.28), Oct. 11 (0.57), Nov. 8 (0.77), and Dec. 5 (0.72). Derwin adds that conditions will be excellent, with a degradation of <1.0 dB, for one day in each month of 2002 and the first half of 2003.

Generally, on 144 MHz degradation under 1.0 is considered excellent, 1.0 to 1.5 is very good, 1.5 to 2.5 is good, 2.5 to 4.0 is moderate, 4.0 to 5.5 is poor, and over 5.5 is very poor. Being in the new Moon phase of the month can make otherwise good conditions very poor. Ironically, late in this year many good weekends are near new Moon. It is always best to be near full Moon because at full Moon the stable nighttime conditions can be advantageous, while at new Moon the sun noise is a problem.

As also can be seen by Derwin's predictions, there are many good days during the week. This can be problematic for those of us who cannot rearrange our work schedules to match the Moon's schedule.

The additional EME path loss, expressed in dB, because of the Earth-to-Moon separation distance being greater than the absolute minimum (221,000 miles from Earth) reference is known as the *range factor*. The range factor varies on a near monthly cycle from a low (0 to 0.7 dB) at perigee to as much as 2.43 dB at apogee.

Concerning the above predictions, unfortunately they cannot be better than he has indicated. Derwin adds the caveat that conditions may be worse because of ionospheric disturbances. Such ionospheric disturbances can be an aurora in progress and meteor shower activities. Either one of these can be a deterrent to EME communications on 2 meters because the ionosphere is reflecting the outward-bound signals back to Earth prematurely, thereby truncating the Earthly distance the operator is hoping that they will travel.

Selecting the ARRL contest weekends likely will be controversial. The surveying of EME operators is going on while this column is being prepared. When we have the dates, we will report them in this column.

Each month in a box in this column I report Derwin's predictions for each Sunday at 0000 UTC during the month so as to provide a guide concerning the expected weekend conditions. In order to make his prediction, Derwin takes into account a number of factors. Among them are the following.

As discussed above, distance from the Earth to the Moon and cosmic noise from the direction of the Moon are predictable variables that substantially affect EME communications. Derwin

notes that the variation in Earth-Moon distance over a monthly lunar cycle can introduce a change of over 2.4 dB in the path loss, with the minimum being at perigee and the maximum at apogee.

Because sky noise varies with Moon position, the RA at which perigee occurs is very important in determining EME conditions. The best conditions occur when perigee is in the low-noise region of the sky (cold sky). As mentioned above, the RA for Moon perigee is a cyclical function with a period of about nine years.

The Moon declination in degrees north and south of the equator is cyclical, with an average period of 27.212221 days. The maximum declination is also cyclical with a range of +18.15° to +28.72° and a period of about 19 years. The next maximum is in September 2006.

If you are seriously considering EME communications, here are some factors to keep in mind: Among the VHF/UHF bands 144 MHz is the most popular for EME communication. Although EME communication has been successful on 50 MHz (see last month's cover), the size of the antenna arrays and background sky noise restrictions remain barriers for all but the most serious operators on that band.

The higher the frequency, the higher the path loss; therefore, more elaborate arrays and power close to the legal maximum are required for successful EME work above 144 MHz. Accordingly, most operators start on 144 MHz and, if they find EME is for them, try the higher frequencies later.

Other factors that affect EME communications include libration fading, tremendous path loss, noise (both from the Sun and the background sky), Faraday rotation, and spatial polarization.

Because the Earth and the Moon wobble along in their orbits, signals emitted from Earth stations hit a target *area* on the Moon, rather than a bull's eye. Also, because the Moon's surface is very irregular, the reflected signal takes on that irregular shape. The signal that comes over your radio is a bit like what you see when you bob up and down while watching your image in a funhouse mirror at a carnival.

The combined effects of the wobbling orbits and irregularly shaped signals cause fading and a certain amount of Doppler shift between stations attempting communications. This is called *libration fading*. When operating on 2 meters you'll experience longer-term peaks and valleys, where portions of a callsign will be heard clearly, followed by very weak signals. While these ef-

fects aren't nearly as pronounced on 144 MHz, the effect on 1296 MHz may be as high as 20 dB fading and 10 Hz frequency shift.

The Moon is located over 221,000 miles from Earth at perigee and over 252,000 miles from Earth at apogee. Because of the shape of the Moon, only about 7 percent of the signal that strikes it is reflected. The remaining 93 percent is absorbed and lost for communication. The path loss is directly proportional to the frequency of operation—that is, the higher the frequency, the higher the path loss. Therefore, the path loss is around 252 dB at perigee and 254 dB at apogee on 144 MHz. For the low-power station the 2 dB difference between perigee and apogee may be just enough for a successful QSO.

Noise, caused by the Sun and the background sky, inhibits your ability to receive weak signals. For those of us in the northern hemisphere, communications generally aren't favorable the day of a new Moon (you won't be able to see the Moon with the naked eye, except in an eclipse) or at times when the Moon is farther south in the sky. Communications are less favorable during times when the Moon lies more to the south, not only because of increased background sky noise caused by constellations in the southern sky, but also because of convention.

The higher latitude European stations see less of the Moon when it's farther south; consequently, they don't get on the air. The most ideal time of the month for northern hemisphere stations tends to be when the Moon has finished its most northerly declination and is moving southward in the sky.

Faraday rotation is the polarization rotation of a signal due to the influence of the Earth's ionosphere on that signal. Some say this is the result of the effect of the Earth's magnetic field on the signal as it passes through the ionosphere. Some EME operators who also work HF have noticed some correlation between what happens with Faraday rotation and what happens with HF propagation. It remains one of the mysteries of EME communication and deserves further study.

Faraday rotation affects the signal by causing it to go through a deep cyclical fade. This cycle changes in period, from shorter to longer, as the frequency is increased. It is estimated to have a period of approximately 20 minutes on 144 MHz. This cycle is more pronounced on some days than on others. QSO schedules are set up to accommodate this period. These schedules last typically for one-half hour to one hour on 144 MHz, with one hour for casual schedules and one-half hour for contest schedules. Although some contest QSOs are made by schedules (particularly low-power stations wanting to work high-power stations), most contacts are random.

Spatial polarization simply means that two stations at different locations on the Earth are aiming antennas fixed in the (horizontal or vertical) plane at the Moon. Using the mirror analogy again, if you were to look at something at an angle with a mirror, depending on how your head is tilted, that object may appear right side up, at an angle, or upside down.

If one of the stations has the ability to rotate the antennas through the plane between horizontal and vertical, some of the effects of spatial polarization can be overcome. However, rotating several antennas through this plane simultaneously while maintaining phasing relationships between each antenna becomes a bit of a mechanical nightmare. Therefore, spatial rotation is often overcome by brute force. Adding more and more elements to an antenna array helps reduce the effects by increasing the array's dB gain. Also, it is interesting to note that Faraday rotation has a tendency to overcome spatial polarization during at least part of the scheduled period for a QSO on 2 meters.

This combination of spatial polarization and Faraday rotation can be problematic. Paul Kelley, N1BUG, points out that there also is such a thing as true one-way propagation on EME, largely because of polarization shifting. Sometimes both operators can hear each other just fine. However, at times one operator can hear the other but not vice versa. Sometimes the reverse is true. Finally, sometimes neither operator can hear the other.

To read more of what Paul has to say visit his URL at <http://members.mint.net/n1bug/prop/eme.html>.

Ian White, G3SEK, explains this phenomenon very well at his URL <http://www.ifwtech.demon.co.uk/g3sek/eme/pol4.htm>. He adds the following caveat at the end:

If you have fixed horizontal polarization, one-way propagation is very real—and very frustrating! Sometimes European stations can hear US stations calling CQ, but they never come back to our calls... they just keep on calling CQ because replies from Europe are arriving vertically polarized. And sometimes it works the opposite way: We in Europe call CQ, but we don't hear the W stations calling us because their signals are arriving vertically polarized over here.

After several hours of one-way propagation, it becomes very easy to imagine that

the other guys have deaf receivers... are running too much power... don't want to work us... are not really serious about EME... One-way propagation is not difficult to understand, but it can be very bad for international relations!

There are two other points to keep in mind concerning EME communication. First, on moonrise, you'll experience Doppler shift of between 300 and 500 Hz above your frequency. On moonset, the Doppler shift will be 300 to 500 Hz below your frequency. When the Moon is overhead, there is no Doppler shift. Those of you who have worked the satellites are familiar with the effects of Doppler shift and keep your hand on the tuning knob. Second, if you are able to hear your echoes, be prepared for a 2.3 to 2.7 second delay. The Moon is a long way off, and it takes time for your signal to get there and back.

CW is the preferred mode of communication on EME. It's the most reliable mode due to the weakness of the signal. The transmission is at a rate between 10 and 15 wpm. Slower CW can break up as a result of fading and fluttering, while letters transmitted using faster CW tend to disappear.

EME communication is similar to meteor scatter in one sense: Both deal with weak and irregular signals. Therefore, as with meteor scatter, EME communication has a protocol. However, because of the nature of the EME signal, the procedure is very different from the protocol used for meteor scatter.

The preferred frequency of operation for schedules is above 144.030 MHz. The preferred frequency of operation for random QSOs is between 144.000 and 144.030 MHz. If signals are loud enough to sustain SSB QSOs, the preferred frequency is around 144.150 and up.

There are some nets you can listen to for information on conditions and schedules. One net coordinates 144 MHz EME communication. It's hosted by VE7BQH and meets every Saturday and Sunday on 14.345 MHz at 1700 UTC, or as soon as the 432 MHz net is finished. Every Monday at 0230 UTC (Sunday evening local time) on 3.818 MHz (plus or minus QRM) a VHF/UHF clearinghouse net meets to exchange information and set skeds.

Now let's look at a sample QSO. A sked is set between DL8DAT in Germany and N6CW in San Diego. The QSO is scheduled to last an hour and will start at 0000 UTC. The eastern station (relative to its position on Earth) transmits first. In this case it's DL8DAT. The transmission will last for two minutes. DL8DAT will send the receiving station's call followed by his own call as follows: N6CW de DL8DAT, N6CW de DL8DAT, etc. At 0002 UTC N6CW begins an identical routine, sending DL8DAT de N6CW, DL8DAT de N6CW, etc. The two hams transmit back and forth every two minutes, until one station hears the other sending complete callsigns.

Once the receiving station copies complete callsigns, he starts the next phase of the sequence. He sends callsigns, as before, for the first 90 seconds of the 2 minute sequence. However, during the last 30 seconds. he adds a signal report—the letter "O." The signal report was once either a "T," an "M," or an "O." A "T" meant that the callsigns were just barely detectable; an "M" meant that portions of a call were copied; an "O" meant that complete callsigns were received. However, because the receiving station is looking for complete callsigns, any other report would be a waste of time in completion of the QSO. As a result, the signal report convention has evolved into the letter "O."

Let's assume that N6CW was successful in copying the callsigns and has initiated the second phase of the protocol. It's now up to DL8DAT to hear the

signal-report portion of the QSO (assuming he's already heard the complete callsign exchange). Once he hears the signal report, he sends "RO" throughout his entire 2 minute time period. This tells N6CW that DL8DAT has heard the signal report (the "R") and is sending a signal report of his own (the "O"). If his country requires him to sign his callsign at the end of every transmission, he sends N6CW de DL8DAT once at the end of the 2 minutes. Otherwise, no callsigns are sent.

When N6CW finally hears "RO," he sends only the letter "R" during his next 2 minute transmission. When DL8DAT finally hears the "R," he sends "73" or "73/SK" during his next 2 minute session—followed by complete callsigns at the end of the transmission (to comply with government rules pertaining to station identification). The QSO is considered complete when DL8DAT hears the "R" sent by N6CW. The honor system comes into effect here, because you are the only one who knows what you heard.

EME and QRP

What does it take to get "on the Moon"? San Hutson, K5YY, was able to complete his WAS (Worked All States), work 32 countries, and add to his grid locator total by spending just $200 more than his initial outlay for his 2 meter station. He has an excellent write-up in the 1990 Central States VHF Society *Proceedings* (available from the ARRL for $12, plus $3.50 s&h).

Ray Soifer, W2RS, has made over 20 contacts running only 150 watts and a single Cushcraft long-boom beam. He presented a very informative paper entitled "QRP EME on 144 MHz: How and Why" at the 1992 Central States VHF Society conference. His paper is part of the *Proceedings* for that year, which is also available from the League for $12, plus $3.50 s&h. Both Soifer and Hutson's write-ups unlock some of the mystery of EME operation for the "little guy."

EME on Other VHF+ Frequencies

While EME has taken place on 135 cm (222 MHz), uncertainty has caused interest to wane in recent years. Now, however, because of the new FCC regulations that set aside a portion of the band for weak- signal (in the FCC's words, *experimental*) work, interest is picking up again. It remains to be seen, however, just how popular EME communications on that 135 cm band will become.

Seventy cm is perhaps the second most popular band for EME work. It is both easier and harder to get on this band than on 2 meters. Assembling the right antenna array is one of the easier tasks. Steve Powlishen, K1FO, in the second part of his two-part article in *Communications Quarterly* ("432-MHz EME 1990s Style," Part 1, Fall 1990; Part 2, Fall 1991), reported that a four-antenna array for 70 cm is typically 5 feet by 6 1/2 feet, whereas a typical array for 2 meters is 10 feet by 13 1/2 feet. Also, because of the higher frequency, the 70 cm antennas are much shorter for the same number of elements.

As mentioned above, signal propagation also is a bit easier on 70 cm. While it still takes high power to make it to the Moon, factors described for 2 meters—such as Faraday rotation and sky noise—have far less influence on 70 cm. Here again the antenna becomes a consideration. Because the array used for this band is smaller, it's more practical to design polarization rotation into the antenna. This will help overcome Faraday rotation and correct for cross-polarization problems encountered when working a distant station.

However, as I said, there are some barriers to working 70 cm. While transceivers are available for this band, serious EME operators generally opt for transverters and sophisticated HF radios. Also, while the antenna construction is easier, feeding the antenna is not. Because of feedline losses found in coaxial cables, hardline is often used. In addition, you must use the correct low-loss splitters for feeding multiple Yagis in the array.

While there is some EME activity on 33 cm (902 MHz), the next most popular band is 23 cm (1296 MHz). Here the antenna of choice is the dish. With a circularly polarized feed, antenna cross polarization and Faraday rotation almost become imperceptible. Also, sky noise is even less of a factor on this band than it is on 70 cm.

Above 23 cm most EME is experimental. Only a few operators are found regularly on 13 cm; fewer still operate on 9, 5, or 3 cm. While conditions are such that Faraday rotation and sky noise cease to be problems, other challenges crop up. Equipment availability is the chief difficulty. Learning how to operate with Doppler shift that takes place over tens of kilohertz is another.

It's important to note that sequencing on these higher frequencies is a bit different. Rather than lasting 2 minutes, your transmissions will be 2 1/2 minutes long. The last half minute is either reserved for signal reports or nothing, depending on what you've heard from the other station.

Signal reports are also different. While the letters T, M, and O are the same, their meanings are a bit different. The "T" means "I can hear something"; "M" means "I have picked up fragments of callsigns"; and O means "I have copied complete callsigns." While an M is sufficient on 2 meters, an O is required on 135 cm and above.

This said, there is an exception to these differing procedures. Operators on 135 cm tend to use either the 2 meter or the 70 cm routines, depending on their background. Those who have operated more on 2 meter EME tend to stick with that method, while those who operate on 70 cm prefer that procedure. Thus, when you set a sked on 135 cm, make sure you and the other operator agree on the method of sequencing.

Software

The Moon's orbit is highly visible. However, the well-equipped EME operator wants to plan his or her schedule. In order to do so, you need a good EME tracking software program. One of the longest running programs is *Skymoon*, written by Dave Blaschke, W5UN. To find out more about it, visit his URL at <http://web.wt.net/~w5un>.

William Hewlett

One cannot go to a VHF weak-signal conference and not pass by the table where the preamps are being measured for gain and noise figure and notice the HP spectrum analyzer perking away. When I worked in the calibration lab at the Naval Ocean Systems Center in San Diego in the 1980s, our principal pieces of test equipment were HP products. On my desk today sits my HP scanner and HP printer. Such is the impact of the company called Hewlett-Packard, or HP for short.

Founded in a garage in Palo Alto, California in 1939 by William R. Hewlett and David Packard, the company is now known the world over for its wide range of electronic products. This past January 12th, with the death of Hewlett, the electronics industry lost the second half of the company's founding fathers (Packard died on March 26, 1996.).

While it is believed that Hewlett was never a ham, his company provides many hams with employment. With the amount of cars in an HP employee parking lot sporting ham radio license plates and antennas, one driving into it would think that he or she has arrived at a ham radio convention.

Hewlett and Packard will be remembered for a long time for their contributions to the industry and our hobby. In a small way the State of California has contributed to making that happen. The legendary garage mentioned above is known as the birthplace of Silicon Valley and has been designated a California state historical landmark.

And Finally . . .

Almost all of this column has been devoted to EME operations. It is my hope that you will seriously consider this exotic mode of weak-signal VHF communications. I hope to hear from you concerning your new interest on the Moon or whatever other weak-signal activity you might be trying out.

73, Joe, N6CL

Magic In The Sky

BY JEFF REINHARDT, AA6JR

New Views of Amateur Radio

Cleaning Up Our Act

What we have here is a failure to communicate. The line was magnificently delivered by actor Strother Martin in the classic movie *Cool Hand Luke.*

There are a lot of good things about amateur radio. There are even *some* good things about 80 meters. Then there are certain morons who conduct "nets" on an almost nightly basis, filling the airwaves with vile language, crude attempts at humor, racial epithets, sexist comments, and hatred for government in all its forms; subjecting as many of us as possible to their utterances because they need a kilowatt or more to hold "their" frequency, even though they communicate about 500 miles or less. This is not to castigate those who participate in genuine, worthwhile nets. There are a few. Too few.

Ham Radio's "Problem Children"

You may have heard these "problem children" on the air. In California one net tending toward the moronic is on 3.913 almost every night, but there are many others. These are people who "own" the frequency. Their gutter language is a special treat when you're attempting to demonstrate ham radio to a Cub Scout group or you have a guest such as a clergyman or city council member in front of the radio. Think it can't happen? Think again.

One particularly challenged individual who frequents 3.913 seemingly can't utter a sentence without "goddam" in it at least once, sometimes two or three times in the same sentence, exhibiting particular creativity in hyphenating words with the expletive. It took a while to get his call because one of the other cute techniques used by these brave individuals is to "ID" all at once, on cue (apparently one of them has learned to tell time). This can be viewed as a deliberate attempt to obscure the calls of the parties, who apparently are afraid to ID in the clear. Doing it all at once makes for safety in numbers. Rats have some of the same instincts but are somewhat more talented. In other instances these folks don't bother to ID at all, sometimes for an hour or more. I understand that can occur when the one who can tell time is not on the net.

Sometimes the denizens of these "nets" derive enjoyment from setting up "their net" next to another established "net" before it goes on the air at a scheduled time, just to annoy the participants of the other net. This is apparently great entertainment, because they can tell the other net to "get lost, we were here first." Some of the participants of the 3.913 group in California have taken great pleasure in bragging about displacing a popular "worked all states net." It's an "achievement" that obviously brings them satisfaction.

Some real humor is often achieved by these idiots, but it's nearly always unintentional. One day I heard a conversation lamenting the lack of society honoring the values found in the *Bible.* Not two minutes later someone was being pronounced as a "goddam idiot" because he didn't notice the speaker got too much change from a merchant. "He was too goddam dumb to count, so I kept the money." Yep, give me that old-time religion. (Got at least three "moving violations" of the Ten Commandments in one sentence!)

I was further amused at a lament last year about the "dumbing down" of ham radio with license restructuring, how the whole hobby was going to hell in a handbasket. It went with the sentiment that all our public schools are crap and can't teach kids anything. Not like the "good ol' days." Moments later one of the participants told another he was going to take his Extra test now, because he couldn't pass the math element of the Advanced test when it was still offered.

A Special Case

If you're from "the gummint," you're a special case; you can never do anything right. You're a crook, probably on the take. You're no good and best of all, you're hatching plots to place people in concentration camps. The nets in the northeast seem to have placed the concentration camps in Colorado or Wyoming, while the guys out west have them in Vermont or New Hampshire, "or one of them New England states, I can't never keep 'em straight." However, *everyone* knows they're there.We'll all be taken there in black helicopters, too—right after they take away all our guns.

I have nothing against responsible gun owners (I am one and I know many), but to be a member of some of these nets it's apparent you don't own the gun(s), *the gun owns you.* To some, their weapons are apparently the most important things in their lives and they need ham radio to inform the world about it! And could someone please tell me how you could keep secret a concentration camp that will hold 270 million people—and fit it in Vermont?

Now I acknowledge that rights to owning firearms and freedom of speech are elemental to our Constitution. What is unsaid but implied is that one must be responsible in the use of those freedoms. You can't yell "fire" in a crowded theater and claim constitutional protection. You can call me old-fashioned, but it bothers me to hear people trashing our government night after night with outright lies and fabrications, when that same government is responsible for safeguarding the privileges that you and I enjoy as licensed amateur radio operators, and so much more (*including their right to publicly badmouth the government—ed.*).

These morons wouldn't last five minutes in many other countries. That doesn't make those countries better than ours. It just proves that in this country you're free to be as ignorant as you want. Some of the operators on 80 meter nets are not only taking the fullest advantage of that opportunity, they're proclaiming their achievement on the air, almost every night. There may be many constructive, creative ways to improve government; I've just never heard them discussed on 80 meters.

One recent evening, while working on this article, the airwaves were treated to over two hours of discussion on how to maim human beings with a firearm; what the best ammunition is, where to aim, and which weapons can do the best job. And we wonder why other nations consider us a brutal society.

That's not to say one can't talk politics or other hobbies on ham radio, although it wasn't long ago when talk of religion or politics on the ham bands

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was considered to be "bad form." Maybe it still is. However, before spouting venom, one should make the effort to verify information. I'm very doubtful about the stability of persons who claim to "know" about the U.N. takeover of the USA that's "gonna happen" on January 20, 1996. Oops, it slipped to 1998. Sorry, make that January 1, 2000. Well now, it's 2001 and the plot is updated with Clinton refusing to leave office and enforcing a new government with U.N. troops. (These guys are *sure* of their information, but the plotters are apparently giving them the wrong takeover dates. Maybe they need to visit those concentration camps and get the info right from the source.) If all of this sounds silly to you, think of how it must sound to listeners in other countries, many of whom would give anything to live in America.

I also believe one has the obligation, at all times, to speak on ham radio in a manner suitable for all mixed company, including women and children. I won't go into the racial remarks I've heard. There have been many and they make me sick. They have no place in society, let alone on the ham bands.

So why do I honor these esteemed individuals with valuable space in this publication? Because they're the best argument anyone can make for using ham frequencies for some other, commercial, purpose. Wouldn't it be wonderful to reclaim 75/80 meters for QSOs that are fun, enlightening, and entertaining, *before* some enterprising commercial broadcaster plays a tape of these morons at the next international radio conference? Wouldn't it be a pleasure to call CQ and not get chased off the frequency because "our net uses this frequency every night and we start in ten minutes"? One female Extra class ham reports when attempting a contact on 80, she was told to "get off the band and go back to the YL net where you belong." Never mind the moron issuing the "instructions" had a lower class license and no personal class at all.

Let's Take Action

Help take back the amateur bands for the "real" hams among us. If you hear foul language on the air, let the speaker know you find it objectionable. That can be on the air or by sending a note to him at his published address. If it's on the air, he and his friends will predictably curse at you. Let it go; you've made your point. If they hear from enough of us, they might just get the message. We can also hope that the FCC continues its enforcement efforts, particularly regarding the operators who don't identify or those who deliberately attempt to obscure their calls through "group" identification. For those of you who are die-hard freedom-of-speech advocates, the FCC has reiterated that the terms you agreed to when you applied for a license are enforceable, specifically the prohibition applying to "obscene or indecent words or language" (FCC Rules Part 97.113.4). I'm no prude, and some of my former college roommates will attest to that. There may be a place for vulgar language. Ham radio is not that place, and I'm one "sumbitch" (another 80 meter favorite) who says so.

Riley Hollingsworth, K4ZDH, of the FCC adds, "Every time a licensee carries on like that on the air, that person takes the Amateur Radio Service one step closer to extinction. Spectrum is worth a fortune, and we will never keep it by making fools of ourselves in using it. American operators are all too often the subject of ridicule in other countries."

Hollingsworth continues, "I would also add that this infighting among amateurs will only lead to disaster. There are enough threats on the horizon as it is, and they will require a united front to get through them. The proliferation of Part 15 devices and resulting interference, and unlicensed operation on 10 meters, for example."

One might also ask the FCC to consider more enforcement on the indiscriminate use of amplifiers on 75/80. What I hear does not often comply with using the "minimum amount of power" needed to maintain a contact, as specified in the rules. Far from it. What seems to be the normal practice is to use the maximum amount of available power to deter others in as wide an area as possible from using the frequency. Never mind we're all in Arkansas and we don't talk to anyone from out of state! By the way, I've worked all 50 states and several countries using 100 watts or less on 75/80, with a less-than-ideal antenna arrangement. Does one really need a "California Kilowatt" to maintain a net in Rhode Island? Using less power means more people can enjoy the band. It's that simple.

Now why can't I take the advice of some folks and either turn off the radio or find another frequency? I didn't get a license and spend the money on a radio system with the intention of letting others dictate when I turn it on or off. Neither did you. By turning our backs on the morons, we're giving them exactly what *they* want and depriving the majority of what *we* want. The result of turning our backs to this problem has been the loss of 75/80 meters as a band where hamming can be fun, educational, and enjoyable, particularly in the "prime" evening hours.

To any operators who see themselves as "picked on" by this article, take comfort in the fact that I did not include your callsigns in this piece. I could have, and some say I should have. Consider this an opportunity to wake up and improve your on-air conduct. I may not be so restrained in a follow-up to this effort.

To go back to *Cool Hand Luke*, the "failure to communicate" could well rest with you and me. Like most schoolyard bullies, these morons will continue until someone stands up to them. However, it takes guts, just like it took guts for *CQ* to publish this piece. These irresponsible operators don't add to the Magic In The Sky; they detract from it mightily. The ham bands will be a better place without their racist, sexist, fascist garbage-mouth mentality.

73, Jeff, AA6JR

DX

BY CARL SMITH, N4AA

News Of Communication Around The World

Stop and Listen!

You'll have to pardon me for taking to my soapbox this month, but I feel strongly enough about this to devote space to the subject.

I've been listening to DX pile-ups for over four decades, mostly CW, but I do listen to SSB, too. I could quote DXpedition after DXpedition commenting on the outstanding operating habits of the Japanese operators. Surely you have read those comments over the years. The Japanese still practice old-fashioned courtesy and common sense when calling a DX station. They *listen,* they give their callsign a few times, and then, wonder of wonders, they *stop talking and listen* to see to whom the station came back. As the years pass I hear more and more of the constant calling, yelling, screaming, repeating of callsigns, over and over and over again even if the DX station has already identified a station and given a signal report. Folks, if you don't listen you'll never know if the guy comes back to you. If he came back to someone other than you, he certainly can't hear you no matter how many times you give your call. If you are not hearing the DX station well enough to be able to tell to whom he came back, *why are you calling anyway!?*

Most of these DX stations are operating "split," listening up 5, 10, 15 kHz or so. Chances are he will be on the air for a period of time after you first hear him—or see him spotted on the cluster network—so *slow down.* Again, *listen* to what the guy is saying. Where is he listening? Is he moving each time he makes a contact? Is he moving up or down to find another station to work? Is he working by call areas or some other method to minimize the QRM? If you just slow down and *listen* to what is going on you, stand a much better chance of working the station in a reasonable amount of time. Of course that "assumes" that you are a typical DXer and don't have 10 KW and 8 over 8 over 8 at 200 feet above salt water.

A good friend of mine who has been at the top of the Honor Roll for a long time recently started chasing DX with QRP (10 watts or less). In less than a year he has worked over 230 entities on

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Luis, ZP7FRA, has over 300 confirmed now. Current gear includes a TS450/TL922A setup with a 4-element on 20, 15, and 10, plus an A3WS for 12 and 17, along with assorted wires for the lower bands. He says he likes all the high bands and only works SSB. (Photo courtesy John, KDØJL)

CW and over 130 on SSB. Oh, sure, he has better than average antennas, of the single Yagi type at roughly 100 feet, but not huge stacked mono-band arrays. Of course he came from the old school and learned to *listen* before engaging his vocal cords or hitting the CW key.

Several months ago I talked about a book called *The Complete DX'er, 2nd Edition,* by Bob Locher, W9KNI. After listening to some of the pile-ups during the winter months, I went back to Bob's book and looked up some of his thoughts/ideas. Keep in mind that this book was published in 1989. His comments on chasing DX and how to "do it right" were appropriate 12 years ago and are most certainly appropriate today. The *ARRL Handbook* contains a DX Operating Code that conveys the same thoughts that Bob Locher provided years ago: *Listen; do not* call a DX station on his frequency or because you hear someone else calling him. Observe calling instructions from the DX station.

It's no wonder we have trouble attracting more people to the fun of DXing. Listening to some of the inappropriate comments and language heard on the bands in the past few months, I'm not sure I would want to invite a newcomer to hear that stuff. There's no way you can justify this type of behavior and language to anyone you are trying to impress.

I don't mean to imply that DXers are all "bad," but we certainly do have a segment who doesn't seem to care what they say, or to whom, as long as they "get in the log." Excessive power, inappropriate language, bad manners, lack of courtesy and respect for others seems to be their way of getting what *they* want, regardless of its effect on others. In a conversation a while back on this subject, I told someone that as a teenager just getting into DXing I really looked up to DXers as the "cream of the crop" in amateur radio. Unfortunately, in recent years it appears that some of that cream has soured.

We as DXers should think long and hard about the legacy we are leaving for those who follow us. Do we want future amateurs to look at DXers as the "cream of the crop" or the "soured cream"? It is our responsibility to be the leaders and show by example the lessons spelled out by Bob Locher to "do it right." Are

Vadim, 4X4FJ, shown here operating as 4XØA, the only Israeli IOTA—Akhziv Island, AS-100. (Photo courtesy John, KDØJL)

Todd, Z34A/Z39T, has logged nearly a half-million QSOs in his 21 years on the air. He stands at 317 confirmed. Todd uses a homebrew 2-element, 6-band quad for 14–50 MHz. Forty-six different awards decorate his ham shack. (Photo courtesy John, KDØJL)

you up to the task? To do less would be a disservice to amateur radio, DXing, and yourself. I hope we can regain the respectability that we once enjoyed among our fellow amateurs.

As long as I am on the subject, and I mentioned bad manners above, I have to comment on something I heard on 20 meters SSB just this past week. There was a station in the Caribbean, not a rare place by any means. He was working a lot of stations both US and elsewhere. This was not a contest operation, but apparently just someone on the island for a holiday and playing radio. While I was listening, a station from the US west coast called him. It was obvious, even to a casual observer, that this was an older individual who was probably not a DXer. He seemed to be hav-

The WPX Program

SSB

2778 .....S57MVD

Mixed

1873.....PY1NEW

CW

3054.....7N2JZT 3055 .....IK5QPS

CW: 700 E4/G3WQU. 800 WA2VQV, AI9L. 950 F5MQW. 1500 IK2ECP, JA8AJE. 1900 EA7AAW. 2000 S51NR. 2050 I7PXV.

SSB: 950 S57MVD.

MIXED: 1050 PY1NEW. 1200 WZ4P, 7N2UTO. 2100 JN3SAC. 4800 W2FXA.

Asia: 7N2JZT.

Award of Excellence: EA5AT

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, KBØG, 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, K1NU, W1TE.

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, RW9SG, K1NU, W1TE.

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.

5 Band WAZ

As of November 30, 2000, 544 stations have attained the 200 zone level and 1175 stations have attained the 150 zone level.

New recipients of 5 Band WAZ with all 200 zones confirmed:
None

The top contenders for 5 Band WAZ (zones needed, 80 meters):

N4WW, 199 (26)
W4LI, 199 (26)
K7UR, 199 (34)
W0PGI, 199 (26)
W2YY, 199 (26)
VE7AHA, 199 (34)
IK8BQE, 199 (31)
JA2IVK, 199 (34 on 40m)
AB0P, 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)
HB9BGV, 199 (31)
K4IQJ, 199 (23)
K3NW, 199 (23)
UA3AP, 199 (6)
OH2VZ, 199 (31)
K2UU, 199 (26)
W1FZ, 199 (26)
K9GX, 199 (26)
UT4UZ, 199 (6)
SM7BIP, 199 (31)
N3UN, 199 (18)
EA5BCX, 198 (27,39)
G3KDB, 198 (1,12)
KG9N, 198 (18,22)
K0SR, 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)
W5BOS, 198 (18,23)
N2QT, 198 (23,24)
OK1DWC, 198 (6,31)

The following have qualified for the basic 5 Band WAZ Award:
W8AEF (190 zones)
K8EP (152 zones)
W8UZ (150 zones)

Endorsements:
HC8N (194 zones)
K7FL (196 zones)
DL3JJ (200 zones)

****Please note: Cost of the 5 Band WAZ Plaque is $80 ($100 if airmail shipping is requested).**

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 the 5BWAZ award is $10.00 for subscribers (please include your most recent *CQ* mailing label or a copy) and $15.00 for nonsubscribers. An endorsement fee of $2.00 for subscribers and $5.00 for nonsubscribers is charged for each additional 10 zones confirmed. 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 at e-mail: <k5rt@cq-amateur-radio.com>.

The WAZ Program

Single Band WAZ

10 Meter SSB

511 ..... JA1PAP 512 ..... JA4GXX

15 Meter SSB

545 ..... DL2CHN 546 ..... IK1PFE

17 Meter SSB

23 ..... IV3BKC

20 Meter SSB

1072 ..... VE7SMP

10 Meter CW

159 ..... W7GA

15 Meter CW

285 ..... YB0ECT

20 Meter CW

510 ..... RN9HM

All Band WAZ

SSB

4612 ..... DL8UO 4615 ..... JH4BTI
4613 ..... CX4ACH 4616 ..... DK7SL
4614 ..... WB7EBR 4617 ..... G3LZQ

Mixed

7994 ..... AB1BX 7998 ..... F6FFM
7995 ..... KF8OR 7999 ..... JK1QJE
7996 ..... JA2EOW 8000 ..... IK4IDF
7997 ..... S55SL 8001 ..... JA1CPS

All CW

217 ..... K8EP 220 ..... SP3FZN
218 ..... K9WYP 221 ..... JA5AB
219 ..... IK0IXI 222 ..... G3LZQ

RTTY

126 ..... DL3IAC

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>.

ing trouble with the "funny" callsign of the Caribbean station and asked a few times for a repeat of the call. The DX station sounded irritated because this K7 asked him to repeat his call. Finally, the K7 managed to get the call and commented that he had his grandchildren there and asked the DX station to tell them where he was. Talk about bad manners: The DX station ignored the question and went on to work two or three other stations. The K7 finally called him again, and the DX station sounded quite irritated, saying something like, "I've worked half a dozen stations since you called me," and proceeded to work more stations, leaving this poor guy and his grandchildren sitting in the dust. Quite an impression this DX station made on this grandfather, and especially the kids. I'd be willing to bet they would not be interested in learning any more about DXing after this experience.

A little common courtesy and respect for others goes a *long* way toward making amateur radio a great pastime. Is it too much to ask? I don't think so. How about you?

DXpeditions

There are a few operations from around the world that either have occurred by the time you read this or are scheduled for this month. Several of these are much-needed entities.We start off the list with 3Y0C.

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 333 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 333	K2JLA 332	N4JF 331	K8PV 327	IT9TQH 326	YU1AB 325	VE7DX 320	K9FYZ 313	K9HQW 299
K2FL 333	K4CEB 332	W6DN 330	W4QB 327	4N7ZZ 326	K8LJG 324	W4UW 319	K9DDO 312	F6HMJ 296
K6JG 333	WØHZ 332	G4BWP 330	I1JQJ 327	VE7CNE 326	DL3DXX 324	HA5NK 319	W3II 312	WG7A 295
K9BWQ 333	W7CNL 332	EA2IA 330	N5FG 327	WA8DXA 325	I2EOW 324	SM5HV/HK7 317	N4OT 311	W9IL 282
K2ENT 333	N7RO 332	W8XD 330	I4EAT 327	N5FW 325	N4AH 324	G3KMQ 317	KF8UN 308	EA3BHK 282
N7FU 333	K6LEB 331	W2UE 330	DL8CM 327	IK2ILH 325	LA7JO 324	K7JS 317	WG5G/QRPp 307	F5OIU 282
K3UA 333	YU1HA 331	KZ4V 329	SM6CST 327	9A2AA 325	NØFW 324	YU1TR 316	W7IIT 305	YC2OK 282
K9MM 333	WA4IUM 331	K4CN 329	N4KG 327	OK1MP 325	W6SR 323	K8JJC 315	W6YQ 305	XE1MD 278
K2OWE 333	F3AT 331	K9IW 329	WØJLC 327	W4LI 325	9A2AJ 323	IKØADY 315	KE5PO 304	EA2CIN 278
N4MM 333	W2FXA 331	IT9QDS 329	I4LCK 327	K3JGJ 325	KUØS 322	OZ5UR 315	N7WO 303	I3ZSX 276
W4OEL 333	PT2TF 331	K4IQJ 328	KA7T 327	K1HDO 325	HA5DA 321	K1FK 315	LU3DSI 302	G3DPX 275
W7OM 333	K6GJ 331	WB4UBD 328	N4CH 327	I5XIM 325	K6CU 321	HB9DDZ 314	PY4WS 302	
F3TH 333	K2JF 331	DJ2PJ 328	K7LAY 326	K5UO 325	K7JS 321	N1HN 313	YU7FW 301	
WB5MTV 333	W1WAI 331	PAØXPQ 328	NC9T 326	N5HB 325	K4JLD 321	CT1YH 313	KH6CF 300	

SSB

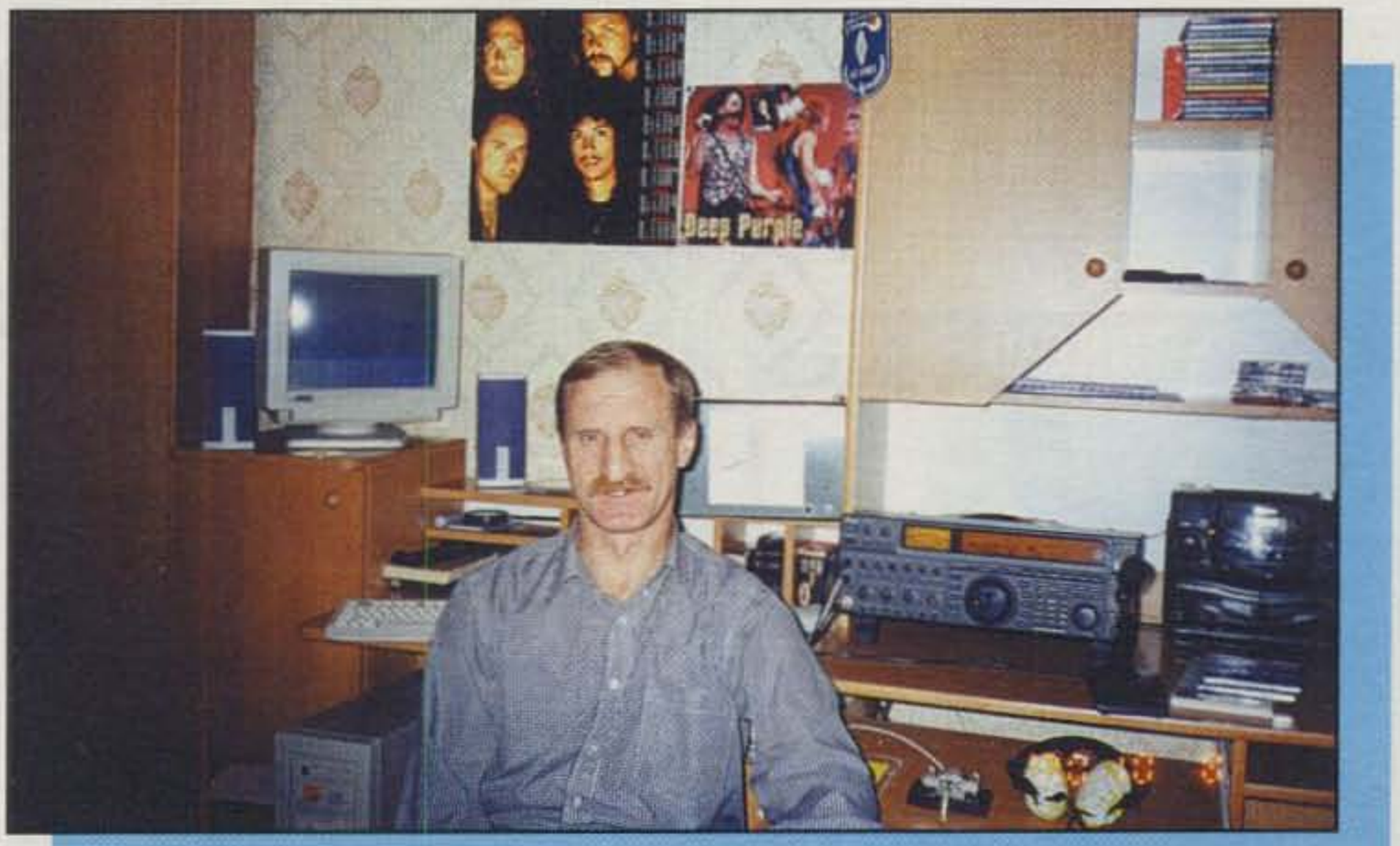
K4MZU 333	N7RO 333	EA4DO 331	WS9V 329	KX5V 327	IKØIOL 325	DL3DXX 320	WR5Y 310	KK4TR 286
K2TQC 333	IK8CNT 333	PT2TF 331	I2EOW 329	IT9TQH 327	YV5AIP 325	AE5DX 320	K7HG 309	RW9SG 286
K2FL 333	K5TVC 332	XE1VIC 331	K2JF 329	IT9TGO 327	K9IW 325	KB1HC 320	EA3BHK 307	VE7HAM 285
W6EUF 333	DJ9ZB 332	W3AZD 331	W7FP 329	WD8MGQ 327	WA4JTI 325	EA1JG 320	N1ALR 306	F5RRS 284
K2JLA 333	K9BWQ 332	WA4WTG 331	DU1KT 329	I1EEW 327	W8KS 325	EA7TV 320	XE1MDX 305	CT1CFH 284
K6JG 333	KØKG 332	VE4ACY 331	4Z4DX 329	SV1ADG 327	KC4MJ 325	SV1RK 320	EA5OL 305	WØIKD 283
K6GJ 333	W4NKI 332	EA1JG 331	VE7DX 329	DL8CM 327	K3JGJ 324	N6RJY 319	YT1AT 305	EA3CYM 283
K2ENT 333	W4UW 332	W6DN 330	K4CN 329	KE4VU 327	IØSGF 324	CT1EEN 319	WB2AQC 305	K7ZM 282
K6YRA 333	OE7SEL 332	ZL3NS 330	VE4ROY 329	I1JQJ 327	AC7DX 324	WA4DAN 319	K6CF 304	WN6J 281
K4MQG 333	K4JLD 332	XE1AE 330	ZL1AGO 329	F9RM 327	KØHQW 324	EA3EQT 319	KC4FW 304	CP2DL 281
K7LAY 333	I8KCI 332	K3UA 330	N5FG 329	XE1MD 327	ZL1BOQ 324	CE1YI 318	EA5GMB 304	F5JSK 281
IK1GPG 333	OE2EGL 332	VE3MRS 330	VE2GHZ 329	I4EAT 327	EA3BKI 323	EA5GMB 317	YC2OK 303	N5WYR 281
K5OVC 333	WB4UBD 332	WA4IUM 330	W2JZK 328	CT1EEB 327	K4JDJ 323	YV4VN 317	WB2NQT 303	YU1TR 280
NØFW 333	WØYDB 332	YV1KZ 330	YV1JV 328	W2CC 327	W9IL 323	CT1AHU 316	VK3IR 303	KK5UY 280
OZ5EV 333	WB3DNA 332	YV1AJ 330	KZ4V 328	W9OKL 327	WW1N 322	N5HSF 316	W5GZI 302	EA3CWT 278
K9MM 333	EA2IA 331	I4LCK 330	WDØBNC 328	W5RUK 327	F6BFI 322	K6RO 316	N5QDE 302	N1KC 278
ZL3NS 333	N4JF 331	4N7ZZ 330	K1HDO 328	DL6KG 326	LU7HJM 322	K7TCL 315	KD4YT 302	9A9R 277
N4MM 333	VE1YX 331	YV1CLM 330	KF8UN 328	W6SR 326	K5NP 322	WB8ZRV 314	SV3AQR 302	VE2DRN 277
OZ3SK 333	VE3MR 331	K8CSG 330	K5UO 328	N4KG 326	NI5D 322	WA4ZZ 314	LU3HBO 301	XE2NLD 277
N4CH 333	K1UO 331	W2FXA 330	N5ZM 328	W4QB 326	PY2DBU 322	NØMI 313	YT7TY 300	W6UPI 276
IØZV 333	W6BCQ 331	XE1L 330	PAØXPQ 328	K8PV 326	YZ7AA 321	K9YY 313	LU5DV 300	VE2AJT 275
YU1AB 333	YV5IVB 331	W8ZET 330	W6SHY 328	KD8IW 326	N3RX 321	KD5ZD 312	SV2CWY 300	Z31JA 275
W7OM 333	VE3XN 331	VE7WJ 330	K9PP 328	W4LI 326	EA8TE 321	VE3CKP 311	K6GFJ 299	KA5OER 275
KZ2P 333	PY4OY 331	LA7JO 330	K9HQM 328	K6BZ 326	XE1CI 321	CT1YH 311	4X6DK 295	
K7JS 333	I8LEL 331	W9SS 330	AA6BB 327	W4WX 326	W6MFC 321	W5OXA 311	OA4EI 292	
DU9RG 333	OE3WWB 331	VE2WY 330	SM6CST 327	W2FKF 326	KØFP 320	WX3E 311	KØOZ 291	
W4UNP 333	DL9OH 331	W8AXI 330	W3GG 327	KE5PO 325	N4CSF 320	HA6NF 310	KE4SCY 291	
N7BK 333	K9FYZ 331	VE2PJ 330	CX4HS 327	N2VW 325	N4HK 320	K3LC 310	YV5NWG 287	

RTTY

K2ENT 331	W2JGR 316	NI4H 305	I1JQJ 289	EA5FKI 284	YC2OK 280	I2EOW 278	KE5PO 274	PAØXPQ 272
WB4UBD 325	K3UA 315	W4EEU 291	G4BWP 287	W4QB 280				

3YØC from Bouvet should be wrapping up his operation about the time you read this column. Astronaut Chuck Brady, N4BQW, has been on the island since mid-December, braving the elements and assisting a team of Norweigian scientists. In his spare time he managed to provide thousands of contacts with this much-needed entity. I applaud his efforts under far less than ideal conditions from the weather as well as the on- the-air difficulties.

D68C from Comoros was scheduled to be active for nearly three weeks in February. This DXpedition, under the banner of "5 Star DXers Association," was to be a major effort with a large group of 28 operators and tons of equipment for the long stay at Comoros. The ops came from all over the world. The 5 Star DXers Association was formed after the very successful February 1998 Chiltern DX Club (CDXC) 9MØC Spratly Islands DXpedition. It is associated with



Sergey, RZ9IZ, has been on the air since 1986. He prefers 20, 15, and 10 meters SSB and CW. His QSL cards show a snow-covered area of western Siberia. (Photo courtesy John, KDØJL)

QSL INFORMATION

1SL1J to K7CO
3B8/DL7DF to DL7DF
3D2CQ to N6PEQ
3DAØAA to W5AHC
3DAØNL to ZS6ANL
3S2AU to Z32AU
3V8ST to DL1BDF
3W2B to XW2A
3W2LWS to WA1LWS
3W2YL to JR3MVF
3YØC to WA4FFW
3ZØKOR to SP4KSY
3Z1MHV to SP1MHV
4K5CW to PA3EPG
4K9C to PA3EPG
4N1KW to DJØLZ
4S7WHG/A to G3SWH
4X3A to WA4WTG
4X4NJ to WA4WTG
5C8M to DL6FBL
5P1ER to SM6CAS
6Y7A to KN5H
7S5Z to SMØUXX
8P9FX to G3RFX
8P9Z to K4BAI
8Q7RR to IZ1CRR
8Q7TX to DL5XAT
8Q7WW to DL5XAT
9A2L to 9A3AG
9G5EE to PE1LUC
9G5GM to PA3GGM
9G5WP to PE1PFN
9H1EL to LA2TO
9H1EU to WA4JTK
9H3MM to DF4SA
9K2LOW to 9K2RA
9K9Z to W8CNL
9M6CTT to JA8CCL
9M6HTT to JF1SQC
9M6LFT to JM1LJS
9M6NNT to N7NU
9M6NXT to N4NX
9M6NZT to N6NZ
9M6RET to W7RR
9M6SMT to JF1SQC
9M6TA to W7YAQ
9M8CC to PB4CC
9N7RB to W4FOA
A35MO to OM2SA
A35RK to W7TSQ
A35TO to OM2SA
A41KJ to N5FTR
A52AP to N2OO
A52CO to UA9DD
A52DX to JH8DEH
A52FH to F8RZ
A52VJ to KL7YL
A52XX to JA1PCY
A52YL to NØMAJ
A61AJ to W3UR
B7K to W2AY
BT4ARDF to LZ1ZF
BV1US to K4MPI
3A2MD to Laura Marcelle Airaldi, 73 Bd du Jardin Exotique, 98000 Monaco,PTE,Monaco
3B8GD to Mohammad Iqbal Muttur, 69 Dr Ferriere Avenue, Stanley, Rose-Hill, Mauritius Island
3D2DI to W.J. Smith, P.O. Box 184, Suva, Fiji
3V8BB Nov. 24–26, 2000 to YT1AD, Dr. Hrane Milosevic, 36206 Vitanovac, Yugoslavia
3V8BB Jan. 4–6, 2001 to IK7YZG, Antonio Cicerale, Via Risorgimento 99, 71016 San Severo - FG, Italy
3W1A any operation in year 2000 is a pirate
4S7NB to Ananda Wettasinghe, 28 6th Lane, Nawala Rd., Rajagiriya, Sri Lanka
4S7NE to Nelson Ranasinghe, Radio Monitor.Stn, Kadirana, Negombo, Sri Lanka
4U1UN to UN Amateur Radio Club, P.O. Box 3873, New York, NY 10017 USA
5B4AGN to Bob Henderson, P.O. Box 62155, Pafos 8061, Cyprus
6Y5DA to Donald G Ashdown, 18 Villa Rd., Mandeville, Manchester, Jamaica, W.I.
7M4PTE to Kazunori Abe, 7-12, Kagura, Ashhikawa 070-8007, Japan
8P9HU to K3KG (K4BAI for 1987), John W. Satterthwaite, 6899 N Lakeview Dr., Salado, TX 76571 USA
8R1AK to Esmond L. Jones, P.O. Box 10868, Georgetown, Guyana
9L1GG 1980s contacts to ZP6CU, Dani Woolley, P.O. Box 73, Caacupe, Paraguay
A92ZE to Capt. Julius Gostel Jr., PSC 451, Box 1198 FPO AE 09834, USA
AP2NK to Nasir H. Khan, P.O. Box 1944, Islamabad 44000, Pakistan
ATØJH to Box 15, Secunderabad 500003, India
C6AHN to KC4SZE, Kenneth A. Helton, P.O. Box 372, Cullman, AL 35056, USA
CN8YR to Mohamed Agayr, 72 Rue Brahim Nakhai – Maarif, Casablanca, Morocco
CT2FUP to P.O. Box 39, 2520-349 Peniche, Portugal
CT3BX 2000 to DJ6QT, Walter Skudlarek, an der Klostermauer 10, D-63697 Hirzenhain, Germany
DL6FBL to Bernd Och, Chr.-Wirth-Str. 18, D-36043 Fulda, Germany
DL7VOG to Gerd Uhlig, P.O. Box 700 332, D-10323 Berlin, Germany
EA6IB to P.O. Box 1166, 07800 Ibiza, Balearic Islands, Spain
EA6NB to Jaime Perez, Ullivarri Cortes Apartado 5, 07193 Palmanyola, Mallorca, Spain
EA6TC to P.O. Box 1527-Airport, 07817 Sant Jordi - Ibiza, Spain
EA9IB to Pedro J. Ruiz, P.O. Box 213, Mellia, 29880, Spain
EI2ØØØ to Irish Radio Transmitters Society, Box 462, Dublin 9, Ireland
ET3AA to Ethiopian AR Society, P.O. Box 60258, Addis Ababa, Ethiopia
ET3VSC to Claudio Vascotto, P.O. Box 20011, Addis Ababa, Ethiopia
F6AUS to Serge Soulet, BP 54, F-79402 Saint Maixent l' cole, France
FG/NØJK to Jon K Jones, 12400 Meadow, Wichita, KS 67206 USA
FG5BG to Georges Santtalikan, 44 Rue Amedee Fengarol, Brest, F-97130 Capesterre Belle Eau, Guadeloupe
GØVAX to Brian Bowers, 23 Rake Close, Upton, Wirral Merseyside, CH49 0XD , UK
GJ2A CQWW CW 2000 to MJØBJU, A J Mourant, Little Mead, Claremont Road, St. Saviour, Jersey, JE2 7RT, UK
HC2BEV to Alex 0tto 0gorodov Rafalsky, Correo Central, Provincia Guayas, Ecuador
HC2DX to Alex 0tto 0gorodov Rafalsky, Correo Central, Provincia Guayas, Ecuador
HFØPOL 2000 to SP3WVL, Tomasz Lipinski, Ul.l Paderewskiego 24m 1 69-100 Slubice, Poland
HI3K to J. Henriquez, P.O. Box 1464, Santiago, Dominican Republic
HL2CFY to 109-903, woo-lim aptment, gongdo anseong, kyeonggi 456-713, South Korea
HL2KV to Michael Chung, P.O. Box 75, Sungnam, 461-600 South Korea
HR1AAB to P.O. Box 1734, Tegucigalpa, Honduras 11101 Central America
IK2HTW to Angelo Morello, Via Adda 4, Angera, VA 21021, Italy
IZ8CCW to P.O. Box 360, 87100 Cosenza - CS, Italy

(The table of QSL Managers is courtesy of John Shelton, K1XN, editor of "The Go List," P.O. Box 3071, Paris, TN 38242; phone 901-641-0109; e-mail: <golist@wk.net>.)

CDXC and the UK DX Foundation. The Team Leader was Neville Cheadle, G3NUG, and the Deputy Leader was Don Beattie, G3OZF.

A **J3** Grenada operation is scheduled for March 30 to April 11. Dee, W1HEO, and Paul, W5PF, will spend two weeks on a mini-DXpedition to Grenada. They will be operating 40–10 meters SSB/CW, and special attention will be given to the WARC bands and the General Class portions of the phone bands. Two 100 watt transceivers plus a beam for 10, 15, and 20 meters and an inverted-Vees for 12, 17, and 40 meters round out the gear. Dee says that J3 calls will be assigned on arrival, but they expect them to be J3/W1HEO and J3/W5PF.

CQ DX Awards Program

SSB

2326	EC5CFL	2329	VE7SMP
2327	HS1NGR	2330	WA2RF
2328	4Z5FL/M	2331	DU1KT

CW

1014	YT1AT	1016	F8PFJ
1015	W4SAA		

SSB Endorsements

320	KZ2P/333	320	VE4ROY/329
320	N7RO/333	320	DU1KT/329
320	DU9RG/333	310	EA5GMB/317
320	EA1JG/331	300	YT1AT/305
320	VE4ACY/331	275	RW9SG/286
320	WA4WTG/331	275	XE2NLD/277
320	W8AXI/330	250	4Z5FL/254
320	VE2PJ/330	200	EC5CFZ/214

CW Endorsements

320	W7OM/333	320	KA7T/329
320	DJ2PJ/332	275	YT1AT/290
320	N7RO/332	250	F5YJ/251
320	K4CEB/332	28 MHz	K6UXO

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 333 active countries. Please make all checks payable to the award manager.

QSL requests should go to the respective home calls direct (with the usual SASE) or via the respective bureaus. In 1999 Dee operated as VK9LM and says he is still getting requests for that operation. Unfortunately, he is also getting requests for "old" operations by someone else who previously held the callsign. He cannot help with anything other than his own 1999 operation.

YK9A from Syria, another much-needed entity, got a lot of attention in mid-February as a team of US ops spent nine days operating from the Syrian Telecommunications Establishment in Damascus.

DXpedition University 2001: An interesting project by Kenny, K2KW, and Tom, N6BT, this is billed as the first of its kind to provide a training ground for energetic radio amateurs wanting to learn the foundational methods and tactics of DXpeditioning. A group of six to ten hams were to go to Jamaica for a teaching/learning experience. The web site <http://pages.prodigy.net/k2kw/dxu/> provides details of the project.

Visalia 2001 International DX Convention

I am looking forward to making the trip back to the west coast April 20–22 for this outstanding gathering of DXers. Sponsored this year by the Northern California group, with an excellent program and great facilities, it is sure to be another one to be remembered. Will you be there? I hope you will, and I look forward to seeing you.

Dayton Hamvention 2001

There's always the Dayton Hamvention to look forward to with all of those goodies to be picked up and all those friends to see. I don't know of any major DXpeditions planning on being there with QSL cards this year, but one never knows. I will be there as usual at my own booth (# 313) and welcome you to drop by and say hello. If I miss you there, perhaps we can share a few words around the *CQ* booth area.

Until next month, have fun, work lots of DX, and as we discussed earlier in this column, please try to "do it right."

73, Carl, N4AA

Contesting

BY JOHN DORR, K1AR

News/Views Of On-The-Air Competition

A Categorical Assessment

March's Contest Tip of the Month

Ever have someone complain about the quality of your signal during a contest? It always seems that your audio is over-processed or you're too broad. On CW you may suffer from some key clicks or multiple signals on the same band. In some cases this is nothing more than being too loud at someone else's station due to location/propagation. However, there are other times when the complaint is legitimate. Why not save yourself some grief by checking out this part of your station before the contest starts? A pre-contest check-up may actually save you time during the contest by identifying equipment problems that can be repaired without using valuable operating time. Also, it just may make our ability to co-exist with non-contesting users on the bands a bit easier. Think about it.

Calendar of Events

Feb. 23-24	**CQ 160M SSB Contest**
Feb. 24-25	REF SSB Contest
Feb. 24-25	UBA DX CW Contest
Mar. 3-4	ARRL SSB DX Contest
Mar. 10-11	RSGB Commonwealth CW
Mar. 10-11	QCWA QSO Party
Mar. 11	North American RTTY Sprint
Mar. 17-18	Bermuda Contest
Mar. 17-18	Russian DX Contest
Mar. 17-19	BARTG Spring RTTY Contest
Mar. 17-19	Virginia QSO Party
Mar. 24-25	**CQ WW WPX SSB Contest**
Apr. 7-8	SP DX Contest
Apr. 7-8	EA RTTY Contest
Apr. 13-15	JA Int'l HF DX Contest
Apr. 14-15	MARAC County Hunter SSB
Apr. 21-22	YU DX Contest
Apr. 21-22	Michigan QSO Party
Apr. 28-29	Helvetia (HB) Contest
Apr. 28-29	Florida QSO Party
Apr. 28-29	Nebraska QSO Party
May 26-27	**CQ WW WPX CW Contest**

Everyone likes to be a winner, and operating contests is no exception. While there are precious few in our sport who can realistically achieve the goal of "winning the contest" and "achieving the prize," contesting's appeal continues to be driven by the metrics of how we score and perform compared to our peers.

The simplicity of the goals for winning is what drives even the most casual competitor towards the prize. While contest rules vary widely from one event to the next, the concept for the most part is determined by who works the most stations in the most places.

With thousands of entrants participating in the largest of contest events, a piece of brilliance (and perhaps common sense) was introduced into contesting many decades ago with the advent of operating categories. In an ideal world, we simply could have lined up all potential contest participants in a race similar to the Boston Marathon, with thousands of competitors ready to go. Some of those competitors are serious enough to get near the starting line at the beginning of the race; others are simply happy to be there with the hope of finishing. Our sport of contesting has many parallels. However, given the desire to claim victory, the notion of operating classes was invented for events as old as the ARRL Sweepstakes, starting way back in the 1930s.

2 Mitchell Pond Road, Windham, NH 03087
e-mail: <K1AR@contesting.com>

What's the Real Reason For Operating Categories?

The genesis for the creation of operator classes has been based on two primary factors:

- A means of supporting different methods of operating that can result in increased interest and participation in the event itself.
- A reward-based system that reaches a broader range of participants who can justifiably call themselves winners.

Contest operating began under the guise of a single operator competing by him or herself against other like competitors. It became quickly obvious that not everyone liked the notion of the loneliness that came with the single operator category. Informal operating events such as ARRL Field Day and even exotic DXpeditions fueled the idea that contesters like to operate as teams as much as they do individually. In a team environment, an entire new realm of operating strategy came to the forefront as new judgment calls were required regarding who should operate and what bands should be used by additional transmitters based on the team's experience and other factors. In fact, the creation of the multi-single (one transmitter, multiple operators) and multi-multi (multiple simultaneous transmitters, multiple operators) categories was an overnight success in many of today's popular contesting events.

While the popularity of single operating has continued to this day, so has the concept of team operating. Multi-operator stations offer many advantages. For starters, they provide a venue for "part-time" folks who don't have the time or interest to dedicate an entire weekend to a contest event. Furthermore, the multi-operator stations add interest to the contest by allowing for additional operating positions to pursue band openings and strategies that typically are ignored by the single operator who, by design, is focussed for the most part on being where the rate is in a given contest. In fact, the titan of all multi categories, multi-multi, has created a competition within the competition, as operators claim victory when "winning their band," regardless of how the ultimate station victory turns out.

One of the other operating classes that has emerged over the years is the single band category. This is a great way to operate contests, especially if your station's antennas are limited on one or more bands yet you still want to operate in a competitive setting. Others have chosen the route of the single band because it sometimes can reduce the physical/time commitments presented by the all band categories. For example, an operator participating as a monoband 10 meter entry certainly can count on several hours of sleep that are not available to the single operator who burns his extra operating time on the low bands. As a rule, there are many single band categories where the competition is reduced, which can result in a winning effort and a certificate/trophy that would not necessarily be possible in other operating classes.

Too Many Categories?

In recent years there has been a trend that needs to be discussed in this column—the proliferation of contest categories. While the creation of new categories when done in the spirit of increased participation is a good thing, it's an action that has significant impli-

High-Claimed Scores
2000 CQ WW VHF Contest
USA
Single Operator

All Band

W3SE/6.....75,990
K2DRH/9.....57,129
K9HUY/4.....37,846
W6OAL/Ø....36,840
K8TQK.....34,985
KB8U.....31,304
K2SMN.....27,887
W1XX/2.....26,676
NJ2F/4.....25,070
W3ZZ.....24,288

QRP

KA5GLX.....5,376
N8XA.....4,326
WØKFG.....3,139

6 Meters

KØGU.....96,220
WD5K.....46,580
N2ODU.....35,056
NW5E/4.....13,674

2 Meters

K5ZG/8.....9,384
KØMQS.....6,642

Rover

W4VHF/R....28,634
N6DN/R.....15,928
N4OFA/R..... 8,650

Multi-Operator

NØKE.....66,930
NØVSB.....28,896
K6FQ.....18,873

DX
Single Operator

All Band

VE4KX.....16,356
VE9AA..... 5,978

6 Meters

AN6SA.....83,398
TI5KD/2..... 5,712
CO2OJ..... 2,050

QRP

VE1SKY..... 1,247

2 Meters

TI2ALF..... 240

Multi-Operator

YMØKA.....103,934
VE7DXG..... 31,902
E20SZO..... 27,396

cations to the overall health of the contest itself. Here are just a few points to consider:

• Does the creation of new contest categories water down the experience of winning to the point where it no longer carries its deserving value?

• Are there so many categories in a given contest that the task of adjudicating the contest and delivering timely awards outweighs the benefit of the operating classes themselves?

• Have some operating categories outlived their time and could be candidates for elimination from the rules?

As you might expect, I receive a lot of mail on this subject from individuals all over the world. A great deal of this input comes with tremendous forethought and consideration of the implications of a new category. Some of the more common proposals include:

• Consideration of operator age and acknowledgement of our increased maturity (I'm treading lightly here!).

• Recognition of the "small pistol" station and its accomplishments.

• Acceptance of the impact of packet radio and its unique influence on contest operating.

The good news is that many contest sponsors have been sympathetic to these initiatives and in some cases have created new and popular operating classes as a result. The Single Operator Assisted category is a good example. Another is the Rookie/Tribander Only classes that exist for the CQ WW WPX Contest and are published in *CQ Contest* magazine as an addition to the regular results. However, the reality is that there need to be limits to the rise in the numbers of categories, or the dilution to being a winner will outweigh the benefit of new and unique winning opportunities.

On Another Note...

Finally, while not related to this month's primary topic, lately I've been receiving a great deal of mail that focuses on a growing trend of some contesters to push the operating envelope. In particular, some of the input has been about items such as use of band edges, transmitter power, operator courtesy, proper use of sub-bands, applying common sense in the gray areas of contest rules, and so on.

The reality is we've all pushed the limit (hopefully not to the point of breaking rules!) in the heat of battle. For some, it's been a more benign battle of words on 20 meter SSB. For others it is a serious case of running illegal power and/or illegitimate use of packet spots.

Some of you may recall a contest survey I ran several years ago that probed the subject of our operating ethics. I think we all were pleasantly surprised to learn that the vast majority of contesters are extremely ethical and play by the rules.

The challenge for you to think about this month is not whether you should turn off your 10 KW amplifier (hopefully you don't own one, and if you do, again hopefully there's no debate about its use). Are you operating inside the spirit of a contest's rules? Is your operating technique one which is the envy of non-contest operators? Are there fewer contest advocates in the world as a result of your operating attitude?

These are topics to be taken seriously and I urge all of us, myself included, to take them under consideration in the next contest. All of contesting will benefit in the long run.

Final Comments

I'm out of space and time for this month. Be sure to look for the CQ 2001 Contest Survey in next month's column. There will be some challenging questions for you to ponder this year, and as always, your input is invaluable.

Also, beginning this month on *CQ*'s website you can find valuable links to most contest sponsor websites. For space reasons we have had to cut back on the "printed" coverage formally found in this column. However, easy access via *CQ*'s website is a good compromise, providing the latest information about a given event, including access to contest forms, results, and other useful information. Be sure to check it out!

73, John, K1AR

Awards

BY TED MELINOSKY, K1BV

News Of Certificate And Award Collecting

Terry Holman, AC4PY, USA-CA All Counties #1012.

Terry Holman, AC4PY, USA-CA All Counties #1012, is our featured county hunter this month. He found the quest for the award both rewarding and challenging, and here is his story:

"In still remember my first encounter with county hunting. It was about seven years ago, I guess. A relatively new ham back then, I was attending a club meeting in Nicholasville, Kentucky when a special-interest presentation on county hunting was being given by Harry Sparks, AB4OQ. Until then I hadn't considered myself a paper chaser, although I was looking for any opportunity to work on my DXCC.

"On the side, during the presentation was that magnificent award for USA-CA. I thought, how nice! If someone had asked me, I might have thought there are between 500 and 1000 counties, but then Harry reminded us that there are a few more—3076 to be sure! That almost burst my bubble!

"Could I ever accomplish such a thing, I wondered. Then we learned that you could go about it in phases or classes of 500 counties with endorsements along the way. Now it was a big challenge, but not the monster it first had appeared to be only minutes before.

"After the meeting and on several occasions I discussed county hunting more with Harry. I was finally getting close enough to consider applying for my first 500 class for USA-CA when he mentioned that many of the county hunters made it a personal challenge to apply for the award only after confirming *all* 3076 counties. Boy, I had to bite my lip and wonder if I could ever stay in there long enough. It was worth a try, so I held off. After all, I could cash-in if I got cold feet. The pressure was off—for a while.

"As time went on, all those mobiles piqued my interest in another way. Nights and weekends weren't giving me the results I wanted; there were other obligations in life, too. Sitting at the base station became difficult to do at times. I began to think about some possible changes. I eventually bought my first new HF rig and decided to move my old one to mobile service in my pickup. Now there was a chance to work counties going to and from work each day. That really broadened my horizons.

"Then they came—the folks wanting counties I was in and out of from time to time. I remember making something of a sked to work Jessamine, Kentucky for VE1BES and KL7D. Then someone needed a last county. KD8HB, realizing that I was often mobile in Fayette, Kentucky (where I work), made a query about Jessamine County. We set up a sked and we both went away happy.

"By this time I was beginning to consider putting out some of the local counties now and then. Although I had worked other mobiles on the nets, I still wasn't comfortable doing a run myself. More coaching and encouragement from my elmer, Harry. We decided to head for the Fayette/Bourbon, Kentucky border and make it happen. That done, I wasn't sure if I would do it again. After some thought, however, and some more requests I decided to give it another try. It really feels good when you can contact someone for a last one. From both sides, I can't decide who is more satisfied—the giver or the receiver. They both feel rewarding to me. As a mobile, I get lots of counties I need also.

"There were some disappointments, too. It's a terrible feeling when you try to accommodate someone's request for a county, or unexpectedly you find you are in a county that someone requested of you before, only to find that propagation has failed or you're unable to make or complete a QSO with that person. My apologies to those I've missed on such occasions. There is never any intentional neglect. Opportunity and timing often seemingly are in different worlds. That applies to mobiles and fixed stations.

"Some, but not all, of my best memories along the way to USA-CA are: (1) Working five of my last counties in four days; (2) unexpectedly finding out and giving a last county for 'the whole ball of wax' to legendary county hunter Ed, WAØSBR; meeting personally many fellow county hunters at the 3M convention in 1999 as well as at several hamfests, and a few even at the side of the road as we crossed paths to and fro; (4) finishing up my own Last One by working KN4S (ex-AB4OQ).

"I would be remiss not to thank all who have helped me complete such a task, so many who gave me counties, assisted with the nets, made good suggestions, helped to create leads and contacts to finish up. Many were exceedingly helpful, but all were appre-

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e-mail: <k1bv@cq-amateur-radio.com>

USA-CA Special Honor Roll

Bill Zaner, WB6IYS
USA-CA All Counties #1013 (All CW)
December 18, 2000

USA-CA Honor Roll

500
OK2FD.....3133
AA9KH.....3134
DK7YY.....3135
WB6IYS.....3136

1000
OK2FD.....1562
WB6IYS.....1563

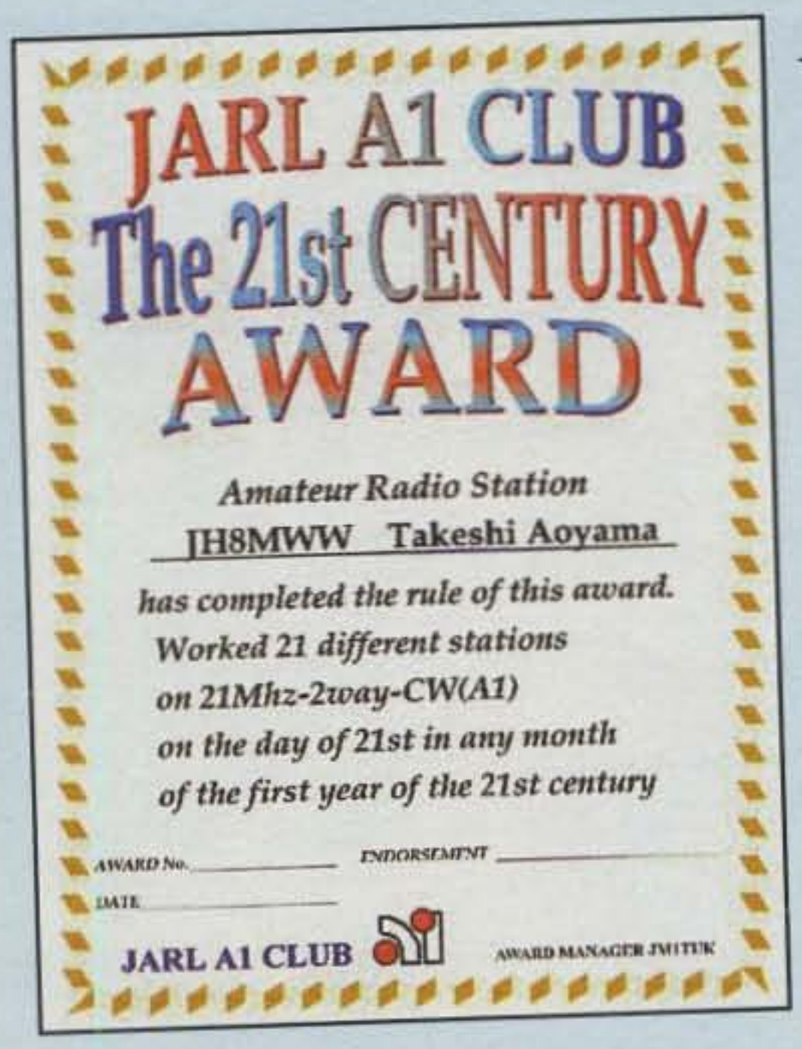
1500
OK2FD.....1302
WB6IYS.....1303

2000
WB6IYS.....1202

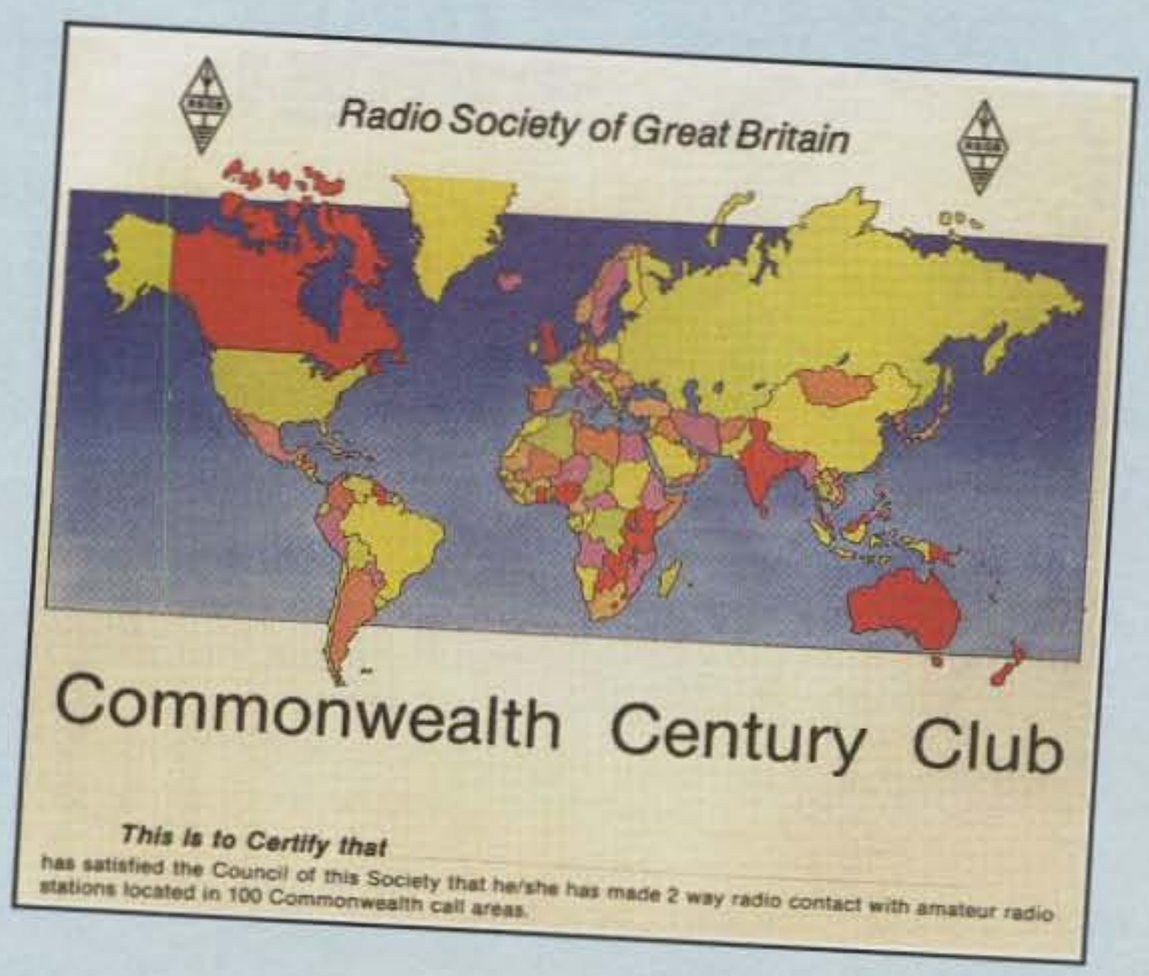
2500
WB6IYS.....1127

3000
WB6IYS.....1032

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.



← *The JARL A-1 Club 21st Century Award is a short-term award (see text).*



The RSGB's Commonwealth Century Club Award for contacting 100 Commonwealth call areas. →

ciated. I also would like to thank my family for allowing me to complete such a journey, especially my wife Pam, KD4HXH (good for Bingo on VHF everywhere, hi!), for being my partner, logger, secretary, and navigator so much of the time. C-ya'll down the road."

—73, Terry, AC4PY

Short-Term Award

Here's an interesting short-term award from a Japanese club for making contacts on 21 MHz on the 21st day of each month in 2001. Could be an interesting challenge, especially if you want to earn it each of three, six, or nine months for the special endorsement.

The JARL A-1 Club 21st Century Award. Contact 21 different stations using "A1 mode on 21 MHz" on the 21st day of any month in 2001. A QSO with an A1 club member is counted as two QSOs. SWL stations can also apply. The day and time have to follow the standard time (00:00–23:59Z) of the QRV place. QSL cards are not required. Endorsements are available for Straight Key, QRP (5W output), AJD (All Japan Districts, call area Ø to 9), Perfect (earn the award every month for nine consecutive months), Half (six months), and Three (three months). Send GCR list and fee of $US6 or 5 IRCs to: Kazuyoshi Nasu, JM1TUK, 3-12-11-201, Oda, Kawasaki, 210-0846 Japan.

RSGB Awards

This month we feature several of the awards of the Radio Society of Great Britain (RSGB) thanks to their HF Awards Manager, Fred Handscombe, G4BWP (<hf.awards@rsgb.org.uk>). Note that a number of the awards will require you to refer to lists of eligible countries or require you to use a special application due to the number of contacts that are needed. This extra paperwork is all available at a special RSGB HF Committee website listed at the end of this article, or a hard copy may be obtained from the sponsor for a mailing cost of £1.50, $US3, or 5 IRCs.

General Requirements: Fee for each award is £3, 9 IRCs, or $US6. Cards must be submitted in accordance with the award claimed. If cards are sent, sufficient postage must be provided for their return. Endorsements are available for all phone, all CW, and/or single-band accomplishments.

Apply to Awards Manager Fred Handscombe, G4BWP, Sandholm, Bridge End Road, Red Lodge, Bury St. Edmonds, Suffolk, England IP28 8LQ.

Commonwealth Century Club (CCC). May be claimed by any licensed amateur who can provide evidence of having contacted since 15 November 1945 amateurs in at least 100 Commonwealth call areas on the list current at time of application. An amateur providing evidence of having contacted *all* the Commonwealth call areas on the list current at time of application may claim the Supreme Plaque in recognition of the magnitude of the achievement.

Notes: Credit for South Georgia and South Sandwich will be given only for stations using the VP8 callsign. Credit for South Shetland Isl. will be given only for stations using a call issued by a Commonwealth government.

5 Band Commonwealth Century Club (5BCCC). Available in five classes, this award may be claimed by any licensed amateur who can produce evidence of having contacted since 15 November 1945 stations located in call areas listed using the five HF bands. Each station should be located in a different call area per band. The five classes are as follows:

5BCCC Supreme—500 stations

5BCCC, Class 1—450 stations

5BCCC, Class 2—400 stations with minimum of 50 per band

5BCCC, Class 3—300 stations with minimum of 40 per band

5BCCC, Class 4—200 stations, with minimum of 30 per band

← *The IARU Region 1 Award is available from the RSGB. See text for the list of Region 1 members.*

The RSGB's basic 136 kHz Award is for confirmed two-way contacts on 136 kHz with five countries from the DXCC/WAE list. →

Winners of Supreme and Class 1 will be eligible to claim a plaque.

DX Listeners Century Award (DXLCA). May be claimed by any SWL who can produce evidence of having received signals from amateur radio stations located in at least 100 DXCC countries. Stickers are available for every 25 additional countries confirmed. A 5-band endorsement is available for hearing 100 countries on 5 bands. The same countries do not have to be heard on each band.

Worked All Continents (WAC). Available to any licensed UK, Channel Islands, or Isle of Man amateur who is a member of the RSGB and can produce evidence of having contacted stations in each of the six continents: North America, South America, Europe, Africa, Asia, and Oceania. Cards are required to be submitted. All contacts must be made from the same location, namely, not exceeding 25 miles (40 km). Various endorsements, including an "all 1.8 MHz," are available. In addition, both a 5- and 6-band WAC may be claimed, but the confirmed contacts in each case must have taken place since 1 January 1974.

IARU Region I Award. Contact the required number of stations in countries whose national societies are members of the Region I Division of the IARU. This award may be endorsed for a single mode or band, including 2 or 6 meters, or for contacts made by satellite. The three classes are:

Class 1—All member countries on the current list.
Class 2 —60 member countries
Class 3 —40 member countries

Members of IARU Region I are:

3A Monaco
3B Mauritius
3DA Swaziland
4X Israel
5B Cyprus
5H Tanzania
5N Nigeria
5X Uganda
5Z Kenya
6W Senegal
7P Lesotho
7X Algeria
9A Croatia
9G Ghana
9H Malta
9J Zambia
9L Sierra Leone
A2 Botswana
A4 Oman
A7 Qatar
A9 Bahrain
C3 Andorra
C5 Gambia
CN Morocco
CT Portugal incl. CU and CT3
DL Germany
EA Spain
EI Ireland
EL Liberia
ES Estonia
EU Belarus
Faso
EY Tadjikstan
EZ Turkmenistan
F France incl. TK
G UK including G GJ GM GU GW
HA Hungary
HB9 Switzerland
HBØ Liechtenstein
I Italy incl. ISØ
J2 Djibouti
JT Mongolia
JY Jordan
LA Norway
LX Luxembourg
LY Lithuania
LZ Bulgaria
OD Lebanon
OE Austria
OH Finland incl. OHØ and OJØ
OK Czech Rep.
OM Slovakia
ON Belgium
OY Faroe Isl.
OZ Denmark
PA Netherlands
R Russian Fed.
S5 Slovenia
SM Sweden
SP Poland
SU Egypt
SV Greece
T7 San Marino
T9 Bosnia
TA Turkey
TF Iceland
TR Gabon
TU Ivory Coast
TZ Mali
UR Ukraine
V5 Namibia
XT Burkina Faso
YI Iraq
YK Syria
YL Latvia
YO Romania
YU Yugoslavia
Z2 Zimbabwe
Z3 Macedonia
ZA Albania
ZB2 Gibraltar
ZS South Africa

Worked ITU Zones (WITUZ). May be claimed by any station who can provide evidence of having contacted since 15 November 1945 stations in at least 70 of the 75 zones as defined by the ITU. An optional plaque is available. A special plaque is available for proof of contact with all 75 zones.

5 Band Worked ITU Zones (5B WITUZ). May be claimed by any station who can provide evidence of having contacted since 15 November 1945 the required number of stations located in the 75 ITU zones using all five HF bands. Each station should be located in a different ITU zone per band. The five classes are as follows:

5BWITUZ Supreme—350 zones
5BWITUZ, Class 1—325 zones
5BWITUZ, Class 2—300 zones, minimum of 50/band
5BWITUZ, Class 3—250 zones, minimum of 40/band
5BWITUZ, Class 4—200 zones, minimum of 30/band

Winners of Supreme and Class 1 may claim a plaque upon special payment.

136 kHz Award. Basic award is for confirmed two-way QSOs on 136 kHz with five countries from the DXCC/WAE list. The SWL award is for confirmation of SWL reports from five countries. It also may be claimed by amateurs working crossband to sta-

tions transmitting in the 136 kHz band. The third category is for crossband contacts where the station claiming the award has worked five countries by transmitting on the 136 kHz band and receiving stations on other bands. Crossmode contacts are allowed for this award. Categories may not be mixed, but awards from some or all of the categories may be claimed and endorsed concurrently. Endorsements are available in steps of each additional five countries worked or heard.

A Couple of Reminders

Whenever you see the letters "GCR" in award rules, it means that the sponsor honors the "General Certification Rule." Your application does not have to include the cards, just a list of the cards with appropriate QSO information that is signed by at least two witnesses. Most local and club awards are like this. If there is any question about the legitimacy of a card or a contact, the sponsor always reserves the right to ask for the actual card, but in practice this is rarely needed.

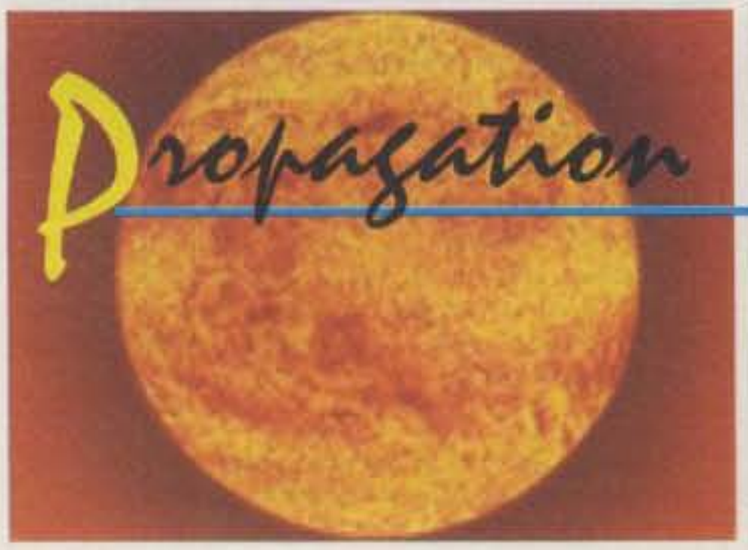
For a couple of years now USA-CA has accepted computer printouts of your county contacts instead of the previously required booklet and the laborious hand printing of all that information. We only ask that the same information be provided: state, county, station, location/mobile, band, and mode. Each application for successively higher endorsements requires a complete listing, including all previous counties, so a computer list is the way to go.

Internet Site of the Month

The RSGB HF Awards Committee maintains a separate site with complete rules for each of the awards, applications, and country lists for you to download and print. This is located at <http://www.g3wkl.freeserve.co.uk/awards/hf_awards_index.html>. The RSGB website is also worth visiting for an English perspective on the hobby. It is located at <http://www.rsgb.org/>. Look under the "Operating" page for links to a wealth of information on IOTA (Islands On The Air), for example.

Remember to send me a copy of your club or group's award for publication in a future column. Publicity is the key to a successful award program.

73, Ted, K1BV



BY GEORGE JACOBS, W3ASK

The Science Of Predicting Radio Conditions

50th Anniversary!

On New Year's Eve, as this is being written, the famous ball in Times Square is slowly dropping to welcome in a new year: four, three, two, one . . . welcome 2001! This will be a very special year for me, since it will mark three anniversaries in my professional career. The new year will be my 60th year in the field of Broadcast Engineering, my 60th year as a licensed radio amateur, and my 50th year as Propagation Editor of *CQ* magazine.

Reminiscing

The masthead from the March 1951 issue of *CQ* introduced me as the new Propagation Editor, and my first column appeared in that issue. Fifty years have passed since my first article—a total of 600 months—with never a deadline missed! It takes me an average of three days a month to prepare and write this column; it has been the equivalent of five years of my life.

I usually write the column in Silver Spring, Maryland, but my professional broadcast engineering consultancy often takes me to distant lands. To meet deadlines I have written columns in more than two dozen countries, and on at least two occasions within the sounds of war, in Viet Nam and in Israel.

I was first licensed as W2PAJ in December 1941 and was on the air for only two days when the shut down of ham radio came after the Pearl Harbor attack. This was long enough, though, to spark my interest in radio propagation. This interest grew with my WW II service in radar navigation and communications. My interest in wave propagation intensified during my post-war university studies.

I have been an avid reader of *CQ* since 1946, when I found of particular interest the monthly "Propagation Predictions" column and articles written by the late Perry Ferrell. *CQ* was the first journal to recognize the importance of HF predictions and forecasts for radio amateurs. Perry took the mystery out of HF propagation by converting scientific data into easy to understand and use graphs and charts. His column was an immediate success.

Due to the pressures of conducting a radio amateur sporadic-*E* propagation research project for *CQ*, Perry stopped writing his monthly columns in 1950. His column was sorely missed, since HF propagation data was not then readily available in any other form for radio amateurs.

In 1949, after receiving my Electrical Engineering degree from Pratt Institute, I joined the engineering staff of the Voice of America, specializing in HF propagation. Aside from my engineering responsibilities, I wrote a weekly propagation report for the very popular VOA *Amateur Radio Program*. The program was written and edited by Gene Black, then W2ESO, now W2LL, who was also Editor of *CQ*. It was voiced by the late Bill Leonard, W2SKE, who later became the president of CBS News.

In early 1951 Gene invited me to resume writing Perry Ferrell's *CQ* "Propagation" column. I jumped at the opportunity and had the initial March column ready in a few days. It was my goal to provide *CQ* readers with the very latest state-of-the-art worldwide band-opening predictions, day-to-day propagation forecasts, and down-to-earth explanations of HF propagation phenomena. The rest is history!

Engineers and scientists in the field of shortwave or HF propagation often measure elapsed time not in months or years, but in solar cycles. A solar or sunspot cycle has an average life of approximately eleven years. In March 1951, when I wrote my first *CQ* column, Cycle 18 had passed its peak. I have continued through the entire lifespan of Cycles 19, 20, 21, and 22, and the peak of the present Cycle 23. What cycles these have been!

11307 Clara Street, Silver Spring, MD 20902
e-mail: <george@gjainc.com>

LAST-MINUTE FORECAST

Day-to-Day Conditions Expected for March 2001

	Expected Signal Quality			
Propagation Index.....	(4)	(3)	(2)	(1)
Above Normal: 5-6, 12-13, 18, 22, 23	A	A	B	C
High Normal: 3-4, 7, 10-11, 17 19-20, 23-24, 28-30	A	B	C	C-D
Low Normal: 1-2, 9, 16, 21 26-28	B	C-B	C-D	D-E
Below Normal: 8, 14	C	C-D	D-E	E
Disturbed: 15, 25	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 fair to good (C-B) on March 1st and 2nd, good (B) on the 3rd and 4th, excellent (A) on the 5th and 6th, etc.

This month W3ASK celebrates 50 years of writing CQ's "Propagation" column. This year also marks his 60th year as a radio amateur and his 60th year in the field of Broadcast Engineering.

Included in this period was the mother of all solar cycles, Cycle 19, which reached the record-breaking smoothed sunspot peak of 201 in November 1957. This was the most intense cycle recorded in the 200 years that sunspot data had been recorded. It produced "once in a lifetime" propagation conditions on the HF bands. My columns during 1957, and some special articles that I wrote for *CQ* at the time, are among the most exciting writings for me, since I realized that I was writing about a scientific event which very likely would not be exceeded in the next century or two. The "twin" cycles of 21 and 22, both of which exceeded a count of 150, also produced years of outstanding HF propagation.

I have paid very special attention to the columns I write each October and November for the CQ World-Wide DX Contests because of the very heavy use amateurs worldwide make of the HF bands during such contests. The contests also serve as excellent checks on the accuracy of band-opening predictions and day-to-day propagation conditions. To date, the accuracy for these contest columns exceeds 90%.

As I have mentioned many times in the past, my greatest reward for writing this column is the comments I receive from readers who have found the propagation prediction and forecast material useful and informative.

Knowing that my writing may help take the mystery out of HF propagation and contribute much to making amateur radio more enjoyable and a more effective communication medium is the fuel that has energized me to write the column month after month.

Fifty years, a total of 600 columns—that's a lot of writing over a very long period of time, but I have enjoyed every minute of it!

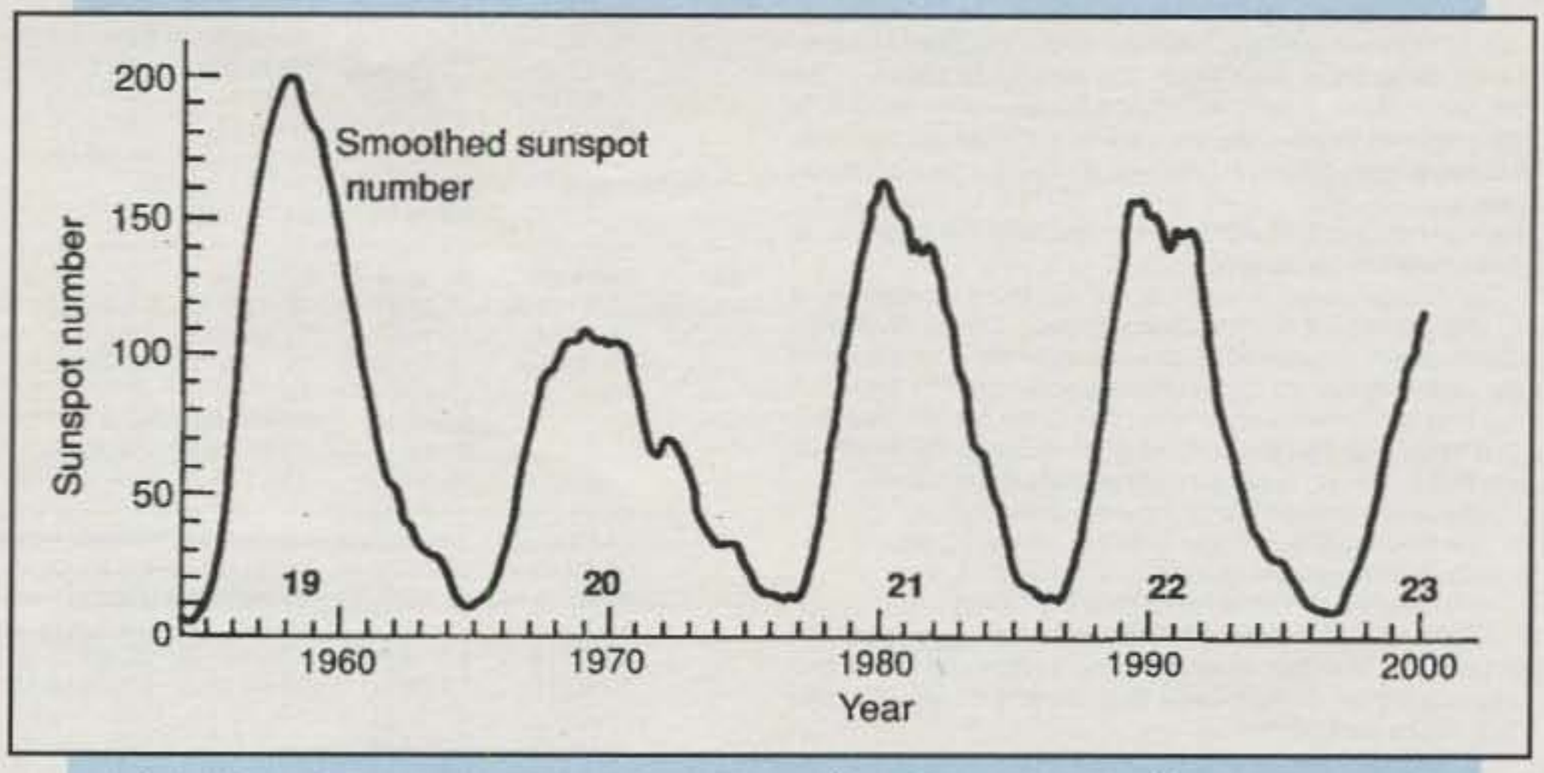


Fig. 1– The 50 years that I have been writing this column coincide with sunspot Cycle 19 through the rising portion of Cycle 23. This is the highest level of sustained solar activity since observations began during the mid-18th century.

Solar Cycle Progress

The Royal Observatory of Belgium reports a monthly mean sunspot level of 106.5 for November 2000. This results in a 12-month running smoothed sunspot number of 119 centered on May 2000. This is a decline of two points from last month's level of 121. During November daily levels of solar activity varied between a high of 147 on November 2nd and a low of 59 recorded on the 26th.

According to daily observations made at Penticton, British Columbia by the Dominion Radio Astrophysical Observatory of Canada, the adjusted mean level of 10.7 cm solar flux for November 2000 was 176. This results in a 12-month running number of 180 centered on May 2000. This is a drop of one point from last month's level.

A smoothed sunspot number on the order of 115 and a 10.7 cm solar flux level of approximately 180 are forecast for March 2001 as Cycle 23 appears to be declining slowly from its peak level of 121 believed to have been reached during April 2000.

March Conditions

While sunspot Cycle 23 appears to be slowly declining, solar activity during March is expected to remain at near peak levels.

As discussed in last month's column, equinoctial propagation conditions are expected to continue through the month of March and into early April. The experts generally agree that overall DX conditions are usually optimum during the equinoctial periods. Improved DX conditions expected during March should be most noticeable on long circuits between the United States and the southern hemisphere—for example, to Australia, South America, southern Africa, southern Asia, Antarctica, etc. Gray-line DX propagation conditions, both at dawn and at sunset, should peak during March because of the similar conditions that are expected to exist at these times in both hemispheres. Conditions should be optimum for long-path openings as well. Improvement due to equinoctial propagation conditions should be observable on all HF bands.

While considerably fewer east-west openings are likely during March on the 10 and 12 meter bands, fine inter-hemisphere openings should be possible from an hour or two after sunrise, through the daylight hours, and into the sunset period.

Good worldwide DX conditions, including fine inter-hemisphere openings, are expected on 15, 17, and 20 meters during most of the daylight hours. Daytime openings on 10, 12, 15, 17, and 20 meters should follow the sun, first opening toward the east and south after sunrise, peaking toward the south and north during the afternoon hours, and toward the west and south during the late afternoon and sunset period. As you go lower in frequency, the bands stay open longer, so plan to work from 10 and 12 through 15, 17, and 20 meters.

Between sunset and midnight expect DX openings on all bands between 15 and 160 meters, with some also possible on 10 and 12 meters when condi-

George's first professional position in broadcasting as an engineer at WKNT in 1941 in Kingston, New York.

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 (15 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 Chart
March & April 2001
Band Openings Given in Local Standard Time
At Path Mid-Point
(24-Hour Time System)

Band (meters)	Distance From Transmitter (Miles)			
	50-250 miles	*250-750 miles*	*750-1300 miles*	*1300-2300 miles*
10	*Nil*	09-13 (0-1)	07-09 (1) 09-12 (1-2) 12-13 (1-3) 13-16 (0-3) 16-18 (0-2) 18-20 (0-1)	07-08 (1) 08-09 (1-2) 09-12 (2-4) 12-16 (3-4) 16-18 (2-3) 18-20 (1-2) 20-21 (0-1)
15	*Nil*	07-09 (0-1) 09-15 (0-2) 15-19 (0-1)	07-08 (1) 08-09 (1-2) 09-15 (2-4) 15-18 (1-3) 18-19 (1-2) 19-23 (0-1)	07-08 (1) 08-09 (1-3) 09-15 (4) 15-18 (3-4) 18-19 (2-3) 19-21 (1-3) 21-23 (1-2) 23-01 (0-1)
20	11-13 (0-1) 13-16 (0-2) 16-19 (0-1)	08-09 (0-3) 09-11 (0-4) 11-13 (1-4) 13-16 (2-4) 16-18 (1-4) 18-19 (1-3) 19-22 (0-2) 22-08 (0-1)	06-07 (1-2) 07-08 (3) 08-09 (3-4) 09-18 (4) 18-19 (3-4) 19-22 (2-4) 22-00 (1-3) 00-02 (1-2) 02-06 (1)	06-07 (2) 07-08 (3) 08-10 (4) 10-15 (4-3) 15-22 (4) 22-23 (3-4) 23-00 (3) 00-02 (2) 02-04 (1-2) 04-06 (1)
40	06-07 (1-2) 07-09 (2-3) 09-18 (4) 18-20 (3-4) 20-22 (2-3) 22-00 (1-2) 00-06 (1)	06-07 (2-3) 07-09 (3-4) 09-11 (4-3) 11-13 (4-2) 13-15 (4-3) 15-20 (4) 20-22 (3-4) 22-00 (2-4) 00-03 (1-3) 03-06 (1-2)	06-07 (3-2) 07-08 (4-2) 08-09 (4-1) 09-13 (2-1) 13-15 (3-1) 15-17 (4-2) 17-19 (4-3) 19-00 (4) 00-03 (3-4) 03-06 (2-3)	06-08 (2-1) 08-15 (1-0) 15-16 (2-0) 16-17 (2-1) 17-19 (3-2) 19-03 (4) 03-04 (3-4) 04-06 (3)
80	07-11 (4) 11-18 (4-3) 18-22 (4) 22-00 (3-4) 00-07 (2-3)	07-08 (4-2) 08-11 (4-1) 11-16 (3-0) 16-18 (3-2) 18-20 (4-3) 20-00 (4) 00-05 (3-4) 05-07 (3)	07-08 (2-1) 08-11 (1-0) 11-16 (0) 16-18 (2-1) 18-20 (3-2) 20-03 (4) 03-05 (4-3) 05-07 (3-2)	07-08 (1-0) 08-16 (0) 16-18 (1-0) 18-20 (2-1) 20-22 (4-2) 22-03 (4-3) 03-05 (3-2) 05-07 (2-1)
160	05-07 (4-2) 07-09 (3-1) 09-17 (2-0) 17-19 (3-1) 19-20 (4-2) 20-05 (4)	05-06 (2-1) 06-07 (2-0) 07-09 (1-0) 09-17 (0) 17-19 (1-0) 19-20 (2) 20-22 (4-3) 22-03 (4) 03-05 (4-3)	05-06 (1) 06-19 (0) 19-20 (2-1) 20-22 (3-2) 22-03 (4-3) 03-05 (3-2)	05-06 (1-0) 06-19 (0) 19-20 (1-0) 20-22 (2) 22-03 (3-2) 03-05 (2-1)

HAWAII
March & April 2001
Openings Given in Hawaiian Standard Time

To:	*10 meters*	*15 meters*	*20 meters*	*40/80 meters*
Eastern USA	08-09 (1) 09-14 (2) 14-16 (3) 16-17 (2) 17-18 (1)	06-07 (1) 07-08 (2) 08-11 (1) 11-13 (2) 13-15 (3) 15-17 (4) 17-18 (3) 18-19 (2) 19-20 (1)	12-14 (1) 14-16 (2) 16-18 (3) 18-21 (4) 21-00 (3) 00-04 (2) 04-06 (3) 06-07 (2) 07-08 (1)	18-20 (1) 20-22 (2) 22-01 (3) 01-02 (2) 02-03 (1) 21-22 (1)* 22-01 (2)* 01-02 (1)*
Central USA	08-09 (1) 09-11 (2) 11-15 (3) 15-17 (4) 17-19 (2) 19-20 (1)	06-07 (1) 07-08 (2) 08-09 (3) 09-14 (2) 14-16 (3) 16-18 (4) 18-19 (3) 19-20 (2) 20-21 (1)	09-14 (1) 14-16 (2) 16-19 (3) 19-23 (4) 23-03 (3) 03-06 (2) 06-08 (3) 08-09 (2)	19-20 (1) 20-22 (2) 20-02 (3) 02-04 (4) 04-05 (2) 05-06 (1) 22-23 (1)* 23-02 (2)* 02-03 (3)* 03-04 (2)* 04-05 (1)*
Western USA	08-09 (1) 09-11 (2) 11-12 (3) 12-16 (4) 16-17 (3) 17-19 (2) 19-20 (1)	06-07 (1) 07-09 (2) 09-11 (4) 11-15 (3) 15-18 (4) 18-20 (3) 20-21 (2) 21-23 (1)	15-17 (3) 17-21 (4) 21-00 (3) 00-02 (2) 02-04 (1) 04-06 (2) 06-08 (4) 08-10 (3) 10-15 (2)	18-19 (1) 19-21 (2) 21-22 (3) 22-04 (4) 04-05 (3) 05-06 (1) 21-22 (1)* 22-23 (2)* 23-04 (3)* 04-05 (2)* 05-06 (1)*

ALASKA
March & April 2001
Openings Given in GMT

To:	*10 meters*	*15 meters*	*20 meters*	*40/80 meters*
Eastern USA	20-22 (1) 22-00 (2) 00-01 (1)	18-20 (1) 20-22 (2) 22-00 (3) 00-01 (2) 01-02 (1)	13-15 (1) 20-22 (1) 22-01 (2) 01-03 (3) 03-05 (2) 05-06 (1)	06-13 (1) 07-12 (1)*
Central USA	20-23 (1) 23-01 (2) 01-02 (1)	18-20 (1) 20-23 (2) 23-01 (3) 01-02 (2) 02-03 (1)	14-16 (1) 20-23 (1) 23-02 (2) 02-04 (3) 04-05 (2) 05-07 (1)	07-14 (1) 08-12 (1)*
Western USA	20-23 (1) 23-00 (2) 00-02 (3) 02-03 (2) 03-04 (1)	18-20 (1) 20-22 (2) 22-00 (3) 00-02 (4) 02-04 (3) 04-05 (2) 05-06 (1)	16-18 (1) 18-20 (3) 20-00 (2) 00-02 (3) 02-04 (4) 04-05 (3) 05-06 (2) 08-10 (1)	07-09 (1) 09-12 (2) 12-14 (1) 09-10 (1)* 10-12 (2)* 12-13 (1)*

#See explanation in "How To Use Short-Skip Charts" in box at the beginning of this column.
*Indicates best time 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.
Note: The Alaska and Hawaii Propagation charts are intended for distances *greater* than 1300 miles. For shorter distances use the preceding Short-Skip Propagation Chart.
For 12 meter openings interpolate between 10 and 15 meter openings.
For 17 meter openings interpolate between 15 and 20 meter openings.
For 30 meter openings interpolate between 40 and 20 meter openings.

tions are High or Above Normal. The 15, 17, and 20 meter bands should be open toward the south and west during this time period. Conditions on 30, 40, 80, and 160 meters should favor openings toward the east and south. These bands should peak for openings to Europe and Africa near midnight. Occasional 10 and 12 meter openings toward the south and west should also be possible during this period.

From midnight to sunrise expect optimum DX conditions on 30, 40, and 80 meters, with openings also possible on 160 meters. Conditions should favor openings toward the west and south. Remember, signals peak on 30, 40, 80, and 160 meters when it is *sunrise* on the *easterly* leg of a path. Some fairly good 20 meter DX openings may also be possible toward the south and west during this time period.

All in all, this March should be a very good month for worldwide DX propagation conditions on all of the HF bands. For more detailed information, refer to the DX Propagation Charts which appeared here last month. This month's column contains Short-Skip Propagation Charts which are valid through March and April, as well as Propagation Charts centered on Alaska and Hawaii. The Short-Skip Charts contain band-opening predictions for predominantly one-hop paths, ranging in distance between approximately 50 and 2300 miles.

For day-to-day changes in shortwave propagation conditions expected during March, see the Last-Minute Forecast at the beginning of this column.

For optimum short-skip openings between approximately 50 and 250 miles, try 80, 40, or 30 meters during the day and 80 or 160 meters at night. Between 250 and 750 miles, 30 and 40 meters should be best during the day and 80 or 160 meters at night. Try 20 meters for optimum conditions during the day between 750 and 1300 miles, and 30, 40, or 80 meters at night. For openings between 1300 and 2300 miles, 20, 17, or 15 meters should be best during the day-

Monthly DX Predictions - - MARCH

GEORGE JACOBS, W2PAJ*

We have received many requests to bring back CQ's DX predictions, so here they are. W2PAJ would like to know how well your observations check his forecasts.

The original masthead for W3ASK's first article in the March 1951 issue of CQ.

light hours, with 40 or 30 meters the band to use at night.

VHF Ionospheric Openings

March can be an unusually good month for VHF ionospheric propagation openings. Some 6 meter *F*-layer propagation is expected, along with increased chances for trans-equatorial, sporadic-*E,* and auroral-type openings.

Although solar activity is slowly declining, it is expected to be high enough in March to permit *F*-layer propagation between North America and the deep southern hemisphere, including southern Africa, the south Pacific areas, and South America. The band won't open every day, but look for openings when conditions are expected to be High or Above Normal. If the band is to open at all, it will open toward the southeast by mid-morning. Noontime should be best for openings toward South America. During the afternoon hours skip should extend farther into South America and also shift toward the west and southwest.

Trans-equatorial (TE) propagation conditions usually peak during equinoctial periods. Improved openings should be possible during March from the southern tier states to countries located in the southern half of South America. Most TE openings occur on 6 meters, but some may also be possible on 2 meters. TE openings must cross the magnetic equator at or near a right angle, and signals are at best very weak and often with heavy flutter fading. The best time to check for TE openings should be between 8 and 11 PM local time. TE openings do not occur very often, and when they do, you may have to really dig for them.

Auroras

Auroral activity generally occurs more often during equinoctial periods than in other seasons. Intense ionization associated with auroral displays can be responsible for auroral-scatter openings on the VHF bands and for short-skip openings up to approximately 1200 miles. While ionospheric openings resulting from auroral ionization usually are marked with a distinctive flutter-fading pattern, they at times can be clear and exceptionally strong. Look for auroral activity on days during March expected to be Below Normal or Disturbed.

Frequent daily updates of aurora information, as well as geomagnetic, solar, and ionospheric data, can be found on the web at: <http://dx.qsl.net/propagation> and <http://hfradio.org/propagation.html>. For a more complete review of VHF propagation, see N6CL's informative "VHF Plus" column here in *CQ.*

Meteors

Very little, if any, meteor activity is expected during March. The *delta-Leonids* shower, which reached its peak during late February, should continue through March 10th. This is a weak shower, with only a slight possibility of producing sufficient ionization for meteor-type communications. 73, George, W3ASK

A late-1950 photo showing (left to right) George, W2PAJ (now W3ASK); Gene Black, W2ESO (now W2LL), then Editor of CQ; *the late Bill Leonard, W2SKE; and Bill Scherer on a Voice of America radio program. This was the day on which it was agreed to bring back* CQ*'s "Propagation" column in March 1951 under the editorship of W3ASK.*

On the Cover

Congratulations to George Jacobs, W3ASK, as he celebrates his 50th anniversary as *CQ* Propagation Editor, the longest-serving Contributing Editor this magazine—and possibly *any* magazine—has ever had. In our cover photo, George is either receiving information on propagation conditions *from* the ionosphere on his state-of-the-art crystal ball, *or* transmitting instructions *to* the ionosphere! With George's 90+% accuracy rate in predicting propagation conditions over the past 50 years, either one is possible! We hope that George's unbroken string of monthly propagation columns extending back to March 1951 has been helpful to you in your on-air activities.

In addition to writing *CQ*'s propagation column for the past half century, George has been a consultant to the broadcast industry for even longer, starting out as an engineer with the Voice of America just after World War II. His specialty, of course, is propagation. For our cover, George was photographed communing with the ionosphere outside his home in Silver Spring, Maryland. (Cover photo and special effects by Larry Mulvehill, WB2ZPI)

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