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CQ

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AUGUST 1999

In This Issue:

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Moulding, KE7NS, Ogden, UT

AMATEUR'S JOURNAL

LEGACY

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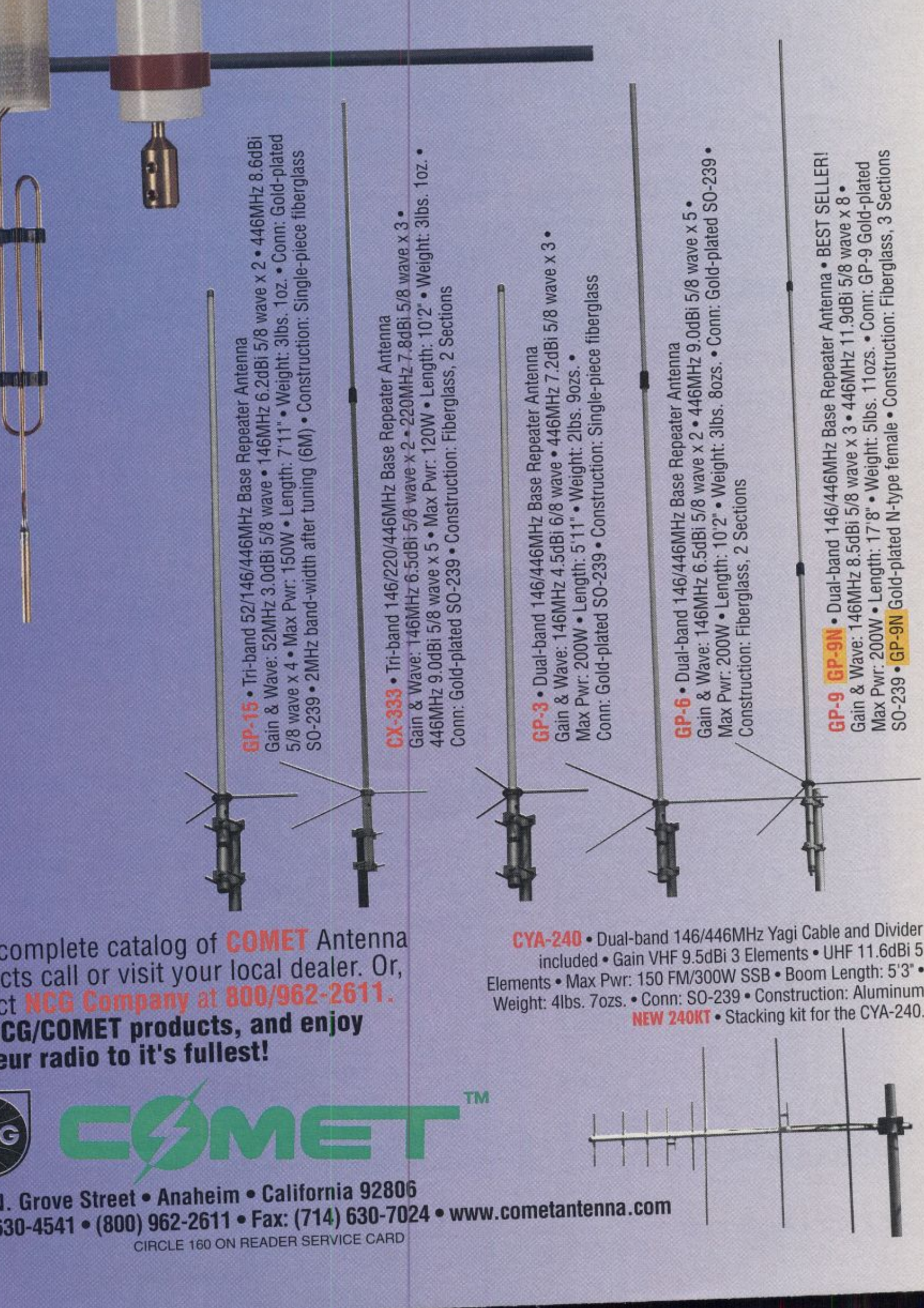

GP-15 • Tri-band 52/146/446MHz Base Repeater Antenna
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CIRCLE 160 ON READER SERVICE CARD

CQ Amateur Radio

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FEATURES

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DEPARTMENTS

ON THE COVER: Meet Mark Moulding, KE7NS, of Ogden, Utah. Through the magic of Larry Mulvehill's photography, it might appear as if Mark has a pretty spacious shack. In reality, though, it's a cozy, heated room tucked away in a corner of the garage. Mark's amateur radio activities began when he was first licensed in 1979 as KA7DXM and extend from horizon to horizon, with activity from 160 meters through 75 centimeters. CW is his mode of choice on HF, but above 30 MHz the sky's the limit. Mark spends much of his time working the digital satellites, such as UO-22 and KO-25, and working weak-signal DX on 6 and 2 meters. By the way, he's still waiting for that first breakthrough to Europe on 6. There must be someone out there in Europe who needs Utah on 6! In real life, Mark works as an aircraft electrician on C-130s owned by Uncle Sam. (Photo by Larry Mulvehill, WB2ZPI)

TH-D7A
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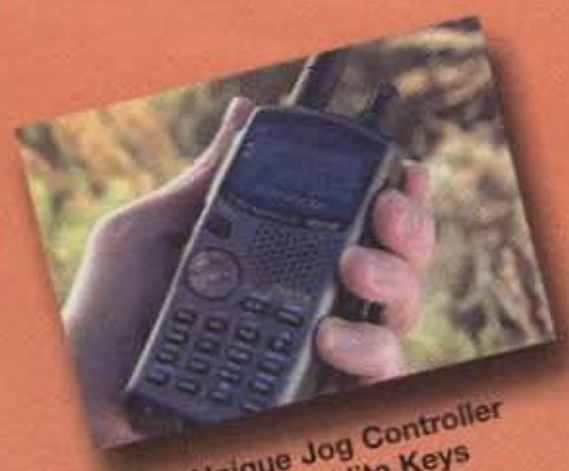

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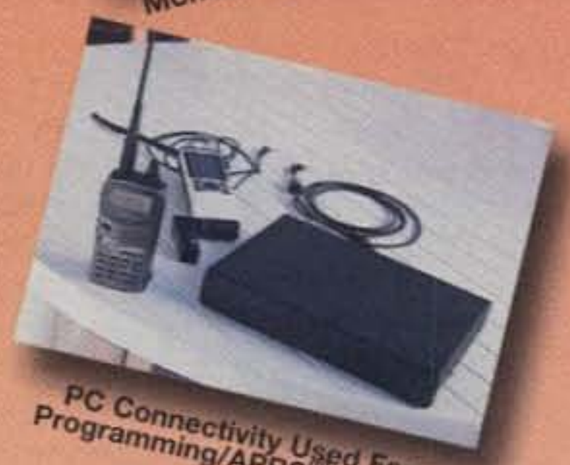

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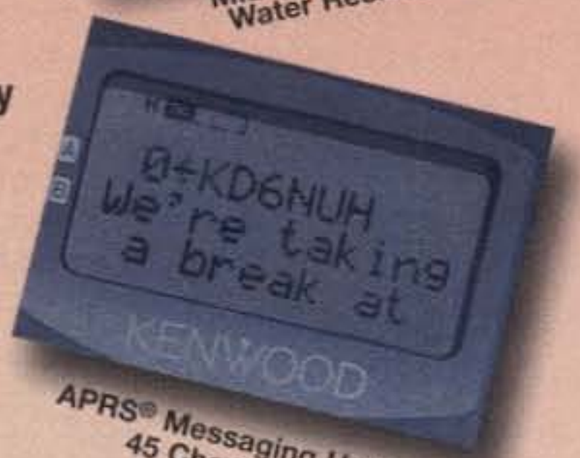

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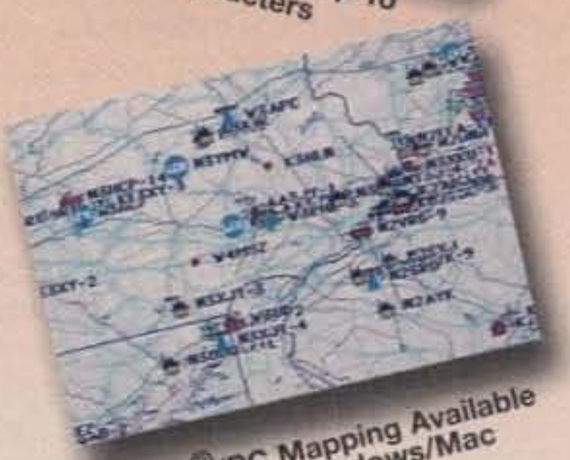

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ZERO BIAS

AN EDITORIAL

Great Britain or the United Kingdom (UK)? I could never decide which sounded more formidable. We're talking a long, rich tradition and an equally long, rich history. In 1086, for example, William the Conqueror set out in the *Domes' Day Book* to record a complete survey of England, giving ownership, values, and extent of properties. Let's face it: In 1086 there really was no comparable activity going on here. So, with a lineage like that, it's easy to see why Great Britain would be reluctant to change anything. It seems to work for them just fine.

Well, our friends across the pond have not only changed something, they apparently have beat us to the punch. In the June issue of *RadCom* (the journal of The Radio Society of Great Britain) there is the announcement of a new two-tiered CW system. There will now be a 5 wpm and a 12 wpm system. The 5 wpm test is enough for a complete HF license, and the top license will have a 12 wpm test. The basic difference in license class privileges will be determined by written exam for each class. For the full HF license, the 5 wpm test offers the holder a maximum of 100 watts output. The 12 wpm test offers the maximum power of 400 watts output. They both appear to have the same written exam. I would go into more detail, but as they are British, they seem to have complicated the issue by introducing a new license class and a new prefix block to differentiate the 100 watt amateurs from the 400 watt ones, bringing their total to six license classes.

To compound the issue, they fully expect at the 2002 or 2003 World Radio Conference the mandatory CW testing will be eliminated. Following that, they intend to revamp the whole system again. Therefore, this is basically an interim move to tide them over until the next conference. The tradition then is gently preserved through a bureaucratic move. Well done.

With regard to what's happening here, the best guess these days is post Labor Day for the big decision. However, I think it's pretty safe to say that whatever it is will not include more license classes, more bureaucracy, or more of anything that has to be revamped in the next two or three years. We probably will see the structure of what is to be, with or without CW, for a long time to come. The interesting thing, though, will be that we'll all learn to live with it, accept it, and most important, prosper. Whether it's the interim or the long run, it's best to think of the politician who's running for re-election who asks, "Are you better off now than you were 20 years ago?" With respect to amateur radio, just about all of us are better off.

Regardless of whatever happens, the world goes on. Going on right now should be primo antenna weather and preparations for the CQ WW coming up. Next month as usual we'll have the results of last year's SSB contest and the complete rules for the 1999 event. You don't even have to worry about Y2K screwing up your logging program (or not) for this year's contest because there's still time to go. For those of you who really hate the CQ WW, remember it's only two weekends where you won't be able to pontificate about the way things should be. It might be time well spent reacquainting yourself with your family and community.

As for me, by the time you read this, I hope to have another antenna up and running. I finally bit the bullet and got rid of a beam-snagging tree (it had been dead for some time), and now there is clear sailing on the beam front. There are still a few other things to do before the contest, and I've been gathering stuff at some of the hamfests we've been to. All I need at the moment is time to devote to it. I guess that's the common complaint these days—not enough time. This month we're scheduled to be at the Huntsville Hamfest, so it's probably my last shot at picking up some exotic hardware and whatevers in the fleamarket. You never know what you might need.

You may not be particularly interested in building a balanced antenna tuner, but I suggest that you read the article "A Delicate Balance" in this issue anyway. When I first looked at it, it was the pictures that caught my attention. After I read the text a few times, I was hooked. Certainly, I had no need for a balanced antenna tuner myself, but the author caught the essence, the feel, and almost the smell of what it was like in some wonderful days of homebrewing. It brought back great memories of projects, some finished and used, some discarded, but all joys to work on. It was pads and pads of graph paper and endless drawings. It was looking at something you finished and were using that you could now modify and add to. Obviously, the art is continuing, and people are still building stuff. Okay, maybe they are not in the numbers that used to dominate the hobby, but people are still having fun building stuff.

What I got out of the article, though, was a great reminder. Most construction articles are basically text, pictures, drawings, and schematics. You read them and decide whether or not you can use or want whatever it is. However, you don't really get a sense of what it's like to actually build the project. This article reminded me of what it was like to go through the building process, which I have to admit was more fun for me than actually using whatever it was I built.

Well, not all of us want to build things, and some of us can think of a million reasons why we can't. It's really okay. You don't have to. Amateur radio is really a continuum stretching back and slightly ahead in time. There have been loads of changes of which most of us are totally unaware. Our personal amateur radio history and sense of normalcy starts with the day we receive our first license. That's day one of our experience and everything there on that day is normal, readily accepted, and the way things are. It's as though all of the bands, equipment, antennas, and everything else have always been there, pristine and just the way are on this day. While it doesn't really matter to us what happened before, our duration on that continuum has only just begun.

Now somewhere down that line when something changes, that's when we get upset. Collectively, we all get a bit upset with any changes to amateur radio as we know it. However, I'll bet it would be impossible to simply codify a few reasons that would be applicable to all.

I can't think of any other hobby that operates under the same mind-set as amateur radio. I have plenty of great memories of amateur radio in the '50s, but I certainly wouldn't want to go back there as a "better time." I have a lot of great memories of my first car, but I wouldn't want to drive it today. Today's amateur radio, in case you haven't noticed, is a heck of a lot better than it was in the '50s. Every change was met with kicking, yelling, and screaming over the imminent death of amateur radio. Now if someone suggested giving up some of these gains, there would be even more yelling, screaming, and kicking, pointing to the question, "How can you take away something that 'always was'?" We are at times a peculiar lot.

Right now, today, you can enjoy amateur radio just the way you always have. Whatever happens down the road, you'll still enjoy the same things and probably find a few new opportunities to try out. You may find that you'll be accommodating a few new neighbors, but that's okay. There's plenty of room for everyone. Over all the changes so far, I think the only thing that could qualify as the loss of a mode would be the inability to operate spark. Well, I don't see a grass-roots movement to bring that back, nor would too many of us opt to build a station today centered around a spark-gap.

Whatever the FCC finally decides, it will not be in any manner, shape, or form that will harm amateur radio. If Incentive Licensing didn't kill amateur radio, then nothing can. Every other change has been a vast improvement to the hobby and its participants. So in the meantime, sit back, prepare for the contest, and smell the roses.

73, Alan, K2EEK

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R7000 SPECIFICATIONS

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(80 M with optional add-on)
HEIGHT
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R7000+ -32 feet (9.8 M)


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  This antenna is a snap to install and short enough to be concealed.
- **Heavy Duty Stainless Steel Mounting Hardware**
  Rugged, easy to install mounting hardware.

R6000 SPECIFICATIONS

FREQUENCY
6, 10, 12, 15, 17, 20 M
HEIGHT
R6000 - 19 feet (5.8 M)

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ANNOUNCEMENTS

• **RADIOFEST XVIII**, sponsored by the Antique Radio Club of Illinois, is one of the largest gatherings of antique radio collectors. The event is to be held August 4–7 at the Elgin Plaza Hotel, Elgin, Illinois. Station host Harry Blesy, NC9CQX, will assist individuals who bring a current copy of their license, to broadcast over a variety of vintage tube equipment. The station will operate AM phone and SSB on the 40, 20, 15, and 10 meter bands. For a QSL, send QSL and large SASE to ARCI, P.O. Box 1139, LaGrange, IL 60526 (e-mail: <arci1280@aol.com>). (SWLs okay.)

• **EME 2000 Brazil Conference** will be the ninth such conference devoted to 432 MHz and above EME amateur radio activities. The conference, which includes presentations of technical papers, will be held August 18–19, 2000 in Rio de Janeiro. For more information, check the web site at <www.eme2000.com.br>, e-mail: <eme @inepar.com.br>.

• **The following Special Events are scheduled for August:**

W2L, from various lighthouses and lightships in the Chesapeake, MD and Delaware Bays (NJ/DE). National Lighthouse Day, 1200Z Aug. 7 to 2200Z Aug. 8. International Lighthouse Day, 0001Z Aug. 21 to 2359Z Aug. 22. Several other Special Event stations—such as N1L, W1L, K2L, W6L, K7L, W7L—and many DX lighthouses/lightships will be participating. For details see the Ham Radio Lighthouse page <http://www.waterw.com/~weidner/ld.htm>.

K2L, from the Buffalo, NY Harborfest, Lighthouse/Lightship Activity Day (Aug. 22), BUffalo, NY; Aug. 8–22; activity Aug. 8–21 on all bands (including WARC) CW, SSB, RTTY; freqs. Aug. 22 CW 3531, 7031, 14031, 21031, 28031 kHz, and SSB 3821, 7261, 14231, 21331, 28421 kHz. QSL via WB2YQH, P.O.B. 73, Spring Brook, NY 14140 with SAE/SASE).

K3SMT, from Mt. Davis, PA expedition; Somerset County ARC; 2100Z Aug. 14 to 2300Z Aug. 15; General portions of 40 and 20 meters plus possible CW operation. For certificate send QSL and SASE to K3SMT, 708 Casselman St., Confluence, PA 15424.

W3CWC, from 130th anniversary of birth of Hiram Percy Maxim, W1AW, Hagerstown, MD; Antietam Radio Assn.; 1600–0200Z each day Aug. 28 through Sept. 2; on 3.905, 7.23, 7.035, 14.25, 28.45, 147.09 MHz. For certificate send QSL and large SASE to Antietam ARA, P.O. Box 52, Hagerstown, MD 21741-0052 by Sept. 30, 1999.

W4B, from Bristol Motor Speedway and NASCAR anniversaries, Bristol, TN; Bristol ARC; 0001Z Aug. 16 to 2359Z Aug. 29; freqs. (±QRM) 3.860, 7.245, 14.237, 21.305, 28.310, plus 146.67, 147.000. For certificate featuring race winner send QSL and SASE to William Price, W4CZ, 232 Cherry St., Blountville, TN 37617.

K8ONV, from the Boca Grande Lighthouse and Museum, Gasparilla Isl. (NA-069); Englewood ARS; 1200–2100Z Aug. 22; on 7.260, 14.260, 21.260, 28.460. QSL with SASE to EARS, P.O. Box 572, Englewood, FL 34223-0572.

K8R, from Rogue's Hollow Festival, Doylestown, OH; Silvercreek Amateur Assn.; 1300–2359Z Aug. 7; on 7.270, 14.270, 21.370, 28.370. For 9 × 12 certificate send SASE to K8RMR, 11781 Fraze Rd., Doylestown, OH 44230-9713.

W8AL, from the Pro Football Hall of Fame Festival, Canton, OH; Canton ARC; 1300Z July 30 through 2400Z Aug. 1; on 7.265, 14.265, 21.350, 28.350. For certificate send 9 × 12 SASE to Donald E. Perry, WQ8J, 968 Culverne Ave. NW, Massillon, OH 44647.

• **The following hamfests, etc., are slated for August:**

July 31 – Aug. 1, **Reassemblement International**, Marennes (in front of Oleron island) near "Intermarche," **France**. Contact REF-Union 17, Mairie 17770, Saint Hilaire de Villefranche, France.

Aug. 1, **49th Annual Berryville Hamfest**, Clarke County, Ruritan Fairgrounds, **Berryville, VA**. Contact Jane Barb, KD4IET, 540-955-1745; e-mail: <ibarb@visuallink.com>; on web: <http://www.Vvalley.com/svarc/hamfest>. (Exams)

Aug. 1, **Warren ARA Hamfest, Champion, OH.** Contact Pete Kozup, K8OUA, 330-847-0975, or Tom Roscoe, K8CX, 330-448-0306.

Aug. 1, **Land of Lakes Hamfest**, Steuben County 4-H Fairgrounds, **Angola, IN**. Contact Land of Lakes ARC at 219-475-5897; e-mail: <sharon.1.brown@gte.net>. (Exams)

Aug. 1, **Portage ARC Hamfair '99**, Portage County Fairgrounds, Randolph, OH. Contact Joanne Solak, KJ3O, 330-274-8240. (Exams)

Aug. 7, **Hamfest '99,** Weedsport Speedway/Fairgrounds, **Weedsport, NY**. Contact Joe Kahler, WA2NGX, 315-364-5135, or e-mail: <htx@usa.net>. (Exams)

Aug. 7, **Golden Empire ARS 60th Anniversary Hamfest & Swapmeet**, Chico State University Farm Pavilion, **Chico, CA**. Contact Ray Watkins, KO6TW, 530-865-9623 (after 5 PM); e-mail: <ko6tw@w6rhc.org>; on the web: <www.w6rhc.org>. (Exams)

Aug. 7, **JVARC Hamfest & Antique Radio Swapmeet**, Decatur Township

(Continued on page 95)

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- 200 memory channels plus two call channels
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OUR READERS SAY

Worldwide Y2K Nets

Editor, *CQ*:

The Y2K arrival presents a human service as well as public relations opportunity that ham radio cannot afford to pass up! Hams are experienced with handling information and are often quite independent of the common power and communication systems. So with some planning, our net traffic controllers have the experience to collect and handle any information as the passage of the new year occurs. With preparation, hams worldwide could establish official "Y2K Nets" on various frequencies from time zone to time zone, monitoring and reporting information which could be useful to the next area(s). Information needs to be accurate, for we would expect there will be many SWLs and media people monitoring. If nothing much happens, then many public fears are quelled. If there should be any unexpected problems, the information may be of preventative help elsewhere.

Bill Breuer, KE4SGV

The Solar Maximum

Editor, *CQ:*

I was delighted to see Cary Oler's article "Getting Primed for the Solar Maximum" back in the November 1998 issue of *CQ* magazine. I have been "wandering the web" in search of various educational sources regarding the Sun's activity and the resulting effects on ham radio we experience. I am currently trying to work the world on 20 meters with a little 20 watt rig and live in a condo in Vancouver where there are no antennas allowed. So stealth is the name of the game, and it has been interesting to try and figure out when my extreme "stealth" in the antenna department was at cause or what was going on in our ionosphere. I just started trying to get on the air at the start of the recent (early November) magnetic storms, etc.

Thanks for running such a readable, useful article in *CQ*. I assume Cary is on faculty in the physics department at the University of Lethbridge. Anyway, he is a good teacher.

Dave, VE7DKR

A Matter of Choice

Editor, *CQ:*

I am writing in reference to the ZL2CA piece on the U.S. Amateur Restructuring in the February 1999 issue of CQ on page 86. I totally agree with Mr. Vernall about the Morse Code testing requirements. I myself am a Tech Plus and I only took the Morse Code test to upgrade. I have never used Morse Code on the air except to practice with a friend of mine. I do most of my radio on packet and voice on the VHF and UHF bands. I operate 10 meters every now and then, but would like to do more. I don't like to use Morse Code at all, and I think it should be abandoned as an outdated mode.

If someone wants to use Morse Code on the air, that's not a problem either. It is a matter of choice and should be treated as such. I have never seen a section of the test that explains how to do packet radio in detail, but I do it all the time on the air, so Morse Code should be treated the same way.

Greg Thompson, KC7GNM/DA2GNM

License Restructuring

Editor, *CQ:*

As a high-school teacher who has tried in vain for years to drum up support for ham radio (I've had school stations at four different schools since 1978), I fully support *CQ*'s license restructuring proposal.

Over the years my best efforts have been persistently thwarted by tight school schedules that leave little time in the day for any kind of meaningful club activities, by insistent demands upon student time and attention, by the Internet, by computer games, and ironically all too often by an irrational fear of anything technical. I've managed to license a few new amateur operators over the years, but I imagine most of them are now inactive. Even so, I've kept amateur radio visible and available in the classroom over the years. Students are always interested, but clearly momentary interest is rarely enough to bring them into our ranks. Nor are they encouraged by the price of amateur equipment. It doesn't help that the equipment cost for a new amateur operator can be pretty substantial. Young beginners are often hard pressed to find an adequate, affordable rig on the new equipment market, and they are not knowledgeable enough usually to spot a used bargain. I'd really like to see a stripped-down rig with an adequate receiver and moderate power pitched specifically at the new ham. Rigs with thousand dollar price tags may be fine for experienced operators with the money to indulge themselves, but they don't bring young people into the amateur radio community.

Unless something substantial is done to encourage new amateurs of high-school age, I see little prospect of attracting enough of them to matter. I agree with *CQ* that the ARRL's proposal is a step in the right direction, but probably does not go far enough. We can keep the amateur

(Continued on page 94)

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PROPAGATION

Skewed Paths to Europe On the Low Bands

BY CARL LUETZELSCHWAB*, K9LA

The fact that something occurs is an observable phenomenon. Why that something occurs and whether its occurrence is predictable is a whole other thing. With propagation theory, as K9LA explains, the number of tools used to measure and quantify has increased enough to raise some interesting explanations.

About twenty years ago, way before the proliferation of giant computers, exotic satellites, and wondrous modeling programs, we ran an article by VE3BMV entitled "Electromagnetic Wave Propagation by Conduction" (CQ, June 1980, p. 44). Yuri was trying to codify or explain in theory form what he was observing and experiencing, which no longer fit traditional theory. Obviously, at the time it was controversial, yet the list of anomalies to traditional theory was growing and they were neatly set aside with neat explanations. However, I think that the core of Yuri's thesis was, "If you have all of these things apparently happening that don't neatly fit into established theory, then something else is just as apparently operant, though we can't actually define or measure it at the moment." So, through an inductive reasoning process, he offered a theory and explanation of the phenomenon. Today, while we can offer sophisticated technological data in place of conjecture, it all still starts with the human brain noticing something different and inexplicable happening. —K2EEK

I started going after 160 meter DXCC in the fall of 1995. Soon thereafter I subscribed to the Topband reflector on the Internet, as it is a valuable aid in finding out when certain 160 meter operations will take place and the real-time status of those operations.

In addition to "who's going to be on when" threads, another popular thread is propagation, especially those paths that do not appear to follow great-circle paths. A recent posting to the Topband reflector in reference to the North America-to-Europe skewed path was the observation of Bill Tippett, W4ZV, when he worked SM4CAN on March 10, 1999:

"Last night I noticed some very interesting propagation. I first heard SM4CAN around 0230 with a good signal but coming in best via my 80 degree Beverage. My true bearing to SM from here is 34 degrees, so apparently the signal was skewed south by the disturbed geomagnetic field caused by auroral conditions (WWV k = 5 at 03 UTC and k = 6 at 06 UTC). Kent's signal was also readable on my 40 and 110 degree Beverages, but 80 was definitely best. I heard Kent comment to another station that he was hearing us over South America so the skew must have been reciprocal on his side."

W4ZV and others have observed this skewed path to Europe many times. Bill saw this skewed path occur more when he was in Colorado (WØZV), and back in 1991 he even wrote an article about his observations of long path and skewed path on the lower short-wave frequencies for the SWL publication *1991 Proceedings of Fine Tuning*. This article was reprinted in the *Top Band Anthology*, Volume I (edited by Ward Silver, NØAX), which was offered at the 1998 Pacific Northwest DX Convention in Seattle.

The obvious question for this W4ZV-to-SM4CAN skewed path is: What causes the skewing? Specifically, what in the ionosphere is the cause of this anomaly?

There indeed is an explanation for these skewed paths to Europe. The pieces of the puzzle started falling together when Bob Brown, NM7M, said "go find the gradient and you'll find the answer."

What Bob was referring to is a sufficient horizontal gradient in electron density (an

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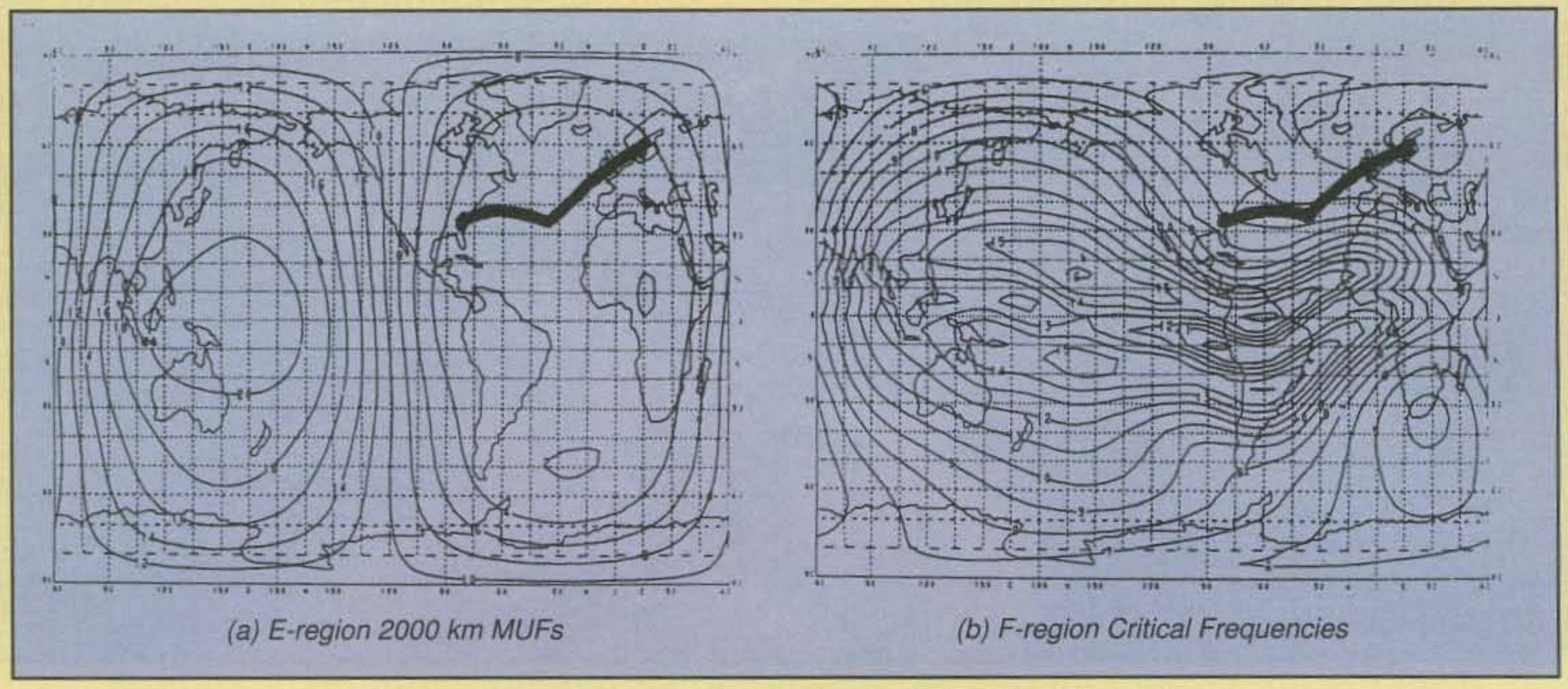

(a) E-region 2000 km MUFs

(b) F-region Critical Frequencies

Fig. 1– Ionospheric maps for March at 0200 UTC for SSN = 110.

increasing electron density perpendicular to the path) that could significantly skew the signal off one great circle path and onto another great circle path. Just as RF going upward can encounter an increasing electron density (a vertical gradient) and be refracted back to Earth, RF can also be refracted off one great circle path and onto another by a horizontal gradient. Let's take a look at a map of the ionosphere for the time of the W4ZV-to-SM4CAN QSO to see if there are any horizontal gradients in the area where skewing must have occurred for the skewed path to happen.

Before doing this, a couple of comments are in order. First, maps of the ionosphere are usually shown with critical frequencies, or maximum usable frequencies (MUFs), for a given hop length. This is okay, as the electron density is proportional to the square of the critical frequency, and MUFs are proportional to critical frequency. Thus, any gradient in electron density will also show up as a gradient in critical frequency or MUF. Second, the propagation of RF down on 1.8 MHz is usually confined to the *E*-region (about 110 km) and lower *F*-region (200 km or so) because of electron densities and the resulting amount of refraction. Any *F*-region gradient will have to be looked at in terms of the altitude at which it occurs, as 1.8 MHz RF may not get up high enough to be affected by it.

Fig. 1(a) is a world map of the *E*-region 2000 km MUF, and fig. 1(b) is a world map of the *F*-region critical frequency. The maps are for March of 1999 at 0200 UTC. Both maps include the skewed path based on W4ZV's and SM4CAN's observations of which Beverages were best for receiving. With their Beverages having 3 dB beamwidths on the order of several tens of degrees, though, it's difficult to pin down the exact point where the skewing occurred. The skewed path in reality is two great circle paths; they are straight lines in the real world, but look curved on these maps because the maps are a rectangular projection of the Earth.

There indeed are some horizontal gradients, as shown by those areas where the contour lines are closely spaced (this is similar to a weather map indicating high winds where the contour lines of atmospheric pressure are closely spaced). They are along the sunrise terminator on the left side of both maps, along the sunset terminator in the middle of the *E*-region map, and in the equatorial region on the *F*-region map. The sunrise and sunset gradients are far removed from the area in which we're interested, so we won't bother with them. But the northernmost edge of the equatorial gradient in the *F*-region in fig. 1(b) requires a closer look.

The Proplab Pro propagation software (Solar Terrestrial Dispatch) was used to ray trace a signal coming out of W4ZV on the 80 degree heading. Its ray trace engine includes the effects of the Earth's magnetic field and electron collisions with neutral particles, which are important for accurate results on 160 meters due to magneto-ionic theory. As expected, since this is an *F*-region gradient, there wasn't much skewing in the suspect area, as the 160 meter RF just didn't get high enough up into it. It amounted to only a couple of degrees off of the 80 degree heading, and this agrees with the results of other ray tracings on 1.8 MHz (Oler and Cohen, 1998). It confirms that 1.8 MHz energy just doesn't get too high into the *F*-region before being refracted back to Earth.

But wait a minute. These ionospheric maps come from the database used for propagation predictions, and as such they are monthly median values. In other words, it's a statistical "average" of what to expect in a one-month period. Any very short-term variations in the data are not shown on these maps, as the variations are just too dynamic.

Do we have any data at these higher latitudes showing the real-time variations and not just the monthly "average"? We sure do. We have data from incoherent-scatter radar sites operating in Alaska. This allows us to see, on a real-time basis, what's actually going on at these higher latitudes. Let me point out that the data I'll present is several decades old, but it is still relevant and accurate. In the early 1960s, technology advanced to where incoherent-scatter radar could be used to derive electron density profiles. Thus, during the 1960s, '70s, and '80s, intensive investigations of the high-latitude ionosphere were undertaken. Much of the data that we have on the high-latitude ionosphere is from this time period.

Fig. 2 shows an electron density profile derived from the auroral-zone incoherent-scatter radar near Chatanika, Alaska (Bates, Belon, and Hunsucker, 1973). The y-axis is electron density in electrons per cubic centimeter. The x-axis is geomagnetic latitude. The scans were along a constant magnetic longitude. The profile is for a night when the authors reported that the geomagnetic field was moderately active as evidenced by observations of the visible aurora.

What's important to note is how steep the gradients are, both in the *E*-region and in the *F*-region. In the span of several degrees of latitude, both the *E*-region electron density and the *F*-region electron density increase by a factor of at least 10.

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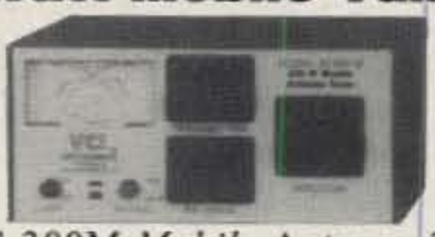

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- DCS Encode/Decode
- CTCSS/DCS Tone Search
- Dual Watch
- SmartSearch™
- Auto Range Transpond System™ (ARTS™)
- Priority Channel Alarm
- ADMS-1D Windows™ Programmable
- 1 Watt External Power Supply
- 80 Minute Rapid Charger
- Flexible Antenna, Belt Clip, Hand Strap

***Cellular blocked*

**Battery Life: 5-5-90 duty cycle.*

The world's smallest HT with all the high-tech features Dick Tracy could ever want!

The ultra-compact size of the VX-1R Dual-Band is the first thing you notice as you cradle it in your palm. But the high-tech features make this radio one you must have now! Simple combinations, using seven buttons and one knob, control this marvel of engineering. One soft key touch, and wide receive VHF/ UHF—76~999 MHz RX (except cellular); 144~148, 430~450 MHz TX, or AM/FM Broadcast, Aircraft, Police, Fire—even TV, spring to life! Touch again for Yaesu-exclusives, SmartSearch™ and ARTS™, or Priority Channel Alarm. Built-in CTCSS and DCS Encode/Decode for 2m/440 amateur bands, CTCSS/DCS Tone Search, and Dual Watch, are included along with 291 Memory Channels in 9 banks with 500 mW power output. Backlit LCD Display shows 6-character alphanumeric capability; backlit keypad makes operation easy in dim light. And, although the VX-1R is the world's smallest† dual-band HT, you get over 19 hours* of use with just a 1 hour recharge from its long-lasting lithium ion battery! Big features, small size—the most satisfying combination in the world! See it at your Yaesu dealer today!

FT-50RD
MIL-SPEC,Heavy Duty, Dual-Band Handheld

FT-51R
Dual-Band with Dual Receive and Help Menu Function

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Specifications subject to change without notice. Specifications guaranteed only within amateur bands. So me accessories and/or options are standard in certain areas. Check with your local Yaesu dealer for specific details.

†Smallest HT as of Jan. 1998

TRUE MIL-SPEC TOUGHNESS
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US MILITARY APPROVED MIL-SPEC 810

FT-2600M
HEAVY-DUTY VHF FM TRANSCEIVER

The FT-2600M is a deluxe, compact FM mobile transceiver providing high power output and outstanding receiver performance for the 144 MHz band. Included in the FT-2600M's feature complement are:

Features

- 60 Watts of power output, with selection of four power levels for every operating situation.
- Expanded receiver coverage: 134-174 MHz.
- Keyboard entry of operating frequencies from the microphone.
- Excellent protection from receiver intermodulation distortion, thanks to Yaesu's renowned Advanced Track Tuning front end.
- Outstanding packet radio capability at 1200 or 9600 bps with easy interface via a dedicated rear-panel jack.
- 175 memories which can store repeater shifts, odd repeater shifts, CTCSS/DCS tones, and 8-character Alpha-Numeric labels.
- Built-in CTCSS and DCS Encoder/Decoder circuits.
- The Smart Search™ feature automatically sweeps a band and loads active frequencies into a dedicated memory bank.
- The Yaesu-exclusive Omni-Glow™ multi-function LCD display.
- Yaesu's exclusive ARTS™ (Auto-Range Transponder System), which alerts the operator when an "out-of-range" condition exists with another ARTS™- equipped station. This feature is especially valuable during search-and-rescue operations with hand-held units.
- Extensive MENU system, which allows customization of a number of transceiver performance characteristics.
- Additional features include a transmit Time-Out-Timer (TOT), Automatic Power-Off (APO), Automatic Repeater Shift (ARS), plus provision for reduction of the TX deviation in areas of high channel congestion. And an all-new S-Meter Squelch circuit allows the owner to set the squelch to open at a programmable setting of the S-Meter, thus reducing guesswork in setting the squelch threshold.

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These gradients are much steeper (by at least an order of magnitude) than any gradient seen in the high-latitude area of fig. 1(a) or 1(b). These steep gradients are not shown on the monthly median maps because they are just too dynamic for a monthly median presentation.

The gradient we're seeing in the *F*-region (two traces are shown—one for the upward sweep of the radar and the other for the downward sweep) is the poleward wall of what's known as the mid-latitude trough. This trough is about 5 degrees of latitude wide, putting the equatorward wall off the left side of the plot at about 60 degrees. As can be seen, the gradient is a sharp reduction in electron density, which translates to a sharp reduction in critical frequency. As noted in the figure, the bottom of the trough is just equatorward of where visible aurora occurs. At first glance, one might assume that this gradient could be important for 160 meters. However, like the *F*-region equatorial area of fig. 1(b), it's just too high to affect our 160 meter energy (it's been found to be above 300 km).

The gradient we're seeing in the *E*-region is auroral-*E* ionization—a sharp increase in electron density peaking at about 110 km. This altitude makes it extremely important for 160 meter propagation. What's shown in the figure is the equatorward wall (increasing electron density going north) of this steep gradient. The radar profile doesn't show the peak or the poleward wall (increasing electron density going south). This instance of auroral-*E* ionization occurs just equatorward of the visible aurora. Also note that the radar's minimum sensitivity translates to around two times ten to the fourth electrons per cubic centimeter. The normal night-time *E*-region density is quite a bit below this level at around .3 times ten to the fourth electrons per cubic centimeter, so the gradient is even more extensive than this radar profile shows.

Much effort has been expended in the scientific community studying auroral-*E*. From these efforts, some very general statements about the steep *E*-region gradient can be made:

1) The gradient is very dynamic. Although it predominantly occurs and is steepest during magnetically active times, it also has shown up during magnetically quiet times.

2) The gradient is not confined to the region of visible aurora (the familiar annular ring portrayed in books and on maps), nor is it always right at the equatorward edge of the visible aurora as is seen in fig. 2. Frequently it extends up to several degrees of latitude equatorward of the visible aurora.

3) It occurs mostly within several hours of the local midnight portion of the auroral oval, but is not necessarily continuous. Gaps can exist.

4) Because the outer edge of the auroral oval expands equatorward as geomagnetic field activity increases, this gradient follows along and also moves equatorward.

Okay, all this technical information about the ionosphere is interesting, but how does it relate to our skewed path? You've probably figured it out already: This steep *E*-region gradient occurs in the area where it could provide the skewing for the W4ZV-to-SM4CAN path. How do we know that? As luck would have it, the NOAA-12 satellite made a pass over the northern polar cap around the time of this QSO, and from the data taken by its electron detector the location of the auroral oval can be extrapolated.

Fig. 3 shows the satellite data. This is an azimuthal equidistant map with its center at the geographic north pole. The satellite track is the slightly curved line going from the southwest to the northeast just above the center of the photo. The length of the solid lines coming off the track to the southeast are proportional to the logarithm of the average energy flux observed at that location. The dots coming off the track to the northwest are the energy of the electrons—2 dots are 350 eV and 22 dots are 17.5 keV, with the number of dots in between following a semi-logarithmic relation. All this data allows the auroral oval (the colors ranging from orange through yellow to blue) to be extrapolated and superimposed on the photo.

The orange area is where there is the most electron precipitation—that is, the most electrons spiraling down around magnetic field lines into the *E*-region and *D*-region. The yellow area roughly corresponds to the outer edge of the visible aurora. Auroral-*E* ionization gradients occur anywhere in the orange area, the yellow area, or several degrees equatorward in the blue area. The lack of data just south and east of Nova Scotia and Newfoundland (where the orange area abruptly stops) is not a break in the auroral zone. It's just that the satellite didn't get any data for that area. The auroral zone is certainly there, and it's easy to eyeball in the colors to fill in this missing-data area.

The true great circle path from W4ZV to SM4CAN is also shown in the figure (it's slightly curved because it does not originate from the center of the map), and it's easy to see why the true great circle path would have a problem: It encounters much increased auroral absorption. I have also added the skewed path per fig. 1 (with the same earlier caveat in reference to the exact point of skewing due to the 3 dB beamwidths of Beverages). One comment is appropriate: The exact location of the equatorward edge of the visible aurora (the yellow area) could be several degrees either way. That's another way of saying that the extrapolation of the

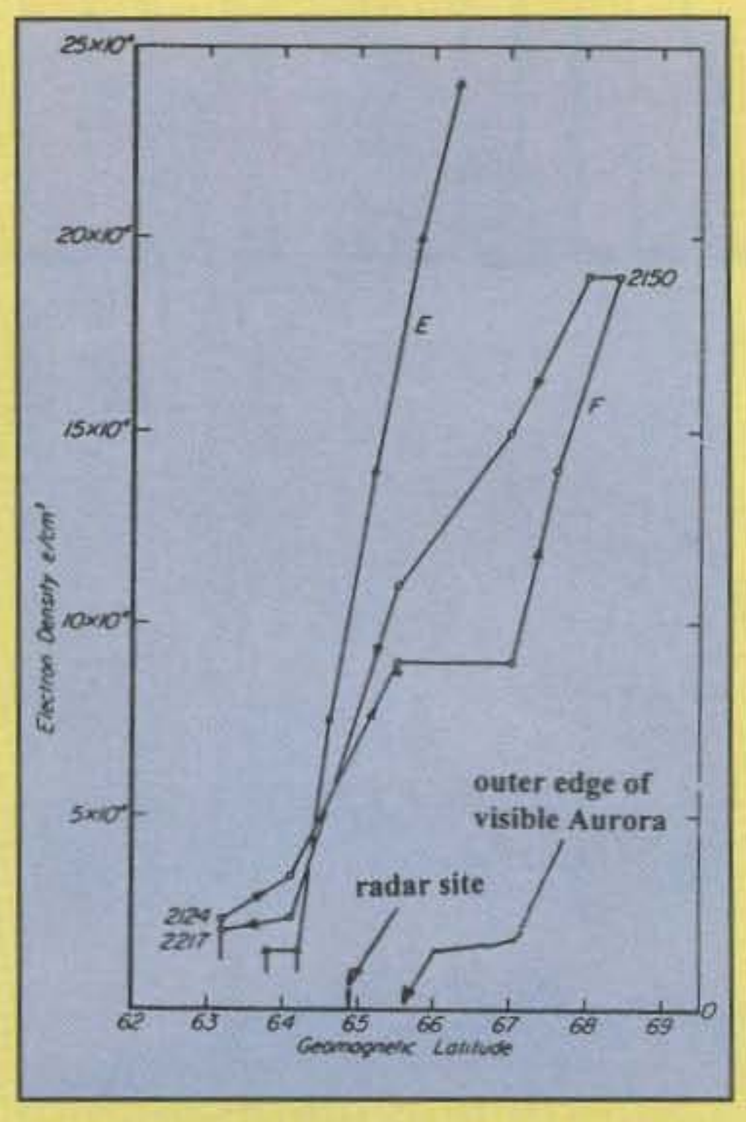


Fig. 2– Latitudinal variation of electron densities for aurorally active night (October 13, 1971).

electron energy data from the satellite into an auroral oval is not an exact science. The location shown does agree very well with other sources that have studied the location of the visible aurora versus magnetic field activity.

This data is supported by other data—specifically, a magnetogram and all-sky photos from the Swedish Institute of Space Physics in Kiruna, Sweden. Fig. 4 is the magnetogram, showing disturbances in the magnetic field starting a little before 0200 UTC and ending at around 0500 UTC. Kiruna reported *k*-indices of 5 for 00–03 UTC and 6 for 03–06 UTC. During this time, the all-sky camera (which is at the focal point of a convex mirror that allows pictures to be taken all around the compass from close in and out to about 1000 km at *E*-region heights) recorded much visible auroral activity that extended out to at least the 1000 km limit of the camera in the southeast to southwest sector. Photos were taken every minute, and they showed the visible aurora (and hence the electron density gradient) to be very dynamic in location and intensity.

All of this adds up to the following: The signal from W4ZV headed to the east on a great circle path was skewed off of this path due to the *E*-region gradient at the outer edge of the auroral oval, and then continued on the great circle path that comes into SM from the southwest. The gradient required to do this would be an increasing electron density going south; as stated earlier, this exists on the poleward side of the *E*-region gradient. A good question to ask is, if the signal is skewed

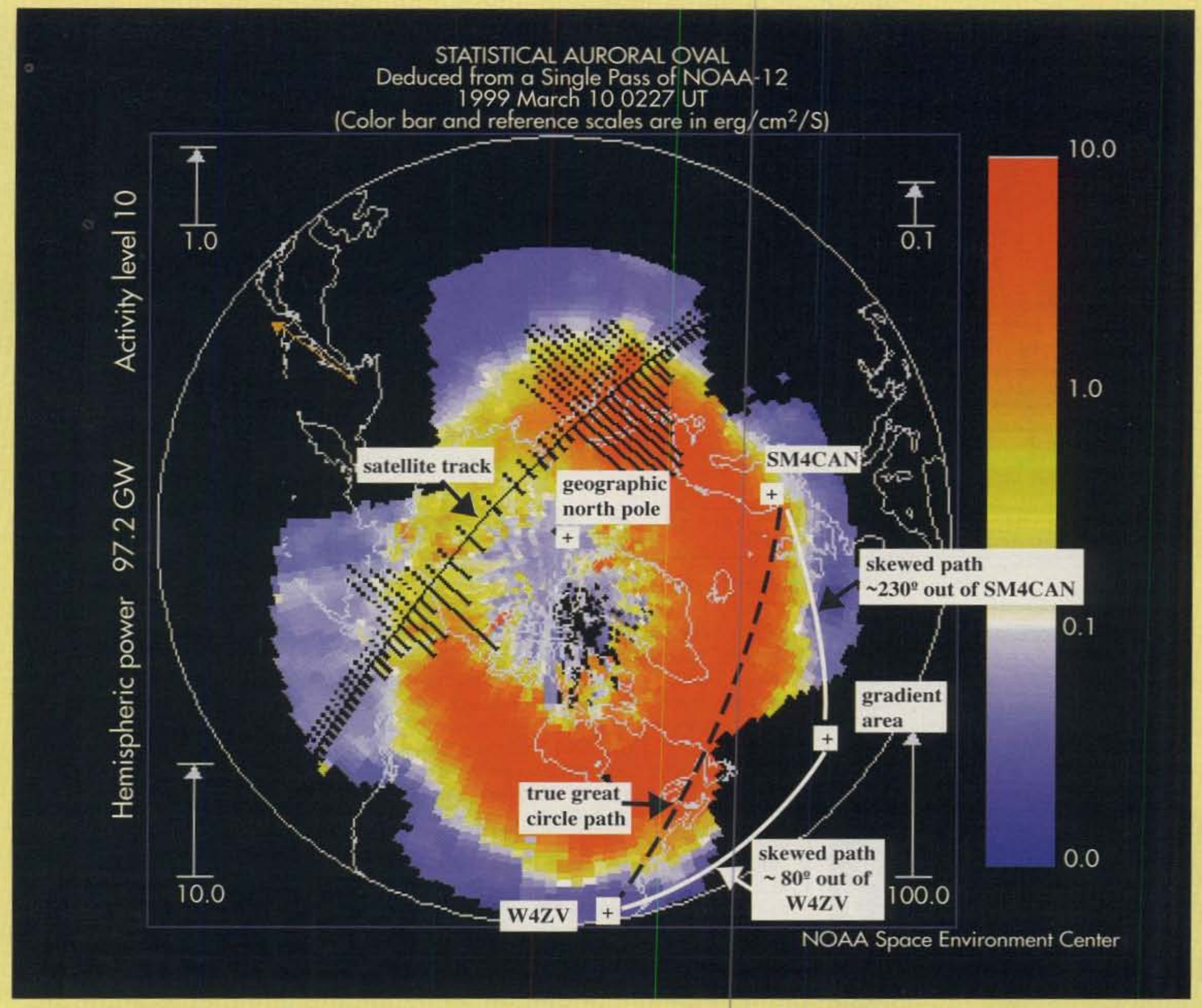


Fig. 3– Satellite photo with auroral oval and W4ZV-to-SM4CAN paths.

to the north due to the poleward side of the gradient, how does it even get to the poleward side? Wouldn't it first be skewed to the south due to the equatorward side of the gradient? General statement number 3 listed previously about auroral-*E* ionization explains it: The gradient is not continuous around the outer edge of the auroral oval; there are gaps that the signal can sneak through.

Another good question to ask is, what magnitude of gradient is required to do this amount of skewing? Does it make sense with respect to the data of fig. 2? The amount of skewing, if it is by refraction, is directly proportional to the change in electron density over distance (the gradient) and is inversely proportional to the square of the frequency. Thus, the steeper the gradient, the more the skewing for a given frequency. Likewise, the lower the frequency, the more the skewing for a given gradient.

Looking at fig. 1 shows the signal must make almost a 90 degree left turn to come off the easterly great circle path out of W4ZV and onto the great circle path into SM. After much effort with ray tracing under various gradient conditions, it appears that refraction is not the mechanism. The ray just can't turn enough in the relatively short distance (span of latitude) associated with the auroral-*E* ionization.

Thus, it is likely that this gradient is more like a metallic-type reflector, given that it is so steep and it is on the order of a wavelength or so in extent. Using the *E*-region data from fig. 2, the conductivity of this gradient can be calculated; it's in the neighborhood of 1 milliSiemen/meter, which corresponds to the conductivity of poor earth. This certainly says reflection is possible from this gradient. This is an interesting and important result, as it shows that auroral zone gradients can skew signals to the magnitude needed to fit the observations.

When you think about it, this is kind of a nice thing for the auroral oval to do: provide us with another path when it shuts down the normal path due to increased absorption. It's also easy to show that skewing to Europe from W4ZV's old WØ QTH in Colorado is more likely than from his new W4 QTH (as he has observed) due to the relationship of the auroral oval to the WØ-to-Europe path. Likewise, it's easy to show that skewing to Japan from his old Colorado QTH is less likely (as he observed) again due to the relationship of the auroral oval to that path.

All of this sounds great because all the pieces of the puzzle seem to fall into place, but still this is just a hypothesis. Doing some ray tracing with the aforementioned Proplab Pro propagation software on this skewed path would go a long way in confirming the hypothesis. But the model of

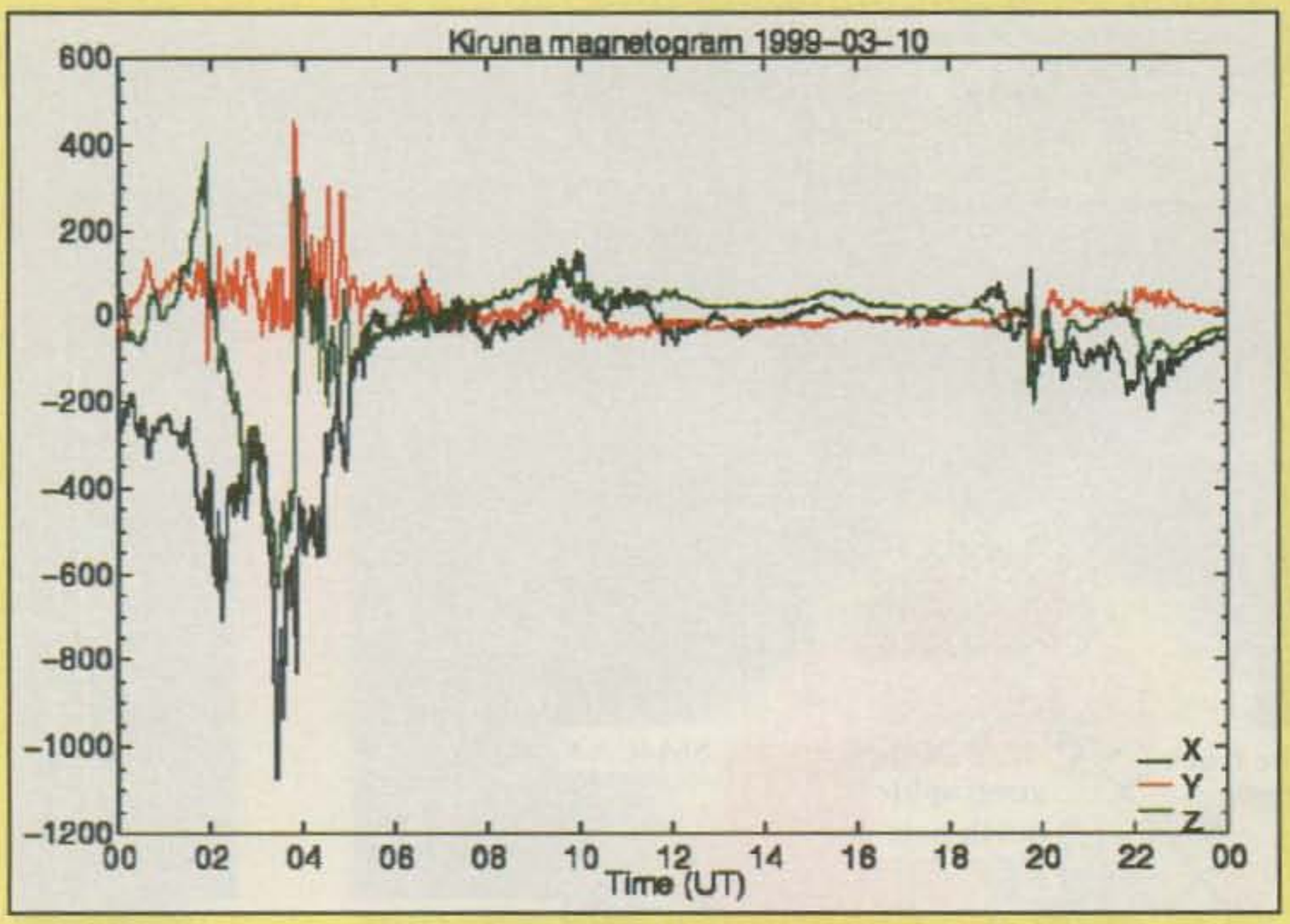


Fig. 4– Kiruna, Sweden magnetogram.

the ionosphere in Proplab Pro (which is selectable between either the CCIR model or the URSI model) does not include the steep and dynamic auroral-*E* ionization gradients that we're interested in.

Thus, the next best confidence-builder would be someone else's independent study of skewed paths. Indeed, others (Rogers, Warrington, and Jones, 1997) have specifically looked at these paths. Back in March of 1994, they measured the arrival angles in England of signals coming from Halifax, Nova Scotia, on three frequencies: 5.097 MHz, 10.945 MHz, and 15.920 MHz. They used 24-element circular goniometer arrays to measure the arrival angle.

Rogers, Warrington, and Jones reported that the bearing deviations from the true great circle short path were far larger and more systematic than had been expected. Their results on 5.097 MHz (I'll only summarize these results, as it's closest to our low bands) showed deviations from the true great circle short path of up to 70 degrees. Most of the deviations came from a more southerly direction compared to the true great circle short path of 286 degrees. And the deviations tended to be greater with an elevated *k*-index. Because of the higher frequencies used in their study (which go higher into the ionosphere), the authors tied the skewed paths to the gradients in the aforementioned *F*-region trough. Going through the mechanics of this path, including the location of the auroral oval, shows it to be very similar to our East Coast observations of skewed paths to Europe, except for our lower frequencies.

One final comment: John Devoldere, ON4UN, recently released a new edition of his *Low-Band DXing* book (Devoldere, 1999). The first chapter is devoted to propagation, and one topic of discussion is skewed paths. Devoldere correctly states that this skewing is due to horizontal gradients, but many of his figures (for example, figs. 1-22 through 1-27) hypothesize that the RF follows a smooth curved path around the outer edge of the auroral oval. Due to the intricate horizontal and vertical electron density profile required to do this and the fact that it would have to be continuous all the way around, in my humble opinion it is highly unlikely for this to happen. It is more likely that the mechanism is that which is explained in this article—a signal being skewed off one great circle path and onto another great circle path due to simple reflection from a very steep horizontal gradient.

In summary, the observations of non-great circle paths from the US East Coast (and Midwest) to Europe can be explained by significant skewing of the signal from a steep horizontal gradient in electron density on the poleward side of the auroral-*E* ionization that is at the equatorward edge of the auroral oval. It is also likely that this mechanism is responsible for skewed path reports from the Pacific Northwest of European stations coming out of the northwest.

Acknowledgments

I would like to thank Ted Cohen N4XX, Cary Oler, Bill Tippett W4ZV, and Dean Straw N6BV for their review and helpful suggestions for this article; Bob Hunsucker AB7VP for the many technical papers about the auroral ionosphere, which included the data of fig. 2; Dave Evans and Sue Greer of NOAA/SEC for fig. 3; Urban Brandstrom SM2PQQ for fig. 4; and finally, Bob Brown NM7M, not only for his review of this article, but also for his gentle urging that the explanation of skewed paths must deal with the physics of the ionosphere.

(The material in this article does not necessarily reflect the opinions of any of these propagation specialists. The conclusions drawn are mine and mine alone.—K9LA)

References

Proplab Pro propagation software, Solar Terrestrial Dispatch, P.O. Box 357, Stirling, Alberta, T0K 2E0, Canada (web site: <http://solar.uleth.ca/solar/www/proplab.html>)

Oler, C. and T. J. Cohen; "The 160 Meter Band—An Enigma Shrouded in a Mystery, Parts I and II," *CQ Amateur Radio,* Vol. 54, No. 3, March 1998, pp. 9–14, and Vol. 54, No. 4, April 1998, pp. 11–16.

Bates, H. F., A. E. Belon, and R. D. Hunsucker; "Aurora and the Poleward Edge of the Main Ionospheric Trough," *Journal of Geophysical Research,* Vol. 78, No. 4, February 1, 1973, pp. 648–658.

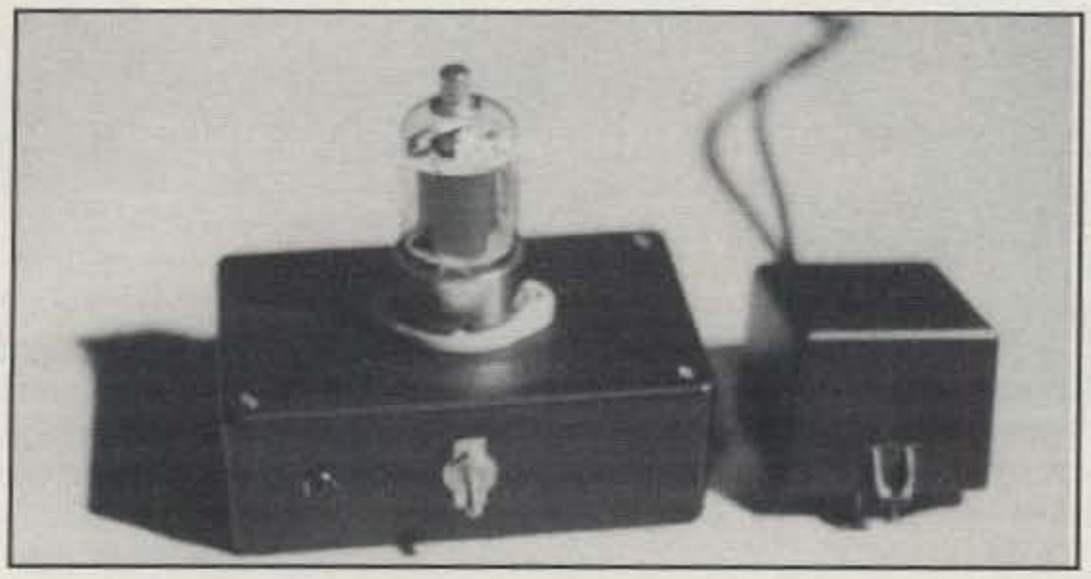
Rogers, N. C., E. M. Warrington, and T. B. Jones; "Large HF bearing errors for propagation paths tangential to auroral oval," *IEEE Proceedings—Microwaves, Antennas, and Propagation,* Vol. 144, No. 2, April 1997, pp 91–96.

Devoldere, J.; *ON4UN's Low-Band DXing,* 3rd Ed., 1999, ARRL, Newington, CT.

Instant nostalgia: Flick the switch, put your feet up, sip an 807 or two, and let the good times roll.

The Un-Radio

BY THOMAS M. HART*, AD1B



If the finished unit is a little too stark for you, you can add whatever you want to achieve the desired effect.

I have always enjoyed the glow of tubes in transmitters and receivers. However, lack of space and aversion to the heavy maintenance have kept me in the realm of solid-state equipment. Still, it is nice to see the glow of a tube every so often, and I check with Gerry, WA1CKV, for some components. Gerry has a great collection of salvaged electronics, and I was not disappointed in my search. I came up with a 6146 tube, socket, and an old H.P. computer power supply that provided low-voltage AC for the filaments.

Fig. 1 and the accompanying photo show the contraption mounted in a RadioShack utility box and featuring a functional, but not particularly necessary, on/off switch and pilot light.

I have enjoyed the glow of my one-tube un-radio and recommend it to anyone who wants the sight without the upkeep. ■

*54 Hermaine Ave., Dedham, MA 02026

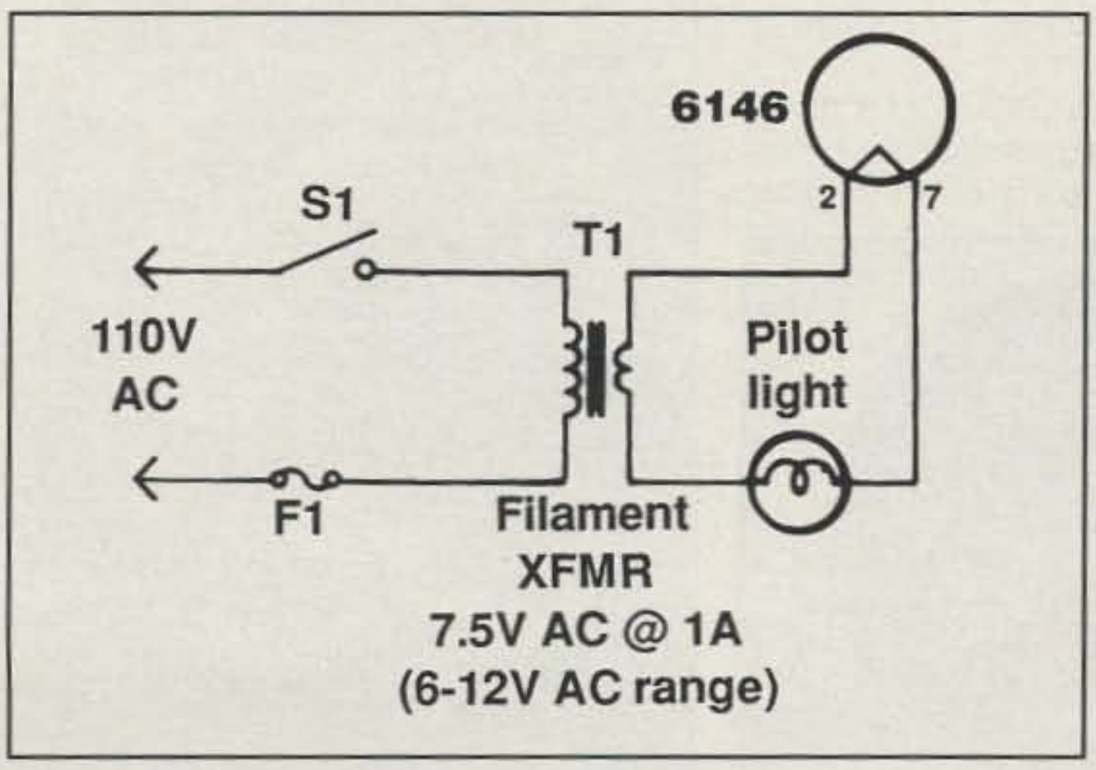
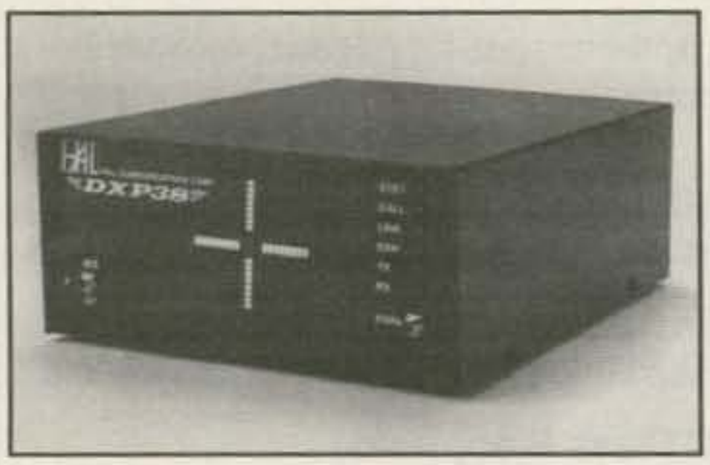


Fig. 1– The circuit is simple enough, and the parts should be readily available.

CQ SHOWCASE

The DXP38 DSP HF Radio Modem From HAL Communications

HAL Communications Corp. has announced the all new DXP38 DSP HF Radio Modem which combines all the features of the P38 modem and the RTTY-1 in a self-contained 12 VDC modem. A new "Crossed-X" tuning display similar to the RTTY-1 works in all the modes: RTTY, AMTOR, P-Mode, and CLOVER-II. The easy-to-use tuning display can be switched to show M/S or zero-center frequency tuning-error "on the fly" in any mode. The DXP38 also boasts expanded frequency selection and more CLOVER-II modes, including 8P2A and 16P4A. The user can choose any FSK Mark and Space tone between 500 and 3000 Hz and any of the four CLOVER-II channels. Like the P38, all modem connections are made via phono connectors and a standard 9-pin serial cable.



The DXP38 comes with all the software needed to run either DOS or Windows (95/98/NT 4.0) and is compatible with any third-party programs written for the DSP-4100. HAL software upgrades are free via their website <www.halcomm.com>. For more information, contact HAL Communications Corp., P.O. Box 365, Urbana, IL 61803 (217-367-7373; fax 217-367-1701; e-mail: <halcomm@halcomm.com>), or circle 101 on the reader service card.

Universal Radio Communications Catalog

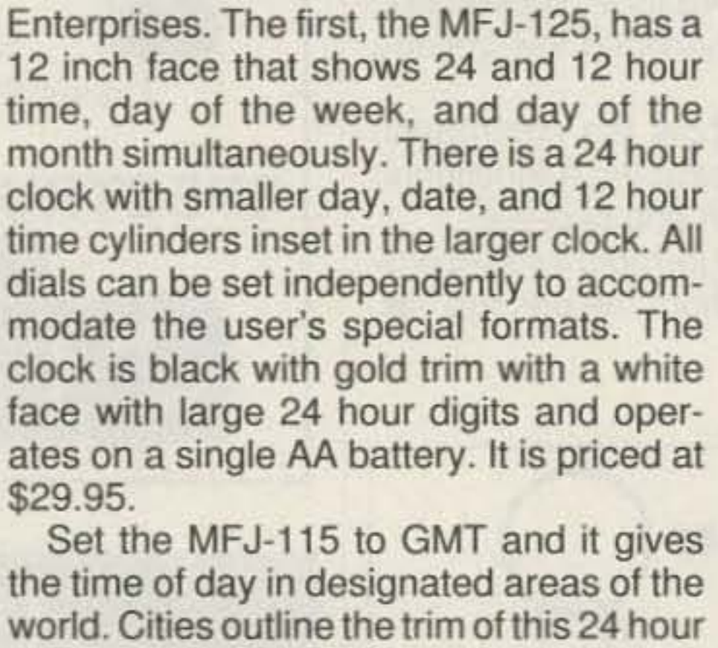
Universal's new 1999 Communications Catalog #99-02 is 120 pages in an 8½" × 11" format and covers equipment for the amateur, shortwave, and scanner enthusiast. A selection of antennas, headphones, books, and accessories is also featured. New items premiering in the catalog include a Sony ICF-SW07 Portable Receiver, ICOM IC-R75 Receiver, ICOM PCR-100 Wideband Computer Receiver, AOR AR7000B Wideband Receiver, Japan Radio NRD-301A Receiver, Grundig YB-300PE Portable Receiver, Kenwood TH-D7A 2M/440 MHz Handie-Talkie, ICOM T81A 6M/2M/440MHz/1.2GHz Handie-Talkie, plus new antennas, accessories, and books.

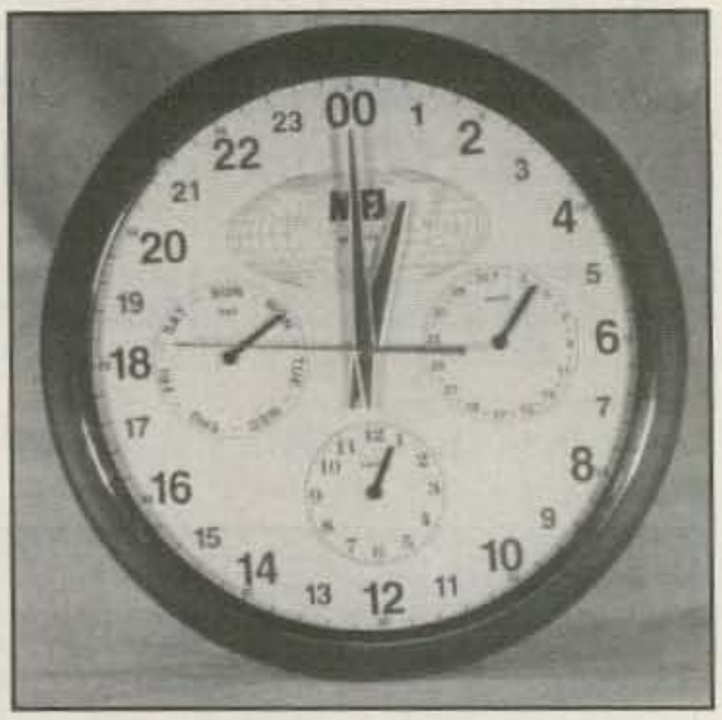
The catalog is available free on request by 4th class mail, or for $3.00 by priority mail. It is also available outside North America for 5 IRCs. Contact Universal Radio, Inc., 6830 Americana Pkwy., Reynoldsburg, OH 43068-4113 USA (e-mail: dx@universal-radio.com>; web: <www.universal-radio.com>), or circle number 102 on the reader service card.

New MFJ 24-Hour Clocks

Two new clocks are available from MFJ Enterprises. The first, the MFJ-125, has a 12 inch face that shows 24 and 12 hour time, day of the week, and day of the month simultaneously. There is a 24 hour clock with smaller day, date, and 12 hour time cylinders inset in the larger clock. All dials can be set independently to accommodate the user's special formats. The clock is black with gold trim with a white face with large 24 hour digits and operates on a single AA battery. It is priced at $29.95.

Set the MFJ-115 to GMT and it gives the time of day in designated areas of the world. Cities outline the trim of this 24 hour





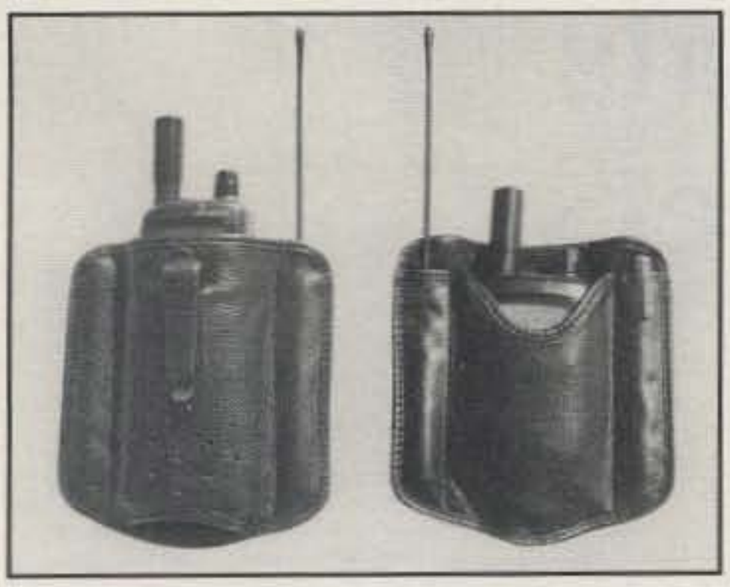
clock. Each city has a plus or minus number from GMT. A blue and brown map background is complemented by bright red hands. The 24 hour digits are silver inside a black inside trim. This 12 inch clock operates on a single AA battery and is priced at $24.95.

For more information, contact MFJ Enterprises, Inc., P.O. Box 494, Mississippi State, MS 39762 (601-323-5869), or circle 103 on the reader service card.

Updated '99 Jensen Tools Catalog

Jensen Tools has released an updated version of their Spring 1999 Master Catalog. This 308-page, full-color catalog contains many new products, including the recently introduced line of Jensen brand handheld meters. In addition to 50 pages of Jensen original tool kits, the catalog features products from major tool manufacturers including test equipment, power and specialty tools, wire and cable, equipment for soldering, telecommunications, computers, and more.

Jensen benefits include unconditional guarantee on all products , with a special lifetime guarantee on Jensen brand hand tools. For a free copy of the catalog, contact Jensen Tools Inc., 7815 S. 46th St., Phoenix, AZ 85044 (800-426-1194 or 602-968-6231; fax 602-438-1690; e-mail: <jensen@stanleyworks.com>; on web: <www.jensentools.com>), or circle number 104 on the reader service card.



Cutting Edge Enterprises PowerPort PocketPRO™

This "new face and new purpose to the old pocket protector" is a small soft-leather pouch that holds a mini radio plus a spare antenna and a few pens in a shirt pocket. A snug fit keeps the radio in place to prevent it from falling out if you bend over, plus the radio is close to your ear for low-volume listening. The PocketPRO™ is priced at $19.95. For more information, contact Cutting Edge Enterprises, 1803 Mission St., Suite 546, Santa Cruz, CA 95060 (800-206-0115; e-mail: <cee@cruzio.com>), or circle number 106 on the reader service card.

VisualRadio 3 from Computer International

VisualRadio 3 is a Windows-based radio frequency (RF) and audio frequency (AF) spectrum analysis and control software for most computer-ready scanners and receivers/transceivers by AOR, ICOM, JRD-NRD, Kenwood, Optoelectronics, Rohde & Schwarz, Watkins-Johnson, WiNRADiO, and Yaesu. Features include receiver tuning by means of a double click on the corresponding data in a table or on the desired frequency in a graphic display (also tune with IntelliTune and markers); automatic identification of stations at tuned frequencies; unlimited number of Microsoft access compatible databases; unlimited number of user-defined tables; additional user-defined fields can be added to tables; tables can be filtered easily by using SQL queries; and much more.

For more information, contact the US and Canada distributor, Computer International, 207 South US-27, St. Johns, MI 48879 (phone/fax 517-224-1791; e-mail: <computer@email.mintcity.com>; web: <http://computer-international.virtualave.net>), or circle number 107 on the reader service card.

LDG BA-1 Balun Box

LDG Electronics has announced the 4:1 BA-1 Balun Box, which provides interface of ladder line and long-wire antennas to radio transceivers requiring an output impedance of 50–75 ohms. The device also complements the AT-11 microprocessor-controlled automatic antenna tuner.

The BA-1 is sold in kit (enclosure included) and assembled form. The kit assembles in about 20 minutes and requires minimal soldering skills. The finished kit measures 4.7" × 6.1" × 1.2" and weighs 6 oz. Frequency coverage is 1.8 to 30 MHz and peak input power is 200 watts.

The BA-1 Balun kit retails for $25 plus shipping. The assembled unit retails for $30. For more information, contact 1445 Parran Rd., St. Leonard, MD 20685 (410-586-2177; fax: 410-586-8475; e-mail: <ldg@ldgelectronics.com>; web: <http://www.ldgelectronics.com>), or circle number 105 on the reader service card.

ACOM 2000A Automatic HF Linear Amplifier

The ACOM 200A is the first amateur HF linear amplifier to include both fully automatic tuning and sophisticated digital control capabilities, maker says. It delivers maximum legal power in all modes and operates on all HF bands. Features include: frequency coverage all amateur bands 1.8–29.7 MHz (extensions and/or changes on request); power output 1500W PEP or continuous carrier (no mode limit); intermodulation distortion better than 35 dB below rated output; hum and noise better than 35 dB below rated output; harmonics output suppression better than 50 dB below rated output; etc.

Size of the 2000A is 17 1/3"W × 19 2/3"D × 7"H and weight is 79.4 lbs. Options include the ACOM 2000S automatic antenna selector, 2000SW remore antenna switch, and DOS application for tuning via a PC. For more information, contact ACOM International, Inc., 157 Horse Pond Rd., Sudbury, MA 01776 (phone 978-440-7555; fax 978-440-9008; e-mail: <info@acom-intl.com>; or on the web <www.hfpower.com>), or circle number 108 on the reader service card.

Here's a couple of neat antennas that you can build in practically no time and store in a small space for portable use. They'll both increase your operating range and fun.

Feedline Verticals For 2 and 6 Meters

BY ROLF BREVIG*, LA1IC

During my decades of portable operation on the 2 and 6 meter bands, I have met amateurs who needed antennas that are efficient, simple to construct, and also easy to hang up almost anywhere. The vertical feedline dipoles described in this article provide an excellent match to the transceiver without a separate antenna tuner. They can easily be coiled up and stored in your luggage or even tucked in a pocket, as they are made of only one piece of flexible coaxial cable. The basic design is extendible to any frequency segment between 50 and 150 MHz.

The point of departure is the Coaxial Sleeve Antenna (fig. 1), which was very popular until the advent of modern SWR analyzers. A true resonance will always be found, but I have never achieved a better standing-wave ratio than 2:1 in such antennas, probably due to stray capacitance. The lesson learned, however, was that the RF current has no trouble traveling up the inside of the coax and making a 180° turn to travel back on the outer sleeve.

Because this is true, perhaps we don't need the sleeve. Why not just use the braid of the coax itself? If we do this, however, how do we let the RF "know" when it should stop flowing and reflect back toward the center of the dipole, as it did when it came to the end of the outer braid in the Coaxial Sleeve Antenna?

After trying different wideband devices, I found that a coaxial cable choke resonating within the band segment in question was the best solution to meeting my requirements: very low SWR, a broadband quality, and the possibility of working out reliable formulas for the feedline vertical in fig. 2.

*Dyrefaret 3, 3470 Slemmestad, Norway

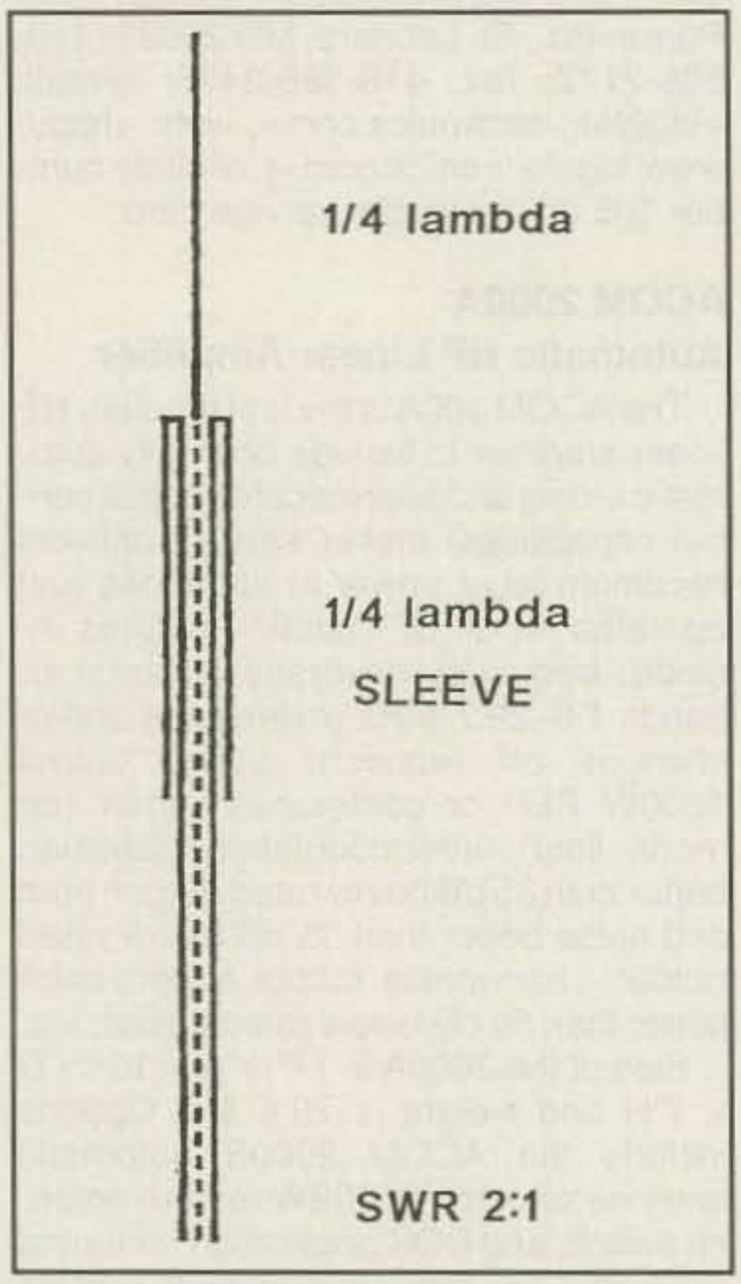


Fig. 1– The typical coaxial sleeve antenna.

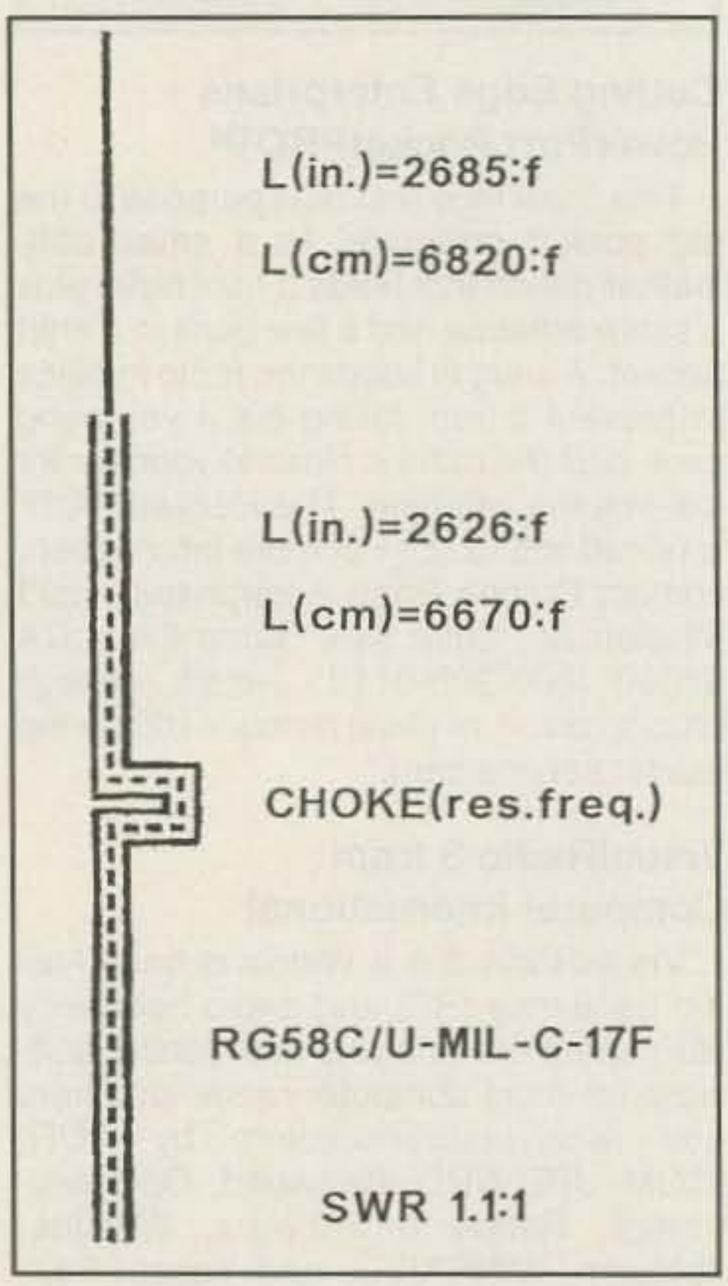


Fig. 2– The feed-line vertical antenna with resonant choke.

Two Meter Antenna

In the photos you see the 2 meter version of this antenna. It is made of a 387 cm (152 1/4 inch) long RG58CU coaxial cable on which a quarter wavelength (use formula) of sheath and braid is stripped off, thus forming the upper part of the dipole.

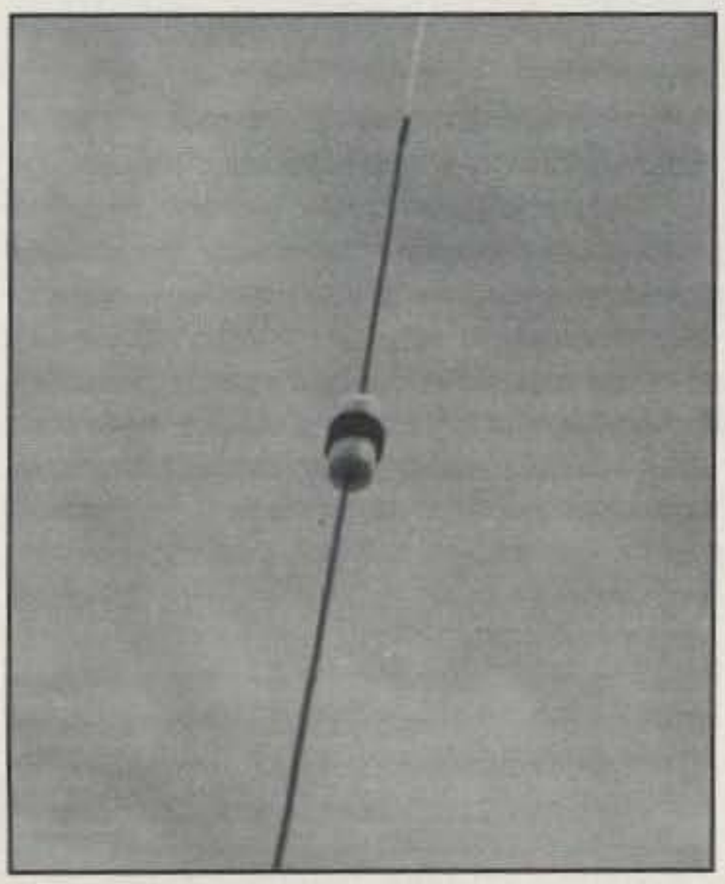
Now measure the lower part (use formula) and mark off the starting point of the choke windings, 4.6 turns on a 32 mm (1 1/4 inch) OD piece of PVC tubing. The caps on each side are not essential, but are useful in order to center the cable and lock the turns. A ring terminal or tag must be soldered to the tip of the dipole, bearing in mind that this will lower the frequency a bit. Trimming, if necessary, should be done at the tip in free space outdoors, but don't cut more than 6 mm (1/4 inch) at a time. SWR will check out with less than 1.3 to 1 and very close to 50 ohms across the entire 2 meter band. Observant readers will see that I have used exactly 5 electrical halfwaves (340

The HT and antenna still make a small package to take with you on your travels.

cm) of feeder to get correct readings. It is a good idea to make additional feeders a multiple of 68 cm (26 1/2 inches).

Six Meter Antenna

For a 50–52 MHz vertical dipole you can start with a 728 cm (286 1/2 inch) length of RG58CU. Using the formulas, follow the same construction procedure as mentioned above. The choke consists of 11.8 turns on a 50 mm (2 inch) OD piece of PVC tubing. Although not critical, you can center the antenna to your favorite 6 meter frequency, cutting the tip little by little, and still have less than 1.3 to 1 across the band. Adding feeder to this antenna should be done in multiples of 198 cm (78 inches) in order to keep your SWR meter or analyzer and impedance bridge happy!



The antenna can be supported by practically anything with a bit of Dacron™ line.

This is more of an attitude article than a construction article. The author continually mentions the word "balance" in relation to this project and his preference in antennas. It's almost as if there is an analogy between amateur radio and the Chinese philosophy of Feng Shui (literally, wind and water), whereby you create a balance through harmonious surroundings. Well, K8WPI does create and use balance. However, he also creates the urge to build something once you see his workshop photos.

A Delicate Balance

Building a Balanced Antenna Tuner For 160, 80, 40, and 20 Meters

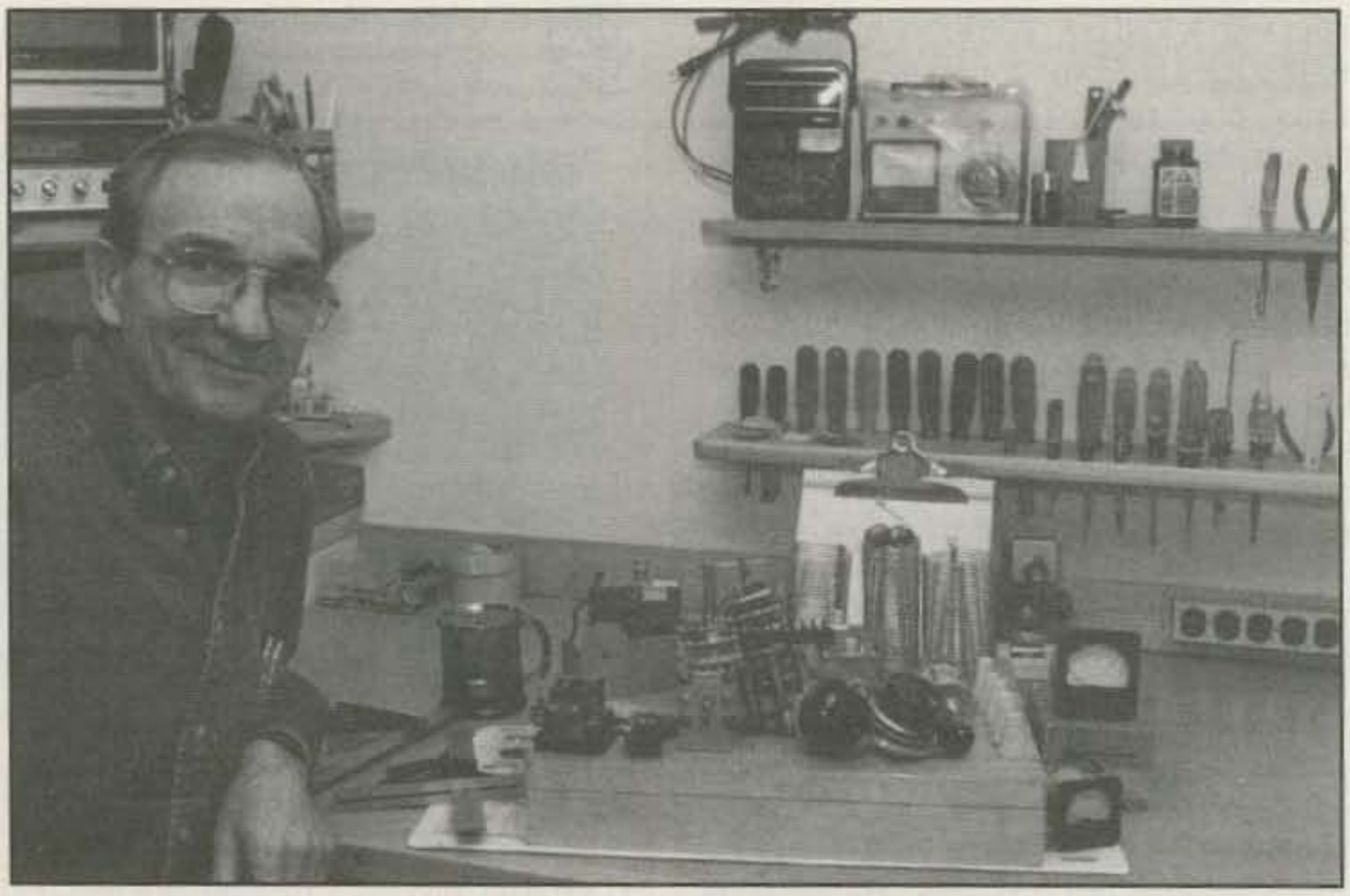
BY JAMES R. BUCHANAN*, K8WPI

In my nearly 40 years as an amateur radio operator, I have made a few observations which seem safe to qualify as generalizations. Of the many passions this discipline has to offer—code versus phone, HF versus VHF, contests versus rag chewing, etc.—the choice of balanced versus unbalanced antennas is not to be taken lightly. Before the invention of coaxial cable, antennas were either balanced or end fed. The early handbooks and magazines contain page after page of antennas and feed systems, all of which are fed with open-wire line and link coupled through a symmetrical output stage to the transmitter. There is no doubt that balanced open-wire line is not the easiest thing to work with, and seeing direct and inductively coupled balanced lines feeding rotary arrays as depicted in the handbooks of the 1940s is certainly testimony to determination!

In the early days of radio no one knew any better than to use balanced feeds, as they were all that was available. Triumphs of technology seemed to abound as our fledgling discipline worked its way from a curiosity to a life-saving medium which eventually would change the world. As technology advanced, no doubt championed by the war effort (eh, that would be WW II), new materials and manufacturing techniques in turn influenced design considerations and the way antennas, feed lines, and even transmitter output stages were designed and built. Coaxial cable, referred to as "concentric line," was first mentioned in the 1942 issue of the *ARRL Handbook*. Although coax exhibited many favorable attributes—as it could be insulated, easily handled, coiled, taped next to metallic objects, run through walls, and have universal connectors attached—it did not come into vogue until after the war; 40 years later it is still the rage.

Although today's solid-state transmitters (especially the no-tune, broad-band variety) are an ideal match for low-impedance coaxial systems, during the "middle ages" of radio things were different. With

*9549 N. 17th St., Kalamazoo, MI 49004 <jerb@view2earth.com>



A man with a plan, a pile of parts, and a large cup of coffee. The chassis was covered with masking tape to prevent scratching and to offer a surface suitable for marking. Brackets for switches and capacitors were made and painted. Contact areas were masked or paint was removed to allow good ground connection. Meters being given consideration for use are still being studied.

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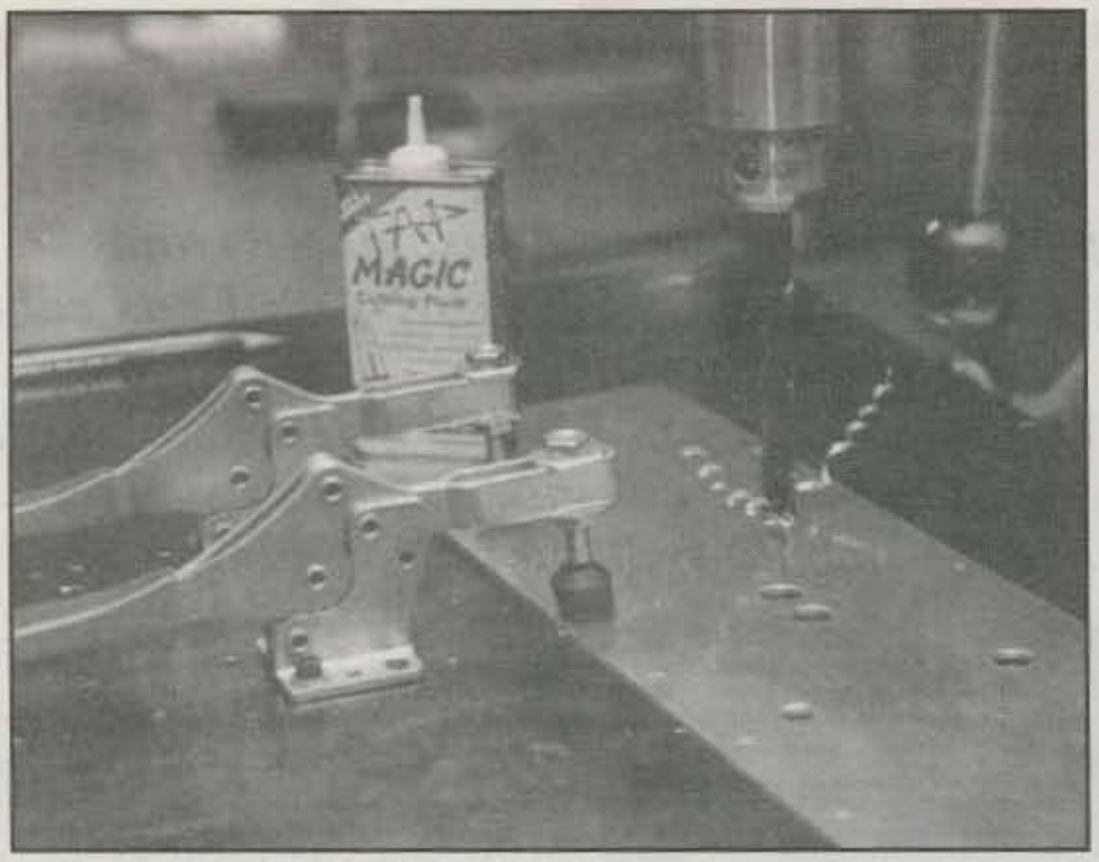


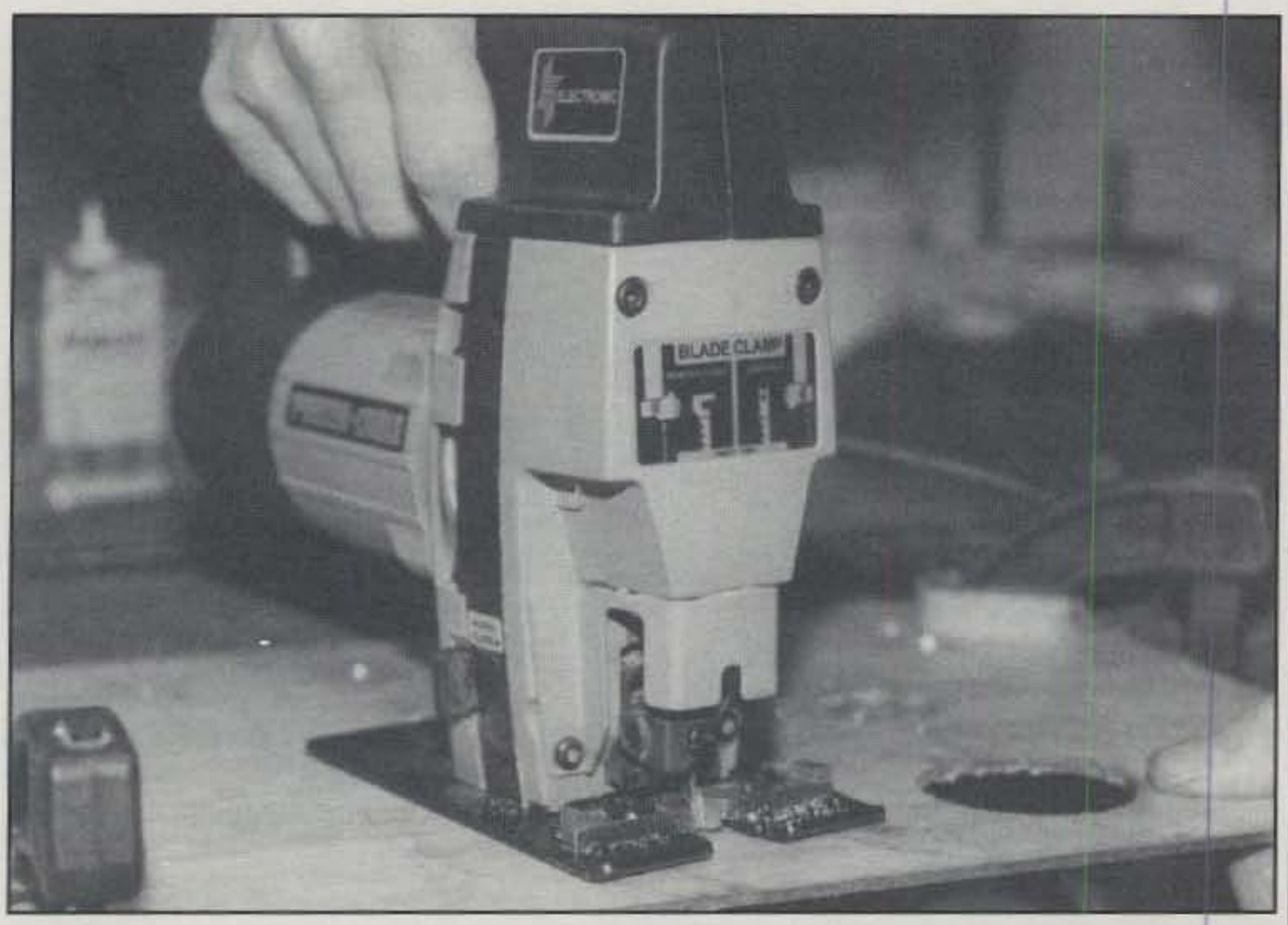
Accurate drilling requires well marked centers, the work piece held firmly in place, and cutting fluid. Today's cutting fluids are waterborne, making clean-up easy, and the product safe for people and the environment. Special products are available for all materials. In this case, aluminum cutting fluid was used.

Blind nuts are installed in the chassis (three locations shown) for attaching the cabinet. The Drake SWR indicator unit was originally held together by sheet-metal screws. The holes were drilled out and blind nuts installed to allow machine screw attachment to the underside of the chassis.

high-voltage tube output stages exhibiting a high natural impedance, to match the lower impedance of coaxial cable, sometimes very complex calculations and output stages were used bridge the gap.

Like many others, I have always had a preference for the balanced approach. It is seldom wise to try to justify a position, as it infers that a particular view cannot be accepted at face value. However, I will try to persuade you that I really have no choice, as being a Libra the entire world must be in balance. Since I was licensed at age 13, I can't remember life not being an amateur radio operator. I don't consider my passion for balanced arrays a fetish, but rather a way of life.

There is no doubt that balanced antennas and feed lines require considerable work, and in many cases they are much more expensive than a more common approach. However, there are benefits which some believe outweigh the obstacles.



Meter holes and other unusual size or shape openings are best cut with a saw. Although Tim Allen may scoff at the lack of bells and whistles on this saw, it offers tremendous accuracy. The saw base does not tilt for angled cuts. This saw is used only for cutting perpendicular to the surface. To that end, this model has a blade guide directly at the saw base, holding the blade in perfect alignment right down to the cutting surface. The accuracy of cuts using this technique is as good as the operator. This saw features a selectable oscillating blade, which improves cutting speed and decreases blade wear on straight cuts. The oscillating feature should be turned off when cutting other than straight patterns, as with one surface being cut before or ahead of the other surface, accurate radii are impossible. Both front and rear panels of this antenna tuner were cut from a large blank of aluminum using the saw and techniques mentioned. Cutting fluid was poured along the line of the cut, and additional fluid was added as needed.

It has been my experience that the reservoir of stored heat in an old-style soldering iron is the best way to solder shield connectors on a PL-259. The "heat bank" allows quickly heating the connector, getting the connector to temperature before heat is conducted away by the length of cable. Center conductors are soldered with a traditional pencil, as the iron is literally too large for such delicate operations. A fixture holds connectors in two different positions for both shield and center conductor soldering.

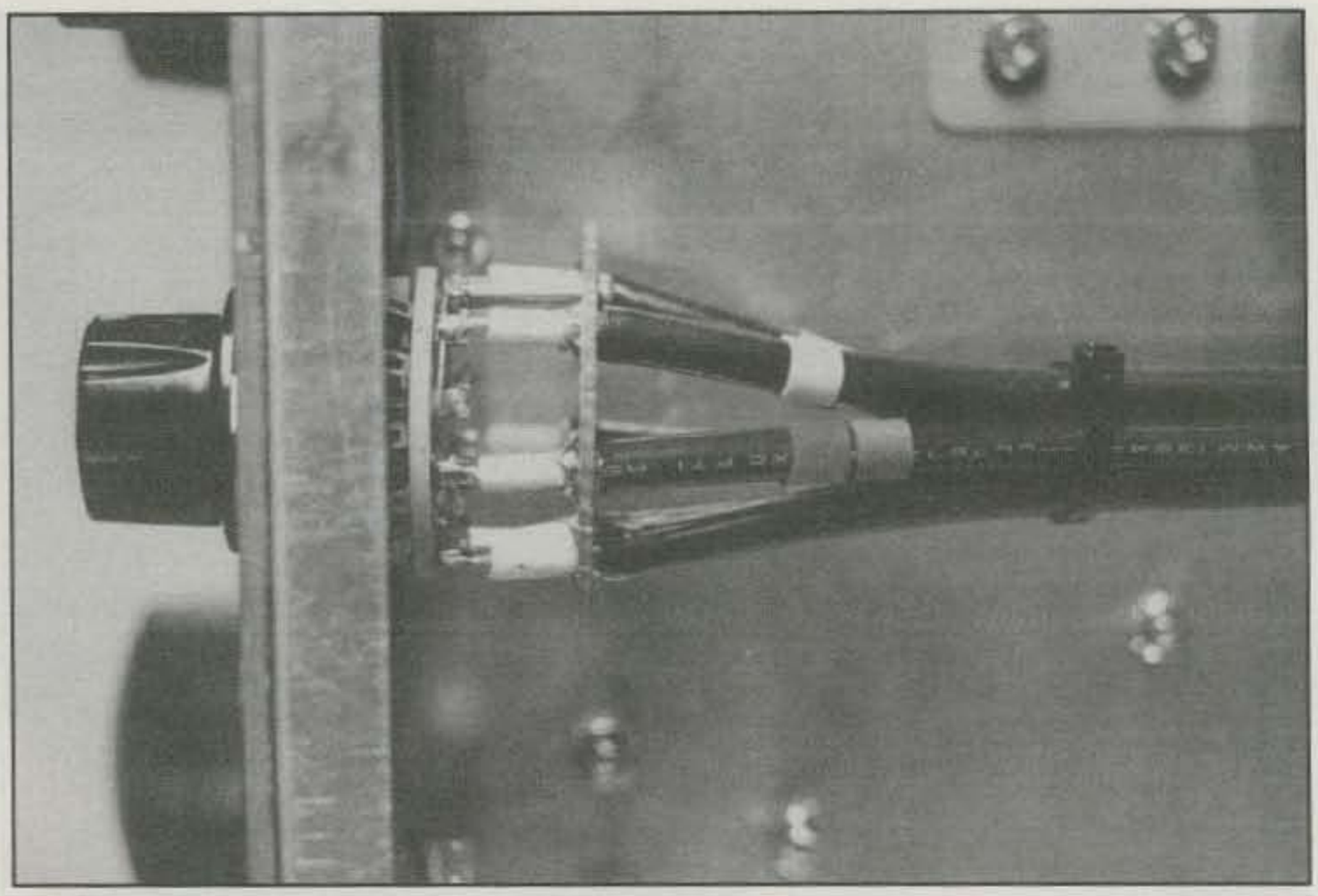
A primary motivation behind balanced HF wire antennas is that many offer successful operation over a broad frequency range. Multi-band antennas have been shown in the *ARRL Handbook* since the 1930s. Such antennas are simple, with balanced feed, and are not available with coax feed. Sure, the radiation pattern changes with frequency as the antenna becomes different portions of a wavelength, but it still works! Serious consideration of SWR is ignored, as without feedline losses, as long as the SWR isn't so high it fries your output stage, it is practically insignificant. There are so many configurations of antennas, most of which were developed in the '30s and '40s, one is bound to fit the space available. If your passion is playing with antennas, you'll never run out of new possibilities. Something about a product which has continually been in reference literature of any discipline for over half a century seems to give an air of credibility to it, don't you agree?

I've used balanced antennas for decades, and although I have also installed unbalanced wire antennas, I believe the balanced antennas work better. My belief is not to be proven and I trust not challenged, but you may disagree.

At the risk of seeming to have gone over the deep end, I even have some issues with the definition of *balanced.* I don't consider conventional current baluns as a true balancing act. Actually, coaxial and bifilar baluns aren't much better, and "choke" baluns, well, they aren't to be taken seriously at all. *My* concept of balanced is simple: To achieve balance, or symmetry, both halves of the antenna system must be identical, and opposite. If you look at the schematic of a current, bifilar, or coaxial balun, it is painfully obvious that there is no symmetry. Just follow an output lead back to the input, then follow the other output lead back to the input. For me, the difference is like black to white. Thus, the options of achieving true balance are becoming few, far between, and generally, of long ago.

In previous decades of our hobby, even during the dark days of the coaxial revolution, a very successful effort was spearheaded by E. F. Johnson and Harvey Wells. These premier manufacturers held back no effort to make antenna tuners which would feed a wide range of impedances on balanced lines from the then current standard of 50 ohm unbalanced transmitter output. The Johnson Matchbox is legendary, while the Harvey Wells Z-Match is a very rare and expensive item which also performs very well.

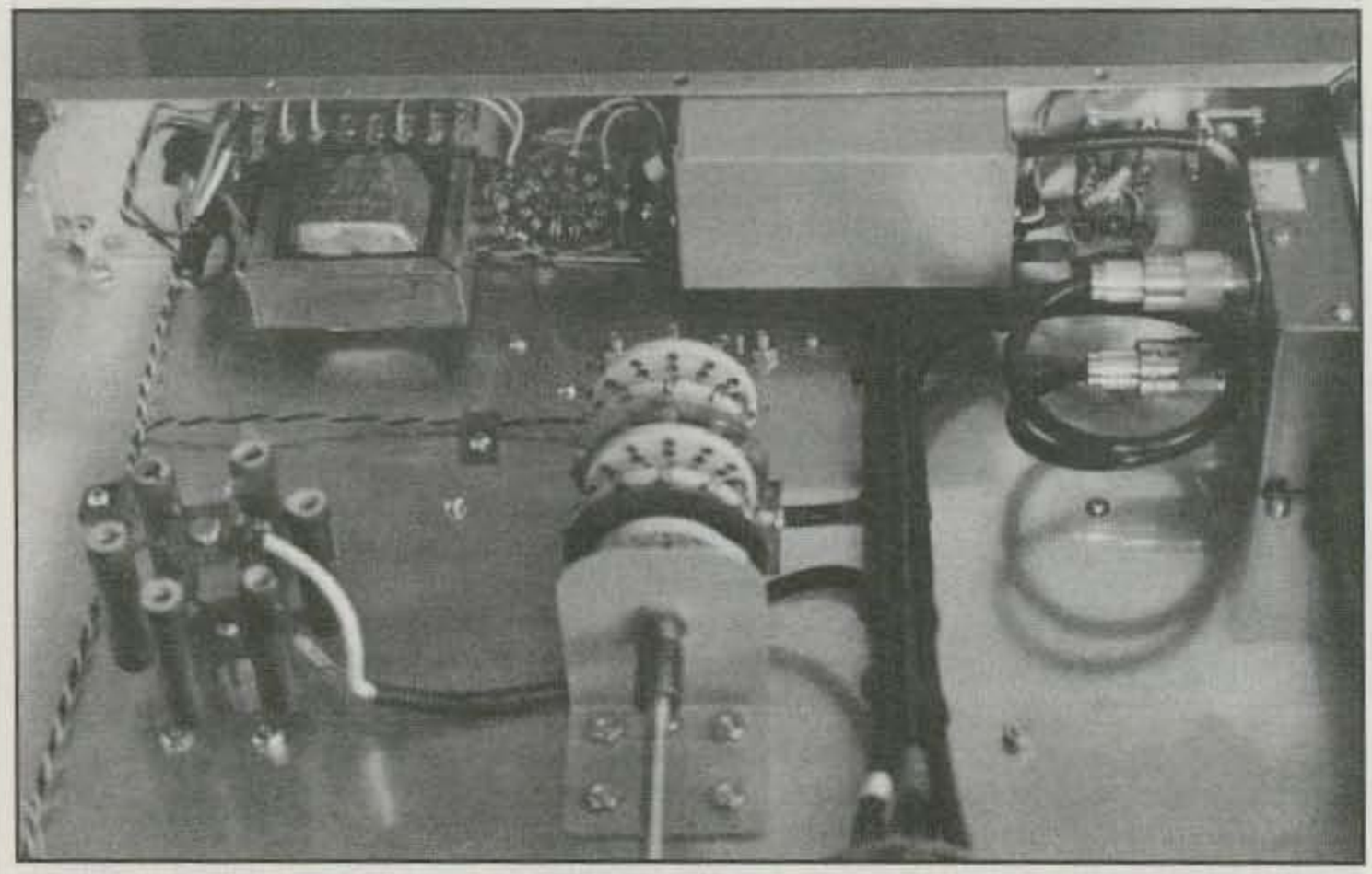
Although I have both the Matchbox and Z-Match, something was missing in my life—160 meters. None of the commercial balanced tuners from previous eras cover the 1.8 MHz band. Although there is no



Many coaxial cables attached to the function switch caused concern for mechanical integrity of the delicate switch wafer. To relieve physical strain on the switch and provide good shield bonding, a printed circuit board disk was made to act as a feedthrough. The disk was cut to the size of the switch and holes were drilled directly in line with switch terminals. Coaxial cables were then passed through the disk and the shield was soldered to the disk on the switch side. The entire assembly, one disk and five cables, was then attached to the switch with stand-offs. The weight of cables and any mechanical forces are transferred from the cable to the disk, to the mounting frame of the switch, and directly to the chassis. Colored heat-shrink bands on cables make it easier to determine which cable connects where.

denying the size of inductance required for 160 is a quick deterrent, I feel the lack of popularity of 160 meters was due primarily to its time sharing with LORAN services, the band being broken into three noncontiguous segments, low power restrictions, and the unavailability to all geographic areas. "Top Band" wasn't to be taken seriously until it became a "full time" amateur band, which I believe was in the early 1970s. I don't mean to solely impugn the antenna tuner manufacturers, as few receivers and transmitters of the '50s to '60s included 160 meters; it just wasn't that popular. Today 160 even has its own contests!

I decided a properly balanced antenna tuner which would include 160 meters



Rear chassis lip holds all input/output connections, power supply, selection rotary switch, and sub-chassis enclosing T/R relay.

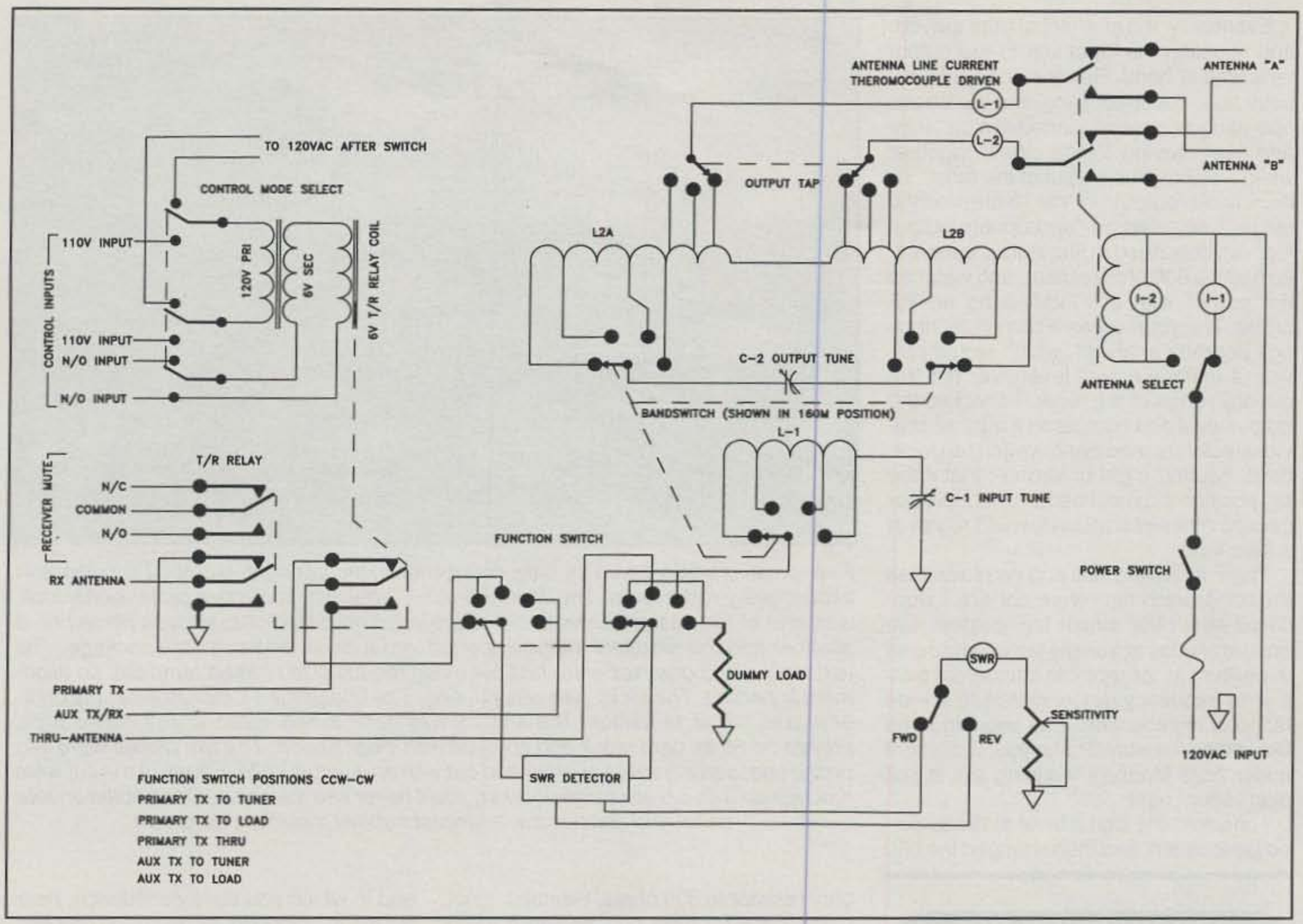


Fig. 1– As can be seen, the control circuitry overpowers the tuner section. Switching arrangement allows convenient selection of normally open contacts or supplied 110 VAC input. Switching isolates N/O inputs so that voltage does not appear on these terminals if 110 source is selected. Multiple input selection allows this tuner to be used with a variety of units.

was needed. The design concept was relatively simple. There were many good tuners in handbooks of yore. All I needed to do was extend the low end.

I started a casual parts collection at various hamfests, and even put the touch on a couple of friends to check their junk boxes. When the spirit moved me, I reviewed the *ARRL Handbooks* going back into the '30's, as well as the *Radio Handbook* and specialty antenna publications by McCoy, Orr, and Cowan. There was a similarity in all publications, and it was painfully obvious all I needed to do was get started. A design similar to this project can be found in many of the 1960 decade *ARRL Handbooks*, while the closest circuit is from Orr's *Antenna Handbook*.

It took a number of years to collect the materials. Coil stock and ceramic rotary switches were the most difficult to acquire followed by the *Velvet Verniers*. Dayton '97 suppled the chassis for a few bucks; it was still wrapped in the original paper with the Bud label intact.

As winter '98–99 approached, I wanted to get on 160. The legendary quiet nights of winter operation beckoned, like the sirens on the shore—come, enjoy! I started thinking about the ancillary functions that would be needed, and realized the basic tuner components were the minority. The expense, labor, and difficulty in this project would be the control and interface circuits.

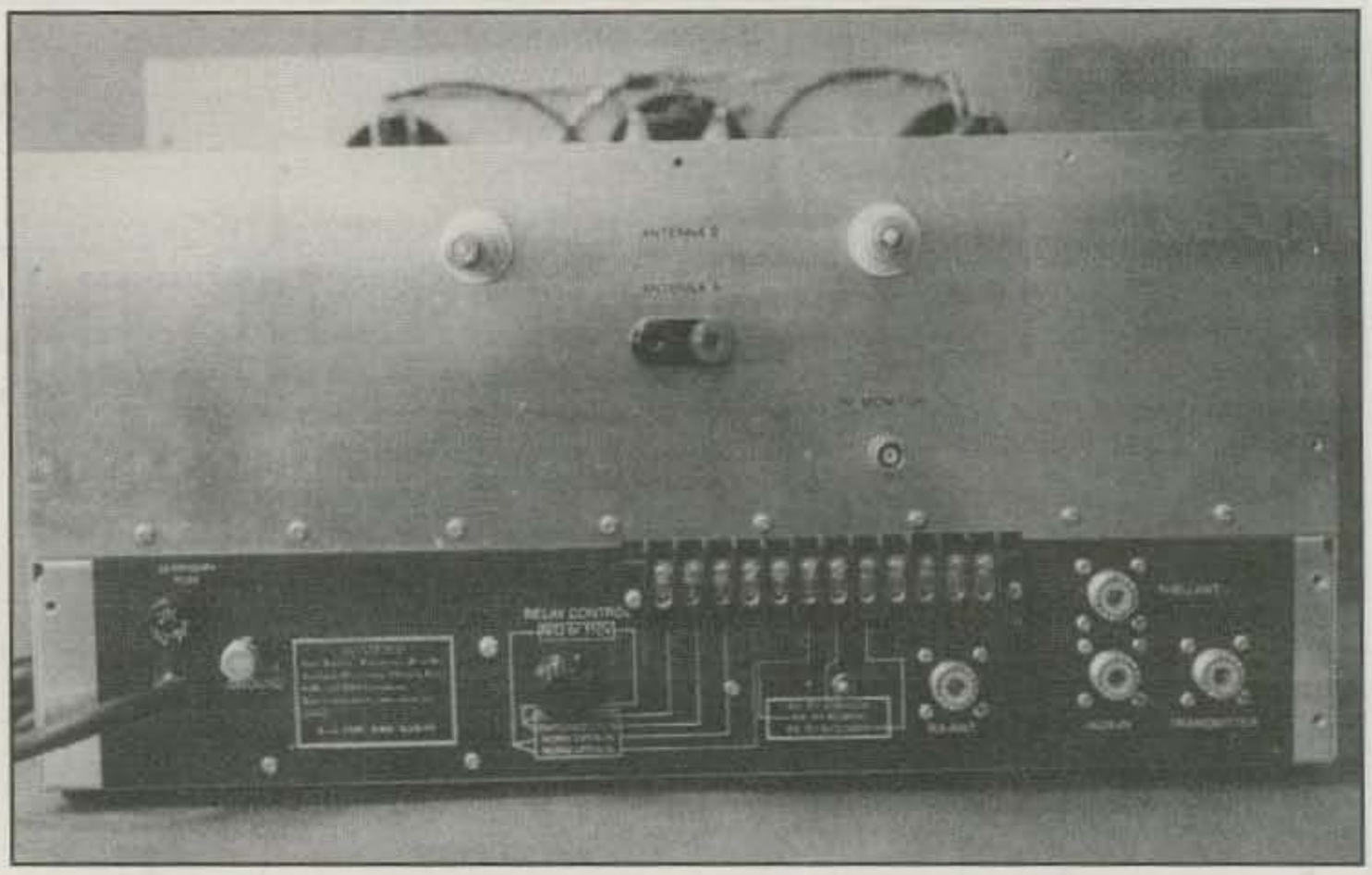
I planned that the tuner should have an internal dummy load. As it would be used with vintage gear, which does not include T/R switching, an internal relay and control circuit, along with receiver muting capabilities, would be included. Actually, the input control would need to be selectable between the two popular formats of years gone by—normally open relay contacts, or supplied 110 VAC (ouch!). The primary rig should be able to bypass the tuner and head directly out at 50 ohms, and the tuner should be available to a secondary rig. Of course, some sort of SWR indication would need to be available, as would ammeters for each line of the antenna. I decided while I was at it, I had better make arrangements for two antennas, with connectors spaced for both 600 and 450 ohm line. I don't implicitly trust theory; there are too many of them. I decided the basic tuner components should be mounted on a suitable metal plate and Rube Goldberged together to confirm operation and fine tune the coil taps. This would also be a good chance to see how the unit actually performed, so the time and energy would be well spent.

With tuning capacitors selected, the inductors were tuned. I started with the input stage, the unbalanced part. Using grid dip meter, I determined the amount of inductance required for mid-band resonance to match a 50 ohm source with the capacitor set mid-range. It was nice to see the "cut and try" method was a very good match for results gained from inductance tables from the *Handbook*. With the input working, I proceeded to tune the output tank band switch taps. Using clip cords to connect the tuning capacitor to the coils, various taps were determined for 160, 80, 40, and 20 meters.

Eventually, the moment of truth arrived, and coupling the input link to the output tank was at hand. Being somewhat cautious about over-coupling and the erratic operation it causes, I started at a distance and kept moving things closer together while watching the output of the tuner. To determine output in the experimental stage, I selected an "appropriate output tap" (as described in literature), terminated it with a 600 ohm resistor, and watched the output with a VTVM using an RF probe. The source was a current technology antenna analyzer, which would provide a uniform signal level over the frequency range of the tuner. I checked the output level and compared it against previously determined band-switch tap locations, figuring (right or wrong), that if the tap position moved, I had over-coupled or caused other interaction I would regret at a later time.

When all looked well and I was satisfied the bandswitch taps were correct, I wondered about the output tap location. Literature alludes to a single tap which seems to perform to "acceptable standards" over a wide frequency range, matching a wide range of impedances. This seemed to be like finding the Holy Grail in your basement under Aunt Martha's wedding gift. It just didn't seem right.

I checked the signal level at the selected tap location, and then changed the 600 ohm resistor to 300 ohms. Hmmm . . . not much output. I then changed to a 1200 ohm resistor, and again, not much output. To make a number of evenings of work into a short story, it became obvious the published generalizations on output tap location were not acceptable to me. I would need at least three output taps to match various impedances at different frequencies.



Rear panel is well marked for easy connection in the low-light, cramped conditions in almost every radio room. The white-on-black label, which offers a professional look, was one of the easiest aspects of the project. The drilled chassis was placed on a scanner and the resultant image imported into a publishing software package. The text blocks and graphics were laid out using the full-size chassis template, so alignment is perfect. The tricky part was printing. The chassis is 17 inches wide; my printer maxes out at 11 inches. The artwork was done in two sections 8 1/2 inches wide, printed on 65 lb. card stock and sprayed with clear Krylon. The two pieces were laid on the chassis with some overlap and cut with an Xacto® knife. Edges of the cut were touched up with a black magic marker, you'll never see the seam. Open holes on rear panel and chassis are to accept cabinet mounting hardware.

Okay, I was still in the design stage, so adding another switch wouldn't be a problem, right! I soon remembered the difference between a custom-made one-off project and an item which is to be mass produced, and realized why such a feature was not on commercial units. As I redrew the diagram, this simple switch became a major item. When I transferred the switch knob to the front panel, things became even more complicated.

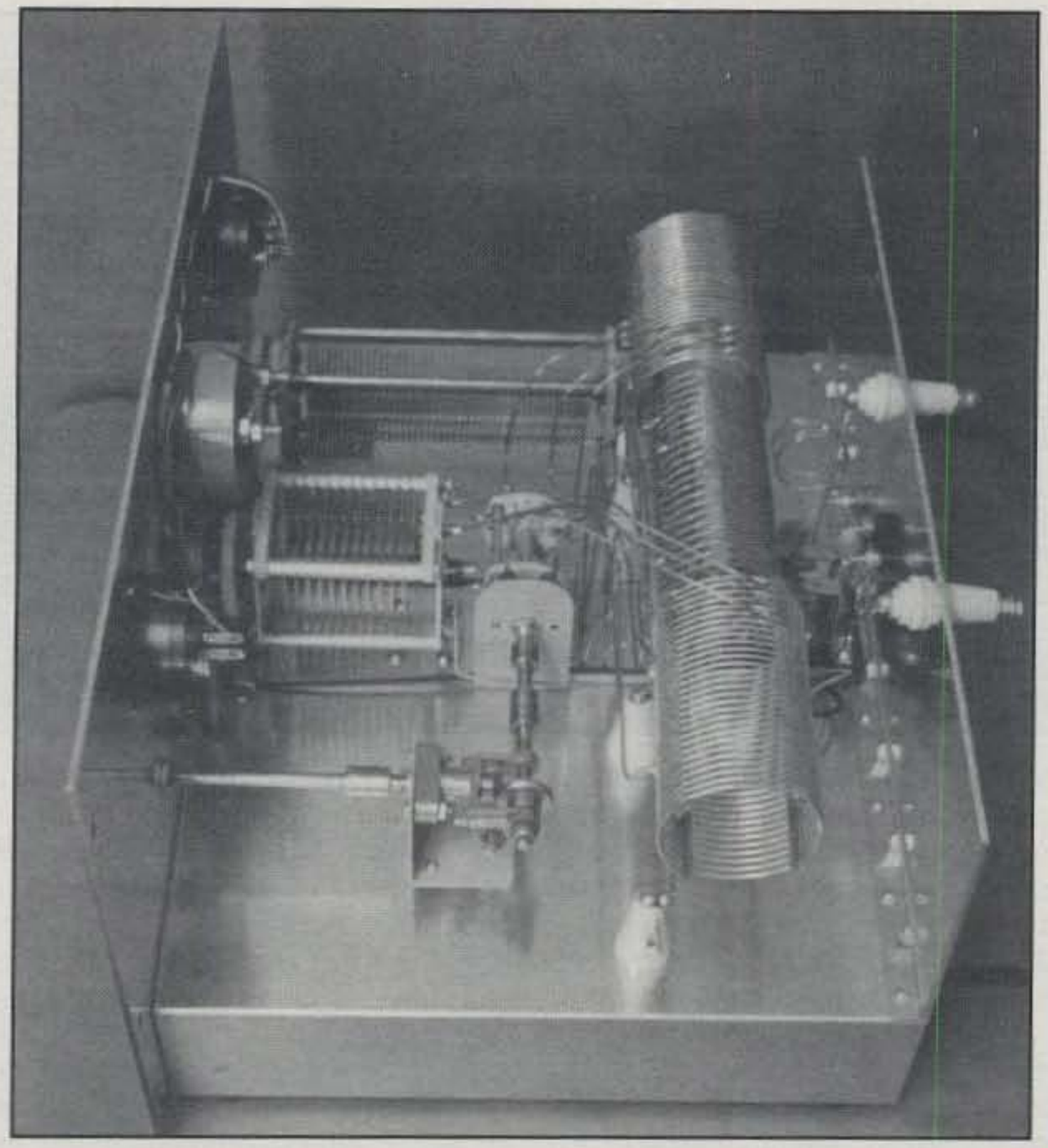
The primary design consideration from which I was unwilling to bend was the aspect of symmetry. After the signal is link coupled into the output stage, it is balanced and should be as symmetrical as possible. In short, every wire on one side of the output tank is complemented by another wire of the same length and approximate position (in relation to other components) on the other side of the tank. This may seem obsessive or even absurd, but I suggest you take your best dipole antenna, one which you know well and in which you have confidence, head out to the backyard, let down just one end, and cut off, say, 3 inches. I bet you'll notice the difference. Enough said.

With this in mind, the new output tap selector switch had to be wedged into the center of the output tank. Now all I needed to find was a right-angle drive so the symmetry of the electronics could be complemented by the aesthetics of the front panel. Would it ever end?

Since I run all vintage gear, and this tuner was to operate down to 1.8 MHz, I knew it wouldn't be small, but this switch could easily become the last straw!

The only way to accomplish a project such as this with success the first time is to measure many times and cut only once. All parts were gathered and a conceptual layout of the chassis and front panel was envisioned. Not having all parts on hand can lead to a disaster; you may not acquire exactly what you are looking for.

A scale drawing was made of the chassis top, and when it seemed to fit, a similar scale drawing was made from the side. This ensured no components would project into other parts. Eventually, a layout of the underside of the chassis was made, to again confirm everything would fit. It was here I found a conflict in mounting brackets. The band switch bracket would be under the chassis, directly below the output capacitor mounting pillar.



Overall view of chassis top side. Input coil L1 is between output coil L2a and L2b. Behind and underneath the tank circuit is antenna selection relay and the line current thermocouples. Small, four-turn link connects to the "monitor output" jack on rear panel for feeding a Monitone or other RF-derived signal monitor. The band- switch lead cutout was plugged with a plexiglas plate. A relief on the bottom of the plate holds it firmly in place. Individual holes were drilled above each band switch terminal to allow passage of leads from tank to switch. Appearances can be deceiving. Although there is still plenty of chassis showing, components really can't be crowded any further. The top of the 11"×17"×3" chassis is as full as practical. Some room must be left to keep stray cabinetry capacitance from de-tuning the entire tuner.

Mounting brackets to brackets is not a good idea, as it is difficult to assemble, and if ever a component needs to be removed, two components must be disassembled. A simple cure was found and construction began. All mounting brackets were made first, and stops were added to all rotary switches to limit rotation to the desired number of positions.

Using recycled parts, you seldom have exactly what you want; improvision is the word of the day. I could see no reason to build an SWR detection circuit. The Drake unit shown was purchased at a fleamarket for less than $5, and the dummy load resistors are right out of an old B&W.

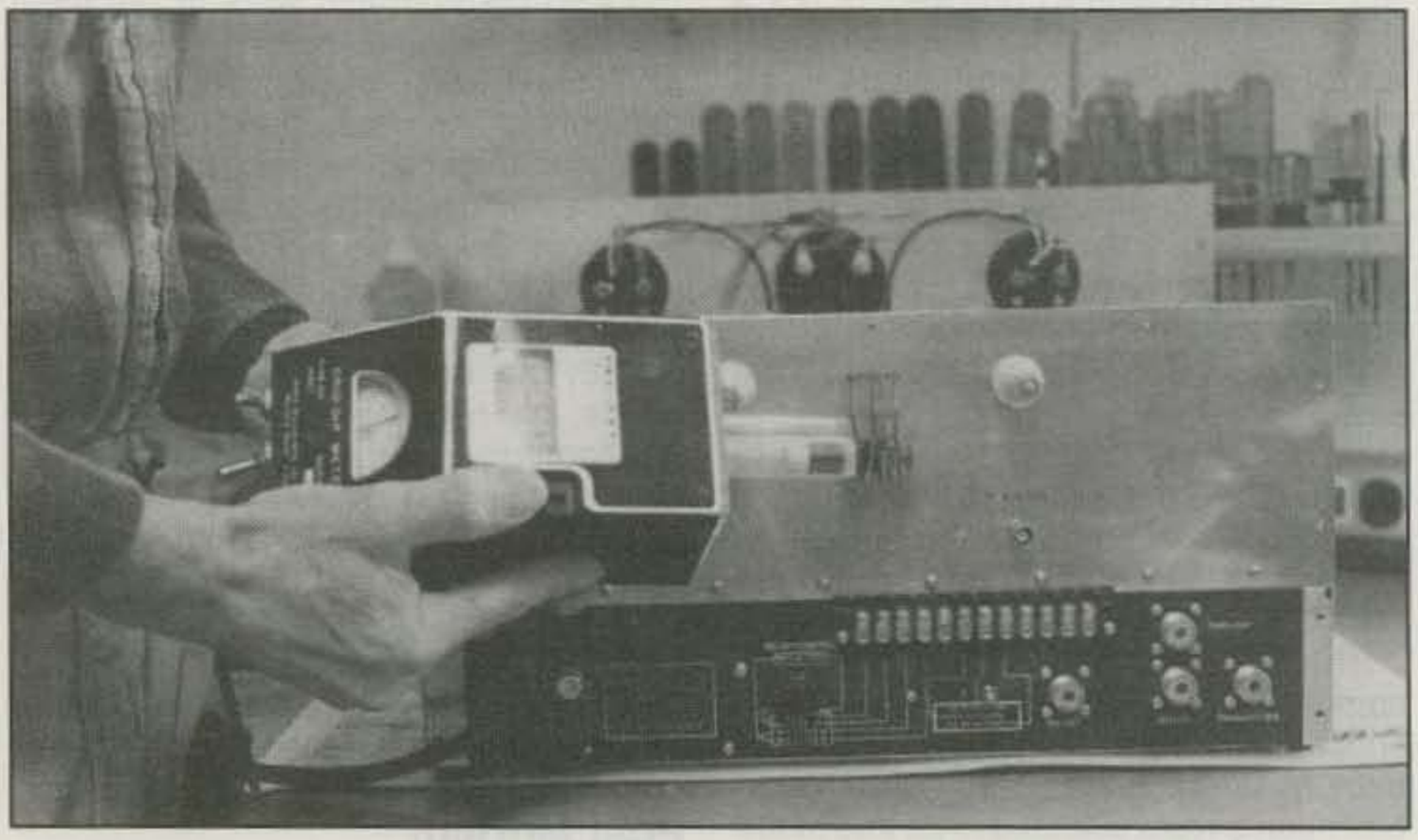
The front-panel finish was selected to complement other radio equipment in the shack—sort of a marriage of a number of manufacturers. Knobs, lamp holders, and other items were selected to be true to the era of what we now call *vintage gear*. Except for the chassis and panels, all components are old and well used. Most required considerable work to get them into the condition desired. The coil stock still shows wear of previous taps and mountings. The chassis and panels were designed to accept either rack mounting or to be enclosed in a cabinet, depending on ultimate placement in my radio room.

On-air operation confirms that time devoted to working out details was time well spent. The unit tunes smoothly on all bands, and none of the 160 meter crowd has figured out I am using a 40 watt transmitter feeding an antenna naturally resonant on 3.5 MHz. The RF ammeters indicate the efficiency of this tuner is greater than either the Johnson or Harvey Wells. I don't feel I have the equipment to accurately measure the efficiency, but general observations are more than encouraging.

Post Mortem

A disadvantage of "one off" projects is there are always unexpected results which could be improved upon. If I were

Front view of the 160–20 meter balanced antenna tuner. Everything in this unit but the chassis and panels are recycled from previous "junk." The line ammeters are "pull-outs" from Fair Radio and arrived with snipped leads still attached. The SWR meter face was made to complement the ammeter scales using a computer-based graphic program. All meters were painted to complement the front panel. The two-tone paint is easily done using "painter's tape," sort of like a roll of Post It® note material. This 3M product is just great for masking painted surfaces. After the coat of base paint cures, apply the tape as desired and paint the second color. Although techniques may vary, my "baked-enamel finishes" are cured under the wood stove overnight. Lettering is done with a Brother P-touch label maker. Trimming the label close to the letters reduces the highly reflective tape to a minimum. I have been unsuccessful in reducing the glare with dulling sprays. I have used these labels for over five years and found no problems with fading, flaking, or peeling. Although both black or white on clear tape is available for older P-touch units, white on clear is not available for newer models. Bummer! The output tap switch escutcheon was made by drilling out a matching Velvet Vernier knob to accept a standard 1/4 inch shaft. A round aluminum disk was cut with tin snips to match the diameter of the other drives, and a white-on-black graphic was made. The laser-printed graphic was contact-cemented to the aluminum disk, sprayed with clear Krylon®, and contact-cemented to the knob. The gear reduction of the right-angle drive spreads out the normal 60-degree switch indexing to 120 degrees. You know when you switch taps! Speaking of knobs, all of these knobs are older than I am, and two evenings with Novus® plastic polish restored them to their glistening condition seen here.



Checking resonance with a grid dip meter after assembly to confirm "assembly anomalies." The venerable GDO is still a very valuable tool. I don't understand why so many are cast aside at swap meets for mere pennies.

to build this tuner again, I would use stepped inductance coils for the higher frequencies. Knowing the advantages of the output tap selector switch, I would also resolve a different approach so the band switch taps wouldn't be as long. The stray capacity of the band switch tap leads is detectable, and I feel improvements could be made. Unfortunately, the design concept applied to this tuner dictates the band switch, output tuning capacitor, and output tap selector switch all be mounted in virtually the same place. Separation of front-panel controls and layout would require additional mechanical drive mechanisms. This is a challenge left for the next generation.

Epilog

Some days it just doesn't pay to get out of bed! The evening I took the photographs of this tuner, a gas main broke and ignited about three miles from my home. This was not a small explosion or fire, and there was no desire to get out the marshmallows or dogs. The ignition of natural gas briefly interrupted the electrical grid of Michigan over a four county area; no one lost power for more than 20 seconds or so. The clean burning gas created a plume of flame seen throughout two counties, and air traffic reports from Detroit to Milwaukee queried the nature of the inferno.

The next evening I felt like a little time on 40 meters was in order. To my surprise, I could see no output on the line meters of the tuner. I noticed field strength meters in the radio room indicated RF output, but not the line meters. I switched to another antenna, and a different exciter, with no change. I then took a closer look at the ammeters and detected they were wound around the left-hand stop! A result of the EMP generated from the explosion the previous evening. Hello, Fair Radio?

The Last Word

I don't feel right taking credit for this project. Sure, I did the work, spent the money, and have the fun of using this very nice tuner, but I owe a great debt to Lew McCoy and Bill Orr. Lew and Bill, and to a slightly lesser extent, Stuart Cowan and the late Doug DeMaw, inspired me, taught me, scolded me, and opened my mind to the joys of *radio*. For my entire life, I have studied at the feet of these enthusiastic, sharing, knowledgeable sages of modern communication. Their prolific writing has caused me to spend my entire allowance on their publications, which I believe I have in total, while my discretionary income has gone for parts. I wonder who will be the legends of the next generation, or if there will be any.

Lew, Bill, Stuart, and Doug, thank you for taking the time to put your wisdom on paper. ■

BY IRWIN MATH, WA2NDM

MATH'S NOTES

WHAT'S NEW AND HOW TO USE IT

Balanced Video

A couple of months ago, we discussed the implementation, characteristics, and benefits of both the balanced and unbalanced configurations for audio. We discussed how a balanced scheme rejects common-mode noise while preserving desired signal fidelity, and we even gave a couple of circuit examples to show how to implement inputs and outputs. This month we would like to expand on that topic but in the area of video, since the use of balanced transmission techniques for conventional baseband closed-circuit TV video offer some interesting and unique opportunities for the experimenter.

The most common and familiar method for connecting video signals is with coaxial cable. Using coax provides some degree of shielding from outside noise sources and is relatively inexpensive. Coax does suffer from one problem, however: You need the coax! When you have to route a video signal throughout a building or even from one room to another, the job of routing the coaxial cable can be a real headache, especially if you want a permanent, neat installation. On some occasions, it may even be impractical to run coax.

This was the case in my home, where we wanted to install a small CCTV camera to monitor the front door, but had no way to route the coax through the brick veneer walls that constitute the front of the house. We did have the push-button leads from the doorbell, however, which happened to be located in just the right place. Research into how to use these leads resulted in a neat solution which we will divulge in a moment.

There is a technique in use today with some CCTV installations that employs a simple twisted pair of wires, such as telephone-grade cable, for the transmission of video. This technique operates by first converting the normally unbalanced video signal into a balanced differential signal. This is easily done with a readily available transformer. The balanced signal is then applied to the twisted pair of copper conductors. At the receiving end another transformer converts the differential signal back into a single-ended one. Fig. 1 shows this arrangement.

The transformer must have enough bandwidth to pass the 4–5 MHz baseband video signal, to operate into and from 75 ohms, and to handle the 1 volt pp signal level. Fortunately, such transformers do exist and are commonly used to transport digital signals in various computer-oriented local-area networks. They are called "baluns" in this marketplace. Baluns are fairly inexpensive and are stocked by most of the larger computer accessory dealers. The connectors on these devices are usually BNC on the unbalanced end and RJ-11 type connectors on the balanced end. Obviously, they are designed to work with telephone cable, and installation is simply "plug and play," as they say. Inexpensive (under $10) baluns can often transport video signals hundreds or even thousands of feet, depending on the quality of the twisted pair and the actual transformers used. This is a real experimenters project, however, so results can be anything from spectacular to miserable. When longer distances are involved, the high-frequency degradation of the twisted pair comes into play and must be compensated for.

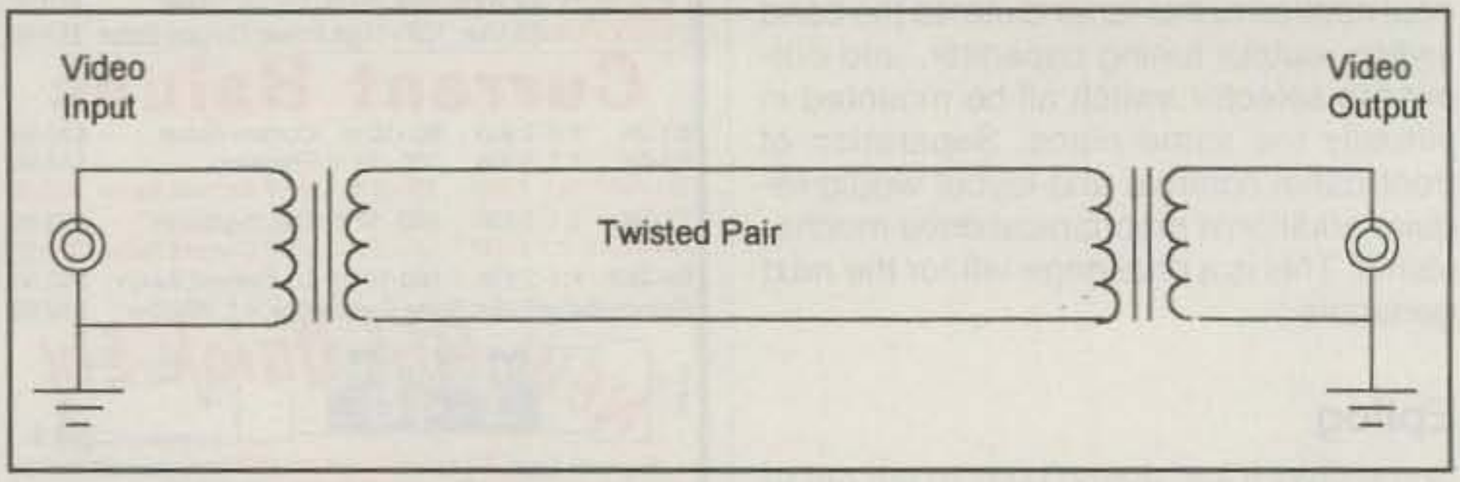


Fig. 1– Balanced video transmission using a twisted pair.

When longer distances must be covered, compensation is accomplished by a cable equalizer circuit which is in reality just a variable high-pass filter. Since the loss of any cable increases as the frequency increases, a simple circuit such as shown in fig. 2, which increases its gain as a function of frequency, will do nicely as such an equalizer. If the cable loss is properly matched to the filter gain, the result is a flat response. Those of you who are familiar with commercial FM broadcasting will be aware of the same technique, at audio, where the signal is first pre-emphasized at the transmitter and then de-emphasized at the receiver.

The circuit shown is a simple op-amp stage with a variable capacitor across the input resistor. As the input frequency increases, the capacitive reactance decreases, effectively shunting the 2.2K input resistor and raising the overall gain of the stage. By adjusting the variable capacitor, the "slope" of this gain characteristic can be modified as needed. Again,

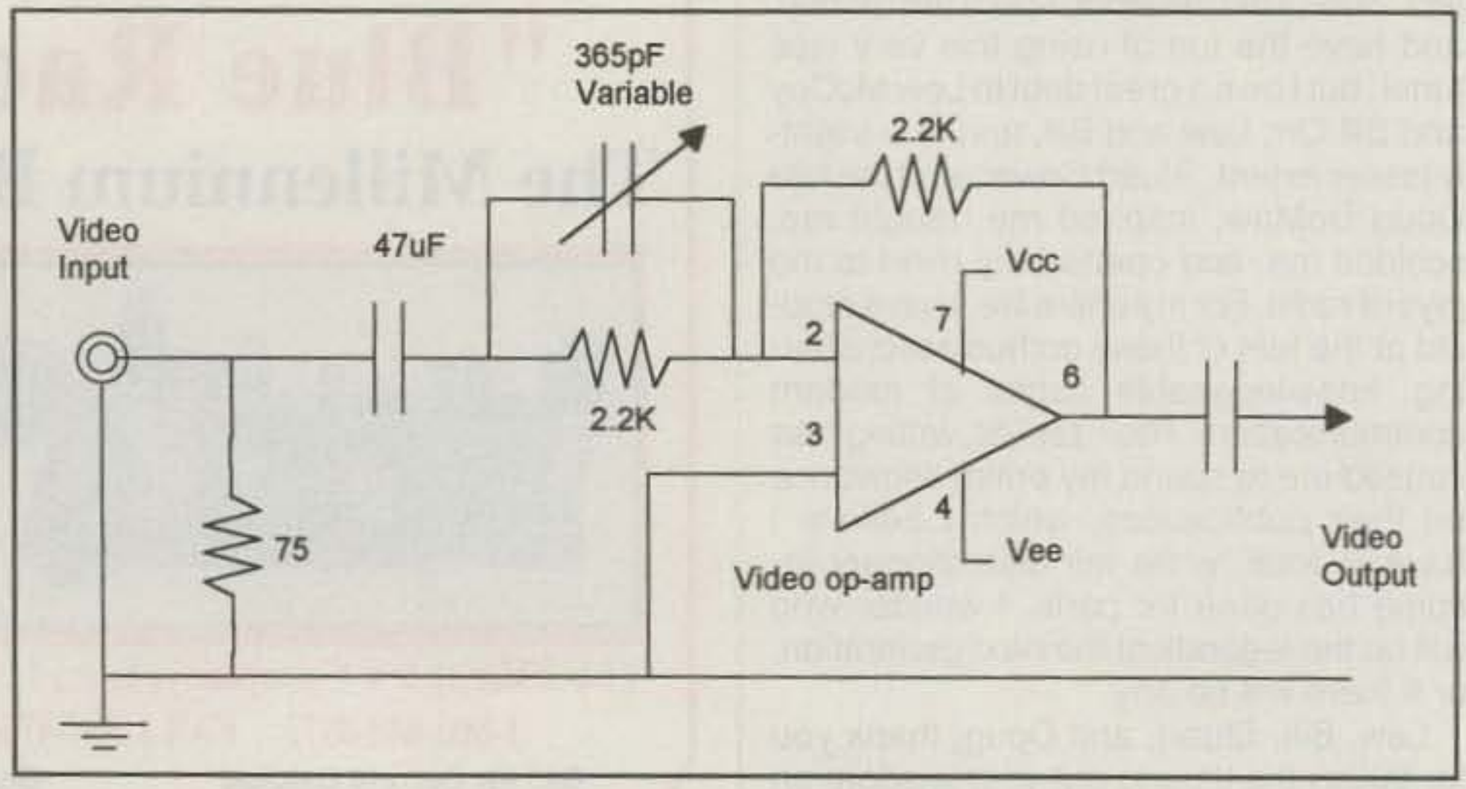


Fig. 2– Experimenter's video equalizer/filter.

c/o CQ magazine

this is an experimenter's type circuit and probably will require a bit of "tweaking" to get acceptable results. The variable capacitor, by the way, will be familiar to AM broadcast-band experimenters, as it used to be quite commonplace, having been used in virtually all older AM broadcast-band receivers.

In the equalizer circuit, once the correct value is found by experimentation, it can always be replaced with a fixed ceramic capacitor of the proper value. By the way, this circuit can be used at the transmitting or receiving end, whichever gives better results. In commercial implementations of this technique, the video signal may be both pre-emphasized as well as de-emphasized. Bear in mind, however, that the circuit will not perfectly compensate for all cable losses. Phase changes, non-uniform cable characteristics, and a whole host of other factors that will affect the final results you obtain can come into play. The effort will be quite interesting, though, and certainly a lot of fun. Commercial systems using this scheme have transmitted good color video signals up to 10 miles through simple telephone cable, so keep in mind that it can be done.

Now to our final circuit. Fig. 3 shows how we configured the TV camera/doorbell system. Two center-tapped transformers were used for the video, while the low-voltage AC for the doorbell was applied between the balanced lines by means of the center tap and a third, common ground. We modified two commercial baluns by carefully unwinding them, adding the center tap, and rewinding. Everything was then held in place with a drop of nail polish.

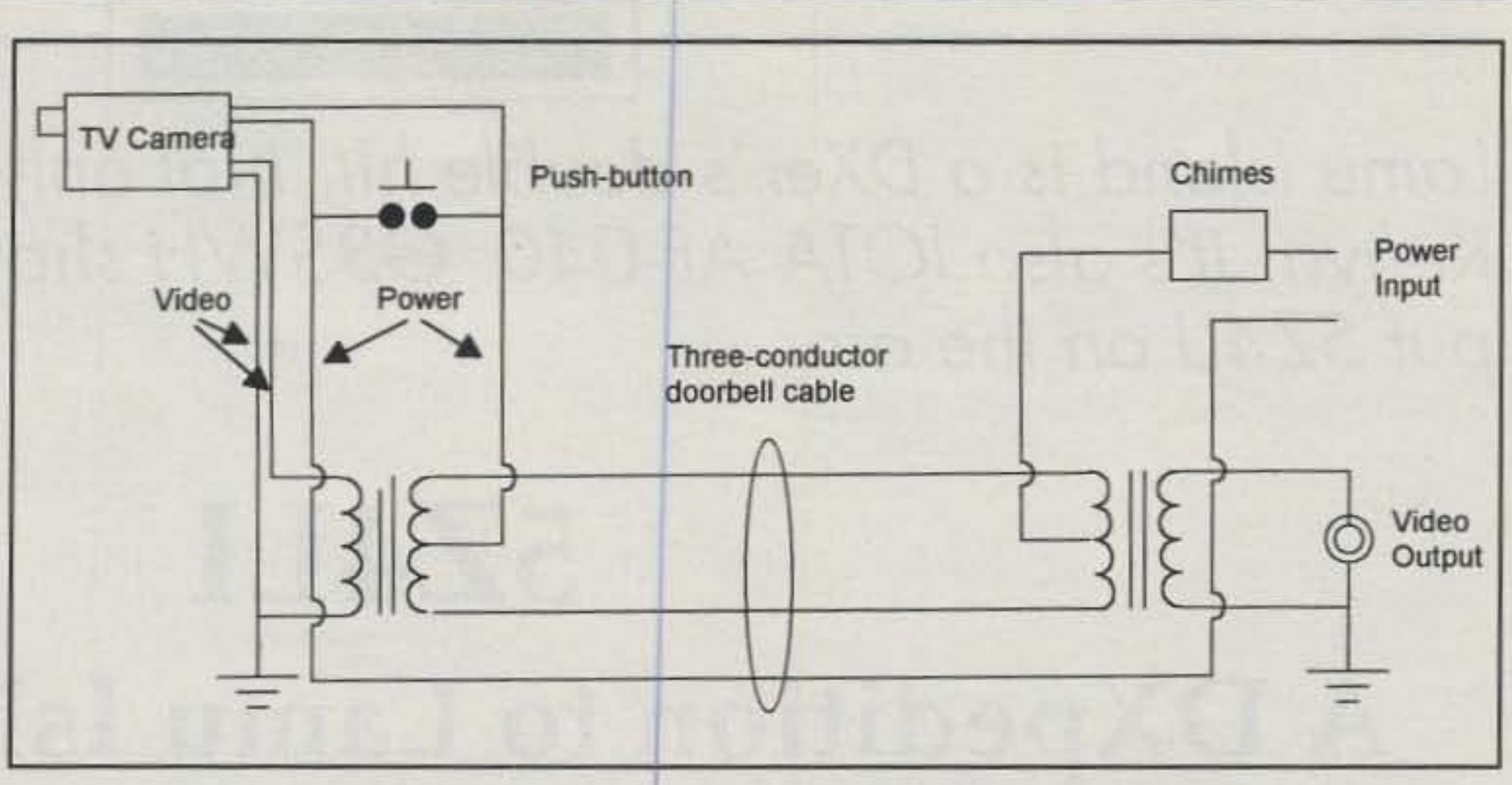


Fig. 3– Transmitting video over a twisted doorbell cable.

Although 60 Hz is present on the video conductors, it cancels itself (as far as the video is concerned) in the transformers due to the fact that the same phase of the sine wave is present on both conductors compared to the opposite phase for the video. The only problem with this setup is that the video is cut off when the push-button is activated.

The camera power (9–12 VDC) was obtained from a full-wave bridge and filter (not shown) which rectified the 16 volt AC from the doorbell transformer. Power required by the chip camera was low enough so that the doorbell chimes would not ring nor drop the AC by very much. The tiny camera was mounted in a small housing that also held the push-button, and the result was a compact front-door video monitor that did not require any coax over the 50 feet span to the monitor. 73, Irwin, WA2NDM

Lamu Island is a DXer's double hit. Not only does it count for Kenya, it's also IOTA AF-040. G3SWH shows us what it took to put 5Z4LI on the air.

5Z4LI

A DXpedition to Lamu Island, Kenya

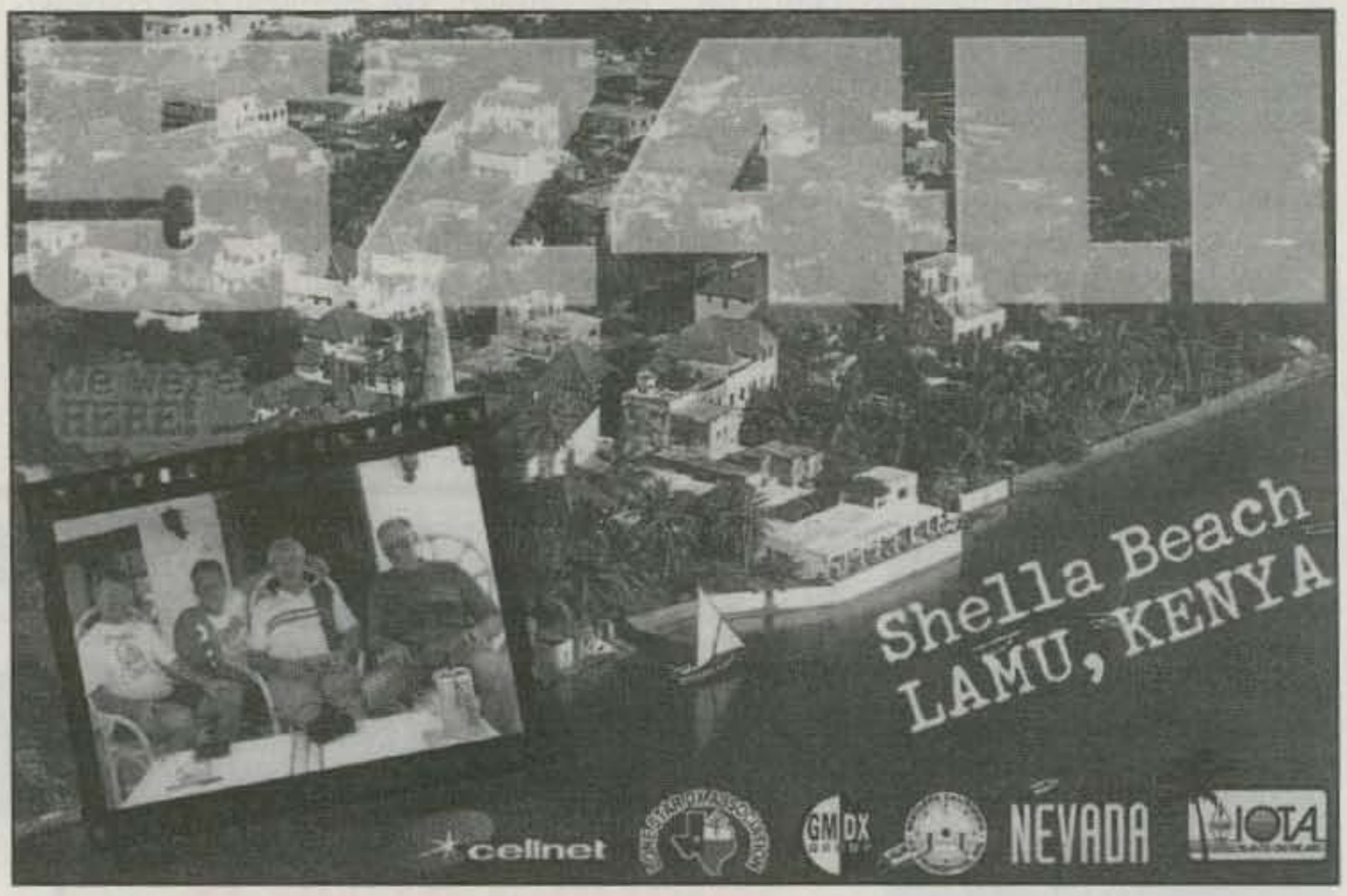
BY PHIL WHITCHURCH*, G3SWH

The expedition did not get off to a good start. The Sabena flight which John, G3WGV, and I were to catch from Bristol International Airport was delayed and we arrived in Brussels in time to watch our connecting flight for Nairobi take off without us.

The idea for an expedition to Lamu Island, off the north Kenyan coast, was born when I met Ted, 5Z4NU, during a brief stopover in Nairobi in September 1997 on my way home from my trip to Tanzania and Zanzibar as 5H3/G3SWH and 5H1/G3SWH. Lamu Island counts as AF-040 for the IOTA program, and of course for Kenya for DXCC purposes. Other islands in the archipelago are Pate and Manda. A sinister e-mail from Roger, G3KMA, warned us that as a result of his receiving more accurate maps, activity from Manda Island would not be acceptable. As far as I could establish, the group had been activated only twice previously.

Ted is the Secretary of the Amateur Radio Society of Kenya (ARSK) and is very keen on promoting amateur radio in his country. While there is a reciprocal licensing agreement with the UK, the process of granting Kenyan licenses is extremely bureaucratic and an application usually takes at least six months to process. In addition to formal Application Forms and the usual copies of passports and UK licenses, one of the Kenyan license requirements is to provide a declaration from the applicant's local police forces that he or she does not have a criminal record.

With an almost exclusively Muslim population, Lamu is Kenya's oldest town. It has changed little in appearance or character over the centuries. There are no motor vehicles, and the streets of the town are far too narrow and winding to accommodate anything other than pedestrians or donkeys. Men still wear the full-length white robes known as *khanzus* and the *kofia* caps. The women cover themselves with a liberalized version of the black wrap-around *buibui*, as they do in other Islamic cultures. The architecture is very reminiscent of Stone Town in Zanzibar, and many of the buildings date back to the 18th century or before.



The 5Z4LI QSL features a view of Shella Beach, Lamu, Kenya, and the 5Z4LI ops.

When I mentioned a possible trip to my usual expeditioning partner, Jim, G3RTE, he jumped at the chance. We believed that four operators would be necessary, including at least one based in Kenya. Ted undertook an attempt to find someone at his end, while Jim and I looked around for a third UK-based team member. In anticipation of delays, Jim and I applied for our licenses in January 1998, with a view to an operation in February or March 1999.

Christian, F6FFS, was residing in Nairobi at the time and expressed interest, but he was waiting for his Kenyan license to come through, although he had not been active for about seven years. Gordon, 5Z4FH, was also resident, but returned to the US for the latter part of 1998. Don, 5Z4FN/G4ABI, was interested, but he was scheduled to retire back to the UK in May 1998. Ian, 5Z4IC/GWØWGG, took up a posting in Mombasa in early 1998 and was interested, but our proposed dates clashed with his work commitments and he had to withdraw at quite short notice. Eventually, Rob, 5Z4RL, who is the Chairman of the ARSK, agreed to join

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us in October 1998, and we certainly benefited from his local knowledge, fluent Swahili, and logistical support.

We had no luck in attracting another UK-based operator until I met John, G3WGV, for lunch one Sunday in August 1998, principally to discuss 9MØC QSLing. A casual comment and we suddenly had a fourth member of the team. A very hasty license application was forwarded to Nairobi and we began serious planning.

My early research had identified a four-bedroom house in Shella, which is a village on the beach about one kilometer outside Lamu town. Known as *Mnarani House* (which means "minaret" in Swahili), it was available for rent at reasonable cost and included the services of a full-time housekeeper and cook. There is an airstrip on the adjacent Manda Island with daily scheduled service to Nairobi. Transfers to Shella from the airstrip are by motorized *dhow*.

Rob, 5Z4RL, is an SSB-only operator; Jim, G3RTE, is equally at home with SSB or CW; and John and I are dyed-in-the-wool CW-only men. We thus had a good mix of CW and SSB operators and planned to run two stations simultaneously, one on each mode. Rob had a spare Cushcraft A3S beam with a Create stand and a support mast. He also had a Heathkit SB-200 amplifier. We arranged a 40 meter extension for the A3S and agreed to take RTTY equipment, although none of us had more than a nodding acquaintance with that mode. John was duly elected as RTTY operator.

With Ted and Rob's assistance we obtained the special callsign 5Z4LI, agreed on the dates, and booked the house and flights to the island from the UK. For convenience, Jim decided to fly from Stanstead via Amsterdam with KLM, whereas John and I decided to fly from Bristol via Brussels with Sabena. Conflicting airline schedules meant that John and I would arrive a whole day early.

Sabena very efficiently re-routed us via Zurich on a Swissair flight and allowed us phone calls to let those meeting us in Nairobi know of the revised schedule, but we spent a very boring ten hours in snowy Brussels waiting for our connection. We arrived at Nairobi's Jomo Kenyatta International Airport at 6 AM local time, feeling very travel weary and bleary eyed, to be pleasantly surprised by our baggage appearing on the carousel. Ted and Rob met us and whisked us away to the Fairview Hotel for breakfast.

After a couple of hours of sleep and a much needed shower, Rob collected us and took us off to see the Rift Valley and Lake Naivasha. We saw a few zebras and baboons on the side of the road, but we didn't go to any game parks. After lunch by the lakeside, we returned to the hotel in the early afternoon for a siesta before going to Rob's house for a barbecue to celebrate his son's first birthday. It was then time to go out to the airport to meet Jim's flight. Jimmy, 5Z4FM, turned up as well, as coincidentally he was seeing his wife off on a flight to the UK.

Left to right: outside Rob's office are John, G3WGV; Jim, G3RTE; Rob, 5Z4RL; Phil, G3SWH; and Ted, 5Z4NU.

The following day we were collected from the hotel and taken to Nairobi's Wilson Airport via Rob's office. Fortunately, Rob has contacts at Air Kenya and had arranged for the beam antenna, mast, and stand to be flown down to the island the day before. He also arranged for our excess baggage to be carried at no additional cost, which was just as well, since it amounted to over 70 kg, not counting the weight of the SB-200!

On arrival at Manda Island, we loaded all the equipment onto two hand-carts and set off for the jetty and the *dhow* transfer to Shella. There were many willing hands to help us carry all the equipment the hundred yards or so through the narrow lanes to the *Mnarani House,* where we met Wilson and Lucas, our housekeeper and cook. The house itself was ideal, built in the local style with arched open areas and a traditional *makuti* thatched roof. However, the garden was very much smaller than I had expected and there were overhead power lines on two sides.

Rob immediately organized supplies of beer, soft drinks, and food. Fresh fish and shellfish were readily available and could be bought at reasonable prices from the local fishermen. I am not usually a fish-eating person, so I was a bit apprehensive at first. We ate like kings and I thoroughly enjoyed a fish diet the entire time I was on the island.

The antennas and the power lines.

We erected the beam for 40, 20, 15, and 10 meters and a rotary dipole for 17 and 12 meters on a flat area of the roof on the second floor, with a good, clear take-off in all directions. Even with the Dunestar fil-

A very rare picture of G3SWH making an SSB QSO (one of two in the last 20 years!).

John, G3WGV, concentrating hard on the CW pile-up.

ters, there was insufficient physical separation between the antennas to be able to satisfactorily operate two stations simultaneously. After a delicious dinner of lobster thermidor, it fell to my privilege to make the first QSO with OK1ASK on 20 meters CW at 1910 UTC on February 17, 1999, followed by a hectic run of 200 stations in two hours.

Rob threw what can only be described as a short wire antenna over the ridge of the roof of the house next door and actually made the first SSB QSO with Jimmy, 5Z4FM, at 2006 UTC using his Alinco DX-70 and EDX-2 automatic tuner. However, we didn't settle down to run SSB properly until 2117 UTC, when we made about 50 QSOs on 20 meters before closing for the night.

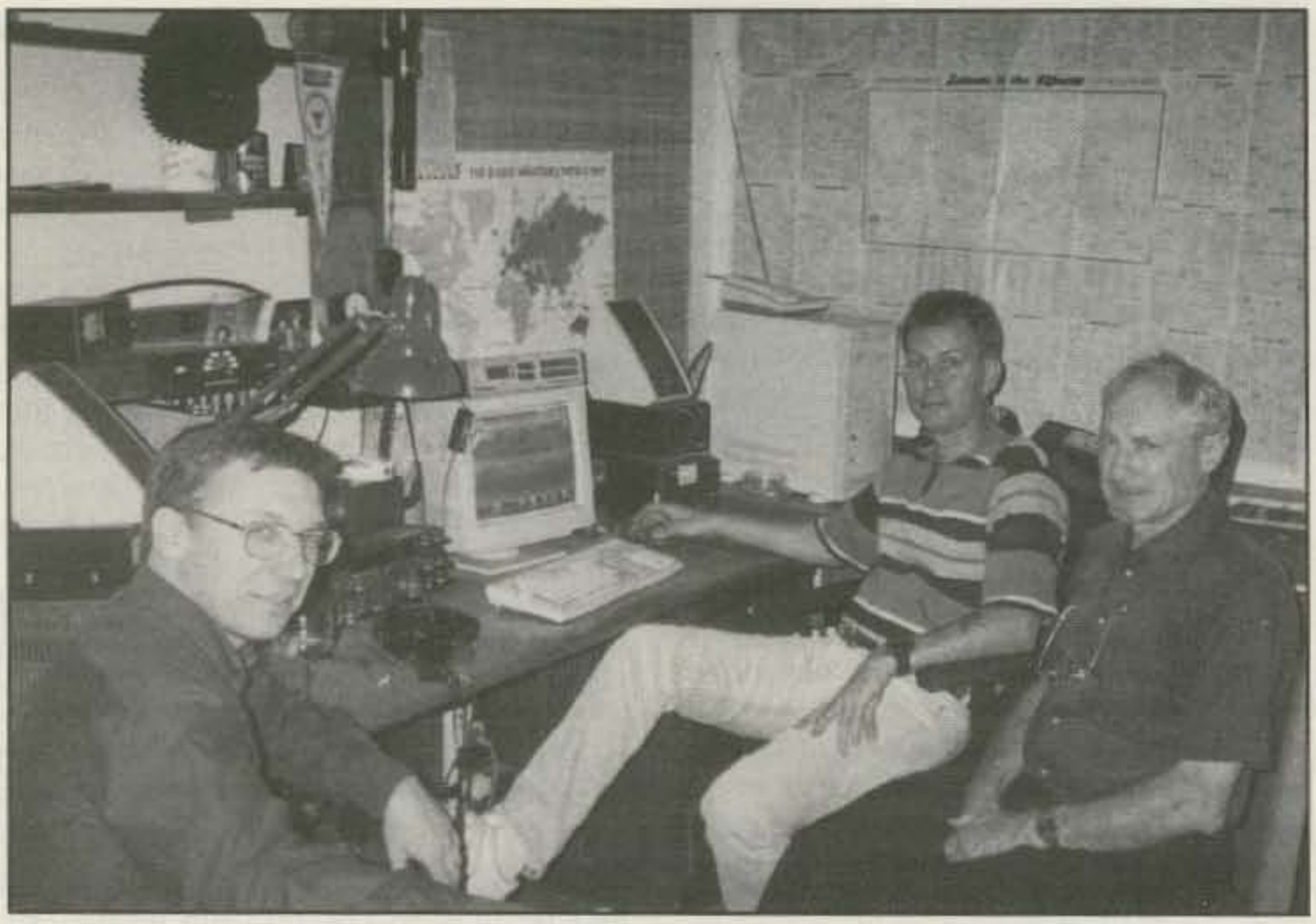
The next day, we put up wire dipoles with better separation for some of the other bands. After some experimentation, we set up the SSB station on the ground floor using the Yaesu FT-900AT and the SB-200 amplifier, and also set up the CW/RTTY station on the first floor using John's barefoot Yaesu FT-847.

Even so, it was very difficult to find a combination of bands and modes which could be operated together. We compromised and agreed to have a primarily CW day, followed by a primarily SSB day. This meant that the number of QSOs on each mode remained approximately equal. Severe space restrictions meant erecting antennas for 160 and 80 meters was almost impossible. The power lines produced S9+ noise levels, particularly on the lower bands, which made 160 and 80 meters unusable. Regrettably, we abandoned all ideas of operating on those bands.

Part of our plan was to have at least one station on the air around the clock, but we found that both 40 and 20 meters closed at around 0000 UTC. It is a great pity that 30 meters is not permitted in Kenya, as I'm sure we could have racked up a few thousand extra QSOs on that band alone and achieved around-the-clock activity.

The social life of Shella revolves around the Peponi Hotel, which is owned by a Norwegian couple. It is one of the few places where you can buy alcohol—or a ham sandwich! Situated right at the end of the wonderful 14 km long beach, facing the channel between Lamu and Manda islands, it doubles as the local pub. We lost no time in visiting, and almost immediately Rob bumped into someone he knew. It's that sort of a place! There followed a steady stream of people to the *Mnarani House* wanting to find out about amateur radio and why we had come to Lamu Island to perpetuate it.

The minaret of the adjacent mosque contained a very large loudspeaker, which the *Muezzin* used to call the faithful to prayer at dawn, dusk, and various



Left to right in Rob's shack: John, G3WGV; Rob, 5Z4RL; and Ted, 5Z4NU.

other times in between. There was never a problem getting up to catch the early morning 40 meter opening to the US! Trying to work a 20 meter CW pile-up through the power-line noise on Saturday night while a one hour sermon was being broadcast was a truly demanding task. We did notice some moderate breakthrough on SSB when using the amplifier, especially when Jim was operating, but he made his peace with the *Imam* and arranged to have a conducted tour of the mosque the following day. Unfortunately, when the *Imam* called to collect him, Jim was drinking at the Peponi!

We also had a third station using Rob's DX-70 and short wire antenna, but this was used very intermittently. Jim took it down to the beach one day, set up a vertical in the sand, plugged into the Peponi's power, and worked a bunch of Japanese on 17 meters SSB.

There are estimated to be 3000 donkeys on the island, most of whom seem to wander aimlessly through the streets of the town. How the owners identify which donkey belongs to whom is a mystery. Their braying at all hours of the day and night is another reason not to miss the DX openings on 40 meters.

With over 4000 QSOs in the log on CW and SSB, we decided that the Friday evening was the best time to run RTTY, when Europe was home from work and preparing for the weekend. Unfortunately, the high noise level made copy difficult, and John made only 70 QSOs in two hours of operating.

Sunday was scheduled to be a CW day, but the *Muezzin* failed to wake us as usual. When we woke naturally, the reason was obvious: There was no power to drive his loudspeaker, or our radios. Nobody knew how long the power would be off, so Rob, Jim, and I set off in a *dhow* to Lamu town on a sightseeing tour, leaving John praying for power. The island power station was working, and we later discovered that some of the locals had lit a fire under a pole-mounted transformer unit and brought down the transformer. When we got back to the Peponi, we found that they had a back-up generator, and they very kindly allowed us to run an extension lead down the lane and connect into their system. We were back on 20 meters SSB by 1737 UTC, but had lost most of that day's possible activity. Mains power was eventually restored some time during the night.

I was also able to make the last QSO on 15 meters CW with LZ3HI at 0835 UTC on February 24th. By this time the others had dismantled all the antennas except the beam, which was a four-handed job. Once we were packed up, there was time for a last beer at the Peponi before taking the *dhow* back to the airstrip and the flight back to Nairobi. Ted, 5Z4NU, met us and took us back to his place for a shower and a meal, while Rob was immediately embroiled in running the communications for the Safari Rally. He later managed to come out to the airport, where we said our farewells. Jim's KLM flight left an hour or so before John and my Sabena flight. All flights were uneventful, and we arrived home safely. I even went to work in the afternoon!

We made a total of 11,329 QSOs: 5461 on CW, 5798 on SSB, and 70 on RTTY, with 7022 different stations. We worked a total of 127 DXCC entities, with 85 on CW, 116 on SSB, and 19 on RTTY. Special QSLs are available from my home address, which is correct in any callbook since 1970. Donations towards the cost of the expedition will be gratefully received!

Our particular thanks go to our sponsors, NCDXF, GM DX Group, Lone Star DX Association, Cellnet, and Nevada; our XYLs, Cheryl, Jan, and Shan for letting us go; Wilson and Lucas of Kisiwani Ltd. for looking after us so well; Ted Alleyne, 5Z4NU, and the Amateur Radio Society of Kenya for their help with the licenses and special callsign; Air Kenya for help with the excess baggage; and Neville Cheadle, G3NUG, for loaning us the Yaesu FT-900AT. Without Neville's help and understanding this operation would not have been possible. ■

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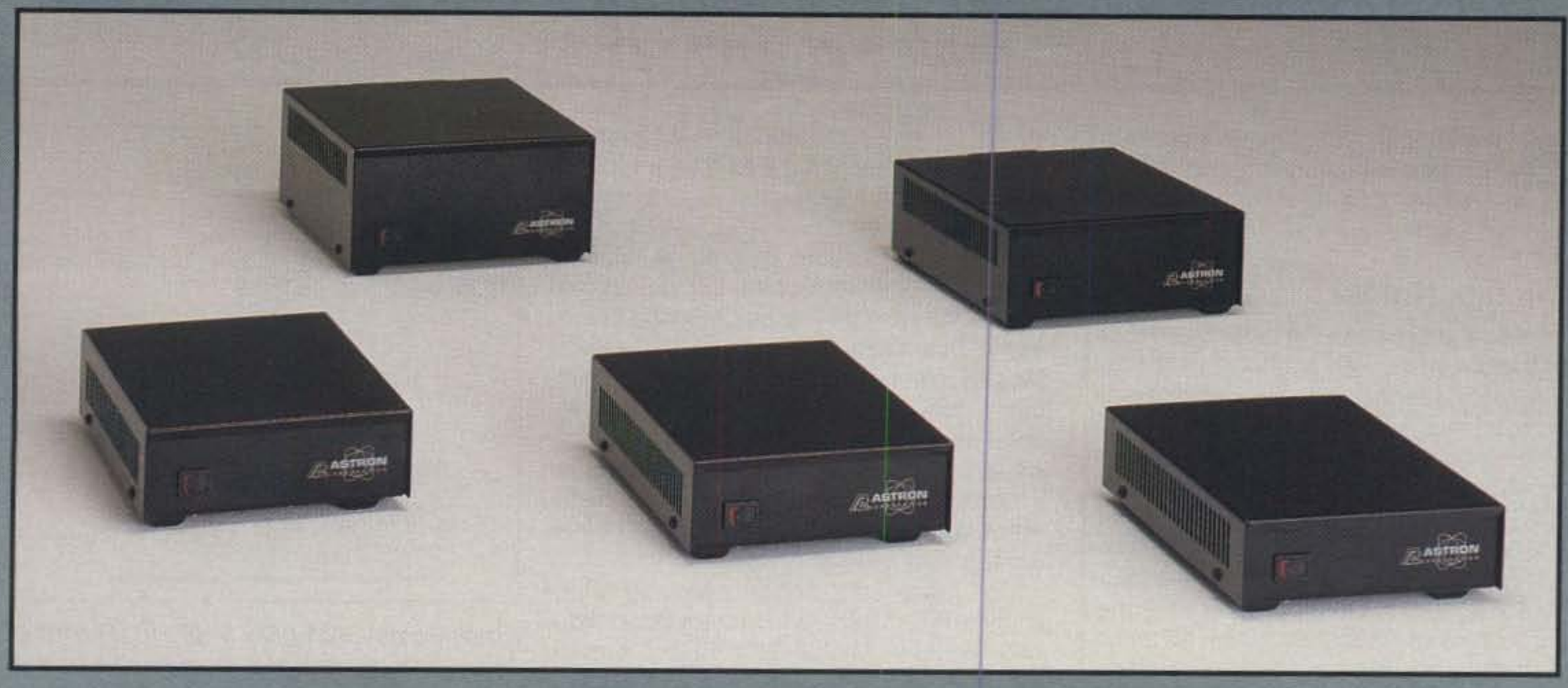

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OR 180-264 VAC 50/60Hz
SWITCH SELECTABLE
OUTPUT VOLTAGE: 13.8 VDC

MODEL	CONT. AMP	ICS	SIZE (Inches)	WT.(LBS)
SS-10	7	10	2.3 x 6 x 9	3.2
SS-12	10	12	2.3 x 6 x 9	3.4
SS-18	15	18	2.3 x 6 x 9	3.6
SS-25	20	25	2 7/8 x 7 x 9 3/8	4.2
SS-30	25	30	3 3/4 x 7 x 9 5/8	5
SS-25M*	20	25	2 7/8 x 7 x 9 3/8	4.2
SS-30M*	25	30	3 3/4 x 7 x 9 5/8	5

- *with separate volt & amp meters
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BY KARL T. THURBER, JR., W8FX

THE DIGITAL DIPOLE

FROM SOFTWARE THROUGH ANTENNAS FOR THE SHACK

Summer Fun '99

Are you ready for some summer fun? Check out this month's column for a heavy dose of antenna and software fun stuff.

Antenna Notes

Catalogs and a New Website from Mosley Electronics. Two catalogs are offered by Mosley Electronics, Inc., whose self-declared tradition is that of supplying "a better antenna." One of the Mosley catalogs describes the firm's TA, MP, TW, CL, and S Series HF multiband amateur beam antennas; the other catalog describes the high-end PRO-Series beams. A supplement and flyer describing other antennas and some new additions, as well as antenna pricing, accompany the two catalogs.

The former catalog mostly describes Mosley's classic beams, such as the original TA-33 and TA-34 trap multibanders, along with conversion and add-on kits. There also are several variations on these designs. The latter catalog describes Mosley's line of heavy-duty, premium-quality PRO-Series HF multiband trap beams that are the envy of many "big guns."

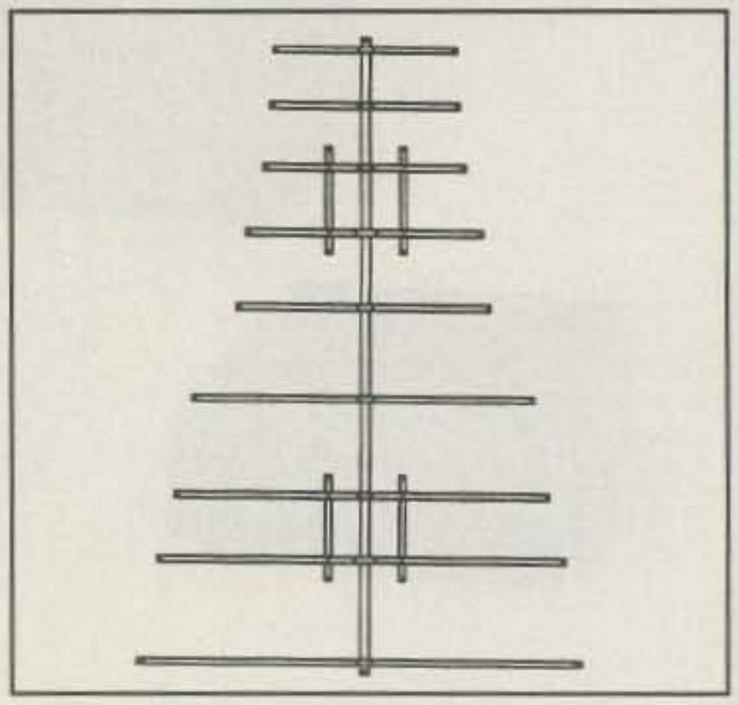
The supplement and flyer also describe the Mosley Signal Master single-band 40 meter beams; the RV-4C, RV-6C, and RV-8C Series automatic bandswitching verticals; and the MINI-33 small tribander. Included too is the large PRO-Series design, "The Sting," which is the new, extra-heavy-boom PRO-96-S six-bander at the top of the PRO line; HF dipoles; and VHF/UHF beams and ground planes.

Mosley notes that during 1998 it was impossible to keep up with amateur demand, due to a glut of commercial orders, existing contracts, and world conditions. In the flyer, Mosley describes its new 40,000 sq. ft. Union, Michigan facility that's expected to relieve the amateur delivery backlog. Also under construction is another antenna range for product development and testing.

Some important chemical compounds also are listed in the catalogs. One very useful product Mosley offers is Weather Guard, a brush-applied clear coating that protects the surfaces of exposed aluminum from the corrosive action of salt-laden air, moisture, acid rain, and ultraviolet (UV) radiation. The product reportedly keeps antennas in new condition for 8 years if they are located at least 50 miles from salt water, or for 2 to 3 years if they are close to the seacoast or exposed to direct salt spray.

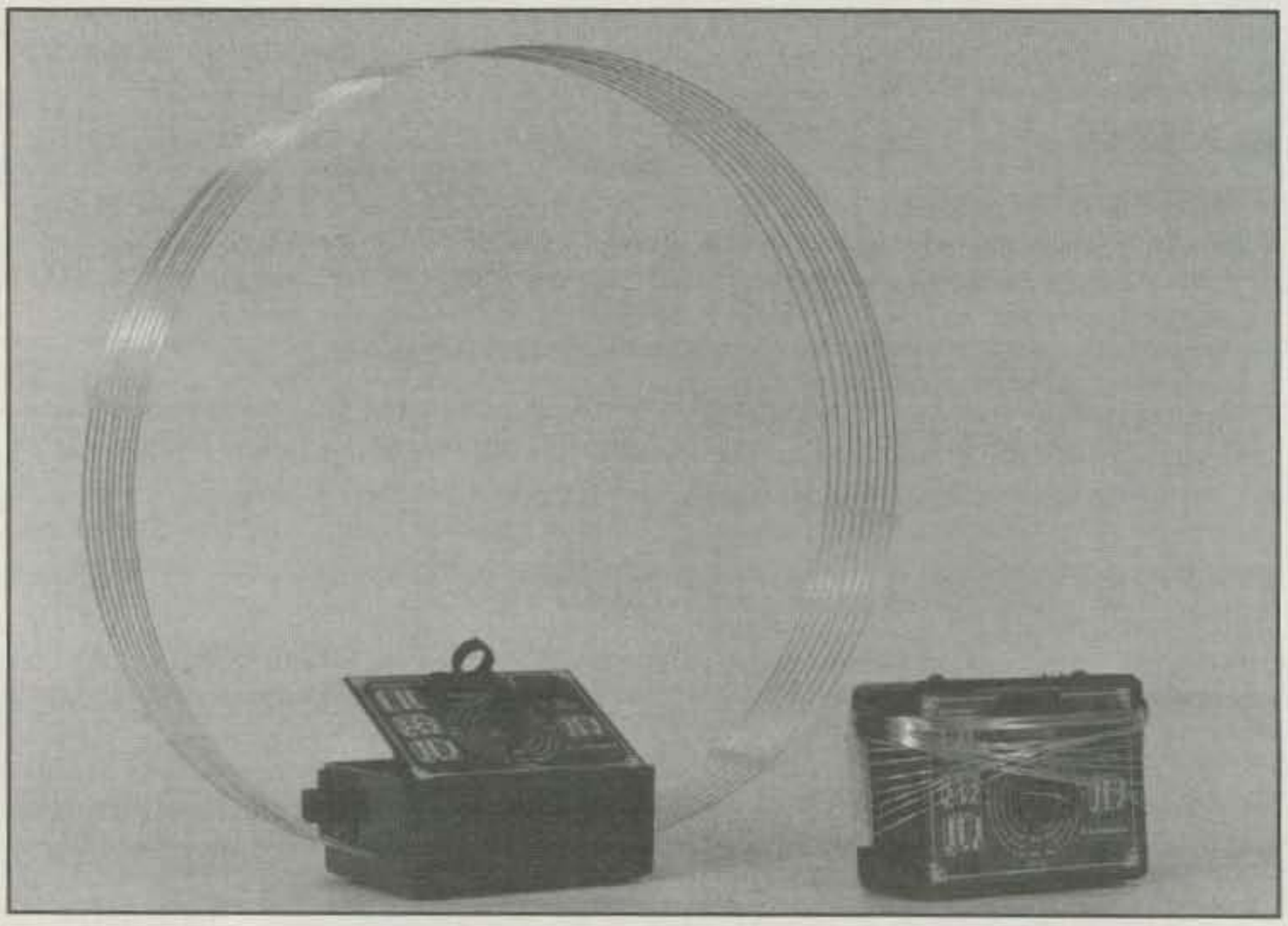
Another chemical offered is Mosley Penetrox™, an anticorrosion compound created to work with their precision drawn tubing (a small quantity is included with all Mosley antennas). Its purpose is to maintain a good joint between sections of telescoping tubing, without causing electrolysis at the joint. The product also acts as an anti-seize compound, which keeps element sections from locking up and binding together.

For more info, contact Mosley Electronics, Inc., 1325 Style Master Dr., Union, MO 63084 (1-800-325-4016; e-mail: <mosley@mosley-electronics.com>). Also check out Mosley's new website at <http://www.mosley-electronics.com>.



The Mosley AM-2N6 VHF dual-band 6 and 2 meter antenna is only one of the many antennas and antenna-related products featured in their catalogs. Also check out their website at <http://www.mosley-electronics.com>. (Artwork from Mosley's "Amateur Antenna" catalog)

New Low-Band Goodies from Kiwa Electronics. In April 1996 we described the Kiwa MW (mediumwave) Air-Core Loop Antenna. As we pointed out, receiving loops are enjoying renewed popularity because they can be physically small yet work well, they can be tuned to a particular frequency, and they can be rotated to take advantage of their directional characteristics. Loops are quieter than single wires, they're less prone to "swamping," and they can be used to null out noise and interference. The unique, 12 inch circular air-core design, priced at



Kiwa Electronics' new Pocket Loop is a 12 inch air-core loop that collapses to fit in a pocket, making it well suited for both travelers and backpackers alike. (Photo courtesy Kiwa Electronics)

289 Poplar Drive, Millbrook, AL 36054-1674

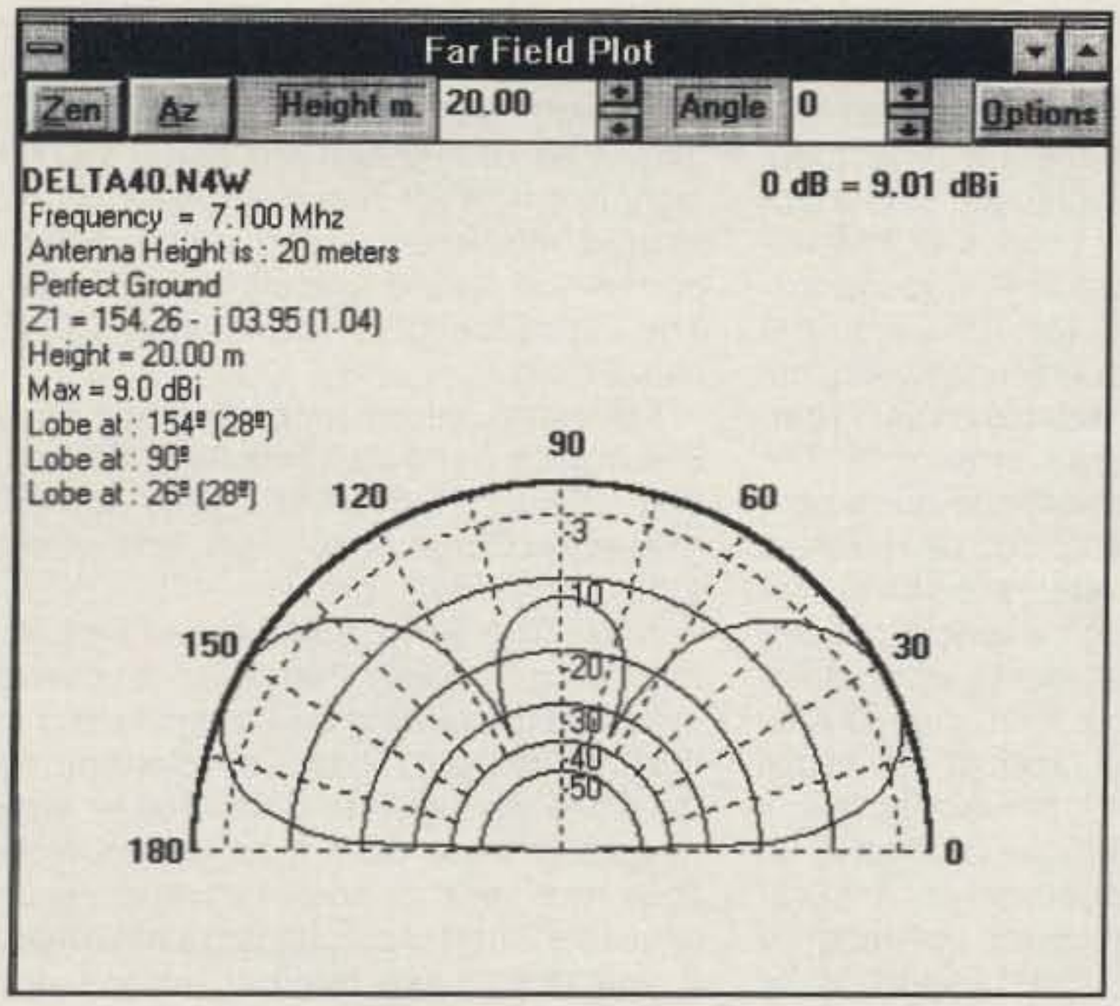


Fig. 1– The most mature and perhaps best-known product offered by ORION Microsystems is NEC4WIN, a user-friendly implementation of MININEC3 for Windows 3.1 and Windows 95. NEC4WIN is an antenna modeling and software package designed to analyze and design antennas for communications engineers, students, and especially radio amateurs. It's intended to be used by those who are very familiar with antennas but also by the less technically inclined. Shown here is the program's Far Field Plot Window.

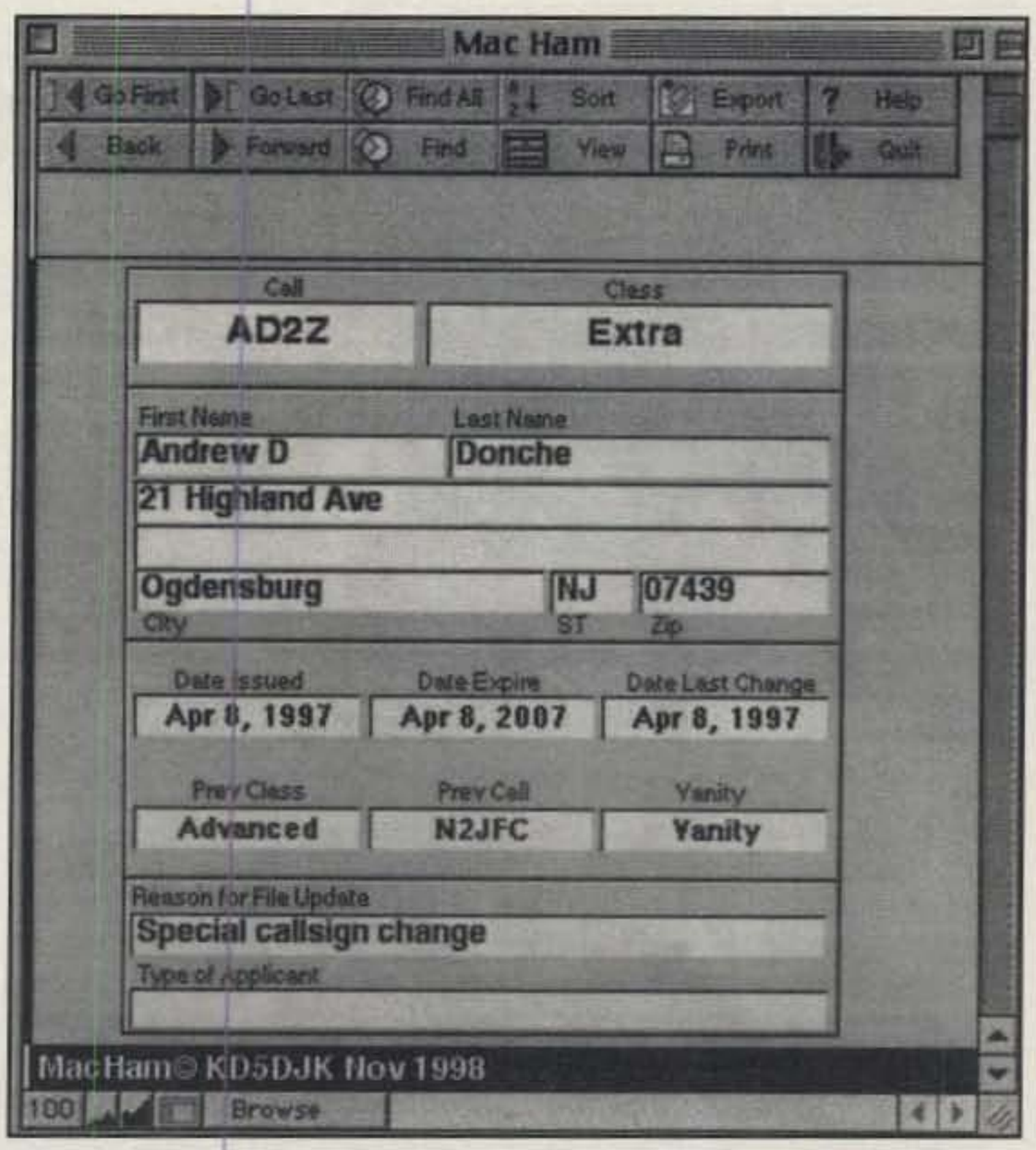
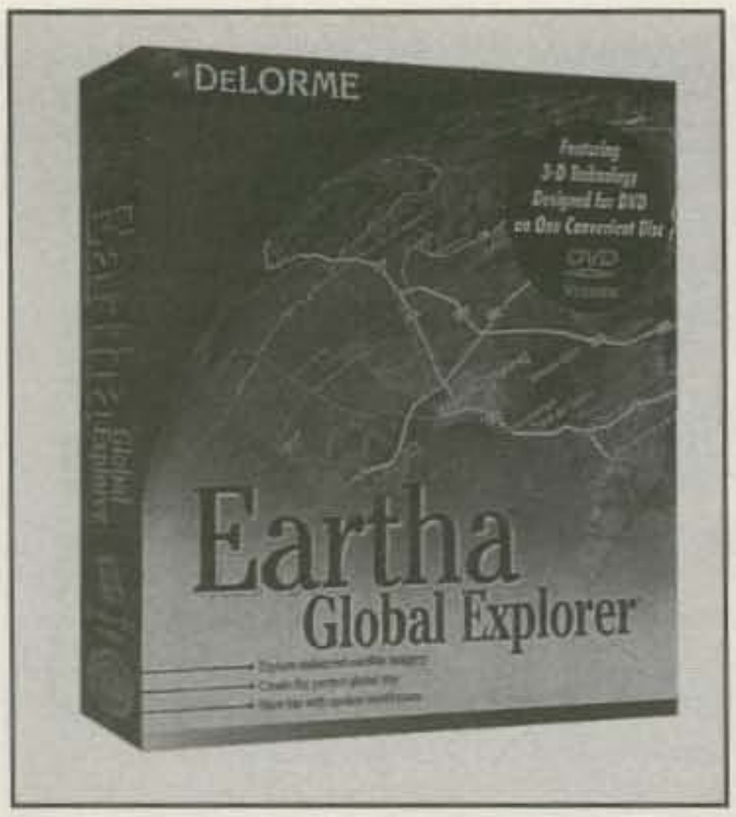


Fig. 2– Macs by Moonlight's MacHam 1.0 is an easy-to-use, fast-access database containing FCC amateur callsign information for the Apple Macintosh. The program runs directly from the CD-ROM. The new program allows for the fast searching, sorting, printing, and exporting of any of the database fields in a variety of file formats.



DeLorme's EARTHA Global Explorer is based on DeLorme's EARTHA database. With topographical maps of the entire planet, facts and features about each country, and an animated guide, the new product offers a new way to explore the planet. It lets you plan a trip anywhere in the world, using actual air, rail, ferry, or road routes, and then preview these routes with Floyd, the animated travel guide. The program offers several unique features, discussed in the text. (Photo courtesy DeLorme)

$360 plus $14 s/h, tunes from 530–1700 kHz using main and fine tuning controls that are mounted in a separate small box.

Since we profiled the big MW loop, Proprietor Craig Siegenthaler has introduced the new Pocket Loop, a 12 inch air-core loop that collapses to fit in your pocket and is designed for travelers and backpackers. The new antenna tunes from 530 kHz to 23 MHz in four bands using battery-powered, low-noise amplifiers. The antenna includes a broadband noise generator to facilitate tuning. You can connect the loop directly to the receiver or, for portable radios, through a special coupler that fits over the portable set's whip antenna. The Pocket Loop is $120 plus $7 s/h.

Another new Kiwa product of special interest to low-band enthusiasts is the Earth Monitor. This unique product is an extremely low-frequency/very-low-frequency (ELF/VLF) receiver covering 10 Hz to 15 kHz. It's designed especially for listening to so-called "natural radio signals" generated by planet Earth; these signals include the mysterious "whistlers," "tweeks," "dawn chorus," and other natural radio signals we've described previously in the column. (These naturally-occurring radio signals generally are caused by lightning strikes and the Sun as it affects the Earth's magnetic field.)

The Earth Monitor features a remote field probe for optimum reception, as well as a variable-frequency bandpass filter that tunes 200 Hz to 8 kHz and a 300 Hz highpass filter for reducing pesky 60 Hz related interference and noise. Headphone and record outputs are included. The Earth Monitor low-band radio is $145 plus $7 s/h.

For more information, contact Kiwa Electronics, 612 South 14th Ave., Yakima, WA 98902 (1-800-398-1146; e-mail: <kiwa@wolfenet.com>; on the web: <http://www.kiwa.com>).

Note: The Kiwa publication "Tips for Improving Receiver Performance" now is available for viewing and downloading at the Kiwa website. These collected tips are for those who wish to gain another level of performance from their communications receiver that would not normally be available, short of purchasing a new radio. If you don't have Internet access and would like a copy, it's available from Kiwa for $5 ($7 outside North America).

Specialty Items from Champion Radio Products. Champion Radio Products is a supplier of specialty products for communications professionals and radio amateurs. Some of the products Champion offers include tower hardware and accessories; rigging gear; grounding products;

safety equipment; lubricating and weatherproofing materials; rotators; UV-resistant Dacron® rope; mast, antenna, and rotator calculation software; county windspeed data; publications; and various other products of antenna- and tower-related interest.

For a free flyer, contact Champion Radio Products, P.O. Box 2034, El Macero, CA 95618 (1-888-833-3104; e-mail: <sales@championradio.com>; web: <http://www.championradio.com>.

Update: HAMCO Hidden Antennas for 1999. As we pointed out in August 1996, sometimes it takes ingenuity to operate or "work out" when you're an apartment dweller or if you have antenna restrictions or covenants on your home or condo. Often, you're forced to use invisible antennas and the like.

In that column, we described proprietor Larry Feick, NFØZ's original TapeTenna© kit, which consisted of 108 ft. of highly conductive, 3.5 mil thick, 1/2 inch wide copper foil tape, two feedpoint connectors, and a detailed instruction manual. With the Tape-Tenna kit, you could construct a variety of "stealth" antennas of most types, including verticals, dipoles, quads, Yagis, and J-poles, for UHF, VHF, and HF. The kit also lent itself quite well to mobile, portable, and emergency operations.

Later, in May 1997, we described HAMCO's Tape-Jay™ Stealth 2 meter J-pole. This was a concealed antenna for 2 meters, used to get handie-talkies (HTs) and base units into the repeater from fringe areas.

HAMCO's new 1999 catalog offers a concise, two-page description of the TapeTennas, a basic tutorial on how they work, and information on how to install and use the materials. The catalog also describes a greatly expanded, specialized line of TapeTenna HF, VHF, and UHF products. These include a number of HF monoband dipoles; the Spywire™ HF multiband stealth antenna; the Covertical™ "out-of-sight" single- and multi-band vertical antennas; VHF and UHF J-poles and ground planes; the HF Eave-Tenna™, for homes with pitched eaves; and the TapeTenna HF Center-Fed Zepp. For SWLs, HAMCO offers the Hide-a-Wire™ and the Hide-a-Loop™ antennas.

For a free 12-page catalog, contact HAMCO, 3590 Roundbottom Rd., Suite F239193, Cincinnati, OH 45244-3026.

Soft Stuff

Antenna Modeling Software from ORION Microsystems. As many of us older amateurs recall, amateur antennas used to be designed mostly by the seat of the pants, or by using a stubby pencil or calculator. Either way, final performance characteristics were hard to predict. In the past few years, computer-based antenna

design, construction, and modeling has become rather routine, with the formerly difficult number crunching done on your own PC.

With antenna modeling programs, it's fairly simple to calculate the correct dimensions and wire sizes for all sorts of antennas, including dipoles, quads, Yagis, and verticals. Such programs offer the intrepid experimenter and casual user alike some nice "what if" possibilities as well as considerable confidence in the overall results obtained.

Several popular Windows®-based modelers are offered by the Canadian firm ORION Microsystems. Their most mature and perhaps best-known product is NEC4WIN, a user-friendly implementation of MININEC3 for Windows 3.1 and Windows 95 (see fig. 1). The NEC4WIN program is an antenna-modeling software package designed to analyze and design antennas for communications engineers, students, and especially radio amateurs. It's intended to be used by those who are very familiar with antennas but *also* by the less technically inclined (being a computer expert is not required).

The mouse-driven NEC4WIN software computes antenna impedance and SWR, and it lets you plot azimuth and zenith far-field patterns. You can display the antenna in 3-D form with currents, pulses, pulse numbers, sources, and loads. It's US $30 when ordered directly by check. A downloadable evaluation version is available on the firm's website.

NEC4WIN95 is a newer, follow-on product which initially was released at the end of 1997 and is used by an increasing number of radio amateurs and professionals. The latest update, V2.0, is user-friendly, fast, and affordable 32-bit antenna simulation software based on MININEC and intended for use under Windows 95, 98, and NT.

Antennas are defined in spreadsheet format or in ASCII files. Manipulation of wires includes copy, past, taper, rescale, and rotation. Two- and three-dimensional views of the antenna allow you to immediately see your design, with sources, loads, wire dimensions, and interconnections. Antennas and patterns can be rotated freely using the mouse only.

NEC4WIN95 also features automatic full analysis of lobes and angles displayed with far-field patterns; impedance, SWR, gain, and front-to-back frequency sweep plots; and a unique, user-friendly "click and go" optimizer that lets you optimize antennas without having to define variables. V2.0 is US $60 (upgrades from NEC4WIN are US $30). A downloadable evaluation version is available on the firm's website.

As this is being written, an even more advanced product, NEC4WIN95VM, is in beta test. The new product is the "virtual memory" equivalent of NEC4WIN95, and it allows an almost unlimited number of segments and wires. The final version should be available by the time you read this column.

For more information, contact Madjid Boukri, VE2GMI, at ORION Microsystems, 197 Joncaire, Ile Bizard, Quebec, Canada H9C 2P7 (514-626-5002; e-mail: <info@orionmicro.com>; web: <http://www.orionmicro.com>). The firm's website offers a number of interesting "extras," including comprehensive product software reviews and informative antenna-modeling articles.

MacHam 1.0 from Macs By Moonlight. Okay, we know Apple Macintosh users take a lot of ribbing. Radio amateurs, especially, always have suffered from a somewhat limited range of available application software. Now, however, Mac owners should rejoice in the knowledge that there's a callsign database made just for them—not a mere ported-over copy of a PC program, but rather it's a program "made on the Macintosh for the Macintosh."

The new program is MacHam 1.0, and it's offered by Tim Neudecker, KD5DJK, of Macs by Moonlight. MacHam is an easy-to-use, fast-access database containing FCC amateur callsign information for the Macintosh. The program runs directly from the CD-ROM, but you can easily copy it to your hard drive for a major speed increase if you have about 215 MB of available space on the hard drive to accommodate the database files.

The new program allows for the fast searching, sorting, printing, and exporting of any of the database fields in a variety of file formats. The fields include callsign, license class, first and last names, address, city, state, zip, previous callsign, previous license class, date of issue, date of last update, date of expiration, vanity information, type of applicant, and reason for last update.

MacHam 1.0 is designed for use under Mac System 7.0 or above, with 3400K or more free RAM and a CD-ROM drive (4× or faster is recommended). Updates are expected to be available every six months, in November and May.

The program is $30 including shipping. It's available from Macs by Moonlight, 35 South Broadway, Box A3, Irvington, NY 10533 (e-mail: <macham@neudecker.org>; web: <http://www.neudecker.org/~macham>).

EARTHA Global Explorer. Among the many highly capable software products we have reviewed over the years are the excellent mapping and navigation software packages from DeLorme. These include Street Atlas USA®, the first consumer mapping software; AAA Map'n'Go®; DeLorme Topo USA™; and several others. The company also pub-

lishes the popular Atlas & Gazetteer™ series of state recreational atlases.

In January we profiled EARTHA™, the world's largest moving globe—the largest image of Earth *ever* created. As we noted, EARTHA took two years to build and represents Earth as seen from space. Every continent is well-detailed, with vivid colors illustrating vegetation, major roadways, and cities. Ocean depths are also represented. EARTHA is housed in a three-story glass atrium at the company's Maine headquarters.

EARTHA was developed using computer technology. The mapping data, which took over a year to compile, constitute a special composite database built from satellite imagery, colored bathymetry (ocean depth data), and information from various terrestrial sources. The printed EARTHA database is equivalent to about 140 gigabytes (or 214 CD-ROMs), making it one of the largest databases in the world. Its scale is 1:1,000,000, which works out to be one inch equaling nearly 16 miles.

DeLorme's newest product, EARTHA Global Explorer, is based on DeLorme's slick EARTHA database. With topographical maps of the entire planet, facts and features about each country, and an animated guide, the new product offers a fun and educational new way to explore the planet.

EARTH Global Explorer is a CD-ROM product that lets you plan a trip anywhere in the world (DXpeditioners, take note!), using actual air, rail, ferry, or road routes, and then preview these routes with Floyd, the animated on-screen travel guide. The Floyd travel guide reads aloud descriptions of the points of interest located along a planned route.

The program offers several unique features, including two-dimensional satellite views of the entire planet displaying geographical topography and ocean bathymetry; world information, including cultural and social statistics such as population, currency, and languages spoken; and the capability to book online travel reservations. With EARTHA you can zoom from majestic views of the entire planet to detailed views of the major road infrastructures for every country in the world. The program features Global Positioning System (GPS) compatibility and offers links to online information for thousands of places.

The CD-ROM based product, which runs under Microsoft® Windows® 95/98 or NT, is $49.95 when purchased direct from DeLorme. A DVD-ROM version also is available, which adds enhanced satellite imagery and realistic 3-D flyovers of the entire planet; it's $59.95. DeLorme also offers the CD-ROM based EARTHA Value Pack for $59.95 and the DVD-ROM based EARTHA DVD Value Pack for $69.95. (In my opinion, the two Value Packs are well worth the extra $10, as they include the *EARTHA World Travelog*, a stunningly beautiful, 168-page, large-page-size world atlas.)

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

Wrap-Up

That's all for this time, gang. Next time, more "Digital Dipole" topics of current interest. See you then.

Overheard: Give me a break! Why is it that every single time I buy something for my PC, the very next day I see it priced much lower?

73, Karl, W8FX

1999 CQ 160 Meter Contest High-Claimed Scores

SSB

Call	M	Score	QSOs
3V8BB	M	824,880	985
VE3BY	S	361,608	969
OT9T	S	327,348	680
I4JMY	S	278,120	585
GJ2D	M	266,228	615
UU7J	M	258,267	1079
XE1RCS	M	241,878	611
RW2F	M	238,112	823
LX9UN	M	230,346	648
N8TR	M	219,730	1008
S51F	S	210,373	536
LY5A	S	203,557	539
VE3DC	M	199,584	652
K8MK	M	197,374	966
SV8CS	S	196,878	583
W4MYA	S	196,424	905
V47KP	S	196,078	469
4LØG	M	192,738	487
W3TS	S	188,529	832
OM7M	M	181,719	572
KØXG	M	179,400	963
HB9CXZ	M	176,088	506
YZ6A	S	173,476	533
PA4WM	M	163,060	494
HB9FBO	M	148,413	466
N2ORM	M	143,120	717
WY3T	M	130,159	744
VE5RA	S	130,113	441
HG1S	M	128,472	471
S57M	S	128,470	426
KZ5MM	S	128,128	686
NE3F	M	127,190	623
K9NR	S	127,167	807
K8CC	S	126,490	852
KD9SV	S	126,290	738
IV3OWC	S	125,477	406
G6YB/P	M	120,645	369
WN9O	M	118,680	744
WØETC	S	115,895	781
OZ3SK	S	114,855	382
AJ3K	S	111,683	641
IT9EQO	M	110,044	329
K2YR	M	108,484	594
AA1BU	S	107,973	497
W3GH	S	104,616	575
N3OUC	S	103,280	474
N4RV	S	102,127	558
N7GP	S	101,170	647
WA1LNP	S	101,010	604
K8OQL	S	100,098	643
OH1LEU	S	98,600	378
DJ6QT	S	97,292	413
G3NAS	S	95,225	249
KT1O	M	94,248	516
VE3PN	S	93,456	325
LZ9A	M	92,659	363
K9XD	S	90,279	642
WD5R	M	87,040	607
NØAH	S	85,620	624
DL8PC	S	85,425	381
K2OWE	M	85,272	520
K3WW	M	84,560	500
NC4NC	S	84,111	522
VE6JY	S	83,752	302
N3MKZ	S	82,160	527
K4IQ	S	81,489	503
DL7VRO	S	81,141	387
N2ED	S	80,199	505
W3BGN	S	79,344	305
AA4V	M	78,870	504
UA4UDF	S	78,288	362
NØKOV	M	77,066	651
KF4ZR	M	76,966	612
KH7R	M	76,900	162
YO4FRF	S	76,800	285
H22H	S	76,482	193
K1PX	S	75,033	504
N7KQ	M	74,994	568
LY2OU	S	74,880	379
KS4YT	M	73,899	518

CW

Call	M	Score	QSOs
8P9DX	S	773,376	1059
SP3GEM	S	716,144	1070
C4A	S	648,374	842
9A1A	M	592,567	927
DJ7AA	M	578,235	936
W2GD	M	574,200	1273
W8JI	M	567,525	1267
DK1NO	M	557,333	9322
RW2F	M	554,974	932
SP7GIQ	S	549,549	912
W1BB	M	549,172	1307
VE3EJ	S	542,208	1081
OM7M	M	541,926	907
IK4MTF	M	538,835	907
OK5W	M	518,231	865
PI4COM	M	502,405	908
OZ7YY	S	497,901	873
4X4NJ	S	483,807	623
F6BEE	S	483,066	757
KH7R	M	474,354	655
W4WA	M	469,660	1195
V47KP	S	461,429	781
M2D	S	457,330	799
DL1AUZ	S	451,680	775
NB1B	M	441,886	916
SL3ZV	M	430,470	822
UA2FJ	S	416,342	829
OHØR	M	413,360	915
YZ6A	S	401,212	783
UU4JMG	S	396,633	734
S50U	S	394,152	742
HG5A	M	374,100	763
HG6N	M	366,532	734
K8XXX	M	365,032	1200
LY2FY	S	361,374	843
OK1DX	S	359,310	723
9A7A	M	358,668	751
K3WW	M	356,512	938
DK6WL	S	351,000	706
W3AO	S	344,331	925
UA2FZ	S	342,584	665
K8MK	M	335,231	861
OK1CW	S	333,880	643
S53R	S	326,771	685
LY2BTA	S	325,480	724
DJ5CL	M	321,957	709
DK8LV	S	321,038	678
HG1S	S	309,372	649
W3BGN	S	303,000	770
UA2FB	S	302,412	693
I4IKW	S	302,400	614
HB9DBC	M	299,133	663
N2NT	S	296,738	836
4LØG	M	295,218	551
LZ5Z	S	295,184	707
RY9C	M	294,400	514
W8TOP	M	293,514	955
SM3EVR	S	290,640	624
WB9Z	S	280,984	810
VE3DC	M	280,904	781
T97M	S	276,500	723
S50R	S	274,454	607
DK1II	M	265,437	611
9A2TW	S	263,840	540
W4MYA	S	260,121	967
K8CC	S	256,588	974
LY2WR	S	255,640	645
GW3JXN	S	254,254	563
SV1NA	S	252,252	691
HA8BE	S	251,484	581
KD9SV	M	250,842	809
KVØQ	S	250,428	878
UA6LV	M	247,254	502
OH4JFN	S	245,640	653
K4VX	S	244,035	1029
KH6CC	S	241,780	422
ZF2MO	S	240,702	583
W3GH	S	238,545	805
LA8W	M	235,625	667
OH1MA	S	234,366	612

Club Claimed Scores

Club	Score
FRANKFORD RADIO CLUB	4,539,175
POTOMAC VALLEY RADIO CLUB	3,741,745
UA2 CONTEST CLUB	2,974,714
SLOVENIAN CONTEST CLUB	2,693,966
BAVARIAN CONTEST CLUB	2,121,137

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BY DAVE INGRAM, K4TWJ

WORLD OF IDEAS

A LOOK AT THE WORLD AROUND US

Mobiling '99: New Interests and New Ideas Abound!

Once again old Sol is warming up the great outdoors, Willie Nelson is singing "On the Road Again," and big-time mobiling is back in the limelight. Happy days are here again! Yes, and some interesting types of mobile activities are being noticed at the present time.

Apparently inspired by rising sunspot counts (the bands are great!) and the continuing uncertainties of Y2K, many amateurs are going HF mobile for the first time. Some are setting up low-profile stations for basic survival communications, and others are going all out by installing a "do everything" setup in the car for serious global DXing. Still others are pursuing unique ideas such as OSCAR mobile with a dual-band rig and loop antennas or "walking mobile" with a chest-strap rig and back-strap antenna (you must see this to believe it!). What else can I say except trying new ideas keeps amateur radio exciting. Go for it all!

Need more coaxing? Okay, our previously mentioned areas of interest (plus a few extra tidbits for spice) are lined up for both this month and next. Somewhere in this collection are a few ideas with your name written all over them. Just read on and visualize adapting these ideas to your lifestyle. After all, everyone is a "mover and shaker" in his or her own special way!

Tips and Notes for First-Time Mobileers

A fair number of friends and followers continue to ask me to discuss more tried-and-proven beneficial ideas for basic or "low-profile" mobiling, so let's begin with some always useful tips for success.

First is the classic question of where the best place is to install your transceiver (or its main section if remote-mounted). This varies according to each vehicle and each person's opinion, so I just say think logically. Most important, your selected spot should protect the rig from direct sunlight and moisture (heat, humidity, and dirt are the major causes of damage to electronic equipment). Your location should also support the transceiver by its mating mounting bracket, if possible, or by its rubber feet, rather than allowing some type of homebrew brace or support to press directly against the rig's bottom area. Why? Many modern, ultra-compact transceivers are squeezed rather tightly into their enclosures, and shields for oscillator sections often press right against a lower case cover. If a support brace or shelf presses directly on the enclosure's bottom, in-motion vibrations can cause noticeable "warbling" of your transmitted signal. This may sound to others like distortion, fuzziness, or "burbles." Yes, and as many bewildered mobileers can attest, locating the source of this problem can be a real challenge. Save yourself unnecessary entanglements and fumbles; start by mounting your transceiver in a good shock-surviving manner.

4941 Scenic View Dr., Birmingham, AL 35210

Photo 1– This homebrew shelf/mount was removed from our car for clear-view photographing in sunlight. It illustrates an important point in how a transceiver should be supported by its feet rather than its case. (Discussion in text.)

Another important consideration in today's "corner cutting" world is avoiding that natural urge to use a cigarette-lighter plug for obtaining 13 volts DC for your transceiver (unless it runs 5 watts or less output). This accessory wiring is frightfully thin in many modern cars (a fire hazard looking for a place to happen!), and I personally wouldn't trust it to handle over one amp—regardless of dealer claims. Like many of you, I have heard too many tales of vehicle fires due to poor wiring (and in vehicles without amateur rigs).

So how might you quick-route a DC cable to your rig? Mobileers can use a narrow screwdriver to widen space in the large rubber grommet around the speedometer cable or steering column, and then pull the DC cable through that opening.

Photo 2– If routing a cable through a car's steering column opening or speedometer grommet is difficult, consider routing it through a fender gap and door opening as shown here and explained in the text.

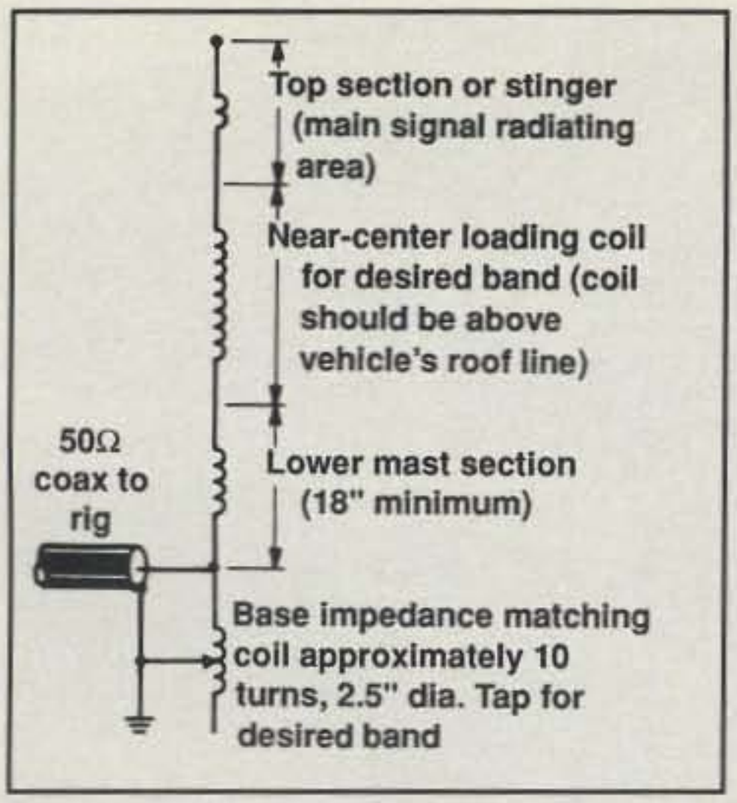

Fig. 1–Electrical outline of a mobile antenna illustrating its main sections and their noteworthy points (see text).

This approach makes a very clean run and custom installation.

Say getting to the steering column area from under the dash is a hassle? Prefer to avoid the old bumped noggin and brake pedal in the jaw syndrome? Okay, think safety first and opt for the convenient around-the-doorsill approach. Look around where the windshield, left or right fender, and door all meet to locate an open gap for routing a cable from the engine area to the door. This gap is different for every vehicle and thus cannot be described perfectly. However, open the hood and door and then look from the engine area back and you will spot it. Carefully route your DC cable, making sure only the door's rubber weatherstripping presses against it when closed, and then use tape to "train it" or hold it into position for a couple of months (photo 2). Check the cable every few days during "training" to ensure your routing position is still correct and rain cannot ride along the cable and drip inside the door. A touch of silicone rubber or Coax Seal® will help if a drip occurs. Next, ensure the DC cable is fused close to actual battery terminals and then connect it to the battery. Why do I emphasize fusing right at the battery? If the DC cable gets nicked by metal body work or a short circuit develops at a later date, it will just pop the fuse rather than causing sparks or a fire. You can also remove the fuse for additional safety and security during no-rig non-mobiling times.

Next is the all-too-common dilemma of adequately hearing your little transceiver's speaker. Some folks just crank up their rig's volume until its built-in speaker rattles its cone into oblivion—not very classy. Others stick a big speaker in a cigar box and throw it on the car's floor—definitely a "no class" act. What is a more acceptable solution? Use rubber bands to attach a thin mobile speaker such as the MFJ-281 shown in

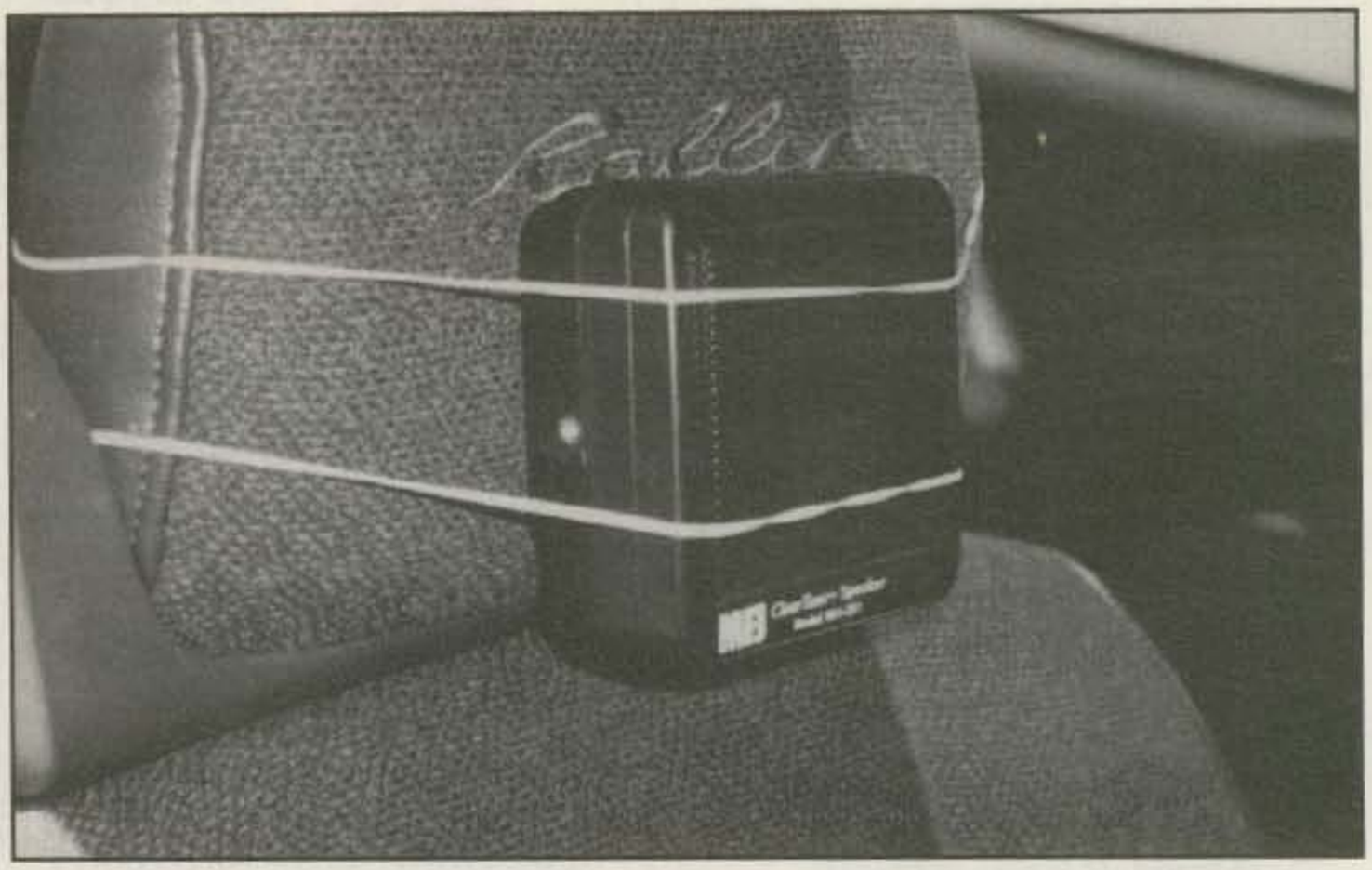

Photo 3– Copying weaker signals can prove quite challenging while mobile, but a thin speaker rubber-banded to a seat's headrest solves the problem. Its cable is easily routed under the edge of the center console and on to the rig.

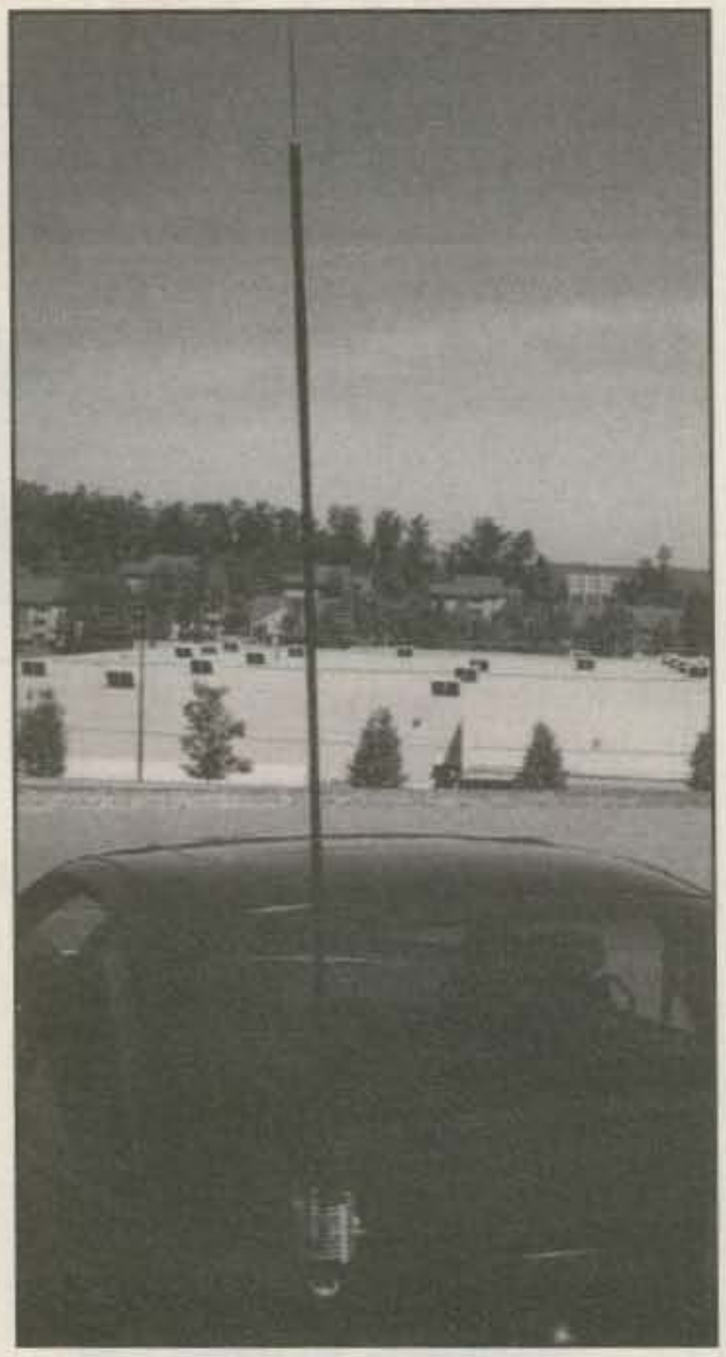

Photo 4– The Hamstick shortened to 4 foot height and modified for "one band up" operation as described in the text. The whip is lightweight and short enough to go almost anywhere. Note the short top stinger and base matching coil. The location? A park down the hill a few blocks from my house. Those black blobs are air conditioners atop a Wal-Mart.

photo 3 to your seat's headrest. Then you can lean back like a fat cat rather than straining forward or trying to find that cigar-box speaker on the floor to copy weak signals. Try the idea. You'll love it—really!

Low-Profile Antenna Ideas

We've almost finished putting together our basic mobile setup, but something is still missing. We need a mild-mannered antenna for casual and convenient operation (the "Big Bertha" job will emerge later).

What to use? Hamsticks are a good low-cost choice, but even their 7 or 8 foot height can preclude slipping in and out of parking garages without some fumbling or fun-in-the-rain dismantling. If we sacrifice approximately one "S" unit in signal strength, however, we can rebuild a Hamstick into a trim "go-anywhere" 4 foot antenna (photo 4).

Reworking or homebrewing mobile antennas is always a controversial subject, as everyone's ideas and opinions vary. Not wishing to disturb this wasp nest of endless technology, I will simply share some time-proven tips and ideas for your mix 'n match pleasure. I am sure everyone agrees that center- or near-center-loaded whips make the most efficient radiators, so let's focus in that direction.

As a convenient means of discussion, let's separate the antenna into three sections: the below-coil mast, the loading coil, and the above-coil stinger (fig. 1). Now remember the following prime-info facts. The mast does very little signal squirting; its main function is just to support the coil (and stinger). The loading coil, in turn, should be at least 2 or 3 inches above the

Photo 5– The neat mobile setup of Joel Kornreich, K2QBV, looks like a factory installation and pumps out a big-time signal on all bands. A High Sierra "Screwdriver" antenna is fitted to a custom mount and both have been painted to match vehicle. (Photo courtesy K2QBV)

vehicle's roof line. Otherwise, radiation efficiency will be reduced by two more "S" units. The stinger (which also includes any and all above-coil spiral-wound wire) comprises the antenna's main radiating section and therefore should be as long, or tall, as possible.

Now think a minute: A short mast is good for a trunk lid-mounted antenna, as it will permit using the tallest possible stinger to radiate a terrific signal. A taller mast will be necessary to elevate the loading coil above roof level, however, if the antenna's base is mounted lower (a nice paradox!). Finally, any mobile antenna should require a base-matching coil to raise its impedance from a few ohms to near 50 ohms—and simultaneously lower its "lowest SWR" from 2.5:1 (or higher) to near 1:1. If SWR is low without base matching, it is a sign feedpoint impedance is closer to 50 ohms than a few ohms, radiation efficiency is low, and DX capabilities are limited (and you thought it indicated a perfect match—tisk, tisk!).

Reworking a Hamstick or similar type of antenna for shorter height is fairly easy, especially if you desire to move it up only one band in coverage. First, set up the unmodified antenna complete with its

optional base matching coil and check (confirm) proper resonant frequency operation. A self-contained SWR analyzer capable of continuous tuning from 1.8 to 30 MHz is most beneficial here and in subsequent steps. Next use a sharp-edged file to cut the stinger to a shorter length (such as 4 inches rather than 4 feet). Reassemble the antenna, and then check its new resonant frequency. If you modified a 20 meter antenna, it will probably be resonant around 17 meters. If you modified another band antenna, resonance may be on some strange upper frequency and a bit of coil tweaking may be necessary (this is why I suggested using a tunable SWR analyzer).

Use a pocket knife to slit and remove the lower section's plastic cover, and then carefully loosen one end of the exposed winding and unwind a couple of turns from its coil. This will raise its resonant frequency. Do not "go overboard" unwinding turns, or you may "overshoot" your desired band. Reconnect the helical wire, recheck resonance, and then remove one or two more turns, if necessary, until resonance falls in your desired band. Final frequency pruning can then be accomplished with the short stinger.

Finally, make a couple of test contacts with the short antenna, and then seal/weatherproof it with heat-shrink tubing and/or hefty wraps of tape (with silicone added at joints). You are then ready for action. Enjoy!

Now, let's shift from the "getting started track" to the "fast lane" and see what can be accomplished with a slightly larger investment in time and money. In other words, let's look at a big-time mobile.

Mobile Supreme

After mobiling for several years with various types of equipment and cars, Joel Kornreich, K2QBV, decided to go first class with a built-in, custom installation in his 1997 Lexus. As shown in photos 5 and 6, the results of his planning and detailing were truly worth the effort. The setup works all bands and looks like an integral part of the vehicle. Joel's installation concepts are applicable to many other cars and thus warrant sharing.

First, Joel removed the center console's ashtray and made a small box approximately the size of a tissue box from sheet plastic to fit in its place. The box was cut out and fitted with a shelf so a digital SWR meter would slide into the lower area and cables could be routed to the control head of his IC-706 mounted above the SWR meter. Since the box was square, another sheet of plastic was cut to fit over and enclose the full ashtray area.

The transceiver's main section was then mounted in the car's trunk and connected to the High Sierra "Screwdriver" antenna by a 5 ft. length of coax cable. The antenna's lower section was painted black to match the car. Its mount, also painted black, is a Class III trailer hitch bolted to a tie-down loop on the frame. These loops or holes are used to secure imported vehicles on ships during transportation and then are left unused after delivery—a ready-made mount socket!

Photo 6– Center console view of the K2QBV custom mobile setup. Below the radio and heater are an ICOM 706 front control panel and digital SWR meter. Both fit into a homebrewed shelf that replaces the ashtray. A front template adds the perfect finishing touch. (Photo courtesy Joel Kornreich, K2QBV)

The Lexus is a composite body vehicle, so Joel installed two long strips of wide copper foil under each side of the car plus added several more straps under and around the bumper area. All of the straps were then bonded together and routed to the mount to serve as a ground plane.

Does the setup work as good as it looks? Yes, indeed! Joel's mobiling time is limited to only 10 or 15 minutes during commutes to and from work, but he has already passed the hundred country mark and is still climbing. This setup is not "low profile," true, but neither is its radiated signal! Yes, and that takes us right up to the closing wire of this month's column. Stay tuned for more views plus a ride in the "far lane" next month (sounds like a classic model Ford!). Meanwhile, keep on mobiling and may the force of good signals ride with you

73, Dave, K4TWJ

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BY BUCK ROGERS, K4ABT

PACKET USER'S NOTEBOOK

CONNECTING YOU AND PACKET RADIO IN THE REAL WORLD

The GE/Ericsson Phoenix SX for 9600 Baud

Last month we covered modification of the GE/Ericsson 110 watt Delta S/SX into a powerful 9600 baud radio. In a similar fashion, but using a 40 to 50 watt radio that is now easy to find on the surplus market, we are about to modify the GE/Ericsson Phoenix SX. This transceiver has some similarities to the Delta in that it is easy to convert and modify for amateur band operation, and even easier to modify for use at 9600 baud. Likewise, the Phoenix SX becomes a very smooth-operating 9600 baud radio that has a clean eye pattern. In fact, the Delta and Phoenix SX are two of the best 9600 baud radios that I have in service. (Something I failed to mention in last month's column is that the Delta "low-band" 42 to 50 MHz is also easy to move to 51 MHz and modify for 9600 baud use.)

For the record, I used both the Kantronics KPC-9612 and the MFJ-1270CQ Turbo 9600 baud TNCs with the Delta and Phoenix SX, and the results are the most pleasing I've had with any 9k6 system.

The Kantronics KPC-9612 can be configured as a TheNET "look-alike" by exchanging the standard 9612 EPROM with the Kantronics KPC-9612 KNET option EPROM. The KNET option EPROM maintains the KPC-9612 standard features while adding the KNET/TheNET node functions. This makes the KPC-9612 into a highly desirable network node, in that it now provides full gateway capabilities between two different frequencies, and/or baud rates. Think about this for a moment. The KPC-9612 has it all in one package. Therefore, no node-stacking, or umbilical connecting cables are needed between the nodes.

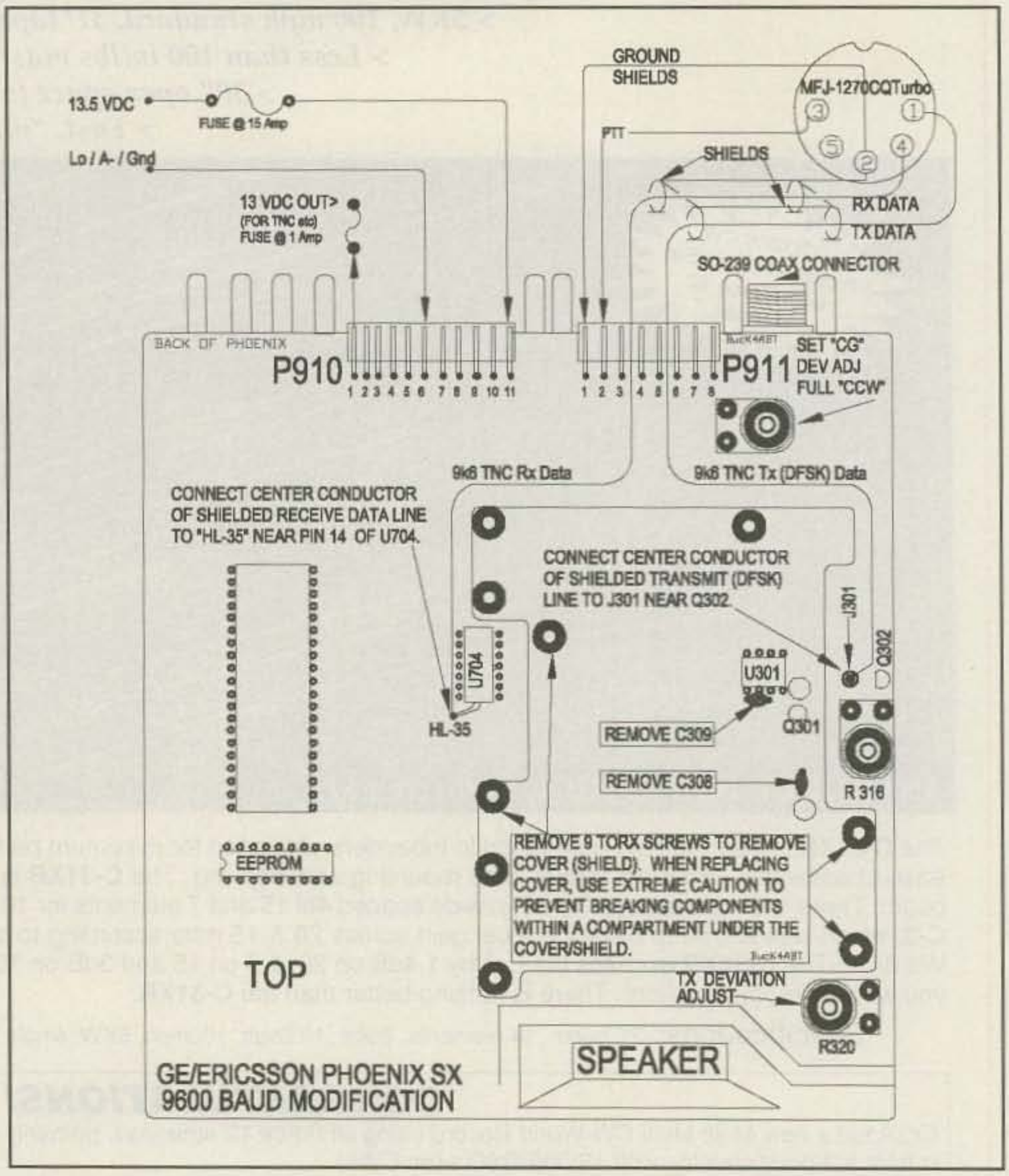

Fig. 1– Make sure the Phoenix is in good working condition by making the connections as shown above. Test it with the EEPROM that is in the radio. This will let you know the radio is working with the present frequency (EEPROM) configuration. Once the radio is confirmed in good operating condition, you can then proceed to the next steps.

Let's Build The 9600 Baud Transceiver

Make sure the Phoenix is in good working condition by making the connections as shown in fig. 1. Test it with the EEPROM that is in the radio. This will let you know the radio is working with the present frequency (EEPROM 2212) configuration. Once the radio is confirmed in good operating condition, you can then proceed to the next steps.

Pluck out any little channel or unit IDers that might be installed and toss them away. In fig. 1, note the "channel guard" deviation control. Turn it completely down, or counter-clockwise. The CG pot is located at the rear of the Phoenix near the SO-239, but inside the radio.

Program, or have someone's 2212 EEPROM with a "suitcase" programmer. Program the 2212 EEPROM with your favorite 16 channels/frequency(s) that you wish to use. Before removing the EEPROM from socket U805, observe the (notch) orientation of the IC (U805) 2212 before it is removed. After the EEPROM programming is complete, insert it into the socket at U805.

Now tune the Phoenix using an on-frequency signal, or your favorite IFR-1200 S, or equivalent test set or communication analyzer. Set the transmitter to frequency, and adjust the output power level in the shielded section on the bottom of the Phoenix.

Look at fig. 1 and note the location of the channel guard deviation control at the rear of the Phoenix, and the location of the transmit (data) deviation control, R320,

115 Luenburg Drive, Evington, VA 24550
e-mail: K4ABT@PacketRadio.com

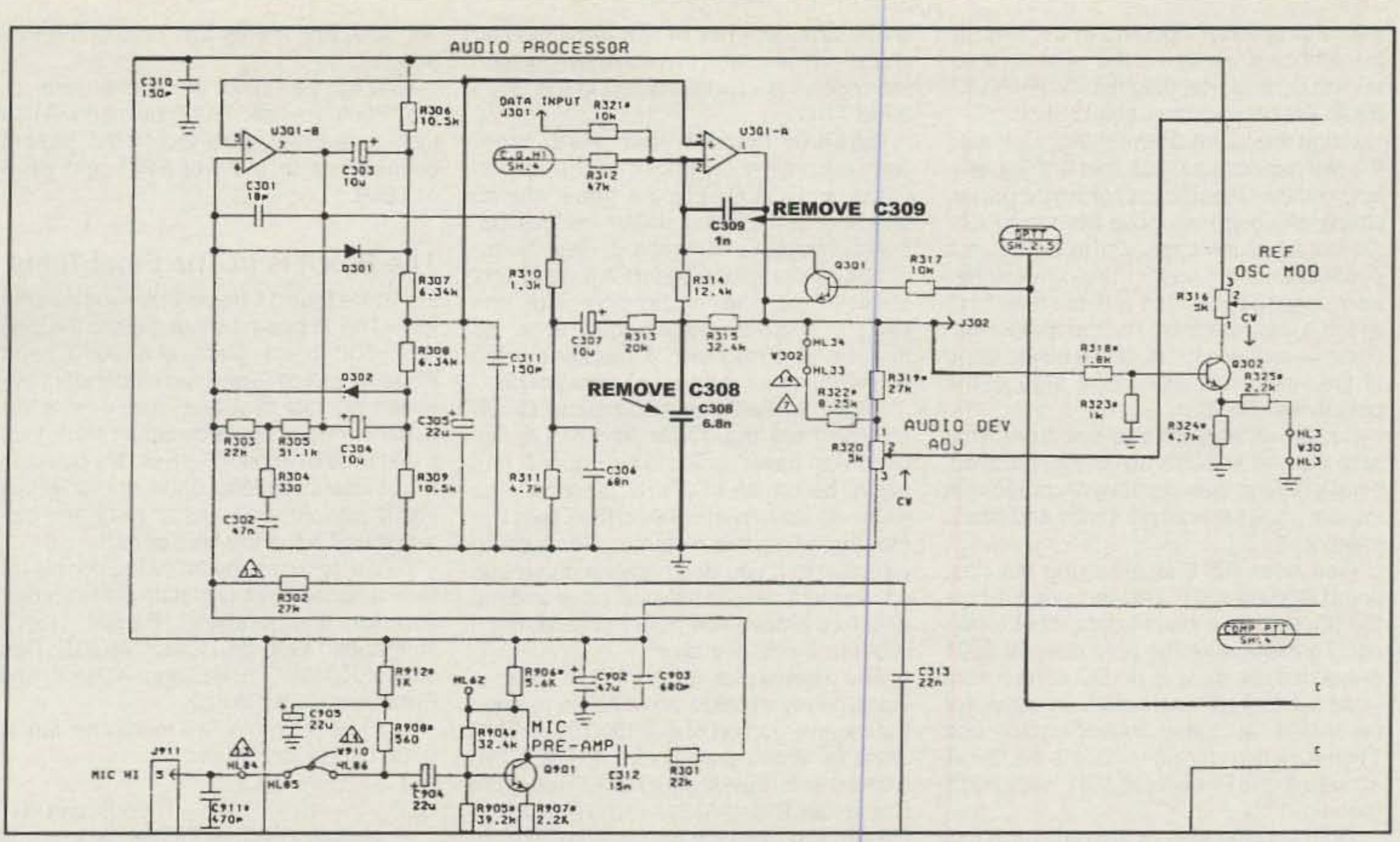

*Fig. 2– For those who wish to see from what area the components are being removed, or for a different perspective of component location, see the bold-print lines and labels in the above drawing. Note the location of the two capacitors C308 and C309. Carefully remove these caps, or if you prefer, simply clip one end loose from the PCB. **Do not** allow the capacitor(s) to be left in a position that will restrict the cover/shield from seating back flush with the area from which it was removed.*

near the speaker opening at the front of the Phoenix. Remove the nine torx retaining screws that hold the exciter/VCO/audio-processor cover/shield in place.

Using the same drawing (fig. 1), locate the two capacitors C308 and C309. Carefully remove these caps, or if you prefer, simply clip one end loose from the PCB. *Do not* allow the capacitor to be left in a position that will restrict the cover/shield from seating back flush with the area from which it was removed. Both of these components are located near the inside edge of the shield housing, in the area of the pot labeled R318.

For those who wish to see from what area the components are being removed, or for a different perspective of component location, see the bold print lines and labels in fig. 2.

Also near R318 is a staking pin (test point) labeled J301. This test point is now the 9600 baud transmit data input terminal. To make sure the feed point at J301 is isolated, or there is no DC connection, I use a 1 to 4 µF non-polarized capacitor (available at most RadioShacks and Tech-America stores) to couple the DFSK signal into the Phoenix at J301, near R318 (see fig. 1).

On the same side of the radio, but just outside the cover/housing/shield, is U704, and near pin 14 is a trace labeled HL-35. This point is where we attach the receive audio that is fed to the 9600 baud TNC.

Carefully inspect your work, especially where you chopped and removed C308 and C309. Ensure there are no shorts or unintended solder bridges between traces. For the record, I test the radio before I replace the multitude of torx screws into the shield/cover for the exciter/ audio-processor/VCO area, as this is where my Black & Decker electric screw-driver saves a lot of wrist action.

There is plenty of 9600 baud DFSK coming from the TNCs and KPCs I've used with these radios. The Phoenix can easily be driven to 3 kHz deviation *(no more, no less!)* with either of the TNCs I've mentioned in this column. Don't try to guess at it. If you don't have a communications test set or analyzer, have a friend who has a deviation meter ensure that it is set to 3 kHz deviation.

The receive pick-off point at HL-35 provides plenty of 9600 baud audio to drive the receive portion of our 9600 baud TNC or node. With (almost) all the TNCs I've worked with (the MFJ-1270CQ Turbo, the Kantronics KPC-9612, and the PacComm NB-96) the results have been exceptional. I'm no longer a beta-tester of the PK-96, so I cannot offer any help to the PK-96 user.

Use fig. 1 to make the connections for the "Push-To-Talk" line. You also will use the same drawing to locate the ground connections to pin 1 of P911 and pin 6 of P910.

The Proof is in The Final Tests

For more than 11 hours I ran "roll'n eighties" at 9600 baud without a glitch through the 9600 baud Delta and 9600 baud Phoenix radios. They were operating between my lab "test-bed" and one of the SEDAN node sites atop Smith Mountain, a distance of about 25 miles. My guess is that these two 9600 baud nodes would easily perform this well at twice the distance and twice the time period.

I'd like to thank the following people for their extensive support data and information for this month's "Packet User's Notebook": George Rose, W4GCE; Ben Jones, KB4MPX; Bill Glahn, AD4YY; and Pete Lascell, W4WWQ.

Until next month, we're having fun at 9600 baud—packeting!

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BY JOHN DORR, K1AR

CONTEST CALENDAR

NEWS/VIEWS OF ON-THE-AIR COMPETITION

CQ's Newest Contest Hall of Fame Members

August's Contest Tip

Do you really know your radio? I found myself totally befuddled the other day when I temporarily got stuck in a strange memory mode with my "borrowed" TS-950SDX. The thought occurred to me: (1) How well do I really know this radio? and (2) What features am I missing out on that could improve my contest score? The reality is that most of us use the volume, VFO, and RIT functions and call it a day. However, there are more features in most modern transceivers that are worth checking out. I *may* be the only contester who hasn't taken the time, but I'd guess your score might improve a bit if you take a test drive via the radio's manual!

CALENDAR OF EVENTS

July 24-25	Venezuela CW DX Contest
July 24-25	IOTA Contest
July 24-25	Russian RTTY Contest
Jul. 31-Ag. 1	Georgia QSO Party
Aug. 1	YO DX Contest
Aug. 7	European HF Championship
Aug. 7-8	ARRL UHF Contest
Aug. 7-8	North American CW QSO Party
Aug. 14-15	WAE CW Contest
Aug. 14-15	Maryland/DC QSO Party
Aug. 14-15	SEANET SSB Contest
Aug. 21-22	North American SSB QSO Party
Aug. 21-22	SARTG WW RTTY Contest
Aug. 21-23	New Jersey QSO Party
Aug. 28-29	Hawaii QSO Party
Sept. 4-5	All Asian SSB Contest
Sept. 5	North American CW Sprint
Sept. 11-12	Worked All Europe SSB Contest
Sept. 12	North American SSB Sprint
Sept. 18-19	Washington Salmon Run
Sept. 18-19	Scandinavian Activity CW Contest
Sept. 25-26	**CQ WW RTTY DX Contest**
Sept. 25-26	Scandinavian Activity SSB Contest
Oct. 2-3	VK/ZL SSB Contest
Oct. 2-3	California QSO Party
Oct. 9-10	VK/ZL CW Contest
Oct. 30-31	**CQ WW DX SSB Contest**
Nov. 27-28	**CQ WW DX CW Contest**

A tradition that was started in 1986 with the induction of Buzz Reeves, K2GL, the CQ Contest Hall of Fame (and its cousin, the CQ DX Hall of Fame) has emerged as a group of contesting's finest contributors from around the world. In recent years it has become a regular practice to induct new members into the respective Halls of Fame at the Dayton Hamvention contest and DX banquets. This year was no exception, and at the contest banquet we had the honor of witnessing the induction of W3LPL and W2GD into the CQ Contest Hall of Fame.

I'm proud to say that I've known each of this year's inductees for over 25 years. To say that each has had a personal impact on my own contesting experience is an understatement.

Frank, W3LPL, not only taught me about big-league contesting, he also provided invaluable insight into the drive and energy it takes to be a champion. I'll never forget the years I spent at his station building towers and antennas and learning what it takes to be the best at what you do—both in amateur radio and in life in general. Frank's influence has had a profound impact on the contester I am today. We all should be so lucky to claim him as our friend. Congratulations, Frank!

To know John, W2GD, is to know the ultimate competitor. John is a world-class operator, a team player, and a person who not only knows what it means to help his fellow amateur, but who takes action on a regular basis. There's not a person John has met who hasn't been touched by his insatiable appetite and desire for success.

2 Mitchell Pond Road, Windham, NH 03087
e-mail: K1AR@contesting.com

It is not an exaggeration for me to say that W2GD is one reason why I am so personally passionate about this sport of contesting. John exemplifies the persona of contesting, wearing it proudly on his sleeve wherever he goes. To be able to say that I'm one of John's friends is an honor and a privilege.

What follows is an edited excerpt from some of Bob, K3EST's comments about this year's newest Hall of Fame members. *(For more details, see the July/August issue of* CQ Contest *magazine.)* Without any further ado, I proudly introduce W3LPL and W2GD.

Member #33
Frank Donovan, W3LPL

Nominated by: The Potomac Valley Radio Club

For more than 30 years, Frank has been at the forefront of contest station design technology. In numerous public forums as well as within his own club, the PVRC, he has been prolific in imparting this skill, along with his extensive knowledge of radio propagation, to both fellow club members and the general amateur radio community.

W3LPL is also a world-class contest operator. Before devoting himself to constructing and maintaining a major multi-multi contest station, Frank took first place, single operator, USA numerous times in the ARRL CW DX Contests and the CQ WW DX CW Contest. He was also an operator in world-record multi-multi operations from Curacao.

Over the years Frank has regularly topped the third district in the ARRL CW SS. He developed the "East Coast" operating approach, since used by countless others, that one should begin the CW SS by two or three hours of rapid S&P before settling down to run stations.

Frank has demonstrated that you don't have to be a millionaire to build and maintain a top-notch multi-multi contest station. Through a combination of the aggressive pursuit of surplus government tower materials and thoughtful, common-sense station design (in which he has home-brewed many single-band amplifiers himself), Frank has consistently produced champagne-budget results with beer-budget input.

In the two decades that W3LPL has operated as a multi-multi station, he won top USA multi-multi honors dozens of times in the ARRL and CQ WW DX contests on both modes. His was the first multi-multi station to win both DX contests on both modes in one season, and he has now done this several times. His station has amassed over 100,000 QSOs in the CQ WW SSB and CW and ARRL CW DX contests, and lacks only a few thousand contacts to reach the 100K mark in the ARRL SSB DX affair.

Bob Cox, K3EST (second from the right), is shown here presenting the CQ Contest Hall of Fame plaque to Frank Donovan, W3LPL (left), at the Dayton Hamvention Contest Dinner this past May. To the far right is Gene Zimmerman, W3ZZ. (Photos in this month's column are by Tom Roscoe, K8CX, Paradox Design Group, <http://paradox2010.com>)

W3LPL has also been the mainstay of his contest club, the PVRC. Through his cajoling, cheerleading, and sheer force of personality, he kept the club together and motivated through some of the lean years when few newcomers were joining the ranks of amateur radio and contesting.

Along with fellow PVRCer N2FB, Frank established the PVDXSN Packetcluster network in the earliest days of that technology and pioneered many of the techniques which now are taken for granted in the integration of this technology with traditional contest operating. This network soon evolved into one of the premier DX spotting networks in the world, the East Coast Megacluster, which covers the entire northeastern US.

In all ways, as an organizer and leader, as a source of innovative technical designs, and as a world-class operator, Frank Donovan is a most deserving member of the CQ Contest Hall of Fame.

Member #34
John Crovelli, W2GD

Nominated by: The Frankford Radio Club

John was just ten years old and not even a ham when he operated his first contest, the 1960 ARRL Field Day. By the following summer he had qualified for his Novice license and received the call WV2UOO. Within months he upgraded to General (WA2UOO), and he qualified for his Advanced and Extra class licenses in 1972. John obtained the callsign W2GD in the mid-'70s.

John's heavy involvement in traffic handling during the 1960s and '70s served to sharpen his operating skills. John also served as manager of the New Jersey Net (NJN) in 1973–74, was the Wednesday night early-session net control station for 17 consecutive years, and held an ARRL Official Relay Station appointment for over 20 years. He qualified for the elite BPL (Brass Pounder's League) a half-dozen times and was awarded the ARRL Certificate of Appreciation for providing communications assistance during the Alaskan Earthquake in 1964. Soon after graduation from The American University in 1971, John served a term as ARRL Section Communications Manager (SCM) for the Northern New Jersey Section.

John caught the DXpedition bug and has operated from the other side of the pile-up nearly three dozen times over the last 20 years. Although best known for his efforts at P40W, where he has achieved world high scores in every major DX contest, both modes (except perhaps the WPX Phone and IARU Phone, which he has never entered), John has also contributed his skills to multi-op efforts from 9Y4W, PJ7A, and PJ1B.

John Crovelli, W2GD (left), is being awarded the prestigious CQ Contest Hall of Fame award at the Contest Dinner by Bob Cox, K3EST.

W2GD is unique, being the only operator in the world to have achieved world-high winning scores on both modes (CW and phone) of the CQ WW and ARRL DX contests. However, W2GD has talents that go far beyond how he uses a paddle or a microphone. Over the past 20 years he has helped organize the Cherryville Repeater Association's "4A" Field Day efforts, which have earned first-in-class honors in 13 of the last 15 years. Also, he is the mastermind behind the Sandy Hook

CQ 160 multi-op entries that have resulted in world-winning CW and phone scores the past four contest seasons.

In addition, John is an accomplished writer and public speaker who has communicated about various radio sporting and amateur radio issues and events for over 25 years. He volunteered to take over as editor and publisher of the *National Contest Journal* in the early '80s and later continued on as a contributing editor, writing the *NCJ* "Profile" column for over a decade. He attended WRTC-90 in Seattle as a spectator, and also as a reporter for *QST*, which later published his extensive account of the event in their October 1990 issue. Many other feature articles written by W2GD have appeared in *QST, CQ, NCJ, CQ Contest,* and numerous club newsletters. John has been a featured speaker at the Dayton Hamvention DX and Contest Forums, Visalia DX Convention, and other international events. Closer to home, W2GD has made dozens of presentations about contesting and DXpeditions to local radio clubs in the New Jersey, Pennsylvania, and New York metro areas during the past 20 years.

Finally, it should be mentioned that John has actively recruited numerous operators into the Frankford Radio Club and local clubs and provides individual encouragement to many FRC members on an ongoing basis. An accomplished tower climber, he has also volunteered his time to repair the FRC repeater antenna and various packet network antenna systems, and helped many contesters erect their towers and antennas.

In summary, W2GD is one of the top operators in contesting who has earned an unparalleled variety of operating successes for his efforts. He has repeatedly demonstrated his ability to plan, build, and operate winning stations both here and abroad, for single and multi-op efforts, either CW or phone, and is a valued member of the CQ Contest Hall of Fame.

Final Comments

The 1999 CQ Contest Survey results are now in, with over 500 responses received from around the world thanks to the assistance provided by W4AN and his Web site at <www.contesting.com>. I'll be reporting the final results next month.

Well, that's it for this month. As always, please remember that the deadline for the November issue is September 1st.

73, John, K1AR

YO DX Contest
0000Z to 2000Z Sun., Aug. 1

This is the annual running of the YO DX Contest sponsored by the Romanian Amateur Radio Federation and the Romanian DX Club. This is a worldwide contest with everyone working each other on SSB and CW.

Classes: Single Operator All Band/Single Band and Multi-Operator/Single Transmitter.

Frequencies: Operation is limited to 80–10 meters, no WARC bands, using the usual sub-band allocations.

Exchange: RS(T) plus ITU Zone. YO stations will substitute their two-letter country abbreviation for their zone.

Scoring: Credit 8 points for YO QSOs, 4 points for QSOs outside your continent, and 2 points for QSOs within your continent. QSOs within your own country are valid for multiplier credit only. Final score is computed by multiplying your total QSO points times the sum of YO counties and ITU Zones worked on each band. Stations may be worked only once per band regardless of mode.

Deadline for logs is August 30th. Mail to: RARF, P.O. Box 22-50, R-71100 Bucuresti, Romania or e-mail in ASCII format only to <yodx_contest@hotmail.com>.

ARRL UHF Contest
1800Z Sat. to 1800Z Sun., Aug. 7–8

Activity on this one starts at 220 MHz and goes all the way up to 2.3 GHz and higher.

Classes: Single Operator, Multi-Operator, Rover.

Exchange: Grid square locator.

Points: Take 3 points for 220 or 432 MHz contacts, 6 points for 902 or 1296 MHz, and 12 points for 2.3 GHz or higher.

Multiplier: Total number of different grid squares worked on each band. Final score is the total QSO points from all bands times the sum of the grid-square multiplier from each band.

An award pin program is available for this contest for making 5 QSOs. Details including the full rules are published at <www.arrl.org/contests/announcements/99/rules-uhf.html>. It is suggested you send a large SASE to the ARRL for official log and summary sheets.

Send logs to: ARRL UHF Contest, 225 Main Street, Newington, CT 06111 or via the standard ARRL e-mail methods.

North American QSO Party
CW: 1800Z Sat., Aug. 7 to 0600Z Sun., Aug. 8
SSB: 1800Z Sat., Aug. 21 to 0600Z Sun., Aug. 22

This is a short but fun QSO party that can have some fast rates at times. Any licensed radio amateur may enter with the object being to work as many North American stations (and/or other stations if you are in North America) as possible during the contest period.

Classes: Single operator and multi-operator, two transmitter. Multi-operator

stations shall keep a separate log for each transmitter. Multi-operator stations must have at least 10 minutes between band changes. Single operator entrants may only have one transmitted signal at a time. Output power must be limited to 150 watts for eligible entries. Single operator stations may operate 10 out of 12 hours (multis may use the full 12-hour period). Off-times must be at least 30 minutes in length and must be clearly marked in the log.

Mode: CW only in CW parties. Phone only in Phone parties.

Bands: 160, 80, 40, 20, 15, and 10 meters only. You may work a station once per band. Suggested frequencies are: 1815, 3535, 7035, 14035, 21035, and 28035 (35 kHz up from band edge for Novice) on CW; and 1865, 3850, 7225, 14250, 21300, and 28600 (28450 for novices) on phone. Try 10 meters at 1900Z and 2000Z, 15 meters 1930Z and 2030Z, and 160 meters at 0430Z and 0530Z.

Exchange: Operator name and station location (state, province, or country).

Scoring: Multiply total valid contacts by the sum of the number of multipliers worked on each band. Multipliers are states (including KH6 and KL7), Canadian provinces/territories, and other North American countries (do not count USA, Canada, KH6, or KL7 as countries). Non-North American countries do not count as multipliers, but may be worked for QSO credit.

Team Competition: Team competition is limited to a maximum of five single operator stations as a single entry unit. Groups having more than five members may submit more than one team entry. To qualify as a team entry, the name, callsign of each operator, and callsign of the station operated should the operator be a guest at a station other than his own (e.g., K6ZZ op by K6RO) must be registered with K6ZZ on CW and WA7BNM on SSB. The team registration information must be in written or telegraphic form and must be received before the start of the NAQP. There are neither distance nor meeting requirements for a team entry.

Awards: A total of five plaques will be awarded: high score Single Operator CW, Single Operator Phone, Multi-Operator CW, Multi-Operator Phone, and Single Operator Combined. Certificates of merit will be awarded to the highest scoring entrant with at least 200 QSOs from each state, province, and North American country.

CW contest logs must be sent to Bob Selbrede, K6ZZ, 6200 Natoma Ave., Mojave, CA 93501. SSB logs go to: Bruce Horn, WA7BNM, 4225 Farmdale Ave., Studio City, CA 91604. Entries must be postmarked not later than 30 days after the party to be eligible for trophies and awards. Logs can be submitted via e-mail, too. E-mail log submissions must be in ASCII text format and include your summary sheet and complete log. Name your files with your callsign (i.e., yourcall.SUM and yourcall.LOG). Please do not send any binary format logs (i.e., yourcall.BIN or yourcall.QDF). NAQP CW logs should be sent to <k6zz@ccis.com> and NAQP SSB logs to <bhorn@hornucopia.com>.

European DX Contest

CW: Aug. 14–15 SSB: Sept. 11–12
0000Z Saturday to 2400Z Sunday

This is the 45th annual contest sponsored by the DARC. The activity will be between European countries and the rest of the world on all five bands, 3.5–28 MHz. (IARU Region I regulation of frequencies for contest operation.)

A reminder that the WAEDC has returned to a 36-hour limit for single operator entries. In addition, there is no longer a Multi-Multi category.

Classes: (a) Single Operator, All Band. (b) Multi-Operator, Single Transmitter. Only one signal on any band at the same time. (c) SWL. Note: DX spotting is allowed for all classes.

Exchange: RS(T) plus a progressive QSO number starting with 001.

Points: One point per QSO and 1 point for each QTC reported.

Multiplier: The multiplier for non-Europeans is determined by the number of European countries worked in each band (see WAE country list). Europeans will use the ARRL DXCC list of non-European countries.

Bonus Multiplier: Multiply your multiplier on 80 meters by 4, on 40 by 3, and on 10/15/20 by 2.

Final Score: Total QSO points plus QTC points times the sum total multiplier from all bands.

SWL: Only the single operator, all-band class may be used. The same callsign, European or non-European, may only be logged once per band. The log must contain both callsigns and at least one of the control numbers. Each QSO logged counts 1 point; each complete QTC 1 point (maximum of 10 per station). Multiplier is determined by the DXCC and WAE country lists.

QTC Traffic: Additional point credit may be earned by making use of the QTC traffic feature. A QTC is a report of a confirmed QSO that took place earlier in the contest and was later sent back to a European station. It can only be sent by a non-European station back to a European. The general idea is that after a number of Europeans have been worked, a list of these stations can be reported back during a QSO with another station. An additional one-point credit can be claimed for each station reported.

A QTC contains the time, call, and QSO number of the station being reported (e.g., 1300/DL2DN/134, which means that at 1300Z you worked DL2DN and received #134).

A QSO can be reported only once and not back to the originating station. A maximum of 10 QTCs to a station is allowed. The same station may be worked several times to complete this quota. Only the original contact, however, has QSO value.

Keep a uniform list of QTCs sent; 3/7 indicates that this is the third series of QTCs sent and that 7 are being reported.

If more than 100 QTCs are claimed, a check list must show that the maximum quota of 10 per station is not exceeded.

Club Competition: This rule requires the club to be a local group and not a national organization. Eligible club members must operate within a 500 km diameter. To be listed, a minimum of three logs must be received from a club. Entries must clearly indicate their club name on the summary sheet. A special trophy will be awarded by the DARC to the winning clubs from Europe and non-Europe.

Awards: Certificates will be awarded to the top scorers in each class in each country. Each participant with at least half the score of the continental leader will also receive a certificate. Plaques will go to continental winners in the single- and multi-operator classes and the winning EU and non-EU clubs.

Logs: It is suggested that you use the official DARC or equivalent log form. Use 40 contacts to the page and a separate sheet for each band. Submit a dupe sheet for each band with 200 or more contacts. A summary sheet showing the score and a signed declaration are also required (sample log forms are available for an SASE and/or IRCs). You may also send logs via e-mail. Check the DARC homepage at <www.darc.de/referate/dx/>for the details. Stations using logging programs are expected to send their logs electronically.

WAE Country List: C31, CT1, CU, EA, EA6, EI, F, G, GD, GI, GJ, GM, GM Shetland, GU, GW, HA, HB, HBØ, HV, I, IS,IT, JW Bear, JW Spitsbergen, JX, LA, LX, LZ, OE, OH, OHØ, OJØ, OK, OM, ON, OY, OZ, PA, S5, SM, SP, SV, SV5 Rhodes, SV9 Crete, SY Athos, T7, T9, TA1, TF, TK, UA1346, other EU-CIS republics, YU1267, ZA, ZB2, 1AØ, 3A, 4J1M-V, 4U1 Vienna, 9A, and 9H1.

The mailing deadline for logs is September 15th for CW entries and October 15th for SSB. Send to: WAEDC Contest Committee, Durerring 7, P.O. Box 1126, D-74370 Sersheim, Germany.

Maryland DC QSO Party

1600Z Sat. to 0400Z Sun. Aug. 14–15
1600Z to 2359Z Sun. Aug. 15

The Maryland/DC QSO Party is sponsored by the Antietam Radio Association. Non-Maryland stations work Maryland/DC operators. Maryland/DC stations may work anyone. Stations may be worked once per band/mode, and mobiles/portables that change counties may be worked again for QSO credit. You may only operate single operator outside of Maryland. Inside Maryland, entrants may operate single operator, portable, or mobile.

Exchange: QTH (county for MD stations, state/province/DXCC country for others), and operating category (Club, QRP, Mobile, Novice/Technician, and Standard).

Frequencies: SSB 3920, 7230, 14260, 21370, 28380, 50150, and 146550 kHz. CW 3643, 3701, 7035, 7126, 14040, 21115, and 28040 and 28115 kHz.

Scoring: Each Maryland county, Baltimore city, and D.C. are multipliers (25 maximum). Multipliers may be claimed once; they do not repeat on each band. Score 10 points for club station QSOs, 5 points for mobiles, 4 points for QRP/Novice and Technician QSOs, 3 points for a CW contact, and 1 point for any other valid contact. QSO points are cumulative (i.e., mobile MD stations count 5 points). The final score is total QSO points times the multiplier.

Awards: Plaques are available to the high-scoring MD-DC, non-MD-DC, and MD-DC club. Certificates will be awarded to the high scorer from each state and Canadian province. In addition, there will be certificates awarded to the high score from a MD mobile, top 10 MD logs, Novice, Technician, DX station, QRP per state, high score per non-MD entry, and MD YL.

Logs are to be postmarked by September 10th and sent to: Antietam Radio Association, P.O. Box 52, Hagerstown, MD 21741. Be sure to indicate your operating class on the summary sheet. If you want the final results, include an SASE with your entry.

New Jersey QSO Party

2000Z Sat. to 0700Z Sun., Aug. 21–22
1300Z Sun. to 0200Z Mon., Aug. 22–23

This is the 40th annual party sponsored by the Englewood ARA. Phone and CW are part of the same contest. The same station may be worked on each band and mode, and New Jersey stations may contact in-state stations for QSO and multiplier credit.

Exchange: QSO number, RS(T), and QTH; county for NJ, state/province or country for others.

Scoring: All stations credit 3 points for each contact. Multiply total QSO points by multiplier to compute final score. Out-of-state stations multiply total NJ QSOs by number of NJ counties worked (maximum of 21).

Frequencies: 1810, 3535, 3950, 7035, 7135, 7235, 14035, 14285, 21100, 21355, 28100, 28400 kHz, and 50–50.5 and 144–146 MHz. Suggest phone on even hours, 15/10 meters on odd hours, and 160 at 0500Z.

Awards: Certificates to the top scorers in each NJ county, ARRL section, and DX country. Second-place awards if four or more logs are received from that section. Also, there are Novice/Tech and mobile awards. Four plaques have been donated by the NNJ/SNJ section managers for the winning stations in those sections.

Use UTC time and indicate the multiplier only the first time it is worked. Be sure to include a QSO check sheet, and a summary sheet showing scoring, etc. Send a large SASE if you wish to receive a copy of the results.

Stations planning activity in NJ are requested to advise the EARA by August 1st so that coverage in all counties may be planned.

Logs must be received no later than September 18th and go to: Englewood ARA, P.O. Box 528, Englewood, NJ 07631-0528. ■

BY JOE LYNCH, N6CL

VHF PLUS

ALL ABOUT THE WORLD ABOVE HF

That Summer Meteor Shower

August is the month that tends to signal the beginning of the meteor-scatter season. The last of summer sporadic-*E* communications are taking place and we weak-signal VHF+ enthusiasts are starting to run out of people to work. Furthermore, after we have whetted our appetites for exotic communications with the sporadic-*E* contacts, we are now looking for something else to pursue. The *Perseids* meteor shower provides that something to keep us going for yet another month.

VHF Plus Calendar

August 1	Good EME conditions.
August 4	Last quarter Moon.
August 7	Moon perigee.
August 7-8	ARRL UHF Contest. *(See text for details.)*
August 8	Highest Moon declination. Poor EME conditions.
August 11	New Moon.
August 12	Predicted peak, *Perseids* meteor shower peak.
August 15	Moderate EME conditions.
August 18–19	First weekend of ARRL 10 GHz and above contest. *(See text for details.)*
August 17	Poor EME conditions.
August 18	First quarter Moon.
August 19	Moon Apogee.
August 22	Lowest Moon declination. Very poor EME conditions.
August 27	Full Moon.
August 29	Moderate EME conditions.

—EME conditions courtesy W5LUU

Meteor Scatter Communications

What is it about meteor showers that provides that interest? Meteor scatter is probably one of the most exotic forms of propagation on the VHF+ frequencies. Meteor showers are principally caused by debris discharged from comets as they make their way around their orbit. Most of the debris, consisting of sand and small pebbles, is expelled when the comet grows a tail as it moves to its closest point to the sun. This is called the *perihelion*. This debris tends to travel in orbit both ahead of and behind the comet. When the Earth travels close to the orbit of a comet, it can run into or cross through this debris, thereby creating a meteor shower as the debris enters the Earth's atmosphere.

A *meteoroid* is that grain of sand which hasn't yet made its spectacular entrance into the Earth's atmosphere. When it does, at around 60–70 miles (96–112 km), it's speeding into it at around 160,000 mph (260,000 km/hr). All that speed strips away electrons both from the grain of sand and the ionosphere. The result is ionization. And, depending upon what makes up the grain of sand, the ionization takes on a particular color. For example, silicon appears red, magnesium appears blue-green, calcium appears violet, iron appears yellow, and sodium appears orange-yellow.

In the wake of a meteoroid an ionization trail appears, like a cloud. This ionization is either overdense or underdense, with the overdense area being in the central part of the cloud. Also, it is frequency sensitive. As the ionization decays, the underdense area expands at the expense of the overdense area. During this ionization, signals hitting the underdense area pass through it. However, signals are refracted off the overdense areas. Depending on the denseness of this area, higher and higher frequency signals are refracted. Yet, as this overdense area is disappearing, the maximum usable frequency (MUF) of the ionized cloud is falling. Eventually, the MUF falls out altogether as the ionosphere returns to its pre-ionized state. And, because of the recombination of the electrons with atoms, the ionization disappears. It's during this brief moment of ionization that we get our adrenaline rush while we complete the previously impossible QSO.

It is important to note that the denseness is frequency sensitive. What may be "underdense" at one frequency may also be "overdense" at a lower frequency.

Meteors are usually harmless—unless they are large enough to make it to the surface of the Earth. Then they become known as *meteorites*. Every once in a while there is a news report of a meteorite which crashes through someone's roof. However, most of the time meteorites are harmless grains of sand which hit the Earth's surface without notice.

Sometimes a meteor can explode. When it does, it often appears to be a fireball. This can happen as a normal course of it flying through the ionosphere and breaking apart, or it can happen if an upward bolt of lightning strikes it. The propagation caused by that phenomenon is usually much longer and more intense.

Some people—namely *CQ VHF* columnists Gordon West, WB6NOA, and Tim Marek, K7XC—have reported "hearing" the meteors. What they report is a hissing sound. If a meteor explodes, they report the sound of its explosion. Some say that the hissing sound has to do with low-frequency radiation intermingling with the atmosphere, causing a sort of audio rectification of the signal. In the case of the fireball, it may sound like rumbling, like thunder. If you are hearing that sound, it's because the shock wave has penetrated all the way through the atmosphere to within your hearing distance.

Background of the *Perseids* Meteor Shower

For a long time it was thought that the Swift-Tuttle Comet was the originator of the debris that makes up the *Perseids* meteor shower. However, because the comet's orbit is so long (around 129-plus years), no one knew for sure.

An astronomer, Dr. Brian G. Marsden, who works at Harvard University's observatory, wrote an article in the September 1973 issue of *The Astronomical Journal* entitled "The next return of the comet of the *Perseids* meteors." This article examined historical sightings of comets and tied them to a prediction of the return of the Swift-Tuttle Comet. In the article Marsden actually made two predictions in one when he stated, "The point is, of course, that if the comet has not been found before late 1983, it would certainly be desirable to start thinking about searching . . . in 1992 . . . "

What happened was that during his research, Dr. Marsden tried to make a comet sighting in 1748 "fit" with the comet

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sighting of 1862. Finding that there were flaws in this assumption, he went back to a comet sighting in 1737 (the Kegler Comet). In order to predict the 1992 sighting, he assumed that since the 1737 sighting was 11 years earlier, the next sighting would be 11 years later than a possible 1981 date. However, he left the door open for discussion by saying, "Our procedure for forcing the linkage of the 1737 and 1862 observations is certainly open to question, and these resulting 1992 predicted elements are consequently somewhat uncertain." This "hedging his bet" caused Marsden to be somewhat indifferent about the September sighting until he remembered the tremendous activity reported by amateur radio operators, in particular Shelby Ennis, W8WN, who sent reports to *Sky and Telescope* following the 1991 *Perseids* meteor shower.

In an article that appeared in the January 1993 issue of *S&T*, Marsden discussed the possibility of the comet hitting the Earth in the year 2126. Such speculation has given rise to a recent spate of books, movies, and a PBS television special on asteroids hitting the Earth and other apocalyptic themes. That's another subject, however.

Within that article Marsden reviewed his reservations about his own prediction. Upon examination of Ennis' reports, though, he remarked, "Maybe the comet really was coming!"

Another astronomer, an amateur, Joe Rao, who has observed the *Perseids* since 1966, also took notice of the amateur radio operators' reports. Following my article in August 1992 *S&T* (on "listening to" the *Perseids*), Rao contacted me to find out more about the way meteors affect propagation on the VHF+ frequencies. Being assured that there was a tie-in between the increase in visual observation and the increase in radio-wave propagation, Rao set about to see what were the implications for shower activity should the comet actually be sighted.

Following the September sighting of the comet, Rao examined Marsden's orbital data that appeared in the *Astronomical Journal* article and calculated that the orbits of the comet and Earth may come within 100,000 miles of each other. With clumps of debris being contained in knots as big as 100,000 miles in diameter, Rao concluded that we might graze one of these knots. However, not being totally satisfied with his own calculations, he took his findings to Marsden. Marsden calculated that the orbits might be as close as 93,000 miles.

Rao then took his findings to another astronomer, Dr. Donald K. Yeomans, who, as an employee of the NASA's Jet Propulsion Laboratory, is interested in meteors from an outer-space survey standpoint. Yeomans in turn calculated that the rendezvous might be as close as 87,400 miles, thereby putting us well within the realm of a close encounter with the knots of debris.

Because the comet has been recovered (a comet is "recovered" when, after being lost for a period of time, it is again sighted), Rao concluded that the visual increases in *Perseids* activity since 1988 (and the radio-wave propagation increases since 1991) can be attributed to debris expelled ahead of the comet. As the comet has proceeded through its orbit, the debris ahead of it also has proceeded through the same orbit. Now that the comet has gone beyond the Earth's orbit, Rao concluded, "It is quite possible to expect that, in view of the very small distance between the Earth's and comet's orbit, we may very well encounter dust that was released as recently as 1737, and "maybe" even 1862!"

In 1993 Rao predicted that year's *Perseids* would be a storm. In order to conclude that it would be a storm, Rao examined the *Perseids* displays for the years surrounding the previous return in 1862. He found that the Far East reports showed increases in *Perseids* displays for the years 1861 and 1862. He then examined a report made by William F. Denning, a devoted meteor observer. Rao found Denning had observed that the 1863 display produced a rate of three to four times the normal maximal *Perseids* rates. Rao then examined the work of S. Herschel, another noted meteor observer. He found that Herschel, commenting on the *Andromedid* meteor storm of 1872, compared it favorably to the *Leonids* storm of November 1866 and the marked maximum of the *Perseids* shower of 1863.

Using the regularity of meteor storms (every 33 or so years) associated with the *Leonids* shower as a model and the fact that this regularity closely follows the periodicity of the Temple-Tuttle Comet, the parent of the *Leonids* shower, most astronomers theorize that there is a knot (or knots) of debris in close proximity to the comet that is associated with a particular meteor shower.

Applying this theory to the Swift-Tuttle Comet, relating the intense increase in radio propagation activity of the *Perseids* during the 1991 and 1992 showers, and noting that the comet's passage by the Earth's orbit had occurred only 224 days before for these orbits nearly intersecting, as compared to 332 days for the 1862 orbits, Rao concluded that there existed a high probability for a storm for that year's *Perseids* display.

In analyzing the probability of a storm, one other aspect Rao considered was the ability of the comet to continue to produce debris. An excellent measure of its ability is its brilliance. Rao's research led him to discover that contemporary comet expert John E. Bortle has noted that the Swift-

Tuttle Comet is " . . . 4 to 10 times brighter than the average long-period comet."

So what happened to the predicted storm? Well, it was not "storm" levels. To be considered a storm, the zenith hourly rates (ZHR) should be in excess of 1000. A good show did occur, however, but in the high latitude, and then mostly over Europe. Rao, who had booked passage on a cruise ship, which was in the Mediterranean, witnessed quite a visual display.

The consensus of those amateurs who played in the *Perseids* meteor shower was that it did not live up to its advanced billing —not in the least. Nevertheless, it was a good shower. Several stations reported completed contacts, and that is the importance of a shower—being able to complete contacts.

What was notable—and pleasantly surprising also—was the sheer number of operators on the air during the days surrounding the shower. Reports from all over the country indicate that new and old operators alike were looking for contacts via the meteors. Perhaps this is an indication of the potential for populating the VHF+ frequencies. We who operate on them regularly can only hope so.

So what is the prognosis for this year's *Perseids* meteor shower? The IMO makes this observation on their home page: "The *Perseids* have become the single most exciting and dynamic meteor shower in recent times, with outbursts producing EZHRs [estimated zenith hourly rates] of 400+ in 1991 and 1992, decreasing to around 300 in 1993, 220 in 1994, and 120–160 since, at the shower's primary maximum. Allowing for an average annual shift of +0.05° in lambda since 1991, this peak is expected to fall around 2300 UTC on August 12. Other timing variations cannot be ruled out, however. A new feature in 1997 was a tertiary peak of strength comparable to the traditional (currently secondary) maximum, but a few hours after it. The timing for this third peak is based on just this one return, but there are no guarantees it will recur in 1999.

"Even now, as the *Perseids'* parent comet, 109P/Swift-Tuttle, returns to the outer Solar System after its 1992 perihelion passage, the shower can still spring surprises! The August New Moon provides the perfect opening for all watchers, certainly. As the radiant rises throughout the night for the northern hemisphere, near and post-midnight watching is most valuable. If the maxima appear as predicted, the places to be should be Europe, eastern North America, far eastern Siberia, Alaska, and the Northern Pacific Ocean, respectively."

Making Contacts Via Meteor Scatter

While it is usual for contacts made during storms to be "nearly normal" in that the operators were able to copy each other for periods of 2 to 3 minutes at a time, contacts attempted via meteor scatter are much different in structure.

During a meteor shower there usually is sufficient meteoroid activity to make it possible for random contacts to take place. This occurs when one station calls a very brief CQ and listens for a response. A station hearing the first station calls that station and gives his callsign and either his grid locator or a signal report. The first station then announces the calling station's callsign and gives the responding grid locator or signal report. The second station responds by saying "Roger" several times. The contact is considered complete if both parties have all they need for the QSO. The entire contact may take as little as 10 seconds to complete, if that.

For most meteor-scatter contacts, however, a structured schedule is set between two operators who wish to talk to each other. The structure of the schedule goes something like this: You'll probably run a schedule for half an hour. You'll transmit for 15 seconds and listen for 15 seconds. The westward station transmits first. Some operators break at the end of 7 seconds and listen briefly for the other station. Be sure to clarify operating procedures with the other station before beginning your sked. The initial exchange includes the other station's callsign and your callsign, without either of you saying, "this is."

For example, if I, in Oklahoma, grid locator EM15, were running with Ken Ramirez, N4UK, in EM84, I would start by saying "N4UK N6CL" over and over again for 15 seconds. I would then listen for Ken to repeat "N6CL N4UK" over and over again during his 15 seconds of transmission time.

After one of us has heard "complete callsigns," the receiving station starts transmitting a signal report. When I've heard both my call and Ken's call (in no particular order), I start repeating ?S-2? during my 15 second segment, interspersing our callsigns—just in case Ken has yet to hear complete callsigns.

The signal report of "S-2," rather than the traditional "59," is a way of telling the listener the length of the burns being heard. The letter "S" stands for the word "signal" and the number 1, 2, or 3, stands for the length of the burn. Number 1 stands for "pings," number 2 stands for burns long enough to make a contact, and number 3 stands for very long burns (at least 15 to 30 seconds in length). Therefore, a signal report of "S-2" means that the sending station is hearing the receiving station on burns long enough to make a contact. As a matter of convenience, most operators stick with "S-2"—much like HF operators stick with "59."

Assuming Ken has heard both calls and the signal report "S-2," he'll start saying "Roger, S-2" over and over again during his 15 seconds. Once I have heard "Roger, S-2," I reply with "Roger" over and over again. Once Ken has heard my "Rogers," the QSO is considered complete. As an option, Ken can come back and say "Roger, 73" repeatedly during his sequence. However, it's not necessary to complete the contact.

Occasionally, the sequence can be broken. For example, when I ran with Ted Goldthorpe, W4VHF (then WA4VCC), during the 1992 *Perseids*, I heard him give callsigns during the last 3 to 4 seconds of his 15-second segment. I immediately said, "WA4VCC N6CL. WA4VCC N6CL. S-2, S-2, break." Hearing me, Ted came back and said, "Roger, S-2. Roger, S-2, break." Continuing to hear him, I replied, "Roger, roger, roger, break." Hearing my "Rogers," Ted responded, "Roger, 73. Roger, 73. Break." I then replied "73, 73." At that point we both considered the contact more than complete just three minutes into the half-hour schedule.

Band Conditions

What band conditions can you expect during meteor showers? Unfortunately, it's not entirely possible to predict band conditions with certainty, especially considering what propagation modes may be present at that time (sporadic-*E*, tropo, etc.). However, some generalizations can be made based on past experiences. On 12 meters it will seem as if the band is

open everywhere (on short skip) during the hour or so long peak. On 10 meters conditions will be much the same. If the storm is very intense, the same conditions that exist on 10 meters may also be present on 6 meters. On 2 meters stations may have propagation over a given path for up to a minute or so. On 135 cm propagation may exist for up to 5 seconds or more. Propagation on 70 cm over a given path may exist for a fraction of a second up to a couple of seconds.

Books on Meteors

A relatively new book, *Observing Meteors, Comets, Supernovae, and Other Transient Phenomena (Practical Astronomy)*, by Neil Bone, is excellent. It is an update of his previous book, *Meteors*. Sky Publishing produced the latter book in 1994. For the radio amateur, this book provides a great deal of insight into what a meteor is and how a meteor and Earth collide to create the visual (and, in our case, the electronic) observations we experience. The book gives a brief history of meteor studies and contains a season-by-season calendar of annual meteor showers and their characteristics. A few paragraphs are devoted to the amateur's interest in meteor-scatter propagation.

The International Meteor Organization's *Handbook for Visual Meteor Observations*, edited by Paul Roggemans and published by Sky Publishing Corporation, covers meteor showers extensively. Included are historical anecdotes of both major and minor showers.

Any of the abovementioned books may be ordered from <Amazon.com>. However, the *Meteors* book is five years old and the IMO book is ten years old, and either one or both may be out of print. If this is the case, Amazon will notify you within two to three weeks.

HSMS Continues to Grow

What I described above for meteor-scatter contacts is probably the easiest entry point into this form of communications. It is not the only way to make meteor scatter contacts, though. The preferred mode for meteor-scatter contacts in some parts of Europe has been via high-speed CW (HSCW). Known as high-speed meteor scatter (HSMS), it has become increasingly popular here in the U.S. and in Canada. For more information, you can go to the following home page: <www.nitehawk.com/rasmit>.

Current Contests

The annual **ARRL UHF** contest is scheduled for 7–8 August. The contest period is for 24 hours beginning 1800 UTC Saturday. There are several entry categories.

Scoring: Count three points for 222 or 432 MHz contacts, six points for 902 and 1296 MHz contacts, and 12 points for contacts on 2.3 GHz and above. Exchange is your four-digit grid square. Again this year pins are available, as they are for other ARRL contests. The minimum number of contacts necessary for a pin is five. Submit your log by 8 September to the League to be eligible for awards. What is new this year is that the Rover scoring is like the Rover scoring for all other ARRL VHF contests. For complete rules, see July *QST*.

The dates for the first weekend of the eighth annual **ARRL 10 GHz** cumulative contest are 21–22 August (the second weekend is 18–19 September). The operating times are 8 AM to 8 PM, *local* time each day. The exchange is the *six*-digit Maidenhead grid locator. Scoring is adding the sum of the distances in *kilometers* of each station worked to the sum of each unique callsign worked multiplied by 100. For example, if you work four unique stations (two of which operated from two separate locations) that are 97, 107, 154, 205, 157, and 147 km apart (for a total of 867 km), then your final score would be 1267 (867 + 400).

To be eligible for contest awards, submit your log by 19 October. Remember that the contest includes all bands, 10 GHz and above. Plus there are two entry

categories from which to choose: 10 GHz only and 10 GHz and up. For complete rules, see June *QST*.

Note: When submitting your logs to the ARRL, you may do so either in writing or by several electronic ways. Consult their rules for instructions.

Frank A. Gunther, W2ALS, SK

The following is from the "ARRL Letter": "Communications and FM pioneer Frank Gunther, W2ALS, of Staten Island, New York, died May 31. He was 91. Gunther was in the vanguard of shortwave, two-way, and FM radio system development for military and public-service applications. An ARRL Life Member, Gunther was a past president of the Radio Club of America and was trustee of its club station, W2RCA. He also served from 1974 until 1977 as president of the Quarter Century Wireless Association.

"In the mid-1920s, Gunther went to work for Radio Engineering Laboratories in Long Island City, New York, where he served as chief engineer. While there, he built and operated an experimental radio station that was among the first shortwave broadcasting systems. In 1931 he took part in the first public broadcast from an aircraft and installed one of the first airborne two-way radios the following year. Also in 1932 he built what is believed to be the first two-way mobile radio system for the police department in Bayonne, New Jersey.

"Gunther was a long-time associate of the inventor and developer of FM, Major Edwin H. Armstrong. In the late 1930s and early 1940s, Gunther was involved in the installation of nearly all of the FM-band pioneers. Also in the years before World War II, Gunther designed and manufactured LORAN transmitters used by the Allies.

"He became president of REL in 1961 and directed the development of the first tropospheric scatter systems for the military. At the time of his death, he was associated with High Point Tower Technology in Oldsmar, Florida.

"Gunther also was a *QST* author. In 1932 he detailed plans for 'A Portable 56-Mc. Transmitter-Receiver' in the May issue of *QST*. He used the article as a platform to urge greater experimentation on the 'ultra-high frequencies' (as they were called then)."

And Finally . . .

I have been concerned with the phenomenon called "dumbing-down" and how it is affecting our hobby. At the risk of sounding nostalgic, I state the following: When I got my ticket we had to learn not the correct answers to our test, but how to figure out what were the right answers to our tests.

Recently, my wife, Carol, W6CL, and I were editing question pools for friends of ours who are interested in getting into our hobby. I say editing because we were converting their content into Braille coding for printing from our Braille printer. As I reviewed the content, the thought occurred to me that it would be very easy to edit out the distracter answers and memorize the correct ones. While this guarantees a passing score on an exam, it does nothing toward understanding what one has committed to memory. Subsequently, in some of my conversations with relatively new amateurs, I have come to the conclusion that this is precisely what is occurring. The net result is that phenomenon that I mention above. It takes much less effort to memorize correct answers than to master the theory behind the problems.

In an effort to stem this tide, in the coming months through this column I will attempt to explain the theory behind the questions that pertain to electronics. I will not attempt to explain the theory or logic behind some of the rules and regulations questions, however.

I believe that this project will have a two-fold result. First, I will make available to anyone who is interested in reading it some insight into these answers. Second, I will force myself to keep abreast of what is changing in our regulations. Frankly, I have to admit that I know little about the new near-field radiation questions. I just haven't bothered to learn about them, as under the present conditions of operating only mobile, I am exempt from them. Nevertheless, I have to admit that I, as well as the rest of us, need to understand these new regulatory questions.

Perhaps in my small way I can help make the hobby a bit better. What way can you help make our hobby a better? Think about it.

Until next month . . .

73, Joe, N6CL

CQ VHF Contest Update

The published results of the 1998 CQ VHF Contest will be delayed. They will appear in a near-future issue of *CQ*. We ask you to be patient as they are assembled under a new VHF contest director, who will be introduced on these pages soon. We apologize for this delay, and look forward to the dynamic leadership of the new director.

DX

BY CHOD HARRIS, VP2ML

NEWS OF COMMUNICATION AROUND THE WORLD

Basic Common-Sense Procedures

As the sunspot cycle moves on and conditions continue to improve, it's probably a good time to go over some basic operating principles. The following words of operating wisdom were first printed in this column back in 1990, but are definitely worth reviewing, nine years later, for those who may have forgotten them and for those who have joined the ranks since then. Chod has taken a month off, but will be back next month with current happenings in the DX world and updates on QSL routes.

These days there is a wealth of DX information on the air, in print, and on numerous DX reflectors and Internet sites. While we can instantly find out just about anything, it's sometimes hard simply to find out about how to use our common sense. The following axioms are given as common-sense reminders so that more of us can enjoy the DX experience.

The pursuit of DX is too often debased by the poor operating habits of a minority of DXers. If even a few of these operators improved their skills, every DXer would benefit from increased QSO rates and lower frustration levels. As you read the following list, resolve to improve your own operating habits, thereby improving the quality of the hobby.

• Do not tune up on top of a DX station. Few operating habits are as annoying to the DX station and to those trying to work the DX station as the long tuner-upper on frequency. Everyone winces as the operator slowly, painstakingly twiddles the knobs on the amplifier to eke out the last couple of watts. What is worse than the torture to the poor tubes in the amplifier is that the practice is totally unnecessary.

Even if a DXer does not own a dummy load (for which there is little excuse), the DXer can certainly move a few kiloHertz away from the DX station to tune up. Better yet, on a day when the bands are shut down, a considerate DXer will tape paper behind the knobs of the amplifier and tune up the amp on common DX frequencies on each band. By marking the position of each knob on the paper, labeled with the frequency, the DXer can then move to a given band or frequency and preset the amplifier controls. This can eliminate on-the-air tune-up completely.

• Listen more and transmit less. A good DXer spends more than 90% of his or her operating time listening. Listening not only helps the individual DXer by providing information about the band conditions, callsign of the DX station, QSL information, operating schedule, etc., it also helps every other DXer by eliminating repetitive questions. DXpeditions in particular are plagued by the frequent:

"What's your QSL information?"

"When are you going to be on 80 meters [RTTY, CW, 1260, 10, etc.]?"

"What's your call [the worst!]?"

If most DXers simply listened for a few moments, they would not only get the desired information, they would also permit more DXers to contact the DX station.

• Stay well-informed. The well-informed DXer is the successful DXer. By keeping up to date with accurate DX information, a DXer can work more countries in less time and reduce QRM. For example, DXpedition stations may work many stations without giving their callsign, listening frequency, QSL information, etc. A DXer who is knowledgeable about the details of the DXpedition already knows this information and can work the station more quickly and refrain from cluttering the bands with questions.

There are several ways a DXer can keep on top of DX news. One is by sitting in front of the rig much of the time, *listening*. Much DX news eventually finds its way to the airwaves. (Beware the rumor mills, however, especially on DX nets; the vast majority is simply wishful thinking.) For those DXers without the time to listen to the bands all day, there are DX newsletters available which provide comprehensive DX information.

• Refrain from making duplicate contacts. DXers often make "insurance contacts" (a second contact on the same band and mode). These duplicate contacts always deprive another DXer of a contact with that station. Ask any DXpedition operator what his greatest problem is (after the ubiquitous "When are you going to be on 80?") and he will answer "insurance contacts." DXpeditioners would rather call unanswered CQs than work a station twice on the same band and mode. Martti Laine, OH2BH, reported that years ago

Giovanni Bini, I5JHW, was in Tunisia when this column was written and also operated from there in the CQ WPX SSB Contest back in March. He would like to remind everyone that he is the QSL Manager for 3V8BB only for the Italian operations as follows: 3V8BB and TS8ZA for the 1997 A.R.I. Contest; 3V8BB and TS5I for the 1998 WPX SSB; and 3V8BB for May1–4 and December 11–14, 1998.

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The WPX Program

SSB

2704 ..... F6FYD
2705 ..... F5RRS
2706 ..... SM3GBA

CW

3008 ..... DJ2XP
3009 ..... RU3DG
3010 ..... F5RRS
3011 ..... K4CN

Mixed

1835 ..... F5RRS
1836 ..... YU7GMN

CW: 350 F5RRS, K4CN. 400 F5RRS, K4CN. 450 F5RRS, K4CN. 500 F5RRS, K4CN. 550 F5RRS, K4CN, 4X0/G3WQU. 600 4X0/G3WQU. 650 K4CN. 1050 I2EAY.
SSB: 350 F6FYD, F5RRS. 400 F6FYD, F5RRS. 450 F6FYD, F5RRS. 500 F6FYD, F5RRS. 550 F6FYD, F5RRS. 600 F6RYD, F5RRS. 650 F5RRS. 700 F5RRS.
Mixed: 450 F5RRS. 500 F5RRS. 550 F5RRS. 600 F5RRS. 650 F5RRS. 700 F5RRS. 750 F5RRS. 800 F5RRS. 850 F5RRS. 900 F5RRS. 950 F5RRS. 1000 F5RRS. 3250 WB2YQH. 3800 F2YT. 4500 W2FXA.

10 meters: K4CN, EA2CIN
15 meters: F5RRS, K4CN
20 meters: F5RRS, K4CN
40 meters: K4CN
80 meters: K4CN

Asia: F5RRS, K4CN
Africa: F5RRS, K4CN
No. America: F5RRS, K4CN
So. America: K4CN
Europe: F5RRS, K4CN
Oceania: K4CN

Award of Excellence Plaque Holders: K6JG, N4MM, W4CRW, K5UR, K2VV, VE3XN, DL1MD, DJ7CX, DL3RK, WB4SIJ, DL7AA, ON4QX, 9A2AA, OK3EA, OK1MP, N4NO, ZL3GQ, W4BQY, I0JX, WA1JMP, K0JN, W4VQ, KF2O, W8CNL, W1JR, F9RM, W5UR, CT1FL, W8RSW, WA4QMQ, W8ILC, VE7DP, K9BG, W1CU, G4BUE, N3ED, LU3YL/W4, NN4Q, KA3A, VE7WJ, VE7IG, N2AC, W9NUF, N4NX, SM0DJZ, DK5AD, WD9IIC, W3ARK, LA7JO, VK4SS, I8YRK, SM0AJU, N5TV, W6OUL, WB8ZRL, WA8YTM, SM6DHU, N4KE, I2UIY, I4EAT, VK9NS, DE0DXM, DK4SY, UR2QD, AB0P, FM5WD, I2DMK, SM6CST, VE1NG, I1JQJ, PY2DBU, HI8LC, KA5W, K3UA, HA8XX, K7LJ, SM3EVR, K2SHZ, UP1BZZ, EA7OH, K2POF, DJ4XA, IT9TQH, K2POA, N6JV. W2HG, ONL-4003, W5AWT, KB0G, HB9CSA, F6BVB, YU7SF, DF1SD, K7CU, I1POR, K9LJN, YB0TK, K9QFR, 9A2NA, W4UW, NX0I, WB4RUA, I6DQE, I1EEW, I8RFD, I3CRW, VE3MC, NE4F, KC8PG, F1HWB, ZP5JCY, KA5RNH, IV3PVD, CT1YH, ZS6EZ, KC7EM, YU1AB, IK2ILH, DE0DAQ, IQWXY, LU1DOW, N1IR, IV4GME, VE9RJ, WX3N, HB9AUT, KC6X, N6IBP, W5ODD, I0RIZ, I2MQP, F6HMJ, HB9DDZ, W0ULU, K9XR, JA0SU, I5ZJK, I2EOW, IK2MRZ, KS4S, KA1CLV, KZ1R, CT4UW, K0IFL, WT3W, IN3NJB, S50A, IK1GPG, AA6WJ, W3AP. OE1EMN, W9IL, S53EO, DF7GK, I7PXV, S57J, EA8BM, DL1EY, K0DEQ, KU0A, DJ1YH, OE6CLD, VR2UW, 9A9R, UA0FZ, DJ3JSW, HB9BIN, N1KC, SM5DAC, RW9SG, WA3GNW, S51U, W4MS, I2EAY.

Award of Excellence Plaque Holders with 160 Meter Endorsement: K6JG, N4MM, W4CRW, N5UR, VE3XN, DL3RK, OKMP, N4NO, W4BQY, W4VQ, KF2O, W8CNL, W1JR, W5UR, W8RSW, W8ILC, G4BU, LU3YL/W4, NN4Q, VE7WJ, VE7IG, W9NUF, N4NX, SM0DJZ, DK5AD, W3ARK, LA7JO, SM0AJU, N5TV, W6OUL, N4KE, I2UIY, I4EAT, VK9NS, DE0DXM, UR1QD, AB9O, FM5WD, SM6CST, I1JQJ, PY2DBU, HI8LC, KA5W, K3UA, K7LJ, SM3EVR, UP1BZZ, K2POF, IT9TQH, N8JV, ONL-4003, W5AWT, KB0G, F6BVB, YU7SF, DF1SD, K7CU, I1POR, YB0TK, K9QFR, W4UW, NX0I, WB4RUA, I1EEW, ZP5JCY, KA5RNH, IV3PVD, CT1YH, ZS6EZ, YU1AB, IK4GME, WX3N, W5ODD, I0RIZ, I2MQP, F6HMJ, HB9DDZ, K9XR, JA0SU, I5ZJK, I2EOW, KS4S, KA1CLV, K0IFL, WT3W, IN3NJB, S50A, IK1GPG, AA6WJ, W3AP, S53EO, S57J, DL1EY, K0DEQ, DJ1YH, OE6CLE, HB9BIN, N1KC, SM5DAC, S51U.

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.

one W0 station worked the XF4L Revillagigedo DXpedition eight times on 10 meter SSB—once each day!

As with tuning up on top of a DX station, there is no excuse for "insurance contacts." First, the DX station and the DXer both should ensure that the contact is "in the log" before confirming it. A good DX station will always give the entire callsign of the station worked. When the DXer hears his or her call repeated by the DX station, he or she knows that the call is "in the log" and there is no reason for a duplicate contact. If the DX station fails to repeat the entire call and the DXer has some doubt about which station got through the pile-up, that DXer has some justification for making a second contact, but *on a different band or mode.* An increasing number of DX operators are using computer logging systems which flag duplicate contacts instantly.

• **Do not be a "DX policeman."** Do not police the policemen. Do not police those policing the policemen. DX policemen are self-appointed masters of ceremony on the DX station's frequency. These so-called DXers tell those stations transmitting on top of the DX station that the DX station is listening split, give out QSL information, and provide helpful hints such as

CQ DX Awards Program

SSB

2273 ..... G0VXX
2274 ..... W6UPI

CW

990 ..... K9FYZ
991 ..... WA5IEX

SSB Endorsements

320 ..... VE3XN/330
320 ..... K4CN/329
320 ..... W4UW/329
320 ..... WB3DNA/328
320 ..... VE7WJ/327
320 ..... AE5DX/320
300 ..... WZ3E/300
275 ..... 4X6DK/295
250 ..... W6UPI/273
250 ..... RW9SG/251

CW Endorsements

320 ..... K3UA/330
320 ..... K4CN/329
320 ..... K9FYZ/297
150 ..... K6UXO/176
3.5/7 MHz K1FK
3.5/7 MHz K6UXO

RTTY Endorsements

300 ..... K3UA/302

The basic award fee for subscribers to *CQ* is $4. For non-subscribers, it is $10. 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 330 active countries. Please make all checks payable to the award manager.

THE WPX HONOR ROLL

The WPX Honor Roll is based on the current confirmed prefixes which are submitted by separate application in strict conformance with the CQ Master Prefix list. Scores are based on the current prefix total, regardless of an operator's all-time count. Honor Roll must be updated annually by addition to, or confirmation of, present total. If no up-date, files will be made inactive. Lifetime Honor Roll fee is $4.00 (U.S.) for each mode, with no fee for additions.

MIXED

4892.....9A2AA
4773.....F9RM
4206.....W2FXA
3891.....EA2IA
4880.....F2YT
3797.....UA3FT
3775.....W1CU
3747.....K6JG
3623.....N4NO
3603.....N6JV
3566.....VE3XN
3482.....N4MM
3424...SN3EVR
3405.....YU1AB
3390.....I2PJA
3386.....N9AF
3262.....N5JR
3240.....9A2NA
3103.....I1EEW
3099.....YU7SF
3085...WA8YTM
3059...PAØSNG
2990.....HA8XX
2940.....K9BG
2926...YU7BCD
2926.....KF2O
2906.....I2MQP
2884..WB2YQH
2832.....HA5NK
2787.....W9HA
2776.....W2ME
2776.....I1POR
2745.....I2EOW
2669.....S53EO
2660.....4N7ZZ
2648.....K9DEQ
2631.....IK2ILH
2546...SM6DHU
2512...JH8BOE
2484.....K8LJG
2376.....HAØIT
2346.....S58MU
2281.....N6JM
2273....YU7JDE
2270.....KS4S
2264.....K2XF
2259.....W9IL
2242.....K5UR
2238.....9A4RU
2237.....W6OUL
2224....W8UMR
2218.....F6IGF
2159.....W4UW
2019.....G4OBK
2018.....N3XX
2001...OE6CLD
1919...SM6CST
1875.....HA9PP
1871.....DJ1YH
1851....VE4ACY
1836.....F5NBX
1802...PY2DBU
1767.....IØAOF
1765.....K5IID
1759.....I2EAY
1732.....LU8DY
1653.....AE5B
1628....JN3SAC
1625.....KØNL
1607...OZ1ACB
1591.....W7CB
1580....I1-21171
1522.....AA1KS
1488.....YU1ZD
1485.....Z32KV
1389.....KØKG
1339.....N1KC
1371.....F6HMJ
1328.....W9IAL
1319.....WT3W
1311..WB2AQC
1307.....NH6T
1268...KW5USA
1264.....VE6BF
1223...VE6BMX
1207.....W2EZ
1198.....S52QM
1162....JR3TOE
1142.....VE6FR
1110.....W2CF
1059.....RA9FY
1010.....F5RRS
989.....US7MM
906.....N3KR
611.....JH2IEE

SSB

4180.....IØZV
3743.....VE1YX
3779.....ZL3NS
3485.....K6JG
3476.....F6DZU
3384.....I2PJA
3049.....N4MM
2978.....EA2IA
2976.....F2VX
2935....EA8AKN
2921.....OZ5EV
2913.....CT4NH
2827.....I4CSP
2802.....I2MQP
2772.....N4NO
2731.....HA8XX
2725.....I1EEW
2714.....N5JR
2657...PAØSNG
2509...CT1AHU
2507.....9A2NA
2491....LU8ESU
2487.....UA3FT
2446.....KF2O
2401.....PY4OY
2397..WA8YTM
2396.....I8KCI
2385.....4X6DK
2380.....I2EOW
2329.....KF7RU
2360.....EA5AT
2291...YU7BCD
2260.....KD9OT
2257.....I1POR
2213.....EA1JG
2211.....CX6BZ
2134.....K5RPC
2033.....IN3QCI
1975.....W4UW
1921.....K5UR
1881...SM6DHU
1867...OE6CLD
1809.....LU8DY
1802...OE2EGL
1770.....YU7SF
1760.....HAØIT
1757.....N6FX
1754.....W2WC
1741.....KBØC
1714.....K2XF
1685.....KS4S
1659.....K8LJG
1650.....HA5NK
1649...EA5CGU
1569.....K3IXD
1570.....W6OUL
1567..CT1BWW
1546.....K8NDU
1544.....DK5WQ
1525.....W2ME
1518.....AE5B
1489.....I3ZSX
1470.....K2EEK
1452.....LU5DV
1451.....IT9SVJ
1443.....N3XX
1396.....W9IL
1395.....EA5KY
1366.....DF7HX
1353.....K5IID
1336.....G4IBJ
1299...SV3AQR
1288.....I3UBL
1271.....W2FKF
1252.....T30JH
1229.....YC2OK
1196.....KØNL
1160.....K4CN
1127.....EA8AG
1090...LU3HBO
1061.....KI7AO
1061.....WT3W
1030.....NH6T
1028....DL8AAV
1017.....IK4HPU
1011.....I2EAY
1010.....EA7CD
1002.....N1KC
965.....DJ4GJ
954.....EA1AX
933.....DF1IC
921.....HA9PP
919.....CP1FF
896.....JR3TOE
894.....EA3EQT
894.....EA5DCL
836.....AG4W
792.....EA5GMB
790.....N3DRO
786.....JN3SAC
729.....F5RRS
703.....VE6BMX
697.....I2VGW
660.....F5LIW
643.....BD4DW
613.....SM5DAC
608.....LU3HL
608.....KE4SCY
605.....N7VY

CW

3912...WA2HZR
3589.....N6JV
3251.....UA3FT
3176.....N4NO
3119....VE7CNE
3005.....K6JG
2940.....EA2IA
2926.....YU7LS
2881.....N4UU
2811.....K9QVB
2786.....YU7SF
2613.....VE7DP
2479.....G4UOL
2468.....W2ME
2451.....N4MM
2423.....N5JR
2415.....LZ1XL
2384...WA8YTM
2362....YU7BCD
2196.....VR2UW
2194.....9A2NA
2179.....HA5NK
2124....JA9CWJ
2089.....KA7T
2079.....KF2O
2046.....HA8XX
2043.....S58MU
1973.....G3VQO
1956.....K8LJG
1954.....TI4SU
1927...SM6DHU
1927.....N6FX
1906.....G4SSH
1876.....HAØIT
1871.....OZ5UR
1816...SM6CST
1804.....K5UR
1799.....I7PXV
1798.....W2WC
1795.....W1WAI
1755.....LU2YA
1750.....K2XF
1750....IT9VDQ
1711.....W6OUL
1694.....N3XX
1652.....KS4S
1641.....G4OBK
1626.....DJ1YH
1603.....IK3ER
1599.....EA6BD
1590.....JA1GTF
1546.....9A2HF
1537....JN3SAC
1514.....EA5YU
1513.....IK5TSS
1509.....9A3SM
1506.....I2EAY
1482...EA7AAW
1411...SM5DAC
1349.....N1IA
1298.....EA6AA
1271.....LU3DSI
1270.....K5IID
1270.....W9IL
1268.....DJ4GJ
1249.....VE6BF
1217.....AC5K
1211.....I2MQP
1175.....EA2CIN
1156.....4X6DK
1094....LU7EAR
1083.....I2EOW
1078.....9A3UF
1058.....DF6SW
1055.....W4UW
1041.....W9IAL
998.....K2LUQ
993.....HA9PP
906.....YU1TR
884.....PY4WS
870.....HB9CSM
847.....NH6T
844.....JK1AJX
823.....VE6BMX
821.....RAØFU
820.....K3WWP
815.....WT3W
741.....DL3NEO
725.....KØNL
678.....IK8VRP
659.....N1KC
619.....F5RRS
603.....OE6CLD

"Shut up. He's transmitting." Every one of these comments is totally unnecessary, and all of them simply QRM the pile-up. If the DX station is listening off frequency, this quickly will become apparent to all but the most obtuse DXer. Also, there are sources of QSL information other than the DX policemen.

• **Be courteous at all times.** Even when the actions of other DXers are obnoxious, objectionable, or downright illegal, the good DXer keeps his or her temper and refrains from telling the other amateur what he or she really thinks about the activity. Write a letter instead and wait at least one day before mailing it.

• **Follow proper QSLing procedures.** Another chronic complaint of DX stations and DXpeditioners is bad QSLing. DXers who put *local* time or date on the card, who don't have their callsign on the same side of the card as the QSO data, who don't provide an SASE or SAE and postage, who send a follow-up QSL within a few weeks, or whose handwriting makes doctors look like calligraphers drive QSL managers crazy. With a few noted exceptions, QSL managers are a dedicated, hard-working breed, and a DXer should try to make their task as easy as possible.

• **Keep the station technically clean.** Some DXers seem to feel that if some audio compression is good, then a lot of it is better, or that they can increase power output by turning up the microphone gain, or that introducing a little hum on their CW signal will make it more distinctive in the pile-ups. The truth is that a clean, well-modulated signal is easier for the DX station to copy and is the one most likely to break the pile-up. Work with another DXer in another part of the country to try to find the best settings for the mic gain and compression or maximum drive into the amplifier. Note these settings and don't exceed them. The spurs, clicks, and unintelligible audio should be confined to the "band" just

5 Band WAZ

As of May 30, 1999, 493 stations have attained the 200 Zone level.

New recipients of 5 Band WAZ Award with all 200 Zones confirmed:

BV5BG

The top contenders for 5 Band WAZ (zones needed, 80 meters):

N4WW, 199 (26)
W4LI, 199 (26)
K7UR, 199 (34)
WØPGI, 199 (26)
W2YY, 199 (26)
VE7AHA, 199 (34)
IK8BQE, 199 (31)
JA2IVK,199 (34 on 40)
K1ST, 199 (26)
ABØP, 199 (23)
KL7Y, 199 (34)
NN7X, 199 (34)
OE6MKG, 199 (31)
HA8IB, 199 (2 on 15)
IK1AOD, 199 (1)
DF3CB, 199 (1)
F6CPO, 199 (1)
W6SR, 199 (37)
W3UR, 199 (23)
KC7V, 199 (34)
GM3YOR, 199 (31)
VO1FB, 199 (19)
KZ4V, 199 (26)
N4CH, 199 (18 on 10)
OE1ZL, 199 (1)
W6DN, 199 (17)
W3NO, 199 (26)
K4UTE, 199 (18)
K5RT, 199 (23)
UT5UGR, 199 (10)
K4PI, 199 (23)
HB9DDZ, 199 (31)
UA3AGW, 198 (1, 12)
EA5BCK, 198 (27, 39)
G3KDB, 198 (1, 12)
KG9N, 198 (18, 22)
DKØEE, 198 (19,31)
KØSR, 198 (22, 23)
K3NW, 198 (23, 26)
UA4PO, 198 (1, 2)
JA1DM, 198 (2, 40)
9A5I, 198 (1, 16)
K4ZW, 198 (18, 23)
OH2VZ, 198 (1, 31)
RAØFA, 198 (2 on10,15)
LA7FD, 198 (3, 4)
K5PC, 198 (18, 23)
NT5C, 198 (18, 23 on 40)
VE3XO, 198(23, 23on40)
K4CN, 198 (23, 26)

The following have qualified for the basic 5 Band WAZ Award:

VE3XO, 198 zones
OK1DH, 158 zones

Endorsements:

N4XR, 196 zones
K4CN, 198 zones
I2VRF, 170 zones

1091 Stations have attained the 150 Zone level as of June 1, 1999.

****PLEASE NOTE: Due to supplier increases, effective September 1, 1998 cost of the 5 Band WAZ Plaque is now $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 Manager, Jim Dionne, K1MEM, 31 DeMarco Road, Sudbury, MA 01776. The processing fee for all *CQ* awards is $4.00 for subscribers (please include your most recent *CQ* mailing label or a copy) and $10.00 for nonsubscribers. Please make all checks payable to the Award Manager. Applicants sending QSL cards to a *CQ* checkpoint or the Award Manager must include return postage. Questions regarding the WAZ Award may be sent to K1MEM with an SASE.

The WAZ Program

Single Band WAZ

12 Meter Mixed

19 ..... N4CH

15 Meter SSB

523 ..... JH1FTS

15 Meter CW

277 ..... N6KZ

17 Meter CW

25 ..... OH3YI

17 Meter SSB

14 ..... N4CH 15 ..... N2QT

20 Meter SSB

1046 ..... VK1TX

30 Meter CW

30 ..... K8MFO 31 ..... N4CH

40 Meter SSB

90 ..... W8UVZ

80 Meter SSB

72 ..... N4CH

80 Meter CW

51 ..... OH2DW

RTTY 20 Meter

45 ..... N2QT

All CW

135 ..... GØPSE 129 ..... N6KZ

160 Meter WAZ

139 ..... all 30 zones VK6VZ
140 ..... all 40 zones ZS4TX
91 ..... all 40 zones N4SU
98 ..... endorsement 35 zones K4ZW

All Band WAZ

SSB

4485 ..... WHØAAV 4486 ..... AC6WO

CW/Phone

7848 ..... ER1OA 7852 ..... K5CWR
7849 ..... SV8CKM 7853 ..... W3OU
7850 ..... AAØFT 7854 ..... SM4CEZ
7851 WA9FWO (allCW,allQRP) 7855 ..... W4GP

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 Manager, Jim Dionne, K1MEM, 31 DeMarco Road, Sudbury, MA 01776. The processing fee for all *CQ* awards is $4.00 for subscribers (please include your most recent *CQ* mailing label or a copy) and $10.00 for nonsubscribers. Please make all checks payable to the Award Manager. Applicants sending QSL cards to a *CQ* checkpoint or the Award Manager must include return postage. Questions regarding the WAZ Award may be sent

below 10 meters, where they don't know any better.

Another way to reduce QRM on the DX bands is to use minimum power for each contact. Not only is this an FCC requirement, it is also common courtesy. When VP2ML was operating from the Gambia as C5AAQ, he came across three very loud W2 stations in the same town ragchewing on 20 meters about the lack of African stations on the band. He broke in and explained that if they wouldn't run a kilowatt to talk across town, or, better still, if they would move up to 2 meters for local communications, there would be more space on 20 meters for African stations. (They were kind enough to relinquish the frequency to him.)

• **Send your complete call.** The practice of sending the last two letters of one's callsign has dramatically reduced pile-up efficiency. While the practice may have some value in nets, it hampers DX pile-ups. The DX station must ask for the complete callsign, rather than give a report. This extra exchange cuts into the number of DXers the DX station can work in an hour, and thus the total number of DXers who work that DX station. A DXer has nothing to lose by sending the entire callsign in a pile-up and everything to gain in increased efficiency.

With a little help from DXers around the world, every amateur radio operator can work more DX, with less frustration, and everyone can enjoy DXing more. ■

MOVING? MOVING?

If your'e planning on moving in the near future, don't risk missing an issue of CQ Magazine. Please give us 6-8 weeks notice if you are planning on changing your address. Just write your new address and mail it with your supscription label to:

CQ Magazine
25 Newbridge Road
Hicksville, NY 11801

BY TED MELINOSKY, K1BV

AWARDS

NEWS OF CERTIFICATE AND AWARD COLLECTING

Robert "Buck" Buckley, W6HOR, USA-CA #970, March 19, 1999, started county hunting back before county hunting was the "in thing."

"It was about 1949 and I was looking for WACC (Worked All California), which was sponsored by the Oakland Radio Club, W6OT. I never will forget W6KZN, who got #1 all SSB, and I wanted #1 CW. Well, it sure took years.

"Back in '46 while I was still a lad of 17, I enlisted in the USCG. I was sent to Radioman school, where they sure had an incentive to learn code. If you flunked the code, it was a three to six month assignment of "Mess Cooking" (known as KP to you grunts), so there weren't many trying to drop out.

"My first assignment was a weather ship, then an isolated Loran station in the Aleutians, where I took and passed my General test and got KL7W (later assigned to a nice lady at North Pole, AK). When I rotated back home, I got my present call, W6HOR. After my discharge I joined the USMCR just months before Korea and activation.

"I didn't operate from Korea, as I was too darn cold and busy. However, when I got home, I went to trade school looking for a commercial CW ticket and a seagoing job. I settled for three years with the Alarneda County Sheriff's Department, and then quit and went to sea. Later I joined Philco as a Tech Rep and toured (?) Greenland (KG1LZ) and Newfoundland (/VOI), with a short spell in Labrador (/VO2). That was followed by a job in England and finally my going home to California.

"While in Newfoundland, I met and was very happy to wed my lovely wife Jean, who in following years presented me with two sons, one of whom is studying for his Novice/Tech license. Oh, yes: Jean is N6NOM (General class).

"I retired in 1984 to Trinity County for the peace and quiet (I'm still looking) and became active on some 40 meter nets. One member, Al, W7HZL, was absent quite often, as he was 'county hunting.' Well, Al and Muriel came down for a visit. He and I worked Ed, WA6VJP, and it was hooksville for me. Ed was a *gentleman* of the first order, and between Al and him, this poor slob was hooked. That was 11 years ago and a lot of water has passed under the bridge.

"My station now consists of a TS570D, TS211 A (VHF), and an FT901 (just gotta fix that), an FT900 mobile, and a real farm of antennas. Living in a valley, I have scrounged some CATV 3/4 inch coax and have two runs each of about 750 feet—one for VHF (When you live in a valley, what's a little loss for elevation?) and the other run to a Heathkit coax switch for a 5/8 vertical, a double half square both on 20, and a horizontal loop on 40 for short range work. Down at the lower level (house) I have a 40 meter dipole up 120 ft. and a combo 1/2 80 meter vertical and 1/4-wave 160 both tuned by a tuner in the pump house (ground is 225 foot well and radials). I have plans for a 15/30 meter trap dipole down here and a 17/12/10 trap on the hill using a spare spot on the switch.

"County hunting is one of the very best collections of super-fine Odd Balls anyone could ever meet. I just plain love 'em all."—Buck, W6HOR

65 Glebe Road, Spofford, NH 03462-4411
e-mail: k1bv@top.monad.net

USA-CA Special Honor Roll

Fred E. Levinson, KF9YL
USA-CA All Counties #972
May 19, 1999

Aaron L. Depew, WY8H
USA-CA All Counties #973
May 20, 1999

USA-CA Honor Roll

500		2000	
ON40N	3075	KB6HW	1157
N9PM	3076	KF9YL	1158
NØPFY	3077	WY8H	1159
WY8H	3078		
1000		**2500**	
ON40N	1510	KB6HW	1082
NpPM	1511	KF9YL	1083
DL6RAI	1512	WY8H	1084
WY8H	1513		
1500		**3000**	
AD1B	1258	KF9YL	989
DL6RAI	1259	WY8H	990
KF9YL	1260		
WY8H	1261		

The total number of counties for credit for the United States of America Counties Award is 3076. The basic award fee for subscribers is $4.00. For nonsubscribers it is $10.00. 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 March 1, 1997. 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.

Short-Term Award

UA9UAX advises that the Rostov-on-Don—250 Years anniversary award is available throughout all of 1999 (no photo provided). It is available for both amateurs and SWLs for earning 250 points during 1999 according to the following schedule: stations from Rostovskaya oblast (RO) = 1 point; stations from Rostov-on-Don = 5 points; special station UE6LRD = 10 points. The same station may be worked on different bands and different modes to help accumulate the needed points. During the special anniversary period of 27–28 September 1999, all contact points may be multiplied by a factor of 5. Send a GCR list and fee of $US3, or 6 IRCs (for CIS countries $US2, or 4 IRCs) to: Gudyma I.A., P.O. Box 4102, Rostov-on-Don, 344103 Russia.

Hint: If the bands are open to Russia and you don't hear any of these stations, you can try to stir up some activity by contacting the following e-mail address: <ua6mf@dx.aaanet.ru>.

Awards Available

USA Great Lakes Award. The Great Lakes certificate is a very good award for beginners, since the contacts required involve the states which border the Great Lakes of the American Midwest, all of which have plenty of activity. These lakes have a long history of American maritime commerce. The award displays a historical cross section of the types of ships used for commerce.

Work the U.S. states and Canadian provinces that border the Great Lakes: VE3/ONT Michigan, Illinois, Indiana, Wisconsin, Ohio, Pennsylvania, New York, and Minnesota. Contacts after August 31, 1991. All bands and modes. No repeater

The Great Lakes Award is a great beginner's award.

The Baton Rouge ARC sponsors the Worked All Parishes Award for working all 64 of the parishes of Lousiana.

QSOs. Contacts must be verified by a QSL or photocopy. Send an SASE for an application and chart. Fee is $US6. Apply to: MARA/GLA, Brian Scholten, KC8DOC, 8570 Peach Ridge Ave. N.W., Sparta, MI 49345 <http://webspawner.com/users/cyberham/>.

USA Worked All Parishes Award. The state of Louisiana is the only state in the U.S. that uses parishes instead of counties as the primary political subdivision. The following award is sponsored by the leading radio club in Baton Rouge, the state's capital city. It is somewhat difficult in that it is only offered on one level, for working all of the 64 parishes, unlike other state county awards which offer several levels that work up to an all-county award.

Submit proof of contacts with all 64 Louisiana parishes. Photocopies of QSL cards are acceptable as long as they are legible and there is no evidence of alterations. QSLs or copies must show all the usual contact information. Note that you must include postage for return of the cards, separate from the award fee of $US2. All HF bands and any legal mode may be used. Contacts must be on or after 1 September 1996. Contacts must be made by the same person. If multiple calls were used, the applicant should state that he or she made the contacts.

Send the award fee and sufficient postage for return of cards to: Baton Rouge ARC, Awards Committee, P.O. Box 4004, Baton Rouge, LA 70821.

Brazil's Worked Maritime Mobile Award. Many years ago, the U.S. Navy offered an award for working five different /MM stations. However, by the time I applied (and I was in the Navy at the time), the award was no longer available. The rules for the next award are just about the same. This is a fairly easy award, and in your QSL collection you might already have the cards needed.

Brazil's Worked Maritime Mobile Award is a CW-only award sponsored by the Pioneiros Radio Club.

Contact five Maritime Mobile stations representing different countries on any band using CW only on or after 27 February 1982. Send photocopies of the cards and fee of 5 IRCs to: Pioneiros Radio Club, P.O. Box 1470, Recife, PE, Brazil 50001-970. The Internet site is: <http://www2.netpe.com.br/users/prc/>.

The Trans-Canada Award. Neil Sutherland, VE8CQ, has developed an interesting series of certificates all with a Canadian theme. He recently sent a sample of the Trans-Canada Award, which is a perfect example of the kind of work I mention at the end of this article on the use of

The Trans-Canada Award is issued for contacting cities along Canada's number one highway.

color laser or inkjet technology. The map detail is excellent, and Neil has kept the price affordable. This award presents a fairly high level of challenge, but it is a good excuse to work VE's.

Contact cities along Canada's #1 highway as listed below. Forty-two of the 77 are needed to earn the award. It is not available to SWLs. Special endorsement for all contacts on one band. Available for HF bands only. Send GCR list and fee of $US2 to: Trans Canada Highway Award, 203-5012 48th Street, Yellowknife, NWT, Canada X1A 1N3.

British Columbia—9 needed: Victoria, Duncan, Naniamo, Vancouver, North Vancouver, West Vancouver, Abbotsford, New Westminster, Chilliwack, Hope, Boston Bar, Cache Creek, Kamloops, Chase, Salmon Arm, Golden, Revelstoke.

Alberta—5 needed: Lake Louise, Banff, Canmore, Calgary (3 contacts), Brooks, Medicine Hat, Strathmore, Bassano.

Saskatchewan—4 needed: Maple Creek, Swift Current, Moose Jaw, Regina (2 contacts).

Manitoba—3 needed: Brandon, Portage la Prairie, Winnipeg (2 contacts).

Ontario—5 needed: Kenora, Dryden, Thunder Bay, Nipigon, Sault Ste. Marie, Sudbury, North Bay, Parry Sound, Orillia, Peterborough, Pembroke, Ottawa, Cochrane, Wawa.

Quebec—4 needed: Montreal (2 contacts), Laval, St.-Hyacinthe, Drummondville, River du Loupe.

New Brunswick—3 needed: Edmunston, Hartland, Woodstock, Fredericton, Sussex, Moncton, Sackville.

Prince Edward Island—1 needed: Charlottetown, Borden.

Nova Scotia—4 needed: Amherst, Truro, Pictou, New Glasgow, Antigonish, Port Hawksbury, Baddeck, North Sydney.

Newfoundland—4 needed: Port Aux Basques, Stephenville, Corner Brook, Deer Lake, Windsor, Gander, Grand Falls, St. John.

The Slovenia Diploma. The Slovenian National Society wins this month's contest for the most colorful certificate. The country's mountains, vineyards, caverns, winter sports, and seaports are shown on a high-quality certificate which is definitely worth framing. S5 stations are especially active in contests throughout the year, making the contacts fairly easy to acquire. This one is a keeper.

Contact Slovenian stations on or after 24 October 1992. Valid prefixes are S50–S59. The same station may be contacted on several bands for credit. No cross-mode, cross-band, or repeater use permitted.

Europeans: On HF, 30 contacts with at least 6 different prefixes. (VHF/UHF: Countries bordering Slovenia need 25 contacts with at least 4 prefixes; others 5 contacts with 2 prefixes).

Outside Europe: 15 contacts with at least 4 prefixes needed.

By satellite, 10 contacts using at least 2 satellites. SWL okay.

Endorsements for mixed modes, single mode (including WARC). Send GCR list and fee of 10 IRCs, DM10, or $US7 or equivalent to: Milos A. Oblak, S53EO, Obala 97, SI-6320 Portoroz, Slovenia.

Correction

My April 1999 column on page 86 described the CWYC certificate as requiring

The Slovenia Diploma is sponsored by the Slovenian National Society and is a very colorful certificate well worth framing.

at least one CW QSO per day for a year. Actually, the 365 contacts only represent each day in a year and may made in one day as in a contest. Thanks to Martin, DL5QE, for the correction.

URL of the Month

The South African Radio League sponsors the African continent's famous All Africa Award, as well as the popular Worked All ZS Award. Both awards provide a reasonable challenge to the DXer and award hunter. Complete rules are found at their very informative website at: <http://www.sarl.org.za/awards.htm>.

Remember, I'm always interested in receiving rules and samples of your club's award for future publication. *CQ* remains the number one source of DX awards in the U.S. There's not much of a problem for award sponsors these days to offer a simple, text-only award in one or two colors. High-quality color copies are going mainstream with prices down to 49 cents each, no minimum number needed. Epson, HP, Lexmark, and other desktop inkjet printers have plunged dramatically in price in the last year, and the quality is awesome, offering 600 and even 1200 dpi (dots per inch) color for fantastic photo-sharp resolution. Clubs can turn over the design duties to a member with one of these printers and print small quantities at a very low cost. This sure beats having to print a club-treasury-busting minimum number of certificates by traditional methods with associated high prices.

73, Ted, K1BV

BY FREDERICK O. MAIA, W5YI

WASHINGTON READOUT

REGULATORY NEWS IN THE WORLD OF AMATEUR RADIO

FCC Discusses Rulemaking at Dayton Hamvention Forum!

The standing-room-only FCC Forum was presented by William T. Cross, W3TN, and Riley Hollingsworth, K4ZDH, at this year's Dayton Hamvention. In addition to being long-term FCC staffers, both have been licensed amateur radio operators since they were teenagers. Bill is with the Commission's Policy and Rules Branch of the Wireless Telecommunications Bureau's Public Safety and Private Wireless Division in Washington, DC. This division oversees the Amateur Service and is responsible for most of its rulemaking. Riley Hollingsworth focuses on amateur radio enforcement actions in the FCC's Compliance and Information Bureau. Hollingsworth, also known as "Riley the Enforcer," received an enthusiastic standing ovation from the audience for his work.

Bill started by saying, "I'm here to summarize for you the Commission's major rulemaking and licensing activities that have affected or will affect the Amateur Service and to listen to your remarks. What I ask of you is to carry the information I talk about back to your clubs, newsletter writers, nets, and other groups. Just don't include my e-mail address. There are about 725,000 of you and one of me."

Regulatory Direction

"I want to take a minute and tell you about the Commission's agenda this year. As some of you know, the Commission is composed of five commissioners appointed by the president and confirmed by the Senate.

"Chairman Kennard laid out this year's objectives in a speech he gave on January 7th. His speech is on our web page. His agenda is to promote competition, to foster new technologies, to protect consumers, and to ensure that all Americans have access to the wonders of the communications revolution. There also is the on-going goal of regulating only where absolutely necessary, regulating to the minimum extent necessary, and eliminating unnecessary regulations. "The Commission's top priorities are split between telephone, mass media, and enforcement. High Definition Television implementation, complaints by telephone users about 'slamming and cramming,' Internet availability, and the transition to broadband systems are all high-priority areas for the Commission. The Biennial Review of our rules required by the 1996 statute also is an on-going process.

"I mention this so you have an idea about what the landscape is like in which ham radio is competing for attention at the Commission. The trend in regulation is simplifying and streamlining where possible, eliminating unnecessary regulations, and getting out of the business of managing. "Last year I mentioned that asking for more regulations—especially regulations that have the effect of excluding individuals—using regulations to solve disputes between licensees, or trying to involve us in the management of your service is not the direction the Commission appears to be headed in. The same is true this year.

"The Chief of the Wireless Bureau, where I work, pointed out that one problem we encounter constantly is that for every advocate of deregulation, there is one for regulation. And sometimes they're the same people, just on different sides for different issues.

"We encounter this constantly in the Amateur Service. For example, the spread-spectrum folks fully support eliminating restrictions on spreading codes in Part 97. The repeater folks do not . . . they see eliminating this restrictive regulation as increasing the noise floor in the repeater bands, thereby causing unintentional triggering of voice repeaters."

FCC Web Site

"How many of you have checked out the FCC's ham radio Internet Web Site? For those who haven't, you go to: <http://www.fcc.gov/wtb/amateur>.

"At the top of the amateur service home page are the most recent rulemaking items I think you might be interested in. Some new links have been added. Some items, such as the Universal Licensing System Report and Order, are not strictly amateur radio items, but include the Amateur Service. Each listing is linked to the item so that all you have to do is click your mouse to view the item. If you down- load it, you can see for yourself what the item says.

"The selection of items is based on feedback and my judgment. If you think something else should be there, let me know. My e-mail address is <bcross@fcc.gov>. My standard is this: If the link will save me answering a question, it goes on."

Licensing of Amateur Operators

"One question that keeps coming up, both from within the FCC and from individuals who encounter your examination system, is 'Why do we license amateur radio operators? All they do is operate a radio!' Another question that is kind of a corollary to this, and it came from an individual who is an amateur Extra Class licensee who had been asked to be the trustee of a club repeater, is 'What is the duty of a licensee or trustee?'

"There are two reasons we license amateur radio operators. One is that the International Radio Regulations require that we take measures as we find necessary to verify the operational and technical qualifications of any person wishing to operate the apparatus of an amateur station. This now is in IRR S25.6.

"The second reason is that Section 303(l)(1) of the Communications Act of 1934, as amended, requires the Commission issue licenses only to persons it finds qualified. There is no statute that allows the Commission to grant any individual an exemption from the licensing requirements codified in Section 97.501 of the Rules. Section 97.510 provides that applicants for Amateur Service licenses must pass examinations that show they possess the operational and technical qualifications necessary to perform properly the duties of an amateur service licensee.

"What are those duties? The duties of a club station trustee are the same as the duties of a primary station licensee. These duties are specified in Section 97.103. A trustee or licensee has three duties:

"(1) ensure the proper operation of the station,

"(2) designate the control operator(s) of the station, and

"(3) make that station and station records available for inspection on request of an FCC representative, like Riley.

"You must be able to shut off the transmitter if something goes wrong. How you perform these duties is up to you, but if they are not performed, you are in violation of the rules. And you get to tell Riley about how it isn't going to happen again.

National Volunteer Examiner Coordinator, P.O. Box 565101, Dallas, TX 75356-5101 (telephone 817-461-6443 e-mail <fmaia@cwixmail.com>)

"There are three types of control that can be used at Amateur Service stations. Control is part of the way we all ensure the proper operation of our stations. There is local, remote, and automatic control. These are defined in Section 97.109. When a station is operated under either local or remote control, the control operator must be at the control point. Why? To manipulate the operating adjustments in the station to achieve compliance with the FCC's Rules. This allows you to shut off the transmitter if something goes wrong. Any station can be operated under local or remote control.

"Automatic control is the third type of control. It is the one that has been in use when some people had problems recently and got to meet Riley or his associates—the ones in the DF car.

"Under the rules, only certain types of stations may be automatically controlled. It means that these stations have devices and procedures for control of a station that are being used so that compliance with the rules is achieved without the control operator being at the control point. Automatic control does not mean turn the transmitter on and go on vacation, go to work, or take a sail into the Pacific and forget about your station.

"We have had some problems in this regard recently. It seems the station was transmitting, but there were no devices or procedures in use so that compliance with the rules was achieved. Of all the types of control to execute, automatic control is probably the most difficult.

"The second duty, designating the control operator(s) of the station, seems pretty clear but generates a lot of questions. First of all, the control operator must be a person who has been granted a license by us, or be a person who holds a license issued by the government of Canada, or be an alien licensee operating under reciprocal authority. Usually the control operator is the licensee of the station.

"The control operator is designated by the licensee and is responsible, as is the licensee, for ensuring that the transmissions from that station comply with the rules. We will presume the licensee is the control operator unless documentation to the contrary is in the station records. Okay so far. If you are going to appoint someone to be your station control operator, you need station records. And you both are responsible for the station's operation. Now, where's the problem?

"The problems come up in the applications. Let's say you appoint another licensee control operator of your repeater and take off for vacation, or work, or a sail. And that other licensee allows all kind of terrible things to happen. You are still responsible. And you had better have a way of fixing the problem or Riley comes calling.

"Or let's say you are the licensee or trustee of one super-big contest station or a Field Day station. Your operators are a mix of General, Advanced, and Extra Class licensees. Just because the station licensee or trustee is Extra Class does not mean that all the control operators get Extra Class privileges. Rather, if you are going to designate a General Class licensee the control operator of the 40 meter station, for example, that control operator's privileges are his or her General Class operator privileges. And as licensee of the station, you are responsible for ensuring that it is operated within the privileges of the control operator's license. Remember, operating privileges are based on the class of operator license the control operator has qualified for, not the callsign of the station or the privileges of someone else's license.

"I hope I don't read in your club's newsletter, 'Come to Field Day or operate the CQ WW Contest from here; everyone has Extra Class privileges.' There also is no license class called the 'DXpedition Upgrade Class.'

"A second question that has been coming a lot is Y2K related. A number of your brethren have called and asked, in essence, if the prohibited communications rule goes out the window if communication or other systems don't work on January 1st. I have had calls from hams at a pharmaceutical company, a big electric power utility in the southwest, and a nationwide bank out of New England, all asking if they could use ham radio for business-related communications if their computer or communication systems fail on January 1st.

"The fellow at the electric utility was trying to convince me that Y2K is an emergency and that the safety of life and property exception in Section 97.403 would apply.

"What struck me as odd about all this was the questions came the same month that an article appeared in *QST* saying there were no Y2K problems with all our equipment.

"Y2K is a software problem. It is not a natural disaster or a disaster in the sense the word is used in Part 97. If software problems were disasters, Microsoft would have had all your frequencies 15 years ago—and we wouldn't be here.

"The answer to these inquiries is that the rules about permissible and prohibited communications in Part 97 do not change on January 1, 2000. These rules prohibit the control operator from transmitting communications on behalf of an employer. There is no exception for Y2K."

Vanity Callsigns

"We are still getting about 1000 vanity callsign applications a month. Something like 90 percent of them are coming in electronically.

"Last year I mentioned there is no rule that requires truth in callsigns. For example, there is no requirement that you have a Ph.D. or be an MD to have 'PHD' or 'MD' at the end of your callsign, or to live in Tennessee to have a callsign that ends in 'TN.' When it comes to arranging letters and numbers and gaming the system, your creativity is still astonishing. We expected nothing less. This is the incentive in a vanity system.

"Some licensees are picking combinations of letters and numbers that other licensees find objectionable. This also is an incentive of a vanity callsign system. The other licensees are letting us know they don't like some of the choices. Licensees who use the vanity callsign system to make a statement or pick a callsign that offends you still receive the protection of the first amendment of the Constitution. We do not censor callsigns.

"Several of you still are helping out by keeping close watch on the vanity call-signs that are being assigned. You are still bringing to our attention instances where the requester is not eligible for what he was assigned. We had another example of this last fall. As you may recall, the first vanity callsigns were assigned November 4, 1996. That meant the two-year hold on the callsigns surrendered ended November 5, 1998. A lot of good callsigns were given up in 1996.

"One fellow in California jumped the gate on the November 5 date. He applied for a 1×2, claiming to be a former holder. The original and only real former holder got wind of this and wrote to us. No so, he said, and he provided copies of the original 1976 license, the 1981 renewal, the 1986 renewal (which was good for 10 years) and the FCC Form 610V requesting that it be surrendered for his current vanity callsign. Mr. Gatejumper lost the callsign.

"To research old callsigns, or get information about your vanity callsign, contact the Commission's research contractor. We do not do research for you. Contact is: International Transcription Services, 2100 M Street NW, Washington, DC 20037 (telephone 202-857-3800).

"Speaking of vanity callsigns, on March 24, 1999, the Commission released a Notice of Proposed Rule Making in MD Docket No. 98200. It proposes to increase the fee for vanity callsign applications from $13.00 to $14.20. The final fee may be different. If adopted, the new fee would become applicable when the new fee schedule becomes effective. The fee you pay is based on the date your application is filed with the Commission. The fee is $13.00 for applications received before the effective date for collection of FY 1999 fees."

Special Event Callsigns

"The special event callsign system has been up and running for a while now. It is a self-administered system where certified volunteer entities serve as callsign database coordinators. They coordinate, maintain, and disseminate a common on-line data base for the special event call- signs. A Public Notice is on our home page so you know about this system and who the coordinators are.

"On April 30, we denied a petition for reconsideration from David Popkin. He asked that we impose a number of conditions and limitations on the special event callsign system. The Commission found that his requested changes were unnecessary and that the current rules adequately addressed his concerns.

"The Commission also has denied a request from the ARRL that we expand the special event callsign system. It wanted to include all the offshore callsigns that cannot be assigned by the sequential call- sign system because they are not mailing addresses."

Now for the Big Items . . .

"On December 12, 1998 the Commission published the rules it adopted in WT Docket No. 98-20 in the Federal register. They became effective February 12th. This docket is referred to as the Universal Licensing System, or ULS, docket. It modernizes the Commission's licensing processes so that we can take even greater advantage of automation in our licensing systems.

"In the ULS proceeding, the Commission has revised and streamlined rules governing application procedures for every radio service, including the Amateur Service, that is licensed by the Wireless Telecommunications Bureau. The Commission consolidated the procedural rules relating to applications contained in eleven sets of service-specific rules into Part 1.

"ULS will support full electronic filing of all licensing-related applications and associated filings. It also will provide the public with better on-line access to public licensing information than is available today.

"There are a lot of changes that affect the Amateur Service. There are changes to your forms—one of them is gone, others will disappear—and more important, ULS changes to the whole philosophy of licensing.

"The biggest change you will probably notice is that the FCC Form 610 and Form 610V are going to be replaced by the FCC Short Form 605. FCC Short Form 605 will be used as a quick-form application for applicants who are not presently required to submit extensive technical data to receive a license. The 610 seems to have been around forever. You probably have some at home. They will make good kindling next winter.

"The FCC Form 605 is a very simple form. It asks for only basic information that is needed to identify you and tell us what you want to do—renew your license or change your address, for example. Remember, if you are upgrading or getting a new license, this application comes in through the VECs. Many renewals or other modifications do, too. Vanity call- sign applications will be by way of a schedule that is attached to the form. There goes FCC Form 610V—a casualty of progress.

"There is no need for the form to collect VE information because this does not come to the Commission. The VEC keeps these forms for at least 15 months, except for one VEC in California who kept them in his tool shed. The tool shed was buried in the Northridge earthquake. He assured us he could keep them forever.

"Same with physicians' certifications. The VEs use this as a basis for examination element credit. It stays with the VEC, not us. All we need to know is who you are, an address, and what operator license class you are qualified for.

"The second change is not so monumental to you from an operational point of view, but it helps us a lot.

"Prior to the ULS decision, we granted some 2,000+ reciprocal permits annually to amateur operators from certain foreign countries. It was a paper-based system that kept us in the key-punching business. No standards are required of these applicants other than possession of the license document issued by their country of citizenship. The FCC-issued permit, therefore, simply confirmed that the holder of the permit also holds a license from his or her home country, and we couldn't charge a fee for these licenses.

"ULS changed this. Reciprocal operating authority for aliens who want to operate an amateur station here now is by rule. We no longer issue reciprocal permits. We don't and won't even know about alien operators here under reciprocal operating authority or provisions of the CEPT or CITEL agreements. CEPT and CITEL are agreements the ARRL worked with the State Department to get through.

"The third change is that club, RACES, and military recreation station applications will now go through a coordinator rather than come directly to us. We have to get this system set up and going, but a few organizations already have said they wanted to do it. This will eliminate the need for the FCC Form 610B.

"We plan to bring the Amateur Service into ULS later this year. Our programmers were busy trying to program your vanity callsign system into ULS last I heard. They were really struggling.

"As each wireless service database is transferred to ULS, the Commission will provide information by Public Notice announcing the availability and use of ULS forms for that service.

"For the services that have been brought into ULS, we have had a transition period during which old and new forms were accepted. Generally it is about six months. I expect this will continue as services are brought over.

"The Commission also decided that electronic filing of Amateur Service applications would not be mandatory, except for the VECs. So even after the cut-over is made, you will be able to mail in your Form 605 as some of you still do. The electronically filed one will go zipping through the system, though.

"To use ULS, you have to register. This means identifying yourself to ULS, associating yourself with callsigns, and getting a password into the system so that you can access it. You will have to be registered to use the system, and ultimately, you will have to use it.

"Details of how amateur radio operators can register were published in a Factsheet that came out April 23, 1999. There is a stack of them on the table in the back. It also is on the amateur service homepage. You must register before you can file an application in the ULS, before you can renew your license, or before a VEC can file your upgrade for you. You do not have to register before the Amateur Service is converted to ULS, but you may."

Reciprocal Licensing Changes

"Let me talk for a moment about the reciprocal operation changes that have gone into effect.

"Citizens of Canada holding an amateur service license granted by the Government of Canada and citizens of countries holding an amateur service license granted by a country with which the United States has made reciprocal operating arrangements now are authorized by Section 97.107 to be the control operator of an amateur station transmitting from a place where the Amateur Radio Service is regulated by the FCC.

"Operator privileges are those authorized by the alien's government, but do not exceed those of the amateur Extra Class operator.

"No United States citizen, regardless of any other citizenship also held, is eligible for reciprocal operating authority. The alien must be a citizen of the country that granted his or her amateur service license.

"CEPT and IARP licensees also are included in this decision.

CEPT amateur radio license Class 1 and Class 1 IARP licensees receive amateur Extra Class operator privileges; all CEPT and IARP licensees receive Technician Class privileges. Again, this authority is not available to any United States citizen, regardless of any other citizenship also held, and the license must be issued by the country of citizenship. US citizens must take and pass the exams required by Part 97.

"A British ham asked a question about this. It seems that in the UK, hams have a UK license and it is stamped CEPT amateur radio license Class 1 or 2. He wanted to know which license he was to operate under. The difference is that under the UK license, he has less privileges here than under the CEPT license.

"For an alien licensee, the decision as to which license he or she will operate under is his or hers. The FCC does not have any interest in telling an alien which of their licenses determines their operating privileges here. As long as the license is issued by their country of citizenship, the licensees can decide which of their licenses to use for their operating or licensing authority.

"We still have to get out a Public Notice so that you can operate in other countries under the authority of the CEPT agreement. The Public Notice has to be in three languages.

"I was wondering how long it would take me to learn two more languages. Bart Janke of the ARRL/VEC has bailed you out on this one. He sent me a list of Internet language translation sites. Type in the text, click, and out comes the translation. Of course, the same input text comes out a bit different from each one, but our language is the same way. Hopefully, the translation will be good enough for the foreign official to not confiscate your radio.

"We are working with our International Bureau to prepare this Public Notice now. It should be out soon."

Amateur Service Restructuring

"The WT Docket No. 98-143 Biennial Review proceeding—this is the one you all have been waiting for.

"In this proceeding, the Commission is examining the Amateur Radio Service Rules in an effort to streamline our licensing processes and eliminate unnecessary and duplicative rules. This review is intended to examine ways to further streamline the administration of the Amateur Service and to simplify the licensing process.

"In the Notice of Proposed Rule Making, we proposed to simplify the amateur service license structure to a four-class license structure by grandfathering the Novice Class operator license and by combining the Technician and Technician Plus classes of amateur radio operator licenses. We also sought comment generally on whether we could reduce the number of license classes while still encouraging amateur radio operators to advance their skills in meaningful ways.

"Second, we sought comment on all aspects of the Morse code standards used in our telegraphy examinations, including whether we should continue to have a standard that requires three different telegraphy examinations or whether this standard should be reduced to one or two telegraphy examinations, and, if so, what the required speeds should be.

"We sought comment on whether the written examination requirements should be modified to provide VEs and VECs additional flexibility in determining the specific contents of written examinations.

"There were other parts of the proposal, too, such as authorizing Advanced Class operators to prepare and administer examinations for the General Class operator license and eliminating RACES station licenses by not renewing them. But, as your comments showed, you all recognized that the keystone of our proposal was the simplification of the Amateur Service license structure and the streamlining of our licensing processes.

"The comments and reply comments are in. There are over 2250 of them. You can read them in the ECFS system.

"The League's was 41 pages long, plus four exhibits and one appendix. One interesting thing about the League's comments was that others were saying they supported it or opposed it–before it was filed. What these were really commenting on was the Board of Director's meeting decisions or a committee's recommendation that was published months before the comments (and the League's proposal) were filed.

"Others had pictures. I liked those, especially the one with the picture of Samuel Morse. The paper comments fill two boxes in my office. They, and the electronic ones, have been read, summarized, categorized, analyzed, tabulated, etc.

"With regard to the question about the number of license classes, the comments supported anywhere from one to seven operator license classes. Some commenters want some of the current license classes to remain and add new classes of licenses. Most of you thought that three or four classes of operator licenses are enough. The ARRL wants four; the NCVEC (National Conference of VECs) suggested we simplify even further than our proposal and go to three classes of operator licenses. A few of you wanted us to redo the 1951 license structure and then start again in 1999.

"I think I can safely say that simplification and streamlining aren't going to result in the same or more license classes, or new ones. Also, one or two operator license classes isn't going to encourage amateur radio operators to advance their skills the meaningful ways you want. A two-class structure is essentially a code/ no-code or a VHF and above and HF operator license class structure. There isn't much support for going this way. That leaves three or four classes.

"On the written exams, your comments were generally that they aren't testing on the correct information. You want change here.

"Now for a shameless advertisement: Send the questions you want in your question pools to the VEC Question Pool Committee

or QPC. For about 13 years, this group of individuals, year in and year out, has had the burden of revising each of the question pools (there are five of them) every few years. They do their best to keep them current. The work is thankless, and hard, and boring to some extent. It is a schedule that never ends.

"The QPC has called in all kinds of resources from educators and trainers and others who know about testing and learning. They do their work so you can buy study guides and upgrade your licenses. And they need help.

"If you think your exams are not asking questions on the right material, it is because the right questions are not making it into the question pools. And that is probably because the QPC isn't receiving them from you. They ask for questions every year, and from what I have heard, suggested questions just aren't flooding in."

[Send your question suggestions to: Ray Adams, W4CPA, e-mail: <wcars@ korrnet.org>, Fred Maia, W5YI, <w5yi@ w5yi.org>, Bart Jahnke, W9JJ, <bjahnke @arrl.org>, and/or Scotty Neustadter, W4WW, <scotty@airnet.net>.]

"The questions about the standards used in your telegraphy examinations drew the most passionate responses. Many of you wanted a single telegraphy exam at 5 words per minute. The ARRL suggested we reduce telegraphy to two elements—a 5 wpm and a 12 wpm exam.

"The commenters who asked for telegraphy requirements to be raised above 20 wpm probably are going to be disappointed.

"I do not have any announcement to make as to what the Commission has decided in this proceeding because the Commission hasn't decided anything . . . "

Bill Cross said that there were two processes, though, which the FCC Commissioners could rule on the Amateur Service restructuring item. It could be approved via the 'circulation' route . . . that is, the Report and Order would be 'circulated' to each of the Commissioner's offices for signature. Or the proceeding could be considered at the Commissioner's regular 'Agenda Meeting.'"

Riley Hollingsworth, K4ZDH

While Bill Cross spoke from a prepared text, Riley Hollingsworth addressed the Dayton FCC Forum crowd "off the cuff." He said the Amateur Service enforcement effort began in earnest last October and that the CIB (Compliance and Information Bureau) was being " . . . as creative with enforcement as some of the people we are going after."

He mentioned that some 150 warning letters had been issued and that in 75 to 80 percent of the cases, the letter resolved the problem. CIB is making extensive use of evidence—such as tape recordings and WAV files—submitted by the amateur community, especially that from the amateur auxiliary and official observer corps. Riley said that where warranted, the Commission was stepping up station inspections. Other actions taken include the FCC checking into amateur networks, short- term renewals or suspensions of licenses, and retesting of questionable amateurs. All action taken against violators is public information, and CIB is immediately releasing information about their enforcement activities to serve as a warning to others that the rules must be followed and are being enforced.

Many violators want to provoke people. Hollingsworth felt that "shunning violators"—that is, ignoring them on the air— was an effective way to deal with many problem amateurs. He also mentioned the questionable communications on 75 meters where " . . . 40 years of enforcement might raise the activity there to CB level." He said the CIB is "working" on the 75 meter problem.

There was a lengthy question-and-answer session after the remarks by Bill Cross and Riley Hollingsworth. Most were about enforcement issues, and the audience was indeed pleased that the FCC was taking action where necessary. 73, Fred, W5YI

BY GEORGE JACOBS, W3ASK

PROPAGATION

THE SCIENCE OF PREDICTING RADIO CONDITIONS

Total Solar Eclipse—August 11th

A total eclipse of the Sun is a spectacular astronomical event. This month on August 11th, the last total solar eclipse of both the 20th century and the second millennium will occur.

A total solar eclipse is the blocking out of all light and radiation from the Sun by the Moon at a point on Earth, as the Moon's path passes between the Sun and the Earth. At the time of totality, the Moon casts a shadow, briefly turning daylight into complete darkness, with a number of bright stars and planets visible. The shadow is called the Moon's *umbra*. With solar radiation cut off, there is a corresponding weakening of the ionosphere, and a change from day to night HF propagation conditions. A total solar eclipse is the only time when the Sun's luminous corona, surrounding the Sun, can be photographed, since it is normally invisible compared with the brilliant disc of the Sun.

Fig. 1 is a photo taken during a previous solar eclipse at the moment when the Moon completely shielded the Sun's light and radiation from reaching the Earth.

LAST-MINUTE FORECAST

Day-to-Day Conditions Expected for August 1999

	Expected Signal Quality			
Propagation Index.....	(4)	(3)	(2)	(1)
Above Normal: 7, 10, 25-26	A	A	B	C
High Normal: 8, 19, 23-24, 27	A	B	C	C-D
Low Normal: 3-4, 6, 9, 11-12, 14, 16-18, 20-22, 30-31	B	C-B	C-D	D-E
Below Normal: 1, 5, 13, 15, 28	C	C-D	D-E	E
Disturbed: 2, 29	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-poor (C-D) on Aug. 1st, poor (D) on the 2nd, fair-to-good (C-B) on the 3rd and 4th, fair-to-poor (C-D) on the 5th, etc.

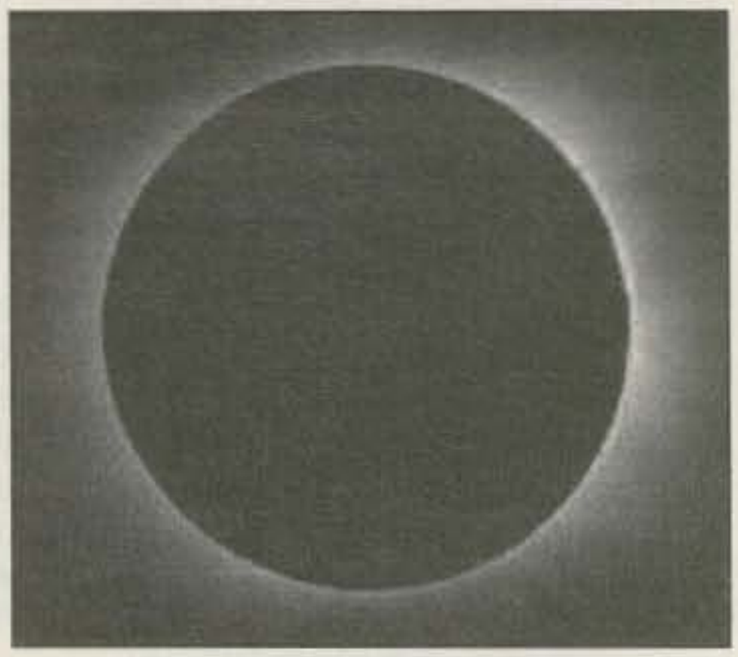

Fig. 1– Total eclipse of the Sun by the Moon, turning daylight into darkness. Note the luminous corona surrounding the Sun, which can be photographed only during a solar eclipse. (NASA photo)

Path of Totality

A total eclipse is not a very rare event, since they do occur every few years. However, the section of the Earth over which the Moon's umbra follows, called the *path of totality,* varies considerably with each eclipse.

The path of totality for the solar eclipse of August 11th will begin at 9:31 UT approximately 200 miles northeast of New York City. A path of 60 miles or so wide will sweep across the North Atlantic, across Central Europe and the Middle East, terminating to the east of India at 12:36 UT. Not since 1961 has the Moon cast its dark shadow upon these regions. The length of the entire path of totality will be approximately 9000 miles, which will be traversed in 3 hours and 5 minutes. Fig. 2 shows the path of totality for the August 11th solar eclipse, as well as areas of the world where it can be viewed as a partial eclipse. Table I lists data for some key points along the path of totality.

Eclipsed Ionosphere

Along the path of totality all light and radiation from the Sun will be cut off as the Moon passes between the Sun and the Earth. As well as plunging daylight into darkness, this will also prevent ultraviolet radiation from the Sun from reaching the Earth's ionosphere. Fig. 3 shows typical results on the ionosphere of the Moon's shielding effects during a solar eclipse. During the solar eclipse of August 11th, expect a sharp decrease in the strength of the ionosphere between the hours of 9:31 and 12:36 UT. During these hours, the ionosphere will act more as it does at night than during the day.

In North America it is expected that signals transversing the North Atlantic will be enhanced on 160, 80, 40, 30, and 20 meters. The ionosphere is likely to be too weak to support openings on the 17, 15, 12, and 10 meter bands until the eclipse has ended.

I would appreciate receiving observations made on the amateur bands during the August 11th solar eclipse. They may be sent either to my e-mail or to my snail-mail address.

Warning! Observing the Sun can be very dangerous if you do not take the proper safety precautions. Improper viewing of the Sun during an eclipse can cause "eclipse blindness," or eye retinal burns. The Sun can only be viewed directly when filters specially designed to protect the eyes are used. According to Dr. B. Ralph Chou of the School of Optometry, University of Waterloo, Canada, one of the most widely available filters for safe solar viewing is shade number 14 welder's glass, which can be obtained from welding supply outlets. During the brief period of totality, and only then, Dr. Chou points out, is it safe to view the completely shielded Sun without filters. The naked eye view of totality, according to Dr. Chou, is overwhelmingly awe-inspiring! Viewing in areas and at times when the eclipse will be partial requires eye protection!

The next total solar eclipse will take place on June 21, 2001. Its path of totality will cut across central Africa.

For a wealth of interesting information concerning solar eclipses in general and the eclipse of August 11th in particular, check NASA's web site at: <http://sunearth.gsfc.nasa.gov/eclipse/eclipse.html>

Progress of Sunspot Cycle 23

The Royal Observatory of Belgium reports a mean sunspot number of 64 for April 1999. This is based on the weighted average of daily telescopic observations made at a worldwide network of 42 cooperating observatories.

The daily sunspot count reached a high of 104 on April 9th and a low of 39 on the 1st. The mean value for April results in a

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12-month running smoothed sunspot number of 71 centered on October 1998, an increase of one from last month's smoothed number. The smoothed sunspot number is a 12-month average of monthly mean values centered on the middle month. This tends to smooth out daily and month-to-month variations. The solar cycle is measured by its smoothed monthly numbers. A smoothed sunspot count in the upper 90s is forecast for August 1999.

A corresponding increase was reported in the 10.7 cm solar flux level. Canada's Dominion Radio Astrophysical Observatory in Penticton, B.C., reports a monthly mean of 118 for April 1999. This results in a smoothed value of 128 centered on October 1998. A smoothed level in the lower-to-mid 140s is expected during August 1999.

August DX Conditions

Late August and early September are days when DX forecasters usually like to hide! This is the most difficult period for which to make accurate predictions, because conditions can change drastically from day to day. On some days conditions on the HF bands will sound much as they did during June and July, typically summertime. On other days they will sound more typically fall-like, with somewhat higher daytime and lower nighttime us-

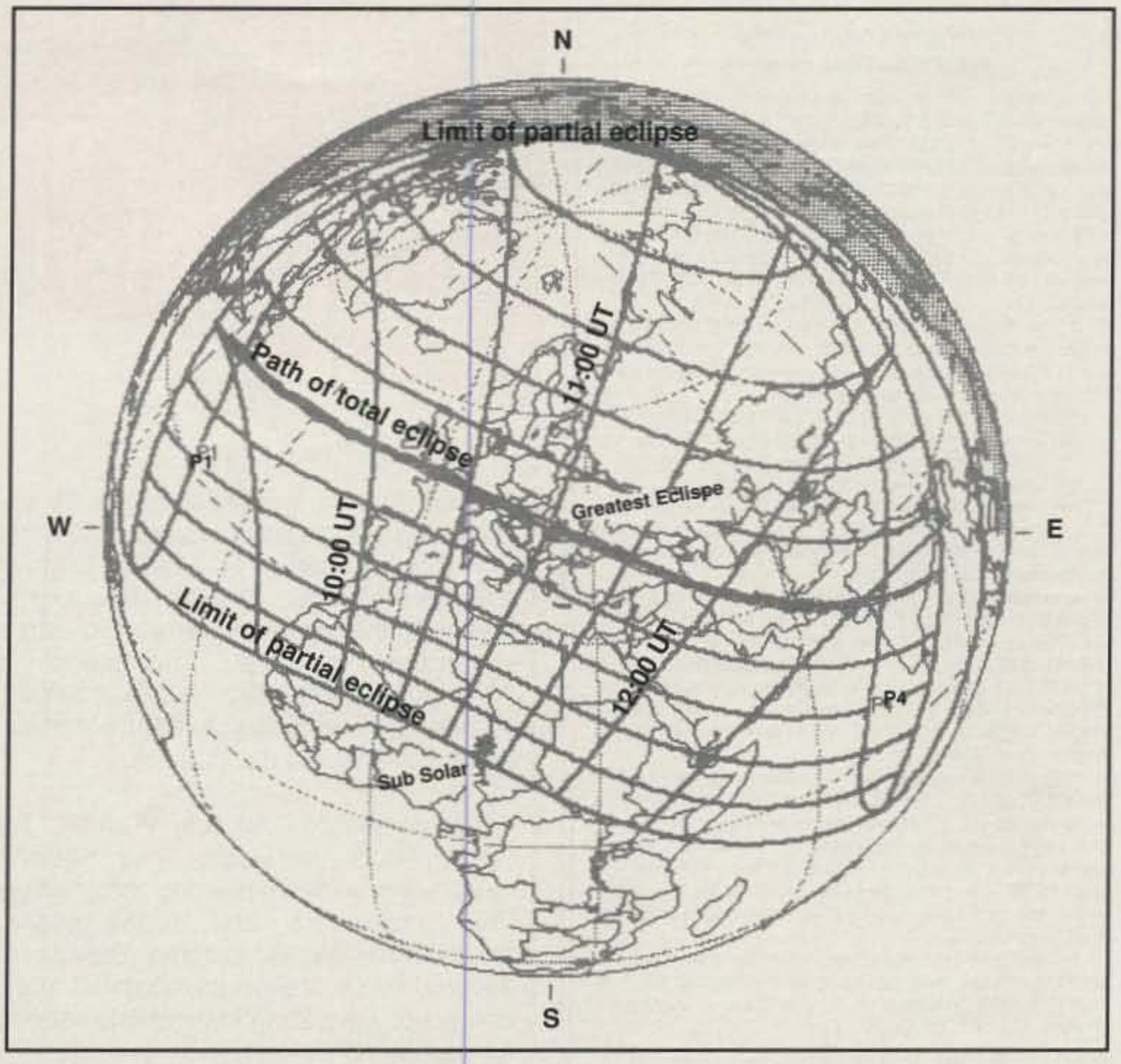

Fig. 2– Solar eclipse of August 11, 1999. Path of totality and area of partial eclipse are shown. (Espenak, NASA)

HOW TO USE THE DX PROPAGATION CHARTS

1. Use chart appropriate to your transmitter location. The Eastern USA Chart can be used in the 1, 2, 3, 4, 8, KP4, KG4, and KV4 areas in the USA and adjacent call areas in Canada; the Central USA Chart in the 5, 9, and 0 areas; the Western USA Chart in the 6 and 7 areas; and with somewhat less accuracy in the KH6 and KL7 areas.

2. The predicted times of openings are found under the appropriate meter band column (10 through 80 meters) for a particular DX region, as shown in the left-hand column of the charts.

3. The propagation index is the number that appears in ( ) after the time of each predicted opening. 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.

4. Times shown in the charts are in the 24-hour system, where 00 is midnight; 12 is noon; 01 is 1 A.M.; 13 is 1 P.M., etc. Appropriate *daylight* time is used, not GMT. To convert to GMT, add to the times shown in the appropriate chart 7 hours in PDT Zone, 6 hours in MDT Zone, 5 hours in CDT Zone, and 4 hours in EDT Zone. For example, 14 hours in Washington, D.C. is 18 GMT. When it is 20 hours in Los Angeles, it is 03 GMT, etc.

5. The charts are based upon a transmitted power of 250 watts CW, or 1 kw, PEP on sideband, into a dipole antenna a quarter-wavelength above ground on 160 and 80 meters, and a half-wavelength 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.

6. 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.

August 15 to September 15, 1999
Time Zone: EDT (24-Hour Time)
EASTERN USA TO:

To:	*10 Meters*	*15 Meters*	*20 Meters*	*40/80 Meters*
Western & Central Europe & North Africa	09-15 (1)	08-10 (1) 10-15 (2) 15-18 (3) 18-19 (2) 19-20 (1)	09-15 (1) 15-16 (2) 16-18 (3) 18-23 (4) 23-03 (3) 03-05 (2) 05-07 (3) 07-09 (2)	19-20 (1) 20-21 (2) 21-22 (3) 22-01 (4) 01-02 (3) 02-03 (2) 03-04 (1) 20-21 (1)* 21-22 (2)* 22-00 (3)* 00-01 (2)* 01-03 (1)*
Northern Europe European CIS	12-15	08-10 (1) 10-14 (2) 14-16 (3) 16-17 (2) 17-18 (1)	09-14 (1) 14-16 (2) 16-19 (3) 19-20 (2) 20-22 (1) 22-01 (2) 01-06 (1) 06-09 (2)	20-21 (1) 21-22 (2) 22-00 (3) 00-01 (2) 01-03 (1) 21-02 (1)*
Eastern Mediter-ranean & Middle East	12-16 (1)	08-10 (1) 10-13 (2) 13-16 (4) 16-18 (3) 18-19 (2) 19-20 (1)	07-09 (2) 09-16 (1) 16-17 (2) 17-20 (3) 20-23 (4) 23-00 (3) 00-02 (2) 02-07 (1)	19-21 (1) 21-00 (2) 00-01 (1) 22-00 (1)*
Western Africa	12-17 (1) 17-19 (2) 19-20 (1)	08-10 (1) 10-15 (2) 15-17 (3) 17-21 (4) 21-23 (3) 23-01 (2) 01-03 (1)	13-16 (1) 16-17 (2) 17-19 (3) 19-02 (4) 02-04 (3) 04-06 (2) 06-09 (1)	19-21 (1) 21-02 (2) 02-03 (1) 22-01 (1)*

Eastern & Central Africa	16-17 (1) 17-19 (2) 19-20 (1)	09-12 (1) 12-15 (2) 15-17 (3) 17-19 (4) 19-20 (3) 20-21 (2) 21-22 (1)	13-16 (1) 16-18 (2) 18-19 (3) 19-22 (4) 22-00 (3) 00-02 (2) 02-05 (1)	21-01 (1)
Central & South Asia	10-12 (1) 20-22 (1)	09-10 (1) 10-12 (1) 12-13 (1) 18-20 (1) 20-22 (2) 22-23 (1)	07-08 (1) 08-10 (2) 10-12 (1) 18-20 (1) 20-22 (2) 22-02 (1)	06-08 (1) 20-22 (1)
Southern Africa	09-11 (1) 11-15 (2) 15-17 (1)	08-11 (1) 11-13 (2) 13-14 (3) 14-16 (4) 16-17 (3) 17-18 (2) 18-19 (1)	06-08 (2) 08-15 (1) 15-18 (2) 18-21 (3) 21-22 (2) 22-00 (1) 00-03 (3) 03-04 (2) 04-06 (1)	21-22 (1) 22-00 (2) 00-02 (1) 23-01 (1)*
Southeast Asia	18-21 (1)	09-12 (1) 12-16 (2) 16-19 (1) 19-21 (2) 21-22 (1)	06-07 (1) 07-09 (2) 09-12 (1) 19-21 (1) 21-23 (2) 23-02 (1)	06-08 (1)
Far East	18-20 (1)	09-11 (2) 16-18 (1) 18-20 (2) 20-22 (1)	17-20 (1) 20-22 (3) 22-00 (2) 00-05 (1) 05-06 (2) 06-08 (3) 08-10 (2) 10-12 (1)	05-08 (1)
South Pacific & New Zealand	09-14 (1) 14-18 (2) 18-20 (3) 20-21 (2) 21-22 (1)	09-10 (1) 10-12 (2) 12-16 (1) 16-18 (2) 18-19 (3) 19-21 (4) 21-22 (3) 22-23 (2) 23-01 (1)	14-20 (1) 20-22 (2) 22-01 (3) 01-04 (4) 04-05 (3) 05-06 (2) 06-09 (3) 09-10 (2) 10-12 (1)	01-02 (1) 02-03 (2) 03-06 (3) 06-08 (2) 08-09 (1) 03-05 (1)* 05-07 (2)* 07-08 (1)*
Australasia	09-11 (1) 16-18 (1) 18-20 (2) 20-22 (1)	09-10 (1) 10-11 (2) 11-12 (1) 16-18 (1) 18-20 (2) 20-22 (3) 22-23 (2) 23-00 (1)	05-08 (2) 08-10 (3) 10-12 (2) 12-17 (1) 17-19 (2) 19-22 (1) 22-01 (2) 01-05 (4)	03-04 (1) 04-07 (2) 07-08 (1) 05-07 (1)*
Caribbean, Central America & Northern Countries of South America	09-11 (1) 11-13 (2) 13-15 (3) 15-18 (4) 18-19 (2) 19-21 (1)	07-08 (1) 08-09 (2) 09-12 (4) 12-14 (3) 14-21 (4) 21-22 (3) 22-23 (2) 23-01 (1)	06-07 (3) 07-10 (4) 10-11 (3) 11-15 (2) 15-17 (3) 17-03 (4) 03-05 (3) 05-06 (2)	19-20 (1) 20-21 (2) 21-23 (3) 23-03 (4) 03-05 (3) 05-06 (2) 06-07 (1) 22-23 (1)* 23-05 (2)* 05-06 (1)*
Peru, Bolivia, Paraguay, Brazil, Chile, Argentina, & Uruguay	08-10 (1) 10-12 (2) 12-14 (1) 14-16 (2) 16-17 (3) 17-18 (4) 18-19 (3) 19-20 (2) 20-21 (1)	07-08 (1) 08-11 (2) 11-15 (1) 15-16 (2) 16-18 (3) 18-22 (4) 22-00 (3) 00-01 (2) 01-02 (1)	10-16 (1) 16-18 (2) 18-19 (3) 19-02 (4) 02-04 (3) 04-07 (2) 07-09 (3) 09-10 (2)	20-21 (1) 21-22 (2) 22-03 (3) 03-05 (2) 05-07 (1) 22-00 (1)* 00-04 (2)* 04-06 (1)
McMurdo Sound, Antarctica	16-17 (1) 17-18 (2) 18-19 (1)	12-17 (1) 17-19 (2) 19-21 (3) 21-22 (2) 22-23 (1)	16-19 (1) 19-22 (2) 22-02 (3) 02-05 (2) 05-08 (1) 07-09 (1)	01-05 (1)

Time Zones: CDT & MDT (24-Hour Time)
CENTRAL USA TO:

To:	*10 Meters*	*15 Meters*	*20 Meters*	*40/80 Meters*
Western & Southern Europe & North Africa	10-13 (1)	09-10 (1) 10-12 (2) 12-16 (3) 16-17 (2) 17-18 (1)	08-13 (1) 13-16 (2) 16-17 (3) 17-21 (4) 21-23 (2) 23-01 (1) 04-06 (1) 06-08 (2)	19-21 (1) 21-22 (2) 22-00 (3) 00-02 (2) 02-03 (1) 20-22 (1)* 22-00 (2)* 00-02 (1)*
Northern & Central Europe & European CIS	11-13 (1)	09-10 (1) 10-13 (2) 13-15 (3) 15-16 (2) 16-17 (1)	01-06 (1) 06-09 (2) 09-12 (1) 12-15 (2) 15-18 (3) 15-18 (3) 18-19 (2) 19-22 (1) 22-01 (2)	19-20 (1) 20-00 (2) 00-02 (1) 21-00 (1)*
Eastern Mediter-ranean & Middle East	11-13 (1) 15-17 (1)	10-12 (1) 12-14 (2) 14-16 (3) 16-17 (2) 17-18 (1)	06-07 (1) 07-09 (2) 09-16 (1) 16-18 (2) 18-22 (3) 22-00 (2) 00-02 (1)	20-23 (1) 21-22 (1)*
Western Africa	10-14 (1) 14-17 (2) 17-18 (1)	07-10 (1) 10-13 (2) 13-15 (3) 15-19 (4) 19-21 (3) 21-23 (2) 23-00 (1)	13-15 (1) 15-17 (2) 17-20 (3) 20-00 (4) 00-02 (3) 02-04 (2) 04-06 (1)	19-22 (1) 22-00 (2) 00-01 (1) 22-00 (1)*
Eastern & Central Africa	14-16 (1) 16-18 (2) 18-19 (1)	10-14 (1) 14-15 (2) 15-16 (3) 16-17 (4) 17-18 (3) 18-19 (2) 19-20 (1)	13-15 (1) 15-18 (2) 18-19 (3) 19-21 (4) 21-23 (3) 23-00 (2) 00-02 (1)	20-00 (1)

Geographical Location	Time of maximum umbra (UT)	Length of maximum umbra (seconds)
200 miles south of Nova Scotia	9:31	47
Plymouth, England	10:15	99
Metz, France	10:29	133
Stuttgart, Germany	10:31	137
Lake Balaton, Hungary	10:50	142
Bucharest, Romania	11:07	142
Southeast Turkey	11.45	135
125 miles north of Baghdad	11:49	125
Karachi, Pakistan	12:24	73
Central India	12:32	50

Table I– Time and duration of total eclipse at key geographical points along path of totality for solar eclipse of August 11th.

Southern Africa	09-11 (1) 11-13 (2) 13-15 (1)	08-09 (1) 09-11 (2) 11-12 (3) 12-14 (4) 14-15 (3) 15-17 (2) 17-18 (1)	06-08 (2) 08-15 (1) 15-16 (2) 16-19 (3) 19-21 (2) 21-23 (1) 23-03 (2) 03-06 (1)	20-21 (1) 21-23 (2) 23-00 (1) 21-00 (1)*
Central & South Asia	09-11 (1) 19-21 (1)	08-09 (1) 09-10 (2) 10-11 (1) 18-19 (1) 19-21 (2) 21-23 (1)	06-07 (1) 07-09 (3) 09-10 (2) 10-11 (1) 17-19 (1) 19-22 (2) 22-02 (1)	05-08 (1) 19-21 (1)
Southeast	12-14 (1) 17-19 (1)	08-09 (1) 09-12 (2) 12-16 (1) 16-18 (2) 18-20 (3) 20-21 (2) 21-22 (1)	06-07 (1) 07-09 (2) 09-13 (1) 18-20 (1) 20-23 (2) 23-00 (3) 00-01 (2) 01-02 (1)	05-08 (1)
Far East	16-20 (1)	08-10 (1) 13-15 (1) 15-17 (2) 17-18 (3) 18-20 (4) 20-21 (3) 21-22 (2) 22-23 (1)	19-22 (1) 22-23 (2) 23-01 (3) 01-03 (2) 03-06 (1) 06-07 (2) 06-09 (3) 09-11 (2) 11-13 (1)	03-06 (1) 06-07 (2) 07-08 (1) 06-07 (1)*
South Pacific & New Zealand	10-12 (1) 12-17 (2) 17-18 (3) 18-19 (4) 19-20 (3) 20-21 (2) 21-22 (1)	07-11 (1) 11-17 (2) 17-19 (3) 19-21 (4) 21-22 (3) 22-00 (2) 00-02 (1)	07-09 (4) 09-10 (3) 10-13 (2) 13-18 (1) 18-20 (2) 20-22 (3) 22-02 (1) 02-04 (3) 04-07 (2)	23-00 (1) 00-01 (2) 01-04 (3) 04-06 (4) 06-07 (2) 07-08 (1) 23-01 (1)* 01-05 (2)* 05-06 (3)* 06-07 (1)*
Australasia	09-11 (1) 15-17 (1) 17-18 (2) 18-19 (3) 19-20 (2) 20-21 (1)	09-11 (2) 14-15 (1) 15-17 (2) 17-19 (1) 19-20 (2) 20-21 (4) 21-22 (3) 22-23 (2) 23-00 (1)	07-09 (4) 09-10 (3) 10-13 (2) 13-19 (1) 19-22 (2) 22-00 (3) 00-03 (4) 03-05 (3) 05-07 (2)	02-04 (1) 04-05 (2) 05-07 (3) 07-08 (1) 04-05 (1)* 05-06 (2)* 06-07 (1)*
Caribbean, Central America & Northern Countries of South America	09-11 (1) 11-13 (2) 13-15 (3) 15-17 (4) 17-18 (2) 18-19 (1)	07-08 (1) 08-09 (2) 09-12 (4) 12-14 (3) 14-20 (4) 20-22 (3) 22-23 (2) 23-01 (1)	07-10 (4) 10-12 (3) 12-15 (2) 15-17 (3) 17-01 (4) 01-03 (3) 03-05 (2) 05-07 (3)	19-20 (1) 20-21 (2) 21-23 (3) 23-02 (4) 02-05 (3) 05-06 (2) 06-07 (1) 20-22 (1)* 22-05 (2)* 05-06 (1)*
Peru, Bolivia, Paraguay, Brazil, Chile, Argentina & Uruguay	07-08 (1) 08-13 (2) 13-15 (3) 15-18 (4) 18-19 (2) 19-20 (1)	07-08 (1) 08-10 (2) 10-13 (1) 13-15 (2) 15-17 (3) 17-21 (4) 21-23 (3) 23-00 (2) 00-01 (1)	10-15 (1) 15-17 (2) 17-18 (3) 18-01 (4) 01-03 (3) 03-06 (2) 06-08 (3) 08-10 (2)	19-20 (1) 20-21 (2) 21-02 (3) 02-03 (2) 03-05 (1) 20-22 (1)* 22-02 (2)* 02-03 (1)*
McMurdo Sound, Antarctica	11-15 (1) 15-18 (2) 18-19 (1)	10-15 (1) 15-19 (2) 19-21 (3) 21-22 (2) 22-23 (1)	16-18 (1) 18-20 (2) 20-02 (3) 02-04 (2) 04-07 (1) 07-09 (2) 09-10 (1)	00-04 (1) 04-06 (2) 06-07 (1)

Time Zones: CDT & MDT (24-Hour Time)
Western USA TO:

To:	*10 Meters*	*15 Meters*	*20 Meters*	*40/80 Meters*
Western & Southern Europe & North Africa	11-13 (1)	08-09 (1) 09-12 (2) 12-14 (1) 14-15 (2) 15-16 (1) 22-00 (1)	00-07 (1) 07-09 (2) 09-13 (1) 13-15 (2) 15-19 (3) 19-22 (2) 22-00 (3)	19-21 (1) 21-23 (2) 23-00 (1) 22-23 (1)
Central & Northern Europe & European CIS	*Nil*	07-09 (1) 09-11 (2) 11-13 (1) 13-14 (1) 14-16 (1) 22-00 (1)	12-14 (1) 14-16 (2) 16-17 (3) 17-23 (2) 23-01 (1) 06-08 (2) 08-09 (1)	19-23 (1)
Eastern Mediter-ranean & Middle East	*Nil*	07-09 (1) 09-11 (2) 11-13 (1) 13-14 (2) 14-15 (1) 22-00 (1)	12-15 (1) 15-17 (2) 17-19 (3) 19-23 (2) 23-01 (1) 06-08 (1)	20-22 (1)
Western & Central Africa	10-13 (1) 13-16 (2) 16-17 (1)	08-11 (1) 11-13 (2) 13-17 (3) 17-19 (2) 19-20 (1)	13-15 (1) 15-17 (2) 17-19 (3) 19-21 (4) 21-23 (3) 23-03 (2) 03-08 (1)	21-23 (1)
Eastern Africa	13-16 (1)	09-13 (1) 13-15 (2) 16-17 (3) 17-18 (2) 18-19 (1) 00-02 (1)	13-16 (1) 16-18 (2) 18-21 (3) 21-23 (2) 23-00 (1)	*Nil*
Southern Africa	09-11 (1) 11-13 (2) 13-15 (1)	08-10 (1) 10-12 (2) 12-14 (1) 14-15 (2) 15-16 (3) 16-17 (2) 17-18 (1)	13-15 (1) 15-17 (2) 17-20 (3) 20-22 (2) 22-00 (3) 00-02 (2) 02-06 (1) 06-08 (2) 08-10 (1)	19-21 (1) 21-22 (2) 22-23 (1) 21-22 (1)*
Central & South Asia	17-19 (1)	08-09 (1) 09-11 (2) 11-13 (1) 16-18 (1) 18-21 (2) 21-23 (1)	06-07 (1) 07-09 (3) 09-11 (1) 19-21 (1) 21-23 (2) 23-01 (1)	05-07 (1) 17-19 (1)
Southeast Asia	16-19 (1)	09-10 (1) 10-12 (3) 12-13 (3) 13-16 (1) 16-19 (2) 19-21 (3) 21-22 (2) 22-23 (1)	23-01 (1) 01-02 (2) 02-04 (3) 04-07 (2) 07-09 (3) 09-11 (2) 11-14 (1)	03-07 (1)
Far East	12-14 (1) 14-16 (2) 16-18 (1)	09-10 (1) 10-12 (2) 12-15 (1) 15-17 (2) 17-19 (3) 19-21 (4) 21-22 (2) 22-23 (1)	19-21 (1) 21-23 (2) 23-01 (3) 01-04 (4) 04-05 (2) 05-06 (1) 06-08 (2) 08-10 (3) 10-12 (2) 12-14 (1)	01-02 (1) 02-03 (2) 03-05 (3) 05-06 (2) 06-07 (1) 03-06 (1)*
South Pacific & New Zealand	10-13 (1) 13-15 (2) 15-18 (3) 18-20 (4) 20-21 (2) 21-22 (1)	08-10 (1) 10-12 (3) 12-15 (2) 15-18 (3) 18-22 (4) 22-00 (3) 00-02 (2) 02-03 (1)	07-09 (4) 09-11 (3) 11-13 (2) 13-17 (1) 17-19 (2) 19-21 (3) 21-03 (4) 03-05 (3) 05-07 (2)	22-23 (1) 23-00 (2) 00-03 (3) 03-06 (4) 06-07 (3) 07-08 (1) 23-01 (1) 01-06 (2)* 06-07 (1)*
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Caribbean, Central America & Northern Countries of South America	09-11 (1) 11-12 (2) 12-14 (3) 14-16 (4) 16-17 (2) 17-18 (1)	07-08 (1) 08-09 (2) 09-14 (3) 14-19 (4) 19-20 (3) 20-22 (2) 22-00 (1)	06-08 (4) 08-11 (3) 11-15 (2) 15-18 (3) 18-04 (4) 04-06 (3)	19-21 (1) 21-01 (3) 01-03 (2) 03-05 (3) 05-06 (2) 06-07 (1) 20-22 (1)* 22-04 (2)* 04-05 (1)*
Peru, Bolivia, Paraguay, Brazil, Chile, Argentina & Uruguay	09-11 (1) 11-13 (2) 13-14 (3) 14-16 (4) 16-17 (3) 17-18 (2) 18-19 (1)	06-08 (1) 08-10 (2) 10-13 (1) 13-15 (2) 15-16 (3) 16-22 (4) 22-23 (3) 23-00 (2) 00-01 (1)	09-15 (1) 15-17 (2) 17-18 (3) 18-01 (4) 01-02 (3) 02-06 (2) 06-08 (3) 08-09 (2)	20-21 (1) 21-00 (2) 00-02 (1) 02-04 (3) 04-05 (2) 05-06 (1) 22-01 (1)* 01-03 (2)* 03-05 (1)*
McMurdo Sound, Antarctica	13-15 (1) 15-17 (2) 17-19 (1)	12-16 (1) 16-18 (2) 18-20 (3) 20-22 (2) 22-00 (1)	09-11 (1) 17-19 (1) 19-20 (2) 20-01 (3) 01-03 (2) 03-04 (1) 06-08 (2)	22-23 (1) 23-01 (2) 01-04 (1) 04-06 (2) 06-07 (1)

*Indicates best time to listen for 80 meter openings.

For 12 meter openings, interpolate between 10 and 12 meter openings.

For 17 meter openings, interpolate between 15 and 20 meter openings.

For 30 meter openings, interpolate between 40 and 20 meter openings.

able frequencies. Since this is a period of transition, this month's DX Propagation Charts cover only the one-month period from August 15th through September 15th, rather than the usual two-month span. Short-Skip Charts for use during August appeared in last month's column.

Good DX openings to many areas of the world should be possible on four bands during the daylight hours—10, 15, 17, and 20 meters. Fifteen and 17 meters are expected to be the best of these bands for most of the daylight hours. Look for optimum DX openings on 20 meters for a window of about an hour or two after sunrise, and again during the late afternoon and early evening hours, although the band should remain open for DX to one area of the world or another just about around the clock on most days. Some fairly good 10 meter openings should be possible, particularly during the afternoon hours, to South America and Africa.

As September approaches, conditions on all four bands should improve during the daylight hours, but expect the bands to close somewhat earlier as a result of the increasing hours of darkness.

From sundown to midnight expect good DX conditions on 20, 30, 40, and 80 meters. From midnight to sunrise the best DX bands should be 30 and 40 meters. Expect plenty of DX also on 80 meters, and 20 meters should remain open to southern and tropical areas during this time period as well.

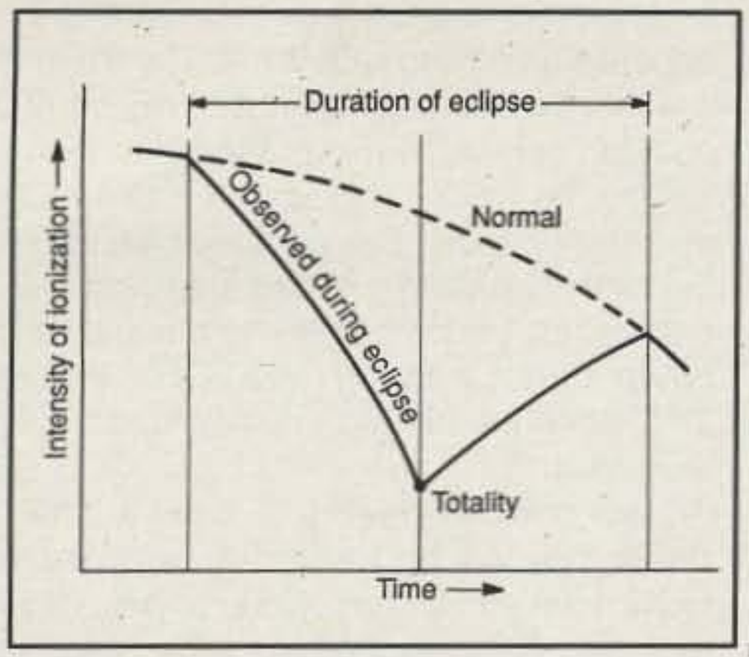

Fig. 3– A sharp decrease in ionization is observed during an eclipse, corresponding to its progress.

By late August it should also be possible to work some DX on 160 meters during the hours of darkness. Conditions on this band, as well as on 40 and 80 meters, tend to peak just as the Sun begins to rise on the light, or eastern, side of the path.

VHF Ionospheric Openings

August should be a very active month for meteor showers, with at least five different ones expected to peak during the first three weeks of the month. At least one of these, the *Perseids,* should be an intense shower with a great deal of activity. It is expected to last for five days, with maximum intensity likely to occur during the afternoon of August 12th. Maximum periods for other meteor showers expected during the month are August 5th, 12th, 18th, and 20th.

Ionization produced by the thousands of meteors expected to enter the Earth's atmosphere during these showers, particularly during periods of maximum intensity, is expected to make possible numerous meteor-scatter-type openings over several hundreds of miles on the 10, 6, and 2 meter bands.

Although on the decrease, fairly frequent sporadic-*E* ionization is expected to continue during August, resulting in some good short-skip openings on 10 and 6 meters over distances of approximately 600 to 1300 miles. During periods of very intense and widespread sporadic-*E* ionization, two-hop openings may also be possible up to distances of about 2600 miles. An occasional opening on the 2 meter band may also occur during August, over distances ranging between approximately 1000 and 1400 miles. While this type of short-skip propagation may occur at any time of the day or night during August, there is a tendency for sporadic-*E* ionization to peak between 8 AM and noon and again between 6 and 9 PM local daylight time.

An occasional 6 meter *F-2* layer DX opening may be possible beginning late August towards southern and tropical areas (i.e., South America and central and southern Africa). Be sure to check 6 meters when a strong opening is observed to these areas on 10 meters.

Auroral displays produce ionization in the Earth's atmosphere which is often capable of reflecting VHF radio signals over distances upwards of 1000 miles or so. Auroral displays and associated auroral-scatter propagation are most likely to occur during August when HF conditions are Below Normal or Disturbed. Check the Last-Minute Forecast at the beginning of this column for those days expected to be in these categories during the month.

There is a fairly good chance for some 6 meter transequatorial (TE) openings during late August, with conditions expected to improve considerably by mid-September. The optimum times for TE openings between the U.S. and Latin America should be the early evening hours, shortly before and just after sundown. TE openings favor locations in the southern tier states, although some may be possible to states farther north.

73, George, W3ASK

OUR READERS SAY

(from page 8)

radio community exclusive, but how long will it survive if we don't attract enough young people to keep it going into the next century?

I've often thought that I might well be among the last amateur radio operators interested in HF and VHF propagation in the atmosphere. (Presumably, such communications will be possible for the indefinite future, at least as long as governments are compliant and amateur technicians remain interested in them.) I certainly hope that does not turn out to be the case. I don't want to open the floodgates and create a new CB fiasco, but at the same time I don't want to see amateur radio die from lack of interest or from a conflict of interests.

I am therefore ready after twenty years to yield a bit, lower the gateway, and encourage interest in amateur radio in any way possible. My impression is that we are not reaching the young to any appreciable degree. We need to think about how to do so. If we fail in that, some of us may live long enough to see amateur radio disappear altogether. Since radio communications have become an enriching lifetime experience for me, I am ready to promote any reasonable measures to preserve that experience for future generations to come.

Bob Olson, WD4OHD

73, Your Majesty

Editor, CQ:

I have been involved in ham radio ever since 1961, when I received the call WN2ETV. I was living in northern New Jersey at the time, and I had an old DX-40 and an old Hallicrafters SX-140 receiver with a Mosley vertical antenna on my roof about 60 feet in the air. I can still recall the cold winter nights I would fire up my DX-40 and sit there and work the different states. The thrill of it was to receive a QSL card from the stations worked.

As time went on, I went to college and got away from ham radio for a while. In 1967 I went back to it, and at that time I received my Advanced ticket and the call WA2QHV. Now I had a brand new Swan 500C with a full KW and a three-element Mosley beam about 100 feet in the air! I was introduced to something called SSB. I went off CW for a while and worked SSB 90 percent of the time.

I can't recall when it was, but I believe it was back in 1969. I remember reading in *QST* magazine that King Hussein of Jordan had received his ham ticket and was on the air as JY1. On night while listening to the 20 meter band, I came across a very strong signal. A gentleman with an accent was calling CQ. When I heard that it was JY1, I almost fell out of my seat! I couldn't believe it! It was King Hussein!

After he said, "This is JY1 calling CQ and standing by," I gave him a call. When I ended my calling, I heard many stations calling him. He came back to me and I will never forget hearing "WA2QHV this is JY1, good evening to you my friend, this is Hussein."

I just couldn't believe it! What a thrill! I remember we had about a two-minute QSO. I asked him for a QSL, and he gave me his QSL manager, who was in Pennsylvania. Later on throughout that year I remember talking to him again a few more times and signing on to a net he conducted called the Arabian Knights Net on 20 meters in which we worked "cross band" with him! There were people from all over the world signing into this net. What a thrill! In later days I worked his wife at the time, Muna, who was JY2, and a captain in his army, JY3.

I was very sad to hear about the passing of King Hussein. He was a great ambassador of ham radio and a friendly voice on 20 meters. 73, Your Majesty.

Lon Cerame, KE6MLH

At Least An SASE

Editor, *CQ:*

With the upswing of the sunspot cycle and more and more hams becoming interested in contests and awards, the QSL cards are flying. A huge amount of these cards are being sent without SASEs. I was wondering if you could please post an article about the ethics of QSLing. I think that along the lines of QSLing, it is not a requirement of a QSO and no one has to send a card if they don't want to. However, if you would like to have someone's card, you should at least send them return postage. Contesters like myself do not need many cards, as we have DXCC, WAS, WAZ, WAC, and many other awards such as the 10-10 awards. So if everyone I worked sent me a QSL card from the last contest I was in, which was the 10-10 contest, and wanted one back, and it numbered some 350 contacts. 350 times $.20 would total some $70, not counting the cards, envelopes, and gas to and from the post office a couple of times a week (12 miles round trip).

On my way to the ±329 countries, I have spent hundreds and hundreds of dollars for postage. The return on the cards is only about 75% direct and 40% via the bureau. I have heard this complaint many times over the past few months, and with the contest season getting hotter and hotter, I think that this would be something good to print.

Ernie Orman, W5OXA

ANNOUNCEMENTS

(from page 6)

Fire County Grounds, **Lewistown, PA**. Contact Richard Yingling at 717-242-1882.

Aug. 8, **65th Hamfesters Hamfest**, Will County Fairgrounds, **Peotone, IL**. Contact Tom Davis, 14914 Washtenaw, Harvey, IL 60426; or e-mail: <tdavis@internetplus.net>.

Aug. 8, **Triple States RAC 22nd Annual Hamfest**, Red Mens Picnic Grounds, **Martins Ferry, OH**. Contact TSRAC, 2011 St Hwy 250 Adena, OH 43901 (phone 740-546-3930; fax: 740-546-3685; e-mail: <k8an@aol.com>).

Aug. 8, **Greentown, IN Hamfest**, Greentown Lions Club Fairgrounds, **Greentown, IN**. Contact L. B. Nickerson, KA6NQW, 517 North Hendricks Ave., Marion, IN 46952 (765-668-4814; e-mail: <ka6nqwnick@netusal.net>; on the web: <www.netusa1.net/~ka6nqwnick/hamfest.html>.

Aug. 14, **Tri-State ARA Hamfest & Computer Show**, Veterans Memorial Field House, **Huntington, WV**. Contact Jerry Stickler, KA8TUD, P.O. Box 4120, Huntington, WV 25729 (304-736-2664). (Exams)

Aug. 14, **Brantford ARC Hamfest '99**, Burford Fairgrounds, **Burford, Ontario**. Contact Bob, VA3BIK, 519-442-4699, or e-mail: <va3bik@rac.ca>.

Aug. 15, **Tailgate Electronics, Computer & Amateur Radio Fleamarket**, Albany & Main St., **Cambridge, MA**. Contact W1GSL, P.O. Box 397082 MIT BR., Cambridge, MA 02139-7082. (Handicapped accessible)

Aug. 15, **York Ham & Computer Swapfest & Fun Auction**, York Vo Tech School, **York, PA**. For information, call 717-741-1780; e-mail: <ad3e@aol.net>.

Aug. 15, **NoBARC Hamfest**, Adams, MA. Contact Joel Miller, N1WCF, 413-442-2609, e-mail: <n1wcf@nobarc.org>; web: <http://www.nobarc.org>.

Aug. 15, **Central Kentucky Hamfest & Computer Show**, National Guard Armory, **Lexington, KY**. Contact John Barnes, KS4GL, at <ks4gl@juno.com>, 606-253-1178 (evenings), or send SASE to John Barnes, KS4GL, 216 Hillsboro Avenue, Lexington, KY 40511-2105. (Exams; handicapped accessible)

Aug. 21, **Kosciusko Co. Hamfest & Computer Show**, Kosciusko Co. Fair grounds, **Warsaw, IN**. Contact Loren Melton, WB9OST, 219-858-9374 evenings; e-mail: <wbØost@waveone.net>. (Exams)

Aug. 21, **Finger Lakes Hamfest & Computerfest**, Tompkins County Airport, Taughannock Aviation Hanger, **Ithaca, NY**. For info contact Richard Spingarn, AA2UP, <richard@eagleprint.com>; web: <www.compcenter.com/~tcarc>.(Exams; handicapped accessible)

Aug. 21, **Roanoke Valley Hamfest & Computer Show**, William Byrd High School, **Vinton, VA**. Contact Mike Marsh, KF4MUB, at Roanoke Valley ARC, P.O. Box 2002, Roanoke, VA 24009, or call 540-389-3056; e-mail: <mikekf4mub@aol.com>. (Exams)

Aug. 21, **W7DG 8th Annual Ham Radio, Computer & Electronic Equipment Swapmeet**, Cowlitz Co. Expo Center (Fairgrounds), **Longview, WA**. Contact Bob Morehouse, KB7ADO, 360-425-6076 eves., or write to LCARA Swap Meet, P.O. Box 906, Longview, WA 98632; e-mail: <kb7ado@aol.com>; web: <www.qsl.net/nc7p/>.

Aug. 21–22, **1999 Duke City Hamfest**, National Guard Armory, **Rio Rancho, NM**. Contact Marcus Lieberman, KM5EH, 505-836-1724; e-mail: <buckml@lobo.net>.

Aug. 22, **Ak-Sar-Ben ARC Annual Fleamarket**, Millard Social Hall, **Omaha, NE**. Contact Gerry Gross, WA6POZ, PMB 142, 643 N. 98th St., Omaha, NE 68114-2342; phone (leave message)/fax 402-891-2481; e-mail: <wa6poz@arrl.net>; web: <http://www.qsl.net/kØusa>.

Aug. 27–29, **25th Eastern VHF/UHF Conference,** Harley Hotel, **Enfield, CT**, Contact Chairman Bruce Wood, N2LIV, 3 Maple Glen Ln., Nesconset, NY 11767-1711 (work 516-225-9400; home 516-265-1015; e-mail: <bdwood@erols.com>; web: <http://uhavax.hartford.edu/~newsvhf>).

Aug. 28, **7th Annual Hamfest**, Mohawk Drive-in Theater, **Gardner, MA**. Talk-in: 145.370 RPTR. For information, contact Paul, W1SEX, 978-632-9432.

Aug. 28, **La Porte ARC Hamfest**, La Porte County Fairgrounds, **La Porte, IN**. Contact Neil Straub, WZ9N, P.O. Box 30, La Porte, IN 46352 (219-324-7525; e-mail: <nstraub@netnitco.net>; on the web: <www.geocities.com/siliconvalley/byte/1653>.

Aug. 28, **Gainesville, Texas Hamfest**, Gainesville Civic Center, **Gainesville, TX**. Contact James Floyd, N5ZPU, 940-668-7511; e-mail: <jfloyd@cooke.net>, or John Clausing 940-665-2285; e-mail: <ks6ez@texoma.net>.

Aug. 28–29, **MARC Camp/Swapfest**, Colorado Lions Club Camp, **Woodland Park, CO**. Contact Wes, KØHPZ, 719-687-8758, or <wlw@prodigy.net>;or MARC, P.O. Box 1012, Woodland Park, CO 80866.

Sept. 18–19, **Weinheim VHF Conference**, "Mannheimer Maimarkthalle" (Mannheim May Fair Centre) near **Weinheim, Germany** (this is a new location). Check the Weinheim VHF Conference web site at: <http://www.hamradio.de/weinheim>. ■

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FREE HAM RADIO GOSPEL TRACTS: Christian youth leaders needed for out-reach areas. Membership is free. Send #10 SASE with call letters for details. Ray Bohmer, W1REZ, P.O. Box 8, Harmony, ME 04942.

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WANTED: HAM EQUIPMENT AND RELATED ITEMS. Donate your excess gear—new, old, in any condition—to the Radio Club of Junior High School 22, the Nation's only full time non-profit organization working to get Ham Radio into schools around the country as a teaching tool using our EDUCOM—Education Thru Communication—program. Send your radio to school. Your donated material will be picked up ANYWHERE or shipping arranged, and this means a tax deduction to the full extent of the law for you as we are an IRS 501(c)(3) charity in our 18th year of service. It is always easier to donate and usually more financially rewarding, BUT MOST IMPORTANT your gift will mean a whole new world of educational opportunity for children nationwide. Radios you can write off; kids you can't. Make 1999 the year to help a child and yourself. Write, phone, or FAX the WB2JKJ "22 Crew" today: The RC of JHS 22, P.O. Box 1052, New York, NY 10002. Twenty-four hours call 516-674-4072; fax 516-674-9600; or e-mail <wb2jkj@juno. com>. Join us on the WB2JKJ Classroom Net, 7.238 MHz, 1200–1330 UTC daily and 21.395 MHz from 1400 to 2000 UTC.

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(continued on page 99)

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WANTED: ICOM IC-970. Must be in mint condition, non-smoker. Also looking for ICOM UX-R96 and UX-97 plug-in modules for the ICOM IC-970. Randy Ballard, N5WV, 903-687-3002.

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TUBES, USED: $2.00 each tested. Winton Radford, 1408 Second Rd., Baltimore, MD 21220.

KENWOOD TS-520S $350. TS-530S $475. Yaesu FT-901DM $500. K1BW, 413-538-7861.

TESLA. WIZARD by Marc Seifer. Citadel Press. Definitive biography. "THOROUGH, INFORMATIVE, ENTERTAINING," *Electronic Engineering Times*. <**www.netsense.net/tesla**>**GREAT CIRCLE MAPS** computer generated for your exact QTH, $20 ppd worldwide. Printouts $12 ppd. SASE for info. Bill Johnston, K5ZI, Box 640, Organ, NM 88052 (505-382-7804).

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RAINBOW AMATEUR RADIO Association, the gay/lesbian club. Active HF nets, newsletter, uncensored listserv, web page: <www.rara.org>. Privacy respected. E-mail: <rara@en.com> or Dept. A, P.O. Box 191, Chesterland, OH 44026-0191.

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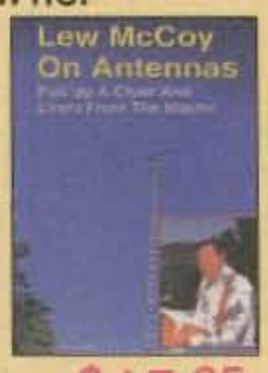

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