NCJ

NATIONAL CONTEST JOURNAL

$4

May/June 2001

Volume 29 Number 3

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Editorial

Dennis Motschenbacher, K7BV

If your copy of the *NCJ* has arrived a little later than normal, it is my fault. I received a last minute message indicating that a news release regarding WRTC 2001 was just days away. I convinced our publisher to hold the magazine so we could get this exciting information in your hands.

That news release appears elsewhere in this issue. Another hugely dynamic and passionate contest club has stepped up to take on the workload that leads up to an action-packed World Radiosport Team Championship. Anyone who has spent time in the company of Contest Club Finland contesters knows what I know—these guys and gals will work themselves raw making sure that the July WRTC 2002 is every bit as memorable as past competitions. And stand by to enjoy techie features only dreamed of in past years. These folks live on the leading edge of communication technology and I trust we will all benefit from that fact during the competition. I'll bet they put on an exciting show that we will all be able to enjoy on the Internet if we cannot actually make the journey to Helsinki.

NCJ Phone Sprint

The *NCJ* Contests Committee recently considered the question of dropping the Phone Sprints. By majority vote it was decided to continue to sponsor these biannual competitions.

I noted that several comments were made regarding the QRM to normal communications that these contests generate. Some feel that this particular contest causes more hate and discontent than other phone contests for a number of reasons. Jim, K4MA, who takes over for Rick, K7GM, intends to study this matter to determine the validity of the QRM claim and to investigate possible fixes. If you have thoughts you would like to share with Jim, please contact him (**ssbsprint@ncjweb.com**).

Speaking of QRM

It has been pointed out to me that the United States Federal Communications Commission recently issued a handful of official Advisory Notices to stateside operators. They were causing QRM to ongoing communications while they were attempting to make cross-band contacts with stations down in the lower portion of 40 meters. Contesters beware—or you too may find a little something like this in your mailbox.

Your Name
Your Address
Your Town, State, Zip
RE: Amateur Radio license WXXX
Advisory Notice

Dear (Your Name Here):

We have received complaints that on numerous evenings on (fill in the dates of any DX contest weekend), you transmitted on top of ongoing communications between 7.150 and 7.300 MHz. This apparently occurred as a result of your attempting to contact cross-band [ie, "split"—*Ed*] DX stations that were operating in the CW band.

While this may not have been malicious interference, please be advised that amateurs must operate in accordance with Section 97.101 of the Commission's rules, which sets out the general standards for operation of an Amateur Radio station and specifically covers frequency sharing and interference.

Please call me if you have any questions about this matter.

Your FCC

Remember the old saying "You can run 'em, but you can't hide" …or something like that.

73, Dennis the Menace, K7BV

Our Cover

N3HBX provided this tremendous photograph of his 2-element 80-meter Yagi being reinstalled after repairs.

John fills in the details…

"Perhaps you'd like to use this photograph in the *NCJ*. It shows Mike Cizek, W3MC, and Mike Patterson (no call) reattaching a 2-element 80-meter beam to the top of my 110-foot rotating tower. The antenna had been removed for repairs.

"To handle its size and weight, we used a homebrew double-cable tram system that I described in an article that appeared in the May/June 1997 issue of the *NCJ*. In the photo, you should just be able to make out the two tram lines that are fastened to the top of the tower and slope down towards the left at about a 45 degree angle. The tram itself is the square contraption attached to the boom of the Yagi.

"To remove—and then reinstall—the antenna, we first had to take down a 6-element 15-meter Yagi that was mounted 10 feet below it, and then tilt a 4-element 20-meter Yagi positioned at 90 feet. It was also necessary to temporarily bow the elements of the 80-meter antenna upwards. This was done by attaching strings to the ends of the elements, feeding them over pulleys, and then fastening them to the center of the antenna.

"I learned—from bitter experience—that bowing them up permanently (as I advocated in my earlier article) is a *bad* idea. The inward tension, and high winds, eventually caused them to buckle."

John Evans, N3HBX

Some Facts of Life About Modeling 160-Meter Vertical Arrays—Part 3: Complex Radial Systems and Limitations of the *MININEC* (No-Radial) Ground

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In our examination of 160-meter vertical antenna modeling, we have noted that it is advisable to model full ground radial systems in lieu of using short-cut methods. As well, models of buried radial systems appear to replicate best actual buried radial systems. We also examined the effects of soil conductivity and permittivity on model predictions, and established that—within limits—the now-traditional soil types that range from Very Poor to Very Good provide a reasonable sampling of modeled vertical antenna behavior.

These results strongly suggest that anyone who wishes seriously to model 160-meter vertical antennas or arrays should develop some modeling techniques that allow the efficient development of radial systems. In this episode, we shall look at a few of these techniques. In addition, we shall also examine some further reasons for using them.

Complex Radial System Construction

With simple radial systems consisting of a single set of radials—however many may be required—the "radial-maker" facilities within commercial implementations of *NEC* provide the most rapid construction. We simply specify the radial parameters and how many we need, and the automated software does the rest. The actual mathematics of radials is fairly simple, but becomes tedious when done with a calculator. With a specimen radial of a certain length, we can obtain the angle for each succeeding radial by dividing the total number needed into 360 degrees. If we set the first radial along the X-axis, then the angle and a little sine and cosine work will net us the X and Y coordinates of each radial. We need only calculate for the first 90 degrees of the circle, since the remaining radials will have the same absolute numerical values, with only sign changes to place the new radial in the proper quadrant.

Length-tapering the radial elements (and the vertical element as well) proves useful, especially for buried radial systems. In such cases, we need at least a 1-segment wire from the surface (Z=0) to the buried radials. Since the source will be placed as low as possible on the main element above ground and since it is most accurate to have the segments on either side of the source the same length as the source segment, the segments near the junction of the element and radials often require very short lengths. With uniform segmentation, the models become exceptionally large if the radial system is larger than about 16 radials. By tapering the segment lengths toward the junction area to the shortest necessary length, we can reduce the size of the model and speed run times.

The technique in its simplest form—with a single set of 1-segment wires handling the source and radial junction region, as shown in Part 1 of this series—limits the main element diameter that we may model accurately. Using a 0.001-λ minimum segment length, which is about 0.164 meters or 6.5 inches at 1.83 MHz, element diameters may be limited to something below this figure. Although linear elements may use segment length-to-diameter ratios as low as 1:1, more complex geometries may dictate a larger ratio, sometimes as high as 4:1. For any given case, convergence testing and the average gain test are both applicable to evaluating the adequacy of a model.

For fatter main elements or for radials buried at a shallow depth, we may wish to resort to a different technique of modeling radials (see **Figure 1**). In this sketch, we have shallow radials and a "fat" main element. Let's suppose that the diameter is about 0.125-meter and that we wish to maintain a 4:1 length-to-diameter ratio for each segment. The shortest segment length we can use is 0.5-meter. Suppose also that the radials are at some shallow depth under the surface, perhaps 0.05-meter. This figure

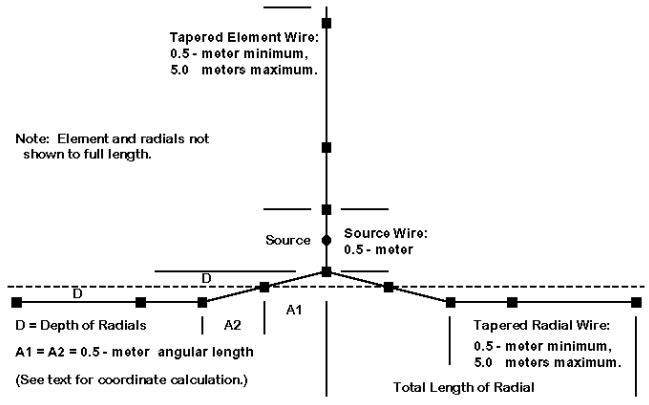

Figure 1—Modeling tapered-length elements and radials for shallow radial systems or for large-diameter elements.

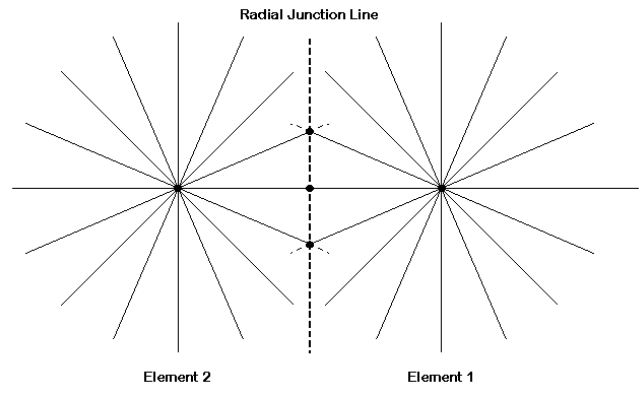

Figure 2—Simplified sketch of the junction between two intersecting radial systems.

is only 0.0003-λ. Using the simple technique of buried radial construction would involve us in modeling conflicts.

However, we may slope our radials from the main element to the surface and then to the buried level portion of the radial. If the base of the main element is 0.05-meter above ground, then two 1-segment wires per radial will satisfy *NEC-4* requirements for the radial start. We may then length-taper the remaining portion of each radial. As well, we can set the length of the source region of the main element as a 1-segment wire that is 0.5-meter long. Then the main element may be length-tapered above that point. In both cases, a minimum segment length of 0.5-meter will satisfy the need for equal segment lengths on each side of the source segment.

If we become serious about modeling 160-meter verticals, then we shall be placing each 1/4-λ monopole element on a radial system. For many designs, we may end up with overlapping radial systems. **Figure 2** shows a 2-system example, simplified to 16 radials for clarity. Note that three of the radials overlap in this case. To prevent the calculating core from rejecting the model because wires intersect at "mid-segment" points, we can resort to several strategies. Displacing one radial system vertically is one possibility, although it leads to potential models that do not reflect the actual system design. Most overlapping radial systems end up with junctions of the radials that would otherwise overlap. The modeler should thus shorten the radials so that they form a junction along the line labeled "radial junction line" in the sketch. The junction points may be connected with an actual modeled wire or left open, according the actual physical radial system being modeled.

In some cases, we may have more than two intersecting radial systems. **Figure 3** shows three systems, more closely spaced than the pair in Figure 2. The more closely spaced the main elements in an array, the more intersecting radials we shall encounter. Perhaps the most complex system of which I am aware is a 5-element array, with 4 radial systems forming a square around the central system.

Recalculating the coordinates of radial ends so that the radial intersections are correctly placed and segmented is a straightforward process. **Figure 4** can provide some guidance. Let the "main" radial system be centered at X=0 and Y=0. If we know the radial junction line coordinate for at least one axis, we can take the ratio of that coordinate relative to the coordinate of the full length radial. Since we are working with congruent triangles for each radial, the new coordinate in the other axis will be reduced by the same ratio. As well, in a uniformly segmented radial, the ratio will also determine the new level of segmentation for the shortened radial. The new coordinate and segmentation data will equally apply to the radial that intersects the one just calculated.

Although the work is a bit tedious, it is necessary to construct reasonably correct models of intersecting radial systems. For large systems, one might transfer the work to a utility program or a spreadsheet.

Why Not Simplify?

The detail work required to set up complex radial systems often leads modelers to accept short-cut methods that yield smaller, simpler models. The standard technique is to use a *MININEC* ground with no radials, with the attendant assumption that the results approximate those which one might obtain with a full radial system. I suspect that we had better test this assumption.

Figure 5 represents our initial test case. Let's set up a vertical over ground. We shall run the vertical over the standard 4 ground qualities (Very Poor, Poor, Good and Very Good) using 3 systems. First is the *MININEC* ground with the vertical connected at its lower end directly to the surface—with no radials. The second system is a 32-radial array that is 0.001-λ above the ground. The third is a 32-radial array buried 0.001-λ below the surface. The choice of 32 radials stems from our observation in Part 1 that with this size radial system, we obtain the closest correlation among modeled results in *NEC-4*. Radials and the main element will be length-tapered for model economy. As always, the radial systems are set within the Sommerfeld-Norton ground calculation system.

Subsequently, we shall perform the same set of modeling runs with the main element tilted from vertical by 30 degrees, 45 degrees and 60 degrees, as indicated in **Figure 5**. If the simplified *MININEC* no-radial ground system is an adequate approximation of a 32-radial system, then the level of correlation that occurs with the main element exactly vertical should hold up for the tilt-tests.

The results of the runs appear in **Table 1**. In portion A, the results are the same as those presented in Part 1 of this series. Perhaps the only serious departure from a reasonably close correlation of results lies in the source impedance values for the buried radial system.

Figure 6 summarizes the gain data from portion B of the table. The gain data divergence for Very Poor soil has grown from 0.61 dB for the vertical main element to 2.48 dB for the element with a 30-degree tilt, with lesser divergence as the soil quality improves. The *MININEC*

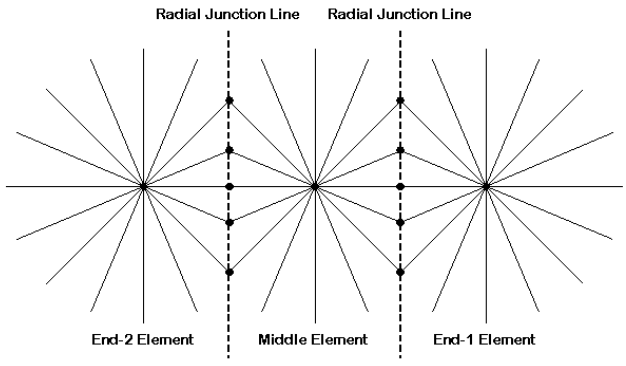

Figure 3—Simplified sketch of the junction between three intersecting radial systems.

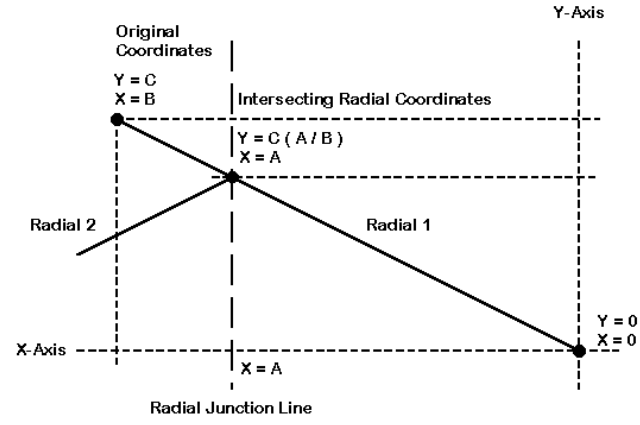

Figure 4—Calculating the revised coordinates for intersecting radials.

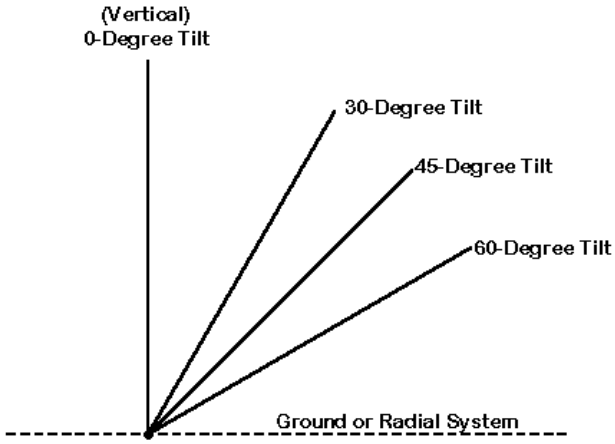

Figure 5—Using tilting 1/4-λ monopoles to test the limits of the *MININEC* no-radial ground system.

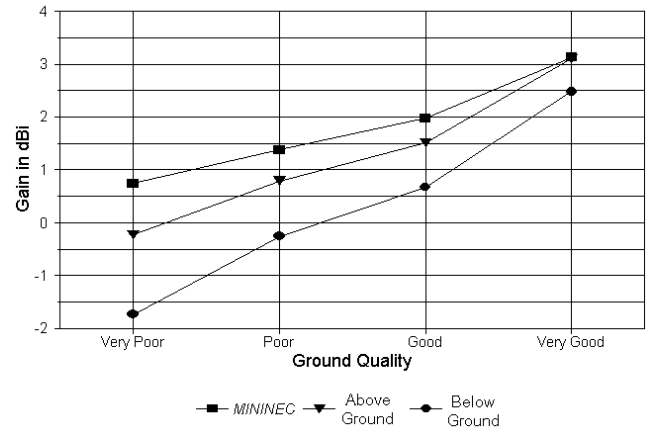

Figure 6—Gain reports over various ground qualities for a monopole tilted 30 degrees from vertical.

Table 1
Tilting a vertical monopole over various grounds.
40-meter tall vertical monopole, 25 mm in diameter.
40.96-meter (1/4-λ) radials, 2 mm in diameter, tapered segmentation: 0.001- to 0.04-λ per wire (where used); *NEC-4*

Soil Type	*Gain (dBi)*	*TO Angle (degrees)*	*Source Impedance (R +/– jX Ω)*
A. Antenna Vertical			
MININEC (no-radial) ground			
Very Poor	–1.00	27	37.08 + *j*6.12*
Poor	0.31	25	
Good	1.41	23	
Very Good	3.16	17	
32 Radials, 0.001-λ above ground			
Very Poor	–1.29	27	35.09 – *j*3.55
Poor	0.09	25	35.69 – *j*1.05
Good	1.04	22	37.24 + *j*0.48
Very Good	2.92	16	37.83 + *j*2.46
32 Radials, 0.001-λ below ground			
Very Poor	–1.61	27	44.89 + *j*7.54
Poor	–0.16	25	43.44 + *j*9.55
Good	0.86	22	42.67 + *j*10.46
Very Good	2.79	17	40.48 + *j*10.03
B. Antenna Tilted 30 Degrees			
MININEC (no-radial) ground			
Very Poor	0.74	32	29.19 – *j*0.42*
Poor	1.37	29	
Good	1.97	25	
Very Good	3.13	18	
32 Radials, 0.001-λ above ground			
Very Poor	–0.23	31	26.46 – *j*7.68
Poor	0.79	27	26.64 – *j*5.59
Good	1.51	24	27.62 – *j*4.19
Very Good	3.10	18	27.95 – *j*2.30
32 Radials, 0.001-λ below ground			
Very Poor	–1.74	31	46.21 – *j*1.30
Poor	–0.26	28	40.20 + *j*2.82
Good	0.67	24	37.53 + *j*5.67
Very Good	2.48	18	33.65 + *j*5.50

Soil Type	*Gain (dBi)*	*TO Angle (degrees)*	*Source Impedance (R +/– jX Ω)*
C. Antenna Tilted 45 Degrees			
MININEC (no-radial) ground			
Very Poor	1.77	36	20.36 – *j*10.10*
Poor	2.01	32	
Good	2.30	27	
Very Good	3.06	19	
32 Radials, 0.001-λ above ground			
Very Poor	–0.07	35	19.55 – *j*14.31
Poor	0.81	31	19.35 – *j*12.65
Good	1.45	26	19.77 – *j*11.44
Very Good	2.94	19	19.63 – *j*10.39
32 Radials, 0.001-λ below ground			
Very Poor	–2.05	35	39.46 – *j*7.78
Poor	–0.60	31	32.61 – *j*3.80
Good	0.32	26	29.35 – *j*0.97
Very Good	2.12	19	25.01 – *j*1.96
D. Antenna Tilted 60 Degrees			
MININEC (no-radial) ground			
Very Poor	3.32	44	10.58 – *j*25.59*
Poor	3.05	37	
Good	2.93	31	
Very Good	3.07	21	
32 Radials, 0.001-λ above ground			
Very Poor	–0.08	38	11.33 – *j*24.68
Poor	0.74	34	10.77 – *j*23.70
Good	1.34	28	10.78 – *j*22.95
Very Good	2.70	21	10.48 – *j*22.34
32 Radials, 0.001-λ below ground			
Very Poor	–2.99	42	31.17 – *j*16.75
Poor	–1.51	35	23.80 – *j*13.34
Good	–0.55	30	20.15 – *j*10.89
Very Good	1.26	21	15.69 – *j*13.14

**MININEC* impedance is over perfect ground.

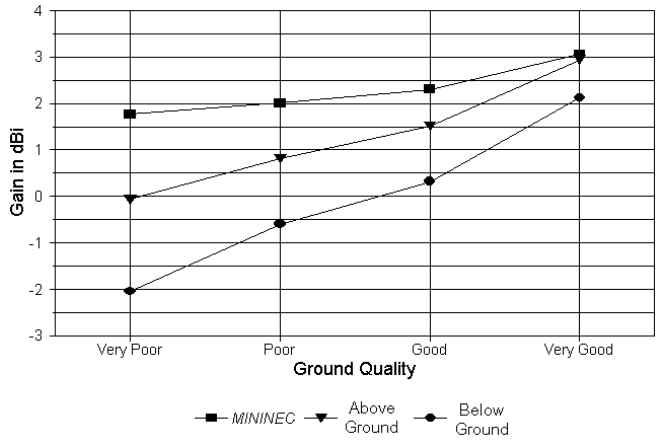

Figure 7—Gain reports over various ground qualities for a monopole tilted 45 degrees from vertical.

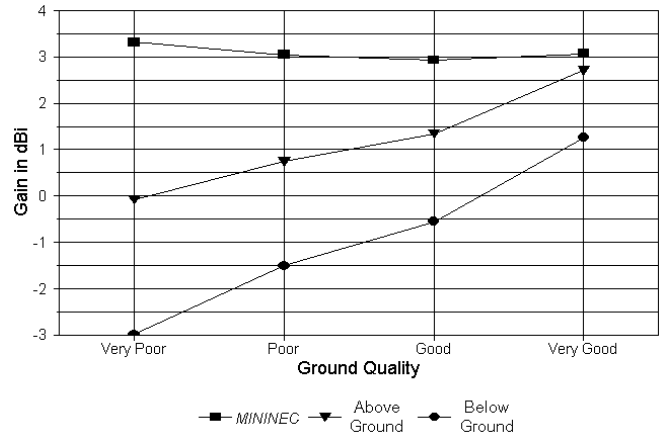

Figure 8—Gain reports over various ground qualities for a monopole tilted 60 degrees from vertical.

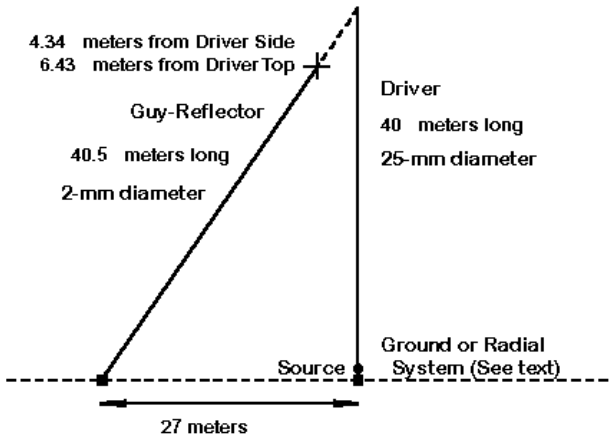

Figure 9—Outline of a 2-element parasitic vertical array using a sloping guy wire as the reflector.

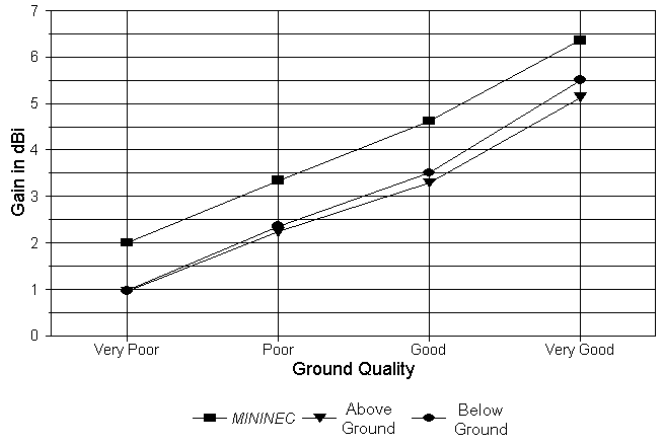

Figure 10—Gain reports for the 2-element array using *MININEC* and radial-system models.

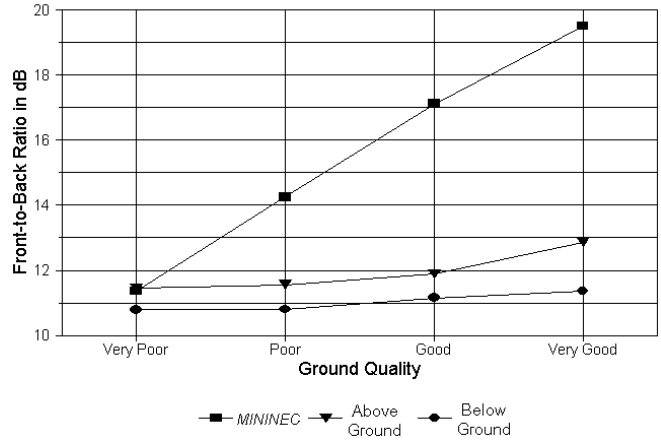

Figure 11—Front-to-back ratio reports for the 2-element array using *MININEC* and radial-system models.

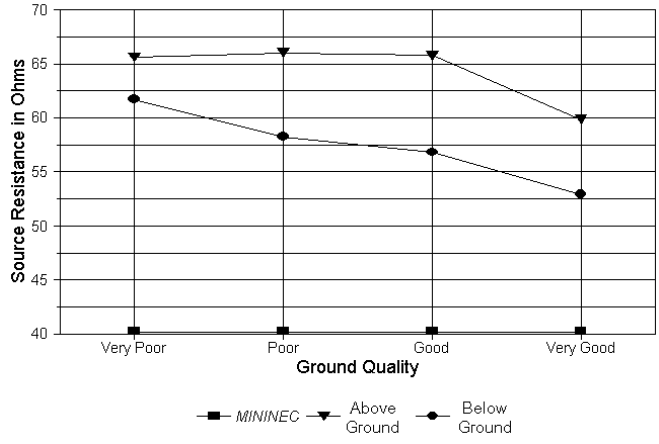

Figure 12—Source resistance reports for the 2-element array using *MININEC* and radial-system models.

ground shows a single impedance value, since it is calculated over perfect ground, while the above-ground radial system shows a tight set of values in the same region. However, the source impedance values for the buried-radial system show a wider spread and coincides with the spread of gain values.

The trends noted with respect to the 30-degree tilt model continue through the 45-degree and 60-degree models. Gain values data is summarized in **Figure 7** and **Figure 8** for these two cases. By the time we reach a 60-degree tilt, over Very Poor soil, the *MININEC* ground system shows a 3-dB advantage over the above-ground radial system, which in turn shows another 3-dB gain over the buried radial system.

The failure of the *MININEC* ground to track with the buried radial system stems from the known limitations of the *MININEC* ground calculation system. Any wire with a horizontal far-field component will display inaccurate results below about 0.2-λ from the surface. The error grows greater as we place the wire closer to the surface. The inaccuracies show up not only in driven elements, but in any array in which one or more parasitic elements fall into the error-prone region of the *MININEC* ground system. Those inaccuracies affect elements with even the slightest tilt.

The "intermediate" level results obtained for the above-ground radial system are also suggestive. The departure of these results from the buried-radial system speak to the limitations of an above-ground radial system as an approximation of a buried radial system. Even in the case of the 32-radial system, the one showing the closest correlation between above-ground and buried radial systems for vertical elements, the divergence of results for tilted main elements suggest that the only good model of a buried-radial system is a buried-radial system model. Unfortunately, these results have economic consequences: since *NEC-4* is the main vehicle for method-of-moments modeling of buried radial systems, serious modelers must obtain a license and then either develop their own interfaces or purchase one of the commercial implementations of the *NEC-4* core. Outside the US, serious modelers may also encounter restrictions in licensure.

A 2-Element Parasitic Vertical Array

Lest the exercise using a tilted vertical be viewed as a Don Quixote sort of quest, let's look at an old standard sort of array using a single sloping parasitic element. We shall take a 25-mm diameter main element, 40 meters long as our driver. The choice of diameters permits us to use a simplified connection for the above-ground and buried radial systems. The parasitic reflector is a 2-mm diameter guy wire that meets the ground or the radial system and which terminates at the position specified in **Figure 9**.

For our test runs, we shall use a *MININEC* ground with no radials, as is so often done in models of this and very closely similar arrays. We shall also run the model over above-ground and buried radial systems. The radial systems will be intersecting 32-radial arrays, with the line of intersection 13.5 meters from each element. As always, we shall run the model over sample ground qualities ranging from Very Poor to Very Good.

Table 2 summarizes the results of these runs. **Figure 10** summarizes the gain data. For this system, in which the parasitic element forms an angle of about 34 degrees to the plane of the driver, both radial system gain reports are consistent for all of the soil types. However, the *MININEC* ground system reports gains that are about 1-dB higher for all soil types.

Figure 11 reveals an even greater weakness of the *MININEC* no-radial system for this type of array. The front-to-back figures for the two radial systems do not perfectly coincide, but are reasonably close for operational purposes. In contrast, the *MININEC* no-radial system shows a nearly linear increase in the front-to-back ratio as we move from one soil quality to the next better soil quality. Over Good soil (conductivity = 0.005, dielectric constant = 13), there is a full 5-dB over-estimation of the front-to-back ratio relative to either radial system.

Similar divergences between the *MININEC* no-radial system of modeling

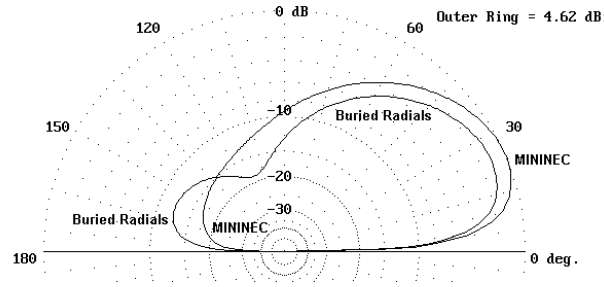

Figure 13—Comparative elevation patterns for the 2-element array using the *MININEC* no-radial ground and using a 32-radial buried radial system.

Table 2
2-element parasitic array—driver: 40-meter tall vertical monopole, 25 mm in diameter; reflector: sloping 2-mm guy, 40.5 meters long; intersecting 32 40.96-meter (0.25-λ) radial system, 2 mm in diameter, tapered segmentation: 0.001 to 0.04-λ per wire (where used); *NEC-4*.

Soil Type	*Gain (dBi)*	*TO Angle (degrees)*	*Front-to Back Ratio (dB)*	*Source Impedance (R +/– jX Ω)*
MININEC (no-radial) ground				
Very Poor	2.00	30	11.36	40.19 + *j*53.02*
Poor	3.34	26	14.25	
Good	4.62	24	17.11	
Very Good	6.36	18	19.50	
32 Radials, 0.001-λ above ground				
Very Poor	0.96	30	11.45	65.61 + *j*43.13
Poor	2.23	27	11.56	65.99 + *j*46.27
Good	3.29	24	11.89	65.76 + *j*47.90
Very Good	5.13	17	12.86	59.82 + *j*52.06
32 Radials, 0.001-λ below ground				
Very Poor	0.97	29	10.79	61.71 + *j*41.67
Poor	2.36	27	10.80	58.24 + *j*44.17
Good	3.51	23	11.16	56.80 + *j*46.49
Very Good	5.50	18	11.36	52.90 + *j*47.48

**MININEC* impedance is over perfect ground.

vertical arrays and the two radial systems show up in the figures calculated for the source impedance. The reactances do not vary significantly among the models. However, as shown in **Figure 12**, the source resistance values do vary considerably. The *MININEC* no-radial system calculates a single value over perfect ground—a value that fails to come close to the values calculated by either radial system. Interestingly, the buried-radial system shows a steadier decline in source resistance as we change soil types than does the above-ground system—another suggestion that neither one is a fully adequate approximation of the other.

The different analyses of the array appear striking in elevation plots. **Figure 13** overlays the *MININEC* pattern and the buried-radial pattern for Good soil. The differences are self-explanatory.

For practical modeling of vertical arrays, then, the *MININEC* no-radial system has serious shortcomings in approximating models of radial systems. Its use in serious modeling work is likely unjustified, given the availability of *NEC* facilities for modeling radial systems of any necessary size. Likewise, above-ground radial systems fail to track adequately with buried-radial systems so that the use of one as an approximation for the other becomes suspect without the modeler laying out situation-specific ground work to justify their use. Since that ground work would necessarily involve the use of buried radials, one might as well model buried radials with buried radials.

I am well aware that two examples do not alone make a general case, let alone a trend, so in the final episode of this series, we shall examine a potpourri of antennas and some further antenna modeling issues related to 160-meter verticals. ■

DXpedition Antennas for Salt Water Locations: A Study of 20-Meter Antennas

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Which is the better 20-meter antenna for an island DXpedition: A Yagi at 25 feet or a vertical or two on the beach?

"Conventional Wisdom" would say that the Yagi (typically a tribander or 2-element full-size Yagi) would be a great choice for an antenna for a DXpedition on a beach. What makes the Yagi so great? Let's examine the reasons to use a Yagi…

The Top 10 reasons to use a Yagi on a DXpedition, even when you are on the beach:

10. You have used Yagis at your home station.
9. You understand how they work.
8. Yagis have directivity.
7. Everyone else uses Yagis on DXpeditions, so they *must* be great.

And…

Hmm. I can't think of any other reasons! But everyone knows that *any* antenna near the ocean works great, or at least "conventional wisdom" tells us so.

Okay, let's examine the use of a Yagi for a serious DXpedition from a remote island. For this discussion, let's assume that you are going on the DXpedition of a lifetime—to Kingman Reef (KH5K).

Kingman is an interesting island. It's a strip of "land," about 25 feet wide and 450 feet long, that consists mostly of broken shells, rocks and rubble. There's no sand, no trees, or much of anything else for that matter. The wind typically blows at a steady 30 MPH.

Now imagine the difficulty that you are likely to encounter setting up a typical triband Yagi. If you drop a nut, you will probably never see it again. Once the Yagi is assembled, you have to armstrong the 35 to 40 pound array, bolted to the top of a 25-foot mast, into an upright position. (I'm assuming that you aren't even going to consider a rotator, which could easily add another 25 lbs to the top of the mast!) And remember that the wind is blowing hard, and you are standing on loose rubble.

To pull this off, you will probably need 3 or 4 teammates to walk the antenna up and hold it in position while someone else secures the base in the shells, finds stable guy points (for 2 sets of guys—6 ropes total) in the rubble and attaches a tag line for rotation. Any slip-up, and someone could easily get cut on the rubble, or even possibly break a bone in a fall. In the tropics, a relatively minor injury can become seriously infected in short order. Bear in mind that you are days away from any kind of medical assistance.

Considering the wind and the hazardous conditions, it will probably take a few hours to erect a single Yagi antenna. This is looking like a lot of effort for just one of *many* antennas… Ah, but waiting hams are worth the effort aren't they?

Perhaps, but your health comes first. You may wonder, "Is there an easier and better way?"

First, let's think a little more about the propagation from Kingman Reef. Kingman is in the middle of no place—more precisely, in the middle of the Pacific Ocean. Based on the distances to the three major target areas, the best takeoff angles are likely to be very low, typically under 10 degrees, and often below 2 degrees!

Europe is the primary target for this expedition, and you will likely spend half of your European operating time working them long path (and that usually requires very low takeoff angles). Most Yagis have a beamwidth of around 60 degrees, which means that you will have to turn the Yagi to cover each of the main target areas. Let's consider the headings.

Directions to target areas from KH5K:
Japan: around 305 degrees
Europe: approximately 355 degrees to 20 degrees
USA: about 43 degrees to 58 degrees

Steadfastly maintaining your original "Yagis rule" mentality, you probably remain convinced that the Yagi is the best choice. What if I were to tell you that a simple $^1/_4$-λ vertical on the ocean, or better yet a 2-element vertical dipole

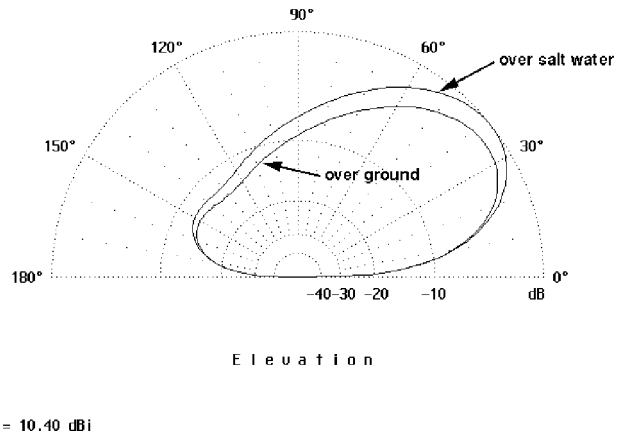


Figure 1—A 2-element Yagi at 25 feet over land and over salt water. Peak gain is 10.40 dBi (over salt water) at a 38-degree takeoff angle in this design.

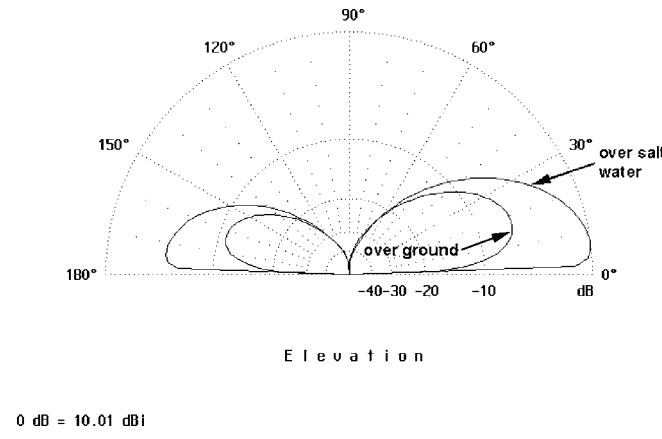


Figure 2—A 2-element vertical dipole array (parasitic) over average ground and over salt water. The peak gain is 10.01 dBi (over salt water) at an 8-degree takeoff angle in this design.

array, would be a far better performer? I can hear the pundits saying, "Verticals are for kids!" or "Real men use Yagis!" You still believe there is no way that a Yagi could be inferior to a vertical, don't you?

So why is it that you think that verticals work so poorly? Because "conventional wisdom" says so? Unfortunately "conventional wisdom" on the performance of vertical antennas usually comes from your comparisons of the performance of your Yagi to that of the trapped vertical in your back yard. Perhaps under those conditions a Yagi *will* be better, but not on the ocean! Near the ocean, you will see that verticals are the clear choice for high-performance antennas, and they just happen to weigh considerably less than a Yagi and are easier to install as well!

First off, let me dispel one long-standing myth: Horizontal antennas over salt water *do not* get any enhancement when set up over salt water (from the increased ground conductivity). Well, to be exact, almost all of the useful angles for HF propagation get little or no useful enhancement. Aside from ground conductivity, horizontal antennas (as do the verticals) receive the greatest benefit from the ocean because the ocean presents an undisturbed foreground for the incoming and outgoing RF energy. Salt water also causes less loss than typical ground when reflecting signals.

To better illustrate the impact of ground conductivity on these two antenna configurations, let's have a look at a couple of plots. **Figure 1** shows that a horizontal 2-element Yagi does exhibit some limited performance enhancement when placed over salt water, but this is primarily in the 30- to 90-degree range (90 degrees being straight up).

Figure 2 shows the plots of a 2-element vertical array over land and over salt water. It's clear from this diagram that vertical antennas display *significant* signal enhancement when placed next to—or over—salt water. In fact, verticals develop about a 6-dB increase in gain when placed over salt water, and the radiation in the pseudo-Brewster angle is filled out (radiation lower than about 12 degrees). So the salt water is enhancing signals right where most DX signals are traveling—in the pseudo-Brewster angle!

Okay, Let's Get Back to Kingman

I suggested that a simple vertical would be better for most useful takeoff angles… let me show you why. **Figure 3** compares a 2-element Yagi at 25 feet over salt water and a 1/4-λ vertical over salt water. The antenna with lots of gain at the 40-degree takeoff angle is the 2-element Yagi at 25 feet. The other antenna is the 1/4-λ vertical. Notice that at takeoff angles below 10 degrees, the vertical is the hands down winner! You may point out that the Yagi has more "gain." This is true, but the gain is at takeoff angles that don't matter for most signals arriving on Kingman! A simple vertical by the ocean can, and usually will, outperform a Yagi on most typical DXpedition paths, because the low takeoff energy from the vertical has fewer hops to the target! It's all a matter of angles.

As you can tell from Figure 3, the 1/4-λ vertical is a good performer. An added bonus—especially for our Kingman Reef expedition—is that a single vertical is really lightweight (maybe 3 or 4 lbs for the 16-foot vertical, compared to 40+ lbs for a tribander and a mast), and can be assembled and installed in just a few minutes. Compared to the Yagi, the vertical only needs some rudimentary guying, you don't have to worry about turning the antenna and you can probably be on the air in as little as 30 minutes! Try that with a Yagi.

I'll bet that some of you *still* aren't convinced yet that a single 1/4-λ vertical is a good enough choice. Okay, let's up the "vertical ante" a bit, and rather than a 1/4-λ vertical, let's examine a 2-element parasitic vertical array using 1/2-λ vertical

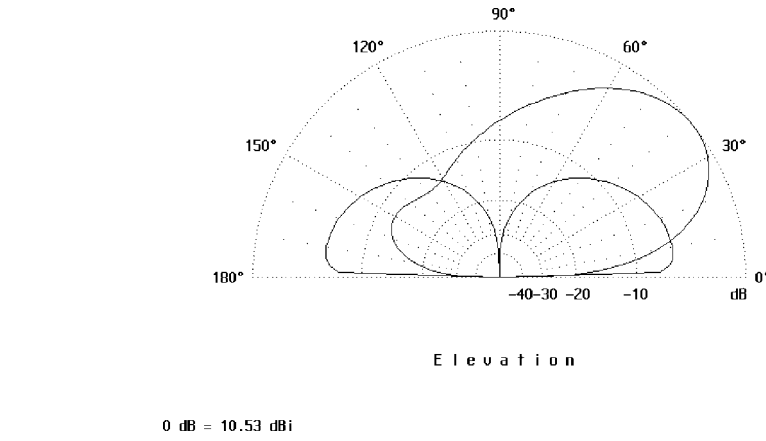


Figure 3—A Yagi at 25 feet compared to a 1/4-λ vertical over salt water.

Figure 4—Some of the verticals used at 6Y2A.

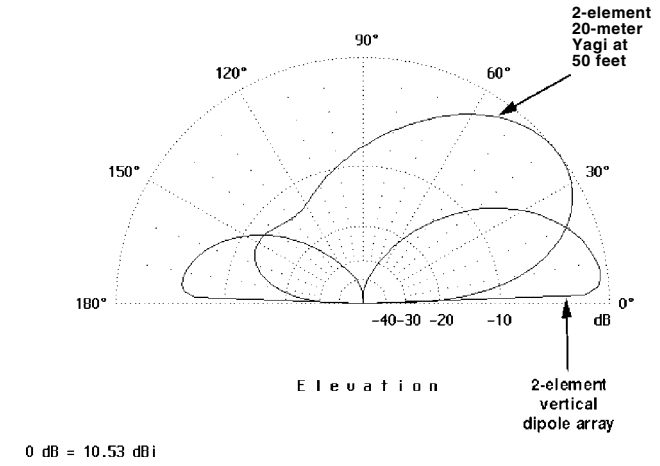


Figure 5—A Yagi at 25 feet compared to a 2-element vertical array using vertical dipoles.

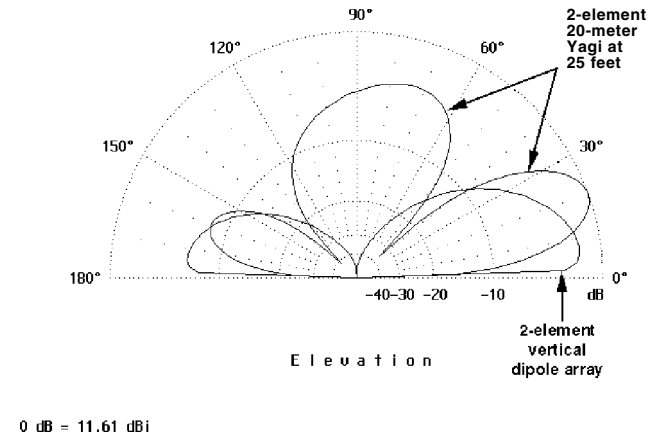


Figure 6—A Yagi at 50 feet compared to 2-element vertical array of vertical dipoles.

dipoles. To better understand this configuration, imagine a 2-element Yagi standing vertically, but minus the mast and boom to support it (resulting in much less overall weight). See **Figure 4** for a picture of the system used at 6Y2A.

There are a few advantages of using vertical dipoles (vs ¼-λ elements): they eliminate the need for radials, and by raising the feedpoint, you achieve an additional 1.5 to 2.0 dB of gain at low takeoff angles. A parasitic vertical array (vs a phased array) is an easy way to increase gain and directivity, yet is still very easy to install and tune up. The parasitic array needs fewer parts than a phased array, which is an important aspect on DXpeditions.

Figure 5 compares the 2-element Yagi at 25 feet to the 2-element vertical array using vertical dipoles. You can see that the vertical array now has nearly the same peak gain as the Yagi, but the gain is focused right where most of the arriving signals are coming from—0 to 10 degrees! And the verticals are now the clear winners for 0- to 20-degree takeoff angles—who could ask for more? Since many of the signals are arriving at around a 1-degree takeoff angle, often the verticals can be 20 dB stronger than the Yagi. Talk about a band-opening antenna!

But I'm sure that the Yagi-lovers are thinking, "I'll bet if you could get the Yagi up to a good height—say 50 feet—that it would surely beat the vertical array."

Guess again, dude! First off, installing a Yagi at 50 feet on a DXpedition is difficult, if not impossible. Secondly, it still doesn't outperform the vertical array. **Figure 6** compares the 2-element 20-meter Yagi at 50 feet to the vertical array. Notice that the Yagi now has a large amount of energy being radiated straight up. Sure the main lobe is lowered, but the 2-element vertical will still be better on most DX signals.

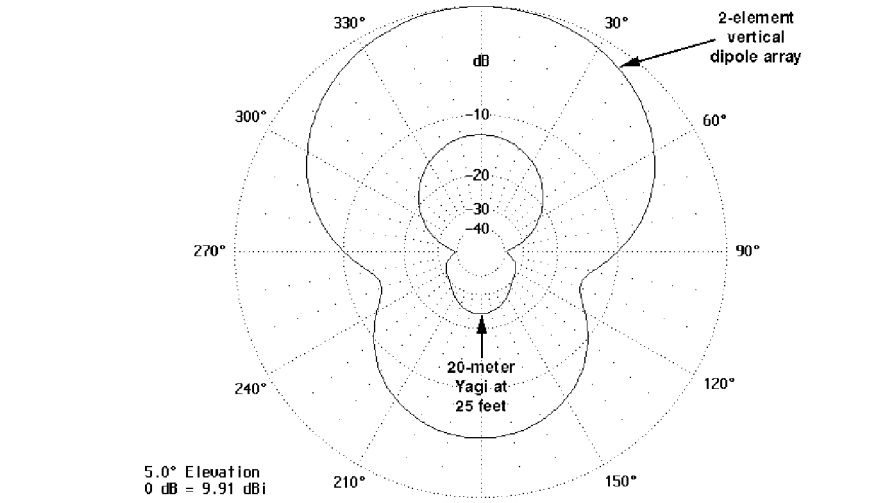


Figure 7—Energy at the 5-degree takeoff angle for a Yagi at 25 feet and a 2-element vertical array of vertical dipoles.

Remember, a typical tribander weighs at least 35 to 40 lbs, and add another 20 pounds or so for the mast, for a total of at least 55 to 60 lbs. A 2-element full-size vertical dipole array for 20 meters can weigh 18 lbs or less. A vertical array is much more efficient if you apply a key metric for DXpedition planning: "*maximize the dB per pound of antenna.*"

Do you still need more convincing? Fair enough. Have a look at **Figure 7**. The antenna with the nice lobe at the 5-degree takeoff angle depicted is the 2-element vertical array—9.9 dBi. The antenna that is down 12 to 20 dB in all directions is the good ole Yagi at 25 feet… The 2-element vertical array also has a very wide beamwidth—on the order of 120 degrees between the –3-dB points. Thus, *the 2-element vertical array can cover all 3 main target areas for our Kingman operation without turning the antenna*! In addition, if there are callers from other directions (assuming that there is a water path in those directions), the vertical has more useful gain than the Yagi on azimuths that are off of the side or the back of the antenna.

Some of the pundits might contend that this is a "made up" example… Sorry to disappoint you, but this Kingman Reef example is real, and this article is based on the antenna plans that were made for the Kingman Reef DXpedition in October 2000. For many island DXpeditions, vertical arrays should be given more serious consideration as the antennas of choice for the high bands.

The computer models were verified by empirical testing done with the help of N6BT and the operators from 6Y2A over the San Francisco Bay (salt water). The measured data followed the models.

Verticals were erected in "Team Vertical" locations in the Caribbean and comparisons to full-size Yagis were made as well. Operators spent many hours switching back and forth between Yagis and verticals, and observed differences of up to 9 S-units (on a Yaesu FT-1000MP's meter), and reported an average increase of 2 to 4 S-units when using the verticals. Horizontal Yagis are still occasionally used during the contests, but only to cover directions where the verticals have nulls.

Using verticals over salt water is one of those situations where if you haven't tried it, you don't know what you are missing. How much better is a larger vertical array made up of vertical dipoles? Tom, N6BT, has commented that they are truly on par with the large commercial curtain arrays he used in Saipan.

Salt water is the key to enhanced vertical performance. If you can get close to salt water, or literally sit right in it, such as on Kingman Reef, verticals are the answer for high performance antennas. An added bonus is that they are significantly easier to transport and setup. Unless you have used verticals by the ocean and compared them to a Yagi, it's hard to comprehend the difference.

While K5K was on the air, they shared the following observations: "These two little poles were at least 3 S-units stronger than the tribander! We shook our heads in amazement every time we looked at the verticals," "There were signals that were S-2 and in the log on the verticals, but these same signals were simply not readable on the Yagi," "If we had used Yagis as originally planned, the entire team believes we would have ended up with one third the total number of QSOs."

Photos of the K5K operation appear on their Web site: **www.qsl.net/krpdxg**.

For more information on the design of the vertical arrays, visit **force12inc.com/k5kinfo.htm**.

Special thanks to Tom Schiller, N6BT, for providing input for this article. ■

An Audio Controller for SO2R Contesting

Barry Kutner, W2UP
w2up@mindspring.com

I have used a number of different schemes to control receive audio during SO2R contesting. Most recently, I used a DP3T toggle switch to provide the choice of Radio A in both ears, Radio B in both ears, or Radio A in one ear and Radio B in the other ear. Keeping one radio in each ear for long periods of time drives me nuts. Manually switching back and forth between audio streams for a whole contest (or as long as I can stay awake) adds up to a lot of unnecessary motion.

I've come up with a switching scheme that accomplishes the following objectives:

- Manual selection of A+A, A+B or B+B.
- Auto-switching (selectable on/off) of both ears to Radio B whenever Radio A is in transmit.
- Switching of both right and left audio channels of each radio—which permits the use of a sub-receiver in the radios, if so equipped.

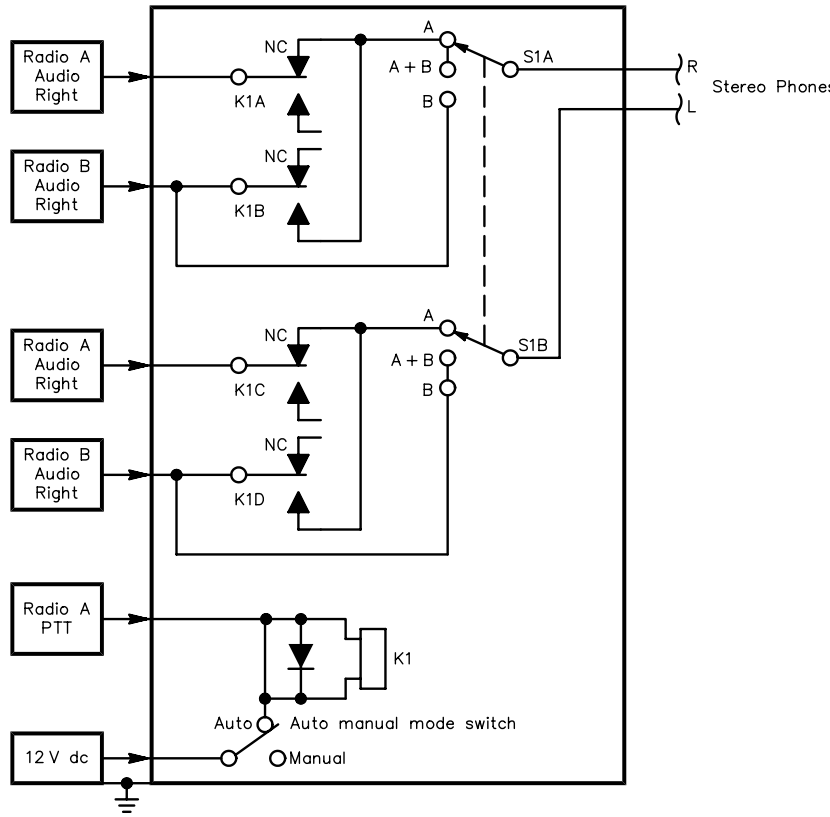
Parts

K_1 is a 4PDT relay (Magnecraft W78CSX-2 or equiv.)

S_1 is a DP3T switch.

Any small diode, such as a 1N4148 will do across the relay.

Thanks to CT1BOH, KG5U, K8CC and others on the CQ-Contest reflector, who provided valuable suggestions during the development stages of this circuit.



Letters

Dear *NCJ,*

Quite often we read that we want to get more contesters involved because of the increasing age of current contesters. Yesterday, I was entering my Sweepstakes SSB contacts into my logging program (I do it one at a time so I can see who I worked) when it dawned on me that quite a few of them were first time contacts. These are the people that we need to groom and lead into contesting.

These days, people seem to be followers; they need to be stimulated and motivated. My idea is to create a database of e-mail addresses of the newer and not often heard hams that enter a contest for a couple of hours. About a week before the target contest, a personal e-mail message could be sent to each one inviting them to participate in that weekend's contest. The message could outline the contest rules, etc, and anything else that might make them want to be a part of that contest.

This database could include US, Canadian and perhaps Mexican hams. To start the database may not be that difficult. The ARRL and CQ receive a good portion of their logs via e-mail. Getting contact information for those that do not send in logs, however, would require some research. (These are the ones we need most.) Other contest clubs/organizations could also help by providing information from state and other contests. The database could be to their benefit.

I feel that if I received a personal invitation to join in a contest, it would encourage me to put additional effort into getting on the air. I do not believe that this database would be all that large, maybe as many as a thousand or so addresses, as the regulars do not require any encouragement to participate.

Regards,
Phil Yasson, AB7RW
pyasson@pacifier.com

Phil does have a great idea—all we need is someone to step up and work with me to get this launched. Any takers?—'BV ■

International Reply Coupons

Dennis Motschenbacher, K7BV

Any operator who has ever operated a contest while on a DXpedition or lives in a semi-rare state receives loads of QSL requests. Many of these requests come complete with an International Reply Coupon (IRC) enclosed. Sometimes it appears as though few of the postal service employees have any familiarity with IRCs. And even fewer of us know the rules regarding the coupons.

The Frankford Radio Club is lucky to have Doug Priest, W3CF, as a member, since he is a postal employee and knows the ins and outs of IRCs. We hope the information he recently posted on the FRC Internet reflector will help you (and less knowledgeable postal employees) the next time you go to the Post Office to convert those coupons into stamps.

Thanks to John, W2GD, for bringing this information to the attention of the NCJ.

(The information that follows was taken from the *US Postal Service International Mail Manual*—issue 24, January 2001, updated with postal bulletin revisions through December 28, 2000)

Section 372—International Reply Coupons

372.1 Description

a. The sender of a letter may prepay a reply by purchasing reply coupons, which are sold and exchangeable for postage stamps at post offices in member countries of the Universal Postal Union. The period of exchange of international reply coupons issued by the Universal Postal Union on or after January 1, 1975, is unlimited.

b. International reply coupons (in French, Coupons-Reponse Internationaux) are printed in blue ink on paper that has the letters "UPU" in large characters in the watermark. The front of each coupon is printed in French. The reverse side of the coupon shows the text relating to its use in German, English, Arabic, Chinese, Spanish and Russian.

c. Coupons sold in the United States have the selling price printed on them, while coupons in other countries may not.

372.2 Availability

Reply coupons may be requisitioned by post offices in the same manner as postage stamps. The coupons should be stocked at post offices that have a demand for them.

372.3 Selling Price and Rate of Exchange

a. The selling price of a reply coupon in the United States is $1.75.

One coupon is exchangeable in any other member country for a stamp or stamps representing the minimum postage on an unregistered air letter. Unused US coupons (that is, those with the US selling price stamped on them) may be exchanged only for United States postage stamps by the original purchaser at a discount of 1 cent below the purchase price.

b. International reply coupons purchased in foreign countries are exchangeable at US post offices toward the purchase of postage stamps, postage meter stamps, postage validation imprinter (*PVI*) labels and embossed stamped envelopes (including aerogrammes) at the rate of $0.80 per coupon, irrespective of the country where they were purchased.

372.4 Processing Requests

a. When an international reply coupon is sold, the USPS clerk must place a postmark in the block that is headed "control stamp of the country of origin."

b. Under Universal Postal Union's regulations, member countries are not required to place a control stamp or postmark on the international reply coupons that they sell. Therefore, some foreign issue reply coupons, which are tendered for redemption, may bear the name of the issuing country (generally in French), rather than the optional control stamp or postmark. Such coupons are exchangeable for US postage, as specified in 372.3b.

c. A post office redeeming an unused US coupon must postmark it in the unpostmarked circle. A post office exchanging a foreign reply coupon must postmark it in the right circle. Post offices must not accept foreign coupons that already bear a USPS postmark.

d. Reply coupons issued by foreign countries prior to January 1, 1975, are no longer redeemable at US post offices. These old-style coupons are distinguishable from the newer coupons printed by the International Bureau of the Universal Postal Union because the name of the country of origin is always present on the old-style coupons. Customers processing pre-1975 coupons of foreign origin should be advised to return them to their correspondents in the country of issue for replacement or redemption through the selling post office.

e. Reply coupons formerly issued by the Postal Union of the Americas and Spain are no longer valid. These coupons are printed in green ink and bear the caption "Cupon Respuesta America-Espanol." Customers possessing any of these coupons should return them to their correspondents in the country of issue for redemption through the selling post office.

f. Postmasters must process exchanged foreign and redeemed US coupons as prescribed in 426.9 International Reply Coupons (IRCs) Handbook F-1, Post Office Accounting Procedures. ■

Antenna Isolation in the Real World

Chad Kurszewski, WE9V
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A while ago, I considered purchasing a WX0B *SixPak*, a 6-in 2-out coax switch that allows one to connect two radios to six antennas. Either radio can connect to any of the six antennas, as long as it isn't currently in use by the other radio.

A friend loaned me his SixPak for a few hours so that I could measure its performance. Isolation from one radio port to the other port measured approximately –50 dB at 30 MHz. This was the worst case for the HF bands. It was measured using a tracking signal generator with –13 dBm output and a spectrum analyzer.

Since I have more than one antenna per band, a six-position switch would be inadequate for my station. So I set out to build a "Ten Pack." (After all, I'm from Wisconsin and a six pack is never enough!)

My first attempt didn't work out very well. I used point-to-point wiring and had a ton of problems with it. When measured, it only provided about –30 dB of isolation. It also caused my automatic controller to go nuts.

Since then, I've built a printed circuit board version with striplines, DPDT relays and a great ground plane. Measurements confirm significantly improved performance (see **Table 1**).

So, the WX0B box provided –50 dB of isolation and my unit measured –44 dB. Since both radios' signals (transmit and receive) are simultaneously "inside the box," the second radio is subjected to the fundamental (transmitted frequency) power from the first radio. I decided to calculate how much power this was.

The majority of radios are calibrated such that a 50 µV signal will result in an S9 meter reading. This is equivalent to –73 dBm. For 1500 W, a 50 dB decrease leaves us with 0.015 W, or +11.8 dBm. On a properly calibrated S-meter, a signal of this strength would indicate S9 + 84 dB! (Or, to put it another way, 24 dB *above the top end stop* of your meter.)

This could be of some concern! Granted, that would be the signal reading only if you tuned to that frequency on both radios. You're probably thinking to yourself right now that you certainly wouldn't do that—you will be operating on two different frequencies on two different bands. Nonetheless, that signal energy is still present at the RF connector on your second radio. It still has the potential to smoke your radio's internal bandpass filters and cause intermodulation problems. A S9 + 84 dB signal is very large when you are trying to pull out a signal that is 115 dB lower in signal on the other band.

Table 1

Isolation measurements between the radio ports of a PC-board version of a homebrew 2-radio/10-antenna switch.

Switching Configuration	*Isolation*
No antennas selected	–65 dB
No A antenna, B antenna selected (worst case)	–49 dB
No B antenna, A antenna selected (worst case)	–49 dB
A and B antennas selected (worst case)	–44 dB

In order to determine the effect that using *SixPak*-type switching devices would have on isolation in a typical station arrangement, I decided to measure the isolation of my HF antennas, *without* any type of switch. After all, commonly available RF switches such as the Top Ten A/B Station selector provide >80 dB of isolation. I wanted to determine the limiting factor in a typical SO2R station—antenna isolation or switch box port isolation.

A description of my antenna system appears in **Table 2**. My test equipment again consisted of a tracking generator

Table 2

A description of the WE9V antenna system.

Tower 1—Primary Antennas
Stacked KT34XAs, 50 and 100 feet
Cushcraft XM-240 at 110 feet
(2 elements on 40 meters)
80-meter K8UR 2-element parasitic array
(two phased half-wave dipole verticals)

Tower 2—Secondary Antennas
40-meter dipole at 45 feet
80-meter dipole at 50 feet
Mosley TA-34 at 56 feet
(a 4-element tribander with a 21-foot boom)

Tower 1 and 2 are located approximately 120 feet apart.

Some Definitions for Table 3 Data

Antenna 1—The transmit antenna.

Antenna 2—The receive antenna, typically connected to the second radio.

At—Indicates that the antennas were pointed directly *at* each other.

Away—Indicates that the antennas were pointed directly *away* from each other.

EU/SE—Indicates that my stack (the KT34Xas) was pointed towards Europe and the other tribander (the TA34) was pointed towards the Caribbean, which is roughly in line with the direction where Tower 1 resides. So, in this arrangement the tips of the elements of the antennas in the Antenna 1 stack are pointing towards Antenna 2, while Antenna 2 is pointed at Antenna 1. This case was included as it represents the typical directions these antennas point during DX contests.

Side—Indicates that the antennas were pointed such that the tips of the elements pointed towards each other, but the main lobes of the Yagis were in opposite directions. For example, if my two towers were aligned east/west, in the *side* configuration, Antenna 1 would be pointed north while Antenna 2 was pointed south. **Table 3** provides the isolation measurements for the various bands, antenna combinations and, where applicable, the directional orientation.

It's not a "statistically correct" thing to do, but if you average all of the isolation measurements, you'll get –39.6 dB. Of those 30 measurements, 25 are worse than –50 dB, and 15 are worse than –44 dB. There's a worst case of –17 dB, and several measurements are only in the 20 to 30 dB range.

producing –13 dBm at the frequency of interest and a spectrum analyzer. The experiment was designed to measure the isolation between the antennas. Of course, the isolation would be a function of antenna direction (Yagis for example), so various directions were tested. See the "Some Definitions" sidebar for an explanation of the various directional configurations tested. In a contest situation, it is possible for me to use most, if not all, of these aiming combinations.

The transmitted signal frequencies were appropriate for the listed transmit antenna. The receive antenna signal level was measured at the transmitted frequency. As an example, let's consider the case where Antenna 1 (the transmit antenna) is an 80-meter dipole, and Antenna 2 (the receive antenna connected to Radio 2) is a 40-meter dipole. Even though Radio/Antenna 2 is being used to listen on 40 meters, it will still be subjected to the 80-meter transmit signal. It is this 80-meter signal energy that will be measured on the second antenna. If you have any questions or difficulty understanding this, please e-mail me. I'll be happy to explain further.

Conclusion

For a ham with a slightly larger "city lot," use of the WX0B SixPak, in most cases, will not degrade Radio 1 and 2 isolation due to the limitations presented by the isolation of the antennas themselves. For hams with one tower, it is almost certain that the antenna isolation will be the limiting factor, not the port isolation within the switch box. While 120 feet between my two towers may seem like a relatively decent amount of physical spacing, you can see from the test data that it isn't all that much when you actually look at it in terms of the resulting isolation.

If you opt to use stub filters, it is imperative that you use them on the radio side of the switching device, not the antenna side. Lastly, if you are concerned about the level of signal power seen by the second radio's receiver, you should definitely consider the use of transceiver bandpass filters (ICE, Dunestar, etc) or coaxial stub filters.

It seems like a great idea to have the stubs on the antenna side if you are using monobanders, since they will be automatically selected with the antenna. However, if you do this, you will not benefit from removing the strong fundamental that is still present inside the Sixpak-type switch box. You will still only have –50 dB isolation. By having the stubs on the radio side of the antenna switch, you will gain the isolation of the stub in addition to the switch's isolation. ■

Table 3

The results of the isolation measurements for various antenna combinations.

Band	*Antenna 1 (TX)*	*Antenna 2 (RX)*	*Direction*	*Isolation*
10 meters	Stack	TA34	At	–34 dB
	Stack	TA34	Away	–46 dB
	Stack	TA34	EU/SE	–50 dB
	Stack	TA34	Side	–51 dB
15 meters	Stack	TA34	At	–21 dB
	Stack	TA34	Away	–36 dB
	Stack	TA34	EU/SE	–47 dB
	Stack	TA34	Side	–52 dB
20 meters	Stack	TA34	At	–17 dB
	Stack	TA34	Away	–34 dB
	Stack	TA34	EU/SE	–38 dB
	Stack	TA34	Side	–47 dB
40 meters	XM240	40-meter dipole	At	–24 dB
	XM240	40-meter dipole	Away	–32 dB
	XM240	40-meter dipole	Side	–32 dB
	XM240	TA-34	At	–45 dB
	40-meter dipole	80-meter dipole		–20 dB
	40-meter dipole	80-meter vertical		–49 dB
80 meters	80-meter dipole	40-meter dipole		–33 dB
	80-meter dipole	TA-34		–48 dB
10 meters	TA34	80-meter vertical		–51 dB
	TA34	80-meter dipole		–33 dB
	TA34	40-meter Yagi		–48 dB
15 meters	TA34	80-meter vertical		–48 dB
	TA34	80-meter dipole		–33 dB
	TA34	40-meter Yagi		–39 dB
20 meters	TA34	80-meter vertical		–49 dB
	TA34	80-meter dipole		–33 dB
	TA34	40-meter Yagi		–60 dB

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22916 107th Ave SW
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Super Combo Keyer

"It Slices, It Dices... But Wait, There's More!"

After a particularly trying session of rearranging the myriad gadgets that make up my single op, two-radio system, I was pretty frustrated. There were far too many cables, switches, adapters, splitters, etc—and that was just for CW. I wanted to add audio switching, but it had become clear that the real need was to simplify the whole lash-up by about 10 dB.

In search of suggestions, I tossed the situation to the CQ-Contest e-mail reflector[1] population. I described the problem and expressed a strong desire for a "single-box solution." Imagine my surprise when Bernie, ZS4TX, wrote back saying, "What you've described is something very close to a product that I'm just finishing!"

After some additional exchanges of e-mail, it was clear that this was exactly what I needed, so I placed an order for one for whenever they became available. As it turned out, both Bernie and I would be in Bled, Slovenia for WRTC-2000. He brought along units #1 and #2 for team South Africa—which included Chris, ZS6EZ. If you worked S572L during IARU-HF last July, then you've heard a Super Combo Keyer (SCK) in action. I brought one of these first units back to the States to evaluate it, and later replaced it with a production-quality model, on which this review is based.

Figure 1

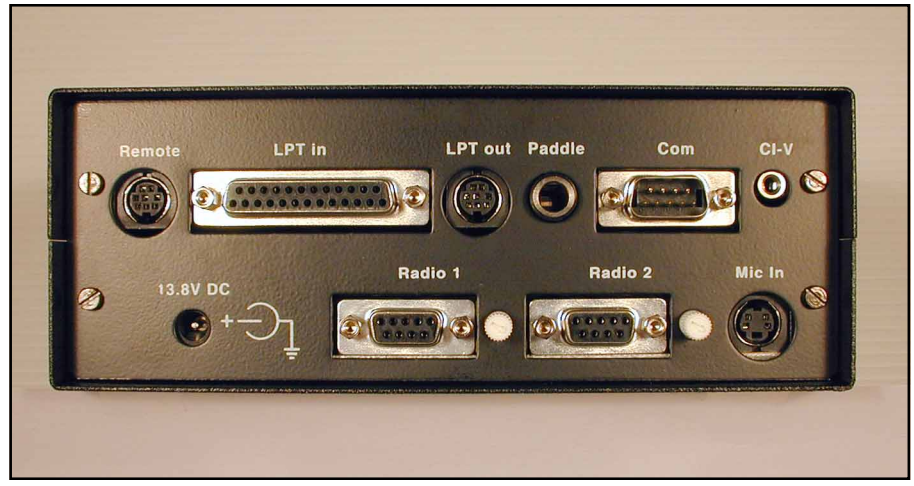


Figure 2

Super Combo Keyer Features

Bernie has developed a two-radio switching and control system that consolidates a great deal of the interface "stuff" into a single 3×7×7-inch box. Microprocessor-controlled, the SCK provides all of the switching needed to route CW, audio and PTT to two radio/amplifier combinations. The switching interface is intended to be driven by the parallel port of a PC running *TR-LOG*, *CT*, *WriteLog* or *NA* logging software. All operational controls are on the front panel and the keyer message switches are on the top of the box.

The SCK features both the Super Keyer III chip from Idiom Press and a custom non-volatile digital voice keyer (DVK). Both can be controlled from the popular PC logging software packages—four of the six available messages in each mode can be activated from the computer keyboard. A keying monitor tone is available if you don't want to use the radio's sidetone. The DVK also sports a compressor and noise gate. Audio signals are transformer-isolated and levels from the microphone and keyer outputs are separately adjustable.

In the cabling department, each radio's audio and keying signals are combined in a single DB-9 connector. The parallel port's band output bits, paddle inputs and the *TR-LOG* footswitch input connections are looped through to a separate connector to allow those signals to be accessed separately. An auxiliary connector is available for a remote interface to the keyer message switches and CW paddle inputs. All connectors are mounted on the back panel.

For ICOM owners, there is a CI-V serial data converter that translates RS-232 data to the single-line ICOM interface. With all the interfacing built into this package, it's hard to imagine that there is any panel space left—front or rear—and it is, indeed, a busy box. The only thing missing is headphone audio switching, which is a simple function easily implemented outside of the SCK.

Inside the SCK are two circuit boards, folded over each other like a sandwich and connected with ribbon cable. All of the pots and connectors are PC board-mount style. This makes assembly and disassembly very easy. The audio level adjustment pots are not particularly

[1] **cq-contest@contesting.com**—Message archives are available at **www.contesting.com**, subscribe by sending the message "subscribe cq-contest" to **majordomo@contesting.com**.

sturdy, but these will be tweaked infrequently and it's better to have them available for easy adjustment without removing a cover. The manual rig switch (labeled **RADIO 1/PC/RADIO 2** in Figure 1) is a little small for my liking—I'd prefer a larger bat-handle unit. These are not common in PC board-mount configurations, though, and I really haven't used it much, so this is not a big flaw. The enclosure is a four-piece metal clam shell that provides good shielding and does not flex a bit—unlike flimsy bent-aluminum enclosures common to ham accessories.

System Impact

The bottom line for me is that my PC interface is greatly simplified—one parallel port cable, a serial cable (COM1) for my FT-990's interface and a serial cable (COM2) to the SCK for my ICOM IC-735. The CW paddle and my Heil Pro Set connect directly to the SCK. Each radio has a single cable bundle connected to the appropriate DB-9 on the SCK rear panel and there is a single cable to the IC-735 CI-V jack.

There are no splitters in the system and the cable tangle behind the radios is greatly reduced. An additional benefit to reducing the number of cables and separate enclosures is that grounding is much improved. A single ground wire to the SCK enclosure does the job, making a ground loop much less probable. For stations with an amplifier, RFI and RF feedback due to grounding problems should be much more manageable with this type of controller.

When not using logging software, the SCK switching and routing functions can be controlled manually from the front panel.

Logging Software Interface

The SCK depends on the parallel port interface from a PC for radio switching control. All of the logging software compatible with the keyer is *Windows*-based and *Windows* is notorious for interfering with parallel port operation, so some caution may be required when setting up the software. I am a *TR-LOG* user and found the following LOGCFG.DAT entries to do the trick for proper control of the SCK:

```
KEYER RADIO ONE OUTPUT PORT = PARALLEL 1
KEYER RADIO TWO OUTPUT PORT = PARALLEL 1
RELAY CONTROL PORT = 1
DVK PORT = 1
```

The radio serial interfaces are unchanged. Even with these lines in the *TR-LOG* control file, most users of that program will still want to run *TR-LOG* in the *Windows* "Command-Prompt Only" mode or perhaps from a *DOS* window. When not running the contest logging program, it may be necessary to disconnect the parallel cable from the SCK in order to prevent spurious signals generated by *Windows* applications from interfering with the keyer's independent operation.

Different programs use the parallel port in different ways, most notably *CT* and *TR-LOG*, so the SCK can be placed in the appropriate mode by closing a combination of the message switches. The SCK blinks its "Record" light to communicate with the user during this operation.

Integrating the SCK

The first thing I did was to rip out all of the rat's nest of cables that implemented my SO2R setup. My trusty AEA MM-3 keyer was retired as was the dedicated parallel-port keying and homebrew ICOM CI-V data interfaces. The only thing left from before was the boom headset, the FT-990 data cable and the Brown Brothers paddle. The station never looked so clean!

The PC was connected to the SCK with shielded data cables. Each radio interface connector was constructed identically with shielded audio cable, terminated in the appropriate set of connectors for the '735 or '990. A single cable terminated in a 1/8-inch miniature phone plug connected to the ICOM's data port. I plugged the paddle into the rear-panel phone jack and my footswitch/boomset into the adapter provided with the SCK. I was ready to roll.

Following the instructions in the SCK manual, I was able to get the audio levels completely aligned in about 10 minutes. I have a Heath SB-610 scope to monitor RF output and used the ALC metering of each rig to set compression levels. It's not recommended that both the SCK and the rig compressors be used at the same time—I elected to use the FT-990's RF speech processor, so the SCK compressor is off. The noise gate was set at a low level—without amps I don't have any noisy fans. I'm not sure what to do about the teenagers and their computer video games that are often in this same room, though.

Interfacing to the logging software wasn't quite as smooth. I had a number of strange, *Windows*-related problems trying to run *TR-LOG*. I eventually wound up running *TR-LOG* from the command-prompt-only mode (press F8 during the boot-up process) and cannot leave the SCK parallel interface connected while *Windows* is running. Logging software written to run in a *Windows* environment, such as *WriteLog*, may not present these problems. At any rate, Bernie was very helpful through e-mails, and once the computer and logging software were properly configured, operation has been trouble free.

On-the-Air Performance

Audio quality reports for both processed mike output and the DVK have been good. The compressor and noise gate functions work as advertised, although someone with a noisier environment will give them a stiffer test. I haven't had any problems with ground loops and there have been no reports of hum. No readjustment of the audio levels has been required. (Note that I do not use an amplifier.)

The keyer is quite different from my trusty MM-3, but all of the basic functions have been fine. I'm used to the paddle control interface now and the keying is excellent. As delivered, the front panel control adjusts speed between 15 and 50 WPM, although—through use of the "R" command—lower and higher speeds are available.

The *TR-LOG* interface has been rock solid, as well as the CI-V interface. I have several contests—both phone and CW—under my belt, and aside from operator error, the SCK has behaved as I've expected it to.

Summary

In my shack, the SCK replaced three separate pieces of equipment, three custom COM/LPT port interfaces, four splitters and one manual switchbox. The only thing I now have to control manually is my headphone audio.

The Super Combo Keyer is really a nice piece of engineering—compact and well laid-out. Even non-contesters would benefit from having this device in the shack.

At about $340, is it worth the price? The equipment it replaces has a retail value of at least $400-and more likely $500. The reduction in cabling and connectors should improve system reliability, which keeps you on the air instead of at the workbench. Grounding is centralized and the necessary controls are all in one place on the operating desk. It's a great deal. Nice job, Bernie!

The Super Contest Keyer is available in the US from Array Solutions, 350 Gloria Rd, Sunnyvale, TX 75182; 972-203-2008 fax 972-203-8811; **wx0b@arraysolutions.com**; **www.arraysolutions.com**. ZS4TX's Web site, with more photos and a downloadable manual, is at **www.zs4tx.co.za/sck/**.

Kid's Day—June 16th, 2001

Jean Wolfgang, WB3IOS
Educational Programs Coordinator
ARRL Field and Educational Services
860-594-0219
jwolfgang@arrl.org

Kid's Day is designed to encourage young people (be they licensed or unlicensed) to have some fun with Amateur Radio. It provides an opportunity for on-the-air experience that may foster an interest in becoming more active or pursuing a ham license in the future. It's also a great time to share your hobby and your station with your own children.

You can add more excitement to the Kid's Day experience by creating a "build up" to the main event. Some examples? Have the kids help you "inspect" or prepare the antenna system, tune-up the equipment, identify the best frequencies, design a commemorative QSL card or practice the exchange.

For additional information visit **www.arrl.org/FandES/ead/kd-rules.html**.

Kid's Day Rules

Date: June 16, 2001.

Time: 1800 to 2400Z. There are no limits on operating time.

Suggested Exchange: Name, age, QTH and favorite color. You are encouraged to work the same station again if either operator has changed. Those looking for contacts should call "CQ Kid's Day."

Suggested Frequencies: 28350 to 28400 kHz, 21380 to 21400 kHz, 14270 to 14300 kHz and 2-meter repeater frequencies (with permission from the particular repeater's sponsor). Remember to observe third party traffic restrictions when making DX QSOs.

Reporting: Logs and comments can be posted to the Internet by sending them to **kids@contesting.com**. You may review these postings at **www.contesting.com/kids/**. Those without Internet access should forward their logs and comments to the Boring Amateur Radio Club.

Awards: All participants are eligible to receive a colorful certificate (it becomes the child's personalized sales brochure on ham radio). These certificates can be downloaded from **www.arrl.org/FandES/ead/kids-day-cert.pdf**. Those without Internet access can obtain a printed copy by sending a 9 × 12-inch SASE to:

Boring Amateur Radio Club
Kid's Day Certificate
PO Box 1357
Boring, OR 97009

For additional information, visit the BARC Web site: **www.jzap.com/k7rat/**. ■

YM3LZ in the 2000 WAE SSB Contest

Valeri (Wally) Stefanov, LZ2CJ
wally@el-soft.com

After a successful first effort by the YM3LZ contest team in the 2000 WPX SSB Contest, we decided that our next contest endeavor would be the 2000 WAE SSB Contest. The September 9th and 10th dates allowed us to combine a vacation at the Turkish seaside (near Kusadasi) with the fun of operating in one of world's most popular and difficult contests.

YM3LZ's 2000 WAE SSB Contest Effort

Band	*QSOs*	*QTCs*	*Mult*
160	0	0	0
80	209	130	164
40	396	292	132
20	716	639	98
15	865	865	92
10	325	324	84
Totals	2511	2250	570

Final score: 2713770 points

YM3LZ placed second in the world and first in Asia in the 2000 WAE SSB Contest.

Preparations

We arranged to set up our station at the QTH of Berkin, TA3J, and Nilay, TA3YJ. Turkey is a good location to operate this contest from. It offers easy European contacts with simple antennas on 80 and 40 meters and still provides an opportunity for lots of multipliers on the higher bands as well.

We started planning our trip long before the contest weekend, but finalizing all of the necessary arrangements in time was still a challenge. It always seemed that there was one more unfinished detail that required attention! The original members of the team were TA3J, TA3YJ, TA3D, LZ1UQ, LZ2CJ, LZ2FI, LZ2FV and LZ2UU. Scheduling conflicts and other unforeseen personal considerations eventually thinned our team down considerably. In the end, the group that remained consisted of Berkin, TA3J; Ceco, LZ2FV; Andy, LZ2HM; and me.

Our initial antenna plans included a 7-element Yagi for 15 meters. Ceco intended to build a 6-element Yagi for 10. Ultimately, transportation considerations kept us from bringing the 15-meter Yagi, and other commitments prevented Ceco from completing his 10-meter Yagi project. We had to settle for a fixed 3-element delta loop array for 15 and a 3-element 10-meter Yagi. We would use a fixed 2-element delta loop array on 20. A 40-meter vertical that I supplied and an 80-meter delta loop (still up at TA3J's QTH from our WPX effort) would complete our rather modest antenna farm.

Obtaining our visas for the WPX trip was easy. We wouldn't be so lucky this time though, probably due to the fact that we had our families along and would be in-country for a longer period of time. We also encountered delays in securing our license. Berkin, TA3J, came to our rescue; the visas and the license showed up a few days before our departure date.

A Quiet Start

My family and I arrived at the "Grand Efe" hotel—near Kusadasi, Turkey—on August 29th. We enjoyed a nice quiet week of vacation time together. The seaside there is beautiful, the ocean was crystal clear and the weather was wonderful. That week of rest and recreation made the frustrations we experienced while making preparations for this trip well worth the trouble.

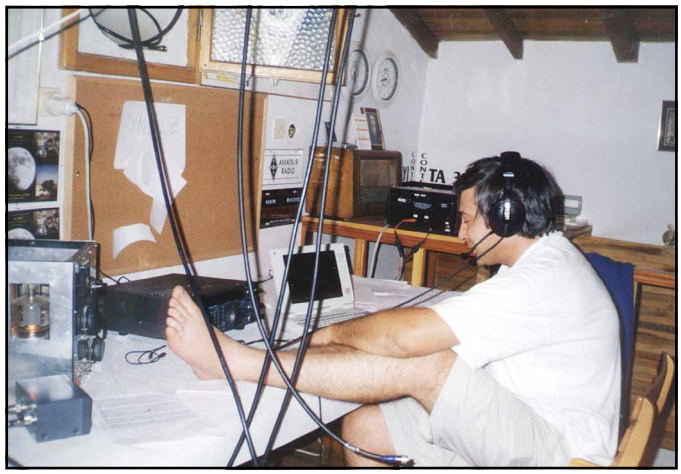
I had to present a lecture on dental implants to my Turkish colleagues in Izmir on September 7th. Ceco, LZ2FV, his son Todor, his wife Svetla, LZ2FI, and Andy, LZ2HM, arrived while Berkin and I were in Izmir. Their 22-hour bus trip had dampened their enthusiasm; by the time they reached the hotel they were exhausted. Berkin and I were also tired from our long day in Izmir. He decided to spend the night at the hotel as well.

Station Preparations

The YM3LZ Contest Team awoke at 5 AM and soon headed off for the village of Turgutalp, located near Manisa at about 1200 meters above sea level. On our way there we made a brief stop in Izmir to pick up a TS-850S, TA3D's homebrew amplifier and a few other odds and ends. We arrived at Berkin's and Nilay's QTH at around 10:30 AM local time and immediately began work on the antennas. We had to move quickly if we were going to complete our preparations in time for the beginning of the contest.

The YM3LZ team for the 2000 WAE SSB Contest (from left to right): Wally, LZ2CJ; Andy, LZ2HM; Berkin, TA3J; and Ceco, LZ2FV.

Andy searches for multipliers while Wally mans the Run Station.



Ceco finds an unusual—but apparently comfortable—position for his broken foot.

Andy continues chasing multipliers as Berkin takes a shift on the Run station.

Our first job was to remove the 160-meter loop that was still up from our WPX operation in March. We then decided to move our existing the 80-meter delta loop to make room for our new 15- and 20-meter loop arrays. The removal and relocation projects took about two hours. Once that was completed, Andy and I erected a lightweight 12-meter tall military 40-meter vertical. The vertical is designed to go up very quickly—we figured it would only take us a few minutes. Unfortunately, the "4-minute" vertical became a "one and a half hour" vertical—it broke when we tried to erect it. We used pieces from a spare mast and some binding wire to make the required repairs. The antenna was finally ready to go at 3 PM local time.

Assembling our 3-element 10-meter Yagi and erecting it on a separate mast—and undertaking some unexpected repairs on our TS-930S—took us another two hours. Consequently, we didn't begin to work on the 20- and 15-meter delta loop arrays until 5 PM—sunset in Turkey. When darkness fell, we were still in the process of measuring and cutting the wire elements. An hour later we erected and tuned the 20-meter antenna by torchlight. We were exhausted at that point, so we decided to finish tuning the 15-meter delta loop array in the morning.

We went inside the house and Berkin made us dinner. Andy and Ceco then began setting up the TS-850S/TA3D 800 W amp Run station and TS930S/TA3J 450 W amp Multiplier station.

Unfortunately, while we were moving the heavy 800 W amplifier from the car to the house in the dark, Ceco fell and broke his foot in two places. He proved to be a brave guy—he managed to withstand the pain throughout the entire contest. Thank God there was no displacement of the bone fragments. (Luckily, he eventually recovered from the injury without any serious complications.)

Andy set up a network connection between my laptop and Berkin's desktop PC. By local midnight we were ready to go. The first crew—LZ2FV and I—caught a couple hours of sleep while TA3J and LZ2HM remained awake until 3 AM—the start of the contest.

The Real Fun Begins!

We began the contest on 40 meters, but the going was slow. We found that most of the European signals were weak and hard to copy. Using the vertical for our 40-meter antenna the first night would prove to be a mistake. We later discovered that the 80-meter delta loop fed through a tuner worked much better for 40-meter European contacts.

Forty minutes into the contest—and with only 60 contacts in the log—we decided to move to 80, where we hoped we could get a better rate. After an hour there, and with only 40 more QSOs, we made a brief return visit to 40. We ended up bouncing back and forth between those two bands until around 0330Z, when we moved up to 20.

We found 20 productive for the next four hours. Once the sun came up, Andy tuned the 15-meter 3-element delta loop and we were ready to go on that band by about 0730Z. We had a good rate on 15, and that bumped up our QSO total to 678.

At 1015Z we moved to 10. The band only stayed open for a short time, however, and there was heavy QSB. An hour of 10-meter operation only netted 83 QSOs, so we returned to 15 meters. We continued to switch between the 20, 15 and 10 meter bands throughout the day, and we eventually reached the 1000-contact milestone.

A little after 1800Z, we returned to 40 meters—this time using the 80-meter delta loop/tuner combination. The European signals were noticeably louder, and we were being heard better as well. We remained on 40 for about two hours—attempted a short jump to 80—and then went back to 20, where we stayed until about 2200Z.

An eventual return to 40 resulted in a good run that lasted until just before 2400Z. We then QSYed to 80, and passed the 24-hour point with 1490 QSOs in the log. We worked the 40 and 80 meter bands hard—milking out every QSO we could until 0400Z—and then moved up to 20. Fifteen opened around 0600Z. We were able to run stations on that band for about an hour and a half. A move to 10 resulted in two and one-half hours of better second day conditions.

We kept focusing on moving from band to band and attempting to locate and work every new station that we could find. Activity was low, however, and there were few QTC takers, so things became rather boring at times. Perhaps it's time for WAE to consider going to a 24 or 36-hour format—that might help keep the activity level during the contest more consistent.

At 1938Z we made a move to 80 meters, but we were soon forced into changing bands again. We spent the last four hours of the contest collecting some good multipliers on 40 and 80 meters.

When the end came we discovered that—in spite of low activity and poor 10-meter conditions—we had managed to make a pretty good showing after all. Our overall final score was 2713770 points.

I'm sure you'll agree that that's not too bad for a simple setup. See you in the next one!

73,

Wally, LZ2CJ, and the rest of the YM3LZ Crew ■

WRTC—Onward to 2002!

Ari Korhonen, OH1EH
ari.korhonen@kolumbus.fi

The next World Radiosport Team Championship, the Olympics of Amateur Radio, will be taking place in Finland in the year 2002.

What is the WRTC?

The WRTC is a competition among two-person teams of some of the top Amateur Radio contest operators in the world. By bringing these competitors together in one geographic area and providing equal operating conditions (antennas, power, etc), the variables normally associated with radio contesting are minimized, and the individual team's operating skills are emphasized.

WRTC 2002—A Joint Effort

Discussions as to which country would host WRTC 2002 began during the highly successful WRTC 2000 in Slovenia. Well known for its long history and high level of participation in contesting, Finland was one of the obvious choices. A common comment heard during the planning discussions in Slovenia was "The Finns must do it!"

We are now pleased to announce that WRTC 2002 will be jointly organized by Contest Club Finland (CCF) and the Finnish Amateur Radio League (SRAL).

The Teams

The team selection process is about to begin. Participants from all continents will be selected based primarily on their track records from past contests. Some 45 to 50 teams will be chosen through a variety of methods. These include open applications as well as "Encouragement Letters" sent out directly by the committee. Leading contest clubs and the IARU societies are encouraged to assist in identifying prospective participants. We will be keeping the contest community informed on the progress of this selection process on a regular basis.

The Contest

The on-the-air portion of the competition will be held within the 2002 IARU HF Championship. In keeping with the original WRTC concept, every effort will be made to provide the teams with operating conditions that are as equal as possible. Our plan is to set up 45 to 50 station sites in locations around the Helsinki area; each equipped with identical antenna systems.

The Finns are considered forerunners in information and telecommunications technology. We are proud to say that during the WRTC 2002, some of these exciting new technologies will be creatively utilized!

The Social Aspects

While the competition itself is certainly the focal point of WRTC 2002, the social aspects of this event will also receive special attention.

Once they've arrived in Finland, the competitors and the other guests will eventually be transported to the SRAL Summer Camp. Summer Camp is one of Finnish Amateur Radio's oldest traditions. It's essentially a combination of a hamfest and Field Day, and just about every ham-related activity is demonstrated. There's something exciting in the air during these camps—something that one has to experience first hand to fully appreciate!

A variety of other activities—such as excursions, parties and more—are also planned.

The WRTC 2002 Management Team

Jouko Häyrynen, OH1RX—Organizing Committee Chairman

Jari Jussila, OH2BU—Events Chairman and Domestic Publicity

Martti Laine, OH2BH—Competition Co-Chairman

Pasi Luoma-aho, OH2IW—Competition Co-Chairman

Jukka Kulha, OH2MA—Site Design and Management

Veijo Kontas, OH6KN—Wireless and Web technology

Merja Veisterä—Financial Controller and Treasurer

Ari Korhonen, OH1EH—Competitor Correspondence and International Publicity

Timo Klimoff, OH1NOA—Competitor Correspondence and Webmaster

Risto Lund, OH3UU—Logging and Scoring Management

WRTC 2002—Preliminary Schedule

Tuesday, July 9th:

Competitors arrive in Finland. There will be an informal get together and registration.

Wednesday, July 10th:

Competitors and guests will be transported to the SRAL Summer Camp and the official opening ceremony will be held.

Thursday, July 11th:

The first official contest meeting, the pileup competition and an evening party are scheduled.

Friday, July 12th:

The second contest meeting will be held. Competitors will then be transported to the contest station sites.

Saturday, July 13th:

WRTC 2002 on-the-air competition begins at 1200Z.

Sunday, July 14th:

WRTC 2002 competition ends at 1200Z.

Late night "after the contest" events will be held in Helsinki.

Monday, July 15th:

There will be a tour of Helsinki, the awards ceremony and the closing ceremony.

Tuesday, July 16th:

Departure.

WRTC 2002 Publicity

We'll be keeping the contest community informed on the progress of WRTC 2002 through various means. One of the best places to find the latest information is the WRTC 2002 Web site: **www.wrtc2002.org**.

Amateur Radio in Finland

The Finnish Amateur Radio League (SRAL) currently has 5000 members. This number represents more than 95 percent of all Finnish amateur licensees—the highest percentage member-to-licensee ratio in all of Europe. SRAL has retained its membership while many other countries have experienced declining numbers. To this end, the League employs some highly advanced initiatives—SRAL is quite possibly the only national Amateur Radio society that recruits new members through television commercials. The organization is professionally run and the Finnish Ministry of Education supports its efforts.

Contesting and DXing are two of the most popular Amateur Radio pursuits in Finland. Countrywide amateur activities are also organized by the Contest Club Finland (CCF) and the OH DX Foundation (OHDXF).

Located at 62 degrees North, Finland is considered by some the "KL7 of Europe"—as it is within the auroral zone at roughly the same latitude as Anchorage, Alaska. Finnish hams seem to believe that by hoisting their antennas higher and adding more elements they can close the "propagation gap" that exists between them and the rest of Europe. In Finland, rotatable 140-foot

towers are fairly common. With antennas positioned at lesser heights, it would be very difficult to be competitive under typical conditions.

When the propagation is favorable, however, OHs are right in the thick of things—fighting for victory. Some of these individuals are not content with leaving their fate to the whims of the local propagation though—they head south and set up operations in contesting "hot spots" in equatorial regions.

Those who visit Finland may be surprised to see that the reach of the internationally renowned *OH2AQ DX Summit*—the global network of Web-based DX spotting—has been extended into the horizon of new innovation. The *DX Summit* is carried by the Finnish nationwide teletext TV network. Switch on a TV set anywhere in Finland—in any household—and you'll enjoy instant access to the latest information from the site on DXing and Amateur Radio contesting.

Many Finnish hams are exposed to state-of-the-art technology in their employment as well—as they work for companies that are front-runners in high-tech sectors. Some of these companies will be providing support for WRTC-2002—Elektrobit, Nokia and Vaisala for example. (Nokia, incidentally, currently employs more than 10 percent of the ham population of Finland.)

But ultimately, the greatest factor that has contributed to the success of Amateur Radio in Finland is the unity of its ham population. While OH DXers and contesters compete head-to-head in many events, the following day they are back around the same table, sharing what they've learned and planning their next endeavors.

As the hosts for WRTC-2002, we invite both the competitors and others to come to Finland and experience first-hand the beauty of our country, the depth of our culture and the tremendous camaraderie that has become the hallmark of the WRTC events.

Some Facts About Finland

Finland is a modern western country located in the northern part of Europe. It is 338000 square kilometers with forests and lakes, clean cities, a beautiful countryside and an abundance of open space and natural settings. Finland is a stable democracy, and her citizens enjoy a high standard of living. The form of government is republic, and the Parliament consists of a single chamber of 200 elected members. Finland lies between Sweden and Russia, and is the link between the East and West—with cultural influences from both areas. Finland is a member of the European Union. For additional information, see **virtual.finland.fi**.

Population

The country's population is 5.1 million. There are two official languages: Finnish is spoken by 93% of the population and Swedish is the mother tongue for 5.8%. Communication for foreign visitors is easy, as most Finnish people also speak English.

Nature

Finland is the seventh largest country in Europe (after Russia, Ukraine, France, Spain, Sweden and Germany). There are almost 200000 lakes, 5100 rapids and 180000 islands—with about 100000 of these islands located on the lakes. About 69% of the country is covered by forest.

A very popular activity in Finland is sauna. Today, the sauna is known the World over as one of the best forms of relaxation. While you can now find saunas in almost every country, they are never quite the same as those in Finland.

Traveling Information

Most major international airlines operating in Europe, the US and Japan offer direct flights to Helsinki International Airport. Helsinki is also easily accessible by water from Sweden, Estonia and Germany and by train from Russia.

Downtown Helsinki is easy to get to from the airport by bus or by taxi. *Finnair* buses depart from a location near the airport arrivals hall at 20-minute intervals. The trip from the airport to the city center takes about 30 minutes. For more information see **www.finnair.com/offices/citybus.htm**.

Currency

The currency in Finland is the Finnish Markka (FIM). One EUR is equivalent to 5.94573 FIM; one USD is approximately 6.35 FIM. Foreign currencies are easily exchanged for Finnish Marks at exchange agencies and banks at the airport, the main railway stations and many other places. There are no currency restrictions and all major credit cards are recognized. For exchange rate information see **www.bof.fi/env/eng/new/fixlist.stm**.

Electrical Power

The electrical power in Finland is 230 V/50 Hz. Plugs and sockets are the same as those used in the continental countries of the European Union. An electrical transformer will be required if your equipment operates at a different voltage.

Weather

The weather in Finland during the summer season is very pleasant. The average temperature during the month of July is around 18 degrees C (64 degrees F) and there are more than 20 hours of daylight in the southern part of the country. For more detailed weather information, visit **www.fmi.fi/en/index.html**.

Time Difference

The time in Finland is 2 hours ahead of GMT. ■

NCJ Profiles—A Connecticut Yankee in King Marconi's Court, Jack Schuster, W1WEF

H. Ward Silver, N0AX
hwardsil@wolfenet.com

Here's a fellow whose call will be instantly recognized by contesters the world over. I think I've probably worked Jack Schuster, W1WEF, in every ARRL Sweepstakes, NAQP, and Sprint I've participated in over the last twenty years. He's one of those guys who has managed to weld all of his contest exchanges onto his call sign in your brain—"W1WEF Jack CT."

Like many of us, Jack became active again following a post-college hiatus. "After graduating from the University of Massachusetts and moving to Long Island for a short time, I lost interest in ham radio and was pretty much inactive from 1960 to 1978. I frequently took a coffee break with a ham who got me interested again.

"I was out of work following an operation and thought it might be a good time to get a radio to keep me busy during my recovery. Before returning to work I had Worked All States and DXCC with a dipole and TS-520S. I was hooked again!" And our logs are the fatter for it.

Jack and his grandson stalking stripers off the coast of Cape Cod.

While he was still in high school, Jack's interest in traffic handling led to CD Parties and, well, you know the rest of that story! "After I upgraded to General, I became interested in traffic handling, and as an ORS received monthly "CD Bulletins." I got into contesting by entering the CD Parties—which I really enjoyed. It didn't take long—especially after I built my 813 amplifiers—to learn that a real loud signal in the CD Parties was coming from a neighbor whose wire antenna ended about 100 feet from my shack! [I believe those were the days of vacuum tube front ends—*N0AX*] That was W1JYH, now W1AX.

"Roger was my contesting Elmer. I remained active in traffic nets right through college somehow, entering the CD Parties and Sweepstakes CW from the school radio club, W1PUO.

"I first became interested in ham radio when I was 13 years old. A Boy Scout, I was going for a Radio Merit Badge when a Scoutmaster told me about ham radio. Prior to that time I was building crystal sets, one tube radios, five tube radios and phono oscillators (a low power AM transmitter meant to transmit a signal from a phonograph to a broadcast radio). My Scoutmaster friend and I could work each other on the BC band with all the kids in the neighborhood listening in! We were both studying together for a Second Class license when we learned that the new Novice Class was about to come out. We passed the exam at a local hamfest. I became WN1WEF and my buddy was WN1WEN."

Jack's first QSO was with VE1II. "What a thrill! My Dad bought me a Hallicrafters S40B and I built my 6AG7 one tube crystal oscillator with a Pi network straight from the ARRL handbook. My one and only crystal was on 3749. I remember calling CQ for two weeks (and logging every one of them) before that first contact. Many of those hams I met as a Novice I still work today."

After he became active again in 1978, the contest bug was still biting. "I did Sweepstakes again, joined the Murphy's Marauder's Contest Club, became interested in DX contests and my favorite contest—the Sprint. I did NAQP in 1986 on both modes, the first year it ran, and to my surprise I won a plaque for First Place Combined."

Through the Connecticut Wireless Association, another fortuitous friendship was formed. "I met John Thompson, W1BIH, and he invited me to operate ARRL DX with him from his place in Curacao as P42J, PJ2J, PJ9J and PJ9C. I had the pleasure of doing it ten times in all. John and I usually operated multi/single and took Number 1 World in '96 and '98, and were usually second or third the rest of the time. I operated single op CW from there once and blew first place by not realizing that the rules had been changed that year to split the Maritime section into 5 separate mults. I also took too much off time. I was third and operated five hours less than the top two stations! That was a tough lesson—you have to stay in the chair if you're out to win, and you have to READ the RULES!

"Outside of operating from Curacao, I once did 10-meter single band from KH6, operating from AH6AZ's place [One of contesting's great QTHs—*N0AX*], and operated from SeaQ Maui a couple times in the CW Sweepstakes. That was almost as much fun as the snorkeling!"

Not only did Jack have a contest Elmer, but two of the contesting giants were still active when he got into the game. "I'll never forget two ops that really impressed me in my earliest days—W4KFC and W9IOP. Both were fantastic ops, but W9IOP would go back to two stations at once, and tell both to go at the

same time when he sent his exchange! Those were the days of paper logs, paper dupe sheets, far fewer contacts and rates nowhere near what they are today.

"In the earliest years in Curacao, I would bring the log sheets home. I recall one year my wife and I spent two weeks duping them! I thought my Commodore VIC 20 was great when I used it with a dupe checking program, but when *CT* came along and revolutionized contesting, now *that* was REALLY great!"

A regular, Jack is always in my Sprint log. "My favorite contest is the CW Sprint. I love the fast pace, the good operators, and the fact that it's 4 hours long. I never could stay up 48 hours for any contest—maybe once I went over 40 hours. I really enjoy the 24-hour IARU HF Championships. I can manage that. I would love to see the major DX contests go to 24 hours long... maybe 24 out of 30 with 2-hour off time minimums."

"I have to admit that I'm surprised I don't see any lessening of contest activity. To the contrary, the number of logs submitted for the major contests are increasing every year. Between contests though, the bands are often so quiet they seem like they're closed... but come contest weekends they open right up! I think contesting is healthy, but I fear the direction that licensing is going with no CW requirements might ultimately take away the CW bands and my favorite mode."

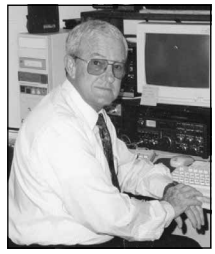
Jack is planning to move from one to two-radio operation. "I have yet to use two radios effectively. I have one tower, with three TH6s, two 40-2CDs, a 4-square on 80 (4 sloping dipoles off a tower) and an Inverted **L** on 160. I'm determined to set up the necessary filtering and switching to let me effectively use two radios by this fall.

"I must admit that I've been saying that I was going to do this for years... but between the contests other interests get in the way. Other than operating when I'm in the car, ham radio takes a back seat. We do most of our RVing in the winter, but we plan our trips so I'm home for the contests. In the summer I spend most of my time on Cape Cod where I have a 60-foot tower and a TH6 that I hardly ever use!"

Not limiting himself to DXing, Jack plies the bounding main, as well. "After about 40 years of boating and salt water fishing, I think I've finally figured out how to catch Stripers. We were lucky to have my three-year-old grandson and his Mom and Dad with us most of the summer last year, and I've already got my grandson as hooked on fishing as I am!" Now, how about setting up a radio in that spare bedroom, Granddad? ■

RTTY Contesting

Wayne Matlock, K7WM
k7wm@i10net.com



If you have missed any of the contests since the first of this year, then you've missed some good ones. With outstanding propagation and lots of participation, the action has been non-stop.

Our guest columnist this time around is Don Hill, AA5AU. Don hails from New Orleans, Louisiana, and has his station set up to operate on all modes—which he does most effectively.

Don's first love is RTTY contesting, and a review of his past contest performance is very indicative of the caliber of operator that he is. Don shares lots of useful contesting information here. It's of value regardless of the operating mode and entry category you choose.

The 2001 ARRL RTTY Roundup

By Don Hill, AA5AU

This year's 2001 ARRL RTTY Roundup will go down as the best ever. Conditions were excellent and activity was at an all-time high. This is my favorite contest, and I've been fortunate enough to win the Low Power category eight times, including the last six years in a row (1995 through 2000).

I had set a couple of goals for this year's running. My ultimate personal challenge was to reach the 1440 QSO mark. This number represents an average of one completed QSO per minute for the entire 24-hour operating period. My second goal was to top my 1999 World Record 152625 points. When the starting bell rang, I had no idea that I was on my way to achieving both of these objectives.

In the previous two Roundups, I had incorporated three radios into the station. After doing some 3-radio RTTY contesting during 2000, however, I eventually came to the conclusion that two radio contesting works out better for me. I found that concentrating on three radios is too difficult. My operation is much more efficient with just two.

Last year I had a lightning strike at my QTH—and it had a considerable impact on this year's Roundup for me. Two of my three radios were damaged (a Kenwood TS-870 and one of my two ICOM IC-751As). While the TS-870 was in for service, I purchased a second TS-870. The damaged TS-870 was eventually repaired, so I wound up with two.

The Kenwood TS-870 is the best transceiver I have ever used for RTTY. Having a pair of them as my main radios in the 2001 Roundup gave me a big boost over previous years, when I was using just one TS-870 and the two ICOMs. The ICOM IC-751A is an excellent RTTY radio—especially when it's equipped with the 250-Hz filter—but it's no match for the Kenwood with its DSP filtering.

Another advantage of the '870 over the '751 is its computer control capabilities. I'm now able to take full advantage of the *WriteLog* bandmap feature.

The Hardware

Station "A"

Station "A" consists of a Kenwood TS-870 transceiver, a Hewlett-Packard Pavilion 200 MHz Pentium computer running *WriteLog* version 10.23B (beta) under *Windows 98SE*, a JPS NIR-10 audio filter and a HAL DXP-38 multimode controller. This station is set up for 15 and 40 meters and is equipped with Dunestar bandpass filters and a shorted 23-foot stub.

The HAL unit is used for both transmit and receive, but I also open up a second RTTY window in *WriteLog*. I split the audio output of the NIR-10 filter and feed one leg to the DXP-38 and the other to the left channel input of the sound card. This allows redundant receive capabilities. During rough copy conditions, if the DXP-38 misses any print, the sound card setup sometimes receives it okay—and vice versa.

The computer in Station "A" is networked to the computer in Station "B" through a 3COM Ethernet hub.

Station "B"

Station "B" is my second TS-870, a Dell 166 MHz Pentium computer running the same version of *WriteLog* under *Windows 95*, a JPS NIR-12 Dual DSP audio filter and a PK-232MBX multimode controller. This station is set up mainly for 10, 20 and 80 meters and is equipped with an open 23-foot stub for 10 and 20 meters. A Dunestar 600 switchable band filter allows operation on any band from 10 to 80 meters.

The 'MBX is used for both transmit and receive. I open up a second RTTY window in *WriteLog* and set up the left channel of the stereo sound card as in Station "A" for redundant receive. This second window can also be configured to operate PSK31. (I didn't end up making any PSK31 contacts this year—the activity on RTTY was too high.)

Station "C"

Station "C" includes an ICOM IC-751A with a 250-Hz filter. I use the right channel of the sound card in the Station "B" computer for RTTY encode and decode. I use an extra COM port on the same computer to key this rig's PTT and FSK. This station is dedicated to 10 meters only and has a Dunestar 10-meter filter. It is primarily a "spare" station in case of a failure in either of the other two. (I ended up making only two Roundup contacts this year using this radio.)

A Strategic Overview

How Much Time Should I Spend on Each Band?

In the days before the contest I developed a strategy. I studied my logs from the past two years to determine what I could do to improve my score. In 2000, I felt as if I had put in more of an effort than in 1999, but my score was somewhat lower.

I noticed some significant differences between the two logs. In 1999, I made more contacts on 10 and 15 meters. In 2000, I made more on 80. It seemed that I spent more time on 40 and 80 in 2000 than I did in 1999. Multipliers—particularly DX—are more readily available on 10 and 15 meters, and this was reflected in the logs. My initial strategy going into this year's running involved spending significantly more time on 10 and 15 meters—and less time on 80 meters.

When Should I Change Bands?

I always begin the contest on 10 and 15 meters. The first major decisions are when to move Station "A" from 15 to 40 meters and when to move Station "B" from 10 to 20 meters.

My logs showed that in 2000 I moved the "A" station from 15 to 40 meters an hour earlier than I had in 1999. Since I wanted to make at least 250 contacts on 40 meters, I had to make sure that this year I moved at the right time and didn't cut myself short on 15 *or* 40.

The switch from 10 to 20 meters on Station "B" always depends on how the 10-meter band is behaving on that particular day. My thoughts were that I would be hitting 10 and 15 meters very hard on Sunday morning, so as soon as 10 began slowing down on Saturday, I would immediately switch Station "B" over to 20 meters.

The second move for Station "B" is from 20 to 80 meters. Looking over the 2000 logs, I began to wonder why I had moved to 80 so early on.

Then I remembered. It was because when Station "A" was on 40 meters and Station "B" was on 20 meters at the same time, there was interference on 20 when I transmitted on 40—in spite of my band filters.

Consequently on Friday, the day before the 2001 Roundup, I added the two 23-foot stubs. I tested them with one station on 40 and the other on 20 meters and found that they significantly reduced the interference. Without the stubs, I had S5-level noise on 20 when I transmitted on 40. With the stubs, the noise was reduced to S2 across the RTTY sub-band of 20 meters.

The reason I had more contacts on 80 meters in 2000 was because the interference had forced me to move there. (These hastily constructed stubs made a big difference in the 2001 contest.)

With the improvements in isolation, my strategy now was to spend more time operating a combination of 40 and 20 meters before I moved Station "B" to 80 meters

Rest Periods

The third and final strategic consideration was determining when to take the rest periods. The rules state that the off time must be taken in no more than two blocks. You are allowed to take the entire 6 hours of off time at once (two 3-hour rest periods back-to-back).

In 1999, I took all 6 hours at once. In 2000, I took 5 hours 45 minutes in one block, and then took the remaining 15 minutes off during the day on Sunday. I decided in 2001 that I would take a single 6-hour break.

But *when* should I take these 6 hours? To develop a plan, I listened to the bands on Thursday and Friday morning to find out what time 15 and 10 meters opened. I found that 15 meters seemed to open up at around 1315Z. Since there wasn't much activity on 10, I had to rely on my recent contest experiences in this sunspot cycle. I have observed that 10 meters opens at approximately the same time as 15—or perhaps 15 to 30 minutes later.

When to start on Sunday is a critical decision. Probably the most critical of all of the strategies. This is a rate contest—I had to be sure that 15 meters would be open enough to get a good rate going, whether that rate was supported by 20 *or* 10-meter contacts. Fifteen meters is only going to be open to Europe at that time for me. Running Low Power, I know that I can hear Europe on 15 meters a few minutes earlier than they can hear me.

Since I had heard strong signals from Europe at 1315Z on 15 meters the previous two mornings, I decided that I would end my break on Sunday at 1300Z. I would begin my time off at 0700Z.

Up and Running

I started out at 1800Z Saturday with Station "A" on 15 meters and Station "B" on 10. At 2015Z, I determined that it was time to move Station "B" from 10 to 20.

I had planned to switch Station "A" from 15 to 40 meters at around 2330Z, but it was still generating a good rate, so I ended up lingering on that band until 2345Z. I probably should have stuck to my plan—my rate jumped dramatically when I switched to 40. With the stubs, I was able to operate 40 and 20 meters at the same time for 2 hours and 15 minutes and logged 174 contacts.

My next decision was when to move Station "B" from 20 to 80 meters. I didn't plan ahead for this. I only knew that I wanted fewer total contacts on 80. The stubs allowed me to remain on 20 longer, but I wanted at least 150 contacts on 80 meters. I switched over to 80 at 0200Z.

Since Station "B" is equipped with a switchable Dunestar 600 filter, I was able to toggle back and forth between 80 to 20 quickly—and that's exactly what I did. At 0230Z, I planted myself on 80 permanently and operated on 40 and 80 meters until 0700Z (1 AM local time), and then began my off period. At that point I had 145 contacts on 80 and 250 contacts on 40. My QSO total was 941. I was very pleased.

When my off time ended at 1300Z, I set the stations up for 15 and 20 meters and jumped back in. I listened to the Station "C" radio until I began hearing signals on 10 meters, and then moved Station "B" from 20 to 10.

That's all for this time. Tune in next time for Part 2, "A Sunday to Remember." Hope to see you all in the contests.

73, Wayne, K7WM ■

Contest Tips, Tricks & Techniques

Gary Sutcliffe, W9XT
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Avoiding Fatigue and Maintaining Concentration—Part 2

Last time we looked at the shack environment and how it affects fatigue and comfort. This included such factors as the operator chair, temperature and lighting. In this installment we will consider food, drink and sleep.

W9XT

Food and Drink

K5ZD, like many others, recommends that you don't eat too much. He does not think about food while operating. Randy notes that once food arrives, he realizes how hungry he is. Perhaps leaving that bag of nacho chips next to the amplifier is not such a great idea.

For a 48-hour contest, YT3T likes a big steak dinner on Friday night (remember CQWW starts after midnight in Yugoslavia) but eats lightly after that. Kele likes to snack on fruits and vegetables. He drinks a cup of coffee every two hours and also enjoys a local drink called "Red Bull" which he says is "supposed to be some sort of energy drink."

KK1L lost 45 pounds on the low carbohydrate/high protein Atkins Diet. He recommends similar cuisine before and during a contest. Ron believes that it keeps the body energy level constant—as opposed to the fluctuating glucose levels that result from eating carbohydrates. This helps him maintain alertness.

K2UA also limits carbohydrates and likes protein-rich foods. Rus keeps low carbohydrate/high protein snacks available, but does not find himself snacking much.

K1VUT takes an opposite approach and eats more carbohydrates than protein and fat. This is pretty much what he normally eats. Dave tends to nibble more. His XYL does bring him a full plate for dinner, but he eats it slowly—over the course of an hour or so. This prevents a full stomach and the feeling for a need to nap afterwards.

K9JY also limits fat in his contest menu. He suggests recipes in *Cooking Light* magazine. Scot says that they meet the low fat criteria and make you feel as if you are eating foods from a great restaurant. He prepares them ahead of time and microwaves them at mealtime.

Coffee and caffeine is a controversial subject. Some people live on it, others stay away. N0AX recommends avoiding it until Saturday night when you really need it. K2UA eliminates it for two weeks before the contest. Rus says it hurts, but it is worth it.

N2MG also used to give up coffee for several weeks before contests. He would avoid coffee until the Saturday of the contest. On Sunday, after he took his last break, Mike would have a large cup of coffee and a couple of caffeinated sodas later in the day. Recently Mike has given up caffeine drinks altogether.

My favorite contest breakfast is oatmeal with a lot of milk. The carbohydrates provide energy and the milk helps to neutralize the acid from the coffee that I drink. I drink several cups of coffee every morning and figure it is best not to change that habit for the contest. I stop drinking coffee about 11 AM local. I found it best to lay off soda and started just drinking ice water after K6NA suggested this many years ago. Sometimes I will have a cup of tea around 10 PM local time.

For meals, I find that the microwave diet meals are great. They take almost no time to fix and there is little danger of feeling stuffed after eating one.

What about specific contest diets? PY2NY likes chocolate cookies and Coca-Cola. K9GY drinks Gatorade. K6LA stops by the local deli and gets small containers of a lot of different foods to snack on. He washes it down with a lot of iced tea. K4OJ likes fresh fruits. K8JP drinks club soda because it gives him an energy burst—but not a sugar high or caffeine jitters. N2MG consumes nuts, trail mix, chips and water between light lunches of sandwiches or pre-packaged microwave meals like spaghetti.

Sleep

Ideally you go through the entire contest period without sleep. A few iron men can actually do that, but the rest of us find it necessary to get at least a little shuteye. Every operator needs to balance alertness and efficiency against lost operating time.

K9GY quoted a US Army manual that indicates that a young, healthy soldier—eating and drinking properly—loses 25% in mental performance for every 24 hours without sleep. Eric goes on to say that the report recommends getting a minimum of 4 hours of sleep in every 48-hour period. It suggests that sleep should be taken between 2 and 6 AM local time. Unfortunately for contesting, 6 AM is usually around sunrise and a period of exciting propagation.

Being rested at the start of a contest is important. K2UA tries to take a nap the afternoon before a contest. Scot, K9JY, and Chas, K3WW, try to get extra sleep every night the week before the contest starts. Chas says Rule #1 is not to do any strenuous work the day the contest starts. Climbing the tower for last minute antenna work is a recipe for disaster.

Your body goes through cycles while sleeping. For most people these cycles last about 90 minutes. Several readers—including N0AX, K1VUT and K5ZD—mentioned sleeping in multiples of 90 minutes. N2MG calls these *Standard Sleep Units*, or SSUs. You can maximize the effect of sleep if you take it in SSU multiples. It is also easier to get up at the end of a 90-minute cycle.

K5ZD notes that when you are going to sleep, go to sleep! Randy warns against replaying the contest in your mind. He concentrates on clearing his mind and it usually does not take long for him to fall asleep. Tom, K2UOP, also mentions the need to fall asleep quickly and finds drinking warm milk helps him.

Once you go to bed, you have to be sure you don't oversleep. K2UOP recommends two alarm clocks to make sure you get up quickly. K2UA gets by with one, but puts it out of reach so that he has to get up to turn it off. Rus also sleeps on a cot in the next room. It is more difficult to get out of a nice warm bed than off a cot.

Sometimes you can't afford to take 90 minutes off for sleep. N0AX suggests that just getting away from the radio for 5 minutes and walking around can be a big help. I have found a 20-minute nap can give me a lift for a couple of hours. The trick is not to give in to extending it. If you do, you'd be better off going for a full 90-minute SSU cycle.

A quick shower can help you feel human after a long night on the radio, especially if the shack is hot. You might find it helps you relax and get to sleep easier. In that case, take it before your sleep period. A cooler one sometimes helps me as an alternative to sleeping.

It goes without saying that you should try to take your sleep periods during slow periods. N2MG finds that the 0900-1000Z is a good time for rest for East Coast operators as that is historically the slowest time. He notes that some contesters recommend taking their rest periods at different times each night to cover different propagation. Mike is not convinced. "Rate rules," he says.

In the past when we discussed equipment and operating techniques, some

suggestions would work very well from some parts of the world but not others, or be most effective with certain sized stations. The last two installments have covered a lot of tricks regarding comfort, food, drink and sleep. Some will work well for some people but be a disaster for others. This is one area where you need to do some experimentation to determine what works best for you.

This wraps up our two-part series on avoiding fatigue and maintaining concentration. Thanks to KK1L, K1VUT, N2MG, K2UA, K2UOP, K3WW, K4OJ, K5ZD, K6LA, K8JP, K9GY, K9JY, N0AX, PY2NT and YT3T for sharing their ideas on these subjects. Perhaps you can contribute a tip or two on our next subject?

Topic for July-August 2001 (deadline May 4)

Station Layout

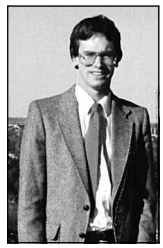
How do you arrange the equipment in your shack including radios, computer components, rotator controls, antenna switches, etc? Why did you do it that way? What do you consider the deficiencies of your station layout? How do you handle the cable rat's nest?

Send in your ideas on these subjects or suggestions for future topics. You can use the following routes: Mail—3310 Bonnie Lane, Slinger, WI 53086. Internet—w9xt@qth.com. Please be sure to get them to me by the deadline.

VHF-UHF Contesting!

Jon K. Jones, N0JK
n0jk@hotmail.com

The January 2001 VHF Sweepstakes—Rovers Save the Day!


N0JK

Low activity, terrible weather in the East and little or no enhanced propagation almost everywhere were par for the January VHF Sweepstakes this year. With poor conditions, rover activity played a major role in providing contacts, grids and keeping interest up in an otherwise slow contest. I did my first "rove" of this year in this contest.

N0JK "Rover" in the January 2001 VHF Sweepstakes

I had not planned to enter the January 2001 VHF Sweepstakes as a rover, but a phone call from Larry, N0LL, on Saturday evening got me thinking about roving. Larry reported poor radio conditions in the contest and the lowest activity in years.

A comment message on the 50 MHz "Propagation Logger" (**www.dxworld.com/50prop.html**) summed it up, "Participation in this contest is UNDERWHELMING!" Larry had not worked anyone, even in adjacent grids like EM08 or EM19. I mulled it over, and decided to attempt a "mini-rover" operation to give N0LL and the other area ops a shot at working the rare grids of EM08 and EM19 on Sunday afternoon. I planned to operate from the location where EM08, '09, '18 and '19 meet, near Beverly, Kansas, and about 25 miles northwest of Salina, Kansas.

I do not have a "rover-mobile" equipped with mounted antennas for all bands from 6 up through the microwaves. To "rove," I would have to set up a portable station, then tear it down and stow it, then set it all up again in each grid.

To make things even more challenging, I decided to add the 432 and 1296 MHz bands. Contacts on 432 MHz count 2 points, and 1296 MHz QSOs are worth 4 points apiece in the January contest. In a slow contest such as this one, the extra QSO points can make a big difference in scores. More bands would make my rover activity more valuable to the stations I worked, but would make setting up and tearing down much more difficult.

I didn't have a working 432 MHz antenna. Last fall I drove over my FO-22 Yagi after operating QRP portable. Saturday evening I built a N6NB 8-element 70-cm quagi. My son was home from college at Kansas University and helped me measure and cut the elements, and drill holes in a piece of PVC pipe for the boom. It was kind of neat spending some time with him working on the antenna. The antenna looked pretty crude when we were done, but I had built quagis before and they are good performers.

For 1296 MHz I have a 45-element loop Yagi, an LT-23S transverter and a Kenwood TR-751A for the 2-meter IF. I tested the TR-751A and discovered that there was no audio output on receive. It seemed to transmit okay. I attempted to troubleshoot it but could not determine the problem. I have another radio that covers 2-meter SSB—the ICOM IC-706—which I had planned to use on 6 and 2 meters. But the LT-23S is set up for only 1 W of drive. The lowest RF power output setting of the '706 would be too high for the transverter input stage.

I finally decided to use two 2-meter rigs for the IF on the LT-23S: the TR-751A for transmit and the IC-706 for receive. I would use a switch to toggle between the two radios. It would be an awkward arrangement, but it would get me on 23 cm.

Sunday January 21st was a bright sunny day and a relatively balmy 40 degrees. The East Coast was buried under a snow and ice storm, but here in the heartland the snow had melted off weeks ago. My son was driving back to KU that afternoon, so I couldn't use his Jeep as a vehicle. I put everything into our small compact car (my wife gave me stern warnings not to scratch it up).

The 5-foot masts, coax, and the 4-element 2-meter Yagi fit in the trunk. The 432 MHz quagi went in the back seat, and the two halves of the 1296 MHz loop Yagi were carefully positioned over the center console. I put the IC-706 and IC-490A on the front seat, and the LT-23S and TR-751A on the back seat. I had already connected the rigs and the transverter together. This would save some time at each stop. A 2-meter $^5/_8$-wave whip would serve as a $^1/_4$-λ antenna on 6.

I finally left Wichita about 3 PM and headed north. On the way I chatted with KA0MR on 2-meters and he spread the word that I would be on later in the day from EM08 and EM19.

On the Air in Breezy EM08

After a 2-hour drive, I exited I-70 and headed north into the Smoky Hills. The road turned to gravel and swung west. About 5 miles later I entered EM08. I drove around and eventually spotted a high point with a cattle fence that I could use to support the masts.

It was dusty and breezy as I stepped out of the car. The wind definitely had a "bite" to it. I operated exposed to the elements, standing outside of the car, and turned the mast by hand to peak the signals. I got the 2-meter and 70-cm antennas up and started out on 2. N0LL was the first in the log at 2210Z. We moved up to 70 cm, and Larry reported better signals there than on 2, despite my having only 10 W on 70 cm. The ugly looking quagi got out great! I worked a couple of stations down in Wichita with good signals and then announced that I was QSYing to 1296 MHz.

I brought along only one piece of 9913 coax with N connectors. To change bands, I had to take down the mast, disconnect the feedline and remove the 432 MHz quagi, then fasten the 1296 MHz loop Yagi to the mast and connect the coax. This took about 15 to 20 minutes.

I asked N0LL to call me first on 1296.097. Larry was right there and peaked up to 5 by 7. The coax switch didn't work, so going from transmit to receive took about 30 seconds. I had to manually swap the coax between the two radios, and take special care not to accidentally transmit on the '706! Larry had a couple of the Wichita gang lined up on frequency and after we finished our contact I swung the antenna southeast towards them. KA0MR and W0EKZ had good signals at about 125 miles.

No one else was around, so the 1296 loop Yagi came down and was replaced with the 70-cm antenna. I picked up a couple of more contacts, including N0KQY in DM98. At that point I noticed that the sun was starting to go down. I did not want to be putting up and taking down antennas in the dark if I could help it. I announced on 144.200 that I was going QRT, and would be heading over to EM19.

My original plan was to operate close to where the four grids intersect so that it would not take long to move between grids. I now know that the spot where these four grids meet is in a deep valley along the Saline River—not a good VHF site. I decided to cross the river and look for a location up on the bluffs along the north side of the valley where the elevation and open horizon would help my

signal—especially on 1296 MHz.

I drove north along a gravel road, crossed the river on a rickety wooden bridge, then started looking for possible operating sites north of Beverly. It took awhile, but I finally found a good location with line-of-sight all the way back to Salina (some 30 miles away) and good horizons in almost all other directions. It was out in the middle of an open cattle range on a high bluff.

Dead Calm in EM19

I spotted a small tree stump that looked like it would support my mast. The sun was just starting to drop behind the hills as I unpacked and started putting up the antennas. The wind had stopped and the sky was perfectly clear. There was no noise at all—just an awesome orange-red sunset and dead calm. I put up the 2-meter and 70-cm antennas and turned on the radios. 144.200 was busy, and it was amazing to hear stations booming in out in the middle of the open prairie, while I stood there watching the sunset.

N0LL was first in the log again and was much louder on both 144 and 432 MHz. Conditions appeared to be improving as it got dark. I worked KA0MR and N0KQY on both bands. Larry wanted to try 6 meters. All that I had for that band was the $^1/_4$-λ whip. Larry called me on SSB and he was Q5. We exchanged reports and then I worked KA0MR in Mound Ridge on 6. Both stations were about 75 miles away, and were using horizontally polarized antennas. This was a great VHF spot!

It was time to QSY to 1296. It was almost completely dark at that point. I was starting to wear out and it took me awhile to switch the antennas and coax. When I finally got on 1296 Larry was there looking for me. He had a good strong signal and I gave him a "EM19 clean sweep."

Larry let me know that N0KQY wanted to try working me on 1296. Gary is located in far-western Kansas, along the Colorado border, in DM98—over 200 miles away. I was running 6 W to a loop Yagi on a 10-foot mast in the middle of January. It seemed hopeless, but I told Larry to have him call me and I would listen for him. I turned the antenna to the west and there he was, Q5 on 1296 MHz SSB! He turned it over to me. Gary didn't know that it would take me almost 30 seconds to go from transmit to receive, so we doubled our transmissions a few times. We finally completed the contact at 0010Z. What a deal!

I turned the antenna southeast to look for the Wichita ops, called CQ a few times, but they were not around. I could clearly see the lights on the Garvy grain elevator in Salina over 30 miles away, sparkling like jewels on the horizon. The stars were coming out, millions of bright diamonds filling the sky. It was so quiet—way off in the distance a coyote howled.

I took the 1296 loop Yagi down and put the 432 MHz quagi back up. Conditions were improving steadily to the southeast. I worked N0LIE in EM27, and I heard K0AZ in EM37 on 2 meters. I called Mike many times both on SSB and CW but only got a "QRZ N0?" He soon disappeared.

I worked some more of the Wichita area ops on 70 cm and called CQ a few more times, but had no more takers. Last call for EM19!

I shut off the radios and began tearing down again. Now that the sun had set, the temperature was dropping fast. It seemed to take forever to get things disassembled and packed in the car.

At this point I had accomplished my goal, which was to give out EM08 and EM19 in the contest. I was cold, tired, dirty and hungry. As I drove back to the main highway I began to warm up. I thought about the operators that were still working the contest, digging for every QSO right up to the end. I crossed over into EM18 as I headed south. There were active contest stations in EM18 on the bands that I had, so it was not a "needed" grid, but as a Rover, everyone could work me again from EM18 for extra QSO points. Should I head on home for a hot shower and food or set up to operate one more time? I decided to "go for it."

VHF Contest "Ghosts" in EM18

Where would I operate from? It would be difficult to find a good spot in the dark. An idea popped into mind, the WB0DRL station! It is a proven VHF site on a high point and I am familiar with the area. Operating Rover from there would be kind of a "tribute" to Dean, WA0TKJ, who was one of the first contest VHF rovers. Pete, WB0DRL, was out of town that weekend and Dean has not contested for years, but in a way I felt as if they were with me as I pulled up on the dirt road by the station and began setting up.

Ironically, I was now operating "Rover" right on the grounds of one of the top VHF contest stations in the country! It was a lot colder by that time, and my fingers were getting numb as I bolted the antennas to the mast and attached the coax.

The towers of the WB0DRL station and the great 24-foot EME dish stood silently in the dark, just beyond the barbwire fence behind me. My mind drifted back to the VHF contests operated from there, the national records set, the awards and plaques won and the camaraderie.

All was quiet. The towers began to fade from view as a mist came up. The fog moved closer and swirled around my antennas, masts and coax, coating them with frost. They appeared to be glowing. Was it the "ghosts" of VHF contests past, or just my imagination?

I flipped a switch and the 2-meter radio crackled to life. The memories faded like the towers in the mist and I was back in the present. Larry, N0LL, was calling CQ on 2-meter SSB and I surprised him with a call from EM18. He thought I had quit for the night.

I logged him on 2 meters, 6 meters and 70 cm, and then swung the antennas southeast. I called CQ—and guess what—now K0AZ in EM37 was calling me! We easily completed contacts on 144 and 432 MHz over a 315-mile path. Conditions were definitely improving; perhaps some tropo was forming—or maybe it was that ghostly frost on the antennas?

The "regulars" in Wichita were logged and Gary, W7FG, called in from Bartlesville, Oklahoma on 2 meters.

I told N0LL that I would QSY again to 1296 MHz. Putting together the loop Yagi antenna was more difficult this time—I lost several small bolts in the dark and ended up trying to put the antenna together backwards. I finally got it squared away. I worked Larry. He told me that N0KQY wanted to give me a try on 1296.

This time Gary was a solid 5 by 7—we completed that contact at 2130Z. I turned the antenna around to the southeast and W0EKZ in EM17 answered my CQ at 2146Z. Bud was 59+. We chatted for a few minutes, and then I asked if anyone else was around.

Hearing no more, and at that point shaking from the cold—but pleased with the contacts made—I called it a night.

Was it worth it? For the contest participants who made a "clean sweep" with me on all bands in the 3 grids, the answer is a definite yes. They earned 24 QSO points and 8 new grid mults. In a slow contest out here in the heartland, with no E_s or tropo, the top stations may complete a total of only 75 to 100 QSOs. A Rover can make a real difference in their score.

Rover contacts are welcomed in all of the VHF contests, but when conditions are flat they are especially appreciated. This is true in all regions of the US and Canada. Rovers encourage overall contest activity, as stations have an incentive to stay on the air to work the Rovers as they move from grid to grid.

Roving was a real challenge for me, both due to the logistics of setting up and the operating skills required to complete some of the microwave contacts. It certainly made for a memorable weekend in an otherwise dull January VHF contest. If you are looking for a new experience in VHF contesting, why not give Roving a try?

East Coast Rover Reports from the January 2001 VHF Sweepstakes

"It was a wild weekend, to say the least. Leon and I drove to the 4-grid corner of FM 18, '19, '28 and '29 for starters. We operated in the first three grids for about 2 hours each, but the pickin's were slim. We had dinner at a truckstop, and headed north, with the idea of operating in FM29, closer to Philly.

"It should have been a sign that the weather was about to change—there was a huge diesel plow truck loaded with salt parked next to our operating site in FM19! The drive north took more than 3 hours, as the snow was falling fast and the roads weren't cleared. There were accidents all over the place.

"We got to a spot in FM29, but stayed there just long enough to make a few microwave QSOs, then creep on home."—73, Rich, K1DS/R, and Leon, N1XKT/R

"This was the toughest rove yet. Conditions—both weather and radio—were horrible. In short, I heard many stations that never heard me, including many of the usual big guns! We started at a decent site just off Route 30, west of Bedford, Pennsylvania. We couldn't get to the highest location, there was too much ice and snow. I heard dozens of stations on 144.237 MHz—most calling W3IY/R in FM26. I finally abandoned that frequency after one contact in 20 minutes. Lots of stations were calling but not many were working anyone!

"The snow got very heavy, and by the time we moved to FM09, there was about 4 inches of new snow, but no ice. An interesting observation: on all bands—but especially on 903 MHz and up—the snow seemed to scatter the signals so that no clear peak could be found. I could hear reasonably strong signals over a 60 to 70 degree beamwidth. On 5760 MHz, this was accompanied by an aurora-like sound on CW. I did work lots of grids on 2 meters, but very little above that. At 6:30 PM we headed down the mountain. It took 90 minutes to travel 20 miles.

"We had a quick dinner, hit the road for FN10 and made it to the base of the mountain about 50 miles away in around 2 hours. It took another half hour to reach the mountaintop.

"Unfortunately, in the dark and the heavy snow, we took a wrong turn. We had no place to turn around, so we just headed up the road 'til it ended at a commercial tower site. It seemed pretty high.

"I had to move many ice-laden trees out of the way. One tree smashed my 6-meter omni and bent the 1296 Yagi. This would have been easy to fix in decent weather, but it's very hard to make repairs in the cold.

"Snow-related scatter was very evident, signals on 432 MHz were heavily affected, and anything higher as well. I worked as many stations as possible, operated from some marginally high FM19 locations, worked a couple of guys on sked, and headed home.

"Linda (no call sign) drove courageously, and we made it home safely. Bottom line: (I haven't cleaned up the log yet, so these results are preliminary) 685 QSOs, 1400 points, 121 mults and with the rover bonus about a 200,000 score." 73, Brian, ND3F/R, and Linda

It amazes me that even with terrible weather and horrible propagation, Brian made 685 contacts roving in the January VHF Sweepstakes. Well done!

January 2001 VHF Sweepstakes Notes

Alert operators turned in a few reports of enhanced propagation during the 2001 contest.

Saturday afternoon on January 20th, VO1GO worked W1s around 2030Z on 6-meter E_s. Sunday afternoon on January 21st, enhanced scatter or weak E_s from New York to Florida occurred around 2150Z. Sunday evening, weak aurora appeared in the northern tier of states along the Canadian border. K1TOL reported 1s, 2s, 3s, 8s and 9s around 0220Z on January 22nd.

Perhaps the most interesting report of the contest was WP4KJJ working CX, LU and PY on 2-meter TEP Saturday evening! Puerto Rico is part of the ARRL Field Organization and KP4s can work DX such as South America for contest credit. If you vacation or contest from the Caribbean, consider taking 6- and 2-meter gear along. A small Yagi and 25 to 100 W is sufficient for 2-meter TEP QSOs. Note that 144.300 MHz is the "calling frequency" for 2-meter weak signal work in South America. ■

International Contests

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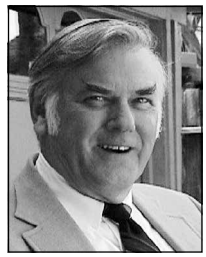
Making it Happen



Many of those who find contesting one of their main interests likely give occasional thought to the possibility of putting together some sort of contest DXpedition. Usually the idea involves selecting a suitably attractive locale—perhaps with a fairly rare prefix—matching available time and funding with the right contest weekend (WW, ARRL DX, WPX, etc), and then setting the necessary wheels in motion to make it all happen.

2000 OK-OM DX Contest

(Claimed Scores)

Call	Total
QRP	
K3TW	7524
VA3TTT	1656
10 M/Single Op	
W4OEL	17226
VA3TTN	10152
W1END	8844
N4MM	2418
VE3ZT	480
W4STX	243
K9NW	75
15 M/Single Op	
VA3TTN	6273
VA7TRS	1200
20 M/Single Op	
VA3TTN	3552
40 M/Single Op	
K8ND	9216
VA3TTN	7095
N4MM	588
80 M/Single Op	
N4MM	48
All Band/Single Op	
N4AF	108990
VA3TTN	105135
W3BYX	78936
K2SX	63273
W2CVW	63042
N6ZZ	58125
W3DAD	38520
VE1KB	37875
VK4TT	32592
K0CIE	9333
AA3VA	9027
N2CQ	7776
N4MM	6426
K2LP	5670
N7OG	741

2000 RSGB Islands-on-the-Air (IOTA) Contest, Final Results*

Place	Call	QSOs	Mults	Score	Category	IOTA
Island Multi-Operator						
16	AA1IZ	2087	265	3319125	DXpedition	NA148
41	VE7UF	1002	191	1323630	DXpedition	NA036
73	W4LVS/P	949	92	486036	100W DX	NA112
76	NM8O/4	756	89	380208	100W DX	NA062
84	W5DDX	516	38	87096	100W DX	NA082
85	VE1JS	205	35	37800	DXpedition	NA127
86	KL7/NO7F	294	24	31248	Permanent	NA059
88	K7PAR	93	31	23157	100W DX	NA065
Island Single Op—24 Hour/Mixed Mode						
14	K1VSJ	552	120	444960	100W DX	NA046
Island Single Op—24 Hour/CW						
26	KP4AH	511	55	143715	Permanent	NA099
Island Single Op—24 Hour/SSB						
2	KP2/AA1BU	1685	174	2057724	100W DX	NA106
11	KW1DX	756	120	560160	100W DX	NA137
16	KF9YL	656	83	294816	DXpedition	NA076
20	VO1BC	473	69	217143	Permanent	NA027
29	KE7CU	294	63	109242	Permanent	NA065
Island Single Op—12 Hour/Mixed Mode						
9	N2US/P	451	68	173604	100W DX	NA083
23	KS4S	124	27	18792	100W DX	NA112
30	K0DI/KH6	432	9	3888	DXpedition	OC019
Island Single Op—12 Hour/CW						
29	KO4PY	264	31	48267	DXpedition	NA067
33	W4SAA	236	25	33300	100W DX	NA141
37	AF4OX	238	22	25212	100W DX	NA110
49	WX3Q	121	10	7680	100W DX	NA083
Island Single Op—12 Hour/SSB						
53	VE7XO	69	38	25498	Permanent	NA036
67	K4RFK	34	20	7320	DXpedition	NA069

World—24 Hour/Mixed Mode		
8	W1NG	2760471
31	K4BAI	676800
42	W5FO	414936
52	VO1SDX	319986
54	N6VR	289416
64	N4MM	227156
65	VE2AYU	221850
66	W1JR	198699
76	K4IU	132000
85	KW4JS	55272
World—24 Hour/CW		
12	VE3KZ	953904
29	NT1N	310272
51	KE8M	133632
World—24 Hour/SSB		
35	N3FX	196011
46	VE3ZZ	136809
47	K4GW	128094
World—12 Hour/Mixed Mode		
6	WB2YQH	477000
10	N4UH	345576
13	K5ZD	317343
21	AA4V	217116
23	VE6JO	176904
39	N6JM	71064
45	VE5SF	48735
46	VA3UZ	46953
49	VO1WET	36498
51	VE4IM	34164
54	W6FA	29148
58	K8KFJ	21525
64	VE6ZT	11466
67	VE5CPU	9768
World—12 Hour/CW		
83	N3TG	22032
90	W9HR	15912
102	W4NTI	8400
104	K8CV	4995
105	KC2AFK	4545
120	K0COP	135
121	W7/JR1NKN	126
122	W5AB	12
World—12 Hour/SSB		
27	W3TN	194085
55	W6AFA	99186
56	W1DAD	98865
74	W8TTS	49833
84	K6ACZ	41310
107	KC8HWV	24420
111	K3GV	20928
112	WB0YJT	20352
117	VE4RP	19264
118	N2SQW	19080
136	W5CTV	10950
151	N2LQQ	5392
154	N8WEL	4032
164	K1MOM	2112

*The IOTA results listings that appeared in the March/April 2001 issue of the *NCJ* were claimed scores.

For those who have such dreams, let me suggest a couple of things that may go a long way towards turning them into a reality. First, read and reread the excellent "Contest Expeditions" column in the March/April 2001 issue of the *NCJ*—by Kenny, K2KW—on what's available in the way of contest expedition QTHs. Then examine the referenced Web sites in detail, and get a good feeling for potential destinations.

Then—and here's the twist—get out three or four back issues of the *NCJ* and turn to Bruce, WA7BNM's, "Contest Calendar." Here you'll find an array of practically all of the world's scheduled contests. (You can also download the full annual list from Bruce's Web site.) Then focus not on the "biggies" but on the "other" contests—such as those covered in this column.

The idea is to avoid confining your thinking to where to go to operate as DX in a major *domestic* contest, but rather where you can go to operate DX-to-DX right in the thick of things—even though it is in a more localized venue. In this way, you avoid having to scramble for the choice weekends amongst long waiting lists for specific locations. For instance, take a run at really good contesting in the SAC, or PACC, or REF or UBA from the Mediterranean or Africa. The possibilities are numerous, bounded only by your means and interests.

Another point to keep in mind. It appears that our present sunspot cycle is already losing its momentum. A few years from now, the really keen competition on the higher bands may no longer be between North America and Europe, but within Europe and its immediate environs. Since planning DXpeditions is often best done well ahead of time, this may be a criterion of increasing importance.

We'll talk more about this in a later column.

2000 WAE DX Contest, CW

Call	Points	QSOs	QTCs	Mults
USA				
K1ZZ	659300	868	867	380
K5MA/1	139925	368	357	193
W1TO	53152	180	172	151
KC1F	48400	220	220	110
K1HI	22066	102	85	118
W1TW	2318	33	28	38
K5ZD/1	2530	36	10	55
WA1KKM	360	15	0	24
N2NC	765510	978	960	395
WK2G	61875	249	246	125
W2OX	37224	132	132	141
W2TO	34602	119	118	146
N2ED	27500	138	137	100
K9GY/3	357984	624	619	288
W3BGN	349056	576	576	303
KQ3F	300612	614	608	246
AA3B	299341	522	521	287
K3WW	275236	520	507	268
W3FQE	840	25	5	28
N4AF	335666	540	529	314
N4CW	76160	234	214	170
K4BAI	48504	172	172	141
K4IU	11026	75	74	74
N8LM/4	8352	58	58	72
W4NTI	7371	67	50	63
N4MM	40	5	0	8
N6ZZ/5	27795	128	127	109
W5NR	44	11	0	4
W6FA	5049	51	48	51
K6TA	1368	29	28	24
W6NKR	770	21	14	22
WZ8A	31878	128	125	126
KE8M	29088	152	151	96
W8GN	21566	132	131	82
K8CV	70	7	0	10
W9RE	54264	200	199	136
KJ9C	29862	126	111	126
K9QVB	12780	111	102	60
W9ILY	7946	70	67	58
K9NW	1280	22	18	32
K0COP	160	10	0	16
USA—Multi-Operator				
KC1XX	758190	960	945	398
N3RD	231291	416	413	279
Canada				
VE2AWR	19460	139	139	70
VA3UZ	637940	835	835	382
VE3KZ	110484	341	341	162
VE4YU	14504	98	98	74
VE5CPU	4089	44	43	47

2000 WAE DX Contest, SSB

Call	Points	QSOs	QTCs	Mults
USA				
W1OP [op K1PLX]	692937	999	942	357
KC1F	287040	552	552	260
K5ZD/1	163283	308	299	269
K1JE	145408	286	282	256
N1API	137158	344	335	202
K1TJ	72704	284	0	256
KE1KD	21576	90	84	124
WY1J	40	5	0	8
W2OX	1096520	1388	1388	395
N2ED	684864	1051	1037	328
N2VW	264439	517	504	259
W2YC	151500	505	0	300
W2GO	69832	217	189	172
W2UDT	53746	179	170	154
N2KJM	50526	202	199	126
KQ3F	1213232	1620	1556	382
K3WW	606980	895	885	341
KB3TS	204006	422	421	242
W3FQE	10260	104	10	90
N4UH	477873	821	788	297
KU4BP	192918	409	405	237
WA4IMC	142882	359	359	199
W4LC	119698	314	303	194
K4IU	79650	226	224	177
N4MM	27686	113	105	127
W4NTI	20418	132	117	82
KE4OAR	20301	102	99	101
WB4SQ	16576	148	0	112
AA3VA/4	15792	141	0	112
KF4VMT	12192	127	0	96
W9CNF/4	494	19	0	26
N6ZZ/5	24400	153	152	80
N6AW	280896	632	622	224
W6AFA	82302	483	463	87
NN6XX	32760	165	150	104
WB6NFO	11328	118	0	96
K6BIR	1088	32	0	34
N6IUM	286	11	0	26
K0JJ/7	47747	185	174	133
K7ZO	27560	133	127	106
W8FDV/7	1360	40	0	34
AC8G	287140	586	586	245
WZ8A	243360	510	504	240
KC8HWV	33524	153	136	116
K8CV	12168	79	77	78
N8KM	10388	106	0	98
WO9Z	570240	903	879	320
W9RE	62400	200	200	156
AE9B	42720	267	0	160
K9NW	37856	174	164	112
W9ILY	28404	132	131	108
KG9N	3000	60	0	50
K0DAT	27040	152	108	104
N0HR	2744	49	0	56
USA—Multi-Operator				
KC1YR	2029433	2051	2016	499
K2NG	2246013	2137	2030	539
WT4Q/2	943200	1627	1517	300
KS4XG	405892	804	794	254
Canada				
VE2AWR	111020	305	305	182
VA3UZ	1939462	2031	1903	493
VE3SY	687514	1266	1216	277
VE3MQW	143754	378	363	194
VE3BUC	63778	241	205	143
VE4YU	35624	152	140	122
VE4RP	23766	131	102	102
VE5CPU	55390	193	189	145
VE5SF	26866	134	132	101
VE9FX	190680	420	420	227

Propagation

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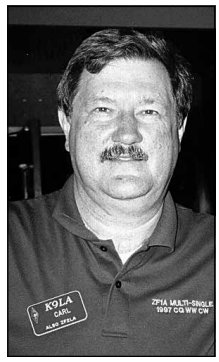
Daily Forecasts—How Good Are They?



K9LA

In my March/April column I discussed how propagation predictions should be validated using real-world data. Figures 1a and 1b of that column showed the probability curves to be validated—one for MUF and one for signal strength. If you stare at either of these curves long enough, you'll realize that they're probabilities based on a monthly time frame. The "problem" with these predictions is that you have no idea on which specific days of the month the "high" values may occur and on which specific days of the month the "low" values may occur.

There's an underlying reason for this. When the model of the ionosphere was developed for propagation predictions, the developers found that the best correlation between what the ionosphere was doing and what the sun was doing was between monthly median ionospheric parameters and the smoothed sunspot number for that month. They did not see any good correlation between the daily sunspot number and what the ionosphere was doing on that day, so they went to a monthly statistical model of the ionosphere using smoothed solar measurements.

Nowadays we look at the daily 10.7-cm solar flux. It's better than sunspots because measuring 10.7-cm solar flux is objective, whereas measuring sunspots is subjective. As a result, daily propagation predictions are made based on the value of the daily 10.7-cm solar flux. How good are these predictions? One way to find out is to record data on a specific path, and see how the daily performance of that path correlates to daily 10.7-cm solar flux.

So that's what I did. I listened to WWV on 10, 15 and 20 MHz on every day in August of last year at 2300 Z. For each frequency I recorded the signal strength if the "band" was open. My results showed that 10 MHz and 15 MHz were open every day, so I have a month's worth of signal strength readings. 20 MHz was open on nine of the days, giving nine days of signal strength readings. For 10.7-cm solar flux, I used the **sec.noaa.gov** reports of the actual 10.7-cm solar flux on each day. The most probable mode for all three frequencies was the 1F2 mode. Prior to taking measurements, I calibrated my receiver's S meter using a signal generator.

Remember that there are two issues with propagation predictions—is the band open, and what's the signal strength? So we need two plots for each frequency—one showing when the band was open versus daily 10.7-cm solar flux and one showing signal strength versus daily 10.7-cm solar flux. Since 10 MHz and 15 MHz were open on all days, there's no reason to show these two plots with respect to the band being open or not. Thus all we need is four plots.

For 10 MHz, **Figure 1** is a scatter diagram of the daily 10.7-cm solar flux and the corresponding signal strength for that day. I've added a best-fit linear trend line to visually show how well the two parameters are related. With the data points scattered on both sides of the trend line, the correlation doesn't appear to be very good. Indeed, the R value of –0.43 at the top right of the plot indicates this. An R value of –1 means a perfect inverse proportionality, a value of 0 means no correlation, and a value of +1 means a perfect direct proportionality. An R value of –0.43 isn't much of a correlation—you might as well flip a coin. For the 15 MHz scatter diagram of the daily 10.7-cm solar flux and the corresponding signal strength for that day, **Figure 2** gives an R value of –0.45. Again, that's not much of a correlation.

For the 20 MHz scatter diagram of the daily 10.7-cm solar flux and the corresponding signal strength for that day,

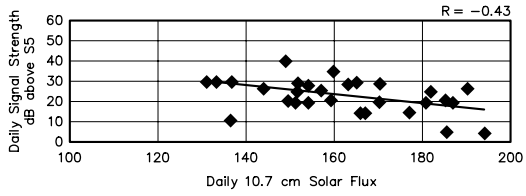


Figure 1—The 10 MHz signal strength vs the daily 10.7-cm solar flux.

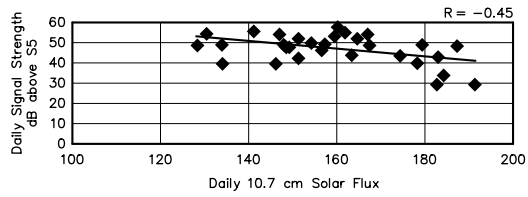


Figure 2—The 15 MHz signal strength vs the daily 10.7-cm solar flux.

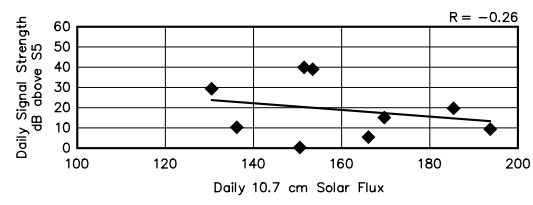


Figure 3—The 20 MHz signal strength vs the daily 10.7-cm solar flux.

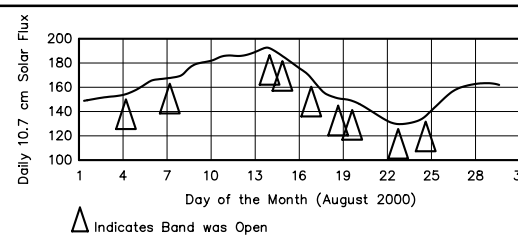


Figure 4—The 20 MHz band opening vs the daily 10.7-cm solar flux.

Figure 3 gives an R value of –0.26—that's even less than the two lower frequencies.

For the 20 MHz scatter diagram of daily 10.7-cm solar flux and whether the band was open or not, Figure 4 shows on which days the band was open (the black triangles) versus the daily 10.7-cm solar flux. The band was open when the 10.7-cm solar flux was high, when it was low, and even when it was in between—in other words, not much of a correlation again.

To summarize all the above, my results showed that the daily 10.7-cm solar flux didn't indicate if the signal level would be high or low on a given day on any of the three frequencies or even if the 20 MHz band would be open on a given day. What it all comes back to is the development of the model of the ionosphere for propagation predictions. Although those guys might not have had the daily 10.7-cm solar flux at their disposal, they did have the daily sunspot number. As stated earlier, they didn't find any acceptable correlation between what the ionosphere was doing on a given day and what the sunspot number was for that day.

This goes right to the heart of the matter—if you look at the ionospheric parameters foE, foF2, hmF2, etc, they themselves don't correlate too well with a daily sunspot number or a daily 10.7-cm solar flux. So why should the performance over a path correlate? One underlying reason for little correlation is that sunspots and 10.7-cm solar flux are indirect measurements of the true ionizing energy. To reiterate, the only decent correlation we have is between the statistical monthly median ionospheric parameters and the 12-month running average smoothed solar flux or smoothed sunspot number.

What about the method presented in the "Shortwave Propagation Handbook" series? In addition to the daily 10.7-cm solar flux, the 24-hour planetary magnetic index A_p is added in. I went through this method with my data and ended up with the same results—not much correlation. On paths not near the auroral zone or on magnetically quiet days, there still isn't much of a correlation. But on a polar path, adding in A_p does increase the correlation to what's actually happening on the path. But it's mostly an A_p effect, not a 10.7-cm solar flux effect.

So the next time you see a daily propagation forecast and it's based on the daily solar flux, you might want to treat it with some caution. Or even better, monitor a path for a month and go through this correlation exercise to see if your results agree with mine. And let me hear about it if you do. ■

Contest Expeditions

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Instructions: Take a sought-after DX location, add an operator and stir.

Result: Guaranteed instant pileups!

The DX Magazine recently published its top 100 "wanted countries" list. Looking over the list, I noticed that there are several countries on it that are relatively easy to get to—many of them have Rent-a-QTHs! Who says that all rare countries are hard to activate?

When selecting a DX location to operate from, you should try to determine your target audience. For example, there are many easy to get to islands in the South Pacific that are in great demand by European operators. By doing a little propagation analysis and figuring out the best times to work them, you will very likely be rewarded with huge pileups—and lots of happy DXers! As with any DXpedition, identifying and catering to your target audience is a big part of the game.

DX-cessible

The following countries seem to be begging for DXpeditions and contest expeditions alike. They are in great regional and world demand, but still enjoy regular air service from major cities. Many have Rent-a-QTHs and/or ham friendly hotels. Just add an operator, and you have instant pileups! Go get 'em!

KH4—Midway Island (#30 Europe, #54 World)

Midway, once a US Military base, has been converted into a privately run nature preserve. There are regularly scheduled flights to the island, a cafeteria, a restaurant... the works! There is a Rent-a-QTH (a club station) on the island, but there are some restrictions on usable frequencies and power levels due to the possibility of RFI to other island communications.

T32—Eastern Kiribati (#34 Europe, #70 World)

This island has a friendly hotel that caters mainly to sport fisherman, but it has been used by hams before. There are regularly scheduled flights from Hawaii. For some reason though, not many ops travel there.

KH8—American Samoa (#63 Europe)

I don't have information on any specific operating locations, but there are regularly scheduled flights from Hawaii, and no customs or licensing issues for US hams.

ZK1/S—South Cooks (#66 Europe)

There are a number of ham friendly locations available and regular air service from Hawaii and the continental US. It's also a great vacation spot.

5W—Samoa (#80 Europe)

Somoa has regular air service, and it's a nice vacation spot.

3W—Vietnam (#78 US, #89 Europe)

A Rent-a-QTH is available and there's regular air service from many countries.

VP8/F—Falkland (#17 US, #75 World)

There's a club station on the island, and air transportation is available both from Chile and directly from the United Kingdom.

8Q—Maldives (#69 US)

Maldives has ham friendly hotels and it's a great place to vacation.

A5—Bhutan (#67 US), XU—Cambodia (#64 US) and T8—Palau (#97 US)

Rent-a-QTHs are available.

Do some of the above locations sound like great contest or DX locations? You can find additional information on them on my DX Holiday Web site.

Flash!

DX Holiday has moved to **www.dxholiday.com**. I've had to relocate the site so that it can accommodate all of the new information that has been coming in from around the world.

DXpedition University

In March, I lead a group of hams down to Jamaica on a trip we called *DXpedition University* (DXU). The goal was to teach hams the details of DXpeditioning. Even though they were first time DX-peditioners, these guys managed to complete over 21000 QSOs (this included a high-scoring effort in the ARRL International DX Contest). By all accounts, the trip was a great success. You can find a story and pictures on **www.k2kw.com**. If you're interested in participating in the next DXU session, please drop me a note.

73, Kenny, K2KW ■

Contesting For Fun

Bob Patten, N4BP
n4bp@bc.seflin.org

I am still lacking column input from contributors (apparently I'm the only one having fun while contesting), so this time around I'll take a departure from the norm. Let's see if I can sneak this tale of K7RE's and my escapades past our editor.

This is an account of a DX Adventure to Freeport, Bahamas, for the ARRL DX CW Contest. Some of what you read will be fact; some of it will be fiction. I'm leaving it up to you to figure out which is which...

Bahama Bound

Our flight from Fort Lauderdale to Freeport arrived on time; unfortunately, my baggage did not. The ground crew somehow "forgot" to load most of the luggage on our plane. I wasn't made aware of this until after I spent an hour at the terminal in Freeport hanging around waiting for it to be "unloaded."

While I was filling out a "missing baggage" claim, Brian went on ahead to check his license at Public Utilities/BaTelCo. I then caught a cab to our hotel.

I was carrying our two DK9SQ telescoping fiberglass masts. While I was waiting for Brian, I extended the masts to full length in the room. I was anticipating that my luggage, with the wire for the antennas packed inside, would be arriving shortly. Brian showed up at the hotel a few minutes later; my luggage, however, did not. By this time, the building maintenance man had already gone home. This left us without access to the roof until the following day.

After a leisurely dinner at the hotel restaurant (all of my food and cooking utensils were in the missing luggage), we decided to set up a 33-foot piece of wire off of our balcony for a temporary antenna. We'd use one of the fiberglass masts to support it.

To reach the tip of the mast and attach the wire, I needed to lower the base to the ground. "Look out below!" I hollered to the sunbather/SCUBA diver/body builder who was standing in the path of the mast as it slid though my hands. Too late, the butt of the mast slammed his left big toe! He let out a scream. When he threatened to come up and beat the *%$# out of us, we quickly hauled the mast back up and bolted the door. The antenna was secured to the railing of our balcony a little while later—with no further accidents or injuries—and Brian made some contacts on the WARC bands.

Water, Water Everywhere...

Water is a valuable commodity in the Bahamas since, in many locations, rainwater is its only source. A house on Man-O-War Cay—where N4UM and I did our contesting for several years—had a sign posted over the toilet: "If it's yellow, let it mellow. If it's brown, flush it down."

First thing Friday morning, we met up with the building maintenance man and the three of us headed up onto the roof. Our two fiberglass masts were to be supported by two of the bathroom vent pipes using custom clamps that we had fabricated at home. Our assistant, however, hadn't been properly briefed on our installation plan. He proceeded to insert one of the masts directly into the bathroom vent pipe. It dropped down the pipe like a rock, splitting the porcelain toilet below and flooding our room with its contents! "Mellow down" you might say, "it's just a simple mop-up job." Well... please refer to the proceeding paragraph...

We eventually properly secured the two masts and used them to support an 80-meter dipole and a 40-meter vertical.

Ready to Contest from C6A

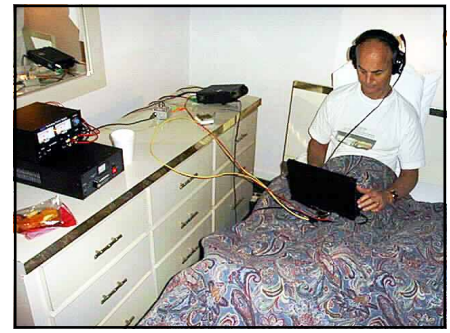
Now we were ready for some serious operating! Brian spent some additional time on the WARC bands while I played on 15 meters using the 40-meter vertical. That afternoon, we both caught about three hours of sleep in preparation for our overnight stints on 80 (Brian) and 40 (me).

At 0000Z we went to work. We experienced the best European openings observed in years, with many of their signals louder than those from the US. This, of course, was a serious problem for us—we were in competition with Europe for US contacts! Neither of our totals at the end matched what had been done from the same location in previous years.

Trouble in Paradise

You've undoubtedly heard the traveler's advice, "Don't drink the water." Unfortunately, we did. As if that weren't enough, I had spent the previous two nights snacking on dried fruit—consisting of approximately 50% prunes. By now, you've probably already guessed that we were both plagued by "Montezuma's Revenge."

Midway through the second night of operating, I was making frequent visits to our new porcelain throne and consequently became rather dehydrated. In my weakened condition, I sought out a more comfortable operating position (please refer to the accompanying photograph).



A comfortable operating position for a particularly uncomfortable operator.

Both of us were also besieged by equipment problems. Brian was using a separate keyboard to send CW. The keyboard was not shielded and often would take off on its own—sending random characters when the RF hit it. He cured the problem to some extent by reducing his power.

My problem turned out to be a little more serious. To reach the 250 W power limit allotted in C6A, I had brought along a 500 W solid-state amplifier and 12 V, 50 A switching power supply. The binding posts apparently were not screwed down tight enough, and they eventually heated up from the resulting resistance.

It probably wouldn't have been that big a deal if the amplifier and power supply had not been set up near the window, but the burning plastic posts set fire to the curtains. Luckily, the still-flooded bathroom floor eventually extinguished the flames when the curtains fell.

A Day at the Beach

By Sunday morning, we had each racked up decent QSO totals and, after catching a few hours sleep, decided to head for the beach. Brian's wife collects beach sand, and he figured he could get back in her good graces by bringing home some Grand Bahaman specimens.

Brian decided to play in the surf. In hindsight, I probably should have warned him—since he is not a particularly proficient swimmer—about the possibility of a strong undertow during such a windy day. I was eventually able to haul him ashore though, and a gorgeous blue-eyed blonde goddess—most likely of Norwegian descent—delivered some much-needed CPR (I almost wish that it had been me fished out of the undertow!).

We both rested while he relearned his breathing skills and then, somehow, I was able to talk him into trying parasailing.

That old rope on the towboat must

have hauled one too many tourists, but—fortunately for Brian—when it did fail the deck of the boat broke his fall. I understand that cracked ribs can be very painful, but this did probably take his mind off the Man-O-War stings he sustained in the earlier swimming mishap.

At this point, we both had had enough of the beach scene. As we limped back to the hotel, we were drenched by the first rain storm to hit the Bahamas in perhaps three months.

Back to the Scene of the Crime

From 4 PM local time until the contest was over, we gave each of our respective bands one more shot and actually made substantial increases in our scores. Eventually, we cooked ourselves some dinner on my camp stove and turned in for a good night's sleep. I think Brian slept okay, but his constant groaning and occasional snoring kept me awake most of the night. I guess his ribs were still smarting.

The next morning we took the antennas down. I had to catch a noon flight back to Fort Lauderdale. The hotel's roof was a disaster. Many of its slate tiles were loose and the rest were covered with mold. Add to that the recent rainfall, and suffice to say that things were a bit slippery!

One of the masts somehow got away from me. It aligned itself perpendicularly with the front edge of the building, gained momentum as it slid down the slope of the roof, and took off like a javelin into the parking lot.

It certainly was a lucky thing that nobody was in the passenger's seat of that pickup truck that was parked out front. The mast punched a clean hole through the windshield, speared the upright seat, and continued on through the back window—narrowly missing the shotgun strapped to the gun rack in the process. Brian quickly scampered down and retrieved the mast while I carefully took down the second one. We both considered ourselves extremely lucky that the sunbather/SCUBA diver/body builder with the broken toe who owned the truck never made the connection between his damaged vehicle and our rooftop escapades!

Safe at Home?

My flight back to Fort Lauderdale was reasonably uneventful. Brian returned on Thursday. I went back to the airport to pick him up, and watched in horror as his flight came in for a touchdown without the benefit of landing gear! No flames were visible when it finally came to rest, and Brian emerged unscathed. Most of the equipment in the baggage compartment was destroyed but, heck, it's all replaceable!

I drove Brian back to my house where he hoped to get some much needed R&R (Rest and Recovery) before he tempted fate once more with his flight back to Phoenix the next morning.

As it was approaching noontime, we decided to head for the local fast food chain for some lunch. Somehow I talked him into getting on the back of my Yamaha Virago. I should have guessed that Brian was not an experienced rider. I should also have taken into account that the bike handles much differently with a 200-pound passenger!

When I took off from the first stop light, Brian lost his grip, slid off the seat, and landed in the road. It could have been much worse—that little Toyota pickup could have been an 18-wheeler! The truck swerved to miss him, but the left front tire caught both of his legs before it was able to stop. It appeared that nothing was broken, and we proceeded on to lunch and then back to my house where we remained until the next morning.

Brian's flight left from the Hollywood/Fort Lauderdale airport without losing any wheels, wings, engines or other necessary parts.

We both had a wonderful time and are already in the process of making plans for next year's adventure. ■

Contest DXpedition List

Steve Nace, KN5H
kn5h@earthlink.net

Dear Fellow Contesters,

By now you should be in the planning stages for Fall 2001 contest-peditions. If you haven't booked those airline tickets yet, then you'd better get busy.

Are you still trying to decide where to go? K2KW maintains a great collection of information on ham friendly QTHs. Check out his *DX Holiday* Web site at **pages.prodigy.net/k2kw/qthlist/**. Use the list below to help you identify a destination that is not already "spoken for." Once your plans are made, please don't forget to drop me a line so that I can let others know of your operation.

This list also appears on the *NCJ* Web site: **www.ncjweb.com**. Be sure to check there for late-breaking information.

73 for now,
Steve, KN5H

Call/QTH	*Category*	*Operator(s)*	*Status*
2001 CQ WPX CW Contest			
FO8DX	SOABLP	W1HIJ	Firm
V25A	M/S	N3OC, DL6LAU	Firm
2001 IARU HF Contest			
PJ2T	M	N8NR, W0CG, N8BJQ, K4LT+	Firm
2001 CQWW SSB Contest			
6Y	M/M	AC8G, WA8LOW+	Plan
FS/AH8DX	SOAB	AH8DX	Firm
P40A	SB20?	KK9A	Firm
PJ2?	M/S	KU8E, K8NZ, N8VW, WC4E	Firm
PJ7/K7ZUM	SOAB	K7ZUM	Firm
2001 CQWW CW Contest			
PJ2T	M/S	W0CG, KP2L, W9EFL, KU8E	Firm
VP2V/KN5H	M/M	KN5H, KG5U, KB3EHU	Plan

Contest Calendar

Compiled by Bruce Horn, WA7BNM
bhorn@hornucopia.com

Here's the list of major contests to help you plan your contesting activity through August 2001. The Web version of this calendar is updated more frequently and lists contests for the next 12 months. It can be found at **www.hornucopia.com/contestcal/**.

Contesters who have limited time should try one of the many sprint contests. Most of these are four hours long, which means you can be competitive without a marathon effort.

As usual, please notify me of any corrections or additions to this calendar. I can be contacted at my callbook address or via e-mail at **bhorn@hornucopia.com**. Good luck and have fun!

May 2001

North American HSMS Contest	0000Z, May 1 to 2359Z, May 9
AGCW QRP/QRP Party	1300Z-1900Z, May 1
MARAC County Hunter Contest, CW	0000Z, May 5 to 2400Z, May 6
IPA Contest, CW	0000Z-2359Z, May 5
SLP Competition (SWL)	0000Z, May 5 to 2400Z, May 6
10-10 Int. Spring Contest, CW	0001Z, May 5 to 2400Z, May 6
903 MHz and Up Spring Sprint	0600-1300 local, May 5
Massachusetts QSO Party	1800Z, May 5 to 0400Z, May 6 and 1100Z-2100Z, May 6
ARI International DX Contest	2000Z, May 5 to 2000Z, May 6
IPA Contest, SSB	0000Z-2359Z, May 6
Nevada QSO Party	0000Z, May 12 to 0600Z, May 13
VOLTA WW RTTY Contest	1200Z, May 12 to 1200Z, May 13
Oregon QSO Party	1400Z, May 12 to 0200Z, May 13
FISTS Spring Sprint	1700Z-2100Z, May 12
CQ-M International DX Contest	2100Z, May 12 to 2100Z, May 13
50 MHz Spring Sprint	2300Z, May 12 to 0300Z, May 13
Manchester Mineira CW Contest	1500Z, May 19 to 2400Z, May 20
Baltic Contest	2100Z, May 19 to 0200Z, May 20
CQ WW WPX Contest, CW	0000Z, May 26 to 2400Z, May 27
Anatolian RTTY WW Contest	0000Z, May 26 to 2400Z, May 27
ARCI Hootowl Sprint	2000-2400 local, May 27
MI QRP Memorial Day CW Sprint	2300Z, May 28 to 0300Z, May 29

June 2001

Major Six Club Contest	2300Z, Jun 1 to 0300Z, Jun 4
WW South America CW Contest	0000Z, Jun 2 to 1600Z, Jun 3
IARU Region 1 Field Day, CW	1500Z, Jun 2 to 1500Z, Jun 3
ANARTS WW RTTY Contest	0000Z, Jun 9 to 2400Z, Jun 10
Portugal Day Contest	0000Z-2400Z, Jun 9
Asia-Pacific Sprint, SSB	1100Z-1300Z, Jun 9
TOEC WW Grid Contest, SSB	1200Z, Jun 9 to 1200Z, Jun 10
ARRL June VHF QSO Party	1800Z, Jun 9 to 0300Z, Jun 11
All Asian DX Contest, CW	0000Z, Jun 16 to 2400Z, Jun 17
SMIRK QSO Party	0000Z, Jun 16 to 2400Z, Jun 17
Marconi Memorial HF Contest	1400Z, Jun 23 to 1400Z, Jun 24
ARRL Field Day	1800Z, Jun 23 to 2100Z, Jun 24
ARCI Milliwatt Field Day	1800Z, Jun 23 to 2100Z, Jun 24

July 2001

RAC Canada Day Contest	0000Z-2359Z, Jul 1
MI QRP July 4th CW Sprint	2300Z, Jul 4 to 0300Z, Jul 5
Venezuelan Ind. Day Contest, SSB	0000Z, Jul 7 to 2400Z, Jul 8
IARU HF World Championship	1200Z, Jul 14 to 1200Z, Jul 15
FISTS Summer Sprint	1700Z-2100Z, Jul 14
CQ Worldwide VHF Contest	1800Z, Jul 14 to 2100Z, Jul 15
Colombian Ind. Day Contest	0000Z-2400Z, Jul 15
QRP ARCI Summer Homebrew Sprint	2000Z-2400Z, Jul 15
Pacific 160m Contest	0700Z-2330Z, Jul 21
AGCW QRP Summer Contest	1500Z, Jul 21 to 1500Z, Jul 22
North American QSO Party, RTTY	1800Z, Jul 21 to 0600Z, Jul 22
Six Club Sprint	2300Z, Jul 21 to 0400Z, Jul 22
Venezuelan Ind. Day Contest, CW	0000Z, Jul 28 to 2400Z, Jul 29
Russian RTTY WW Contest	0000Z, Jul 28 to 2400Z, Jul 29
IOTA Contest	1200Z, Jul 28 to 1200Z, Jul 29

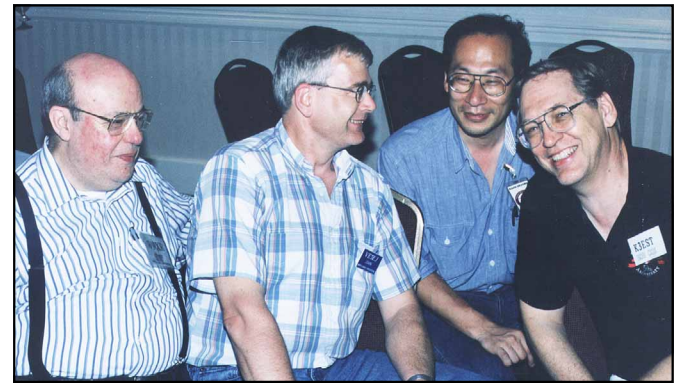
August 2001

10-10 Int. Summer Contest, SSB	0001Z, Aug 4 to 2400Z, Aug 5
European HF Championship	1000Z-2159Z, Aug 4
North American QSO Party, CW	1800Z, Aug 4 to 0600Z, Aug 5
ARRL UHF Contest	1800Z, Aug 4 to 1800Z, Aug 5
YO DX HF Contest	0000Z-2000Z, Aug 5
QRP ARCI Summer Daze SSB Sprint	2000Z-2400Z, Aug 5
WAE DX Contest, CW	0000Z, Aug 11 to 2359Z, Aug 12
Maryland-DC QSO Party	1600Z, Aug 11 to 0400Z, Aug 12 and 600Z-2300Z, Aug 12
SARTG WW RTTY Contest	0000Z-0800Z and 1600Z-2400Z, Aug 18 and 0800Z-1600Z, Aug 19
ARRL 10 GHz Cumulative Contest	0800-2000 local, Aug 18 and 0800-2000 local, Aug 19
Keyman's Club of Japan Contest	1200Z, Aug 18 to 1200Z, Aug 19
SEANET Contest, CW/SSB/Digital	1200Z, Aug 18 to 1200Z, Aug 19
North American QSO Party, SSB	1800Z, Aug 18 to 0600Z, Aug 19
New Jersey QSO Party	2000Z, Aug 18 to 0700Z, Aug 19 and 1300Z, Aug 19 to 0200Z, Aug 20
TOEC WW Grid Contest, CW	1200Z, Aug 25 to 1200Z, Aug 26
SCC RTTY Championship	1200Z, Aug 25 to 1159Z, Aug 26
Ohio QSO Party	1600Z, Aug 25 to 0400Z, Aug 26
Hawaii QSO Party	1600Z, Aug 25 to 2200Z, Aug 26
South Dakota QSO Party	1600Z, Aug 25 to 2200Z, Aug 26

Dayton 2000

Photos by Thomas Roscoe, K8CX
http://hamgalley.com

K4OJ, W4PA, K1TO, K1ZA, WC4E

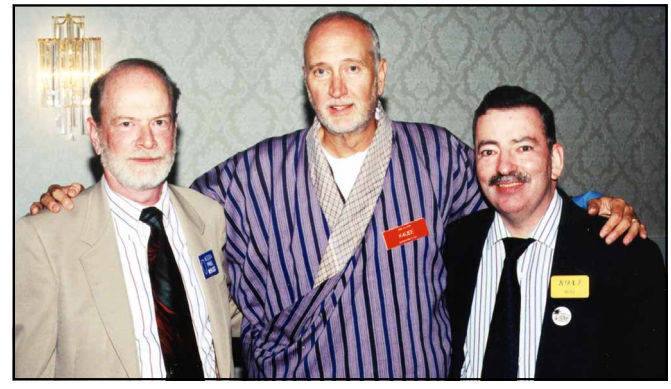


W9XR, VE3EJ, JH1NBN, K3EST

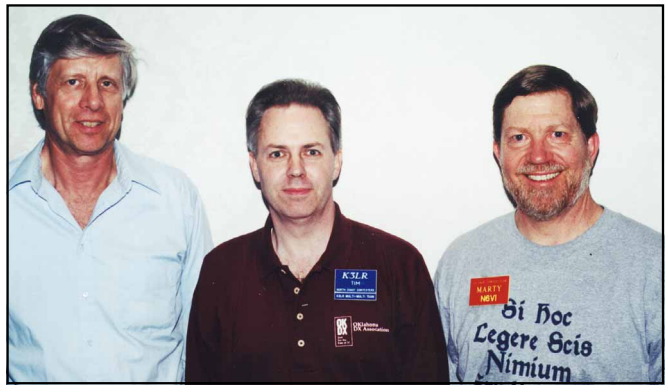
WA3FET, W3LPL, K9GL, K3PXR

N6TR, VA3AGW, KC7V

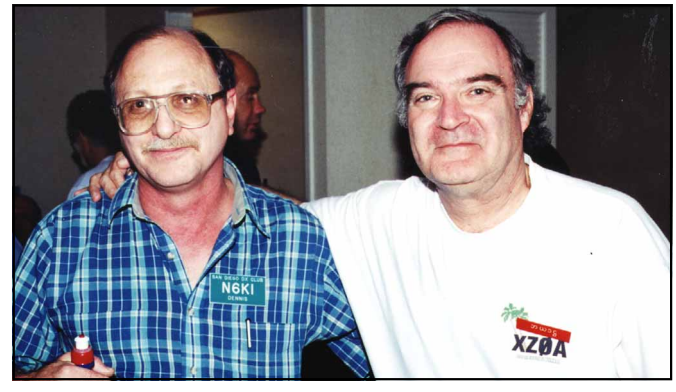
W9RV, WW2Y, K3LR



W9IXX, K4UEE, K9AJ



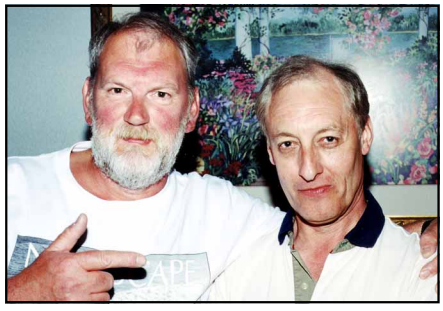
N6AA, K3LR, N6VI



K6KI, XE1L

9K2HN, 9K2SD

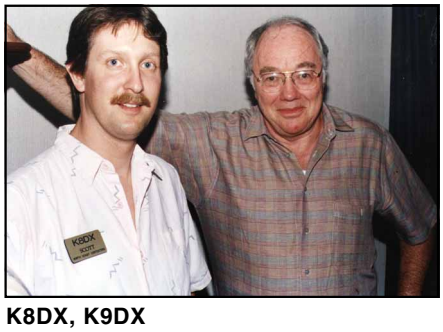
P43G, KW8N, P4EP



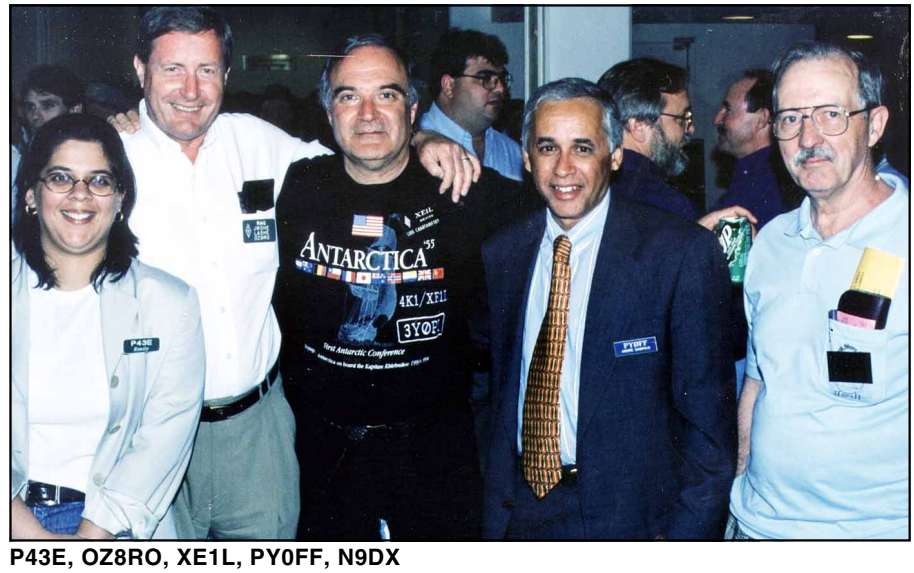
GI4MHD, GI0AIJ

KI7WX, W9RE, K8AZ

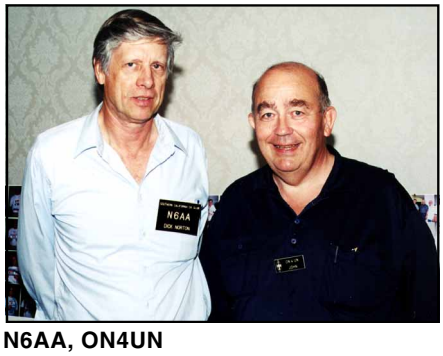
EA3VY, EA3KU



K8DX, K9DX



P43E, OZ8RO, XE1L, PY0FF, N9DX



N6AA, ON4UN

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- *CQ WW DX Contest*
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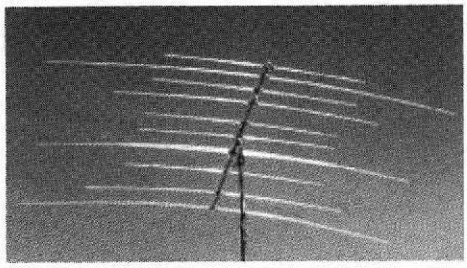

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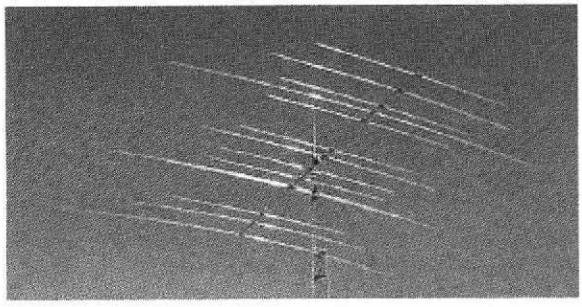

C-31XR for 20-15-10

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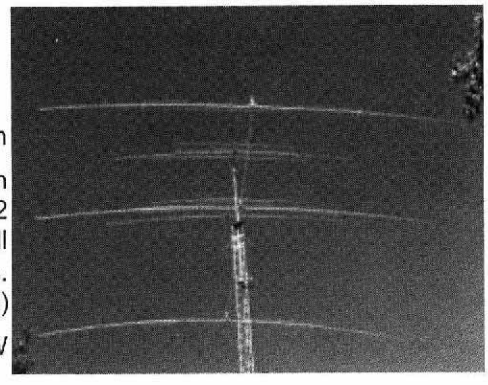

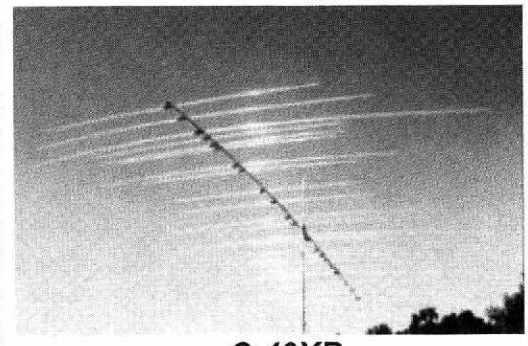

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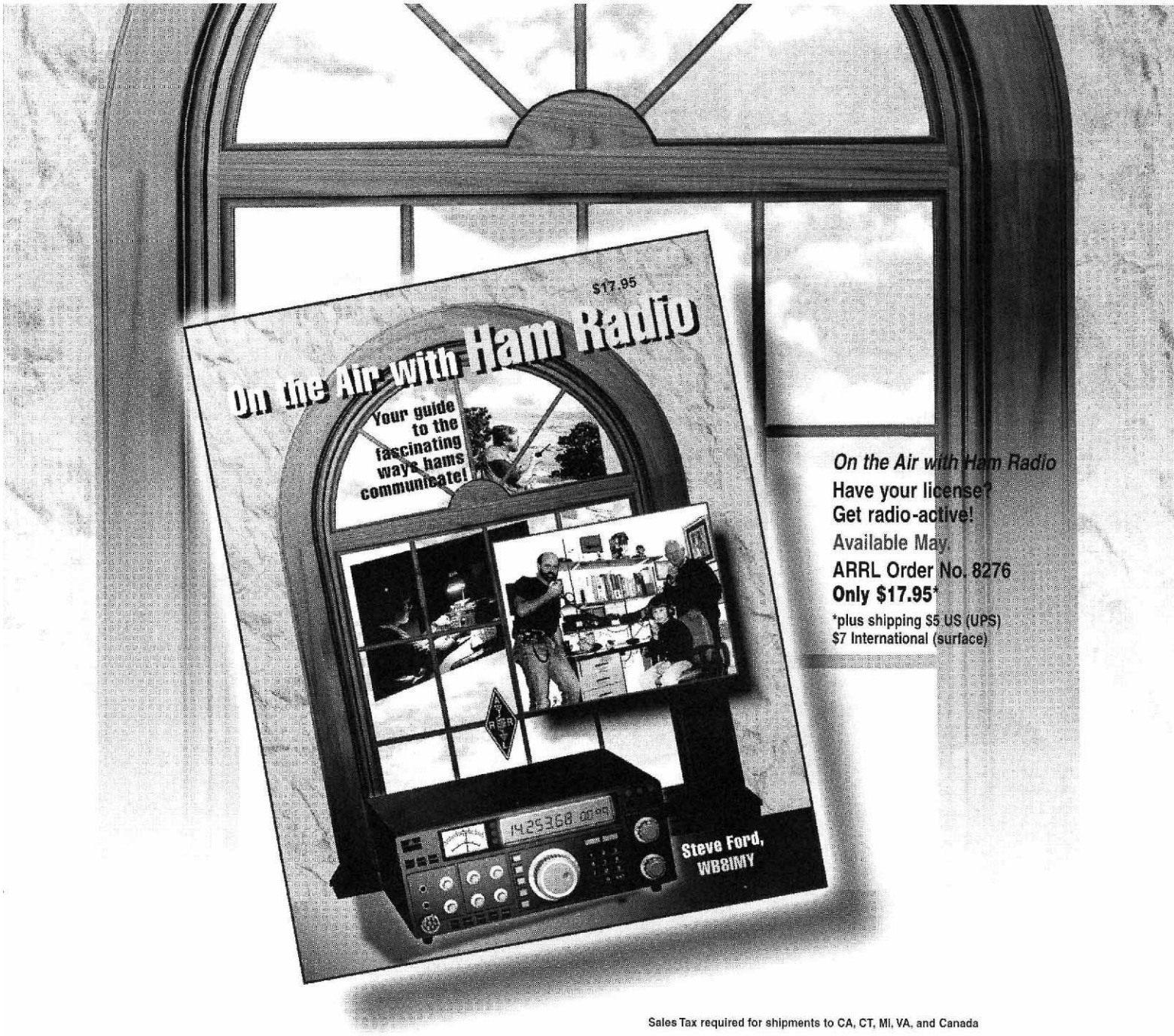

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DRAWN 6063-T832	1.250" .. $1.55/ft
.375 ..... $.70/ft	1.375" .. $1.75/ft
.500" ..... $.80/ft	1.500" .. $1.95/ft
.625" ..... $.90/ft	1.625" .. $2.25/ft
.750" $1.00/ft	1.750" .. $2.50/ft
.875" $1.10/ft	1.875" .. $2.75/ft
1.000" ... $1.20/ft	2.000" .. $3.00/ft
1.125" ... $1.35/ft	2.125" .. $3.50/ft

In 6' or 12' lengths, 6' lengths ship UPS. Call for 3/16"& 1/4" rod, bar stock, and extruded tubing.

BENCHER / BUTTERNUT

Skyhawk, Triband Beam $1129
HF2V, 2 Band Vertical $219
HF5B, 5 Band Minibeam $429
HF6VX, 6 Band Vertical $299
HF9VX, 9 Band Vertical $349
A1712, 12/17m Kit $54
CPK, Counterpoise Kit $129
RMKII, Roof Mount Kit $159
STRII, Roof Radial Kit $125
TBR160S, 160m Kit $119
More Bencher/Butternut–call

COMET ANTENNAS

GP15, 6m/2m/70cm Vertical ... $149
GP6, 2m/70cm Vertical $139
GP9, 2m/70cm Vertical $179
B10NMO, 2m/70cm Mobile $36
B20NMO, 2m/70cm Mobile $49
SBB2NMO, 2m/70cm Mobile $39
SBB5NMO, 2m/70cm Mobile $49
SBB7NMO, 2m/70cm Mobile $75
Z750, 2m/70cm Mobile $55
Z780, 2m/70cm Mobile $69
Much more Comet in stock–call

DIAMOND ANTENNAS

D130J/DPGH62 ..... $79/139
F22A/F23A $89/119
NR72BNMO/NR73BNMO ... $39/54
NR770HBNMO/NR770RA .. $55/49
X200A/X3200A $129/210
X500HNA/700HNA $229/369
X510MA/510NA $189/189
X50A/V2000A $99/149
CR627B/SG2000HD $99/79
SG7500NMO/SG7900A $75/112
More Diamond antennas in stock

GAP ANTENNAS

Challenger DX $289
Challenger Counterpoise $29
Challenger Guy Kit $19
Eagle DX $299
Titan DX $329
Eagle/Titan Guy Kit $29
Voyager DX $409
Voyager Counterpoise $49
Voyager Guy Kit $45
Quicktilt Mount $75
Please Call for Delivery Information

CUSHCRAFT ANTENNAS

X7/X740 ..... $679/229
XM240 ..... $719
R6000/R8 ..... $319/469
A50-3S/5S/6S $95/159/259
AR2/ARX2B $49/69
AR270/AR270B $85/99
ARX270N/ARX-450B $219/65
13B2/17B2 ..... $139/249
26B2 ..... $389
A270-6S/A270-10S $75/99
Please call for more Cushcraft items

M2 VHF/UHF ANTENNAS

144–148 MHz

2M4/2M7/2M9 ..... $89/109/119
2M12/2M5WL $149/189
2M5-440XP, 2m/70cm $159

420–450 MHz

440-470-5W/420-450-11 .. $129/89
432-9WL/432-13WL $169/219
440-18/440-21ATV $119/139

Satellite Antennas

2MCP14/2MCP22 ..... $169/219
436CP30/436CP42UG $219/259

M2 ANTENNAS

50–54 MHz

6M5X/6M7JHV $199/239
6M2WLC/6M2.5WLC $419/449

10/12/15/17/20m HF

10M4DX, 4 Element 10m $379
12M4DX, 4 Element 12m $379
15M4DX, 4 Element 15m $419
17M3DX, 3 Element 17m $379
20M4DX, 4 Element 20m $499
More M2 models in stock–please call

MFJ ANTENNAS

259B, Antenna Analyzer $219
269, Antenna Analyzer $299
941E, 300W Antenna Tuner $109
945E, 300W Antenna Tuner $99
949E, 300W Antenna Tuner $139
969, 300W Antenna Tuner $169
986, 3kW Antenna Tuner $289
989C, 3 kW Antenna Tuner $309
1796, 40/20/15/10/6/2m Vert. $189
1798, 80–2m Vertical $249
Big MFJ inventory–please call

LAKEVIEW HAMSTICKS

9106 ..... 6m 9115 ... 15m 9130 ...30m
9110 ... 10m 9117 ... 17m 9140 ...40m
9112 ... 12m 9120 ... 20m 9175 ...75m
All handle 600W, 7' approximate length, 2:1 typical VSWR ... $24.95

HUSTLER ANTENNAS

4BTV/5BTV/6BTV $149/189/209
G6-270R, 2m/70cm Vertical ... $169
G6-144B/G7-144B $129/179
Hustler Resonators in stock–call

FORCE 12–MULTIBAND

C3	10/12/15/17/20m, 7 el $599
C3E	10/12/15/17/20m, 8 el $649
C3S	10/12/15/17/20m, 6 el $539
C3SS	10/12/15/17/20m, 6 el $559
C4	10/12/15/17/20/40m, 8 el . $759
C4S	10/12/15/17/20/40m, 7 el . $679
C4SXL	10/12/15/17/20/40m, 8 el . $979
C4XL	10/12/15/17/20/40m, 9 el $1119
C19XR	10/15/20m, 11 el $959
C31XR	10/15/20m, 14 el $1299

Please call for more Force 12 items

ROHN TOWER

25G/45G/55G $89/189/239
AS25G/AS455G $39/89
GA25GD/45/55 ..... $68/89/115
GAR30/GAS604 ..... $35/24
SB25G/45/55 ..... $39/89/109
TB3/TB4 ..... $85/99
HBX32/HBX40 ..... $349/439
HBX48/HBX56 ..... $589/699
HDBX40/HDBX48 ..... $549/699
BXB5/6/7-8 ..... $39/49/59/59
Please call for more Rohn prices

GLEN MARTIN ENGINEERING

Hazer Elevators for 25G

H2, Aluminum Hazer, 12 sq ft ... $359
H3, Aluminum Hazer, 8 sq ft $269
H4, HD Steel Hazer, 16 sq ft $339

Aluminum Roof Towers

RT424, 4 Foot, 6 sq ft $159
RT832, 8 Foot, 8 sq ft $229
RT936, 9 Foot, 18 sq ft $389
RT1832, 17 Foot, 12 sq ft $499
Please call for Glen Martin info

COAX CABLE

RG-213/U, (#8267 Equiv.) ..... $.36/ft
RG-8X, Mini RG-8 Foam ..... $.19/ft
RG-213/U Jumpers ..... Please Call
RG-8X Jumpers ..... Please Call
Please call for more coax/connectors

TIMES MICROWAVE LMR® COAX

LMR-400 ..... $.59/ft
LMR-400 Ultraflex ..... $.89/ft
LMR-600 ..... $1.19/ft
LMR600 Ultraflex $1.95/ft

ANTENNA ROTATORS

M2 OR-2800PDC $1099
Yaesu G-450A $249
Yaesu G-800SA/DXA $329/409
Yaesu G-1000DXA $499
Yaesu G-2800SDX $1089
Yaesu G-550/G-5500 ..... $299/599

ROTATOR CABLE

R61 (#20)/R62 (#18) ..... $.28/32
R81/R82 ..... $.25/.39
R83/R84 ..... $.52/.85

TRYLON "TITAN" TOWERS

SELF-SUPPORTING STEEL TOWERS

T200-64	64', 15 square feet $1099
T200-72	72', 15 square feet $1299
T200-80	80', 15 square feet $1499
T200-88	88', 15 square feet $1769
T200-96	96', 15 square feet $2049
T300-88	88', 22 square feet $1989
T400-80	80', 34 square feet $1939
T500-72	72', 45 square feet $1879
T600-64	64', 60 square feet $1799

Many more Trylon towers in stock!

US TOWER

MA40/MA550 ..... $849/1399
MA770/MA850 ..... $2359/3729
TMM433SS/HD $1139/1379
TMM541SS $1499
TX438/TX455 ..... $1069/1599
TX472/TX489 ..... $2649/4599
HDX538/HDX555 ..... $1379/2399
HDX572MDPL $6329
Please call for help selecting a US Tower for your needs. Shipped factory direct to save you money!

UNIVERSAL ALUMINUM TOWERS

4-40'/50'/60' $519/739/1049
7-50'/60'/70' $939/1369/1789
9-40'/50'/60' $729/1049/1469
12-30'/40' $559/869
15-40'/50' $969/1399
23-30'/40' $869/1289
35-30'/40' $979/1509
Bold in part number shows wind-load capacity. Please call for more Universal models. All are shipped factory direct to save you money!

TOWER HARDWARE

3/8"EE / EJ Turnbuckle $11/12
1/2"x9"EE / EJ Turnbuckle $16/17
1/2"x12"EE / EJ Turnbuckle $18/19
3/16" / 1/4" Preformed Grips $5/6
Please call for more hardware items

HIGH CARBON STEEL MASTS

5 FTx .12" / .18" $45/75
10 FT x .12" / 10 FT x .18" $75/125
15 FT x .12" / 15 FT x .18" $105/175
20 FT x .12" / 20 FT x .18" $135/225
10 FT x .25" / 20 FT x .25" $175/335

PHILYSTRAN GUY CABLE

HPTG1200I ..... $.45/ft
HPTG2100I ..... $.59/ft
PLP2738 Big Grip (2100) $6.00
HPTG4000I ..... $.89/ft
PLP2739 Big Grip (4000) $8.50
HPTG6700I $1.29/ft
PLP2755 Big Grip (6700) $12.00
HPTG11200 ..... $1.69/ft
PLP2558 Big Grip (11200) .. $18.00
Please call for more info or help selecting the Phillystran size you need.

WEEKDAY HOURS:
9 AM–5 PM CST

SATURDAY HOURS:
9 AM–12 NOON CST

CREDIT CARDS:
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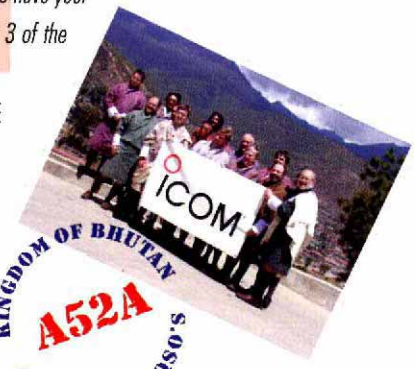
"Just back from K5K, Kingman Reef. The IC-756PROs again performed flawlessly and were a factor in our breaking 80,000 QSOs. I was a participant in FOØAAA, A52A and now K5K, all in 2000, and your radios made a combined 237,000 QSOs. You must be very proud to have your wonderful radios used by these DX'peditions that are now ranked as 3 of the top 6 Dx-peditions in terms of QSOs in the history of our hobby."

- K5K member, Bob Allphin, K4UEE



3 OF THE TOP 6 DX'PEDITIONS IN HISTORY!

Three of the top six DX'peditions in history!

Three remote locations!

38 operators!

The radios?

IC-756PRO

Just listen to the guys who actually used them - they know better than anyone what the power of 32 bit DSP technology can do for ham radio. In fact several members were so impressed that they bought '756PROs for their own ham shacks. "It just doesn't get any better than this" - says Glenn Johnson, WØGJ. Is it any wonder - the world's top DX'ers choose ICOM.

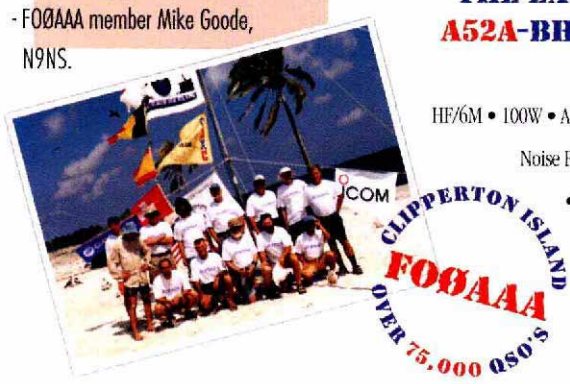
"All seven of the '756PROs worked flawlessly. We ran RTTY perhaps more than 50% duty cycle, and the radios never even got warm at maximum output. The digital filter controls were so easy to adjust and switch...a contester's dream! We had seven radios, most of the time with three modes at once on any given band. There was NO interstation interference. All of our antennas (except for the 160M & 80M verticals) were within a 75 meter circle."

- A52A member Glenn Johnson, WØGJ

"I was particularly impressed with the '756PRO's front end resistance to overloading. I never heard intermod noises or de-sensing even with the huge pileups we generated. Several times I listened carefully for such problems but they simply weren't there. On CW, once I had picked out a station, I could run the selectivity down to 50Hz and hear ONLY the station I wanted. I have worked pileups from several DX'peditions and have never encountered a radio that held up so well."

- FOØAAA member Mike Goode, N9NS.

THE EXCLUSIVE RIG OF FOØAAA-CLIPPERTON ISLAND, A52A-BHUTAN, AND K5K-KINGMAN REEF DX'PEDITIONS.



HF/6M • 100W • All Mode • Triple Conversion Rx • Dual Watch • 32 Bit IF-DSP • Front Panel Adjustable Noise Reduction • Audio Peak Filter • Auto & Manual Notch Filter • Twin Passband Tuning • 5" TFT Color Display Shows Operating Conditions and Spectrum Scope • CW Memory Keyer • VOX • Auto Antenna Tuner • PC Controllable with Optional ICOM Software

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