NCJ

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$4

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Volume 30 Number 2

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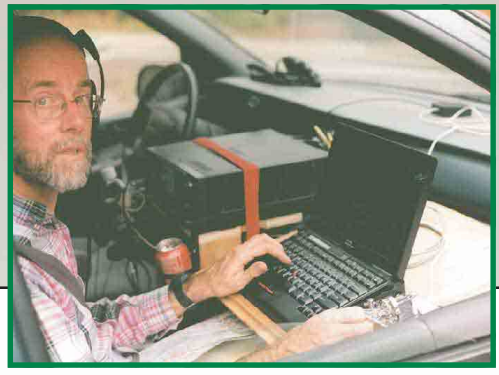

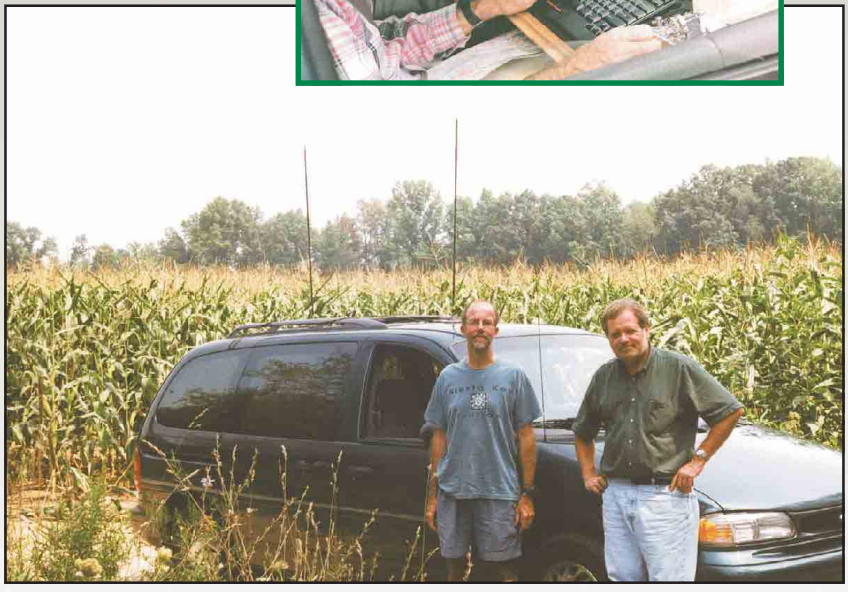

Jim Stahl, K8MR—and his designated driver, Jim Snell, W8DRZ—have been takin' it to the streets for the Michigan, Ohio and Pennsylvania QSO parties.

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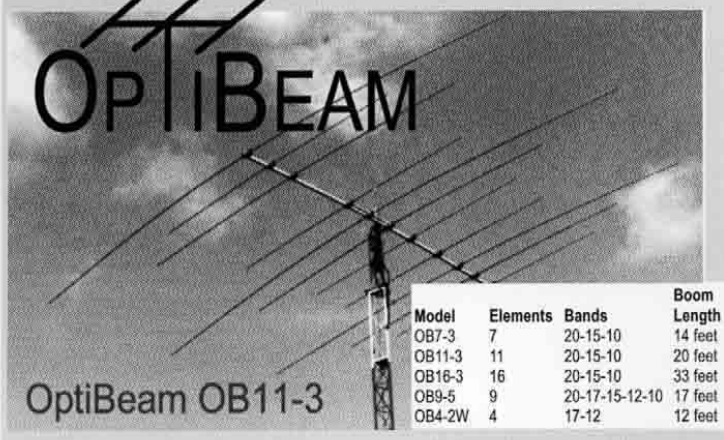

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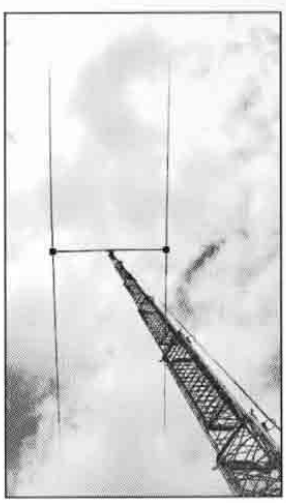

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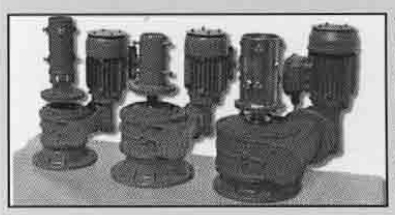

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Editorial

Dennis Motschenbacher, K7BV
k7bv@aol.com

Stepping Aside

I was forewarned when I took on the position of *NCJ* Editor that one day the time would come for me to move aside. Sadly, that day has arrived. I never imagined that it would hit me so hard, though. The time that I've spent working with the readers, the columnists, the contest managers, the article contributors and the rest of the volunteer staff has proven to be a very special part of my life—one that I shall always hold close to my heart.

Fortunately, my departure is not the result of an overwhelming vote of disapproval from you, the readers. Or worse yet, some outrageous personal act that brought embarrassment to the magazine or the contesting world in general (you know, like something that might have occurred before my drying out days in those AA meetings 11 years ago.)

No, it's nothing quite that dramatic. The truth is that I am moving to Connecticut and joining the staff of the ARRL. Like many of us, I've always dreamed of working at HQ—but I never really thought that it would come true! I feel like a kid who has just been granted his fondest wish. While I am honored to have been selected to become a member of the headquarters team, the downside is that I must relinquish my role as leader of the dynamic *NCJ* team.

I am proud and pleased to have been responsible for many of the changes that have occurred in this magazine over the last several years. Working in the background to provide a platform for the wares of our regular columnists and article authors has been a very satisfying experience. I have seen so many perform so well on a stage that I helped set. I consider myself very lucky to have had a chance to stand somewhere in the shadows of the sunshine that they generated.

Fear not, though. I've helped prepare my replacement (without him ever suspecting where things might be leading). I am very happy to announce that Carl Luetzelschwab, K9LA, has agreed to move into the *NCJ* driver's seat. There is no doubt in my mind that he—as has been the case with all of our past editors—has what it takes to guide this publication down yet another new path that leads to fresh ideas and continued growth.

Welcome, Carl. I'm confident that our readers and staff will support you as they did me, and that they will be as patient with you as they were with me in my early frightening days as editor.

More Than Just a Job

If it seems as if I'm getting a bit emotional about my term as editor, it's because it has meant so much to me. Through it, I have had an opportunity to personally interact with many contesters whom I consider heroes of our sport. This job also allowed me to overcome a lot of my own insecurities about getting back into contesting and "exposing myself."

I took a firm stand early on that under my leadership this magazine would not serve simply as a tool for elevating the egos of the elitists amongst us. A pleasant side effect has been that in doing so, I found myself inclined to alter my own contesting objectives to ones that again made it enjoyable for me…and I hope some of you have experienced this metamorphosis, as well.

Moreover—as amazing as this is—I did *not* end up divorced at the top of this sunspot cycle (something that had occurred near the peak of the pervious two cycles). Now *that's* what I call personal growth, my friends!

I hope that you enjoy the content of this—my last—issue of *NCJ* magazine. I will always look back fondly on those occasions when I had the privilege and pleasure to introduce myself as the Editor of the *NCJ.*

73, Dennis Motschenbacher, K7BV

Our Cover

Jim Stahl, K8MR, has temporarily outfitted his family's minivan for some fast-paced state QSO party mobile contesting. Jim's teamed up several times with fellow MRRCer Jim Snell, W8DRZ. W8DRZ serves as wheelman; K8MR mans the station.

For more details on the equipment, installation and strategy involved in participating as a mobile in state QSO parties, check out "Road Warriors," beginning on page 9.

Some Notes on Two-Element Horizontal Phased Arrays—Part 3 The Limits of a Single Phase Line: The ZL-Special

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When George Pritchard (ZL3MH, later ZL2OQ) introduced the amateur community to the 2-element phased array, it seemed to offer magic in the form of performance—up to 7 dBd (9+ dBi free-space equivalent) and up to 40 dB front-to-back ratio. Unfortunately, the comparators of the day were relatively primitive 2- and 3-element Yagis that rarely performed up to their theoretical possibility. Nonetheless, the antenna type acquired the name "ZL-Special" and has been the subject of debate ever since. For a reasonably complete bibliography of ZL-Special articles in English, see my "Modeling and Understanding Small Beams: Part 5: The ZL Special," *Communications Quarterly*, Winter, 1997, pp 72-90.

Figure 1 shows several of the variations on the ZL-Special theme. Some of them work; others do not—or at least not very well. Virtually all early work on horizontal phased arrays presumed that we needed only to attend to the impedance transformation along a transmission line. Hence, with $^1/_8$-λ spacing and a similar transmission line, a half twist would yield a 135° phase shift with the accompanying high gain forward lobe and a deep rear null. Figure 1 shows both linear and folded elements, along with the most popular phase line characteristic impedances. The trombone attempted to overcome the velocity factor of the common TV twinlead line (about 0.8) by making wide-spaced folded elements that were physically $^1/_8$ λ at their outer edges but electrically $^1/_8$-λ apart relative to the phase line. Although the trombone works quite well, the structure is completely unnecessary: simple folded dipoles would work as well.

Not until Roy Lewallen, W7EL, pointed out the fundamental error in amateur conceptions of the ZL-Special did we begin to re-analyze the 2-element horizontal phased array with some precision. (See Lewallen, "Try the 'FD Special' Antenna," *QST,* June, 1984, pp 21-24.) What controls the performance of the ZL-Special phase line is not so much the impedance transformation, but the current transformation (in terms of both current magnitude and phase angle). The current and the impedance do not change at the same rate except when the line is exactly matched to the element that forms its load. Hence, we had to take a wholly new approach to the single-line phased array. In these notes, we shall follow this lead.

ZL-Special Basics

Figure 2 shows the deceptively simple elements of a ZL-Special. The two elements bear "forward" and "rear" element labels, where the forward element indicates two things. First, the main forward lobe is in the direction of the forward element. Second, the standard ZL-Special feedpoint is at the junction of the phase line and the forward element.

Most radio amateurs do not fully appreciate how many variables are at work in this seemingly simple arrangement. First, the individual elements exhibit center-point impedances that are functions of the mutual coupling between them. The mutual coupling depends upon the element diameters, lengths and spacing between them. Second, the feedline meets a parallel current division at the forward junction, which requires that all other variables result in the same voltage at the junction. The requisite voltage is a function of the source impedance of the forward element and the "share" of current received by that element.

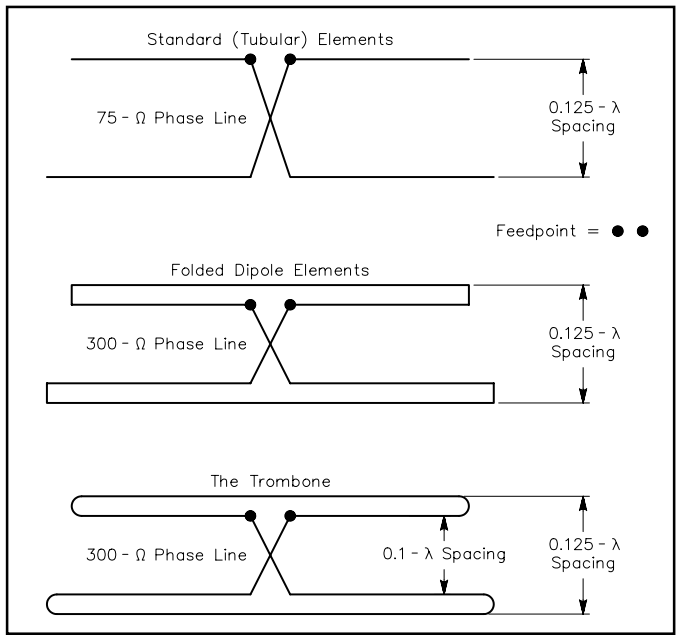


Figure 1—Outline sketches of several classic ZL-Special designs.

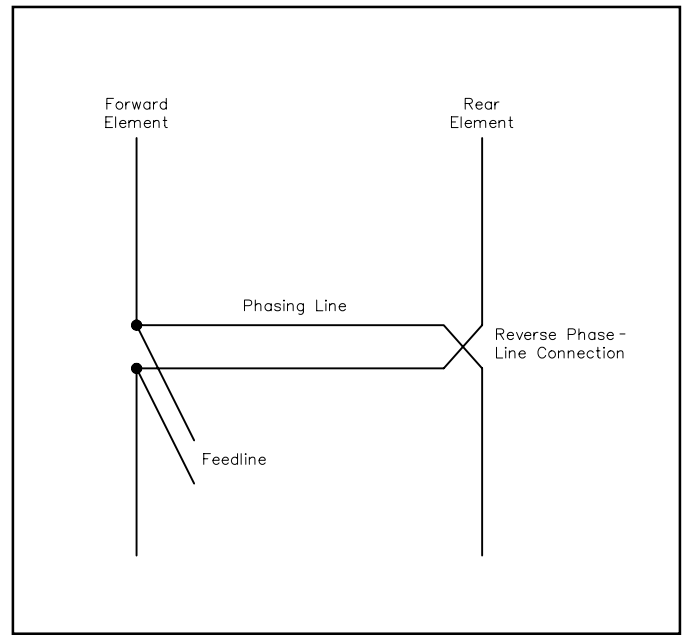


Figure 2—The basic elements of a ZL-Special 2-element horizontal phased array.

Third, the rear element impedance at its center sets both a current magnitude and phase angle and a voltage magnitude and phase angle, both of which undergo transformation down the selected length of phase line. From Terman, *Radio Engineers' Handbook* (McGraw-Hill: 1943), p 185, we have equations for the current and the voltage at any point down a transmission line from a load or antenna element. The following equations are for lossless lines, which are satisfactory for the short phasing lines used in 2-element horizontal phased arrays and which also coincide with the calculations within the *TL* facility of *NEC-2* and *NEC-4*:

$$E_s = E_r \cos\left(2\pi\frac{l}{\lambda}\right) + j\, I_r\, Z_o \sin\left(2\pi\frac{l}{\lambda}\right) \quad \text{(Eq 1)}$$

$$I_s = I_r \cos\left(2\pi\frac{l}{\lambda}\right) + j\,\frac{E_r}{Z_o} \sin\left(2\pi\frac{l}{\lambda}\right) \quad \text{(Eq 2)}$$

The meaning of the terms is as follows:

E_r is the voltage at the load or antenna end of the line

E_s is the voltage at the source end of the line

I_r is the current at the load or antenna end of the line

I_s is the current at the source end of the line

Z_o is the characteristic impedance of the line, and

$2\pi(l/\lambda)$ is an expression for the electrical length of the line in degrees for the frequency of interest.

Because both the voltage and the current have an associated phase angle and resolve into real and imaginary components, the use of these equations in calculations is more complex than the initial appearance of them. Some of the math involved appears in the earlier noted *Communications Quarterly* article. However, such calculations are available within *NEC* in the *TL* facility and are also available in the *HAMCALC* suite of *GW Basic* utility programs from VE3ERP.

Critical to our understanding of phase line operation is the fact that the resultant values of voltage and current (magnitude and phase) at the forward end of the phase line are interactive, as the basic equations make evident. Achiev-

Table 1—Sample ZL-Special analysis data from *NEC* models in the four steps of antenna analysis demonstrated in the text.

The following data come from *NEC-2*/*NEC-4* models of a 2-element horizontal phased array for 28.5 MHz using 0.5-inch aluminum elements. The rear element is 0.506 λ long, while the forward element is 0.465 λ long. The modeling environment is free space. In all cases, the free-space gain is 6.34 dBi, and the 180° front-to-back ratio is 30.15 dB.

Step 1. Independent elements, independent sources:

Element	*Relative I Magnitude*	*Relative I Phase Angle*	*Relative V Magnitude*	*Relative V Phase Angle*	*Impedance (R +/– jX Ω)*
Rear	0.8935	–44.18°	26.24	–23.58°	27.49 + *j*10.34
Forward	1.0	0.0°	33.53	31.94°	28.46 + *j*17.76

Step 2. Independent elements, independent sources, phase line installed:

Element	*Relative I Magnitude*	*Relative I Phase Angle*	*Relative V Magnitude*	*Relative V Phase Angle*	*Impedance (R +/– jX Ω)*
Rear	0.8935	–44.15°	—	—	27.49 + *j*10.34
Phase line	0.664	44.25	33.56	32.02°	49.74 – *j*8.98
Forward	1.0	0.0°	33.51	31.96°	28.43 + *j*17.73

Step 3. Phase line connected to forward element, single source:

Element	*Relative I Magnitude*	*Relative I Phase Angle*	*Relative V Magnitude*	*Relative V Phase Angle*	*Impedance (R +/– jX Ω)*
Rear	0.5734	–60.80°	—	—	
Forward	0.6418	–16.62°	—	—	
Feedpoint	1.0	0.0°	21.53	15.34°	20.76 + *j*5.70

Step 4. Matching section added:

Element	*Relative I Magnitude*	*Relative I Phase Angle*	*Relative V Magnitude*	*Relative V Phase Angle*	*Impedance (R +/– jX Ω)*
Rear	0.9774	–133.7°	—	—	
Forward	1.0939	–89.48°	—	—	
Feedpoint	1.0	0.0°	60.67	6.14°	60.32 + *j*6.49

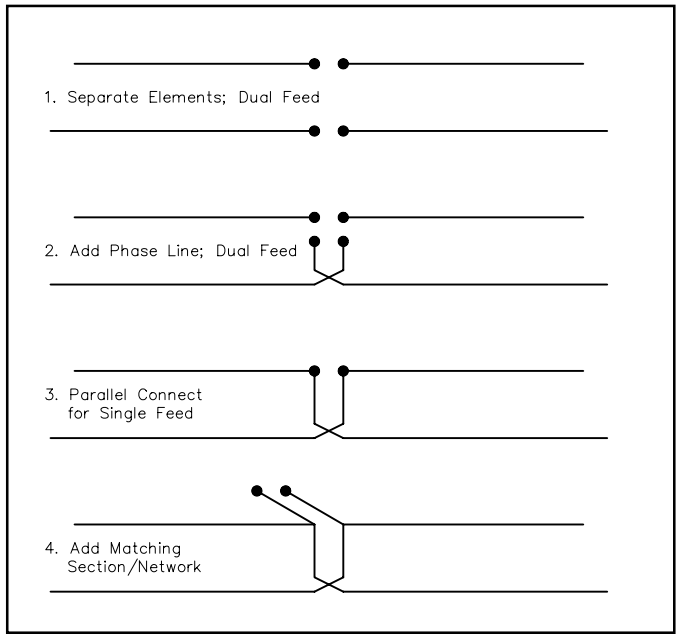


Figure 3—Design steps for a ZL-Special used for array analysis.

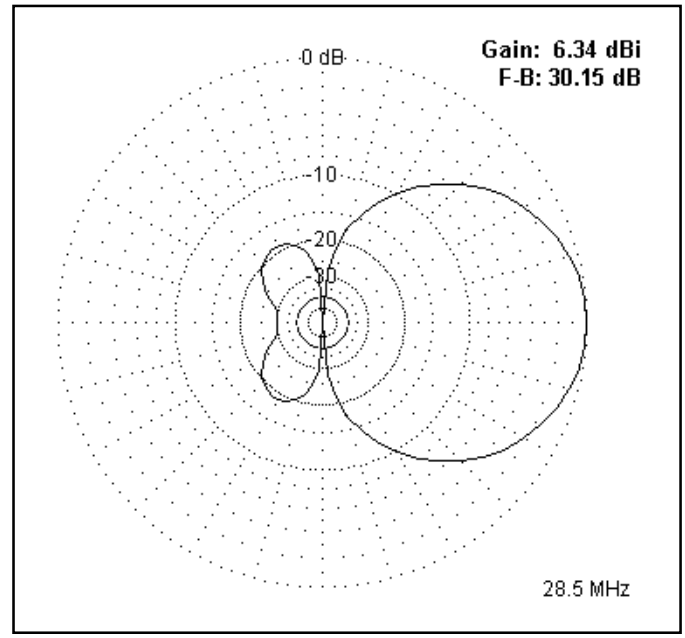


Figure 4—Free-space azimuth pattern of the sample ZL-Special at 28.5 MHz.

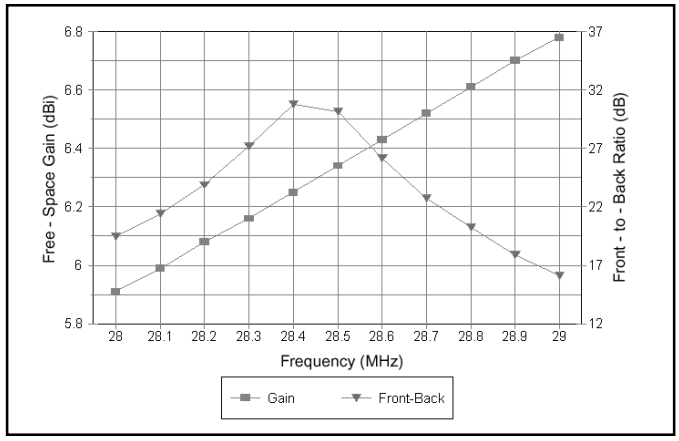


Figure 5—Gain and 180° front-to-back ratio of the sample ZL-Special from 28.0 to 29.0 MHz.

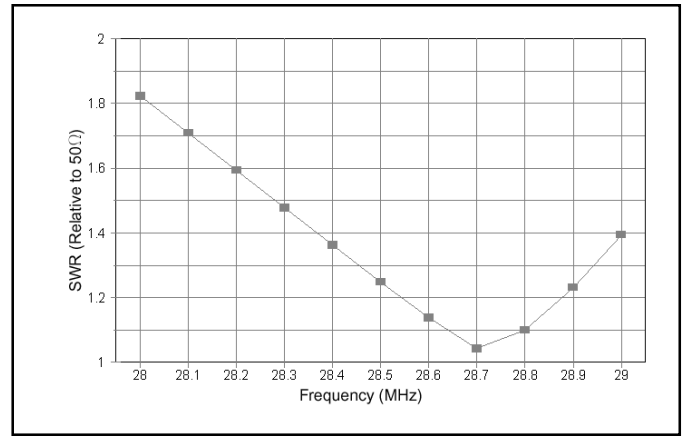


Figure 6—50-Ω SWR curve of the sample ZL-Special from 28.0 to 29.0 MHz.

ing a current level that balances with the portion of source current used by the forward element at a common voltage such that the rear element then has a current magnitude and phase angle to yield a desirable pattern requires juggling all of the variables into a usable collection.

Even if we arrive at a usable collection of values, we have several other variables to consider. First, the calculated characteristic impedance of the phase line must be one that we can acquire or build. Second, the requisite physical length of the phase line (accounting for the line's velocity factor) for the current transformation must be at least the space between the elements. As well, it should not be too much longer than that spacing in light of practical considerations for supporting the line. Since the line will be open—whether we use coax or parallel line for the task—we must isolate it from disturbances that a metallic boom might create. Designing a ZL-Special, then, requires either careful analysis or some very lucky guesses.

A Design Example

Let's analyze a single design for 28.5 MHz to see if we can make the picture clearer. We shall begin with two elements. Both will be our standard 0.5-inch (0.001207-λ) aluminum elements. The forward element will be 0.465 λ long, while the rear element is 0.506 λ long. The spacing will be 0.125 λ. However, from Part 1 of this series, we should now understand that the selected spacing is somewhat arbitrary, since for any element spacing, we may find element lengths that result in a desired phased array pattern.

Figure 3 shows the four steps in our analysis, and the results appear in **Table 1**. If we arrange the elements individually in a *NEC* model and feed them independently with current sources, then the feed values in the table's step one under the relative current columns will result in the relative voltage and the individual element impedances. The models follow the system used in Part 1 of reversing the direction of the rear element relative to the forward element so that any phase line that we add can be in normal orientation. Notable is the similarity of the element impedances, a useful condition (but not the only such condition) for successful ZL-Special design. The tables in Part 1 show in a general way what conditions must exist for us to achieve such similar impedances: the relative longer length of the rear element when both elements are longer than a self-resonant dipole at the frequency of interest is a promising com-

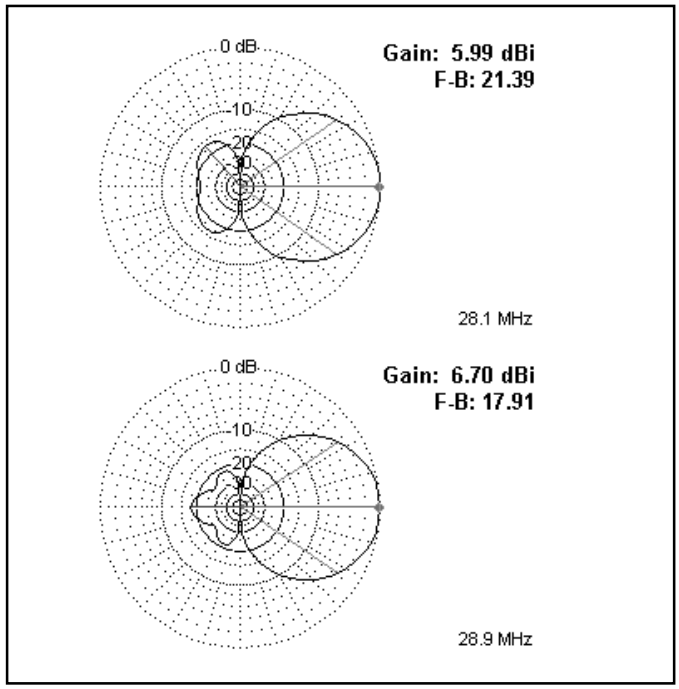


Figure 7—Free-space azimuth patterns of the sample ZL-Special at 28.1 and 28.9 MHz.

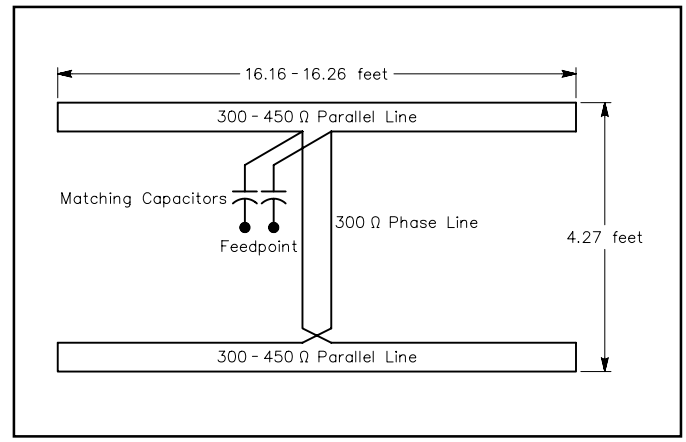


Figure 8—Basic outline of a W7EL Field-Day Special for 28.5 MHz.

bination at the 1/8-λ spacing. As **Figure 4** shows, we have not striven for the highest gain or front-to-back value, but simply for highly usable values.

The second step in our analysis creates a model with a transmission line attached to the rear element, but with its forward end brought to a source wire independent of the forward element. The selected line—from calculations, is RG-83, 35-Ω coax with a velocity factor of 0.66. The required length is 0.13 λ physically or 0.197 λ electrically. This length of the chosen line yields the correct relative rear element current magnitude and phase angle. At the same time, it yields the required forward-end voltage magnitude and phase angle to match the value for the forward element. Note that the required forward line end current is 0.664 (relative to a forward element value of 1.0) with a phase angle of 44.25°.

Step three in the analysis requires that we connect the forward end of the phase line and the forward element center to create a single feedpoint for the array. Under these conditions, supplying the feedpoint with a current of 1.0 at 0.0° phase angle, we obtain the relative element current levels and phase angles shown. The forward element phase angle is a function of the reactance at its center. However, the net phase angle difference between elements is still –44.18°. At this stage, we have a complete array that we can frequency sweep from 28.0 to 29.0 MHz. **Figure 5** shows the results. The gain shows a nearly linear curve upward, with a total change of about 0.9 dB. The front-to-back ratio remains above 20 dB from the lower band edge to above 28.8 MHz and is at all points superior to the front-to-back ratio of a common reflector-driver Yagi by 5 dB minimum. However, as Table 1 shows, the source impedance is just above 20 Ω.

The final step in our design is to add a matching system to raise the impedance to something compatible with common 50-Ω coaxial cable. The low source impedance reactance suggests a matching section. A 0.13-λ section of the same 35-Ω cable (RG-83) used for the phase line functions as a near-1/4-λ section to achieve the goal. With this section in place, we achieve the 50-Ω SWR curve shown in **Figure 6**. One might select other lengths for the matching line to better center the SWR curve, but the values shown would be in most cases quite satisfactory. For reference, **Figure 7** shows the array patterns at 28.1 and 28.9 MHz to confirm that the patterns are usable and to show the evolution of the rear lobes as we increase frequency.

The design explored here has attempted to show the required alignment of the many variables involved in ZL-Special design. It is not the only design that will work, but it shares many characteristics with successful ZL-Specials. Most significant is the required low characteristic impedance of the phase line, calling for a coaxial cable. Such lines are vulnerable to external disruption from near-metallic contact, so a non-conductive boom is desirable without resorting to complex phase line support construction.

Folded-Dipole ZL-Specials

The use of folded dipoles as ZL-Special elements arose to overcome two problems: cost and the need for low-impedance phasing lines. Early versions of such designs taped the elements to bamboo horizontal supports. In general, most of these designs simply set two TV-twinlead elements 1/8-λ apart with a section of TV twinlead as the phasing line. Element lengths were a matter of trial and error experimentation.

W7EL's "Field-Day Special" rests on a different approach—an attempt to calculate the consequences of mutual impedance on the elements, with the selection of element length, spacing and line length designed to achieve the required current magnitude and phase angle transformation. **Figure 8** shows the outline of a 10-meter version of the antenna that I have built. The element lengths indicated are for modeled versions that use #18 wire at a 1-inch spacing (about 450-Ω impedance as a transmission line) and that use #20 wire spaced at 0.375 inch (about 300 Ω as a transmission line). The longer length for the thinner wire that is spaced more closely is natural. The following notes are based on the 1-inch-spaced model. In both cases, using vinyl-covered wire shortens the physical element by 1-2% to account for the velocity factor of the insulation in antenna use.

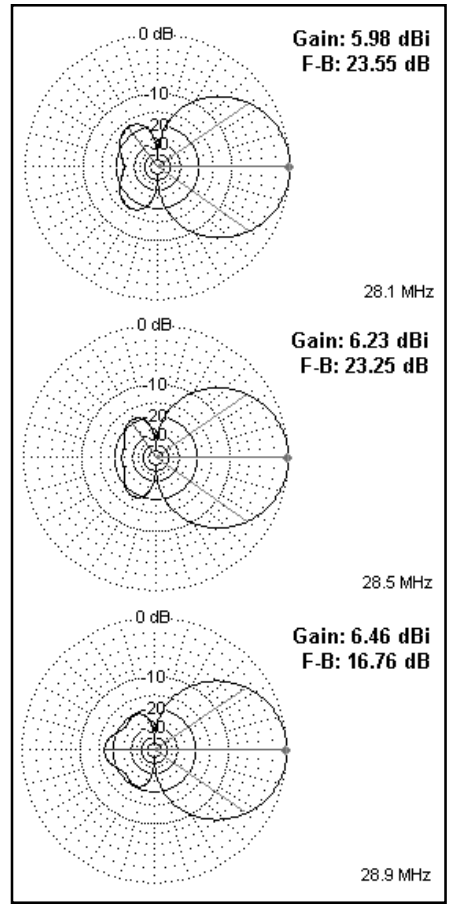


Figure 9—Free-space azimuth patterns of the Field-Day Special at 28.1, 28.5 and 28.9 MHz.

Although the element spacing is 4.27 feet (0.1237 λ), the phase line is 4.9 feet (0.1420 λ) long, despite the 0.8 velocity factor of high-quality twinlead. Indeed, calculations suggest that a higher front-to-back ratio results from the use of 340-Ω line. However, as **Figure 9** shows in the free-space azimuth patterns across the first MHz of 10 meters, performance with a 300-Ω line achieves similar levels to the first design that we explored. As well, with a 300-Ω line, slightly better performance is possible by lengthening the forward element slightly, although the difference is unlikely to be noted in practical operation.

Figure 10 shows the gain and 180° front-to-back curves for the model across the 28.0 to 29.0 MHz span. Typical of ZL-Special designs of any sort, the gain rises almost linearly, while the front-to-back ratio shows a broad peak centered a bit below the center of the design passband. **Figure 11** provides figures on the resistance and reactance within the design passband. The resistance range is only about 7.5 Ω. The reactance changes by a total of 56 Ω. As Figure 8 indicated, a pair of series capacitors, each with a reactance of –110 Ω (about 50 pf at 28.5 MHz) would provide a very reasonable SWR curve across the passband.

The need for a compact portable antenna inspired the original design of the Field-Day Special. However, for our purposes, it serves additional functions. One is to illustrate that equal-length elements (each about 0.468-λ long) result in wide-band performance that is not significantly different from the use of unequal length elements in the first example. A second function is to show that folded dipole elements have no advantage or disadvantage relative to single elements in performance—although there may be differences in the physical convenience of one or another element type. Third, the elements have widely divergent impedances: forward 124 + *j*84 Ω; rear 80 – *j*256 Ω. Nevertheless, the right length of the right impedance

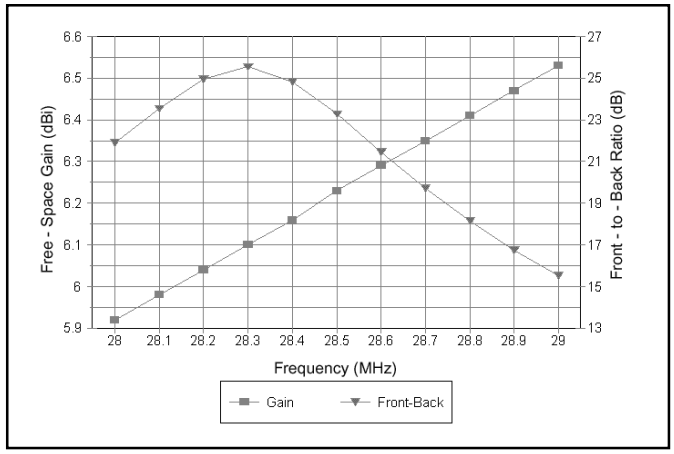


Figure 10—Gain and 180° front-to-back ratio of the Field-Day Special from 28.0 to 29.0 MHz.

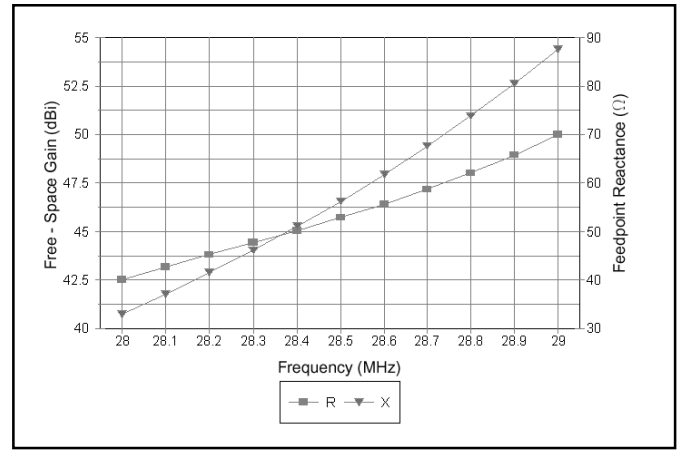


Figure 11—Source resistance and reactance of the Field-Day Special from 28.0 to 29.0 MHz.

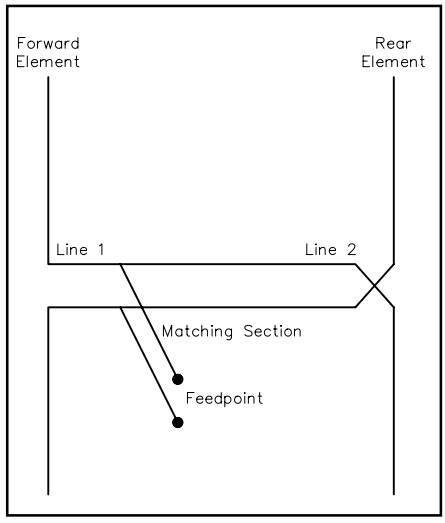


Figure 12—Basic outline of the dual-line ZL-Special for 28.5 MHz.

phase line effects the correct current division at the feedpoint junction so that we arrive at the correct current magnitude and phase angle on the rear element to achieve proper or acceptable phased performance.

A Dual-Line ZL-Special

Before we leave the ZL-Special, let's examine a further variation on the general theme of phasing with a single transmission line section between the elements. There is no rule that says that one must feed the system precisely at the junction with the forward element, even if tradition has imbedded this view in our minds. **Figure 12** shows the general outline of a variant of our first ZL-Special study model.

The design uses the same element lengths as our initial model. The forward element is 0.465 λ long and the rear element is 0.506 λ long. Both are 0.5-inch (0.001207-λ) diameter aluminum. The original design used a single phase line length of 0.13 λ of 35-Ω 0.66 velocity factor line. Suppose that one cannot obtain the required RG-83, but has some RG-8X with a 50-Ω impedance and a velocity factor of 0.78. The higher-impedance line at any length will not achieve in a single line the desired phasing for reasonable ZL-Special performance.

However, we may effect transformations of current magnitude and phase angle on both the forward and the rear elements by bringing lengths of transmission line from each element to a middle point. The length of line from the rear element is 0.13 λ. Although this length is physically similar to our original design, electrically, it is only 0.167 λ, since the velocity factor of our new line is higher. A 0.015-λ line from the forward element is 0.192 λ electrically or about 0.52 feet. At the junction, given a source current of 1.0 at 0.0°, we arrive at a relative current split of these dimensions: forward 0.950 at 4.35° and rearward 0.458 at –2.1°. The resulting current ratio of rear to forward elements is 0.811 at –44.8°, close to the values for the original design.

Figure 13 shows the azimuth patterns across the 28-29 MHz span of the design passband. Only the front-to-back ratio suffers a bit relative to the more ideally phased original example, as shown in the gain and front-to-back curves in Figure 14. A bit of element length adjustment might well have improved the numbers a bit, but would have altered the demonstration.

The natural impedance at 28.5 MHz for the new phase line arrangement is about 23.5 + *j*13.1 Ω. The low reactance suggests that a modified ¼-λ line section might effect a match. 0.167 λ (electrical) of 35- to 37-Ω line provides the broad 50-W SWR curve shown in Figure 15. The line might consist of either RG-83, or in the absence of such line, a parallel section of RG-59. In each case, the line velocity factor will determine the physical length.

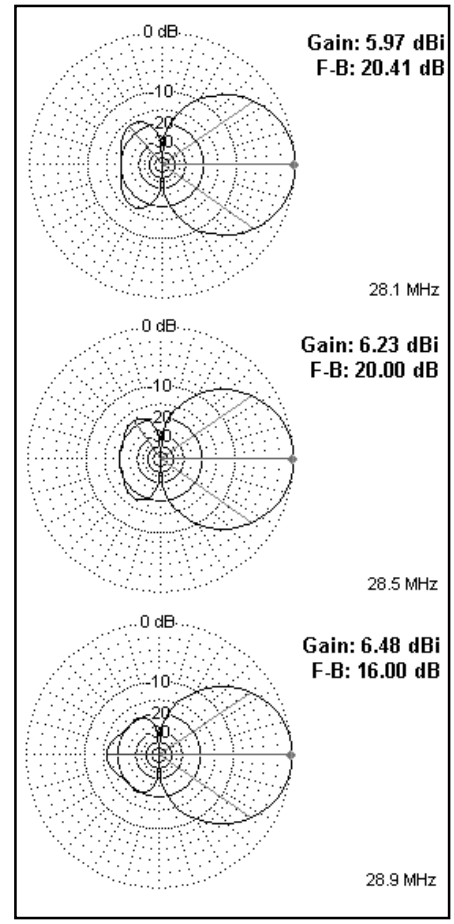


Figure 13—Free-space azimuth pattern of the dual-line ZL-Special at 28.1, 28.5 and 28.9 MHz.

The design shown here is similar in principle to the one used to improve front-to-back performance of a 10-meter hilltopper 2-element Yagi. (See "Two Hilltoppers for 10 Meters," *The ARRL An-*

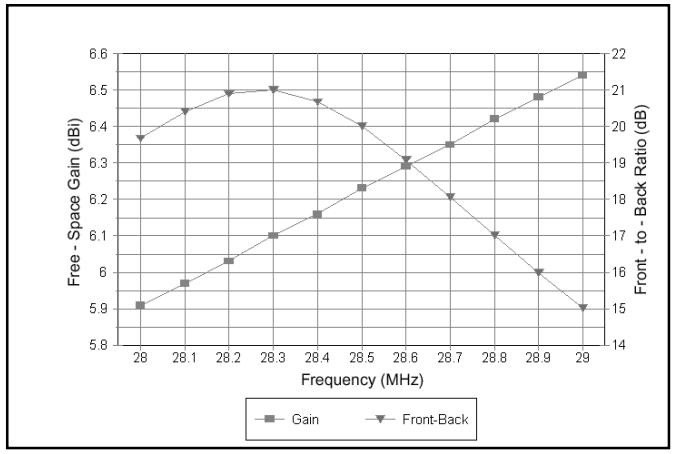


Figure 14—Gain and 180° front-to-back ratio of the dual-line ZL-Special from 28.0 to 29.0 MHz.

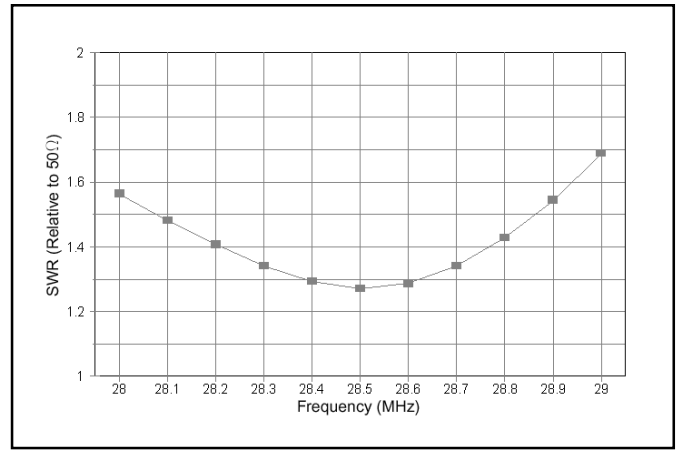


Figure 15—50-Ω SWR curve of the dual-line ZL-Special from 28.0 to 29.0 MHz.

tenna Compendium, Volume 6, pp 1-9.) Like the single-line ZL-Special, the antenna requires a non-conductive boom to ensure that the phase line remains clear of unwanted interactions.

Tentative Conclusions

We have examined the numerous variables that go into the design of a ZL-Special. The somewhat simplistic view of 2-element horizontal phased array design taken in the early years of ZL-Special building has given way to a more complete appreciation of the number of interactive variables involved, including the antenna dimensions and consequential mutual coupling. As well, the phasing work became more complex in terms of the current magnitude and phase angle transitions down a length of line having a given characteristic impedance so as simultaneously to provide each element with the correct relative current magnitude and phase angle and to effect a current division at the line junction or feedpoint that would result in those values.

Many possible ZL-Special designs prove to be unfeasible. The requisite characteristic impedance of the phasing line may not exist and cannot be constructed. The required line length may be shorter than the distance between the elements, or it may be excessively long.

The key to successful ZL-Special design is to find a set of element lengths and a spacing that meets two conditions. First, the relative current magnitude and phase angle on the individual elements must provide a satisfactory pattern in terms of gain and front-to-back ratio. Second, the impedances of the elements under the first condition must permit the design of a phasing line (or pair of lines) that employs an available or achievable characteristic impedance and that allows the requisite current division and transformation. As we saw in Part 1, there is in principle no restriction upon element spacing within the range of 0.05 to 0.2 λ, although element spacing in the 0.1 to 0.13 λ range tends to yield the most easily achieved gain and operating bandwidth levels.

There is, in principle, no restriction upon the element lengths relative to the length of a resonant dipole at the design frequency. As well, there is no restriction upon the relative lengths of the elements: the forward element may be in principle shorter than, equal to, or longer than the rear element. Some combinations may be more favorable than others, although to date, there is no complete survey of all combinations.

Perhaps the major disadvantage of the ZL-Special phasing system lies in the need to use folded dipole elements with high-impedance phase lines or to use with single tubular elements a low-impedance line. Many, if not most, builders wish to use a metallic boom and hence to have a phase line that is not susceptible to unwanted interactions. The quest for a stable phasing system has led to some interesting variants of phasing schemes for the 2-element horizontal array. The early HB9CV system—still in use today—and the recent N7CL system are two approaches to the same end. If the elements and the desired phase line do not match, let's add matching networks. As we shall see in the next episode, a slight increase in electrical complexity can lead to significant simplifications in the physical design of 2-element horizontal phased arrays. ■

Road Warriors

Jim Stahl, K8MR
Jimk8mr@aol.com

Let's start out with a brief quiz…

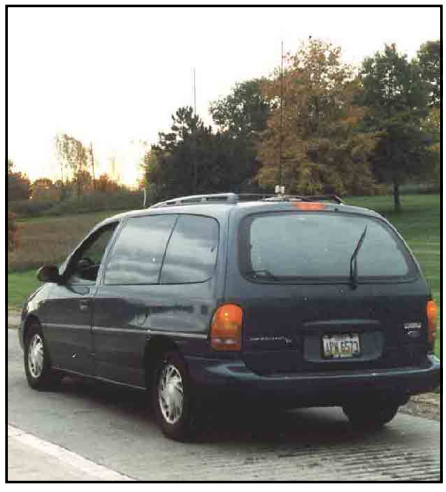
Would you rather spend your contesting time:
A. Staring at the same old ham shack walls.
B. Taking in the sights while cruising the countryside.

If you chose "B", then consider the following:

Take a number of two man teams. Set them up with very similar stations in the same geographical area. Equip them with relatively simple stations such that they will not be the loudest signals on the bands. No outside spotting will be employed. Operate within the framework of a larger contest with lots of bigger signals on the bands. I have just described:
A. The World Radiosport Team Championship.
B. The mobile category in a state QSO party.
C. Both of the above.

The answer is C. Choice A will be getting plenty of attention elsewhere, so let's turn our focus to B.

State QSO parties are not what usually comes to mind when you think of "big time competition" or "high end contesting." I have dabbled in them for years, though—sometimes for a quick contest fix, sometimes to pass out QSOs to friends or newcomers to the contest world. In doing so, I've noticed one particular group that seemed to be having more than their share of fun—the mobiles. They had a fresh pileup waiting for them each time they entered a new county. Two years ago, I had a chance to try out mobile contesting for myself. It is, indeed, lots of fun! Since then, I have assembled my own mobile contesting setup—and I've been having a blast with it!



The K8MR/W8DZR mobile contest team's station-on-wheels staged and ready at the Pennsylvania border (2001 Pennsylvania QSO Party).

It is not just the thrill of making lots of QSOs, but doing so while simultaneously enjoying a tremendous view of the great outdoors. I have participated as a member of a mobile team in the Michigan QSO Party—a state where the weather conditions can vary from spring-like while in the south to downright wintery in the far north; in the Ohio QSO Party—during the fullness of the late summer; and the Pennsylvania QSO Party—near the peak of the beautiful fall colors. We have passed by farm tractors that were large enough to drive a small car under. A few miles later we might see a woman walking behind a horse-drawn plow. On a few occasions, we have suspected that we were getting precariously close to the middle of nowhere.

Great competition or more fun? (This may remind you of the "less filling/tastes great" debate.) Why, of course, it's *both*!

Equipment Considerations

Contemporary equipment designs have made setting up for mobile operation much more convenient. Obviously, smaller radios such as the IC-706 or FT-100 have made it easier to locate a spot to mount a radio in a car.

Perhaps just as important are improvements in mobile antenna mounting arrangements. It's no longer absolutely necessary to drill holes in the car body or to weld supports to the chassis. Inexpensive, lightweight single band antennas—commonly known as "ham sticks"—can be installed on magnetic mounts, and this can eliminate the need for any bodywork butchery. Not only that, but modern antenna analyzers make tuning mobile antennas considerably easier.

It is with just such equipment that I've answered the call of the open road several times over the past couple of years. I use an ICOM IC-746 (my usual home station transceiver) and ham sticks. Though the '746 is by no means the *smallest* HF radio currently on the market, for mobile contesting it fits my needs quite nicely. It has a built in antenna tuner and two antenna ports, allowing instant automatic switching between two antennas. It also has a built in keyer with message memories (I don't ordinarily make use of the internal memories) and a large, bright display.

I mount the ham stick antennas on two triple-magnet mounts that I stick on the roof of my minivan. I space the antennas about five feet apart. I would not want to try two radio contesting with the antennas this close, but there seems to be little interaction between the them. (Installing or removing one antenna shows no effect on the tuning of the other antenna.)

You need not go broke getting set up for mobile contesting. A five band set of these antennas with a pair of suitable multiple-magnet mounts can be purchased new for less than the cost of a single section of Rohn 45G. Although I choose to use the WD4BUM brand ham stick antennas, there are similar antennas available from other manufacturers that would very likely work just as well.

I've had reasonably good results even on 80 meters—as long as the QRN levels cooperate. A few tricks are required on 80. The 75-meter ham stick is too short for 80-meter CW use, so I've added a capacitance hat. I've made this out of a couple of pieces of #12 stranded wire, and fastened them with a hose clamp to the point where the whip attaches to the main antenna body. I've found that pieces of wire about 12-inches long do the trick. I trimmed them to their final length by simply pruning them while keeping track of the resulting resonant point with an antenna analyzer.

To ensure a good ground at low frequencies, I connected ground wires from the magnet mount frames to the roof rack mounting screws closest to them. (I scraped the black anodizing off the underside of the screw heads to improve the connection.)

I use a Lakeview LK-1 tuning coil (**www.hamstick.com**) to improve the match on 80 (and sometimes on 40—depending on where on the van roof that an-

Jim, W8DRZ, proposes swapping out the ham sticks for some higher grain alternatives (2001 Ohio QSO Party).

tenna is mounted). With this device, I can get the VSWR down very close to 1:1. (The best I can get without the tuning coil is about 2:1.) Needless to say, even with all of these tricks, the antenna bandwidth on 80 is still very narrow. The 2:1 VSWR bandwidth is only about 20 kHz. Due primarily to the narrow tuning on 80, I have not attempted 75-meter SSB contest operation.

Installing a contest station into a car is a unique project; it depends entirely on the particular vehicle you'll be using. For my premier mobile contest effort—the 2000 Michigan QSO Party—I teamed up with Ron, W8RU. We used his minivan. Ron removed the middle seats and built an operating table to fit into that space. The radio operator sat in the far back seat. It worked out okay, but the setup was not especially comfortable and made communications between the driver and operator difficult.

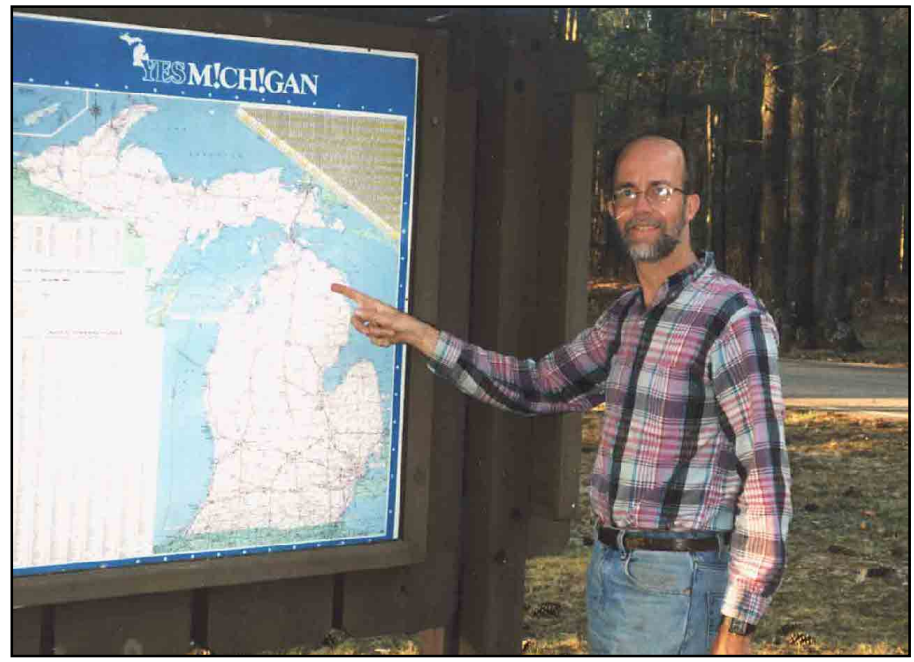
In a mobile contesting environment, ease of communications between the radio operator and the driver is an important consideration. While underway, you often need to discuss things such as where to turn or how long you can wait until the next bathroom break, so it becomes important to be able to converse freely. I consider a front passenger seat operating position ideal.

With my minivan, I got lucky. When my wife and I decided to buy a Ford Windstar in 1996, we were thinking about hauling kids, not radios. However, the van has a nice two-tier dashboard, where the lower tier wraps around and becomes the armrests. The map light provides sufficient nighttime lighting. (I tape a QSL card up near it to shield the driver from the light.)

Designing around the existing interior, I built a wooden stand that fits between the two front seats. The front three-quarters of the IC-746 rests on the stand, while the back feet rest on the dashboard. I then cut a plywood shelf to fit the dash, supported on the left by a bracket attached to the legs of the center stand, and supported the rest of the way around by the dashboard/armrest. My laptop fits on the shelf in front of the right seat perfectly, with just enough room remaining for a paddle to the right. The main tuning knob on the '746 is just in front of the left armrest. This arrangement results in an operating position that is perhaps more comfortable than the one I have at my home station!

I gave special attention to securing and stabilizing the setup. A strap and turnbuckle are used to hold down the radio. A board runs back from the center stand, and is fastened to a crosspiece on the floor in front of the middle seats. This provides added stability to the rear. I feel comfortable with the setup—but careful, sane driving is, of course, essential.

(And now for one of those ever-present disclaimers…Use caution when mounting any accessory equipment in a passenger vehicle. Always be aware of the possible implications of the reduced effectiveness of the existing safety padding and the ramifications of airbag deployment!—*'BV*)



Jim, K8MR, points out his location while on a brief visit to a rest area in Montmorency County during the 2001 Michigan QSO Party.

Much has been written about optimizing mobile performance, but as of yet I have not given this much consideration. I do, of course, wire the radio power cord to the car battery, and the connections are properly fused. I have not gone as far as to bond all of the metal car parts together or to shield the ignition wiring.

My laptop runs on 18 V dc, so I use an inverter to create 115 V ac and plug the computer's power supply into that. Inverters are often electrically noisy. Ferrite and short leads can help keep this hash down to some extent. Some mobile operators I know, such as W1NN and K1TO, log on paper—in part to avoid computer-related noise. K1TO says he also finds it too difficult to see the computer's screen in bright sunlight.

Sometimes I've found that inverter noise is bad on one band but relatively tolerable on another. I keep the inverter within arms length (it's on the floor between the seats) so that I can turn it off and operate off the laptop's internal battery if noise presents a problem.

Operating

The biggest difference that you'll notice when mobile contesting is that you are no longer loud! Your signal may be adequate, but fixed stations will clobber you. I find this especially true on SSB. For mobile operation, I find that the reverse of the typical 2:1 or 3:2 point ratio between CW and SSB QSOs better reflects reality. Nevertheless, I do not expect contest sponsors to come up with different rules for mobiles; I look at this as part of the challenge. I make an extra effort to dig out the SSB QSOs—especially in those contests that offer multipliers by mode.

When mobile operating, you should expect to have more noise, whether it's from the vehicle ignition, computers and inverters or from the power lines that you pass. Working loud home stations is generally not a problem, as they are typically well above the noise. Working other mobiles or weak fixed stations can be tough, though. We therefore try to spend some of our operating time stationary, with the car engine off, in an area that's away from power lines. Since we have just two bands available at any one time, stopping also gives us an opportunity to swap antennas and take a crack at the less-used bands—15 or 10 meters for example. These stops need not be long; 10 or 15 minutes is about average. We will also stop if we are about to leave a county but still have a pileup going, or if we are otherwise in that county for only a few miles. For such brief stops, we just run the equipment off the car battery. (And yes, I do carry a set of jumper cables!) If we're lucky, these stops will occur somewhere near an ice cream parlor.

The high point of mobile operation is the pileup that's awaiting you each time you enter a new county. This can happen twenty or more times in a 12-hour contest. It's a blast, especially since you are often passing out a new multiplier for your fellow contesters or perhaps a new county for the county hunters.

Since you can be worked again from each county, the county information becomes almost as important as your call sign. You need to include it in every transmission, at least when you are CQing.

This is perhaps the biggest operating mistake that I hear other mobile operations making, just signing "K8XYZ/M" without a clue as to which county they are in. I may shorten a "QRZ" to just "TU K8MR" if I know several people are calling me, but I make it a point to include the county information in every CQ call.

On CW, you often have a core of serious participants who will follow you from county to county. On SSB you work more casual guys, including lots who are not in the contest. These guys are a good source of multipliers.

Gathering in-state multipliers from other mobile contestants is important. These mobiles are often weak—and may very well be busy working their own pileups—so good ears and good pileup busting skills are valuable assets.

Traditionally, state QSO parties count multipliers only once, but when the Florida Contest Group resurrected the Florida QSO Party in 1998, they changed the rules to make the multipliers count by mode. Instead of being able to earn a clean sweep (or close to it) by CQing casual operators out of the woodwork on SSB, it then became necessary to follow the mobiles, particularly on CW. I like the multipliers-by-mode feature, because it doubles the number of available multipliers and because it rewards those who spend time tuning for mobiles. Chasing the mobiles can provide great practice for your S&P and SO2R skills.

Twin triple mag mounts—with a few custom adaptations—make HF antenna mounting relatively quick and painless.

The ICOM IC-746 is strapped in tight and we're ready to roll. There's no such thing as "too many" cup holders!

Driving

Although a few diehards may try mobile contesting solo, I *strongly* recommend a two-person team. That way the operator won't be driving distracted. (Some guys will do single person efforts and park to operate, but this costs them significant operating time.)

The dangers of cell phone use while driving are well publicized—the concentration required for Amateur Radio contesting far exceeds that involved with talking on a phone. The driver need not be a serious contester, or even a ham for that matter. My mobiling partner—Jim Snell, W8DRZ—loves driving as much as I love contesting, which makes for a perfect combination. If you have a friend who enjoys road rallies or the like, ask him to consider driving for you. It may be a natural match. I think the road rally analogy is a fitting one. If we ever run into curious spectators or authorities, I simply explain our activity as a "ham radio road rally."

I find route planning to be lots of fun. You're trying to squeeze the most counties into as short a route as practical. This often results in routes with lots of zigs and zags, as you are trying to hit the county corners and stay on roads that are near county lines. I try to arrange our trips so that—if possible—we drive obscure back roads in daylight and major highways after dark.

So far, I have stuck to ordinary road maps for navigation. If you are planning to use back roads, a detailed state road atlas is a wise investment. Some mobile contesters—such as K8CC—run a separate navigation computer with map programs, and use GPS to guide them on their way. However, I feel the biggest navigational challenges are poorly marked intersections and unexpected detours, which will be problems no matter how high tech the navigation system.

As a mobile contester, I highly prefer the single day format such as those used by the QSO parties in Ohio, Michigan and Wisconsin. This eliminates the need to reserve a motel in some remote spot, and then try to time your travels so that you arrive there at the appropriate time. The alternative is worrying about trying to find a place to stay in the middle of who-knows-where at god-knows-when.

The single day format also makes it more practical to operate outside of your own state. For example, when we finished the 2001 Michigan QSO Party at midnight on Saturday, we were still two hours from our evening's destination—K8CC's QTH—and five hours from home. This would have been a real hassle if the contest finished up late on a Sunday afternoon. But with the whole day Sunday to get home, unpack and rest, it was not a major issue.

Competition

Some of the best fun in any contesting experience comes from head-to-head competition with friends in similar circumstances to your own. As mentioned at the beginning of this article, mobile operation in these state parties may provide about as even a playing field as it gets. By definition, you are in the same area—the same state—so you cannot blame your results on "not being in New England," for example. Your stations will be very similar, as you

are limited to what you can fit in or on a car. Even W5WMU is just another signal when he's mobile. You are probably competing against people you know personally, since they most likely live in your state. The competition comes down to your skill against their skill.

My most exciting competition to date has been in the 2001 Michigan QSO Party, when from Mad River Radio Club alone we had six serious mobile teams on the road. W8DRZ and I came in second to the K8CC/W8MJ team by a margin of 2%. The difference came down to about 12 QSOs or three multipliers. This was after 12 hours of operation working in the neighborhood of 600 QSOs and 125 multipliers each. Not many finishes come closer than that!

There is perhaps more latitude for strategy for mobiles in these contests than in many other contests—where it is rate-rate-rate. Should you work casual high band guys on SSB, or dig for in-state counties? Should you take advantage of a fairly predictable rate on CW, or try for high-rate bursts on SSB? Should you go for as many repeat QSOs by traveling to the most counties, or visit fewer counties so you can park and work different groups of guys and perhaps more multipliers? With no set answers, it's fun trying different approaches.

House Parties

Don't forget! These contests are still fun from home. I typically operate other state QSO parties in many short periods interspersed with my weekend chores. It gives me a good excuse to take frequent breaks from the lawn mower or rake to catch the mobile stations as they travel into new counties. I've found that if I put in these short operating periods for a good portion of the contest period, I often place very well among the out-of-state entrants.

Several distinct groups of operators show up regularly in these contests. There are contest junkies who just love to contest. There are those who are active in their own state's QSO parties and who get on to return the favor in the other guys' contests (I fit this description). There are county hunters looking for new ones. They often QSL, but are very good in that many supply "Mobile Reply Cards." (You simply sign the card and insert it into their SASE.)

A state's "ex-patriots" are another good source of out-of-state activity. This first became apparent to me a few years back when I heard K3ZO participating in the Wisconsin QSO Party. For a few seconds I was amazed that Fred was in such a seemingly minor contest. Then I remembered that he was born in the land of Cheeseheads, and he was just having fun working the good 'ole boys back home. You'll also hear plenty of new folks, who find a low-key event such as a state QSO party a good way to dampen their toes in the waters of contesting.

Since mobiles can be worked repeatedly, a little extra activity goes a long way. In the Ohio and Michigan parties, the top mobiles are completing around 750 QSOs in 12 hours. Since a mobile might work the same station 30 or more times, another dozen active stations could be enough for the mobiles to break the 1,000 QSO mark. For 12 hours of work, that would be getting to the point where Sweepstakes activity begins to sound slow! Likewise, if there are ten mobiles each changing counties every half hour, that's 20 new stations on the air every hour, in addition to all the home station activity. Make a couple of QSOs with each mobile from each new county, and you are talking good numbers for the home station guys as well.

The warm weather months are the time for state QSO parties, and two of the best are coming up soon. The Michigan QSO party will be on Saturday, April 20th. This is a single day, 12-hour contest. Florida's two-day affair is the following weekend, April 27th and 28th. My driving partner W8DRZ and I will be out in the wilds of the northern Lower Peninsula of Michigan on April 20th. I hope many of you will take the time to check out the fun we are having and witness the competitiveness amongst the MRRC mobile teams. Enjoy the challenge of chasing a clean sweep of counties. And if your state has a QSO party of its own—or if you live near one that does—I will be looking forward to helping you on your own turf as you enjoy some of the best fun available in contesting. ■

A Visit to the *NCJ* Archives—A 30th Anniversary History Quiz

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"Sherman, set the dials on the Way-Back Machine—we're going to visit the archives of the National Contest Journal!"

"Gee, Mr. Peabody, what for?"

"Because, Sherman, I've never found out exactly why the US Forest Service had me DQed in the 1981 CW Sprint."

"Gee, Mr. Peabody, what could you have done to make them take such drastic action?"

"Well, Sherman, obviously they thought there was some clear-cut violation..."

Arrggh! Maybe you'll find this quiz about the early, early days of the NCJ*—and those that made it happen—a little more entertaining!*

1. What contest club published the first issue of *NCJ*?
a. Minnesota Wireless Association
b. Frankford Radio Club
c. Texas DX Society
d. Rubber Circle Contest Club

2. The first issue of *NCJ* was published in what year?
a. 1970
b. 1973
c. 1976
d. 1980

3. The first editor of *NCJ* was...
a. K5RC
b. K5ZD
c. K0TO
d. W9KNI

4. Who is the longest-serving editor?
a. K5ZD
b. N5KO
c. K5RC
d. AH3C

5. Who was editor for the shortest period of time?
a. K1AR
b. N6TJ
c. W2GD
d. K7SS

6. Which of the following editors has *not* held the post twice?
a. K0TO
b. K5RC
c. K7GM
d. K5ZD

7. Match the old and current calls of these former editors:

a. WN4KKN	e. NT1N
b. W0IYP	f. AH3C
c. W6RTT	g. N5KO
d. W9QA	h. K0TO

8. The first issues of *NCJ* were distributed at what convention?
a. W9DXCC
b. Dayton Hamvention
c. ARRL National
d. Fresno DX

9. Which of the following published items was an *NCJ* first?
a. Comprehensive future contest listings
b. Contest records
c. State QSO Party results
d. Two-radio controller designs

10. 3830 kHz became the *NCJ*'s score collection frequency because what club met there?
a. Mad River Radio Club
b. Minnesota Wireless Association
c. Yankee Clipper Contest Club
d. Royal Order of Boiled Owls

Bonus—Which unlikely national ham radio journal served as the inspiration for *NCJ*, which now serves the most competitive Amateur Radio operators on the planet? ■

Answers

1. a—Well, there's nothing else to do all winter...
2. b
3. c—Thank you, Tod!
4. c—Tom took the helm for 28 issues, and just squeaked by Randy, K5ZD, who totaled out at 27. (Based on data in the NCJ *Collection CD-ROM* 1973-1998 [ARRL order #7733])
5. c—John kept the presses rolling for two issues in 1981. (Again, based on data in the CD-ROM.)
6. c—Rick has managed to avoid a second term (so far, anyway).
7. a-g, b-h, c-f, d-e
8. d—This event is now held in Visalia. The first copies were distributed there.
9. a—Before those that appeared in *NCJ*, there was no thorough listing of future contests.
10. b—And why not? They started it, anyway!

Bonus—*The Milliwatt*, national journal of QRPp, edited by Ade Weiss, K8EEG/0, caught the eye of K0TO in 1970. For reference, see the Jan/Feb 1992 20th anniversary issue of *NCJ* for a guest editorial on the formation of the *NCJ*, by Tod Olson, K0TO.

WRTC USA Youth Fund

The Boring (Oregon) Amateur Radio Club is happy to announce the establishment of a tax-deductible fund intended to help defray the travel costs of young USA competitors to the WRTC events. This fund is being administered by the ARRL Foundation.

To be eligible, an applicant must be a US citizen, no more than 25 years old at the time of the WRTC event, and must be selected as a competitor.

Up to $1000 of the actual travel expenses will be reimbursed per WRTC event, depending on fund availability. If funds are left over, they will be applied to the next WRTC event.

The Boring ARC will verify eligibility and request fund disbursements. You can send your request to the club's mailing address: 15125 SE Bartell Road, Boring, OR 97009. Include a copy of your receipts.

To contribute to the fund, send your check to the ARRL Foundation Inc, 225 Main Street, Newington, CT 06111. Make your check out to "The ARRL Foundation" and include a note indicating the name of the fund that you are contributing to (WRTC USA Youth Fund, in this case). All contributions of $25 USD or more will be recognized in *QST*.

For additional information about the ARRL foundation, visit **www.arrl.org/arrlf**. The Boring ARC Web page is at **jzap.com/k7rat**.

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NCJ Reviews: Top Ten Devices' DX Doubler

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SO2R—Single-Op, Two-Radios—is the latest evolutionary quantum leap in HF contesting. By using two radios effectively, an operator can increase his "presence" on the bands dramatically. Until recently, trying SO2R meant homebrewing your own switching and cabling hardware. During this past year, however, three companies have brought to the amateur contest market controllers that, to varying degrees, provide the necessary interfaces for a turnkey SO2R station.

One of the latest additions is Top Ten Devices' "DX Doubler." Described as a "Two Radio Controller," receive and transmit audio switching and PTT routing are controlled by a parallel port interface compatible with the popular contest logging programs, *CT*, *NA*, *TR* and *WriteLog*. An interface for Top Ten's band data decoder is also included. Top Ten provided me with a DX Doubler (DXD) to evaluate in my own two-radio setup, which consists of an FT-1000MP and an IC-735.

I previously reviewed the Super Combo Keyer by ZS4TX (see "*NCJ* Reviews," *NCJ* May/June 2001) and it has become my main keyer/controller. However, it does not provide audio switching functions, which are still handled by a small homebrew switch box. The DXD, on the other hand, incorporates audio switching, but does not include either a voice or CW keyer. Those accessories are still required. If the keyers are software-controlled, they will continue to require their own interface to the PC.

The first thing that I noticed about the DXD is that the designer clearly spent a lot of time designing the front panel. It's clearly labeled and informative. Switches that have linked functions —such as the AUTO/MANUAL transmit control switch and its associated Radio 1/Radio 2 (R1/R2) switch—are physically and graphically linked. Patterned after the FT-1000MP, LEDs indicate clearly the controller status. Receive controls are green—even the switches—and transmit, red. SO2R is hard enough without making it difficult to tell what the controller is up to. More than once, I've tied myself in a knot on Sunday afternoon by getting out of phase with the computer or switching functions. The consistent color scheme and status indicators are one of the DXD's strongest features.

Top Ten provided cables configured for Yaesu FT-1000MP radios and I modified one to suit the IC-735. This required moving three wires. I also had to add a blocking capacitor (1 µF tantalum) inside the mike connector because ICOM radios have 8 V dc on the audio line for electret microphones.

Top Ten offers prewired cables for Yaesu, Kenwood and ICOM radios and a generic "pigtailed" cable, as well.

Violating all amateur convention, I read the manual first. It's available from the Top Ten Web site (**www.qth.com/topten**) as a PDF file for downloading. The manual is clearly written, well organized, and provides a sample layout of how to route cables for a typical installation. The interface description is complete and there is a cable schematic, as well. There is a good discussion of how each receive or transmit function works and I had no trouble figuring it out once the unit was operational. For those of you that "don' need no stinkin' manuals," there's a *Quick-Start* page at the very front.

Getting connected to the radios only took a few minutes. The only additional cables required were two phono to phono cables for PTT from the radios to the DXD. If you use amplifiers, you'll have to add a phono splitter to "tee" the DXD and amplifier onto the PTT line. The cables break out into phone and DIN jacks at the radio. The keying and headphone connectors are color-coded red and black to help keep things straight. Top Ten clearly appreciates the complexity of getting an SO2R station up and running.

The FT-1000-series of radios has the ability to generate two independent channels of audio. The DXD handles this nicely, with both channels switched and mixed. Single-channel radios just have their audio routed to both output channels.

There are three modes of audio switching on the DXD—manual, PTT and auto. Manual works just like a manually operated toggle switch. PTT switches the headphone audio to the radio not transmitting (if neither is transmitting, both radios feed the headphones). Auto mode switches the headphone audio based on the computer control port. *NA* software features a stereo mode that allows software control of headphone audio and the DXD supports that feature. Note that the PTT mode can run without any computer control whatsoever, switching based on the outputs of the radios—similarly to most homebrew switching arrangements presently in use.

Simple switch boxes like the one I had constructed typically only switch audio between headphone channels—both channels R1, both R2, or one channel R1 and the other R2. The DXD goes one step further and has a mixing feature, by which the audio in each channel contains a varying amount of the other channel. This, I like a *lot*. It reduces the jumpiness of having one audio stream completely disappear. If I were to integrate the DXD permanently into my station, I would most likely use PTT mode with some partial mixing to create a foreground-background effect.

Transmitter control is much simpler. Either you operate in "Manual" mode with R1 or R2 keying controlled by a front-panel toggle switch, or in "Auto" mode with keying controlled by the computer port. Manual allows non-contest operation without disconnecting any cables except possibly the CW paddle.

The DXD is not specific to any single software package. It is shipped ready to work with *CT*, *TR* or *WriteLog*. By moving some jumpers inside the case, it can be changed to work with *NA*. This is due to the configuration of the parallel port control signals. I use *TR* and the DXD worked with that software as advertised with no changes to my *LOGCFG.DAT* file that sets up the program for each contest.

While the DXD is designed to take advantage of all of the FT-1000MP features, including the stereo audio, it interfaced to the simple IC-735 after the cable was modified as described above. The FT-1000MP cable set expects all connections to be grouped together. The cables for other radios accommodate the placement and spacing on those radios. Given the inevitability of increased computer interfacing of radios, however, it would be very useful for radio manufacturers to add back-panel connections for all three functions.

Voice keyers, CW keyers and sound cards can all be attached "upstream" of the DXD, which will never know the difference. Special instructions for connecting the DVP voice keyer are included. No modifications to these devices are required.

What changes would I like to see on future versions of the DXD?

• Right-angle phone plugs on the interface cables would be nice, as the provided cable bundle sticks out 2 inches past the front panel of the radio

• There is no on/off switch on the DXD, so you have to pull the plug or turn off 12 V power to shut the unit down. If powered from a radio 12 V dc output, this is not an issue.

• The size of the DXD is approximately 9 inches wide and 5 inches deep, which means that the unit will have to sit on top of a radio, speaker or shelf. Given the often-cramped quarters on the operating desk—which will already have a CW and/or voice keyer—if the DXD was wider and deeper, it could be positioned under a radio or computer monitor.

• Given that in a high-RF environment the DXD routes low-level audio signals, digital signals and radio control signals, grounding is important. A ground stud would be a very welcome addition to the uncluttered back panel.

Overall, I thought the DXD did its job very well. It was a snap to integrate into the station and allowed me to use all of my existing accessories. It enhanced my existing station with the PTT/Mix feature. The superior control/status coloring scheme will be very useful in high-stress situations and when I'm tired. Adding features while simplifying operation are the mark of a useful product.

The DX Doubler is priced at $195. Prices of the interface cables range up to $35. To find out more, visit Top Ten Devices' Web site (**www.qth.com/topten**) or e-mail them at **n3rd@ix.netcom.com**. ■

Shorts

AUSTRALIAN 75-METER DX WINDOW SET FOR EXPANSION

The *NCJ* is happy to report that we will soon be able to work hordes of VKs on 75-meter phone during DX contests! Savvy DXers and contesters know that the Australian 75-meter DX window is currently limited to 4 kHz around 3798 kHz. Adjacent commercial allocations effectively limit operation to one frequency (in Australia, the band 3700 - 3800 kHz is set aside for the commercial land mobile service.)

The Wireless Institute of Australia (WIA) approached the Australian Communications Authority (ACA) with a view to expansion of the window through the creation of a sharing arrangement with the present commercial users. After considerable dialog between the commercial users, the WIA and the ACA, the ACA has decided to proceed with a change in the allocation of the band 3776-3800 kHz. The ACA's intention is to reallocate this band to the amateur service on a primary basis beginning in January 2004.

Commercial incumbents will be moved to existing land mobile spectrum adjacent to the new amateur band by the end of December 2003.

The WIA is cooperating closely with commercial users and the ACA with a view to expediting the clearing of the band. Several WIA members who are professionals in the HF land mobile industry have offered to assist in the reallocation of commercial equipment to adjacent land mobile channels.

The Wireless Institute of Australia was formed in 1910. It is the world's oldest radio society and has been the single voice for Amateur Radio enthusiasts in Australia since its inception. For more information about this subject, visit their Web site: **www.wiavic.org.au/**.

(We wish to thank Dave, VK3EW, for sharing this good news with us—'BV)■

Propagation

Carl Luetzelschwab, K9LA
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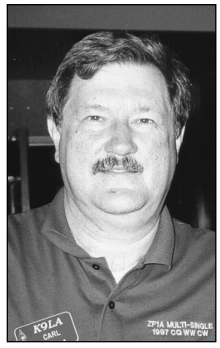
The Importance of "Ground"—Part 2



K9LA

In a figure in the November/December 2001 column, I showed plots of reflection loss versus angle of incidence for 160- and 10-meter signals for four different types of ground ranging from salt water (best) to polar ice cap (worst). Each ground type had separate plots for horizontally and vertically polarized waves.

Four general trends emerge from a study of those plots:

1) There is an increase in reflection loss as the quality of the ground gets worse. For angles of incidence in the 10 to 30° range, poor ground results in a loss of about 6 dB per hop, whereas average ground results in a loss of less than 1 dB per hop.

2) Ten-meter signals suffer more reflection loss than 160-meter signals, with the exception of the worst ground condition—where the losses are pretty much equal. Over average ground, the difference between the two is only a dB or two anyway. That's probably not much of an issue, as the absorption on 10 meters will be a factor of 256 or so less than that on 160 meters (this factor is calculated by using the square of the ratio of the frequencies).

3) Vertically polarized signals exhibit a peak in reflection loss that occurs at progressively higher angles of incidence as the quality of ground gets worse. This is the pseudo-Brewster angle. For an interesting discussion of this phenomenon with respect to antenna polarization and frequency, check out K8CH's "Technical Correspondence," "DX and the Brewster Angle," in the May 1983 issue of *QST*. (If you don't have this back issue, e-mail me and I'll send you a PDF version of Chuck's letter.)

4) The reflection loss for both vertically and horizontally polarized signals for a given ground condition is equal at normal incidence (90°) and also at grazing incidence (0°).

These general trends shouldn't come as much of a surprise. They've been discussed in previous literature, although the first receives the most attention.

How Does All of this Relate to Contesting?

To address this question, let's divide ground considerations into the two categories defined in the November/December column: the ground under your antenna and extending out many wavelengths, and the ground where your RF reflects off the surface of the Earth in a multi-hop mode.

The ground under the antenna and extending out many wavelengths is more of a launch issue than a propagation issue, so I won't discuss it here. It has been covered recently in several excellent articles in *NCJ* (W4RNL's four-part series beginning in the November/December 2000 issue and K2KW's "DXpedition Antennas for Salt Water Locations" in the May/June 2001 issue) and in *The ARRL Antenna Compendium* series (for example, N6BV's "Antennas Here are Some Verticals on the Beach" paper in Volume 6). Suffice to say it's good to strive for the best possible ground under your antenna and extending out many wavelengths. This is the ground you can directly do something about.

This brings us to the other ground—the one far away that determines how much additional loss your signal will incur over a multi-hop path due to ground reflections. It's also the one that, for all practical purposes, you can't directly do something about. The only thing you can do is select your station location to take advantage of the best possible ground for multi-hop propagation. From the figures in the November/December column, the best possible ground is, of course, salt water. Thus the best place to operate from is a QTH that puts as much salt water between you and your target areas as possible.

For domestic contests (North America works North America), it doesn't appear to matter if you're on the East Coast, the West Coast or in the Midwest. *With respect to ground reflections*—they're all pretty much the same—dirt. The best thing for a domestic contest might be to go to a US possession in the Caribbean or to KH6 (if the contest allows it). Based on Sweepstakes results, there seems to be some justification for the Caribbean, but that may not be entirely a ground reflection issue.

For DX contests, things open up a bit. If you're on the North American end, the East Coast has an advantage due to the short distance over water to Europe where there's a large quantity of contesters and multipliers. This can be confirmed by looking at the CQ World Wide DX Contest USA records in the October 2001 issue of *CQ*—all but one of the 24 record holders is from the 1st, 2nd, 3rd or 4th call districts.

If you're on the DX end, you have to first take into account the contest format—the ARRL DX contests are "DX works US/Canada;" the CQ World Wide DX contests allow DX to work other DX.

For ARRL DX contests, you want to be close to North America with water in

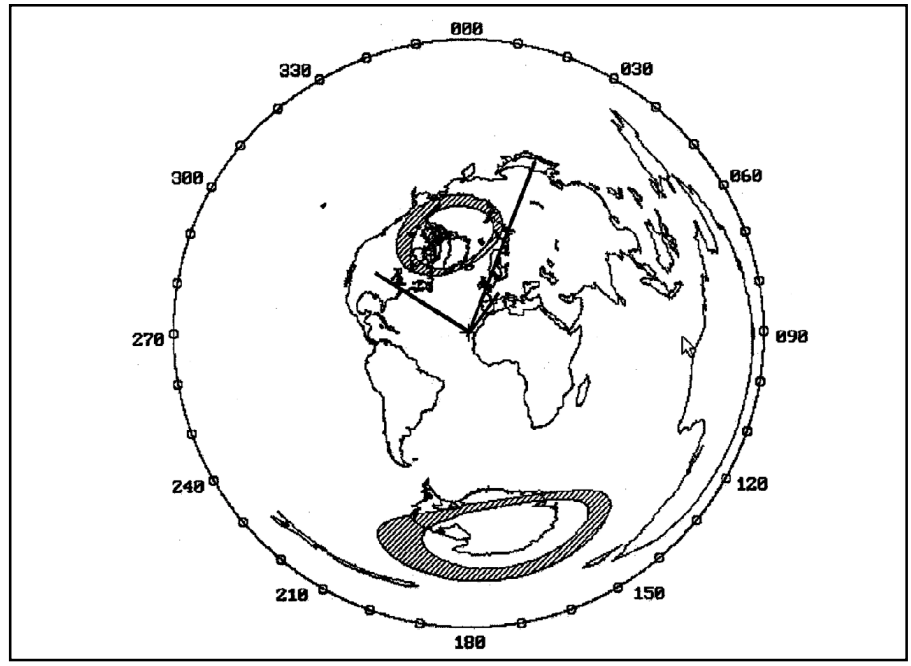


Figure 1—Paths from the Canary Islands (EA8) and the Madeira Islands (CT3) to North America, Europe and Japan. The auroral ovals for K=2 are also shown.

between. That says either in the Caribbean or somewhere off the West Coast in the Pacific Ocean. Since there are many more easily accessible islands in the Caribbean, these usually get the nod over locations in the Pacific.

For the CQ World Wide DX contests, the DX-can-work-other-DX format means that you have three major contest population centers to cover—North America, Europe and Japan. Since Europe offers so many multipliers, it's probably best to weight your decision toward Europe. That puts you in the eastern Atlantic Ocean—lots of water and short distances to Europe, and lots of water but longer distances to North America. The path to Japan kind of gets the short end of the stick here, but this scenario appears to be the best overall compromise.

In his March/April 2001 *NCJ* article "Blazing Rotators," NM7M nominated D4—Cape Verde Islands off the coast of Africa in the eastern Atlantic Ocean—as the ideal operating location for the CQ World Wide DX contests. Bob's decision was based on the distance to population centers, atmospheric noise and propagation issues. The distance issue falls nicely in line with my thoughts related to ground reflection losses. Atmospheric noise is minimal, as centers of major thunderstorm activity have migrated away from D4 around the end of the year. And F-region propagation at low latitudes is robust and largely immune to the magnetic disturbances that the solar wind can trigger in the distant polar regions.

Before everyone makes airline reservations to D4 for the upcoming contest season, though, let me identify a couple of other QTHs in the eastern Atlantic area that appear to be really good candidates for the CQ World Wide DX contests: EA8 (Canary Islands) and CT3 (Madeira Islands). See **Figure 1** for an azimuthal equidistant map from this area (compliments of Peter Oldfield's *DX AID* propagation and mapping software), with paths to the three major contest population centers included along with the auroral ovals at K=2. The Azores (CU) is not included in my list, as it is in Europe—and thus suffers a point disadvantage when working stations in mainland Europe.

Is there any evidence supporting these locations? Yes, but it's not as convincing as the USA results just mentioned. Of the 18 records listed in the CQ World Wide DX Contest All-Time records, three are from EA8, three are from IG9, three are from ZD8, two are from CN8, five are from South American countries and two are from the Mideast. The area in the eastern Atlantic that I've suggested is well represented, but is by no means the only place to be that can help you generate a record-setting score.

Looking at ground reflection loss and relating it to contesting was an interesting exercise for me. I'd love to hear your take on this topic. ■

Contest Expeditions

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K2KW

This time around I'm going to diverge from my usual Rent-a-QTH theme and cover some of the pre/post planning and analysis that I go through for my contest DXpeditions. For many of you, this level of detailed analysis will probably seem extreme. But I subscribe to the idea that when you're setting your sights on world records, you'd better do your homework.

I always begin my planning by reviewing past contest records. I verify these (they are often reported incorrectly in magazines or on Web sites), sift through the archives of the 3830 reflector and contact members of those operations to try to obtain additional information (such as BRK files, for example). After the trip, I also analyze the data I return with and generate statistics. By doing this, I learn from each experience.

"Kenny, *You're Crazy!*"

That statement doesn't faze me anymore. It seems that whenever I do something out of the ordinary many of my (world-class) contest buddies are quick to declare me insane. Call me crazy (*and they do*), but I think it's fun bucking conventional wisdom, and—in the process—I sometimes end up changing their perceptions.

My latest adventure involved a trip to Jamaica with a group of good friends. Our mission: To make a serious assault on the QRP single band records for the CQWW CW Contest. To accomplish this feat, we were going to employ only Elecraft K2 transceivers. A few of the team assembled K2 kits just a few weeks—or even days—before the trip, and others borrowed completed units. Only one member of the team was already intimately familiar with *operating* the rig. Would the K2 hold up on the DX end of a pileup? I guess we'd find out!

This idea for a QRP contest DXpedition wasn't just some brainstorm that occurred during an idle moment, though, it was the result of an evolution of ideas. I have to admit that up until that point I was a die-hard QRO operator.

Our initial thoughts were to mount an attack on the single band records running the usual QRO, but after some research we determined that the low power records were also attractive targets (and would require a lot less cargo—an important consideration in these difficult flying times!). On a whim, I decided to check out the QRP records. Wow, they looked like they were within reach—even from a 2-point location!

After reviewing the QRP single band records for the CQWW CW Contest, I felt confident that a group of talented ops with effective antennas in a 2-point location close to USA/EU would have a good chance of challenging them. We'd have to shoot for more QSOs to counterbalance the lower "points per QSO" we'd be earning operating from the Caribbean, though.

The 6Y Team Vertical QRP Team (from left to right)—Ed, W0YK; Walt, N6XG; Kenny, K2KW; Fred, KE7X; and Tom, N6BT.

To try to develop a better picture of what might be possible running QRP, I carefully examined the QRP single operator all band record set in 1999 by John Crovelli, P40W/W2GD. John is one of the most accomplished operators in the world, so I felt his performance was a good example of the potential limits of QRP.

To come up with a Jamaican baseline, I started out with John's QSO, zone and country numbers (see **Table 1**). The bolded point totals (under "6Y Points") are the equivalent scores that result from using John's Q, Z and C totals and the average North American points per QSO numbers typically recorded for those bands from Jamaica.

In the column to the right of the 6Y Points column, I've listed the single band QRP world records for each band. As you can see, even though John spent only a fraction of his time on any one band during his SOAB effort, these point totals were already approaching the single band QRP records.

It was obvious that I needed to come up with an estimate of the number of QSOs that could be made by a single-band effort. To be conservative, I decided to use a 2× multiplier. I was assuming that a single band participant would spend at least twice the time on a particular band as an all band operator would. Additionally, I also assumed that on most bands there would be a slight increase in the number of multipliers collected. I felt this would better reflect

Table 1—Baseline 6Y Forecast

(Based on P40W's numbers adjusted for average North American Points per QSO from 6Y.)

Band	*QSOs*	*Z*	*C*	*NA Pts/QSO*	***6Y Pts***	*QRP SB World Record*
160	26	7	18	2.1	**1,365**	28,670 (*by ES1CW*)
80	424	17	61	2.2	**72,758**	106,596 (*by 5B4AGM*)
40	555	25	77	2.25	**127,373**	117,262 (*by RB5QNV*)
20	574	28	81	2.31	**144,527**	230,528 (*by UW1BI*)
15	788	32	90	2.43	**233,610**	364,344 (*by LU7EE*)
10	971	30	94	2.53	**304,622**	431,060 (*by LU7EE*)

Table 2—Initial 6Y Predictions for QRP Single Band Efforts

(These are based on 2× P40W SOAB QSO totals and some slight increases in zone and country totals that would likely result from concentrating on a single band.)

Band	*QSOs*	*Z*	*C*	*NA Pts/QSO*	***6Y Pts***	*QRP World Record*
80	848	17	61	2.2	**145,517**	106,596 (*by 5B4AGM*)
40	1110	28	88	2.25	**289,710**	117,262 (*by RB5QNV*)
20	1148	31	95	2.31	**334,137**	230,528 (*by UW1BI*)
15	1576	32	105	2.43	**524,666**	364,344 (*by LU7EE*)
10	1942	33	110	2.53	**702,596**	431,060 (*by LU7EE*)

Table 3—World Record SOAB CQWW CW Contest Scores for the Various Power Categories

Year	*Category*	*Call*	*QSOs*	*Zones*	*Countries*	*Score*
2000	SOAB HP	EA8BH	7616	183	638	18.6M
1999	SOAB HP	HC8N	7001	185	546	14.6M
2000	SOAB HP	P40E	6607	170	538	13.56M
2001	SOAB LP	P40W	5803	152	478	10.87M
1999	SOAB QRP	P40W	3338	139	421	5.52M

Table 4—Claimed Scores for the 6Y 2001 CQWW CW Contest Team Single Band Efforts

Band	*Call*	*Operator*	*QSOs*	*Zones*	*Countries*	*Claimed Score*	*Previous NA Record*	*Previous World Record*
160	6Y0A*	K2KW	162	6	17	7,567	2,232	28,670
80	6Y8A*	N6BT	587	14	54	85,819	6,389	106,596
40	6Y4A	W0YK	1337	22	69	288,652	90,240	117,262
20	6Y2A	N6XG	1206	22	63	232,645	208,392	230,528
15	6Y9A	KE7X	2166	28	93	637,670	186,102	364,344
10	6Y1A	K2KW	2579	31	100	850,190	242,686	431,060

*80 and 160 meters were part-time efforts. We spent only four hours on 160, and 80 meters was off the air for four to five hours each night.

Table 5—6Y QRP Team North American QSO Breakout, with Numbers from Previous QRO Operations for Comparison

	160	*80*	*40*	*20*	*15*	*10*	*All*
6Y2A	941	993	1541	1543	1421	1575	8014
4M7X	594	826	1257	1585	1446	1511	7219
6Y QRP	169	534	904	943	1324	1318	5160
Delta	*22%*	*59%*	*65%*	*60%*	*92%*	*85%*	68%

"Delta" listings represent the percentage of QRP QSOs we completed in comparison to the average of those completed by the 6Y2A and 4M7X operations for the particular band.

what would occur, as a single band contestant "lives" on the band, and will spend what I suspected might actually be closer to three times the time (compared to P40W) on many of them (see **Table 2**). But even using the lower estimate—two times the number of SOAB QSOs—it appeared as if the world records on 10 through 80 meters should be within our grasp!

In addition to considering the data collected from past QRP operations to make a determination of the QSO potential, though, I decided to also look at some of the top SOAB scores over the full range of power categories (see **Table 3**).

From this data it appears that a QRO effort will make roughly twice the number of QSOs as a QRP effort. But with our location, and the very efficient vertical arrays that we use, would our QRP estimates be low?

Pre-Contest Indications

While operating QRP from Jamaica before the start of the contest, we found it was easy to generate large pileups of stations from Europe, the US and even Japan! This was a good sign. But as we all know, when the bands are hopping with activity during a contest, even a sought-after DX station can get lost in the fray, and particularly if it's a QRP entry.

QRP Tactics

Based on our discussions with W2GD, we had expected we would be in the S&P mode for much of the contest, even though John did say that he attempted to CQ throughout the contest. Our team had discussed the possibility of having to do a lot of S&P, but our objective would be to make an effort to CQ most of the time and let the mults come to us. But when running 5 W on the low bands, was this possible?

When the contest started, most of our team members were still suffering from a QRP mentality: "We are weak, and we must act as if we are weak." When we did CQ and someone tried to steal the frequency, many of us initially thought that we didn't have the mojo to chase them off, so we just surrendered the frequency and tried to find another clear one. But when we did set up on a clear frequency, sure enough, people would call us. To have people call helped convince us that we were louder than we thought.

After a few hours, we all came to the realization that we were loud enough to duke it out and win a frequency fight, even on 40 meters! The concept of CQing and letting the world come to us was the right strategy. When we were in the S&P mode, many people wouldn't hear us, and would just continue to call CQ in our face. When we settled onto a run frequency, those same people were now calling in *our* pileups! Go figure!

That QRP mentality—that you've got to resign yourself to S&P operation—just doesn't apply when you have a very efficient station in close proximity to a main ham population center. While being DX helps (considerably), effective QRP contesting requires a *mental* shift more than anything else. It is far more efficient to CQ—even when running QRP—than it is to S&P. But even then, sometimes we surprised ourselves when we would bust a big pileup when S&Ping—*on the first call!*

Another strategy that we adopted was to stay high in the band so that our signal would stand out better. In hindsight, that was the wrong strategy for the depressed conditions of this running of the contest. Since we were effectively running stations on all bands, we should have moved lower in the band—popularly regarded as a better location for running.

Claimed Results

When we reviewed our logs, I've got to say we were delighted with the results. After they pass through the log checking process and the final scores are official, we believe that our group will have set North American records on 10, 15, 40, 80, 160 and possibly 20 meters. We also think that we have a good shot at three World Records—for 10, 15, and 40 meters. Pretty amazing stuff from a 2-point QTH!

QRP Envelope

After the dust had settled and we were home relaxing, I decided to take a regional look at the "QRP Envelope." I define this as the limit of your ability to work stations QRP from a given location with a given antenna system. The antenna systems we used were the same as we usually use for our higher-power operations from this location, but our QRP power level should make us about 23 dB weaker on our transmit signals than our QRO efforts. We could still receive as effectively as we did during previous operations, but how much was our effective range limited by our QRP transmitter power? Based on the data in Table 3, it appears that we should expect about a 50% reduction in the number of QSOs when running QRP as compared to QRO. If this is true, was it borne out in the results?

When considering this next set of statistics, bear in mind that band conditions at the beginning of this running of the

Contest action! (from left to right)—Fred, KE7X/6Y9A; Walt, N6XG/6Y2A; Kenny, K2KW/6Y1A/6Y0A; Tom, N6BT/6Y8A; and Ed, W0YK/6Y4A.

contest were poor. The solar indices hit Flux = 240, Boulder K = 95, and Boulder A = 7. A major proton event was occurring as well. (When was the last time you contested under conditions like that?!)

Have a look at **Table 5**. The 1998 6Y2A and 1999 4M7X efforts were both large-scale multi-multi all band efforts that employed vertical arrays on the ocean. (6Y2A and our team operated from the same spot.) The "Delta" listings in the bottom row of the table represent the percentage of QRP QSOs completed when compared to the average number of the 6Y2A and 4M7X operations.

On 10 and 15 meters, we came very close to making the same number of QSOs as these past QRO efforts did! Remember, we had very poor conditions, so it might be possible that under more typical conditions we would have gathered the same number of North American QSOs as those QRO operations did.

From the data, it's obvious that the lower in frequency we went, the fewer QSOs we made. The results on 20, 40 and 80 meters are in line with the 2× delta seen by the data on the P40W and P40E efforts in Table 3. You should also keep in mind that both our 80-meter and 160-meter efforts were part-time. We only operated 160 meters for around 4 hours. We were off the air on 80 meters for around four or five hours each night. So with a sustained effort, the results on 80 and 160 meters should be more in line.

NA Envelope Conclusion

It seems that we may not have hit the "QRP performance envelope" when it came to the number of North American QSOs we completed on most of the bands. The limiting factor seems to be related more to conditions than transmitter power. Additional QRP operating experience should lead to an increase in the number of QSOs in future operations. On 160 meters we may have hit the edge of the envelope under the conditions that existed, but this was not unexpected. During the few hours that I was on 160 meters, I was able to work a number of west-coast US stations. Under more normal conditions and with a more concerted effort, a few hundred additional QSOs on 160 may be possible.

The percentage of QRP QSOs compared to the previous QRO operations is staggering, and there is a definite decline based on frequency. I personally would discount the high 10-meter number, as if you recall, 10 meters was not in full bloom back during the 1998 6Y2A operation, so the 10-meter delta should actually be lower, and more in line with the trends on the other bands. Conditions on the low bands for this contest were the worst we have ever seen. Not a single European was heard on 160 meters—and usually the band is wall to wall with S9+20 Europeans. The 80- and 40-meter bands also exhibited very depressed conditions, hurting our QSO totals into Europe. The poor conditions cloud the quantity of European stations we could potentially work on most bands. That said, it appears that even under better conditions we will probably not be able to match the penetration that we had into the USA.

Overall, the results for Asia, shown in **Table 7**, are very similar to what we see in the European data of Table 6. But this does not seem to make sense, as Europe is geographically a lot closer and should be easier to work than Asia (presuming that most of these Asian QSOs are JAs—which they were). So why are these percentages similar to those of Europe? While I can only speculate, I think Japanese stations will usually make an extra effort to work any station in the Caribbean as it's rare for them to work into Zone 8 and 9. When the Japanese QSLs for this contest started to pour in, there were many with comments like "thanks for the new all-time country." Pretty good for QRP!

Wrap Up

In total, the 6Y QRP contest team collectively completed around 8,050 QSOs from Jamaica, and the previous 6Y2A M/M World record effort recorded approximately 17,000 QSOs. This relationship is in line with 2× factor seen in the SOAB QRP vs QRO data in Table 3.

While a 2× relationship between QRP

Table 6—6Y QRP Team European QSO Breakout, with Numbers from Previous QRO Operations for Comparison

	160	*80*	*40*	*20*	*15*	*10*	*All*
6Y2A	274	921	1982	2303	1636	1345	8461
4M7X	75	809	1786	1448	1927	1748	7793
6Y QRP	0	81	458	300	741	1143	2723
Delta	*0%*	*9%*	*24%*	*16%*	*42%*	*74%*	34%

Table 7—6Y QRP Team Asian QSO Breakout, with Numbers from Previous QRO Operations for Comparison

	160	*80*	*40*	*20*	*15*	*10*	*All*
6Y2A	9	50	566	547	504	354	2030
4M7X	1	102	331	536	442	205	1617
6Y QRP	0	0	48	31	216	208	503
Delta	*0%*	*0%*	*11%*	*6%*	*46%*	*74%*	28%

and QRO QSOs seems to be possible from the same (or similar) locations, it is my belief that the number of QRP QSOs should exceed half the number of the top world QRO efforts under more normal propagation conditions. The QRP QSO totals into Europe and Asia should be much greater.

Operating QRP was a complete thrill. The people who called us crazy are probably real macho ops who think, "QRP is for kids." We embraced the idea of a challenge, and felt that we learned many new operating strategies during the effort. The fact we set a few records along the way was just icing on the cake. In summary, we think that the biggest hurdle to QRP contesting from the DX end is mostly a mental shift, and is not fundamentally related to transmit power. ■

Kenny, K2KW, stands next to a 6-meter Sigma-6 array. A 4-element 10-meter European array, 4-element 15-meter European array, 2-element 80-meter array, and a 160-meter inverted-L are visible in the background.

Contest Calendar

Compiled by Bruce Horn, WA7BNM
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Here's the list of major contests to help you plan your contesting activity through June 2002. 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/**.

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!

March 2002

ARRL Inter DX Contest, SSB	0000Z, Mar 2 to 2400Z, Mar 3
Open Ukraine RTTY Championship	2200Z, Mar 2 to 0159Z, Mar 3
AGCW YL-CW Party	1900Z - 2100Z, Mar 5
SARL Field Day Contest	1000Z, Mar 9 to 1000Z, Mar 10
RSGB Commonwealth Contest	1000Z, Mar 9 to 1000Z, Mar 10
Great Lakes QSO Party	1700Z, Mar 9 to 0400Z, Mar 10
North American Sprint, RTTY	0000Z - 0400Z, Mar 10
UBA Spring Contest, CW	0700Z - 1100Z, Mar 10
Wisconsin QSO Party	1800Z, Mar 10 to 0100Z, Mar 11
YLISSB QSO Party, SSB	0000Z, Mar 16 to 2400Z, Mar 17
BARTG Spring RTTY Contest	0200Z, Mar 16 to 0200Z, Mar 18
Russian DX Contest	1200Z, Mar 16 to 1200Z, Mar 17
AGCW VHF/UHF Contest	1600Z - 2100Z, Mar 16
Virginia QSO Party	1800Z, Mar 16 to 0200Z, Mar 18
Oklahoma QSO Party	2300Z, Mar 22 to 2300Z, Mar 24 0000Z - 0400Z, Mar 25
CQWW WPX Contest, SSB	0000Z, Mar 30 to 2400Z, Mar 31

April 2002

144 MHz Spring Sprint	1900-2300 local April 1
MARAC County Hunters Contest, SSB	0000Z, Apr 6 to 2400Z, Apr 7
SP DX Contest	1500Z, Apr 6 to 1500Z, Apr 7
EA RTTY Contest	1600Z, Apr 6 to 1600Z, Apr 7
Missouri QSO Party	1800Z, Apr 6 to 0500Z, Apr 7 and 1800Z - 2400Z, Apr 7
222 MHz Spring Sprint	1900-2300 local April 9
YLRL DX to NA YL Contest, CW	1400Z, Apr 10 to 0200Z, Apr 12
JIDX HF CW Contest	2300Z, Apr 12 to 2300Z, Apr 14
QRP ARCI Spring QSO Party	1200Z, Apr 13 to 2400Z, Apr 14
EU Spring Sprint, SSB	1500Z - 1859Z, Apr 13
His Maj King of Spain Contest	1800Z, Apr 13 to 1800Z, Apr 14
Yuri Gararin Inter DX Contest	2100Z, Apr 13 to 2100Z, Apr 14
UBA Spring Contest, SSB	0600Z - 1000Z, Apr 14
432 MHz Spring Sprint	1900-2300 local April 17
YLRL DX to NA YL Contest, SSB	1400Z, Apr 17 to 0200Z, Apr 19
Holyland DX Contest	0000Z - 2359Z, Apr 20
TARA Spring Wakeup PSK31 Rumble	0000Z - 2400Z, Apr 20
ES Open HF Championship	0500Z - 0859Z, Apr 20
YU DX Contest	1200Z, Apr 20 to 1200Z, Apr 21
GACW CW DX Contest	1200Z, Apr 20 to 1200Z, Apr 21
EU Spring Sprint, CW	1500Z - 1859Z, Apr 20
Michigan QSO Party	1600Z, Apr 20 to 0400Z, Apr 21
Ontario QSO Party	1800Z, Apr 20 to 1800Z, Apr 21
Harry Angel Memorial Sprint	1100Z - 1246Z, Apr 25
SP DX RTTY Contest	1200Z, Apr 27 to 1200Z, Apr 28
Helvetia Contest	1300Z, Apr 27 to 1300Z, Apr 28
QRP to the Field	1500Z - 2400Z, Apr 27
Florida QSO Party	1600Z, Apr 27 to 0159Z, Apr 28 and 1200Z - 2159Z, Apr 28
Nebraska QSO Party	1700Z, Apr 27 to 1700Z, Apr 28

May 2002

AGCW QRP/QRP Party	1300Z - 1900Z, May 1
Microwave Spring Sprint	0600-1300 local, May 4
IPA Contest, CW	0000Z - 2359Z, May 4
MARAC County Hunters Contest,	0000Z, May 4 to 2400Z, May 5
10-10 Inter Spring Contest, CW	0001Z, May 4 to 2400Z, May 5
Indiana QSO Party	1300Z, May 4 to 0500Z, May 5
Massachusetts QSO Party	1800Z, May 4 to 0400Z, May 5 and 1100Z - 2100Z, May 5
ARI International Contest	2000Z, May 4 to 2000Z, May 5
Connecticut QSO Party	2000Z, May 4 to 0400Z, May 5 and 1200Z - 2000Z, May 5
IPA Contest, SSB	0000Z - 2359Z, May 5
Nevada QSO Party	0000Z, May 11 to 0600Z, May 12
VOLTA WW RTTY Contest	1200Z, May 11 to 1200Z, May 12
Oregon QSO Party	1400Z, May 11 to 0200Z, May 12
FISTS Spring Sprint	1700Z - 2100Z, May 11
CQ-M International DX Contest	2100Z, May 11 to 2100Z, May 12
50 MHz Spring Sprint	2300Z, May 11 to 0300Z, May 12
Baltic Contest	2100Z, May 18 to 0200Z, May 19
CQWW WPX Contest, CW	0000Z, May 25 to 2400Z, May 26
Anatolian RTTY WW Contest	0000Z, May 25 to 2400Z, May 26
QRP ARCI Hootowl Sprint	2000 - 2400 local, May 26
MI QRP Memorial Day CW Sprint	2300Z, May 27 to 0300Z, May 28

June 2002

WW South America CW Contest	0000Z, Jun 1 to 1600Z, Jun 2
IARU Region 1 Field Day, CW	1500Z, Jun 1 to 1500Z, Jun 2
QRP TAC Sprint	1800Z - 2359Z, Jun 1
ANARTS WW RTTY Contest	0000Z, Jun 8 to 2400Z, Jun 9
Portugal Day Contest	0000Z - 2400Z, Jun 8
RSGB Jubilee Contest	1000Z, Jun 8 to 1000Z, Jun 9
Asia-Pacific Sprint, SSB	1100Z - 1300Z, Jun 8
TOEC WW Grid Contest, SSB	1200Z, Jun 8 to 1200Z, Jun 9
ARRL June VHF QSO Party	1800Z, Jun 8 to 0300Z, Jun 10
All Asian DX Contest, CW	0000Z, Jun 15 to 2400Z, Jun 16
SMIRK Contest	0000Z, Jun 15 to 2400Z, Jun 16
AGCW VHF/UHF Contest	1600Z - 2100Z, Jun 15
West Virginia QSO Party	1800Z - 2400Z, Jun 15
Marconi Memorial HF Contest	1400Z, Jun 22 to 1400Z, Jun 23
ARRL Field Day	1800Z, Jun 22 to 2100Z, Jun 23
QRP ARCI Milliwatt Field Day	1800Z, Jun 22 to 2100Z, Jun 23

■

World Radiosport Team Championship 2002

The Amateur Radio community owes a debt of gratitude to the energetic and ambitious amateurs in the fine country of Finland. Led by Jouko Häyrynen, OH1RX, Organizing Committee Chairman, the Contest Club Finland (CCF) and the Finnish Amateur Radio League (SRAL) have agreed to jointly host World Radiosport Team Championship 2002 from July 9th through 16th, 2002.

The on-the-air operating portion of the event will be held in concurrence with the 2002 IARU HF World Championship (July 14th and 15th). Amateurs worldwide are invited to come to Finland and experience the event firsthand—with all of its inherent excitement, goodwill and camaraderie.

It is our pleasure to announce our appointment as USA representatives. We are charged with assisting our Finnish friends with raising operating funds for WRTC2002.

We strongly urge everyone to support the Finnish effort by sending in a donation. The Northern California DX Foundation (NCDXF) has kindly agreed to assist in processing USA donations. Donations made by credit card or by check (made out to "NCDXF [for WRTC Project]") are tax deductible to the extent permitted by law for USA taxpayers. All cash, check and VISA/MC/AMEX donations from the USA should be sent directly to:

NCDXF, c/o Rusty Epps, W6OAT, 651 Handley Trail, Redwood City, CA 94062 USA (**w6oat@compuserve.com**).

All donations from outside the United States can be sent directly to a WRTC2002 bank account. See **www.wrtc2002.org/support.htm** for specific information.

For event information, please visit the WRTC2002 Web site: **www.wrtc2002.org**.

Thanking you in advance.

73 from the USA representatives,

Dennis Motschenbacher, K7BV—USA West (**K7BV@aol.com**)

Bob Allphin, K4UEE—USA South (**MAllphin@aol.com**)

Jeff, Briggs, K1ZM—USA East (**K1ZM@aol.com**)

Contesting For Fun

Brian Kassel, K7RE
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Glow Little Glow Bug, Glimmer


K7RE

It's no secret that the average age of Amateur Radio operators has been creeping steadily higher each year. To some, this statistic points to a major problem for the continued growth—and therefore the survival—of our hobby. There is an upside though. We senior types can recall those days when our hobby involved huge cabinets full of glowing glass-enveloped devices called "tubes" on this side of the pond, and "valves" on other points on the globe.

Amateur Radio contesting in that bygone era was a multi-armed affair. Switches had to be thrown, knobs had to be turned and meters had to be peaked in specific—and often critical—sequences. Believe it or not, sending CW actually involved forming each character entirely by hand. Logs were all handwritten and dupe sheets had to be updated and referenced at lightning speed if you were to ever approach what could be considered a reasonable QSO rate. Let's face it, folks, back then each and every successful contest QSO required an awful lot of effort.

Yet, there were those operators who mastered the mechanics required and achieved impressive contest scores. They were almost invariably quite pleasant individuals, and were a joy to encounter on the air.

I personally remember Vic Clark, W4KFC, as "the" perfect example of this type of character. He managed to continuously score top, winning scores using that era's technology. His attributes—as both a successful contester *and* as a gentleman ham—speak of an era when contesting was slower, less hectic, and perhaps somewhat better for the soul. Yes, we have it so much easier these days with our computer logging, instantly tuned rigs, automatic antenna tuners, etc. Maybe there was a price to pay for all of this convenience.

Can we ever return to those kinder, gentler times? Well, some operators have found a way to temporarily turn back the hands of time. They have resurrected equipment from that era, and actually use it to contest.

Through the wondrous powers of the Internet, I have been able to locate a few of these stalwart folks, and have asked them if they might share some of their experiences with us. To my surprise, I discovered that this type of contest operating is not all that uncommon.

Let's begin with Alex Mendelsohn, AI2Q, of Kennebunk, Maine:

"I have used my vintage 1939 6L6 oscillator frequently for Antique Wireless Association contests, putting it on 80 and 40 meters. These AWA contests are friendly get-togethers on the air, but they still do get competitive point-wise.

"I pair up my transmitter with a 1938 Hammarlund HQ-120 receiver. The more vintage gear you employ in these AWA events, the more points you earn. If you prefer to use an old tube rig transmitter with a modern receiver, it's allowed—but you cut your score."

Very 73, Alex, AI2Q

Another message came in from Rob Matherly, KC0BOM:

"I have used my Drake TR-3 in many contests, and—in my opinion—I do fairly well. I don't set out to win—I just enjoy operating. (I've posted some of my scores on my Web site: **www.qsl.net/kc0bom**.)

"The main problem that you encounter running older gear is that you don't have the advantage of simply tuning around, hearing someone and pouncing on him or her. You have to peak your RF gain, switch into the tune mode, load everything up...etc. Often times you can't help but tune up on top of someone in the process! But other than that, it is lots of fun!"

72/73, Rob, KC0BOM

And a few more good reasons for doing "the Glow Bug thing" were offered by Don Sanders, W4BWS:

"Due to lack of time, I don't do any serious contesting. I do, however, like to use contests to make a few contacts for new zones, countries, prefixes, etc. My main QRO rig is a TS-530S with tube driver and finals. I like it because I can change frequency without tweaking an antenna matchbox and can make a call quickly. I can also fix it if need be.

"For Straight Key Night, I still prefer my 1957 tube station. It consists of an SX-100 and a Johnson Ranger. I particularly like the crystal bell ring of a properly adjusted gridblock keyed rig.

"Several years ago, I worked a Brazilian station and commented that he was using a tube transmitter. He confirmed that, and asked me how I knew. I could have picked out that gridblocked sound from the biggest of pileups. I quickly received a nice QSL for that contact."

Don, W4BWS

(*Don must have good ears!—'RE*)

If you're up for a double challenge (vintage *and* QRP), consider this from Ron Johnson, W2WU:

"I use tube rigs and prefer to operate QRP. I've worked Mongolia and over 100 DXCC countries."

73, Ron, W2WU

Finally, here's a special example of just how nostalgic the Glow Bug experience can be, sent in by G3RZP…

Reflections in the Envelopes

by Peter Chadwick, G3RZP

Just in case there are any readers of this column who may not have knowledge of some of the terms that relate to the earlier days of our hobby, let's begin with a brief glossary:

Boat Anchor: An unusually large and heavy piece of radio equipment that has been deemed too obsolete to adequately serve in its original capacity. Since most would consider this object useless, possible applications for it are essentially limited to use as dead weight for anchoring watercraft. (Some examples of these are truly capable of securing the largest of vessels—I know, I've owned a few.)

Kon-Tiki: The name of a raft that was built and sailed across the Pacific Ocean by an explorer named Thor Hyadall. It was constructed in a fashion believed to have been employed by past generations of Polynesians. Thor was trying to prove that ancient peoples could populate distant islands using these very primitive—and uncomfortable—vessels.

Vernier Dial: A tuning device that uses either mechanical or electronic means to enhance the resolution of adjustment. (A "fine tuner" of sorts.) Some of the Glow Bug rigs of yesteryear could perform a QSY to the next higher band segment with a proper thump on the side panel.

Record: While I'm at it, here is another—non-ham—definition from about the same time period. A "record" was an object that was used to store a sound recording. It consisted of grooves that were imprinted onto one or both sides of a disk-shaped material. It is akin to a compact disk, but it's larger and the storage media was analog in nature. If you were unaware of the existence of these, you will likely find all of this tube stuff quite unbelievable. Trust me, I'm not making any of this up!

Nostalgic Contesting

Have you ever thought about what con-

testing was like 40 or 50 years ago—back in the days when you had separate receivers and transmitters, and in most cases, had to manually operate the transmit/receive switch between them? When there weren't any computers to keep your logs, and rigs had to be tuned up every time you changed bands? When receivers and transmitters drifted (much like the *Kon-Tiki*), especially on 28 megacycles ("cycles" is an earlier unit of measure for what is now known as "hertz"—for those of you who are still struggling with the concept of a "record").

If you're a boat anchor aficionado, you may already be using the old gear—and even AM—for casual operating. To get the adrenaline really racing, though, you should try *contesting* with this equipment. If you happen to be into homebrewing, then it's possible to combine all of these elements—vintage style gear, contesting and construction—for some extreme ham radio fun.

A Match Made in Heaven

In the UK, the national society (the Radio Society of Great Britain) sponsors a Low Power Contest every summer. It has evolved over the years and now comprises two operating sessions—one on Sunday morning on 80-meter CW and a second on that same afternoon on 40-meter CW. There are four classes: maximum 3 W out, fixed or portable; and maximum 10 W out, fixed or portable. It's just the sort of gentle contest to participate in using boat anchors or homebrew gear! (See **www.rsgbhfcc.org** for more information.)

A Boat Anchor Legacy

In 1946, my father purchased an HRO receiver, complete with bandspread coils. I inherited it, and over the years it has been modified and rebuilt several times. The paint had suffered, so I figured a restoration job was in order.

The original tubes (6D6, 6C6) were long gone, as were the sockets, so an "as new" restoration seemed out of the question. The substitution of octal tubes was possible, though, so I figured that that was the way to go. I already had a few tubes on hand that would work, and others could be picked up for $1 or so each at Dayton Hamvention.

Stripping and repainting the chassis and cabinet and properly painting the dial engraving turned out to be much more difficult than the electronic work, which included redesigning the oscillator tracking arrangement to get that to work right. One interesting aspect of my particular HRO is its vernier—it is not a standard unit.

During World War II, a lot of hams—my father included—were issued HROs by the UK government. When not at work, they would sit at home and monitor the air waves for enemy traffic. Reports of intercepted communications were sent in to a special post office box—from there they would "disappear." My father (G8ON) took part in this program after he was invalided out of the RAF. At the end of the war, the headphones and the vernier scale from the government's HRO didn't make it back. I believe the vernier was a special UK modification—I have never seen it on any other HRO.

Some of you younger readers may very well be wondering "What's an HRO?" It was a tube receiver manufactured by the National Company of Malden, Massachusetts, from the mid-1930's onwards. Thousands of a variety of versions were made during the war years. Legend has it that the US Navy's instructions to National were "make HROs until we tell you to stop." It was a very popular receiver with amateurs.

Before World War II, it was considered a "top of the line" amateur receiver. It sold for about $300 in 1936. It had plug-in coils, and these were available in bandspread versions that provided an excellent open dial for 80, 40, 20 and 10-meter band operation.

73, Peter, G3RZP

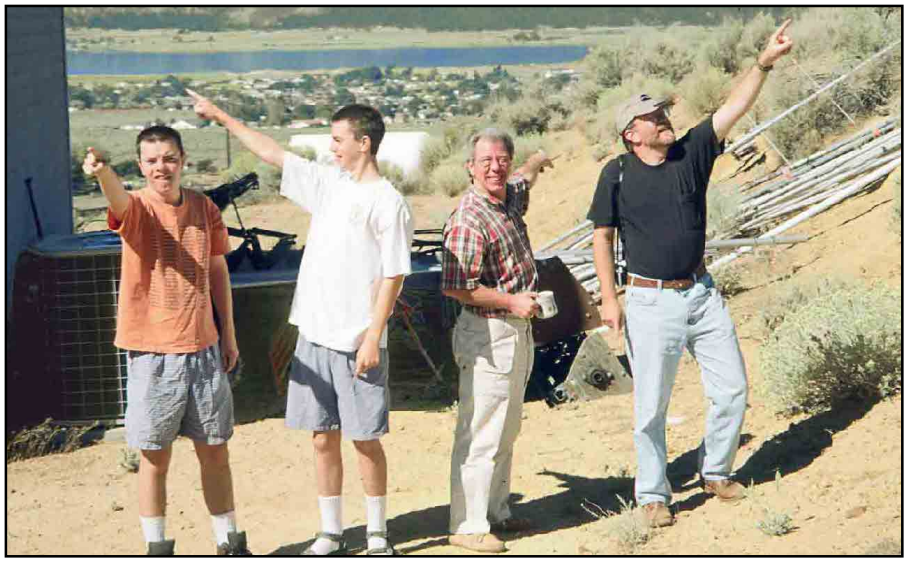
If you would like to share your own HRO experiences with Peter, you can reach him via e-mail at **peter.chadwick@ieee.org**.

Vintage gear contesters—these folks truly understand the concept of contesting for fun.

73, Brian, K7RE ■

Adventures in Contesting

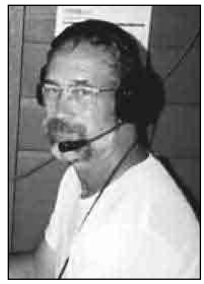
(Last issue's "Adventures in Contesting" photo showed Dino, KR9V [left], and Jim, KR9U [right], operating in the CQ WW SSB Contest from John, K9UWA's, QTH.)



Experienced contesters pool their knowledge to determine true north so that they can properly orient their Beverage antennas.

The Contest Traveler

Joe Pontek, K8JP
k8jp@arrl.net


K8JP

Oh, it's hot and muggy. You left home in a blowing snowstorm at 4:30 AM. It's now 4:30 PM and a few thousand miles later. Oh, did I mention the two lousy airline meals? You're tired and just want to get to your final destination and look over the setup, take a shower, eat a decent meal and flop onto the bed. Now all that stands between you and that happiness is one final hurdle—CUSTOMS.

The sweat is rolling down your brow. Is it the heat or nervousness? If you are properly prepared, it should just be the heat.

In most cases, you will have nothing to declare, as you most likely are going to be taking all of the gear that you are hauling into their country back home with you when you leave. Some countries require that you have an import license for your radio equipment. If that's the case, you will have to declare it.

Most of the time, this process will go smoothly, but there are instances when it will not. Prevention is the best way to avoid these little bumps in the road to a pleasant adventure.

First off, never—I repeat—*never* look like you are in a hurry. Don't show any signs of impatience whatsoever. A few minutes spent making believe you have all the time in the world can save you hours of waiting. Sometimes customs officials are angling for a bribe, but if you seem like you are perfectly willing and able to out-wait them, they will probably leave you alone and move on to an easier mark. They are searching for that "type-A" personality.

If your equipment isn't made in the US, do yourself a favor and take it to the nearest US Customs office and get Certificates of Registration (CF-4457) ahead of time. This will make it much easier to get items back into the US when you return. This bit of documentation can also help you get your gear into the other country, as it clearly shows your intention to haul it back out. (And hang on to this certificate, as it is valid for as long as you own the equipment.) You may also want to do the same for some other personal items as well—such as cameras, video gear, etc. See the US Customs Web page for more information (**www.customs.ustreas.gov/**).

Sometimes, a local contact may be able to help you clear Customs. If you have a local friend who is willing to assist you, by all means, take advantage of it.

Don't carry equipment in its original boxes. Custom officials are much more likely to think that it's new. Besides, the boxes that your equipment originally came in are designed for shipping via UPS and the postal service; they won't hold up to the rough treatment they're likely to get from the airline baggage handling gorillas! You may be asked the value of your equipment. A reasonable understatement may be useful here, and make sure you clearly indicate that it is all used equipment.

Keep smiling—*I don't care how much it hurts*—keep smiling! If you are traveling with a spouse or a friend, chat it up—don't pay too close attention to the process. Don't worry, and if you can't manage that, at the very least try not to *look* like you're worried.

I had one memorable occasion when I came up against a particularly tenacious female Customs officer. She insisted on a deposit before I could take my equipment into the country. I think she was new on the job and was trying to make an impression. (She did—and it wasn't a good one—at least not with me, anyway.) Throughout the whole ordeal, I kept smiling and applying all my usual tricks, but, unfortunately, to no avail. It was just "one of those days." I wasn't going to let it spoil my trip. Fortunately, she eventually agreed to accept a check from my local sponsor.

These days, my gray hair earns me a little more respect, and perhaps I'm even a little more laid back. Nevertheless, I always try to keep a low profile and a casual, relaxed appearance as I make my way through the Customs and Immigration lines.

73 and keep smiling, V31 Joe "Palooka"

(Thanks to K9LA and N0JK for suggesting this topic.) ■

RTTY Contesting

Wayne Matlock, K7WM
k7wm@i10net.com

A CQ/RJ RTTY Multi-Two Effort from the Shores of Lake Buchanan

This past July, I received a phone call from Ron, K5DJ. He invited me to join a multi-two team he was putting together for the September 2001 CQ/RJ WW DX RTTY Contest. The plan was to operate from the contest station facilities on Bryan Edward's (W5KFT) ranch, located right on the shores of Lake Buchanan in Texas. Count me in!


K7WM

The ambient temperature here in Cibola, Arizona in July is up around 125°F, so I half-jokingly asked Ron if it was okay with him if I started packing my bags immediately—I was looking for any excuse to get out of town. He didn't express any objections, but he told me that the temperatures there weren't any lower. Oh well…

Ron had already signed up Jay, WS7I, and John, VK4UC, so we had a full team. A short time after I hung up the phone with him, I contacted Southwest Airlines and purchased round trip tickets to Austin for the contest weekend.

I always jump at any chance I get to operate from Bryan's station. It's in such a beautiful location and features a great selection of towers and antennas. And then, of course, I was also looking forward to seeing Bryan's giant Red Brangus bull, Leonard, as he struts around the ranch surveying his domain. There are also deer, wild pigs, turkey buzzards, eagles, osprey and a variety of other wildlife that frequent the area. It's one of life's greatest pleasures to be able to sit on the front porch of Bryan's operating shack and take in the wonderful sights, with Lake Buchanan as the backdrop.

At the time of Ron's call, little did we know about the upcoming tragic events that would take place in September, and how they would affect airline travel and the general mood of our country.

Getting There *is* Half the Fun

My wife Wilma, (KX7LDS), is an avid garage sale junkie. We have friends who live in Prescott, Arizona—where one of the largest garage sale events in the country is held—so when I filled her in on my plans she decided to make arrangements to spend some time with them while I was in Texas.

Several of Wilma's female friends (and fellow garage sale fanatics) thought a visit to Prescott sounded like a grand idea, so they opted to join her. I would leave my truck in Prescott and take a shuttle bus from there to the airport in Phoenix.

And then, just a couple of weeks before the weekend of the contest, along came the events of September 11th. I made phone calls to the airline and the shuttle bus company to make sure the flight was still on, the buses would be running on schedule and verify that the arrival times would still be valid. All contacted assured me there would be no problem, so with a bit of trepidation, me and the ladies piled into my truck for a pleasant journey from Lonesome Cibola to our friends' place in Prescott.

A Small World

Ahhh, shuttle buses. They pick up passengers at every bus stop, coffee shop and street corner. I didn't end up arriving at the Southwest Airlines terminal until just 35 minutes before my scheduled flight time. In a panic, I scooped up my gear and scrambled towards the security gate. Needless to say the line there was *very* long. At that point making the flight seemed like a lost cause, but—as there was no easy way to get back to Prescott—I decided to wait it out and see what happened.

Eventually it was my turn for the shakedown. The x-ray machine detected my headphones, my radio/computer tool pouch, various cables, etc (doesn't everybody carry this kind of stuff?) and this, of course, resulted in much closer scrutiny and a question and answer period.

When the security agents asked me what all the stuff was for, I decided to 'fess up. I told them I was traveling to Texas to participate in a ham radio contest. When one of the security guards piped up with, "the CQ/RJ?" I figured I had a chance. I fired back a quick "Why, Yes!" and he asked to see a copy of my license. After he was sufficiently convinced that I was telling the truth, they cleared me through. I was so relieved that I forgot to ask the fellow for his call (I'm guessing he was a ham—and probably a RTTY operator at that) but if he is reading this, thanks! And may your signals *always* be strong.

I actually made the flight! It left on schedule and arrived in Austin on schedule. Ron met me at the airport and we waited for Jay, who touched down about 25 minutes later. Things didn't work out quite as well for him as they had for me. His flight was delayed for 1½ hours in Denver. John, VK4UC, was driving straight to Bryan's from Houston, so upon Jays' arrival all that was left to do was to stop at a grocery store for provisions, and then it would be off to the ranch.

Now, Jay and I had decided ahead of time that our traditional RTTY contest diet of spicy polish sausages wrapped in white bread three times a day for three days straight was no longer conducive to our good health, so this time we agreed to buy some "healthy" food. We bought steaks, biscuits, gravy, sausage, lunch meat, condiments, wheat bread, etc. Jay and I don't mind cooking, so it would be steaks at night and biscuits, sausage and gravy for breakfast (made with my secret ingredients, of course). We planned on make-your-own sandwiches for lunch. If we tired of that, we figured we could always head on over to *Coopers*, a nearby restaurant, for their ribs, steaks and—Ron's favorite—spicy sausages.

Onward to the ranch. Upon our arrival, though, no Leonard. We heard a rumor that Leonard had been sold and replaced. Bummer! We never got to meet his replacement, but if he is anything like old Leonard, he'll be a sight to behold.

(I got an e-mail from John a few weeks ago telling me he kinda got hooked on biscuits, sausage and gravy, and is planning on trying to make it at home in VK land—*har!*)

Some RTTY Contesting!

After the usual station preparations were completed, we got a chance to sit out on the porch and enjoy each other's company for awhile before the start of the contest.

The Friday night of the contest was great—we were running good. Come Saturday morning, though, things deteriorated a bit when the 10-meter 4/4/4 stack went south and we were down to just a single TH7 on 10 meters. Oh well, you gotta roll with the punches.

As all great contests do, this one finally came to an end. Our final tally was 2,572 contacts, 5,450 points and 683 mults for a claimed multi-two score of 3,722,350. We are hoping for some wallpaper, we'll see.

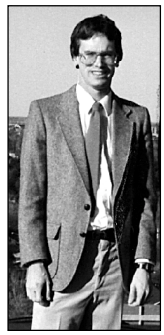
Thats all for this time around. Keep them high in the sky and on the air. 73 from Lonesome Cibola.—*Wayne, K7WM*

■

VHF-UHF Contesting!

Jon K. Jones, N0JK
n0jk@hotmail.com

In last issue's column, I mentioned a 6-meter QSO that I had from Kansas with Tony, GW4VEQ. I had hoped to work Tony from HC8N when I was down there as a member of a contest team for the 2001 CQWW CW Contest. Our contest logs confirm that our team had contacts with him on 160, 20, 15 and 10 meters. And perhaps best of all, I'm happy to report that I did manage to work him on 6 as well!



N0JK

Dave, KM3T, put together a nice summary of our 6-meter activity during the course of our contest expedition. (We were actively DXing on 6 before, during and after the contest.)

HC8N'S November 2001 6-Meter Operations

By Dave Pascoe, KM3T
km3t@contesting.com

Our operation took place from Sunday, November 18th through November 27th, 2001 from the HC8N station located on San Cristobal Island in the Galapagos. The island is about 600 miles off the coast of Ecuador. Jon, N0JK, was our 160-meter operator, so he had his daylight hours free for chasing 6-meter DX.

Our 6-meter station consisted of a Kenwood TS-690 (50 W out on 6) feeding an M² 7-element Yagi up at about 60 feet. The station is the home of the HC8GR beacon (50.035 MHz).

Six-meter propagation during our visit there was outstanding. We experienced openings into North America, Europe, the Far East (Japan, Korea and Hong Kong), Oceania and Africa. We were thrilled that we could work so many stations running only 50 W. The pileups we generated were all pretty well behaved, and we did our best to work them down as quickly as possible. This turned out to be great practice for the CQWW. Table 1 provides a breakdown of our final 6-meter tallies by mode and continent.

Our primary 6-meter ops were Dave, KM3T; Trey N5KO/HC8N; Jon, N0JK; Mike, K9NW; Tim, N4GN; and Tom, K1KI. Ward, N0AX; Steve, K6AW; Bob, N6TV; and Dan, K1TO, also put in a little 6-meter operating time.

73, Dave, KM3T

Dave has MP3 recordings that were made during several of the 6-meter openings available on his Web site. Visit www.tcnc.com/hc8n-6m-nov2001/.

It was truly an amazing experience to operate on the 6-meter band from the Galapagos during the peak of Cycle 23. In some respects, 6 meters was behaving like the 10-meter band. There were daily morning openings to Europe starting around 1300Z, and late afternoon openings to Japan at around 2300Z. A major geomagnetic storm disrupted the HF bands during the CQWW CW Contest, but we had an outstanding 6-meter opening to the west coast of the US and into Japan on Saturday evening. The JAs were peaking 20 to 40 dB over S9.

Another great 5-hour long opening to the US and Canada occurred on Sunday morning, November 26th. At 1700Z, the band was open to the entire lower 48 US states. Trey, N5KO, had to take over running the pileup to the states on SSB when my voice gave out. He worked many mobiles, and even some folks using handhelds with whips!

I was delighted to see our "HF contest ops" get caught up in the 6-meter magic. Dave, KM3T, put in many hours working the pileups. Trey, N5KO; Mike K9NW; Tim, N4GN; and Tom, K1KI, also operated for several hours, and the other contest team members spent some time in the 6-meter operating chair as well. Thanks to Trey, N5KO, for his ongoing enthusiastic support of VHF activity from HC8N, and Guido, HC8GR, for all the help he has provided.

6 Meters in the CQWW and ARRL DX Contests?—Why Not?!

While working the openings, I wondered what it would be like if the 6-meter band were added to the CQWW/WPX contests and the ARRL DX contests? (Back in the '60s, 6-meter QSOs were allowed in the ARRL DX contests, and the ARRL Phone Sweepstakes had entries from Technician class stations on 6 meters and even Novices running 2-meter AM!)

Advantages

This would definitely increase 6-meter DX activity. Both the ARRL and *CQ* magazine encourage VHF activity. Many rare DX locations are only activated during the major contests. Several of these have been operating on the 6-meter band before and after the contests. If the 6-meter band were included in the con-

The 6-meter antenna presently set up at HC8N is an M² 6M7JHV Yagi. The 6-meter halo in the foreground serves as the antenna for the HC8GR beacon.

Tom, K1KI, and Jon, N0JK, review the 6-meter logs.

tests, these stations would be readily available during the contest period.

There were several outstanding 6-meter openings during the CQWW CW Contest. How many more 6-meter DX contacts would have been completed if the contest stations were allowed to count 6-meter QSOs? One good example that comes to mind is HK0GU, San Andres Island. That station was on 6 before the CQWW, but was unavailable during the contest period.

The 6-meter F_2 openings—and the DX stations needed to take advantage of them—are not common. Many ops have only a limited opportunity to work 6-meter DX. The average 6-meter DXer—as is the case with the Amateur Radio community in general—is getting older. Some 6-meter DXers I know measure their life spans in how many solar cycles they imagine they have remaining. Contest activity on 6 would allow us to take better advantage of the openings that do occur and would result in an increase in the number of DX stations that have an interest in the band.

Contest operations could potentially achieve higher scores, and would have an alternative set of frequencies to gather QSOs when conditions on other bands were poor. A geomagnetic storm severely disrupted the lower HF bands during the 2001 CQWW CW Contest, but it *enhanced* propagation on 6. I estimate that our operation may have been able to add another 500 to 1,000 contest QSOs to our log if 6-meter QSOs could be claimed for contest credit.

Table 1—Continental Breakdown of HC8N's 2001 CQWW CW Contest Team's 6-Meter Activity

Continent	*CW QSOs*	*SSB QSOs*	*Total QSOs*
North America	667	1,057	1,724
South America	4	25	29
Europe	232	39	271
Asia	547	425	972
Africa	1	4	5
Oceania	2	8	11
Totals	1,453	1,558	3,011

(These 3,011 QSOs resulted from contacts with 2,625 unique stations between November 18th and November 27th 2001.)

Disadvantages

Adding 6 would make it difficult to compare record scores from previous years

While this is true, 160 meters was not always included in the HF contests. And the 160-meter band has gone through some significant changes with the removal of power restrictions that existed in the past. The HF contests themselves have evolved and changed over the years as computer logging, packet clusters, computer designed antennas and other technical innovations have appeared.

If you're going to consider adding 6, then why not 30, 17 or 12 meters?

Contests are not allowed on those bands, but they are *encouraged* on the 6-meter band.

Stations in South America and Africa would have an unfair advantage on 6 meters.

The 6-meter band at a solar cycle peak often behaves similarly to the 10-meter band during the minimum. Stations in South America and Africa can work "north-south" paths on 10 when stations elsewhere do not have any propagation. The 10-meter band, however, is not *removed* from contests during a solar cycle minimum.

During the peak years, a variety of paths develop on 6. There were certain days in November and December 2001 when stations in Greenland, Iceland, the United Kingdom, New England, the US Gulf Coast, the Marshall Islands and other locations were in the "hot spots." I heard OX3OX running stations in North America for hours. Other days 1 and 2 or 4 and 5 US call areas had their "moments in the sun" and were running Europe. Even this "dog had his day" on December 29th when a JA pileup landed on me! The stations enjoying "the advantage" at a given moment depends on the solar and geomagnetic activity.

Adding another band would be a burden on the SOAB contestants

True, it would be more work for a single op all band station to try to cover 6 meters as well. Many of the more recent HF radios already have 6-meter capabilities, though. Six-meter trans-verters are also available. Effective 6-meter antennas—such as a 3-element quad or Yagi for example—are easy to build, and even commercial antennas are fairly inexpensive. We had great results from HC8N running 50 W into an M^2 6M7JHV Yagi. CO8LY completed over 600 contacts on December 30th and 31st running just 5 W into a dipole! Many contest stations already are set up to operate on 6.

I believe adding 6 meters to the major HF DX contests would benefit both 6-meter DXers *and* contesters. What do you think? Contest sponsors *do* listen to the participants. Write or e-mail them if you'd like to express your opinion on this topic.

Rover Resource Page

By the time you read this, many of you will already be making plans for the June VHF QSO Party. If you are interested in roving during the contest, check out Dan Evans' (N9RLA) great resource page at **www.qsl.net/n9rla**.

W6/W7 VHF Contest "Honor Rolls"

Tim Marek, K7XC, maintains a list of the top W6/W7 scores in the VHF contests and a "Rover Honor Roll" as well. Have a look—**k7xc.tripod.com/VHF_Records/**. ■

NCJ Profiles—An Autobiography—Paul Gentry, K9PG

Paul Gentry, K9PG
Paul@k9pg.com

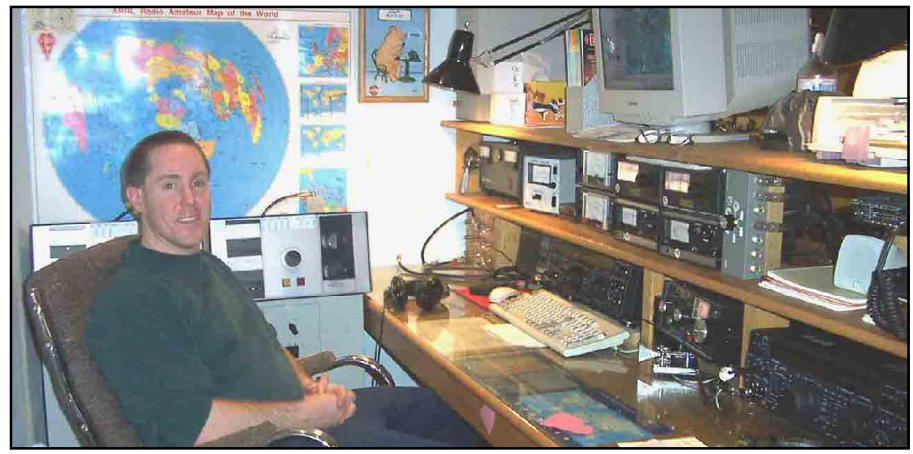
Can you think of one specific event, or one particular person, where if it hadn't occurred or you hadn't met him/her, the entire course of you life would be completely different? Think about it. What if you had never made that trip to the store that day 15 years ago when you just happened to bump into that special someone who would eventually become your spouse? Or if you never got assigned to that annoying guidance counselor—the one that helped put you on the path that led you to the successful career you enjoy today?

I had one of those incidents. It happened back in 1982 when I was 12 years old, on what seemed to be ordinary spring day. My dad decided to get something to eat at a truck stop on his way home from a business trip. At that truck stop, he just happened to decide to buy a CB radio to use on his trips, which were quite frequent. I didn't really know too much about CB—what little I did know came from watching TV shows like *BJ & The Bear* and *The Dukes of Hazard*. When he got home, I immediately noticed the antenna on his car and asked what it was. "It's for a CB radio." I headed straight out to the car and started listening to channel 19 (after all—that's what CB is all about, right? Channel 19!) I continued to fool around with it for the next 6 hours.

Looking back on that day, had he not stopped at that truck stop, I probably wouldn't have ever considered radio as a hobby (not to mention this great sport that we all share called contesting) and I certainly wouldn't be writing this article!

I guess it should come as no surprise that when my dad headed out to the car the next morning, he discovered that the battery was dead. That same day, he visited RadioShack and brought home this little black box with some funny wires coming out of it. He explained that I could plug the CB into this thing, put the antenna on the gutter outside my bedroom window and then use the rig in my room! I was in heaven! I continued to enjoy my new hobby for several years. Over that time I worked my way up through several iterations of better radios and more effective antennas…and met lots of people!

One of those people was the person that would end up serving as my Amateur Radio Elmer. I remember going to his house in the winter of 1985 and watching him talk on his radio…then he handed me the mike! I was terrified, but I had my first ever ham QSO (QSO? What's a *QSO*?) with W7KEQ! (I hear Art on the air every now and then. I'm sure he doesn't remember me, but it's great to hear him!)



K9PG at K9XD

I immediately started studying for my own license, and passed my Novice test a short time later. I received my first license—KA9VAK—in March of 1986. It took me a few months to upgrade to Technician, but as soon as I did I picked up a used Kenwood H-T at a hamfest and started hanging out on 2-meter repeaters. Through some people I met on those repeaters, I was introduced to Scott Pederson, N9FZO (now KI5DR, a K5NA op).

Scott was attending the same college that I would be starting in the spring of 1987, so it wasn't long before we became pretty good friends. During my sophomore year, Scott ended up with a new roommate who also just happened to be a ham—Dave Patton, then NU9R. (Dave's had more call signs than Wilt Chamberlain's had women, but he seems to have recently settled on NT1N. He moved to Connecticut a couple of years ago, and is now one of the gang at ARRL HQ.)

One weekend in October 1988, Dave invited Scott and me to go with him on a road trip to Hannibal, Missouri. He provided precious few details, but he assured us that we'd have fun. It didn't occur to us that the scheduling of this adventure coincided with the weekend of the CQWW SSB contest. (CQWW? What on earth is that?) Not only that, but we had no clue that Hannibal was (and still is) home to of one of the most prominent and well known contesters in our hobby, Lew Gordon, K4VX. Needless to say, I've been hooked on contesting ever since. I owe Lew, Dave and Scott quite a lot!

I've come a long way since then. I've been fortunate enough to travel to many places—both foreign and domestic—to operate contests, places such as VS6WO (the rooftop multi-multi in the CQWW CWs in 1992 and 1993), FS5PL four times, KH7R five times, 6D2X, KL7Y, ZF2NT, 8P2A (and many others) on the DX side. I've also been a guest at N6TR, K5ZD, W3LPL, WC4E, K3LR and many more, both as a single op and part of multi-ops, as well as countless multi-op efforts from K4VX and the old KS9K/W9JA station in Wisconsin (now K4JA in Virginia). I've won a few contests as both a single op and part of multi-op efforts, from both DX and stateside locations. I've also been on winning NAQP and Sprint teams a handful of times and hold a few records in these as well.

Since I've only got a dipole and 100 W at my home station, I've been guest oping quite a bit at K9XD's QTH. Dave lives about 45 miles southwest of Chicago. WE9V has been nice enough to let me invade his home several times as well. Chad lives about 45 miles north of Chicago in far southeast Wisconsin (you can see Lake Michigan from his tower!). Both Chad and Dave live about an hour's drive away from me—but in opposite directions.

Obviously, I'm proud of my accomplishments in contesting, but the thing that I am most proud of is my role as organizer of an effort that led the Society of Midwest Contesters (SMC) to the surprise Unlimited title victory in the 2000 running of the ARRL Sweepstakes.

In May of 2000, I became the president of the SMC. In August of that same year—while at a club dinner in St Charles, Illinois—I decided to float my crazy idea that the SMC should take a serious shot at the 2000 Sweepstakes Unlimited title. I can clearly remember Mike, K9NW, looking at me as if I was completely out of my mind. Then someone else blurted out that it was impos-

sible—*it couldn't be done*. That was all the incentive I needed.

I spent the next two months spreading the word about the SMC all throughout W9 land, signing up new members left and right, making sure that everyone got to meetings, sending and receiving literally thousands of e-mails, answering every conceivable question and getting everyone pumped up. It was more work than I had ever imagined, but I was determined to make it happen. In that short time span, our organization grew from 100 members to just over 300 members.

The contests came and went, and I had heard score rumors…it was very close! I had no idea if we had won or not. Then at the Contest Forum at Dayton 2001, ARRL Contest Branch Manager Dan Henderson, N1ND, made it official by announcing that we were in fact successful in pulling off this upset. The SMC was the 2000 Sweepstakes Unlimited Champions!

Walking up to the front of that packed room—filled with my fellow contesters (including about 100 *very loud* SMCers) to accept the championship gavel on behalf of our club from ARRL Central Division Director Dick Isely, W9GIG, is the most memorable moment in my amateur contesting career. This might not seem like that big of a deal to some, but to me, I equate this with the US hockey team beating the powerhouse Russians in the 1980 Olympics!

I even have ham radio to thank for my current job. An area ham found out that I was a contester and requested that I give a talk on it at his radio club's meeting. He happened to ask me what I did for a living. I told him I was job hunting. Four weeks later I was working for him.

Thanks to my involvement in Amateur Radio—a large portion of which is contesting related—I've met literally hundreds of people that I otherwise wouldn't have met, I've traveled to dozens of places that I otherwise wouldn't have gone and I've done many things that I otherwise wouldn't have done. And you can trace it all back to that spring day 20 years ago when my dad brought home that CB radio!

Along the same lines as what Sammy Sosa says of his career in baseball, I've got to say, "*Ham radio has been very, very good to me!*" I can't imagine what my life would be like if I was never introduced to it.

Well, enough about me! I want to know what you, readers and fellow contesters, would like to see in this column. What questions should I ask guys like K5ZD or K3EST when I corner them at Dayton? Do you want to know what AG9A eats before he heads off to do another CW Sprint? Do you want to know if N6MJ can dunk a basketball? (I'll bet he can!) Do you want to see some updates on guys that were profiled 10 years ago? I need to hear from you guys!

One idea that I have is something along the lines of a surprise "guest" profile once in a while, where a good friend of someone would write up something on them—on the sly. They'd first find out about it when their *NCJ* arrives in the mail! A perfect example would be N9RV filling us in on K3LR. They've been friends for years. Pat has been to Tim's station in western Pennsylvania dozens of times, and they teamed up in WRTC 1996, and will do so again this July in Finland. Now that I've let that cat out of the bag, I guess I'd better get K3LR profiled. What do ya say, Timmy?

If any of you have any suggestions, comments or ideas on what you would like to see in this column—or specific suggestions for people that you'd like to see profiled—please share them with me!

I'll wrap things up this time with something from Bill Fisher, W4AN. Bill had a blurb on his **contesting.com** Web page that has stuck with me ever since I first spotted it a few years ago. It has been very instrumental in my push to get activity up in contests like the Sprint and NAQP, and was (and still is) the motivating philosophy behind my effort to get the gang from the SMC to focus on the top spot in the Sweepstakes Unlimited category. I can't remember it verbatim, but it goes something like this:

"Imagine how many more people we would have to work if each one of us got just one *other person involved in contesting!"* ■

Contesting on a Budget

Paul Schaffenberger, K5AF
PaulK5AF@aol.com

Suggestions for the Young Blood Contester


K5AF

First off, I want to thank all of you who answered our initial "Contesting on a Budget" call for input. I must admit that I was overwhelmed with the number of responses. It seems that many of us can relate to the situation of our hypothetical young contester, Justin.

Just as a recap for those of you who may be tuning in late…Justin is a young individual who wants to build a station of his own. He already has a memory keyer, a mike and a personal computer. His folks have told him that due to his impending college expenses he can spend no more than $1000 on station building. His house is on a typical suburban lot without covenants. His lot has trees and is well suited for wire antennas or a modest tower and beam.

What was especially fascinating about your responses was that there seemed to be equal amounts of philosophical and practical advice. I thought I'd divide them into those general categories, and then toss in a few of the random ideas that came in.

Waxing Philosophical

Blood flow is more important than cash flow

If contesting is flowing in your veins, you'll find ways to succeed regardless of limitations. John, K1RC, provided a great rundown of the very modest stations and antenna farms he's used over the years with great success. He has over 25 certificates from major contests decorating his shack walls! Many other contributors spoke fondly of their early successes using modest setups.

Help is out there!

Our young Justin can find contest help from several sources. Many respondents suggested that he locate an Elmer, join a contest club and get a subscription to *NCJ*. The sense I got from this is that the members of the contest community are a very friendly and generous lot.

Rick, N6XI, suggested that Justin might be able to *borrow* a radio. After all, how many of us have old TS-520s or Drake C-Lines gathering dust in our closets? There were many who recommended that Justin continue to guest op whenever possible. That way he'd be able to learn operating and station-building techniques. (If anyone amongst us doubts the power of Elmering and guest-oping, they should have a look back at Jeff Steinman's [N5TJ] "Profile" in the Jan/Feb 2002 *NCJ*.)

Winning comes from setting goals

Many contributors mentioned the importance of setting goals. Some suggested trying to achieve high scores in smaller contests (such as state QSO parties), while others suggested setting reasonable—yet challenging—goals for the larger contests—such as Sweepstakes and the CQWWs. It was significant, though, that there was an almost universal feeling that winning does *not* necessarily mean making the top ten box. Rather, it is setting and achieving goals, and continuously improving one's operating skills and equipment/antenna configurations along the way.

Let's Be Practical

Set up a Low Power station with tribander/wires

This was the most common recommendation. Many said he should spend roughly equal amounts on the transceiver and the antennas. Recommended transceivers were the IC-735, TS-440, TS-830 or TS-530—although Randy, K5ZD, strongly suggested that computer-controllability be a feature included on *any* radio considered.

Antenna opinions included a used tribander, such as a TA-33JR or TH-3JR, a small tower (30 to 40 feet, also used, of course) or push-up or a roof-mounted tripod; and dipoles for 80 and 40 meters. Yuri, VA3UZ, emphasized the antenna aspect a little more heavily, opting for a TH-6DXX and a HAM IV rotator.

High Power station

There were a couple of recommendations that Justin buy a transceiver and a small amp and use more modest antennas. Carl, K9LA, suggested a good used rig for about $500, a small used amp (like a Dentron GLA-1000B) for around $300 and a combination of wires and perhaps a multi-band vertical for antennas.

QRP contesting?

The prospect of pursuing QRP contesting was a little more hotly contested than the others. Dale, KG5U (a well-known QRPer), suggested that Justin stay away from QRP contesting initially because it can be frustrating for a new contester. Nonetheless, there were recommendations that Justin consider getting a used Elecraft K-2, which has an excellent receive section, and can initially be used as a great QRP radio, and then be upgraded to 100 W later (Elecraft has an amplifier option currently in the works).

Other Notable Notables

Ward, N0AX, suggested that Justin buy a 1000-foot roll of #12 THHN wire ($25 at Home Depot) and the *ARRL Antenna Book*, and build wire beams and other wire antennas.

Tim, EI8IC, suggested that Justin have a look at **www.qsl.net/ei8ic/**—his "EI8IC's Ham Radio Resources Website." It features an excellent eight-page section titled "Budget Fun" that's chock full of ideas, hints and tips for low-cost contesting.

While many suggested an even split between the amount of money spent on antennas and on the radio, Dave, K6LL, suggests Justin spend $800 on a used filter-fitted Kenwood TS-850 or similar radio and use wire antennas initially. Dave, N2NL, also suggested spending a little more than half on the radio ($600-700). He thought a Kenwood TS-930 would be a good choice. He notes that without a decent radio, everything else suffers. Rick, N6XI, wisely suggested buying a radio from another contester, as there's a good chance that it is already set up with the appropriate filters and mods for contest work.

There were several suggestions to feed wire dipoles with ladder line and a tuner, in order to have multiband capabilities. John, K1RC, listed several good tuner choices, including the Murch 2000-A, the 275 W Johnson Matchbox and the Dentron Super Tuner.

There were also some interesting suggestions to allocate a portion of the money toward homebrewing skills. These included buying a good DVM, a few hand tools and a soldering station (from KG5U), learning to perform technical tasks to perfection, such as properly soldering PL-259s (from K1IR) and building an antenna switch and keying interfaces (from K6LL). There was even a recommendation from Scott, W3TX, that Justin build his own Elecraft K2. There were many folks who suggested that he get copies of the *ARRL Handbook* and *Antenna Book*.

Perhaps the most poignant comments involved what I can only call "contester

mentality." What I mean by this is that there is a determination to succeed in contesting that carries over into life. Dave, K6LL, said Justin should get a part-time job to pay for an amp and bigger antennas. Scott, W3TX, suggests that once Justin gets heavily into contesting, he should get a job to make more money, set bigger goals and purchase better equipment (Thanks a lot Scott! He'll soon be beating the rest of us!) What parent wouldn't be proud of a child who sets goals and works to achieve them?

All in all, the responses to this "hypothetical ham-in-need" topic reflects the cooperative and can-do spirit within the contesting community. We haven't forgotten our roots, nor have we forgotten those who helped us establish and achieve our goals. There are Justins out there, and it's reassuring to know that as a community we are rich with volunteers who will nurture and mentor new talent.

Building a station within a specific dollar constraint is just another goal that our very goal-oriented community can help a newcomer attain. Thanks to all those who contributed—K1RC, N0AX, N2NL, N6XI, K1IR, EI8HC, VA3UZ, AA4NU, W9XI, K5ZD, K6LL, KG5U, W3TX, W6PH and K9LA.

Topic for May-June 2002 (deadline March 6)

Used Equipment

Used equipment can represent a significant savings over new equipment, but it can also be a huge headache.

- Where do you go to find good used gear: swap meets, on-line auctions, ham outlets?
- How do you know how much a particular piece of gear is worth?
- How do know if a seller is reputable?
- What do you do if you get a lemon?
- Are package deals (including filters or accessories with a transceiver purchase, for example) the way to go?

Topic for July-August 2002 (deadline May 6)

Rolling Your Own

What cables, accessories, interfaces or other gear do you find that you can save money on by building your own? This includes everything from patch cords, accessories such as antenna tuners, to amplifiers, towers and antennas.

I'm looking forward to your responses!

Station Profile—W0AIH

Conducted by Mark Beckwith, N5OT
swca@swbell.net

This time the Hardware Addict took a trip north to visit a legendary station built by an equally legendary ham—Paul Bittner, W0AIH. Paul's station is in Eau Claire, Wisconsin, and I'm confident that his call is familiar to every *NCJ* reader.

Paul was first licensed in 1949. His Elmer was his high school buddy—a tall, lanky fellow by the name of Dick Ehrhorn (W0ID). Paul is a Lutheran minister who is now enjoying his retirement. He says his hobbies are "towers and antennas"—which should go a long way towards explaining what makes the whole W0AIH operation what it is today.

The Voice of America?—*Guess Again!*

W0AIH is a decades-old multi-multi station on 120 acres in an unlikely location—what contesters only *somewhat* jokingly refer to as "the Black Hole." Those who have driven the interstate between Chicago and Minneapolis have most likely noticed the seemingly endless forest of towers and antennas. Even hams sometimes mistake W0AIH for a CIA installation or a Voice of America facility.

I called Paul up, and he invited me to visit—and what a visit we had! As frequently occurs in this great hobby of ours, we found ourselves chatting for hours as if we were long lost pals. Though we had never met before, we knew many of the same people and had many of the same interests. In short, Paul and I spoke the same *language.* You already know I'm a serious Hardware Addict. Well, I can tell you that next to Paul Bittner, I am but a young, green *novice.* This guy has more towers up than most of us could imagine possessing even in our wildest dreams.

Towers and Antennas

W0AIH currently sports more than 50 towers of all shapes, strengths, face widths and heights. Some are guyed; some are free standing. "I get most of them from radio stations that are relocating. I move in and get them down—and I usually inherit the feedline in the bargain!" This helps explain why so many of Paul's antennas are fed with Heliax.

You can get a good feeling for Paul's passion for towers and antennas just by looking at some of his specialized tools and hardware. (See the "Tools and Hardware" sidebar). To the uninitiated, a gin pole is that magic tool that's used in tower assembly and disassembly. Most of us have to borrow one when we need it, and the one we usually borrow is a light-duty version. Paul's got a collection of them; and the largest ones are 40 feet long!

Nicopress is a trade name for a professional system of joining wire and cable. A Preform is a commercial grade method for terminating EHS guy cable in a loop, for anchors and insulators—and nearly every other guy termination as well.

Paul confesses "I probably have more money tied up in tools than a lot of hams have in their entire hobby. But then, I've been a ham since 1949 and all along I've been acquiring things that might be useful."

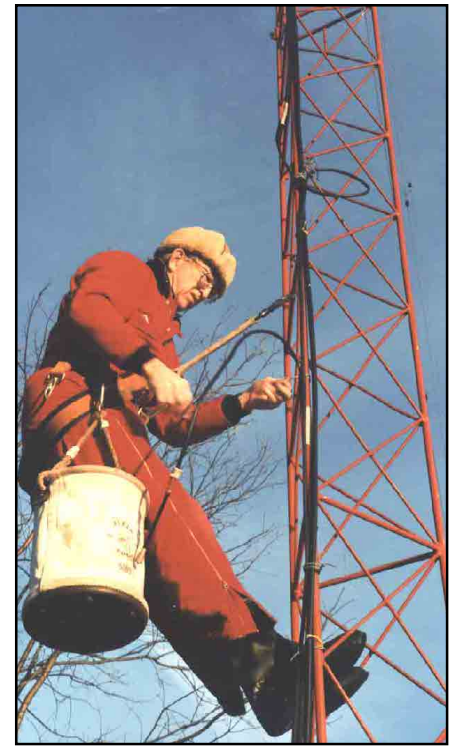
Check the "In The Shack" sidebar for a band-by-band breakdown of the antennas at W0AIH. Paul suspects that the list isn't complete, though, as he can't quite keep track of each and every antenna he has up!

Paul outlined a number of pending antenna improvements, but he was especially enthusiastic about one of his most recent projects. "The real zippy new one is a four-wavelength 20-meter rhombic pointed towards Japan. It works well on 40, 20, 15 and 10! I had put up a K4VX-designed rhombic (four wavelengths on 20 meters) pointed at Europe and, after seeing how well it worked, I decided to put up four more 100-foot towers and set one up for Japan."

Getting the most "*bang for the buck*" is one of the greatest challenges amateur station builders face, and W0AIH has found ways to add entirely new dimensions to the concept of "value." There's great pleasure in the scrounging—and the finding—of priceless treasures, sometimes to be had for just the costs involved with hauling them off. Paul related an old story about how he transported a newly-acquired Hy-Gain 403B from Columbus, Ohio back home (some 600 miles) on a canoe carrier strapped to the top of his Chevy Citation. Now *that's* dedication.

The 403B is a 40-meter Yagi that was first available sometime back in the '60s.

I'm sure you'll all agree—the view up the driveway of the W0AIH farm is absolutely breathtaking!



Paul Bittner, W0AIH, strongly suspects that he spends more time above terra firma than on it!

It was designed mainly for military and commercial use. It employs full-sized elements (around 70 feet long) and tips the scales at several hundred pounds. Very few hams owned them, although they were advertised in *QST*. The rotator Paul uses for this antenna was featured on the October 1994 cover of *CQ* magazine. The photo showed Paul standing *inside* the 54-inch ring rotator assembly that he designed and built for it. Once the antenna was mounted to the ring, Paul had to add 200 pounds of counterweight to get it to balance. Side-mounting *any* 3-element Yagi is always tricky, but Paul found a way.

What's Paul got in the works? "One project is putting up my 140-foot Grasis tower. It's 46 inches on each face. I'm going to use it to support a full-size 80-meter Yagi on an 80-foot boom. I'm planning on building the boom out of Pirod solid rod tower—18 inches on each face. Each 20 foot section of that tower material weighs 240 pounds, so the boom alone will tip the scales at nearly 1000 pounds!"

But then, it's not as if 80 meters is presently a weakness at W0AIH. Paul describes his two 6-element 80-meter Bobtail curtains as his "favorite arrays." He got the idea from N4AR. The design employs two conventional Bobtails, positioned one in front of the other and fed with a phase delay. Reverse the phase delay, and you reverse the direction of the array. The vertical sections are made from 6-inch aluminum tubing and the horizontal sections are wire. He has separate phased arrays set up for NE/SW and for NW/SE. "Each time we switch from the CW to SSB portion of the band, I walk out and re-tune them. They use large air inductors and vacuum capacitors. An MFJ-259B makes tuning them easy."

The sheer quantity of antennas at W0AIH adds an air of credibility to Paul's humorous statement "…really, the coax switches get more of a workout than the antenna rotators." He went on to say that he is a firm believer in prop-pitch equipment (the big 40-meter Yagi takes 5½ minutes to turn). "I've got a number of Tailtwisters," he went on, "but they're for the little antennas."

Paul described countless modifications to the mostly commercial antennas he has up in the air. He has been stiffening weak points and beefing up the hardware. There is probably not a single antenna in the entire W0AIH arsenal that hasn't been "improved" in *some* way. Even though he confesses to tweaking all the Telrexes and Hy-Gains, he is a firm believer in their basic designs. None of his modifications has involved lengthening a boom—although in one instance he did remove an element. "I stick with what has worked for years. They've established their own track records."

Inside the Shack

We could go on for pages describing Paul's towers and antennas, but it's time to see what's at the other end of all these feedline runs.

The ops refer to it as "The Chalet"—the main operating room at W0AIH. The building originally housed a broadcast

Tools and Hardware

Gin Poles:

#1—14 feet 2 inches with a rotating head on top and the usual Rohn-type pole-to-tower clamp.

#2—14 feet 2 inches with the bottom seven feet beefed up with a second tube inside for strength. It has a tower clamp that can be used on Rohn 25, 45 or—with an adapter—55.

#3—20 feet 3 inches. This one doesn't get used much as Paul prefers to use something he can climb.

#4—40 feet of Rohn 25 with 4-foot long solid rods inside each splice (where towers are the weakest). He uses a 100-lb "headache" ball on the bottom end to ensure that the pole won't flip. Occasionally another 10-foot section is added. This pole is secured to the tower with nylon straps at the bottom and at the 20-foot level and has a rotating head.

#5—Built from a 40-foot commercial utility tower. This one is even heavier duty than #4.

Other Tools:

Nicopress: Tools and sleeves for #8, #10, #12 and #14 copperweld, and EHS guy wire.

Guys: Everything for 1/4, 5/16, 3/8 and 2-inch EHS. Preforms for all sizes.

Miscellaneous Hardware: Three 50-gallon barrels full of "Electric Company hardware."

Metalworking Equipment: Lathe, shear and metal brake

In the Shack

Radios:

Two Yaesu FT-1000Ds
ICOM IC-775
Six ICOM IC-765s

Amps:

Five homebrew 4-1000s
Three Alpha 86s
Alpha 87
Alpha 91B

Antennas:

160 meters:

1/4-λ elevated feed vertical
Full wave loop SE/NW
3-element wire beam SE
Two double-extended zepps at 170 feet
1/4-λ sloper
Eleven 1040-foot Beverages

80 meters:

Bobtail curtain NE/SW
Bobtail curtain NW/SE
3-element vertical beam (NE/NW/SE/SW)
Bi-square at 170 feet
Two double-extended zepps at 170 feet
Four 520-foot Beverages

40 meters:

Two Hy-Gain 403Bs at 90 and 180 feet
Telrex 3-element on a 46-foot boom at 70 feet

20 meters:

4-λ rhombic at 80 feet, pointed at Europe
4-λ rhombic at 100 feet, pointed at Japan
Rotary stack of four Hy-Gain 204Bs up to 180 feet
Two 4-element Yagis pointed SE at 35 and 70 feet
Telrex 6-element Yagi on a 46-foot boom at 140 feet
Telrex 5-element Yagi on a 36-foot boom at 105 feet
Telrex 6-element Yagi on a 36-foot boom at 160 feet

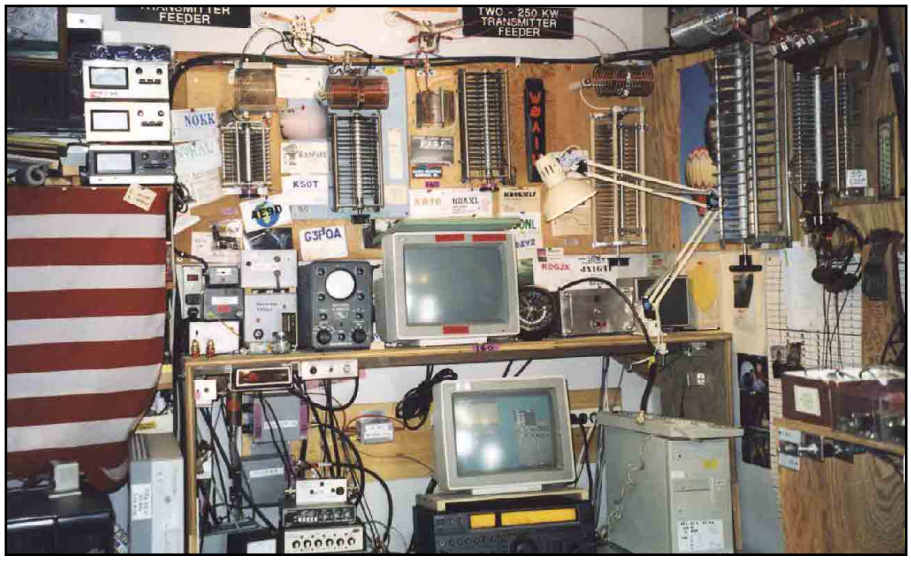
15 meters:

Rotary stack of four 4-element Yagis up to 180 feet [K4VX design]
Two Hy-Gain 155BAs at 110 and 70 feet
Telrex 5-element Yagi at 185 feet
Telrex 4-element Yagi at 45 feet
Telrex 3-element Yagi at 40 feet
Tribander
Duobander

10 meters:

Rotary stack of four Hy-Gain 105BAs up to 120 feet
Rotary stack of four Hy-Gain 103BAs up to 180 feet
Telrex 5-element at 195 feet
Cushcraft 4-element Yagi at 75 feet
Telrex 6-element Yagi at 63 feet
Telrex 3-element Yagi at 45 feet
Two tribander Yagis

This Bobtail array is used primarily to menace Europe.



The W0AIH superstation features six operating and two spotting positions. Paul's personal favorite is the one for 160 meters. Check out those tuners!

Paul built several of these W0ID-designed 4-1000 amps 35 years ago. They're still running strong. (Photo by DL1QQ)

station transmitter (this was formerly a commercial antenna site). These days it plays host to five of the six operating positions, and two spotting positions. A separate location for 20-meter operation is set up about 300 feet away in a small 6×8-foot building. Paul originally acquired this shelter through MARS.

The station facilities can be configured for everything from single operator to multi-multi. All the bands can be patched through to one position, or two, or all to separate positions. Everything in the 20-meter building can be patched to the Chalet.

Experienced contesters know that radios come and radios go, but once a station has nailed down its antennas and amplifiers, these items can outlast several generations of "rigs-du-jour." Paul reminded me that once you have some good amplifiers built, you may as well focus your attention on the other details. The same can be said for a good collection of antennas (as long as they stay up!).

Paul has a bank of amplifiers that employ 4-1000s. He built several like them for Dick Ehrhorn (now there's a switch) in the 1960s. Dick designed the amps, and Paul constructed them for him. While Paul was at it, he made a few more for himself. Paul keeps a supply of 4-1000 broadcast pulls on hand. When the output drops off, in goes a new (used) tube—and he's back in business. They amps are all rack-mounted, and a "pole pig" transformer supplies the HV—a tried and proven approach. Paul remarks of these 35-year-old amps "That's a LONG time for amplifiers to continue to perform!"

In order to satisfy the more exacting SWR demands of Dick Ehrhorn's (W4ETO) newer designs (W0AIH—at last count—has five Alphas), incoming coaxes are terminated in adjustable matching networks; every amp sees a perfect load. These tuners are scratch-built in quart paint cans. The craftsmanship at W0AIH is unrivaled—in both scale and functionality.

Driving the Alphas are the usual assortment of rigs-du-jour, and operating those rigs-du-jour?—well, the usual suspects. Paul has served as a mentor to quite a number of young Midwestern operators, who will carry the W0AIH experience with them throughout their contesting careers. And the older midwest ops? Well they, too, keep coming back for more, so Paul must be doing *something* right!

Towards the end of our chat, Paul reflected, "I'm truly happy to have been blessed with good health and no fear of heights." (I know what he means! Fear of heights has been a challenge for me ever since I started station building.)

A parting thought: You've got to wonder whether this grand Old Man is ever going to slow down. "Thirty years ago I took down four 100-foot Forest Service lookout towers. They sit here in piles awaiting their day in the sun." *Ahhh*, spoken like a true Hardware Addict! ■

DX Contest Activity Announcements

Bill Feidt, NG3K
Bill@ng3k.com

Once again, I haven't exactly been overwhelmed with announcements for upcoming contests. For the May/Jun 2002 issue I'll be especially interested in news of your DXpe-ditions for the CQ WPX CW Contest and the Fall CQ World Wide DX contests (both SSB and CW). The deadline for this getting an announcement into this next issue is March 20th.

NG3K

You can submit your data using the Web form that you'll find at: **www.ng3k.com/Contest/conasc.html**

If you would prefer to e-mail me your information, please be sure to include:

- The contest you will be participating in
- Your personal call sign
- Your return e-mail address
- The call sign that the contest operation will be using
- The DXCC entity
- The operating class (ie: SOAB HP)
- The CQ Zone
- The QSL route
- The home calls of the participating operators
- Any additional notes (ie: By N2GA; QRV Feb 12-19 as VP5/N2GA; SSB CW; also on SSB: VP5/K2DO)

Send it to **Bill@ng3k.com**.

73, Bill, NG3K

ARRL DX Contest, SSB (March 2-3, 2002)

Call	*DXCC Entity*	*Class*	*Operator(s)*
7S2E	Sweden	SOAB HP	SM2DMU
FS/KT8X	St Martin	SOAB LP	KT8X
IR3B	Italy	M/S	IV3IPS, IV3EPO + others
NP3X	Puerto Rico	SOSB 10M	KP4WW
P40A	Aruba	SOAB LP	KK9A
PJ2K	Neth Antilles	SOAB	K6RO
PJ7B	Sint Maarten	M/S	W8EB, K8RLM
TI8/K4QFF	Costa Rica	M/S	K4QFF, K4WZ, WA4PUJ, WA4UPE
V31JP	Belize	SOAB	K8JP
V47KP	St Kitts Nevis	SOAB	W2OX
V51/SP6IXF	Namibia	SOAB LP	SP6IXF
ZF2AH	Cayman Is	SOSB 10M HP	W6VNR
ZF2MM	Cayman Is	SOAB HP	K9PG

Thanks to IV3IPS, K6RO, K8JP, K9PG, KK9A, KP4WW, KT8X, SM2DMU, SP6IXF, W2OX, W6VNR, W8EB, WA4PUJ
See **www.ng3k.com/Misc/adxs2002.html** for further details.

CQ WPX Contest, SSB (March 30-31, 2002)

Call	*DXCC Entity*	*Class*	*Operator(s)*
CN2R	Morocco	SOAB	W7EJ
CQ9K	Madeira	M/S	CT3DL, CT3BD, CT3EE, CT3IA, CT3KU, CT3EN, CT3IQ, CT3HK
D44TC	Cape Verde	M/S	IV3TAN, I4UFH, IK2NCJ
H40	Temotu	M/S	VK1AA, YT6A
IC8JAH	Italy	SOSB 160M	IC8JAH
J6DX	St Lucia	M/M	N9AG, W8QID, K9JE, KI6T, W9CEO, K3LP, K5ZM K5ZM
LX7I	Luxembourg	SOSB 20M	LX2AJ
LZ8T	Bulgaria	SOSB 80M	LZ2CJ
NS2P	USA	M/S	NS2P, N2JNZ (NNY Contest Club)
OT2C	Belgium	M/S	ACC + NOC members
T93M/HI9	Dominican Rep	SOAB HP	T93M
V31BD	Belize	SOAB LP	WQ7R
WP2Z	US Virgin Is	M/S	K6EP, N6DE
ZF2AH	Cayman Is	SOAB HP	W6VNR

Thanks to CT3EE, D44TC, IC8JAH, KN5H, LX2AJ, LZ2CJ, N2JNZ, N6DE, N9AG, ON4ACA, T93M, W6VNR, W7EJ, WQ7R
See **www.ng3k.com/Misc/wpxs2002.html** for further details

CQ WPX Contest, CW (May 25-26, 2002)

Call	*DXCC Entity*	*Class*	*Operator(s)*
LZ8T	Bulgaria	SOSB 80M	LZ2FV

Thanks to LZ2CJ
See **www.ng3k.com/Misc/wpxc2002.html** for further details.

CQWW DX Contest, SSB (October 26-27, 2002)

Call	*DXCC Entity*	*Class*	*Operator(s)*
FS/AH8DX	St Martin	SOAB	AH8DX
GD6IA	Isle of Man	SOAB	GM3WOJ
LZ8T	Bulgaria	SOSB 80M	LZ2CJ
PJ7/K7ZUM	Sint Maarten	SOAB	K7ZUM

Thanks to GM3WOJ, K7ZUM, LZ2CJ
See **www.ng3k.com/Misc/cqs2002.html** for further details

CQWW DX Contest, CW (November 23-24, 2002)

Call	*DXCC Entity*	*Class*	*Operator(s)*
LZ8T	Bulgaria	SOSB 80M	LZ2FV

Thanks to LZ2CJ
See **www.ng3k.com/Misc/cqc2002.html** for further details ■

International Contests

Joe Staples, W5ASP
w5asp@aol.com

What Lies Ahead?


W5ASP

It recently occurred to me that my tenure as the editor of this column has pretty well coincided with the period starting at the end of Cycle 22 and running through the buildup of Cycle 23 to it recent (or present) peak. During this time, the outlook was for forever improving propagation conditions, particularly on the high bands, and consequently for increased activity on the part of domestic operators in the particular contests dealt with here. Such positive conditions have been evident in the improved results and claimed scores reported over the past few years. Yet beyond every peak lies a valley, and perhaps now is the time to start preparing for the downhill trek.

In his Jan/Feb *NCJ* "Propagation" column, Carl, K9LA, offered some broad predictions regarding conditions on the high bands during the descending phase of Cycle 23. He suggests that next year we may see the demise of 10 meters, followed by 15 meters in the following year. Not a pretty picture after all those solid openings into Europe and Asia we've become so accustomed to in recent times.

Are the "Good Times" going to be over

2001 CQ-M International DX Contest

Call	Class	Score	QSOs	QSO Pts	Mults
USA					
N4BP	SOMB-CW	39672	227	551	72
N6ZZ	SOMB-CW	27027	159	429	63
W4SAA	SOMB-CW	25482	154	411	62
K9NW	SOMB-CW	14847	120	303	49
NJ4M	SOMB-CW	14658	140	349	42
K3WW	SOMB-CW	14382	107	282	51
K3ZO	SOMB-CW	4450	60	178	25
AA3VA	SOMB-CW	660	22	55	12
K2TV	SOMB-CW	550	18	50	11
K9QVB	SO-14-CW	16039	155	373	43
N2ED	SOMB-MIX	16850	115	337	50
W7KN/QRP	SOMB-QRP	85	11	17	5
N1XS	MOMB	166010	471	1277	130
Canada					
VA3TTT	SOMB-CW	14306	136	311	46
VE3MQW	SO-14-CW	8091	100	261	31
VA3IX	SO-14-MIX	288	14	36	8

2001 European DX Contest (WAEDC)
CW

Call	Score	QSOs	QTCs	Mults
USA				
N2NC	1605344	1810	1726	454
N4AF	1442408	1690	1566	443
K3WW	1328392	1579	1554	424
K3NM (op: LU9AY)	1281721	1524	1535	419
K5KG	1183217	1382	1389	427
AA3B	1182384	1446	1410	414
N4BP	995285	1487	1484	335
K4JA (op: K9GY)	960344	1563	1555	308
KQ3F	888858	1310	1289	342
W2AX	786787	1199	1178	331
KE9I	683260	1272	1268	269
N6AW	480936	1044	1029	232
N2ED	476214	855	858	278
K4LTA	474981	978	945	247
K4BAI	430560	899	895	240
W2YC	424512	822	786	264
W6XR	419237	802	745	271
WK2G	317034	777	762	206
K5YAA	312936	708	708	221
K5ZD	278720	537	535	260
N9RV	269240	635	635	212
WD5K	258400	647	645	200
K9QVB	256620	707	703	182
K1XM	251648	494	489	256
N5ZK	229620	645	645	178
W4BQF	223930	492	422	245
W2YR	215450	388	387	278
N2GC	200655	370	365	273
N5PO	199850	576	566	175
WZ8A	191438	483	479	199
W0YR/4	190553	510	509	187
N6ZZ	181502	601	601	151
N8LM	161525	463	460	175
N6NT	159104	461	443	176
W3HVQ	156040	338	326	235
W9WI	146616	455	439	164
N9FH	136721	408	401	169
WE9V	136040	386	374	179
W9ILY	134232	357	357	188
KC1F	128709	341	340	189
N9AG	126192	360	357	176
W3GG	118535	380	375	157
WF3M	115830	359	356	162
KG0UA	106554	301	301	177
NX7K	105714	420	419	126
K5RC	102235	315	320	161
KW4DA	102080	320	318	160
N4CW	101772	386	385	132
W1CSM	100320	257	223	209
W4NTI	81949	258	251	161
WA5VGI	81312	308	308	132
K2NV	76368	263	253	148
KS7T	70784	280	273	128
K8AJS	68160	250	230	142
K0SR	63000	300	150	140
W6FA	61360	237	235	130
KA2D	58308	227	225	129
N6TW	53802	221	220	122
AF5Z	53397	176	173	153
W0NXS	51291	210	207	123
ND4AA	48636	194	192	126
K8CV	47908	203	203	118
W6NKR	47444	210	199	116
AE4Y	44805	168	141	145
W4AU	43656	217	211	102
N0AT	42149	193	180	113
K0VSV	40326	220	209	94
K5PI	35310	161	160	110
W1TO	29304	135	129	111
W0HW	26544	230	7	112
W0ETT	25472	199	0	128
W6TK	22000	127	123	88
W2LE	20604	155	148	68
N1RR	20358	177	174	58
K5NZ	17864	104	99	88
AE9B	15840	120	120	66
K0RY	13944	86	82	83
KJ9C/M	9720	74	61	72
K6III	8200	100	0	82
KD2HE	6480	68	67	48
WA3AAN	5320	76	0	70
W1TW	5104	45	43	58
W1QHG	3780	55	50	36
W2UDT	3100	50	0	62
WA2IAU	2288	44	0	52
W3FQE	2100	50	0	42
KA7FEF	1470	28	21	30
K4IU	1066	22	19	26
N4MM	91	7	0	13
Alaska				
KL9A	563904	1684	1520	176
Canada				
XL3UZ	1399976	1761	1637	412
XM3AT	598708	1258	1216	242
XM2AWR (op: VE2AWR)	184851	447	446	207
VA3UA	179550	527	523	171
VE3MQW	162750	465	465	175
K1ZZ/VY2	159094	388	366	211
VE3BUC	71446	258	256	139
VE6TN	44240	199	196	112
VE7FO	30788	180	178	86
VE4YU	28496	139	135	104
VE2FFE	21437	111	110	97
VE5SF	16058	109	108	74
VA3SB	7560	105	0	72

Claimed Scores & Rumors

(Claimed Scores for international contest participation posted to the 3830 Reflector. Compiled by Mike Dinklemen, N7WA.)

2001 RAC Winter Contest

Call	Power	QSOs	CW	SSB	Score
USA					
K3WW	HP	739	39	31	256200
K1BX	LP	334	38	33	198374
W5GAI	LP	331	70	0	193620
WN6K	LP	334	25	27	114920
K7RE	QRP	272	53	0	110452
K4BAI	HP	465	30	9	89076
AA3B	HP	301	30	12	64176
K1IB	LP	186	30	0	36480
W4SAA	HP	109	26	0	19292
AD4L	HP	90	11	14	17800
WA6BOB	LP	69	19	0	9500
K4WW	LP	50	8	0	2128
N6RO (80M)	HP	142	8	9	22338

2001 All Asian SSB Contest

Call	Power	QSOs	Mults	Score
M/S				
W0TM	HP	714	268	199124
SOAB				
K3ZO	HP	741	257	192236
AB0MV @K0RF	HP	727	255	185385
K7MI	HP	622	215	141685
N3RD	HP	483	213	105861
WN6K	LP	485	187	97801
K3WW	HP	363	175	64400
W7ZR	HP	282	146	49640
K7JJ	HP	229	101	22927
VE7FO	LP	217	100	21700
VE3BUC	HP	130	86	11008
K6III	HP	109	60	6540
SOSB/15				
K1KI	HP	698	146	101908

2001 SAC Phone Contest

Call	Power	QSOs	Mults	Score
VE3KZ	HP	257	103	31209
AA3B	HP	204	97	24638
K3WW	HP	189	89	19936
N4BP	QRP	206	82	16892
N1RR	HP	159	90	16830
WN6K	LP	161	81	15147
VE3BUC	LP	158	69	10902
AK4XX (OH7KD)	HP	135	72	9720
K4BAI	HP	125	64	8000
K2SX	HP	81	49	4655

2001 JIDX Contest

Call	Power	QSOs	Mults	Score
SO/AB				
AB0MV	HP	494	101	79790
WN6K	LP	414	92	57224
VE7XB	LP	305		49115
VE7NS	LP	125	70	14350
N6WS	QRP	117	53	6201
K6III	QRP	37	30	1705
WO4O	LP	23	18	720
SOSB/10				
K7ZO	HP	259	45	23310
KA2MGE	HP	82	36	5904
AE0Q	LP	4	3	24

2001 OK/OM DX Contest

Call	Power	QSOs	Mults	Score
SOAB				
K2SX	HP	240	189	136080
K3WW	HP	225	176	118272
N6ZZ	HP	215	165	106425
VA3TTT	QRP	208	166	103584
AE0Q @N0HF	LP	142	117	49491
WO4O	LP	93	84	23436

after 2002 bows out? No, certainly not. However, we will have to prepare for the changes ahead.

This year will be the time to brush up on our understanding of HF propagation, and to follow more closely the abundant flow of information available on the Reflectors, the Web, newsletters and magazines. By keeping current with the predictions, and then carefully observing the actual conditions encountered in the various contests, it should ease the pain of transition. As band openings shorten and signals weaken, knowing where to be and when will be the key to continued success. It will not be as easy as before, but it may be more satisfying.

As I have said previously, I urge anyone wishing to improve their contesting skills to spend whatever time they can manage operating in the many "Single-Country" contests. If you have not already done so yet, go to Bruce, WA7BNM's, Web site (**www.hornucopia.com/contestcal/**) and get the full year's calendar of events. Keep this handy as you plan your operating time. Make it a point to do a bit of checking on propagation before you get on the air. While you are on, make notes of openings and paths that could later provide those much needed multipliers. Also, concentrate on building your call recognition ability. The more active operators are usually on in their own country's contest. The more often you work 'em, the easier it will be to pick them out of a pileup or the noise the next time.

So, though the Good Times may become a bit tarnished with the passage of time, you can assure yourself of lots of operating success and satisfaction by knowing what lies ahead. And isn't this the case with most good things? ■

Contest Tips, Tricks & Techniques

Gary Sutcliffe, W9XT
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UBN Reports


W9XT

In the past, when all of our contest contacts were manually logged on paper, it was impractical for contest sponsors to perform a detailed check of all of the logs. Only the high scoring logs would typically be cross-checked, and even then—unless there was something suspicious—not very closely.

Today most logs, and nearly all of the high scoring entries, are computer generated and then e-mailed or mailed in on a disk. Having a large percentage of the logs in electronic format makes it possible for more complete cross-checking of contacts and verification of correctly copied exchanges. Consequently, sloppy operating these days will almost always result in much larger score reductions than it did in the past.

As an aid to help contesters improve their logging accuracy, detailed reports that list where contacts have been disallowed are sometimes available after the contests. These are typically referred to as UBN (Unique/Broken/Not In Log) reports.

The log checking process begins by evaluating a number of the major logs to generate a list of calls active in the contest. If your log contains a contact with a station that is not on that list, it is considered "Unique." It is certainly possible that you worked a station that only made a few contacts and did not end up in the master log. Most contests do not penalize you for this, but too high a percentage of these in your log can be a warning sign.

Broken calls are improperly copied calls. If I work K5ZD but log him as K5ZB, it is a simple matter for the computer to figure out that I did not copy the call correctly. A "Not In Log," (sometimes referred to as an "NIL") is a situation where you worked a station and logged him, but your call does not appear in the other station's log at that time. You will lose the contact and possibly incur additional penalty points for a broken and an NIL contact.

Nearly all of the respondents to this issue's topic indicated that they reviewed their UBN reports at least occasionally. These reports can help you identify the kinds of errors that you make most often. This lets you take steps to correct them.

A number of readers—including AE9B, K6LA, K9JY and W2UP—responded that they record audio of the contest period and then go back and review it after the UBN reports are available. K9JY and W2UP mentioned the built-in recording feature in *WriteLog* that can record the audio directly to your computer and has features that help you quickly locate the audio snippet related to a given QSO.

K6LA uses software called *RecALL Pro* which allows him to store a 48-hour CQWW and a 30-hour Sweepstakes on a single CD. Ken says the timing indicator in the program is accurate, so he can locate a specific QSO quickly.

WX9U used to record and review a fair number of his contest efforts. When the importance of improving accuracy became apparent a few years ago, Phil reviewed some of his logs. He found that he had an error rate much less than 1%, so he has not bothered checking his UBN reports. He now records and reviews a contest every few years just to make sure he is not getting careless.

Phil's method of recording is to use a videotape. A T-160 tape gives him 8 hours of recording time at SLP. He feeds the audio from the rig to the audio input of the VCR and aims a small black and white video camera at a clock for the time reference.

Logging Mistakes

W2UP has found that about a third of his errors are copying errors, typically just something like a missed dit. Barry notes that a lot of his mistakes seem to be due to distractions caused by his second receiver. About two-thirds show up as Not In Logs, and these seem to be solid contacts on the recording. He thinks that the other station probably did not log the contact for some reason, or was actually working another station on the same frequency.

KB1H has found that his reductions are commonly due to a mix of incorrectly copied calls and typing errors. Dick recommends learning to type properly to reduce the latter kinds of errors.

K6LA says he has to be careful with "JS" and "JH" prefixes. WE9V finds most of his copying mistakes are with the numbers "7" and "8" and the letters "S" and "H."

K5KA—a strong supporter of the new log checking process—reviews UBNs when possible. Ken finds that he often has typing errors following the number "8." Dick is working on improving his focus, slowing down when necessary and completely eliminating guessing, and Ken is striving for the "golden log" as a matter of pride.

KB1H notes that when the closer log checking was initially introduced, his multi-op crew suffered some large score reductions that moved them down in the standings. Since they started reviewing UBN reports and taking more care to improve accuracy in logging, though, score reductions have been greatly reduced.

A problem noted by K3MM is those times when you may be sharing the same CQ frequency with a station you can't hear. This is pretty common on the higher bands. If your CQ calls get synchronized, you may be fooled into thinking that you are working the other station's respondents. Ty remarks that this can rack up a huge number of penalty points very quickly.

If he suspects that this is occurring, Ty will ask the other station to repeat back his call or he will ask if the frequency is clear. If he identifies a problem, he changes frequency.

Bill, AA4LR, notes that a frequent error that shows up on his Sweepstake's UBN reports is the other station logging his check as "35" instead of the correct "75." Since the other station is penalized—not him—when this happens, he wonders if it is worth the effort to ensure that the other guy gets it right. Still, Bill believes that if accuracy is important, it works both ways and he takes special effort to be sure that his check is copied correctly.

KJ9C makes an effort to be sure that the other station gets his call correctly. Mel doesn't want an incorrect version of his call ending up in someone's master call list. Also, if he is unsure of an exchange or call, he will often listen to the guy's next QSO as a check.

Reducing Errors

K9JY makes a concerted effort to find a clear CQ frequency, as that minimizes the chance of problems with exchanges. W2UP doesn't log any station that does not respond to a request for a repeat or confirmation. On a similar note, N6XI sends "SRI NIL TRY LATER" when he can't get the exchange or call after a reasonable number of tries. This lets the other guy know he is not in the log.

In marginal situations, N4ZR repeats the exchange he received and asks for

confirmation. Pete believes this saved him 30 to 40 QSOs in the last ARRL 10-Meter Contest. Randy, K5ZD, takes extra care when the other station makes sending mistakes, especially if he *thinks* he knows what the other station meant.

Besides taking more time to get repeats when he is unsure, WE9V likes to employ *WriteLog*'s CW decoder as a "sanity checker."

K6LA discovered that a lot of other stations log his ARRL section as "LA" instead of "LAX." Ken now says "LAX" instead of "Los Angeles."

Billy, AA4NU, has replaced his old mantra—"rate rate rate"—with a new one—"rate *and* accuracy." His trick to reducing typos is to say out loud what he hears and then type it. Then he checks to make sure the two agree.

With the popularity of vanity calls, there are a growing number of similar calls. When I got W9XT in 1977 there were no other contesters with "XT" suffixes and few calls with "X" suffixes (as the FCC had previously reserved those for experimental stations). Now it is common for there to be at least one or two other stations in a contest with the same suffix as mine. This can be a problem when there's a pileup and the station that's responsible for it comes back to me with something along the lines of "XT 5908." If I just respond "W9XT 5904" and he doesn't repeat my full call, I'll never know for sure whether he logged me or some other "XT." In these situations, I just repeat my call in response to his partial-call exchange, thereby encouraging him to repeat my full call. He doesn't get my half of the exchange until I can confirm he's responding to me.

KB1H notes that the spots that show up on packet have very high error rates. His group takes great pains to verify the call signs of packet spotted stations that they chase down.

According to K3MM, as band conditions deteriorate and signal strengths decrease, the risk of copying errors increase. Ty tries to minimize the number of very weak stations he works early in the contest in order to minimize the number of errors. This also helps to keep the rate up. When things slow down later in the contest, he can take more time to be sure he gets the information from weak contacts correctly. Ty also notes that late in the contest fatigue gets to be more of a factor—and that can lead to sloppiness.

UBN reports have added a new goal for some contesters. Besides trying for a higher score, a number of operators work towards the highest accuracy they can obtain. Making the UBN Honor Roll in contests is one of the primary objectives at KB1H.

The Other Side

UBN log checking is a controversial subject. Not everyone is enamored with UBN reports—to say nothing of the associated penalty points. AA4GA is one with a poor opinion of the process. Lee relates a story where he was on 40 phone in CQWW and needed to work the US for a multiplier. On Sunday morning he came across a multi-multi with a low rate CQing for VE. Lee called him and told him that he needed the QSO for a mult, and the exchange was made. When he got the UBN for the contest, Lee found he was not in the log and lost the multiplier. One solution that Lee rejects is working several zero point QSOs to ensure getting the multiplier.

The other side of that coin that some have voiced is that larger stations don't like working a lot of zero point QSOs. Besides the obvious waste of time, there is the possibility that the big station could make a logging error and end up being penalized for a QSO that has no potential value.

Although he is a big fan of having access to log checking reports, K1HT did run into an occasion where some of his contacts were incorrectly reported as NIL. Dave found that a large number of those NILs occurred while he was S&Ping. Since he would not have logged them unless he had heard the CQing station send his call back correctly, Dave got curious and asked that contest's log checking committee to investigate. After a closer look at the logs, it turned out that half of the contacts reported as NILs in the UBN report were actually in the other station's logs. This occurred several years ago. Hopefully such bugs in the log checking software have been fixed.

Most contesters feel that accurate logging is part of the contest and that you should not gain an advantage by sloppy operating—although assessing penalty points is much more controversial. The fact is that your score can be severely reduced if you are not logging accurately. Reviewing your UBN reports and taking special care in areas where you are weak can minimize your score reductions in future contests.

Thanks to those who shared their experiences and thoughts on UBN reports, including AA4GA, AA4LR, AA4NU, AE9B, KB1H, KJ9C, K1HT, K3MM, K5KA, K5ZD, K6LA, K9JY, N4ZR, N6XI, WE9V, WX9U and W2UP. Thanks also to K9LA for suggesting this topic.

Topic for May-June 2002 (deadline March 6th)

Station and Operating Changes as the Sunspots Decline

Most of the previous predictions for the current sunspot cycle suggested that at this point we would already be on the down slope, but a second peak has provided us with a reprieve. We are living on borrowed time, though.

What station preparations do you plan to make to be more in tune with future conditions? When do you plan to make these changes? What contests will you operate that you avoided during the sunspot peak? Conversely, what contests will you stop operating as solar conditions deteriorate? Will you operate fewer contests in the next few years because of poorer conditions?

Send in your ideas on this subject 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. ■

Results, October 2001 *NCJ* RTTY Sprint

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An increase in participation, more submitted logs, great propagation and a better understanding of the unique format of the Sprint combined to add up to a better, more entertaining, faster-paced and higher-scoring October 2001 RTTY Sprint Contest.

Even our offer to accept any and all log formats—electronic, paper, *whatever*—still kept over half of the entrants from sending in a log, though. We ended up without any logs from contestants in the 3rd and 8th call districts, but we did pick up participants from two more Canadian provinces and several more DX locations.

Soapbox comments turned in this time around included "What a fast, fun, frustrating time," "Most fun I've had all year!," "Won't miss another one," "My fingers were tired," and "Why didn't more people show up on 80?"

There are some very nice certificates available, so don't miss the next running on March 10th, 2002, from 0000Z to 0400Z (Saturday evening in North America). The dates, complete rules, team registration and log submission information can be found in the Jan/Feb 2002 issue of the *NCJ*, or on our Web site: **www.ncjweb.com**.

Top 10 Breakdowns

Call	*Score*	*QSOs*	*QSOs Lost*	*Mults*
K7SV	9666	179	3	54
AF4Z	8525	155	3	55
W6/G0AZT	8460	180	0	47
KI6DY	8450	169	0	50
W7WW	7968	166	0	48
KE7AJ	7375	125	2	59
AE5P	7191	153	2	47
KE5OG	6400	128	1	50
K4QD	6000	125	4	48
K4GMH	5967	153	0	39

Top 10 QSOs

W6/G0AZT	180
K7SV	179
KI6DY	169
W7WW	166
AF4Z	155
AE5P	153
K4GMH	153
W0ETC	129
VA3DX	129
KE5OG	128
K4QD	125

Top 10 Mults

KE7AJ	59
AF4Z	55
K7SV	54
W9HLY	52
KI6DY	50
KE5OG	50
W7WW	48
K4QD	48
NY1S	48
W6/G0AZT	47
AE5P	47

Golden Logs

(>50 QSOs, none removed)

NY1S	W0ETC
W4AUI	W0TY
WB4EQS	WB0YRQ
WA0SXV	N0HR
W6/G0AZT	NH6XM
W7WW	VA3DX
W7DPW	VE3IAY
K4GMH	VE7QO
WD9GMK	
KI6DY	

Single Operator Scores

Call	*Name*	*QTH*	*QSOs*	*Mults*	*Score*
NY1S*	Joe	ME	118	48	5664
KF2XF*	Don	NY	29	18	522
K7SV*	Larry	VA	179	54	9666
AF4Z	Don	FL	155	55	8525
K4QD	Jan	FL	125	48	6000
K4GMH	Mike	VA	153	39	5967
W4AUI	Bill	TN	104	41	4264
WB4EQS	Ron	FL	86	43	3698
AE5P*	Army	TX	153	47	7191
KE5OG	Bill	TX	128	50	6400
WA0SXV	Mike	NM	88	38	3334
K5AM	Mark	NM	39	17	663
W6/G0AZT*	Edy	CA	180	47	8460
AC6JT	Bryan	CA	107	41	4387
KJ6RA	Rich	CA	40	22	880
K6OWL	Mark	CA	2	2	4
W7WW*	Dave	AZ	166	48	7968
KE7AJ	Barb	WA	125	59	7375
W7DPW	Dave	WA	61	32	1952
W9HLY*	Vern	IN	113	52	5876
WD9GMK	Alan	IN	71	29	2059
WA9ALS	John	IN	19	15	285
KI6DY*	Bob	KS	169	50	8450
W0ETC	Lar	IA	129	45	5805
W0TY	Tony	MO	90	36	3240
WB0YRQ	Al	IA	87	35	3045
N0HR	Pat	IA	95	32	3040
K0XU	Jim	NE	43	27	1161
NH6XM*	John	HI	73	31	2263
VA3DX*	Glenn	VE3	129	42	5418
VE3IAY	Rich	VE3	79	31	2449
VE6YR*	Bob	VE6	101	46	4646
VE7QO*	Wilf	VE7	93	40	3720
CT1AOZ*	Jose	CT1	42	26	1092
RK6BZ*	Yuri	UA	9	5	45
OH2LU*	Tapani	OH2	3	3	9
DM5GI*	Hajo	DL	2	2	4

*Certificate winners ■

Results, August 2001 NAQP CW Contest

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Sorry for the delay in getting you this report on last August's NAQP CW Contest. My busy schedule got the better of me. This was one of the better August contests—from the standpoints of both participation *and* scores. I received logs from 235 participants. Most were submitted via e-mail and were in the recommended Cabrillo format. Although electronic submissions help tremendously, I still have to do a lot of manipulation to get them into the correct format for my log checking routine.

Taking top honors for the umpteenth time was Bill, W4AN. He topped Doug, N6RT, who was operating from W6EEN, with a 28-multiplier margin. (Bill collected a good number of these on 10 and 160 meters.) Not far behind Doug were W4PA and N6MJ. A mere 452-point difference separated them.

The multi-two race was also a good one with W5KFT (operated by K5PI and N5KO) edging out the second and third place teams at K5KA and WE9V. Texas seemed to be the place to operate multi-two from, as four of the twelve entries we received came in from the Lone Star State.

Top 10 Single Operator Combined CW/SSB Scores

Call	CW Points	SSB Points	Total Points
N6RT	449	500	949
N6MJ	430	475	905
N4ZZ	389	315	704
KB3AFT	331	334	665
N0AV	297	289	586
W5WMU	314	239	553
K4RO	314	197	511
K6AM	225	264	489
WC4E	322	143	465
KG9X	237	219	456

Just a brief reminder to those folks operating in the multi-two category, please remember that you must submit a separate log for each transmitter, or, if submitting a combined log, you must identify which transmitter was used for each QSO. Nearly half of all of the M2 logs received required resubmission, as the transmitter info could not be determined from the initial version that was sent in. This data is needed to check for compliance with the 10-Minute rule. Double check your logging software setup before the contest begins!

The Team competition sported 27 preregistered teams. The Southern California Contest Club captured the Gold. Very close behind was Team #1 from the Tennessee Contest Group. Team contesting is a great way to get your local contest club on the air by getting folks committed to joining a team. The Tennessee Contest Group (TCG) sported five teams this time and the Society of Midwest Contesters registered seven. Great going guys, keep up the good work.

Doug, N6RT, operating at W6EEN edged out fellow SCCC contester N6MJ for the top score in the Combined CW/SSB category. Congrats go to Doug *and* Dan on their great efforts!

Well, as I complete this column, my mailbox is already filling up with the logs for yet another NAQP CW Contest. As I enter my 8th year as manager, I look back and feel good that the contest continues

Single Op Breakdowns

Call	Score	QSOs	Mults	160	80	40	20	15	10	Team
W4AN	207915	835	249	64/26	120/34	224/44	227/52	126/52	74/41	SECC #1
W6EEN (N6RT)	186745	845	221	21/10	104/33	215/47	253/52	193/52	59/27	SCCC #1
W4PA	179300	815	220	54/25	150/39	236/46	194/49	140/43	41/18	TCG #1
N6MJ	178848	828	216	18/7	54/24	233/48	268/52	197/52	58/33	SCCC #1
N4ZZ	161994	798	203	59/26	152/42	215/45	216/49	148/39	8/2	TCG #1
N6ZZ	154241	731	211	41/21	82/30	142/38	246/49	162/49	58/24	SCCC #1
N4AF	148005	759	195	54/25	116/33	209/46	233/46	138/37	9/8	PVRC
AD5Q	143412	703	204	43/19	77/33	189/42	225/46	120/40	49/24	
K5RC	142964	694	206	25/10	91/31	177/43	175/47	168/50	58/25	NCCC #1
K6LL	141052	716	197	20/7	68/26	193/42	225/47	165/51	45/24	SCCC #1

Multi-Two Breakdowns

Call	Score	QSOs	Mults	160	80	40	20	15	10
W5KFT	282240	1176	240	42/22	145/43	351/52	335/53	232/47	71/23
K5KA	261954	1134	231	82/23	182/44	330/50	364/49	112/37	64/28
WE9V	257948	1093	236	111/32	180/42	312/51	312/53	137/39	41/19

Team Scores

1. Southern California Contest Club #1		*2. Tennessee Contest Club #1*		*3. South East Contest Club #1*	
W6EEN	186745	W4PA	179300	W4AN	207915
N6MJ	178848	N4ZZ	161994	W4OC	129151
N6ZZ	154241	K4RO	130910	K4NO	102583
K6LL	141052	K4LTA	104825	W4NTI	42054
Total	660886	N4IR	78186	*Total*	481703
		Total	655215		

4. Florida Contest Group #1 (N4AO, K5KG, K1PT, NJ4M) 465599
5. Potomac Valley Radio Club (N4AF, N4CW, K4QPL, KO7X) 418979
6. Society of Midwest Contesters #1 (K9RS, N0AV, N9FH, W9IU) 413037
7. Southern California Contest Club #2 (K6AM, N6AA, W6TK, K6NR, XE2MX) 392379
8. Parker County Peaches #2 (N5RG, W0UO, N5PO, W5GN, AA5UN) 377373
9. Northern California Contest Club #1 (K5RC, K6AW, K6CTA) 331598
10. Rush Drake Quintet (N0AX, N7OU, KI7Y, K7AW) 301646
11. Society of Midwest Contesters #2 (K0OU, KG9X, WA9IRV) 262949
12. Northern California Contest Club #2 (W6YX, NA6E) 157863
13. South East Contest Club #2 (K4BAI, W4ATL, AA4LR, K4OGG) 157276
14. Tennessee Contest Club #3 (NA4K, W4NZ, K4BEV) 135203
15. Mad River Radio Club #1 (KU8E, NU8Z) 130352
16. South East Contest Club #3 (K2UFT, K4IQJ, AD4J, W4OGG) 103643
17. Mad River Radio Club #3 (NY1S, K9NW, K8NZ) 85092
18. Green River Valley ARS (KE0FT, K9WA, NO9S, KG9IE) 76391
19. Mad River Radio Club #2 (W8RU, NX8C, K8AAX, N8MG, K8MR) 61435
20. Society of Midwest Contesters #5 (AE9B, N9IJ, K9MI) 59764
21. Society of Midwest Contesters #7 (W0UY, W9VA, KJ9C, N9KO) 50733
22. Society of Midwest Contesters #4 (K9WX, W9XT) 46962
23. Tennessee Contest Club #4 (NY4N, W0ETC, KE4OAR) 46323
24. Florida Contest Group #2 (N4IG, KB4N) 43095
25. Society of Midwest Contesters #3 (AA9NF, AK9F, N9XX, K9KM) 32108
26. Society of Midwest Contesters #6 (N9GUN, K9GY) 15176
27. Tennessee Contest Club #5 (W4AUI, W9WI, AC4ZD) 13319

to be fun and exiting, and is enjoyed by so many folks. The NAQP has grown from a relatively small informal operating event to a semi-major contest that both seasoned veterans and newcomers alike enjoy competing in. The increase in participation and competition is great, but most importantly folks, let's keep it fun!

73, Bob, K6ZZ

Soapbox

A dull afternoon on 15 and 20, with a more exciting evening on 40 and 80.—*AD6G*. As always a lot of fun!—*K6ZM*. As good as conditions were in January, in August they were not.—*N0AX*. Deaf in one ear and can't see out of the other but it was a fun way to spend a few hours at the radio.—*AA8U*. Didn't have much chance to operate, but had a blast swimming amongst the sharks with 250 mW on 20.—*AG0T*. First time I have participated in the contest. Had a great time. Next year I will plan on operating for the entire event. Keep up the great work—*VA3SB*. First time operating this contest. It's great! Lightning storm cut my operating short.—*W4ATL*. Folks, please read the rules—DX stations only send their name!—*VR2BG*. Found the conditions hard going. Particularly QRN, sometimes in the middle of a QSO. I found this very tiring. I still enjoyed the contest, as always.—*VA7LC*. Fun contest!—*KE6QR*. Fun 'test and format. Wish I had more time for a serious effort!—*W7GG*. Got moved around a lot. SO2R must really be getting popular.—*NY1S*. Great contest. Great fun.—*K4RO*. Had lots of fun in spite of lousy band conditions on 15 meters. Lots of great operators on, and the herd was well behaved.—*N5IW*. I don't think I've ever heard 160 so good in August.—*AD5Q*. I got home from VE6-land about 18 hours before the contest. After getting caught up with two weeks of ignored obligations, I finally got on the air about 2150Z with a Ten-Tec 1320 (3 W), a 4 Ah battery, a set of walkman headphones, a notepad and a Windom at 45 feet. (Thanks N4ZZ!) There were a surprising number of deaf competitors, but XE2MX and YN4SU (who I don't think was really in the contest) weren't among them. CU in the Sprints!—*W9WI*. I need to improve the low band antennas—*N9GUN*. Just a part time S&P effort, but I will work the "troika" this summer of NAQP—CW, RTTY and SSB.—*W0ETC*. Just getting some practice with *Writelog*.—*N3MX*. Mobile from three states! I changed QTH in my report but did not dupe on same band.—*KJ9C/M*. My first time over 100k if it stands up to the log check. High bands with exception of 20 were not good here in NTX. Thank goodness for 160 thru 40 and beverage antennas. Did not work MS, ID, MT, DE, NE or SD, although my teammates say there was an MS and SD present. Also missed NB, YT, NS, LAB, PEI and NWT. As usual, it was enjoyable and a good time on the radio.—*N5RG*. Operated from my mobile at the information center at Cheyenne, WY. Requests for QSY to other bands was difficult to do as had to go change out the element on the Hustler mobile antenna. Managed okay for most requests, however, on 10-40 meters. I need a better antenna if I do this again. A number of people stopped by to hear the CW signals on the speaker. The most interesting person was a retired submarine radio operator who knew CW. I encouraged him to get into ham radio and use his code ability.—*W0ETT/7*. Operated portable from my mother-in-law's while there for my wife's birthday. Set up was easy and it was fun to be on the air while away from home.—*KE4OAR/8*. Thanks to all for the QSOs. XE1/AA6RX is now retired. I will be in the US for several months. My return to Mexico is still TBD. I have a new call sign. Please listen for N6AN!—*XE1/AA6RX*. Thanks to Ray for the use of his station!—*K9RS*. This is a fun contest. No frequency fights, clean CW, minimal QRM—but lots of empty space with no QSOs.—*W5GN*. Thunder, lightning, poor conditions, drum major camp—I'm lucky I even got on the air!—*N1MD*. Just prior to the contest I heard very few ops "revving their rigs" and thought maybe I had the wrong date. However, once the test started, there was good activity. Conditions started off very poor here, especially on 20, but improved significantly. Heard only a few signals on 10 which I checked periodically. Great fun, as always.—*NO5W*. What a day. I got a call at 9 AM that a subcontractor had cut six conduits to a strip mall they were working in. Guess who got to put the damn thing back in order. Pulled several thousand feet of heavy copper. About 5 PM—after a very brief dinner and a well-needed shower—I strolled down to the shack hoping I could stay awake. Enjoyed the NA QSOs. Got a chance to hear my beverage for the first time and love it!! No noise problems here. I think I'll have to string a couple more this winter. Probably spent too much time on 80 and 160, but I was in lust with my new antenna. Looking forward to some rest tomorrow. NAQP fits my schedule pretty well when I don't get called in on emergency duty. Thanks to all.—*AE9B*. Worked paddle left-handed and QRP. Lots of fun!—*N9IJ*.

Single Operator Scores

Call	Score	QSOs	Mults	Section	Team
K1VUT	115325	659	175	MA	
NY1S	54944	404	136	ME	MRRC #3
WM1K	46920	408	115	MA	
K1PQS	39098	346	113	ME	
AB1BX	17640	245	72	RI	
N1MD	1581	51	31	CT	
WB6BIG	1122	34	33	NH	
KA2D	20608	224	92	NY	
W5KI	1053	39	27	NJ	
AA3B	120060	667	180	PA	
NA3V	31742	269	118	PA	
W3BBO*	19836	228	87	PA	
K3ZV	19135	215	89	PA	
K3WW	18568	211	88	PA	
WO3Z	15000	200	75	PA	
N3MX	5880	105	56	PA	
W3ERU	2046	62	33	MD	
N8LXR	1092	52	21	PA	
N3CZB	24	6	4	PA	
W4AN	207915	835	249	GA	SECC #1
W4PA (@K4JNY)	179300	815	220	TN	TCG #1
N4ZZ	161994	798	203	TN	TCG #1
N4AF	148005	759	195	NC	PVRC
N4AO (WC4E)	134079	717	187	FL	FCG #1
K5KG	132480	640	207	FL	FCG #1
K4RO	130910	689	190	TN	TCG #1
W4OC	129151	649	199	SC	SECC #1
K1PT	114800	656	175	FL	FCG #1
KT4ZX (KG4BIG)	110048	608	181	KY	
K4LTA	104825	599	175	TN	TCG #1
N4CW	103140	573	180	NC	PVRC
K4NO	102583	607	169	AL	SECC #1
NA4K	92904	553	168	TN	TCG #3
K4QPL	86818	523	166	NC	PVRC
NJ4M (WD4AHZ)	84240	540	156	FL	FCG #1
KO7X (@KI7WX)	81016	533	152	NC	PVRC
N4IR	78186	498	157	TN	TCG #1
K4BAI	75432	449	168	GA	SECC #2
N4BP	64904	488	133	FL	
K2UFT	48195	357	135	GA	SECC #3
W4NTI	42054	326	129	AL	SECC #1
W4ATL	41912	338	124	GA	SECC #2
K4IQJ	40066	299	134	AL	SECC #3
AE4Y	37968	339	112	GA	
N4IG	37740	340	111	FL	FCG #2
AA4LR	32612	263	124	GA	SECC #2
K4LAW	27927	261	107	FL	
NY4N	23735	235	101	TN	TCG #4
W4NZ	21560	245	88	TN	TCG #3
K4BEV	20739	223	93	TN	TCG #3
K4PB	14525	175	83	FL	
AD4J	12070	170	71	GA	SECC #3
W4AUI	11020	145	76	TN	TCG #5
K9BG	9246	138	67	FL	
K4OGG	7320	120	61	GA	SECC #2
NF4A	6272	112	56	FL	
KB4N	5355	105	51	FL	FCG #2
KS4YX	4464	93	48	SC	
W4OGG	3312	72	46	TN	SECC #3
W9WI	1755	65	27	TN	TCG #5
K0COP/4	1715	49	35	SC	
KJ9C/M	1664	52	32	TN/NC/SC	SMC #7
K4WI	975	39	25	AL	
AC4ZD	544	32	17	TN	TCG #5
N6ZZ	154241	731	211	NM	SCCC #1
AD5Q	143412	703	204	TX	
W5WMU	130732	667	196	LA	
W5TM	105248	598	176	OK	
N5RG	102466	563	182	TX	PCP #2
KZ5D	101652	516	197	LA	
W0UO	100777	563	179	TX	PCP #2
N5TU	94050	570	165	TX	

Call	Score	QSOs	Mults	Section	Team
N5DO	77910	530	147	TX	
N5PO	75460	490	154	TX	PCP #2
W5ASP	74202	498	149	TX	
W5GN	70356	492	143	TX	PCP #2
N1LN	66096	432	153	TX	
AA5AU	36378	282	129	LA	
AA5UN	28314	242	117	TX	PCP #2
W5MK	22848	224	102	AR	
WA0SXV	22260	265	84	NM	
N5IW	16182	186	87	TX	
N3BB	13359	183	73	TX	
NO5W	12998	194	67	TX	
WR5O	9750	150	65	TX	
W3DYA	9486	153	62	TX	
N5OT	3300	66	50	OK	
AB5FS	2146	58	37	OK	
KE5C	2072	56	37	TX	
W5NR	1224	51	24	TX	
WA5RAT (N5OT)	72	9	8	OK	
W6EEN (N6RT)	186745	845	221	CA	SCCC #1
N6MJ (@W6KP)	178848	828	216	CA	SCCC #1
W6YX (N7MH)	131943	721	183	CA	NCCC #2
N6NF	113488	656	173	CA	
K6AW (@W6NL)	105432	573	184	CA	NCCC #1
N6NT	100893	597	169	CA	
K6AM	93760	586	160	CA	SCCC #2
N6AA	83476	509	164	CA	SCCC #2
K6CTA	83202	566	147	CA	NCCC #1
W6TK	77308	502	154	CA	SCCC #2
W6RGG	75651	501	151	CA	
K6NR	69309	459	151	CA	SCCC #2
WN6K	56826	462	123	CA	
K6LRN	26265	255	103	CA	
NA6E	25920	240	108	CA	NCCC #2
K6TA	13943	191	73	CA	
WO6M	12717	157	81	CA	
W6RKC	11473	149	77	CA	
AD6G	10220	140	73	CA	
WA6BOB	9798	138	71	CA	
W6ISO	9652	127	76	CA	
KE6QR	8856	123	72	CA	
K6III*	7245	115	63	CA	
KQ6NN	6900	115	60	CA	
K6EP	6572	106	62	CA	
W6FZA	5332	172	31	CA	
K6ZJ	5225	95	55	CA	
W6MVW	2686	79	34	CA	
K6ZCL	1624	56	29	CA	
N6TW	1600	50	32	CA	
K5RC	142964	694	206	NV	NCCC #1
K6LL	141052	716	197	AZ	SCCC #1
W7CT	104442	618	169	UT	
N0AX	98784	588	168	WA	RDQ
N7OU	84010	542	155	OR	RDQ
KI7Y	61910	410	151	OR	RDQ
K7AW (K5ZM)	56942	401	142	OR	RDQ
W7GG	53793	387	139	OR	
N7LOX	48068	394	122	WA	
NC7O	36842	338	109	WY	
W0ETT/7	19920	249	80	WY	
W7HS	16168	172	94	UT	
W7EAI	9702	154	63	WA	
N7RX	7808	128	61	OR	
KU7K	6944	112	62	OR	
NW7DX	4004	91	44	WA	
W7YS	1696	53	32	AZ	
KU8E	79016	476	166	OH	MRRC #1
NU8Z	51336	414	124	MI	MRRC #1
K8KFJ	39100	340	115	WV	
AA8U	39060	315	124	MI	
KC8FS	37247	313	119	WV	
W8RU	29120	260	112	MI	MRRC #2
KG8GW	22515	237	95	WV	
WX3M	20900	220	95	MI	
KA1DDB	19437	209	93	MI	
K8CV	16554	186	89	MI	
K3XXX (K8BK)	16240	203	80	MI	
NX8C	12627	183	69	MI	MRRC #2
K8AAX	9344	146	64	MI	MRRC #2
KB8PGW	8804	142	62	MI	
N8MG	7320	120	61	MI	MRRC #2
WA8WV	6630	130	51	WV	
K8NZ	5400	100	54	OH	MRRC #3
K8MR	3024	72	42	OH	MRRC #2
KE4OAR/8	2400	60	40	OH	TCG #4
K9RS (KB3AFT)	137815	641	215	IL	SMC #1
N9FH	102600	600	171	WI	SMC #1
KG9X	98940	582	170	IL	SMC #2
WA9IRV	62609	457	137	WI	SMC #2
WT9U	61466	421	146	IN	
W9IU	49044	402	122	IN	SMC #1
K9WX	35030	310	113	IN	SMC #4
K9WA	25376	244	104	IL	GRVARS
K9NW (@N9RV)	24748	269	92	IN	MRRC #3
N9IJ	20774	221	94	IL	SMC #5
AA9NF	12240	170	72	IL	SMC #3
W9XT	11932	157	76	WI	SMC #4
AK9F	10502	178	59	IL	SMC #3
N9GUN	10360	148	70	IL	SMC #6
K9UQN	9900	150	66	IL	
N9CK	9648	144	67	WI	
N9XX	5544	99	56	WI	SMC #3
W9YS	5015	85	59	IL	
K9GY	4816	112	43	IL	SMC #6
K9MI	4158	99	42	IN	SMC #5
K9KM	3822	91	42	IL	SMC #3
W9VA	3480	120	29	IL	SMC #7
N9KO	714	34	21	IL	SMC #7
KG9IE	112	16	7	IL	GRVARS
N0AT	128064	696	184	MN	
N0AV	123578	637	194	IA	SMC #1
NA0N	104380	614	170	MN	
K0OU	101400	600	169	MO	SMC #2
K0DE*	53200	400	133	CO	
KE0FT	50553	369	137	IA	GRVARS
W0UY	44875	359	125	KS	SMC #7
AE9B	34832	311	112	MO	SMC #5
N0AJ	33790	310	109	MO	
KN0V	26250	250	105	MN	
K4IU	26104	251	104	MN	
W0ETC	20188	206	98	IA	TCG #4
W0BR	16380	210	78	KS	
KE0T	6000	120	50	ND	
K0QP	5145	105	49	KS	
KS0M	5076	94	54	MO	
KF0U	3570	105	34	CO	
NO9S	350	25	14	IA	GRVARS
AG0T	16	4	4	ND	
VE3KP	65240	466	140	ON	
VA3UA	56420	434	130	ON	
VE3STT	53340	381	140	ON	
VE5SF	43050	350	123	SK	
XM2AWR	40356	342	118	QC	
VE7FO	29344	262	112	BC	
VA7LC	19292	212	91	BC	
VA3UZ	17850	210	85	ON	
VE3HG	8505	135	63	ON	
VA3SB	5358	94	57	ON	
VE3WZ	5184	108	48	ON	
VE2OWL	690	30	23	QC	
XE2MX (N6KI)	68526	486	141	DX	SCCC #2
XE1/AA6RX	65052	417	156	DX	
M0SDX	74408	524	142	DX	
UZ7U	11970	190	63	DX	
LY1DR	1829	59	31	DX	
OK1FCA	1248	52	24	DX	
SM6CRM	1131	39	29	DX	
DL5VSB	975	39	25	DX	
RV1CC	352	22	16	DX	
VR2BG	228	19	12	DX	

*Denotes a QRP entry.

Multi-Two Scores

Call	Score	QSOs	Mults	Section
W5KFT (K5PI, N5KO)	282240	1176	240	TX
K5KA (+N5RZ, W0UA)	261954	1134	231	OK
WE9V (+K9PG)	257948	1093	236	WI
W5NN (K1OJ, K5GA, K5NZ)	255824	1084	236	TX
KT0R (+K0AD, K0SR, K0XQ)	209592	984	213	MN
N5YA (K5WO, N5UM)	202180	919	220	TX
N0NI (+N0HR, N0AC, W0FLS, WO0V)	193228	938	206	IA
KW9A (K9JE, K9LU, K9MMS)	137804	733	188	IL
W5SB (WA5OJE, N5ET, W5MJ, KK5LD)	133892	748	179	TX
WW2Y (+N2NC)	77865	537	145	NJ
K6ZM (K2KW, K6WG)	69090	470	147	CA
KB1H (K1EBY, N1XS)	59658	489	122	CT

■

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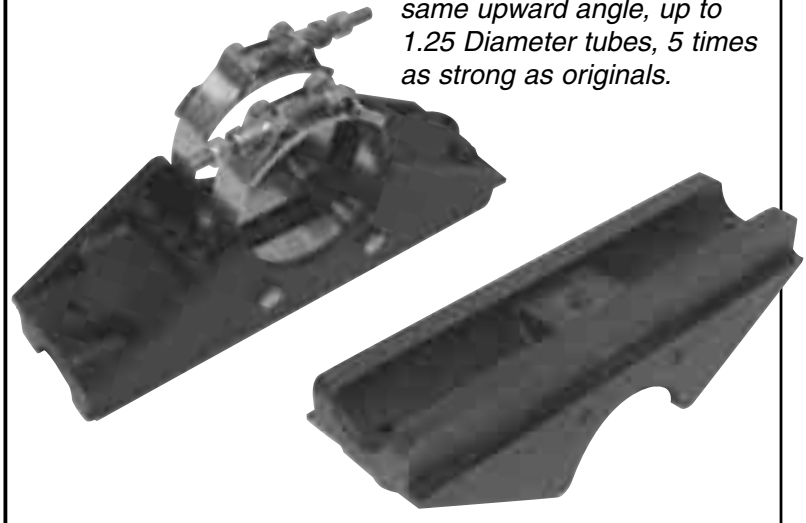

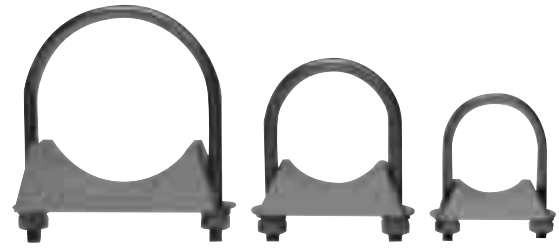

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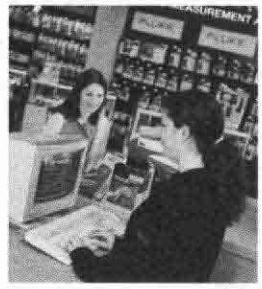

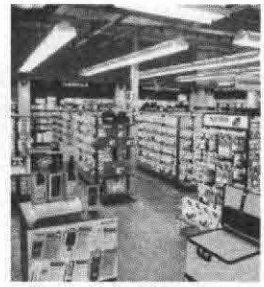

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.750" ... $1.00/ft	1.750" ... $2.50/ft
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HF5B, 5 Band Minibeam	$429
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A1712, 12/17m Kit	$54
CPK, Counterpoise Kit	$129
RMKII, Roof Mount Kit	$159
STRII, Roof Radial Kit	$125
TBR160S, 160m Kit	$119

More Bencher/Butternut–call

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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	$55
SBB7NMO, 2m/70cm Mobile	$75
Z750, 2m/70cm Mobile	$55
Z780, 2m/70cm Mobile	$69

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NR72BNMO/NR73BNMO	$39/54
NR770HBNMO/NR770RA	$55/49
X200A/X3200A	$129/210
X500HNA/700HNA	$229/369
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X50A/V2000A	$99/149
CR627B/SG2000HD	$99/79
SG7500NMO/SG7900A	$75/112

More Diamond antennas in stock

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Challenger DX	$289
Challenger Counterpoise	$29
Challenger Guy Kit	$19
Eagle DX	$299
Eagle Guy Kit	$29
Titan DX	$329
Titan Guy Kit	$29
Voyager DX	$409
Voyager Counterpoise	$49
Voyager Guy Kit	$45

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13B2/17B2	$139/249
A270-6S/A270-10S	$79/99
A3S/A4S	$449/539
A50-3S/5S/6S	$95/169/259
A6270-13S	$169
AR2/ARX2B	$49/69
AR270/AR270B	$85/99
R6000/R8	$319/469
X7/X740	$679/289
XM240	$719

Please call for more Cushcraft items

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144–148 MHz

2M4/2M7/2M9	$89/109/119
2M12/2M5WL	$149/199
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

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6M5X/6M7	$199/279
6M7JHV/6M9KHW	$419/449

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6M/2M/220/432	$89/39/42/43

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15M4DX, 4 Element 15m	$419
20M4DX, 4 Element 20m	$499

More M2 models in stock–please call

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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, 3kW Antenna Tuner	$309
1798, 80–2m Vertical	$249
1796, 40/20/15/10/6/2m Vert.	$189

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

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G6-270R, 2m/70cm Vertical	$169
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Hustler Resonators in stock–call

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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

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45AG2/4	$209/225
AS25G/AS455G	$39/89
BPC25G/45G/55G	$75/99/110
BPL25G/45G/55G	$85/109/125
GA25GD/45/55	$68/89/115
GAR30/GAS604	$35/24
SB25G/45/55	$39/89/109
TB3/TB4	$85/99

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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

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RG-8X Jumpers	Please Call

Please call for more coax/connectors

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Yaesu G-1000DXA	$499
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Yaesu G-550/G-5500	$299/599

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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	$1899
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TMM541SS	$1499
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TX472/TX489	$2459/4579
HDX538/HDX555	$1269/2269
HDX572MDPL	$5899

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Please call for more hardware items

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