



April/May 1992

Editor: Tim O'Sullivan, KE8OC

IT'S SPRINGTIME!

"Spring is sprung, the grass is riz..." Well, not really. In fact, I don't have any grass to "riz" yet, and the weather up here in Michigan has not been too spring like, but the major portion of this contest season is over and boy was it a gooder. For starting on the down side of the latest solar cycle, conditions for most of the contest weekends seemed to be real good. It's also time for the annual pilgrimage to Ham Radio Mecca, The Dayton Ham Vention. So get that shopping list together, break open the piggy bank, and head on down to Dayton and for show. Be sure to stop in at the MRRC hospitality suite at Stouffers and the MRRC meeting held on Saturday at Noon behind the Cushcraft exhibit in the main arena where the annual MRRC Choo-Choo is bound to make a stop. Hope to see you there!

THE MAD RIVER RADIO CLUB

President: Dave Pruett, K8CC
2727 Harris Road
Ypsilanti, MI 48198
(313) 481-0755

Treasurer: Ken Rogner, WD9INF
2520 Centennial Road
Toledo, OH 43671
(419) 841-8781

Scorekeeper: Jim Stahl, K8MR
30499 Jackson Road
Chagrin Falls, OH 44022
(216) 831-6954

Editor: Tim O'Sullivan, KE8OC
39991 Finley Drive
Canton, MI 48188
(313) 397-9732

From the 'Big Fish'

By Dave Pruett, K8CC

Outgoing presidents often use the occasion of their departure to reflect on the accomplishments of their past term. As we approach Dayton 1992, with the election of new officers, it would perhaps to be beneficial to survey even beyond these past two years to glean some insights as to where the club is going for the future.

I see this to be a milestone year for several reasons. Twenty years ago, we were embroiled in the famous "asterisk year" brouhaha from the 1971 ARRL Sweepstakes. MRRC survived, but the Affiliated Club Competition in ARRL contests would never be the same. Ten years ago, K8CC attended his first MRRC meeting, at the Dayton Hamvention. That same year, MRRC elected me as the 'Big Fish'. You should have known better...

1982 was also important in that a number of new people came to join MRRC. Most of these people were from Michigan, which induced significant changes in the demographics of the club. Over the succeeding years, other bursts of new members would join. We saw this when the Port Huron and the Adrian/Toledo groups discovered Mad River.

Each time a new group of members comes in, there is an opportunity for change. When this fresh blood steps up and is willing to accept the responsibilities of office, along comes new ideas, objectives, goals and focus that can take the club in new directions. This "changing of the guard" is beneficial to the club in the long run. When long

**The MAD RIVER RADIO CLUB net
occurs every Monday evening at
8:30pm EST on 3825 Khz ± QRM.**

MRRC members become weary of the burdens of

'Big Fish' (continued)

office, they welcome the chance to let someone else lead. We are fortunate that these people traditionally have not dropped out of MRRC, but move on to other productive roles in the organization.

It is my observation that we are due for another influx of people. This past year has seen renewed activity from the Columbus area, with a solid mix of long-time and new MRRC members. Other than Columbus, we have seen little growth in Ohio, which is probably due to the effects of the North Coast Contesters.

One cannot look over the past two years for MRRC and not see the effects of the NCC. Some of it has been bad - we lost a number of long time active members, and there are undoubtedly some people recruited to NCC who would have otherwise joined MRRC. On the good side, I think the hard-line NCC attitude towards membership and activity helped to clarify the things that we like about MRRC.

I see many strengths in the Mad River Radio Club. Our wide geographic base gives us diversity in our interests and activities. Among our membership, we have highly technical people who are proficient in the various crafts of radio and computers. We have people who can produce newsletters, and those who can keep our bank account balanced. We count among our ranks some of the finest operators in the W8 area. But more important in my view, is that this same bunch of people are for the most part a wonderful group of human beings.

But there is room for improvement. MRRC has always been, and will probably continue to be, a very loosely run organization. Personally, I prefer it this way, as I spend five days a week dealing with excessive amounts of bureaucracy at my place of employment. However, a casual attitude leads to apathy if not recharged occasionally, and in my opinion there are three areas where we, as a club, need to put forth more effort.

First of all, is the **Dayton Hospitality Suite**. Whenever I talk to our club members, everyone seems to be pleased that MRRC sponsors the hospitality suite. However, when we try to get people to staff the bar, finding volunteers is like pulling teeth. Its even harder to find someone who is willing to be responsible for the operation of the suite. Two years ago, Ted, K8AQM and Ken, WD9INF organized the suite with great success. Last year, Ted was in Japan, so Ken

handled it solo. This year, the burden fell on him again by default. Perhaps Ken did not complain enough, but its more likely that we did not ask.

I believe that this will be a pivotal year for our Hospitality Suite. The expensive NCC/FRC lounge on the Stouffer's first floor will attract a certain clientele, and it remains to be seen how this will affect traffic in our suite, as well as those of KCDXC and SoMC. In my view, the NCC/FRC suite caters to the east coast contingent, while our suite and that of the Society of Midwest Contesters represents those of us here in the Midwest. If MRRC and SoMC got together, our combined suite would rival KCDXC or NCC/FRC in size. This makes sense from the fiscal and logistical points of view, so we will see if the SoMC guys are interested.

The second need that I see within our club is to support the **MRRC Monday Night Net**. Throughout my tenure as president, it has been my intent to operate the first 30 minutes of the net as if it was an informal club meeting. Whether this has been accomplished or not is open to debate, but it is my observation that many of our club members never check in to 3825. I charge our new president (whoever that may be) to make it a priority to be on the Monday Night Net. I also encourage all of the Mad River membership to try to make it also.

Finally, I challenge our club to continue to try new things. Here in W8, it can be very hard to "win" a contest outright, so sometimes we must look in different places for our challenges. For example, this past year K8AQM, K8DD, and AC8W et al went to Saipan for ARRL DX CW. KN8Z and crew made big noises in the 160m contests, as well as AA8AV operating from K8CC (Ken's first try on 160). Several MRRC'ers continued to push the envelope in Sweepstakes. Some people tried VHF, and a few people strove for zero point scores in WPX. Some of these efforts were winners, but many of these efforts were not record breakers. However, each served as a challenge for the operators involved, and the club was vitalized by the activity.

In conclusion, my successor will inherit a MRRC that is vital and will continue to grow. I hope that we will continue to recruit and attract new people to our club and contesting in general. It has been my privilege to be your president, and I look forward to our activities in the future.

73, Dave, K8CC

A 5 Element Alternative to the W2PV 4 Element Yagi-Uda Array By Steve Miller, WD8IXE

Over the past decade, the W2PV 4 element (PV 4) Yagi-Uda array has been a very popular design for HF contesting and DXing. The first description of this design, that I know of, was in the May 1982 issue of the YCCC Scuttlebutt by Bill Myers, K1GQ, although this article states the design had been around several years. The PV 4 sports good gain, and a very high "Front to Back" (F/B) ratio at the center design frequency on a 0.57 wavelength boom. However, the original article also states:

"The gain and VSWR tend to degrade rapidly at the high end of the band...The center of gravity ... (is) behind the center of the boom...(and) The antenna is unbalanced in the wind"

Calculations also show the F/B ratio is rather poor at both band edges. In the manner the PV 4 was first presented, its mechanical and (narrowband) electrical characteristics seem to have room for improvement.

The search for an alternative to the PV 4 began following a discussion with Bob Hayes, KW8N, after the ARRL SSB DX contest. Bob uses the PV 4 as the lower antenna in his 15 and 20 meter stacks. (The top antennas are a KLM 6 for 15 and a NBS 5 for 20.) During the SSB contest, Pat, NZ4K, blew up the gamma match on both PV 4 antennas. This was a surprise since a month earlier, I operated the ARRL CW contest from Bob's station with no trouble. After thinking about who else had mentioned problems with gamma match failure, I realized that most incidents involved a PV 4 antenna. The PV 4 input resistance gets quite low toward the high end of the band where, according to Bob, Pat had been occasionally CQing. Apparently, the low input resistance aggravates the gamma match problem (more on this later). Eventually, I told Bob the PV 4 design could probably be improved at which time he asked me to look into it.

This article presents a new, "optimized" Yagi-Uda design for 20 meters and comparisons to the PV 4. Design calculations used Yagi Optimizer software (YO 4.14) by Brian Beezly, K6STI. Keep in mind that "optimized" is a relative term in antenna design. To qualify as optimized, the design goals and *philosophy* must be well defined. During the design process, the relative importance of the following factors were considered for the electrical characteristics: VSWR, Gain, Pattern, and Bandwidth. Physical factors include: Boom Length, Element Placement,

Turn Radius, Wind Load Balance, Weight Balance, and Survivability.

As for the physical design factors, the boom length of the new design is kept the same as the PV 4, 40 feet on 20 meters. Since this design would replace the lower antenna of a stack, elements must be positioned to allow antenna rotation while side-mounted to a tower. The boom to mast plate is placed at the center of the boom. This results in a turning radius very near the theoretic minimum, an important consideration with nearby guy wires.

The constraints of element placement lead to the choice of a 5 element design. Wayne Hillenbrand, N2FB, noticed the parasitic elements of his fine 6 element design were nearly equally spaced (see NCJ Jan-Feb 1986, pp 16-18). The YO starting point for the new design had 4 equally spaced parasitic elements placing the driven element between the reflector and first director. This results in a tail-heavy, imbalanced design. The weight imbalance is easily remedied by weighting the light end of the boom. To ease rotor strain while turning the antenna, the wind-load can be balanced by proper placement of a "dummy" element (made from PVC or another non-conducting element). This information along with survivability aspects should be available in the new book by Dave Leeson, W6QHS, Physical Design of Yagi Antennas, published by the ARRL. As of this writing (March 1992), the book was not yet available at the local ham store so specific details are unavailable.

The main motivation for the new design is to improve the electrical characteristics compared to the PV 4. Since Bob's station is active on CW and SSB (and the band is often full during major phone contests), it is desirable to maintain good VSWR, gain, and pattern across the entire band. YO was run with occasional adjustments of the optimization parameters to find a good overall design. After roughly 20,000 iterations, a suitable design emerged.

Following the design work, I noticed a SHORT5.YAG file on the YO program disk that contained a nearly identical design to the one I had just finished. It had a slightly better VSWR using a longer driven element. I lengthened the driven element of my design then re-optimized

5 Element Yagi (continued)

and came within 0.25 inches of all element lengths and positions of the SHORT5. (I wish I had looked at that file sooner!)

Several plots show various electrical characteristics of the PV 4 (on the left) and the new 5 element (on the right). The plots are actual YO screens using the WordPerfect "grab" feature (the quality is poorer than hoped). Each plot is auto-scaled so be careful when comparing plots as the scales are different. Dimensions of the design (neglecting boom and element clamp effects) are as follows:

Diameters:	1.000"	0.875"	0.750"
<u>Position</u>	<u>Length</u>	<u>Length</u>	<u>Length</u>
0.00"	72.00"	68.00"	74.97"
74.94"	72.00"	68.00"	63.13"
149.88"	72.00"	68.00"	57.98"
288.93"	72.00"	68.00"	55.28"
477.12"	72.00"	68.00"	45.53"

The VSWR of the new 5 element design is less than 1.5:1 across the entire band. This is a major improvement over the PV 4. The low VSWR results in less reflection loss from impedance mismatch. The better match also keeps the equipment happier and should require less amplifier retuning while moving up and down the band. At Bob's station, the low VSWR will provide a more equal power split between the upper and lower antennas for his stack configurations.

The antenna input resistance remains almost constant across the band and is higher than the PV 4 design. This makes the gamma match less prone to capacitor breakdown. The gamma match calculator in YO had a difficult time finding reasonable rod diameters and spacings to match the PV 4. Gamma match designs for the 5 element design were much easier to obtain. Some 50 ohm gamma match values are listed below.

<u>Dia.</u>	<u>Spacing</u>	<u>Length</u>	<u>Capacitance</u>
0.50"	2.0"	49.1"	329 pF
0.50"	4.0"	36.6"	408 pF
0.75"	2.0"	63.0"	571 pF
0.75"	4.0"	47.9"	725 pF

Capacitance values for the 5 element design average 2 to 4 times more than those for the PV 4. The voltage across the gamma capacitor is therefore lower by roughly a factor of 2 to 4 for the 5 element design thereby reducing the chance of gamma capacitor breakdown. Larger gamma rod diameters and spacings increase the required

matching capacitance which further reduces the chance of failure. This problem is more prevalent when a higher impedance step-up is required to match the antenna (those of you with 75 ohm feedlines take note).

Directivity of the 5 element design is between 9.74 and 9.85 dBi in free space. The PV 4 directivity ranges from 9.80 to about 10.15 dBi in free space. Thus, the PV 4 has a slight edge in directivity however, the reflection loss due to impedance mismatch is higher for the PV 4. A loss of 0.18 dB occurs at a VSWR of 1.5:1 increasing to 0.50 dB at 2:1 and 1.25 dB at 3:1. Taking this into account, the gain of the 5 element design is slightly better on average. The gain difference between the PV 4 and 5 element designs are probably inconsequential over 99% of the time.

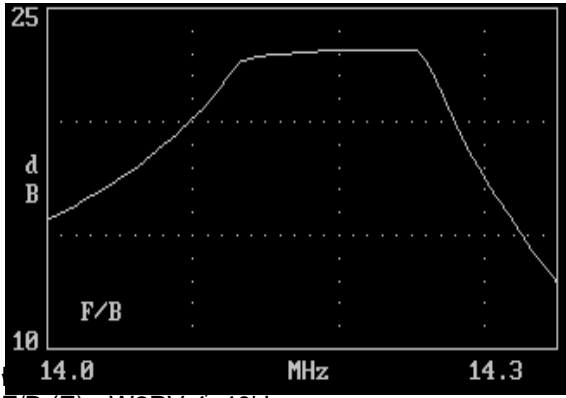
The new 5 element design has an improved pattern. The "Front to Back" ratio plots shown for both designs would be more accurately described as "Front to Rear Lobes" ratio. The rear lobe region is 90 - 180 degrees for E-plane plots, labeled as F/B (E), and 135 - 180 degrees for H-plane plots, labeled F/B (H). Four cases were plotted, free space, and above perfect ground at 50, 75, and 100 ft. [only free space E plots are shown - Ed]. E-plane patterns above ground are taken at the main lobe elevation angles, 18, 13, and 9 degrees for 50, 75, and 100 ft, respectively. In each case, the 5 element outperforms the PV 4 "Front to Back" particularly near the low and high ends of the band. The additional rejection from the rear should provide better signal to noise/QRM levels and hopefully will result in fewer repeats when working weak stations.

The new 5 element design is an attractive alternative to the PV 4. The electrical design has been improved with respect to the chosen design goals and philosophy. The cost (or disadvantage) of this improvement is the additional wind loading presented by the 5th element (and "dummy" element if used). From my point of view, this cost would be well justified. For those using the venerable 204BA, this design would be a nice step up (more gain, better F/B) and the old 204BA boom could be used for the following 15 meter version:

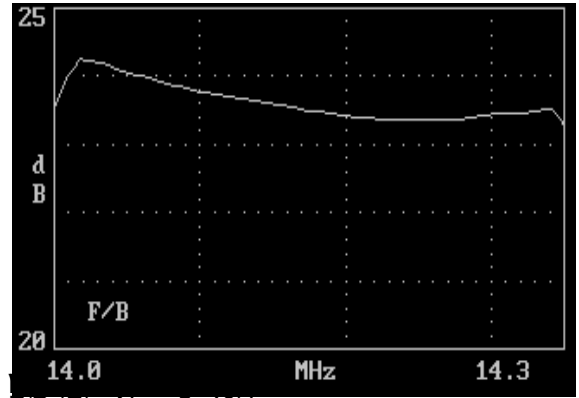
Diameters: 1.000" 0.875" 0.750"

<u>Position</u>	<u>Length</u>	<u>Length</u>	<u>Length</u>
0.00"	72.00"	44.00"	27.15"
50.05"	72.00"	44.00"	18.74"
100.10"	72.00"	44.00"	14.73"
185.47"	72.00"	44.00"	13.02"
309.00"	72.00"	44.00"	6.55"

Good luck to those who try this design, it should work well.



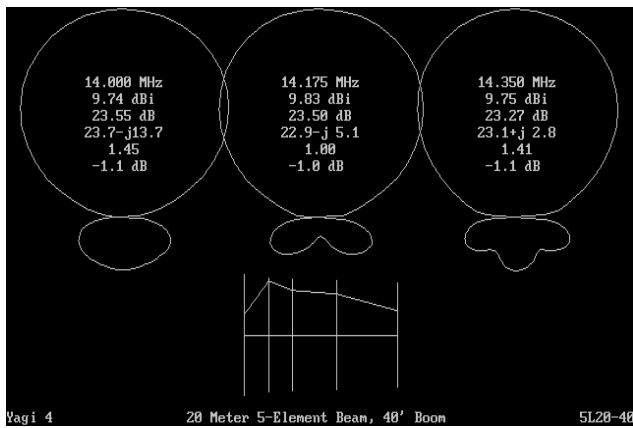
Gain (F/B) vs Freq, 40' boom



Gain (F/B) vs Freq, 40' boom



YO screen - W2PV 4, 40' boom



YO screen - New 5, 40' boom

MRRRC 1992 SCORE RUMORS

de K8MR

ARRL DX CW

KW8N(WD8IXE)

18 18
88 43
274 63
888 70
711 80
757 87
2736 361 2,963,088

NA8V

14 13
47 33
360 61
906 78
651 80
763 79
2741 344 2,828,712

K8MFO 1291 314 1,216,122
AA8AV 976 223 652,992 A POWER
N8CQA 328 113 111,192 QRP
AA8FE 125 77 28,875
K8MR 1622 337 1,639,694 +PKT
N8ATR 262 204 160,344 +PKT
WD9INF 144 67 28,875 +PKT
N8CXX(K8JM) 1287 106 411,000 10M
W8IQ 980 102 299,880 15M
W8FN 670 82 164,820 15M
K7EG(KU8E) 205 61 37,515 80M

WD8LLD

25 24
59 40
354 72
1022 99
828 100
732 99
3020 434 3,932,040 M/2

K8CC

13 13
44 32
232 71
640 86
758 86
909 88
2596 376 2,928,288 M/S

W8SH 268 110 88,440 M/S
AH0/AC8W(+K8AQM,K8DD,N8CC,VE3RIK)

19 11
141 26
410 47

230 41

953 56

1053 57

2806 238 2,003,484 M/2

CQWW 160 CW

K9ALP 614 71 103,000

FEB CW SPRINT

KU8E 273 43 11,739

FEB SSB SPRINT

KU8E 273 51 13,923

ARRL DX SSB

KW8N(NZ4K)

10 9
55 35
82 46
790 92
571 103
817 103
2325 388 2,706,300 S/O

AA8AV 867 255 663,255 S/O A POWER
K8MFO 800 250 600,000 S/O
K8DD 477 176 251,856 S/O A POWER
7J3ABO 468 101 141,804 S/O 50W.

N8ATR

4 3
40 31
67 54
239 85
284 103
984 123
1618 399 1,618,399 S/U

K8MR 696 245 511,560 S/U
WD8IXE 352 170 179,520 S/U
W8FN 355 166 176,970 S/U

K8CC(+KE8OC,AA8FE,W8WD,N8CQA,N8JEC)

10 7
48 31
144 56
947 98
1271 121
1006 115
3426 428 4,398,984 M/2

KN8Z ? ? 1.6M M/2

CQWW 160 SSB

K7EG(+NZ4K,KC8MK,VE3OZB)

845 65 121,000 M/S
N8ATR 700 62 93,200
K8MR 140 36 10,728

WPX SSB

KW8N 80-10 154

21
478
967
713
2333 837 4,647,000 S/O

W8SH 287 230 165,663 20M
N8CQA 240 185 12,445 S/O LP
WD8IXE 23 23 0
NE8T(+N8CXX,AA8FE,K8CC,N8BTU)
80-10 78
32
1073
1064
711
2958 902 6.4MEG M/S

AA8U 2783 856 5.7MEG M/S

More Signs of a Burned Out Contester

By Jim Stahl, K8MR

K1AR provided an interesting list in his September CQ contest column of signs of a burned out contester. A few signs, however, were missed. Here they are:

You have started going through your old HA QSL cards to play Rummy on the Air. You mark down the dates for the QCWA QSO Party.

Ditto for the Classic Radio Exchange.

You believe that your antenna is working great because everyone you worked in the contest gave you a 59 report.

You start giving out honest signal reports.
You ask the other guy to QRS and repeat - on phone.

You attend the local swapfest on the first Sunday in November.

You tell the kids they can have the computer for the weekend, and start searching through the drawer where you kept the blank log sheets.

You decide that Friday night in Dayton is a good time to get some sleep before the big day.

You recognize the model number of ICOM's latest handi-talkie.

In shopping for your new high end contest rig, you check out which ones have FM capability.

KN8Z Update

Doc would like to thank everyone for all of the cards and well wishes he received during his "replumbing job", and is well on his way to recovery. Doc has also announced that he will host an "MRRC meeting/open house/social hour swimming party, drinking contest, and bull session" at his home on August 1. Details will be included in a future edition of the 'FLASH'. If you've never been to Doc's, this is one you won't want to miss, so mark it on your calendar.

Thanks Doc!

Mad River Radio Club
Tim O'Sullivan, KE8OC
39991 Finley Dr.
Canton, MI 48188