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Manager - AB7RG

Manager Notes

DX Antennas: Verticals vs. Horizontal:

Created by Bob Raynor, N4JTE on 2013-11-24

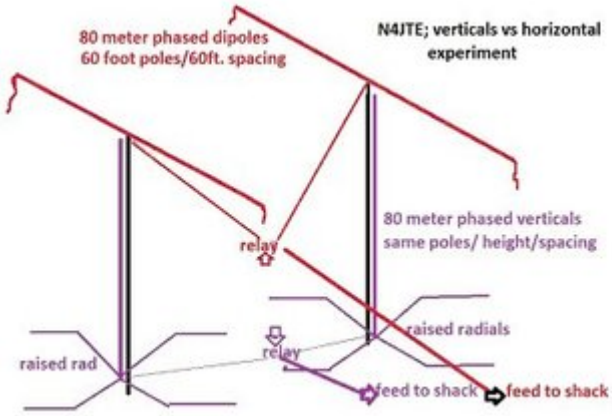
DX Antennas: Verticals vs. Horizontal:

By N4JTE

After reading many comments endorsing vertical antennas as the best choice for lower band DX, I decided to do some real world evaluation and documentation from my backyard in the Hudson Valley of NY. on 40 and 80 meters. Elevation is 382ft. asl with Shawgunk mountains East and Catskill mountains North .
Not my first QTH choice for DX chasing!
All antennas basically favor East/ West.

THE ANTENNAS

80 Meters



A: Phased 2 element *verticals* **using #12 insulated wire** on 60ft. Spider Poles with 1/4wl spacing using Christman phasing. Each vertical had four non symmetric raised radials at approximately 6ft. high and 60ft. long. The impedance was measured at 30 ohms for each vertical. The SWR was 2 to1 and fed direct.B: 2 element *dipoles* at same poles using **20 gauge insulated wire** at 55ft. tall. Dipoles were somewhat flat with non-symmetrical ends due to tree locations, not ideal spacing and some ends dangling. SWR was 2.2 to 1 and fed direct.

40 MetersA: Phased 2 element *verticals* at 50ft. tall with four raised radials angling down from 12ft. Same phasing 1/4wl spacing with 50 ohm impedance, fed direct.B: Phased 2 element *horizontal* dipoles, above photo, at 40ft. high at 1/4wl spacing resulting in SWR of 2.1 to1.

NOTES

The antennas were tested with the usual antenna 1, antenna 2 query, no description was provided until after reports were exchanged.
Switched at desk with less than one second comparison delay.
During 80 testing the 40 antennas were disconnected with radials on the ground. Same was done during 40 testing to alleviate possible mutual coupling. Some late night flashlight work involved with that, hi.
ALL antennas were reversible and exhibited very substantial gain and front to back but those results were not included for clarity on the chart.
Most contacts available for review on DX Summit under my call.
Stateside not charted as we are discussing DX, but worked 91 stations as OMISS 40 NCS one night, awhile back. The verticals never exceeded the horizontal with HI, AK and 38 other states in the mix.

Column1	Column2	Column3	Column4	Column5	Column6
DX CALL	DATE TIME	FREQENCY	HORIZONTAL	VERTICALS	LOCATION
YT1AA	9/16 2210	7152	59 +10	59	SERBIA
7X4AN	9/16 2218	7177.5	59	55	ALGERIA
OZ1BCG	9/16 2224	7145	59	45	DENMARK
9K2OS	9/24 0250	7166	59+ 15	58	KUWAIT
UA6LJV	9/26 2259	7158	57	57	RUSSIA
CT9/CT1FFU	9/27 2240	7160	59+	54	MADEIRA ISLANDS
CU3AC	9/28 2112	7173	59+10	55	AZORES
EJ8M	9/29 2201	7136	59	56	IRELAND
ON7TQ	10/2 2129	7156	59	33	BELGIUM
Z32OE	10/7 0127	7183	59+10	55	MACEDONIA
G0EVY	10/8 0212	7156	59+22	59	ENGLAND
ZS6TQ	10/12 0340	7144	59	59	South Africa
E79D	10/14 0415	7154	59+20	58	Bosnia Herzegovi

Column1	Column2	Column3	Column4	Column5	Column6
EA8MT	9/21 0340	3795.8	59	55	Canary Islands
EA7JZ	9/21 0343	3788	59	57	SPAIN
HA8DM	9/21 0353	3792	59	57	HUNGARY
EA3AKP	9/22 0545	3790	59	55	SPAIN
IV3YER	9/23 0353	3795	59++	59	ITALY
HK6F	9/26 0309	3795	59	59	Columbia
G0EVY	9/26 0429	3780	59+ 20	59	ENGLAND
I5XSS	9/26 0508	3790	59	55	ITALY
G4NLH	10/8 0528	3797	59	59	ENGLAND
G4AMN	10/9 0636	3799	59+	58	ENGLAND
CU3AC	10/10 0109	3793	59	55	AZORES
OE3MBG	10/10 2236	3799	58	52	Austria
S54ZZ	10/11 0354	3790	59	44	Slovenia
EI6S	10/12 0526	3799	59+	57	IRELAND
F4DSD	10/12 0558	3791	59	59	FRANCE

CONCLUSIONS:

Pretty obvious from my backyard that the horizontal wires outperformed the verticals almost 100% during the tests. It may appear as a small sample as presented, but I only presented verifiable contacts as posted on DX summit. There were uncounted multitudes that put up with this experiment and I thank all of you for letting me butt into qso's on 40 and 80.
I have heard some very strong signals from vertical antennas on the bands. They are an antenna that truly depends on location, location, and Installation!

As far as being a better DX antenna, some or all the time; I don't see that from here! I compared well-constructed vertical and horizontal wire gain antennas in the same direction and I feel it was a very fair test. This experiment was informative to me and resulted in my removing all vertical wires and radials and stay

exclusive to horizontal phase reversible wires for 40 and 80 DX.
Your mileage may vary!

Tnx for reading,
Bob

W6PU (/user/view-userprofile?id=W6PU)	2014-01-05	
RE: DX Antennas: Verticals vs. Horizontal:		

PS: Sorry, I forgot to add this: When I speak of using
an end fed long wire for 160, 80, and 40 Mtr DXing, I qualify this as meaning at least one full wavelength on the lowest frequency.

73/W6PU

> Reply to a comment by : **W6PU** on 2014-01-05
>
> *I loved reading this antenna thread, and would sure like to see more of them. First licensed(K2DGT) in 1953, I guess that this makes me an O.T-Ha! Love chasing DX, and find the 160, 80' and 40 Mtr. bands to be most challanging. On these bands in particular, have found over 60 years of DXing that unless I could get my low band dipoles up at least 1/2 wave length, where they would start to develope some low wave angle output, that they could not compete with my home brew verticals in DXing, or DX contesting on the low bands. For low angle work, short of a LF Vert. array, a couple of end fed long wires always did a decent job for me. I have found this to be true: Big signals don't just happen. They are usually the result of many hours of hard work designing and building your antenna set up! Some of you might enjoy reading of my low band Vert. set up on my QRZ.Com Bio. Cheers! Bob / W6PU Cheers!*
>
> > Reply to a comment by : **W5EN** on 2014-01-02
> >
> > *An amusing test that I enjoyed reading. It would apply to my station more if I did not live on a city lot, if I had room for 2 phased fed dipoles at 40 feet, and if I did not have neighbors to complain about a wire array. In the meantime I'll continue to use my single 6BTV, buried radial system, and single feed system. I enjoy both CW and SSB contacts on all ham bands from 40 meters to 10, something your dipole array will not accomplish. I've worked over 250 countries using this station and a 500 watt amp. My point is that there are many factors that affect our antenna selection. 73 de W5EN Steve*

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Cheers!
Bob / W6PU

Cheers!

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W8IFI (/user/view-userprofile?id=W8IFI)	**2013-12-27**	
RE: DX Antennas: Verticals vs. Horizontal:		

Who here would accept a Ham's casual experiments as scientific fact? Only someone who is emotionally unsure of himself would have to give credentials, personal history to show they speak with authority and point out perceived flaws in methods. Hams usually can mentally separate fun from laboratory results. They don't have to put themselves on a pedestal.

> Reply to a comment by : **KX2T** on 2013-12-23
>
> *Yes Bob I will try to get on 75 at night, I still feel on 75 a pair of phased L's would work better than my rectagular loop but I would give up the rag chew antenna for stateside contacts, the loop is kind of a mixed bag and if I could fit 130 center fed flat top it might do better but dont have the room. I did install a 40mtr inverted delta up 75' which I fed at the bottom center and have two high supports which works real well so far. Not knowing what the ground conductivity here at my qth and just going by the soil here I would say that the horizontal antennas do better. In ON4UN's low band DX book he h=goes into loops and both types of fed systems and the vertical style feed will work the best under very good ground conditions but when you look at his charts under poor ground they suck. When I was on LI the only verticals that worked well were with elevated radials or an intense ground screen system, here again soil there was sand. Moving up here I lost 5db I feel from long island, great radio qth but way to many live there and I would rather have the breathing room up state. When I built my contest station back in the 90ies I proved real well what LI was worth and what I had up would have had to been up higher and larger in size if up here. Back then two crank ups and 9 yagi's layed down a signal that would compete with some of the best east coast stations and on 75 I ran two pahsed inverted vee's up 80' and the ends were 40'. Here again the verticals work real well on band openings but once the band opened the vee's would hang the some of the best plus they would still have some hi angle that would keep the frek clear from local's. I feel that which is better depends on your qth and the soil conductivity unless you ar willing to lay tons of copper in the ground. Jim KE2TR*
>
> > Reply to a comment by : **N4JTE** on 2013-12-05
> >
> > *Jim all good info, feel free to join a dx group on 3788, give or take usually tabled by G0EVY and starts when he gets on 9 or 9.30 pm our time.always talking antennas and whateverelse we can think of hi. Bob*
> >
> > > Reply to a comment by : **KX2T** on 2013-12-04
> > >
> > > *Hi Bob, when I was on LI I had run a pair of phased verticals, they are great for when the band opens and closes, the lower angle gain is not all that good when the band is opened well from what I have seen, 4 sqrs do better but hi horizontal antennas seem to work better. Since I have been here in Carmel, ny a horizontal rectangular loop seems to work best facing ENE/WSW on 75mtrs at 65'. Will be placing a 40mtr loop up soon about 70' high, I would love to phase a pair but don't have the room and feel that there would be to much interaction between too many antennas so close together. That is why your verticals seem to suck wind in the reports as well, they act as extra ground screens for your horizontal dipoles but the dipoles are masking your verticals performance. to do these typle of tests right you need to get a larger yard and space them much farther away. Thats why I am sticking with just the loops here on a 1/2 acre plot, the loops are less prone to interaction. On 75mtrs a pair of inverted L's would phase real well and your take off angle would be around 30 degree's which woulod work here on the east coast better than two full size verticals for most dx thats on the band. CUL Jim KE2TR*
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> > > >
> > > > *Well johnz or whatever, give us a real world test link that disputes my "casual" results. bob*
> > > >
> > > > > Reply to a comment by : **JOHNZ** on 2013-12-03
> > > > >
> > > > > *@W6QW Pulleeeeeze! This was a casual experiment, conducted under unscientific conditions*

and lacking any formal engineering practices, which makes it not even close to what would be considered a "benchmark."

Reply to a comment by : **W6QW** on 2013-12-03

As they say, your mileage will vary. Bringing up the subject of which antenna is superior is akin to discussing politics or religion. With that said, N4JTE provided an observation based on his conditions alone and is viable as a benchmark for others to consider. Had he run the same test at the edge of a salt water environment, the results would have been different.

Reply to a comment by : **N4JTE** on 2013-12-03

I approached this experiment with no agenda other than to present my results from my backyard. I do hope when a new ham reads just about everywhere, especially the vendors, that verticals are the best antenna for DX they take a second look and understand the physics and luck required for a vertical to meet or exceed a well place dipole. Bob

Reply to a comment by : **W4MY** on 2013-12-03

Its all about the angles, gents. From THIS locaton, with THIS setup, and THESE ground conditions, obviously the the take off angles of the major energy lobe from the dipoles were more optimum than from the verticals for the desired destination. There are MANY antenna design decisions that can be made to get the best RF energy angle into the destination you desire. Both horizontal and vertical antennas can be used to achieve your desired result.

Reply to a comment by : **W1JKA** on 2013-11-24

Nice article,Once again you have shown the value of A/B comps and the effects of QTH, ground conditions and installation. Only those of us that have done this will know for sure and those who have not are either unable to for various reasons or refuse to admit that they will never know.

KX2T (/user/view-userprofile?id=KX2T)	**2013-12-23**	

RE: DX Antennas: Verticals vs. Horizontal:

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KE2TR

Reply to a comment by : **N4JTE** on 2013-12-05

Jim all good info, feel free to join a dx group on 3788, give or take usually tabled by G0EVY and starts when he gets on 9 or 9.30 pm our time.always talking antennas and whateverelse we can think of hi. Bob

Reply to a comment by : **KX2T** on 2013-12-04

Hi Bob, when I was on LI I had run a pair of phased verticals, they are great for when the band opens and closes, the lower angle gain is not all that good when the band is opened well from what I have seen, 4 sqrs do better but hi horizontal antennas seem to work better. Since I have been here in Carmel, ny a horizontal rectangular loop seems to work best facing ENE/WSW on 75mtrs at 65'. Will be placing a 40mtr loop up soon about 70' high, I would love to phase a pair but don't have the room and feel that there would be to much interaction between too many antennas so close together. That is why your verticals seem to suck wind in the reports as well, they act as extra ground screens for your horizontal dipoles but the dipoles are masking your verticals performance. to do these typle of tests right you need to get a larger yard and space them much farther away. Thats why I am sticking with just the loops here on a 1/2 acre plot, the loops are less prone to interaction. On 75mtrs a pair of inverted L's would phase real well and your take off angle would be around 30 degree's which woulod work here on the east coast better than two full size verticals for most dx thats on the band. CUL Jim KE2TR

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N0AZZ (/user/view-userprofile?id=N0AZZ)	**2013-12-23**	
RE: DX Antennas: Verticals vs. Horizontal:		

On 40m I use a hi Gain Hy Tower with 48 1/4w radials and a 3 element 40m beam at 60' and I'm a DX'er. In comparing the two of them for the last 5 years I have found that the vertical will match the beam about 60-70% of the time on DX over 2500 miles. I do use both of these antennas for duel receive with my K3's excellent combination.

For 80m I have 3 antennas the vertical and 2 wire antennas a 1/4w 80m and a 270' OCFD both at 65'. Again the vertical out preforms the others hands down by quite a bit.

I do live in the country on a farm in a very quite area with the closest house to me over a 1/4 mile away and that's to close 8>).

As always YMMV

73,
Fred/N0AZZ

> Reply to a comment by : **KD4IEM** on 2013-12-22
>
> *My view is this is an Apples and Oranges comparison. Everybody knows that to achieve maximum efficiency with a Omni-directional vertical antenna you are required to have at least 120 ground radials. Also, the dipole functions as a balanced radiator and does not rely on ground interaction to function at its full efficiency. This comparison sets up the vertical to function at a reduced efficiency. A more proper comparison would have been to have two completely separate antenna's at different locations that would not interact with each other, and the vertical located at ground level instead of elevated with a measly 4 radials in a ground plane configuration. Its difficult to see how one can derive a accurate conclusion based on one antenna designed with built-in in-efficiencies.*

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Its difficult to see how one can derive a accurate conclusion based on one antenna designed with built-in in-efficiencies.

LEON (/user/view-userprofile?id=LEON)	**2013-12-19**	

CHEERS

JOHNZ:

Hi Leon,
Feel free to share your opinions with me whenever you wish. My skin is as thick as they come. Got that way after 20 years military service, retired E-9, followed by almost three decades in corporate America and federal civil service. Cheers!

LEON:

Thanks for your service John.

My best 73 to you and your family, and God Bless!!

Merry Christmas!

LEON

> Reply to a comment by : **JOHNZ** on 2013-12-18
>
> *Hi Leon, Feel free to share your opinions with me whenever you wish. My skin is as thick as they come. Got that way after 20 years military service, retired E-9, followed by almost three decades in corporate America and federal civil service. Cheers!*
>
> > Reply to a comment by : **LEON** on 2013-12-18
> >
> > *THIS IS JOHNZ: @W8IFI Amateur radio experimentation is desirable and a historic part of our hobby. The single most important distinction to remember, however, is the world of difference between ham radio experimentation and professional engineering research, development, evaluation, and testing. Hams are not required to adhere to scientific and engineering rules and should not be, thus ham radio experimental results cannot and should not be accepted as scientific fact. That being said, any ham who shares his experimental results here should have thick skin and accept constructive criticism, a.k.a. having emotional maturity. _____ THIS IS LEON: Dude*

really? Being thick skinned, accepting constructive criticism, and emotional maturity are not your strong points John. Thanks for the advice though. LEON

Reply to a comment by : **JOHNZ** on 2013-12-17

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Reply to a comment by : **W8IFI** on 2013-12-16

Always a fun topic and sure to bring up a lot of friendly conversation. I enjoy hearing about various configurations that others have tried and their results. It also encourages us to do a little experimenting of our own with something different. After all, we start in the manual with a theoretical point of perfect ground, which can vary, so where that is exactly no one knows. We begin with an assumed and maybe not accurate starting point. So to demand that everything be tested and measured to the nth degree with $20,0000 worth of test gear at umpteen different points and have results published in scientific journals before they take the persons word for it,indicates perfectionist people with a serious problem! If someone says here is what I found I have no trouble accepting that as a starting point. I don't have to always put people on the defensive and go through their statements with a fine tooth comb looking for proof. This is a hobby, not a physics research lab or courtroom.

Reply to a comment by : **KF7VXA** on 2013-12-10

I should add that I've made contacts in most areas of the world (not every county) except the Aussy's and Africa. I also made contacts with the majority of the states including Alaska and Hawaii. I will need a NVIS for a couple states next to mine. So, with what I have and 100 watts, I'm not doing too bad. It can always get better. John

Reply to a comment by : **KF7VXA** on 2013-12-10

Bob, I do have inverted v's as well as regular dipoles. I also use a Gap Challenger vertical that does not require the ground field of other verticals and is a vertical dipole fed from the middle. Some don't care for the Gap, but it has done exceptionally well in making DX contacts. The numbers I get are much like your verticals, not 20 over 9's very often, but the important thing is that I still make the same contacts, a lot of 5-7's and 5-9's. I live on a valley floor with tall mountains (up to 14,000' on 3 sides of me. The open end is on the other side of the valley. Look at Google Earth, Victor, Idaho. I don't get VHF/UHF in or out of the valley except on the open side (and repeaters). I have yet to get any 6 or 10 meter activity with dipoles or the vertical. 12 meters is as high as it gets. All antennas did great during the 15 meter opening about a month ago, signals everywhere on the band and DX was great. 20 and 40 were fantastic also. Still decent, but not like it was. With everything being cyclic, it always depends on many things as to the distance and countries that can be contacted. Your experiment was a good one, but I doubt you would have the same results where I live. 73's John KF7VXA

Reply to a comment by : **N4JTE** on 2013-12-09

John my bloomers are fine, your the one that sent off the CAPS on your response, understand one thing if you have an open mind as a new ham, a vertical is the hardest

antenna to build that will ever match any advertisements or everything you read on the internet claiming it is a superior dx antenna, it takes a superior, labor intensive ground system to make up for ground losses, secondly any vertical antenna needs to have a far feild reinforcing wave to add any kind of gain, always hit and miss from our backyard. We have no ability to match vertical advertisements unless lucky enough to be on some island in the middle of the ocean. Basic stuff, get the max current point as high as you can if able simple physics. Final point, do both and write your own article, try an inverted vee versus a comercial vertical and report back be good to see how things work from your location. Bob

Reply to a comment by : **KF7VXA** on 2013-12-09

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Hi Leon, Feel free to share your opinions with me whenever you wish. My skin is as thick as they come. Got that way		

after 20 years military service, retired E-9, followed by almost three decades in corporate America and federal civil service. Cheers!

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W8IFI (/user/view-userprofile?id=W8IFI)	**2013-12-16**	

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Always a fun topic and sure to bring up a lot of friendly conversation. I enjoy hearing about various configurations that others have tried and their results. It also encourages us to do a little experimenting of our own with something different. After all, we start in the manual with a theoretical point of perfect ground, which can vary, so where that is exactly no one knows. We begin with an assumed and maybe not accurate starting point. So to demand that everything be tested and measured to the nth degree with $20,0000 worth of test gear at umpteen different points and have results published in scientific journals before they take the persons

word for it,indicates perfectionist people with a serious problem!
If someone says here is what I found I have no trouble accepting that as a starting point. I don't have to always put people on the defensive and go through their statements with a fine tooth comb looking for proof. This is a hobby, not a physics research lab or courtroom.

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Basic stuff, get the max current point as high as you can if able simple physics.
Final point, do both and write your own article, try an inverted vee versus a comercial vertical and report back be good to see how things work from your location.
Bob

Reply to a comment by : **KF7VXA** on 2013-12-09

Glad to hear there was not much mutual couplings. Everything I've read says that anything vertical should be kept a good distance away from each other. I've read this more than a few places so either the authors are wrong or I am, but I really don't care as I make it a point for good separation of my two verticals. Antenna analyzers don't show what signal patterns look like. That's why I asked the question, not to try and rip you one, but to learn. The jab about my look ups being more than 6 is the kind of thing that makes some just give it all up. I may be new to HF, but that does not mean that I have not been around other Hams for many years. I have more look ups other places, but that's not why I'm on the air and don't gauge my skill or manhood on the number of look ups. I enjoy a good round table much more than contesting. I've made quite a few DX contacts and enjoy just knowing that I was able to make contacts on the other side of the world. Contesting is not my thing. It's darn tough to have a decent conversation with a DX contact because as soon as you make a contact, there will be a pile up from small to large and when that happens, I'd just as soon sign off and give others who may really need the contact the chance, I'm just there for a rag chew. I only send QSL cards if asked. You posted your results, I didn't berate anything you said, only pointed out that many do not have the room or physical ability for that matter to put the wire in the air that you did. I do prefer to hear signals from all directions and hope some day to get something directional and movable up when I'm able. For the time being, I can switch to other antennas to see if one of my more directional antennas gets a better signal and also to see if I can hear the other station as well. Also as was stated by many, different locations, types of antennas etc. can produce different results. Sorry if you got your bloomers blow up, that was not my intention. I use both my vertical and a few dipoles and one may be better than the other one day, but not the next. As long as I'm happy with the contacts made, that all that really matters to me, not what anyone else thinks; using the antennas I have works great for me. Right now it's 18 below zero. I'm not much in the mood to try anything new till spring. I've got 6 through a decent portion of 160 covered by about 5 different antennas. May not be yagi's on a tower or dipole's all at 50 plus feet in the air, but they work for me. Anyway, 73's John KF7VXA

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N4JTE (/user/view-userprofile?id=N4JTE)	**2013-12-05**	
RE: DX Antennas: Verticals vs. Horizontal:		

Jim all good info, feel free to join a dx group on 3788, give or take usually tabled by G0EVY and starts when

he gets on 9 or 9.30 pm our time.always talking antennas and whateverelse we can think of hi.
Bob

Reply to a comment by : **KX2T** on 2013-12-04

Hi Bob, when I was on LI I had run a pair of phased verticals, they are great for when the band opens and closes, the lower angle gain is not all that good when the band is opened well from what I have seen, 4 sqrs do better but hi horizontal antennas seem to work better. Since I have been here in Carmel, ny a horizontal rectangular loop seems to work best facing ENE/WSW on 75mtrs at 65'. Will be placing a 40mtr loop up soon about 70' high, I would love to phase a pair but don't have the room and feel that there would be to much interaction between too many antennas so close together. That is why your verticals seem to suck wind in the reports as well, they act as extra ground screens for your horizontal dipoles but the dipoles are masking your verticals performance. to do these typle of tests right you need to get a larger yard and space them much farther away. Thats why I am sticking with just the loops here on a 1/2 acre plot, the loops are less prone to interaction. On 75mtrs a pair of inverted L's would phase real well and your take off angle would be around 30 degree's which woulod work here on the east coast better than two full size verticals for most dx thats on the band. CUL Jim KE2TR

Reply to a comment by : **N4JTE** on 2013-12-03

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@W6QW Pulleeeeeze! This was a casual experiment, conducted under unscientific conditions and lacking any formal engineering practices, which makes it not even close to what would be considered a "benchmark."

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Reply to a comment by : **W4MY** on 2013-12-03

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Sure, but first let me know which Engineering Journals accepted your findings for publication? Hint: QST, CQ Magazine, and your ham radio club newsletter are NOT engineering journals.

> Reply to a comment by : **N4JTE** on 2013-12-03
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N4JTE (/user/view-userprofile?id=N4JTE)	2013-12-02	

RE: DX Antennas: Verticals vs. Horizontal:

DIY, totally understand your comment, what was presented was for around 3 months, but after 30 years,and many stateside and international qth's the only Vertical that became my primary was a location on a out island in the Bahamas.
Would have been a really boring article with 30 years plus of DX contacts validating the point, hi
Repectfully,
Bob

> Reply to a comment by : **W3DIY** on 2013-12-02
>
> *Excellent!! I was impressed with your observations until modeling was mentioned. I learned on a 5 acre lot with an abundance of 100' tall trees with large trunk diameters and the poorest soil conditions modeling is useless here. Coupling with all of this nature nearby the Z of a base fed vertical is typically 10 ohms or less. While making A/B comparisons with as many wire antenna designs that would fit on 5 acres if someone asked which is the best for DX my reply would be at this very minute it's **** in 15min. it may be *** and tomorrow they may be equal. To borrow a comment from a previous post to this thread…it depends.*

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K9MRD (/user/view-userprofile?id=K9MRD)	2013-12-02	

RE: DX Antennas: Verticals vs. Horizontal:

RE: NO9E

Nice Graph

Reply to a comment by : **NO9E** on 2013-11-27

http://karinya.net/g3txq/temp/angle_of_arrival_stats/aoa_dipole_elevations.png

Reply to a comment by : **NO9E** on 2013-11-27

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No, No, and No... The results may be skewed towards the horizontal in your limited tests, BUT... We all know that the omni-directional, lower angle of radiation of a vertical antenna will on most days of the week outperform horizontally polorized, high agle radiators such as dipoles. Here, I'm lucky and have 3 acres, with only 3 trees, and there isn't a tree line for almost a mile 360 degrees around my house (Flat, farmland in Ohio). My Hustler 6BTV Vertical with 3600ft of radials (sixty 60' radials), is working fantastic.

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PA1ZP (/user/view-userprofile?id=PA1ZP)	**2013-11-27**	

RE: DX Antennas: Verticals vs. Horizontal:

Hi all

I do not know how long you tested them.

I had a 80/40 mtr vertical many years and it was a aluminium structure.

SWR on 40 mtr with 1/2 wave high impedance tuning direct at the vartical at the antenna
SWR on 40 mtrs below 1.4 at band ends,

on 80 mtrs no tuning SWR below 2 at band ends

Had rotatable aluminium dipole for 40 mtrs at 40 feet.
In DX above 4000 miles the vertical won very easy on 40 mtrs most of the time.

But there were occasions that the dipole would win.
And sometimes these antennas were a match.

I think it depends on condx. and you need to spend more then a few years in geining experience.
But keep it very simple, yes you can meke excelent DX on 40 and 80 mtrs with horizontal polarised antennas.

But as we had a daily sked on 20 mtrs with PZ (Surinam) at a distance of 4000 miles+.

i know from experience that every time we made a sked from PA to PZ on 40 mtrs after our QSO on 20 mtrs at midnight 23.00 UTC in PA to PZ I could work my friend every time,on the vertical, but only half of the times I could work him with the dipole, though I usualy could hear PZ on both antennas, he could not copy me on the dipole and he could hear me on the vertical.
Tests were done the whole year through.

We made these contacts with more radio friends whom were limited to wire dipoles, they often couldn't even copy PZ while i was working him.

But as you say very clearly , you did have a nice set of dipoles, that helps a lot to certainly on 40 mtrs.

In winter time we prefered 40 meters as often condx on 40 meters were much better at 23.00 UTC as they were at 20.00 UTC on 20 mtrs.

Pse look for our time zones PA is -1/-2 UTC and PZ is +3 UTC.

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> Reply to a comment by : **K8IDW** on 2013-11-26
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> *No, No, and No... The results may be skewed towards the horizontal in your limited tests, BUT... We all know that the omni-directional, lower angle of radiation of a vertical antenna will on most days of the week outperform horizontally polorized, high agle radiators such as dipoles. Here, I'm lucky and have 3 acres, with only 3 trees, and there isn't a tree line for almost a mile 360 degrees around my house (Flat, farmland in Ohio). My Hustler 6BTV Vertical with 3600ft of radials (sixty 60' radials), is working fantastic.*

NO9E (/user/view-userprofile?id=NO9E)	**2013-11-27**	
RE: DX Antennas: Verticals vs. Horizontal:		

There is a graph somewhere on G3TXQ page showing performance of different antennas at different heights with average soil. A dipole at half wave beats vertical all the time.

Verticals do very well in salt water.
Dipoles especially multiband have many nulls.
It is hard to get dipoles for 80 and 160m at half wave.
Vertical on the roof may beat dipole in between obstructions.

ALso, see the post of W8JI http://www.eham.net/ehamforum/smf/index.php?action=printpage;topic=76020.0

Ignacy, NO9E

Reply to a comment by : **N4JTE** on 2013-11-26

Owen, VK1OD was kind enough to respond to me via email. He refers to his article on his homepage; This article describes just one in a series of experiments, some of which compared a quarter wave vertical with elevated radials to a co-sited non-descript OCF dipole, and a half wave dipole located at a nearby site. The series of experiments did NOT support the common belief that a quarter wave vertical is much better transmitting antenna for long distance paths, in fact the experiments put a figure on it to tenths of a dB, and it was less than 3dB IIRC. 73 Owen Food for thought. Bob

Reply to a comment by : **N4JTE** on 2013-11-26

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Reply to a comment by : **WA1RNE** on 2013-11-26

"The 80 dipoles were on same pole with the phased lines connected at top and running off about 60 degree angle to the mid point relay /feedpoint resulting in little or no coupling as they were at around 30 feet away from verticals on the poles." Bob, I'd like to believe there was no coupling between the 80 meter dipoles and their feed lines to the verticals but I highly doubt that was the case. I haven't tried it yet, but EZNEC will likely confirm there is considerable amount of pattern distortion. You might want to try modeling your system and possibly take the dipoles down temporarily and run the test again. WA1RNE

Reply to a comment by : **N4JTE** on 2013-11-24

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N4JTE (/user/view-userprofile?id=N4JTE)	2013-11-26	

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K5AF (/user/view-userprofile?id=K5AF)	**2013-11-26**	
RE: DX Antennas: Verticals vs. Horizontal:		

Perhaps a compromise might be a vertical dipole. The reason that a Dipole performs well is because the high current portion of the antenna is well above the ground, which helps minimize ground losses.

While a vertical dipole does not have the high current portion of the antenna as high as the dipole, it still is significantly higher than a vertical with radials.

While my experiments have been somewhat unscientific, I can tell you that here in Texas, a 33' vertical dipole with end loading has outperformed a vertical with 16 radials every time.

End loading can be accomplished many ways. One way is with a top/bottom hat structure, a "T" top an bottom, or a double L configuration. It all works in a very similar manner. In fact, you can mix and match end loading techniques asymtrically to suit your individual situation.

I use square hat structure, 5' on a side, with perimeter wire, top and bottom, with a dipole length of about 30'. This is a wire structure that I hang from a tree branch. Solid performer all around, but great for DX.

I use a small amount of inductance in the center to bring the dipole to resonance and feed with 300 ohm ladder line. Also works very well on 30M.

> Reply to a comment by : **DL1MEV** on 2013-11-26
>
> *Although I am very happy with my vertical antenna, I am planning to give a dipole on 80m a try after reading your interesting article.*

AI4WC (/user/view-userprofile?id=AI4WC)	**2013-11-26**	
RE: DX Antennas: Verticals vs. Horizontal:		

I love these types of articles, and much interesting information is presented there. I just have to remember that all that is discussed is not necessarily "chiseled in stone." For instance, last weekend, the 10-10 folks were out en mass. I live on the second floor of a 3-story apartment building with a veranda facing North. I cobbled together a 10 Meter dipole (not big, right?) from aluminum electric fence wire and some old RG-58. My veranda is small, so the ends of the dipole hung down about 2 feet on each end, and the antenna was oriented East-West. I made a QRP QSO to Chihuahua, Mexico, SSB voice, with my Yaesu FT-817. The other operator was 1318 miles due West of my East-West pointing dipole. My conclusions: one can sometimes make contact with low powered radios on makeshift antennas situated low and poorly, but the only real definitive conclusion that can be made is: YOU CANNOT MAKE A QSO IF YOU DON'T TRY! That's it! Otherwise, stay civil and take all antenna evaluations thoughtfully and with realistic skepticism! Keep this wonderful hobby fun! I love it! You can too!

> Reply to a comment by : **K8IDW** on 2013-11-26
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JOHNZ (/user/view-userprofile?id=JOHNZ)	**2013-11-26**	
RE: DX Antennas: Verticals vs. Horizontal:		

@WA8JXM
The article you reference was written by Chuck Hutchinson, K8CH. Chuck is a gentleman and a scholar, in addition to being an authority on antennas. That being said, I believe it was he and I at Dayton that had quite a lengthy discussion, concerning some of his findings on antennas. I respectfully disagreed with him on some of his antenna data, the article in question, I believe, could have been one of several items we disagreed on. As an aside, concerning ham radio operators, it has always been my position that if a ham is happy with a particular antenna, then that is most of what counts and is probably the best antenna for that particular amateur radio operator. Hams are, as the name implies, amateur. Thus, unlike a commercial, military, or scientific antenna scenario, a whole different and lesser standard is applied in amateur radio operations.

Reply to a comment by : **WA8JXM** on 2013-11-25

I don't remember where I saw it recently, but a look at the ARRL Handbook says essentially the same thing: "The higher dipole [66'] has a peak gain of 7.1 dBi at an elevation angle of about 26 degrees..." (2011 edition, Fig. 21.7) Ken

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OKAY, OKAY... before the flames start... I re-read the article. Bob, you do say: "They are an antenna that truly depends on location, location, and Installation!" If I could edit my last couple posts, I would... my apologies. I read the article with a different tone now. I thought you started out to slam verticals... you now appear to be simply saying, 'Not in all cases'. And with that we completely agree. So good on you for experimenting and learning and again, apologies for any offense. I gotta remember to read, read and read again before posting. 73, Kevin N4UFO

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VE3XQQ (/user/view-userprofile?id=VE3XQQ)	**2013-11-26**	
RE: DX Antennas: Verticals vs. Horizontal:		

I agree that S/N ratio is critical. I have found the use of the ANC4 and a strategically positioned noise sense antenna brings my S/N ratio close to my terminated folded dipole. This is only true for near field noise, for far field atmospheric noise the folded dipole wins out.

In the end ham radio is part art and part science, this is what makes this hobby uniquely satisfying when even partial success is had.

Now let's see, how big would a helical antenna be for 80 meters.....

73 de VE3XQQ, Frank

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KS1U (/user/view-userprofile?id=KS1U)	**2013-11-25**	
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I have no doubt of the results of these specific configurations of horizontal and vertical antennas, from this location at the frequencies mentioned. However, potential vertical users should not shy away from other vertical configurations, the most common being a single 1/4 wave element with numerous radials. Experiments like the aforementioned are certainly worthwhile and interesting, but results should not be extrapolated to other scenarios.		

K9QR (/user/view-userprofile?id=K9QR)	**2013-11-25**	
DX Antennas: Verticals vs. Horizontal:		

I have had great success with my vertical I installed a couple of months ago. If I can hear them I can usually work them with great signal reports. I even have broken through big pileups with 100 watts. It is very simple and inexpensive. You can see it at http://www.qrz.com/db/K9QR

N4JTE (/user/view-userprofile?id=N4JTE)	2013-11-25	

RE: DX Antennas: Verticals vs. Horizontal:

Well verticals are usually a little noisier but in your situation I would look into passive receive loops or a beverage antenna if you have room, and trust me many articles have been published addressing your concerns.
Bob

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To build the 80 wire beam needed a lot of room and permission from neighbors for tree use for the elements.
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Eznec is starting point but real world testing is more valuable to me.
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K5OX (/user/view-userprofile?id=K5OX)	2013-11-25	

RE: DX Antennas: Verticals vs. Horizontal:

I couldn't help but notice those 17 degree +/- lobes!

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RE: DX Antennas: Verticals vs. Horizontal:

I recently read that at the right height, a single dipole has 6 or 8 dbi gain broadside, far from an isotropic radiator. OTOH, a low dipole is a cloud warmer (aka NVIS antenna).

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The polarity of the antenna at the OTHER end only matters with line of site and "ground wave" paths. Even "single hop" propagation causes polarization shifting.

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WA8JXM (/user/view-userprofile?id=WA8JXM)	**2013-11-25**	
DX Antennas: Verticals vs. Horizontal:		

Valid point about comparing a vertical beam antenna to directional horizontal beam. Were the gains equivalent and in the same direction?

Of course, there is the cost issue for some of us: Four 60' tall supports for phased wire beam antennas is more expensive and complex than a simple vertical. Of course if you are fortunate enough to have big trees growing in the proper spot, that helps.

And then there is the ground plane issue: I doubt that a couple of radials 6 or 10' high is the optimum ground plane for 80 or 40m.

When comparing transmitted signals, what affect does a 2+:1 SWR (on the verticals) have compared to a 1:1 match on the horizontal beam? Some rigs will start cutting power with an SWR like that.

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> *Thank you for your observations on these antennas Bob. One thing of note on your chart is the lack of qso station polarization. I would have made that a big part of my compiled stats. I agree that a good omni vertical is a great antenna, esp if the op builds the very best radial system they can. And I also LOVE my simple inverted dipoles with balanced feeders. I don't use coax here, and don't care about resonant antennas. If I had some room, however, I would sure love to build some phased verticals and dipoles! Gosh that would be a lot of fun! Thanks again om, keep up the good work! 73 j*

KE6SLS (/user/view-userprofile?id=KE6SLS)	**2013-11-25**	
DX Antennas: Verticals vs. Horizontal:		

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Thanks again om, keep up the good work!

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LEON (/user/view-userprofile?id=LEON)	**2013-11-24**	

RE: DX Antennas: Verticals vs. Horizontal:

Nice article Bob. Thank you for putting all that together.

I agree that their are folks that comment and endorse many different antennas for best DX or whatever else. It usually starts with money. The makers and designers of anything stand to make money if they can sell a product. It doesn't have to be the best, they just have to make us think it is so we will buy it.

Mosley is the best, just ask them.

Gap is the best, just ask them and read the reviews they have put on their Site.

The Carolina Windom is the best, just ask anyone who sells them.

Zero Five is the best vertical ever made, just ask the person who sells it.

The DX Blaster is a flame throwing Caged Dipole that cannot be beaten, just go on their website and you may want to buy one. They sell it very well.

Radio Works sells wire and wire antennas, plus a bunch of other stuff. They also sell it very well.

Bob, you spoke about how it was pretty obvious from YOUR backyard and location, location, location.

I agree with that, YOUR backyard and mine may be different. I think you can TRY to put all of this in a nice box but in reality you can't.

Thanks for a cool article Bob, it made me think!!

LEON

Reply to a comment by : **W1JKA** on 2013-11-24

Nice article,Once again you have shown the value of A/B comps and the effects of QTH, ground conditions and installation. Only those of us that have done this will know for sure and those who have not are either unable to for various reasons or refuse to admit that they will never know.

N4JTE (/user/view-userprofile?id=N4JTE)	**2013-11-24**	
DX Antennas: Verticals vs. Horizontal:		

To answer some points;
80 verticals were fed at ground point with raised radials angled up as drawn.The 80 dipoles were on same pole with the phased lines connected at top and running off about 60 degree angle to the mid point relay /feedpoint resulting in little or no coupling as they were at around 30 feet away from verticals on the poles.
The 40 verticals were constructed on another pole at 50 ft and a tree 33ft away with raised radials angled down and tied off.
If dx antennas are to be compared it makes sense to compare both antennas with the dx station which is obviously in the same direction.
If I was forced to choose due to space I would definetly try to get a dipole or inverted vee installed rather than a vertical.
The article was a backyard experiment and as such is not intended to be a scientific paper nor definitive proof, just my observations and conclusions.
As said, your milage may vary.
N4JTE

G3RZP (/user/view-userprofile?id=G3RZP)	**2013-11-24**	
RE: DX Antennas: Verticals vs. Horizontal:		

On one occasion, my 40m full wave centre fed dipole at 60 feet running SE-NW gave a better report by about 1 S point from VK2 on 40m. But for receiving, my sloper pointing SW did better by about 1 S point.....

On 80 and 160, my folded vertical with no radials beats the horizontal for DX outside Europe every time. DX like Heard Island on 160m....

YMMV.....

> Reply to a comment by : **KC7MF** on 2013-11-24
>
> *I agree with AI2IA. The casual reader should note that these vertical antennas the OP is testing would not reflect the performance of an omnidirectional vertical antenna. These antennas are neither stealthy nor do they fit within a small footprint; both features many vertical antenna fans admire. I find my vertical antenna ideal for casual DX given that I have to consider space and stealth. Its omnidirectional nature is ideal for the one-antenna solution many of us need.*
>
> > Reply to a comment by : **NB5N** on 2013-11-24
> >
> > *Nice article, Bob. Pretty convincing, but too many variables to be definitive for all installations. Have you considered testing individual antennae rather than phased? Also, I'd like to see a similar comparison including a G5RV and an OCF windom. That may help address the omnidirectional vs directional differences somewhat. Keep up the good word. Thanks for sharing. 73*

JOHNZ (/user/view-userprofile?id=JOHNZ)	**2013-11-24**	
DX Antennas: Verticals vs. Horizontal:		

I have run many tests similar to this over the years for my employers. Some tests were under laboratory conditions, the rest under various field conditions around the world. Some of my concerns with your test results are your small sample, your location, and lack of sufficient supporting information. I believe these, and a few other things, have led you to produce less than accurate results, leading to insufficiently supported opinions. The ionosphere skews most polarized signals most of the time, producing a mixed collection of signals, which is yet another important consideration. When a ham asks me for my opinion, I normally first state, "It all depends." (Note, I never give a definitive reply.) Some considerations are that it depends on what you are mostly going to use your ham equipment for and what your limitations are? Can you maintain what you erect? For the ham with limited resources, it is still nice to have two antennas, one for short skip and one for DX and a switch to utilize both antennas. On the other end of the scale, I have a college buddy, who is well known on the DX cluster. His retirement home sits on 65 acres of land, and it is covered with every imaginable antenna. His problem is too many antenna choices, a problem many of us would like to have.

KC7MF (/user/view-userprofile?id=KC7MF)	**2013-11-24**	
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WA1RNE (/user/view-userprofile?id=WA1RNE)	**2013-11-24**	
DX Antennas: Verticals vs. Horizontal:		

Bob,

A question and a suggestion:

Are the 80 meter dipoles located directly above the verticals as depicted in your drawing with the dipole feedlines running along the vertical radiator?

I noticed the feedpoints of the 80 meter verticals are 12 feet above ground while the 40 meter verticals are at 6 feet. This is actually the opposite of what you want to do - you will see higher efficiency by virtue of lower ground losses on 80 with the feedpoint at 12' or close to 0.05 wavelength over ground. This is based upon my own experiences as well as the findings by others, such as VK1BRH in his 1995 paper "Short Vertical Antennas and Ground Systems- VK1BRH"

Efficiency will also be improved by matching the feedline to the 30 ohm feedpoint impedance. This is pretty easy to do with a simple L network or a T network.

WA1RNE

AI2IA (/user/view-userprofile?id=AI2IA)	**2013-11-24**	
In defense of the vertical antenna		

Note the following words in the article:
" I compared well-constructed vertical and horizontal wire gain antennas in the same direction and I feel it was a very fair test."

Yes, IN THE SAME DIRECTION he felt that it was a very fair test.

Hams cannot easily rotate wire dipoles. This is an understatement at best.

For the ham who has limited space, as most do, the vertical antenna offers the possibilities of DX. Also, since most vertical antenna arrangements for the average ham are OMNIDIRECTIONAL, he does not miss incoming signals from off the weak ends of a fixed position wire dipole.

More could be said in comparison regarding other features, but for now a well constructed and thoughtfully placed vertical antenna can be a very satisfactory choice for many hams. I leave other advantages to further commentators.

W1JKA (/user/view-userprofile?id=W1JKA)	**2013-11-24**	
DX Antennas: Verticals vs. Horizontal:		

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