

Build a Large DB8 HDTV Antenna: Big Bertha

by [deceiver](#) on October 1, 2009

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Intro: Build a Large DB8 HDTV Antenna: Big Bertha

We've had Cable TV and Cable Internet. It seems that there is less and less on cable than there ever was. Cable in my area is \$49. I eventually cut down to basic for \$20 and supplemented with Netflix. Netflix is excellent by the way but that's another story. We also have my macintosh connected to the TV so we can Hulu any program that played recently.

I'm finding that even basic cable has little 'value'. By value I mean I get the basic local channels and a bunch of junk otherwise. The channels I look at I could get for free if I used an antenna. Hence, I've decided to minimize.

Here in Southern Maine the TV stations are mostly in Portland about 30 miles away. Some are further, about 50-60 miles away. Most HDTV antennas work for 30 miles and a few claim to get up to 60 miles. I decided that I need more antenna than that. Something where 60 miles might be the limit but a doable and good limit. I've decided to produce a DB8. A DB8 antenna has 8 receiving elements, or 4 pairs of elements. It's basically two DB4 antenna's combined. The last picture in the segment is a commercial one.

What follows is my foray into the world of HDTV antenna construction and trying to squeak the most out of it for a moderately fringe TV area I live in.

BTW, the last segment contains all kinds of HDTV signal information and links to places to assist you in learning more. I was a teacher for 30 years (no I don't want any help with my grammar, I said I used to be a teacher) My job was simplification and clarity. I hope this instructable is up to that.

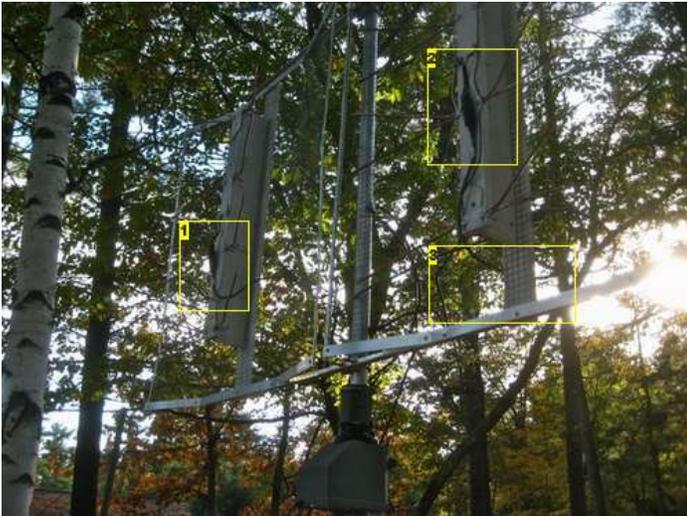


Image Notes

1. matching transformer no1
2. matching transformer no2
3. other parts mounted on the back as shown in previous photos.

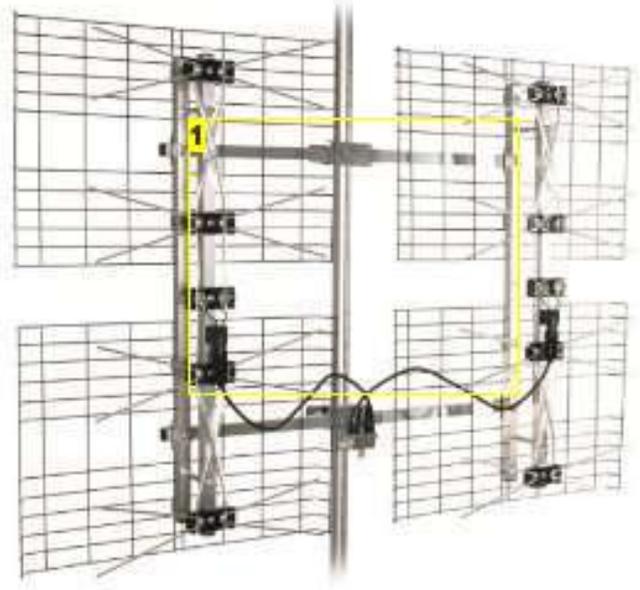


Image Notes

1. Commercially available antenna Smaller than the one I made

step 1: Plans and measurements

I want to give credit to this website for the dimensions for the antenna. And the diagrams uploaded as part of this instructable. At the site you can find a bit more information.

<http://www.frontiernet.net/%7Emclapp/Antennas/diagrams.html>

The measurements should be exact or as exactly as you can get them. I will describe the materials as the steps to building this occur. Most of the actual antenna construction part can be purchased at Home Depot which is where I got the raw construction materials.

The first diagram gives the overall dimensions of one array.

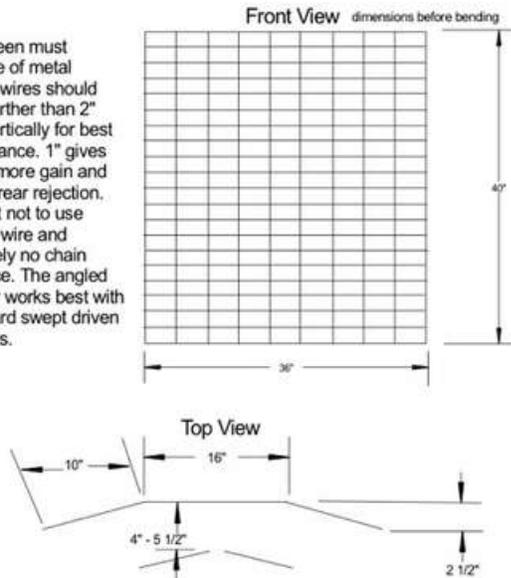
The second diagram shows the wiring and dimensions of the wiskers

The third diagram shows the measurements of the wiring

I suggest you print these three pages.

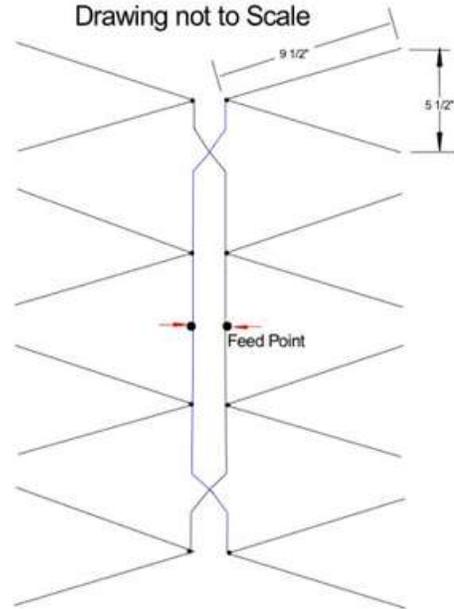
Reflector Screen

The screen must be made of metal and the wires should be no further than 2" apart vertically for best performance. 1" gives slightly more gain and greater rear rejection. It's best not to use chicken wire and absolutely no chain link fence. The angled reflector works best with 2" forward swept driven elements.



The reflector screen can be 36" high but 40" is slightly better. The angle of the bends are critical. The reflector can be wider but the angle must be maintained. Wider screens will give slightly better gain, any width from 30" to 48" works well. Spacing can be varied from 4" to 5 1/2", wider spacing favors the lower UHF channels. For slightly better VHF-Hi performance 14" to 16" reflector spacing can be used.

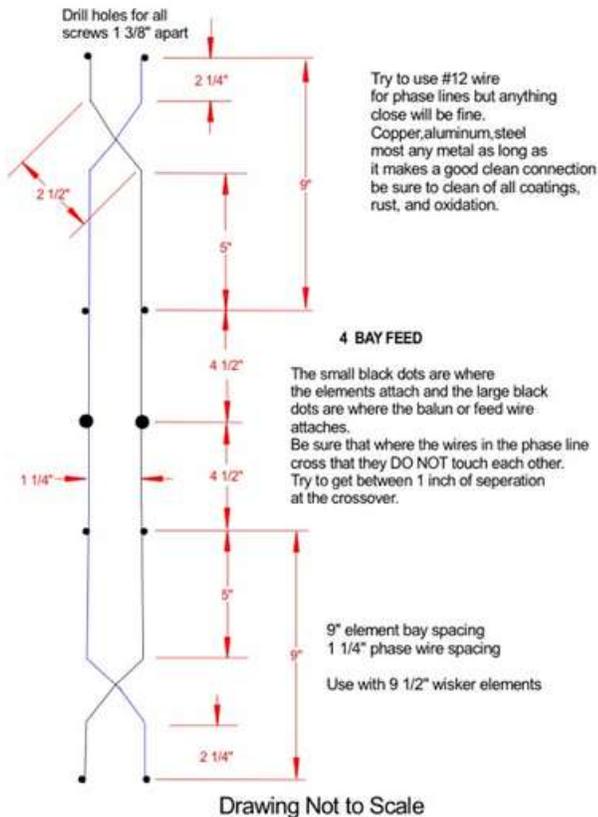
Drawing not to Scale



Most any metal will work for the elements. Try to use something near 1/8" diameter and make sure they are free of all coatings and oxidation where they connect to the phase line.

Cut wire for elements 19" and bend in the middle so that there is 9 1/2" on each side. 8 Total are needed

See other page for phase line details



step 2: Building the reflector

The reflector can be made of any metal. You could use a solid sheet but in a big wind it would be a problem. And all that is really needed is horizontal bars or wire that are separated by no more than 2 inches vertically. Anything larger than that and it would exceed the wavelength and would not reflect the signal to the wiskers. I found some 36" wide rolls of something called galvenized wire netting at Home Depot. It's got 1/2 inch squares of stiff galvenized wire that is welded at each crosslink. The 36" is perfect for the width of the array. Wider could be used but it would go wasted as the reflected signal wouldn't hit anything useful.

Unroll 40 inches (for the hight) and cut it with snips. To reinforce the sides (40" side) I used thin 1/4" wide angled aluminum trim. I placed one side of it under the mesh and pounded it over with a hammer.

Picture 2 shows this more clearly. I then turned it over and pounded the other side to flatten the mesh as the aluminum tended to curl in the direction of pounding. Do the same thing to the other side.

4th picture

Next, use two, thick, 1inch wide X 36 inches long aluminum bar to reinforce the top and bottom. As the measurements show the two sides of the array are wings that will be slightly folded in. Place the bar in a vise and bend 10 inches of the bar 2 1/2 inches forward. Do the same to the other end. To assist, make a wedge 10 inches long and 2 1/2 inches wide out of hardboard to act as a guide. Or just measure it. Make another angled brace for the bottom of the array.

5th picture

To prepare to install the two bent top and bottom braces, measure 10 inches of the side of the mesh and bend it slightly on the edge of the workbench. Do the same to the other side.

6th picture

The bar is on the bench with a final angle check. Drill small holes. 2 on each end of the angled bend and one in the center of entire bar. I used 3/4" size 8 machine screws and nuts with washers on each side to bolt the bar to the FRONT of the mesh. Bolt one to the top and one to the bottom.

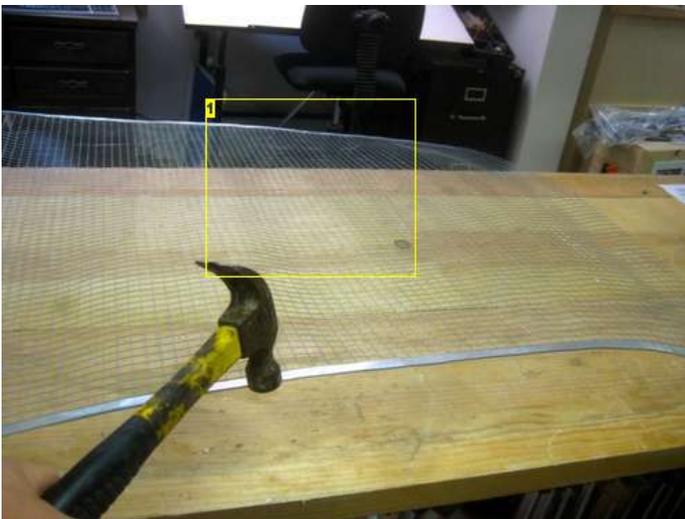
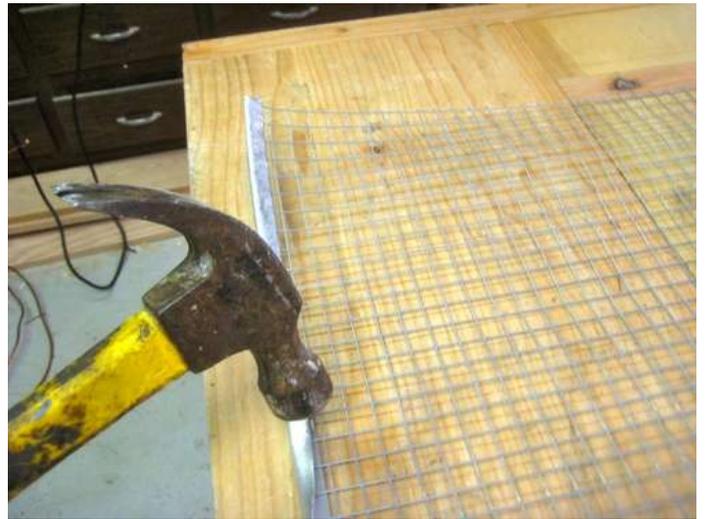


Image Notes

1. pounding the backside takes the curve out of the metal from pounding the front side.

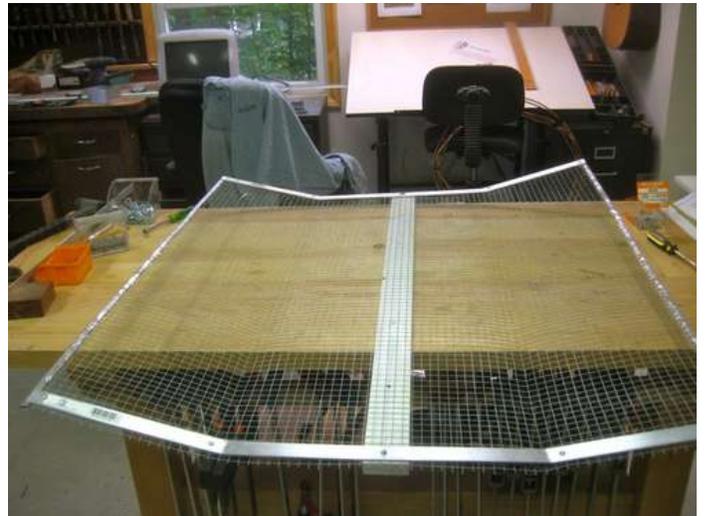


step 3: Spline

For all the solid bracing you could use a number of materials. Wood would work but it might rot over time. I chose to use plastic board. It's the stuff they often use to do the eaves of houses now. It's white, tough and work much like wood. It's also pretty expensive. It's up to you.

Cut the spline the height of the reflector (40") and drill and bolt to the top and bottom of the BACK of the reflector. Be sure to use a washer on the spline side. I also used a small lock washer. I expect wind will rock the reflector back and forth and don't want the nuts coming loose.

The pictures below just show three views of this step.



step 4: Preparing forward whisker brace

The V shaped whiskers will need to be mounted ahead of the reflector. A brace 29" long (the distance from the top to bottom whisker is 27") is made from the same material as the back brace.

Picture 1

Use a large drill (forstner bit works nicely) to drill a recess for each of the eight whiskers. use the diagrams from step two to determine the distance apart they should be. About a 1/4" deep should be enough. Notice that the recess is on the side of the brace. This is to accommodate the whiskers sticking out.

picture 2

Drill the center of the recesses to accept a machine screw.



Image Notes

1. A drill press can be handy

step 5: Preparing phase line and whiskers

Phase line: the wires that connect the whiskers together. See the diagram. I used #12 copper house wire.

Whiskers: The wires that produce the V shaped elements. I splurged and purchased some bare solid copper #6 wire off the roll at home depot. I bought 30 feet of it and have about 2 feet left. I bought enough because we're building two of these things here and hooking them together. If you're only building one then 16 feet should be sufficient with a bit left over. I built two so I could connect them together and maximize my signal collection. One of these is good for 30 mile reception.

You can use smaller wire for the whiskers but it might not stay in the correct configuration over time as movement of the antenna might alter their shape.

Use the phase line diagram in step 2 to determine measurements.

I stripped the plastic of the house wire to obtain a length of plastic coated white and black copper wire. I wanted the plastic coating to stay on the wire everywhere except the place where it connected to the whiskers with a screw.

shape the two wires as shown in the diagram. Make loops where it will go under a screw. make sure the loops coincide with the depressions you drilled in the front brace. Be sure to make a loop for the center. This is where the antenna wire will connect when it is mounted on the roof.

Picture 1 and 2

I wanted the plastic insulation off the loops but cutting it off was getting tedious. So, I fired up the propane torch and melted it off. With a little sandpaper the loop came clean.

Pictures 3 and 4

Cut 8 pieces of the #6 copper wire for the whiskers. In the end each whisker should be 9 1/2" long. So cut it the wire 18". I found that an extra inch helped out. You can always cut any excess length off after.

Bend the wire in half around a bolt in a vise. and pound it together, then use pliers to spread the whiskers apart in a V shape.

Picture 5

Seat the V of the whisker in the recess, Place the phase line wire loop over it, add a screw, with washers on both sides and squeeze it in place by tightening the nut. Do the same for all 8 whiskers.



Image Notes
1. Torch
2. Wire loop



Image Notes
1. It looks messy but cleans up pretty good with sandpaper and steel wool.



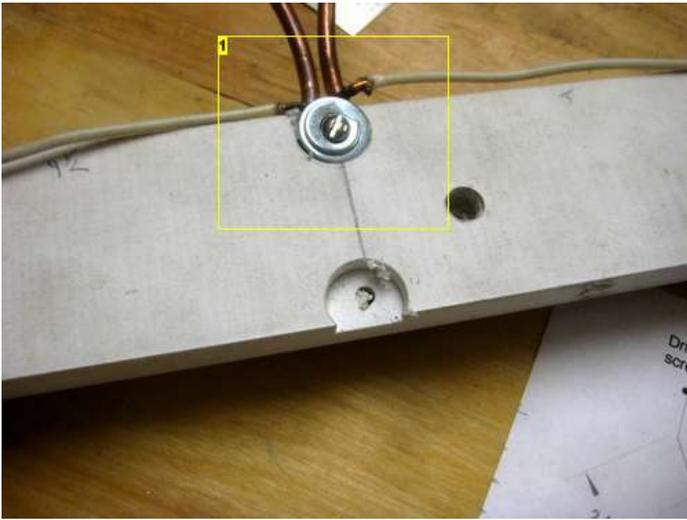


Image Notes

1. Be sure to seat the whiskers first then the loop over that. I have two washers because the large ones were needed but the hole was to large for the screw head.

step 6: Mounting the whisker spline to the reflector

The following pictures are just various views of the same thing. The whisker spline mounted to the reflector. this mounting can be accomplished many ways. You could cut pieces of plastic pipe and use it as spacers for example. I decided to use some more of the plastic board to create a fin between the splines. I thinned it out a bit on my planer (if it looks thinner to you).

It is attached to the rear and front spline with 2 inch galvanized sheetrock screws. 5 or 6 on each side. It seems solid. Be sure to notice the measurement parameters on the diagrams for how high it needs to be raised.

Also notice the whiskers have been bent forwards 2 1/2 inches to coincide with the wings of the reflector. In actuality, this thing could have been made flat. But only the reflector directly behind the whiskers would have deflected a signal to them. The bent configuration creates slightly more reflection and therefore slightly more signal to the whiskers. But not much. Remember, I'm looking for fringe signals. You may not be in that position. Stations might be closer for you.

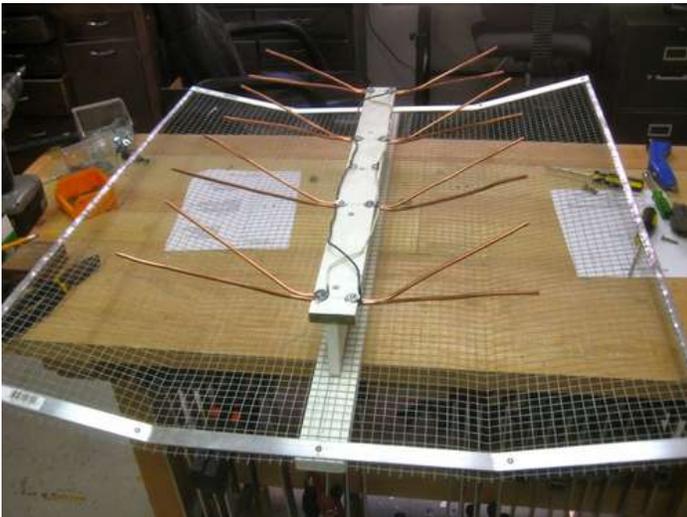


Image Notes

1. Take some time to properly straighten, and align the whiskers the proper hight, distance apart, and look down the edge to see if they create a clean line. i.e. one not up the other down. etc.



Image Notes

1. loops for antenna wire connection

step 7: Ganging two arrays (optional)

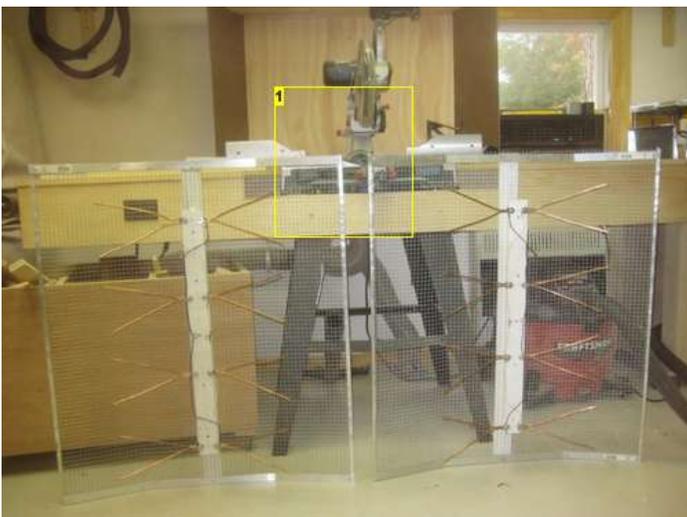
As you can see in the following pictures I created two reflectors to put them together to make an array. One reflector will work perfectly well for up to about 30 miles from a station. Two arrays won't give you double the distance but almost. And I'm counting on the design of these antennas to actually be over 30 miles for one and at least 60 miles for two.

I ganged them together using thick 1" aluminum angle bar. I simply drilled and bolted them across the top and bottom of the flat bar braces. I used two screws on each side, so four screws for the top and four for the bottom.

The center of this whole thing is where my U bolts will be placed to mount to the mast pipe. If you use only one reflector then it would go in the center of that reflector.

These reflectors can also be mounted one above the other on the mast but you'd need a longer mast pipe and doing so might facilitate having to use guy wires to steady it in a wind. Alignment is fairly specific for HDTV signals. A bobbing, waving antenna might be an issue.

If you decide to just have one antenna then skip to the section on connecting them. It will be simpler.



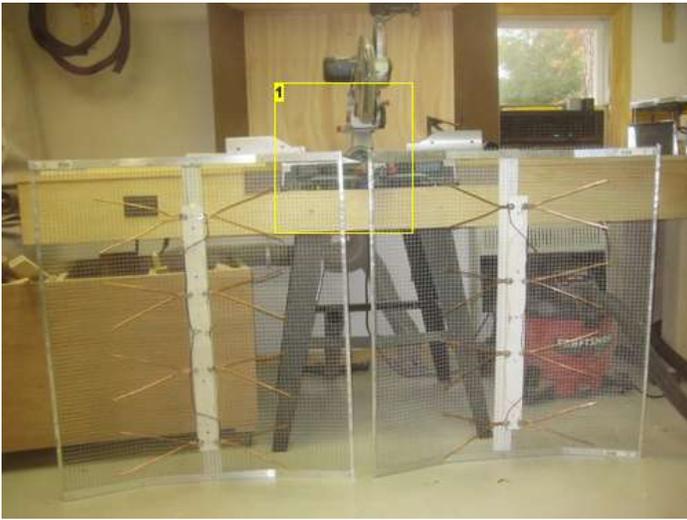


Image Notes

1. Two antenna's ganged together for fringe reception.



Image Notes

1. Two bolts to connect the angle iron (aluminum) to the antenna. One uses the screw already on the spline the other along the inside of the rail.

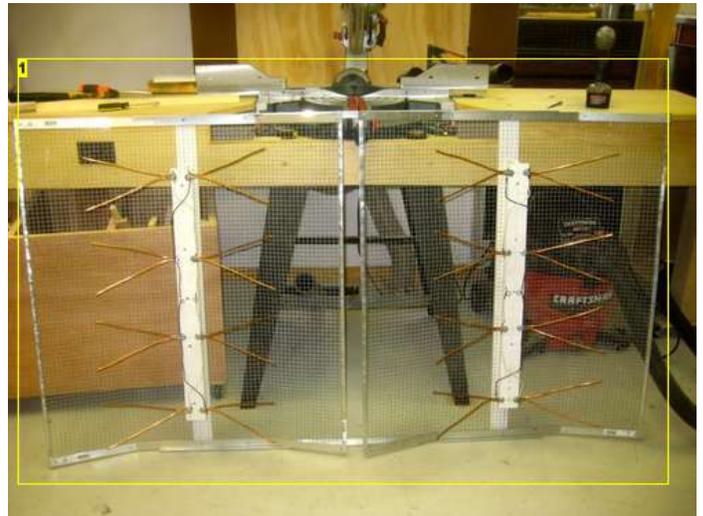


Image Notes

1. Two antennas bolted together with angle iron at the top and bottom to produce an array. This is now a DB8 antenna. One section would be a DB4

step 8: Connecting your antenna array

Please remember that all connection instructions are your responsibility. If you feel uncomfortable on a roof doing this or with grounding properly for lightning then have it done professionally. Basically this means that I absolve myself all responsibility in this area.

Antenna mast

How you mount your antenna is your business. There are several mounting masts available. I'm mounting mine to my chimney. Using a set of stainless straps that wrap around the chimney for just this purpose. My chimney isn't being used. If yours is, especially for wood or coal I suggest another spot. Your antenna will be soon covered with soot if you use the chimney. Two things are important.

One is that if you can get higher, the higher the better. Mine will be 10 feet above the roof. Remember though that anything much over that should have guy wires to steady it.

Secondly, if the stations are not all in one location, like a city, then you'll need an antenna rotor to turn the antenna the desired direction to the station. See the last chapter of this instructable to find out where your stations are located.

Connecting the antenna

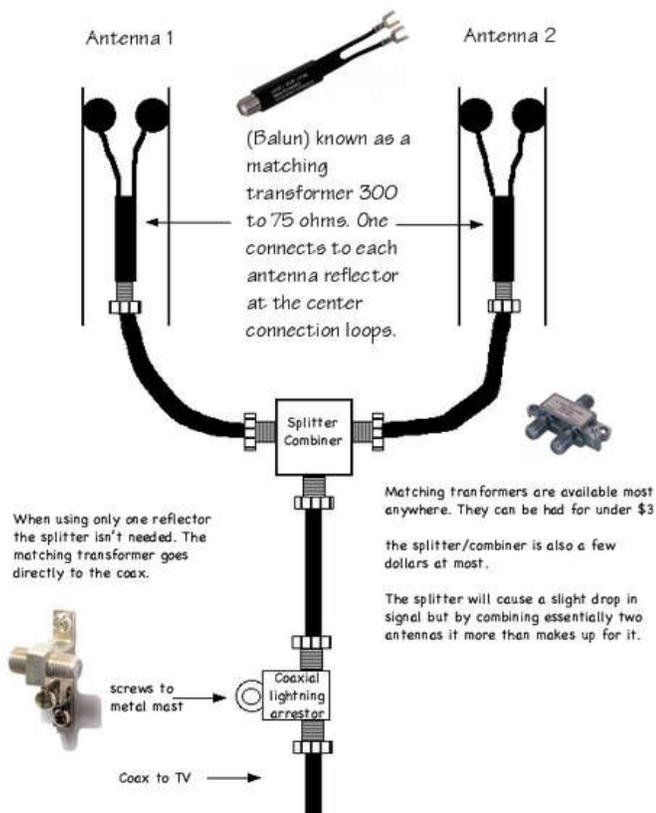
If you just made one antenna then you'll only need the balun, lightning arrestor and coaxial cables. Connect the two leads of the balun to the two center loops of the antenna phase line. Connect with screw, nut and washers keep it loose or drill and bolt it to the stand out board if you want. connect the other end to a short coaxial cable. Screw a lightning arrestor to the pipe and connect the other end of the coax to it. The other terminal on the arrestor goes to the TV or DTV converter box.

If you've got two antenna's like I do then you'll have to use two balun's and a splitter (or in this case a splitter acting as a combiner) mounted between the antennas. the diagram should explain this.

I recommend that all connections either be wrapped nicely with electrical tape, or coated with silicon II that hardens (outdoor silicon caulking is fine) or use coax with weatherproof boots on the connections.

Grounding your mast

It is very important that you ground the antenna and mast. You'll need to get a ground rod and connector made for this and a length of aluminum grounding wire. Attach the ground wire to the antenna mast with a screw or clamp and run it to the ground rod that has been driven into the ground. Securely attach it to the ground rod with a screw clamp made for this.



step 9: Up on the roof!

This series of pictures just shows the assembled antenna up on the roof.

The first picture shows one of many ways it can be done. I have an unused chimney that is large and strong. I chose a chimney strap system. It consists of two corner brackets and stainless straps that go around the chimney. Turnbuckle type bolts let you tighten it. The mount is strong. You can also get roof mounts in various configurations. One of the best and least invasive are the brackets that mount on the side of a house at the peak. No holes in the roof and you can screw into solid wood.

The second picture shows one half of the array and how the matching transformer is connected. I attached the leads with stainless steel machine screws with washers on both sides and a nut. Then ran the bolt through the white plastic to brace and bolted the connection to it.

The third picture is of the splitter being used as a combiner. A coax from each elements matching transformer is connected here so they antennas can be 'combined' into one cable. This splitter actually degrades a bit of the signal but the second element will bring in enough extra signal to make it worthwhile.

The fourth picture: Bolted to the mast pipe is the coax grounding lug. The short length of coax from the splitter is on one side and the other side is the coax to the TV.

<http://www.instructables.com/id/Build-a-Large-DB8-HDTV-Antenna-Big-Bertha/>

The ground wire is connected to the lower pipe and goes to a ground rod. There is a grounding screw on the grounding lug that the ground wire can be attached to. My wire is attached to the mast below the rotor.

Here you also see my channel master rotor. Where I am the signals are within a 20 degree arc with some of them being 180 degrees to the rear.

The fifth picture shows the entire antenna from the front.



Image Notes

1. Stainless strap
2. Bottom half of mast
3. One of two pipe brackets
4. Ground wire to ground rod.

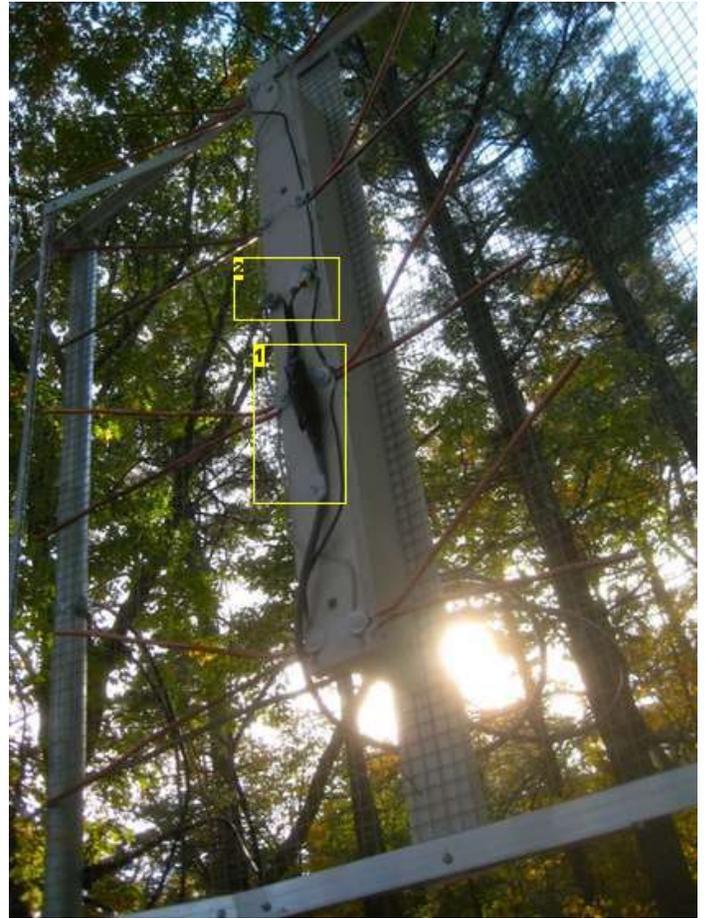


Image Notes

1. Balun or matching transformer. I taped all up with electrical tape for weatherproofing even though I used special weather boots at the connections.
2. Balun connections, with stainless screws.



Image Notes

1. The splitter (here used as a combiner) is bolted someplace and wires from each antenna element's matching transformer connect together. The side grey wires are from the antennas. The black top wire is the coax to the ground lug.



Image Notes

1. Ground lug

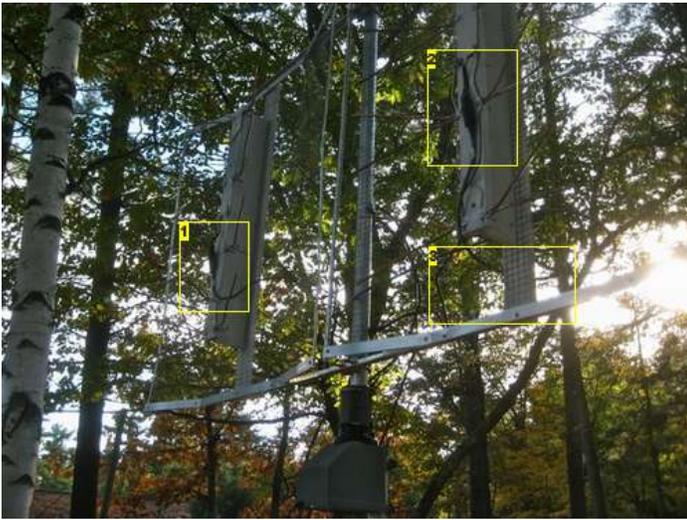


Image Notes

1. matching transformer no1
2. matching transformer no2
3. other parts mounted on the back as shown in previous photos.

step 10: The visual results

The digital tv converter box I chose is the Digital Stream DSP7700P Digital Set-Top Box. There are many to choose from. Some have much better reviews than others. But, there are enough horror stories for each box to make you think that all of them will be a lemon. And at this time not many are available since the government coupon deadline is over. This one seems to be working well.

The second picture shows the back of the converter box. Simple really. Coax antenna in and coax out to TV or you can connect your TV via the analog RCA jacks. Your choice. The box has an on button and channel up/down buttons. It comes with a infrared remote that has more bells and whistles. The instructions are sequential and fairly clear. You can see a signal strength and scan for channels that lock in when done. There are full menu items for a variety of functions.

Where I live in Southern Maine there are three local channels NBC, ABC, and CBS that are 25-35 miles away. I live on a lake and therefore a valley that is low and surrounded by hills. Trees are also all around my house and the leaves are still on them. My antenna is about 20 feet above ground.

There are three public television stations 7-35 miles away and Fox movie station where American Idol exists. So, the wife would like to get that. The only problem is that Fox is 62 miles away. Definitely a fringe station.

The closest station NBC has a signal strength of 88-90 and very strong. ABC and CBS have lower but still strong signals. ABC is further away but the antenna is atop Mt. Washington so, a good signal. Picture three shows the signal strength for NBC.

The fourth picture shows the signal strength for Fox at 62 miles away. The signal strength is 30% which is more than enough for viewing. A strength of 5-10 should be enough but with this station at least 18 is needed. With digital signals the picture is usually always good if you can see it. Snow on the screen is only for analog signals. At 18 though some blocky artifacts can sometimes be seen. This signal was supposed to be the litmus test for my antenna. My neighbor with a db4 an amplifier can't get this station.

The last picture is of the trees in the direction most of my stations need to deal with. Trees aren't good but the antenna seems to not be bothered by them. The leaves will soon be down.

Overall the construction experience has been pretty good. I had a lot of fun and learned a lot in the process. I hope the info here is correct. I'm no expert for sure. I ended up getting the three networks and Fox, three public television stations, and a couple of smaller local stations. BTW one of the good ones ABC is a VHF not UHF station. This often requires a VHF antenna. The strong signal along with the strong antenna seems to make this unnecessary. After the weekend I will be giving Cable TV back their signal.

Thanks for reading,
Dan





Image Notes

1. Very strong signal for where I am.



Image Notes

1. My fringe station. Still works at this level.



Image Notes

1. The trees I've got to point my antenna through. The leaves will fall soon!

step 11: Digital signal strength 101

There are tools on the internet to help you determine the stations in your area, their power, distance, and your chances of getting them to show on your TV.

http://www.tvfool.com/?option=com_wrapper&Itemid=90

I suggest you try 'TV Maps' link. Type in your address, height of your antenna and you can determine your chances of reception.

You'll also see a list of stations in your area. If you choose one you'll see a color coded map of signal strength from the station to your location. The list shows the distance in miles and an important number NM or noise margin. The antenna we're making should have a gain of at least 15, hopefully more. Think of the NM as the loss of the signal to your house. It could be hills, leaves, walls or weather. It's also distance and location of you and the signal tower. The goal is to get a net gain of at least 0. At zero you'll get a signal. For a reliable signal a higher number is beneficial. 5-10 means you'll probably get a signal over 0 consistently.

So, take your antenna gain. Let's use 15 and add the NM For the positive numbers it's no problem. The negative numbers might be another issue. An antenna of 15 db hoping to get a stations that's -11 db leaves a net gain of 4. Marginal but a reliable steady signal is possible at this level. The thing is every splitter, length of cable, branch in front of the antenna, Snow in the air, and many other factors can lower the db of gain bringing that gain of 4 down to 0 or lower meaning loss of signal.

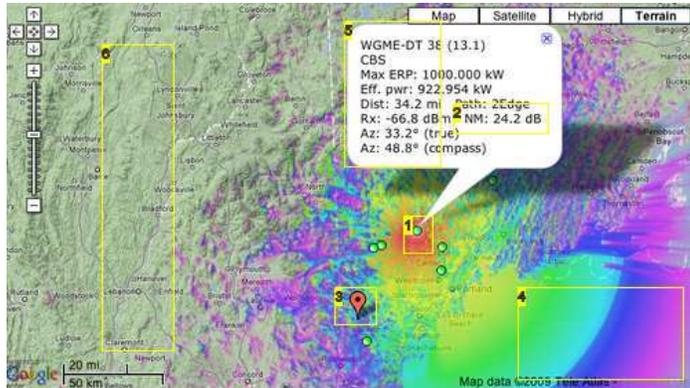


Image Notes

1. One of the stations I'm after
2. shouldn't be a problem with even one of the antenna's being made.
3. My house, when I zoom in I can see the colors hitting all the hills around me. I live at lake level in a valley. Little color in the valley.
4. Notice how the signal strength flows far over the ocean. No obstructions.
5. Lots of useful information for each station in your reception area. Notice the EFF pwr. In this case it's nearly a 1000kw. that's pretty good. Some stations are a third of that. So, not only distance but station output is a big determining factor.
6. This info is in the link above or tvfool.com

Digital						
Callsign	Chan	Network	Dist (mi)	Path	NM (dB)	
WMTW-DT	8 (8.1)	ABC	23.7	2 LOS	46.2	
WCSH-DT	44 (6.1)	NBC	25.2	1Edge	34.9	
WENH-DT	11 (11.1)	PBS	28.9	2Edge	25.6	
WGME-DT	38 (13.1)	CBS	34.2	2Edge	24.2	
WMEA-DT	45 (26.1)	PBS	7.3	2Edge	24.1	
WPXG-DT	33 (21.1)	ION	32.1	2Edge	0.2	
WPXT-DT	43 (51.1)	CW	35.8	2Edge	-2.2	
WCBB-DT	10 (10.1)	PBS	61.8	2Edge	-6.3	
W32CA	32 (32.1)		31.1	2Edge	-7.8	
WMUR-TV	9 (9.1)	ABC	51.5	2Edge	-8.2	
WPME	35 (35.1)	MyN	35.8	2Edge	-9.9	
WPFO-DT	23 (23.1)	Fox	61.8	2Edge	-11.0	
WUTF-DT	27 (66.1)	Tel	84.2	Tropo	-16.3	

Image Notes

1. This is my goal station. I'm not worried about most of the others. This has been the illusive station in that it is 62 miles away, has a NM of -11 and I'm in a low lying valley at the lake. The home of moves and American Idol.
2. LOS- Line of sight. WMTW is atop Mount Washington. Everyone gets that station. It's the highest point in New England. 1 edge is not to bad, means the station is close, not to much in the way and/or it's got a powerful transmitter 2 edge is less than edge 1 for the reasons above.
3. NM, Noise margin The larger the number the better. Whatever the signal gain is from your antenna add or subtract this to get a number over zero or better. 0 means a signal, larger means a better signal. Over 0 is needed for a reliable signal. Antenna strength, cord length, splitters, etc all move your NM down.

Related Instructables



How to get FREE HDTV (and all your DTV questions answered) by recneps



HDTV Antenna on a Direct TV mount. by arte.sano



How to make a fractal antenna for HDTV / DTV plus more on the cheap by williamruckman



Good Digital antenna cheap! by Phil B



Structured Wiring System Design by thb43



Low-cost Battery-powered portable widescreen DTV by Last_Liberal



10\$ Tv Antenna Hack !! by aKaMaKaVeLy



UPDATED: QUADscreens (4,200 x 1,680) -- fka: triplescreens 41-inch uberHDTV (3,150 x 1,680) - 3 x 20" monitors in portrait by acfou

Comments

50 comments [Add Comment](#)

[view all 53 comments](#)



RTChoke says:

Nov 14, 2009. 2:57 PM [REPLY](#)

I just made one antenna, gonna make another tomorrow. See pics here <http://s707.photobucket.com/albums/ww79/RTChoke/HDTV%20Antenna/>

For the edge I used some drywall corner bead -- it is pre-bent at 90deg and has a nice little channel to snug up to the edge of the hardware cloth.

I used PVC sprinkler pipe standoffs, with galvanized lag screws to hold it to the base piece. Have a bit more to do on it, but it was easy to make once I had all the parts on hand.



deceiver says:

Nov 14, 2009. 3:32 PM [REPLY](#)

I AM flattered and impressed. It really looks good. You won't be disappointed. I'm in my first few weeks with this thing and it kicks. I'm the only person in the area (who has an antenna) who can get that elusive Fox Movie channel 62 miles away. Even people with a similar commercial antenna, a double like mine, but they're always smaller, don't even get a hint of that channel.

Please let me know when you finish or make more progress. And if you need any assistance (looks like you probably don't) don't hesitate to ask. I'll do what I can.

And I notice it looks like you have a woodworking shop? Might I mention the best, I mean the very best woodworking forum on the net? Lumberjocks.com I'm 'craftsman on the lake' should you ever get there. I have no other affiliation with them so I'm not selling anything here. It's just a great bunch of guys/gals with common interest. Oh, and could I have your zip code? I'm dying to look up and see how many channels you're going to get with this.



RTChoke says:

Nov 14, 2009. 9:06 PM [REPLY](#)

29455

Right now I get 3 main nets, a coupla subchannels on them, and the 3 PBS channels/subs on a good night. Were at sea level (or 2 ft above) in the woods, the transmitters are about 30-35 miles away (but the PBS I get is off-axis, but closer), There is an old antenna on the chimney, maybe 20 ft above ground, it got whacked by a falling branch last week and reception has been marginal since. It was a POS anyway, so this will definitely be an improvement (can't be worse!)

Yes I build furniture and other stuff www.constructivity.net send me a msg from there. i won a prize in the Texas Furniture Makers Show 3 yr ago for this piece



deceiver says:

Nov 15, 2009. 4:10 AM [REPLY](#)

BTW, the email link at your website returned an undeliverable message in my computer.



evilcooper says:

Nov 1, 2009. 2:49 PM [REPLY](#)

Quick question that will help the paranoid wife sleep better:

Are there any safety issues from using a home built instead of a store bought antenna? She's concerned that such a powerful antenna will be harmful in some way. (She's pregnant, so perhaps that's an excuse for undue paranoia.)

I can't imagine there being anything to worry about, but you all could help my marital harmony by providing some soothing evidence.



deceiver says:

Nov 1, 2009. 3:22 PM [REPLY](#)

HA! I've got one of those. No, no issues with safety. Just ground it like any other antenna. And not grounding it properly would only have an effect on your equipment anyway. A 'powerful' antenna as some people call it. is a misnomer. No antenna is powerful. It doesn't really do anything in itself. It sits there and detects a signal. It doesn't produce any sort of power. So, mount it securely so it doesn't fall on your head and it's as safe as any antenna. Oh, and congratulations of the upcoming new child. There is nothing on this earth better than a new baby.



w8wdx says:

Nov 1, 2009. 4:39 AM [REPLY](#)

Other than the satisfaction of a diy project, is there any difference between this build and this cgi.ebay.com/Antennas-Direct-DB8-UHF-HDTV-TV-Antenna_W0QQitemZ230393152905QQcmdZViewItem one sold at ebay for \$76



deceiver says:

Nov 1, 2009. 7:25 AM [REPLY](#)

Yes, I calculate 41% less surface area on the reflector on theirs and mine has an entire redesign of the sized and separation of components to take advantage of that larger surface area. Thus, with the wider reflector comes larger collecting elements. But, they don't work if the other dimensions aren't adjusted correctly.

It says 70 mile range on the commercial link you sent me. And I'm sure it does but I'll bet that's under ideal conditions. no/few trees, relatively flat terrain, good weather, etc. It's cost is \$76 but add rotor, dtv converter, coax, rotor, and ground cables, mount, connectors, mast, standoffs, and a half dozen other misc items, And the cost easily rises to \$200 or better. Just my channel master rotor and converter were \$150.



dfc849 says:

Oct 31, 2009. 2:22 PM [REPLY](#)

Great instructable, deceiver! I like the simple, easy, and functional design of this project.



deceiver says:

Oct 31, 2009. 7:43 PM [REPLY](#)

Thank you.



enildeR says:

Oct 29, 2009. 2:53 PM [REPLY](#)

Did you look at using fractal designs at all?



deceiver says:

Oct 30, 2009. 2:17 AM [REPLY](#)

Yes I did. I'm an old retired science teacher. I love fractals and chaos theory, but I decided to keep the antenna simple.



biospot says:

Oct 29, 2009. 1:28 PM [REPLY](#)

Good Build.

I debated to build one, but wasn't sure about some construction parts. I like the way you used a home made channel around the outside. Good idea. Strong, permanent and relatively light.

I finally bought one, and it seems to be OK, but I would have been much happier to build one like yours. Good job.

I have a question... I thought it was necessary to "phase match" two antenna. If so, and you inadvertently hooked them up 180 degrees out of phase, the signals will cancel each other out. Even if there is a partial phase difference, you will have weaker signal with 2 than with 1.

Did you check this? Is the signal obviously much better with 2 than with 1?

Also, what about if you turn the antenna around backwards? Some of the homemade's like yours have almost as much pickup from the rear than they do from the front.

Thanks for the great instructable...



deceiver says:

Oct 30, 2009. 12:23 AM [REPLY](#)

Addendum: Yes, I initially connected one antenna. I did this because I had an old and defective combiner. Scared me as nothing worked. So, I eliminated the combiner to see if it was the issue and it was but had one antenna connected at the time. The 30+ mile stations got almost the same signal as with two but my 62 mile station was only at the edge of seeing it sometimes. The good stations all read a signal strength within about 8. so 80 or 88, You'll get a good picture. The further station the strength was 18 with one antenna and 28-30 with two. With this station 22 is needed for a signal to produce a picture.



deceiver says:

Oct 30, 2009. 12:16 AM [REPLY](#)

Phase coupling is indeed an issue. But interestingly mostly for non digital signals. There are two ways of phase coupling. One is to exactly match the length and orientation of the wires connecting to each antenna. The other method is with a phase coupler.

Phase coupling is a product of the signal hitting one antenna before the other and the signal from one literally being ahead of the other as a result.

If you have a VHF antenna and you put two antennas side by side then ghosting occurs because of this and phase coupling is necessary. Or you could put the antennas atop each other. No problem with phasing this way.

I know that this could affect this antenna some, But a phase coupler is another \$70 device. I put the antenna up. It does the job I want. Besides the fact that I have always had a backordered preamp on order that I will install, I won't need to add the phase coupler. And save myself a few bucks too.

If you were looking at the antenna and thinking that the connecting wires should be connected in reverse on one antenna to bring them into phase. I think that only works with connecting speakers. As an example. Look at any other dual array antenna of this type.

I'm no expert here. Anyone else know more about this?



biospot says:

Oct 30, 2009. 9:30 AM [REPLY](#)

I was interested in the phase coupling and if you had significant gain with the second. Your signal gain proves your phase is indeed correct. The question I had was because the alternating pattern of the bowtie connections implies that to keep the phase correct, the antennas elements of the two antennas may need to be crossed also to remain in phase. Since each element in 1 antenna effectively become an element in the final 2 antenna array, I would think it would, but it seems you got everything right, since you are getting such a signal boost.

I would think if you wanted the maximum signal at some time, you may try an inexpensive antenna line booster in line with each antenna. That could overcome any loss in the coupler, and give you the maximum signal possible.

I have also heard that UHF signals are so small (as witness the size of the bow ties, that if an antenna happens to be in the wrong spot even by a foot, it may not pick up anything. With your dual antenna array, you cover such a large cross section that you get good signals strength. That is another good point with 2 antennas.

If I decide to build one, I would follow your directions. Your construction was admirable effective and efficient.



deceiver says:

Oct 30, 2009. 11:35 AM [REPLY](#)

Yes, like I said the phase of commercial antennas made the same way are wired like this. I do have a preamp on backorder that I'm going to try. It might drown out the close channels so we'll see. And it's only the furthest channel that have a narrow angle of direction that I can move the antenna. The closer ones the range is wide.

thanks for your comments.



jtmcdole says:

Oct 29, 2009. 5:37 AM [REPLY](#)

Great looking design. Have you tried looking into the Gray-Hoverman setup? It performs better in the channel range being used by ATSC broadcasts in America. www.digitalhome.ca/ota/superantenna/design.htm



deceiver says:

Oct 29, 2009. 12:21 PM [REPLY](#)

Yes I looked at several designs. The thing is that unless one lives in a completely flat area (I don't) You've got to deal with the curvature of the earth and line of site.

I find it interesting that they have a link for one antenna that's good for 100 miles. The only way that is possible is if you or the transmitter antenna is on a mountain, and a pretty tall one at that. The antenna I made is good for a far distance but with hills and earth curvature anything beyond 60+miles is redundant unless you live on a mountain top.

Also, the further away a station is the better your pointing system has to be. I have a rotor connected. My 30+ mile stations come in when the antenna is pointed anywhere within about a 30 degree angle of the stations. The 60+ mile station as about a 5 degree leeway before it loses the signal.



jtmcdole says:

Oct 29, 2009. 2:01 PM [REPLY](#)

You're incorrect about the antenna on a mountain; mathematically speaking (perfect line of site) the antenna would only need to be ~1445' to see 100miles (not accounting for the height of the antenna mounted on your house). Now, factor in buildings, line of site, etc, yes a mountain (or a tall hill; depending on topology and altitude of a given area) would help. Atlanta has a few 1000' tall towers. Looking at Stone Mountain (825' above surrounding area), you'd not need that tall of an antenna.

In Mexico City several of the towers are on mountain ranges to try and reach as many people as possible. Cell towers, FM and ATSC broadcasts are generally placed in higher elevations because they don't bounce off the ionosphere. An antenna can work at ranges of 100miles.



deceiver says:

Oct 29, 2009. 11:46 PM [REPLY](#)

Well, I don't know where you are but on the east coast of the US the highest point is about 4000 ft, mt Washington. most everything else is sea level to 1000 feet at best. But we do have rolling hills. Most of our Television antenna transmitting towers are located on less than 100 ft buildings located at sea level on the coast. So, either one gets a tall tower at their house or convinces the tv stations to build tall towers. Until then around here 100 miles is well over the horizon. Plus no antenna should be advertised as having a range of 100 miles. An antenna could have a range of any distance with the correct hight. About 60 miles is all any direct line of sight antenna should be advertised. Anything otherwise is misleading. Which is why other antennas aren't advertised as any further than about 60 miles. Line of site is horizon in the antenna world. If people live on a mountain, well good for them. Line of site is different for them.



aqnd says:

Oct 29, 2009. 11:47 AM [REPLY](#)

I second the GH.

It has an excellent design and costs the same as these bowtie-type ones (with better performance!)

Also, if you have ANY questions about DTV OTA then digitalhome has your answers.

(re: ATSC, mostly. DVB-specific questions might be better suited to a DVB-oriented forum instead. The principles of DTV OTA are the same between the specs, though. Antenna design, frequencies, amplification, etc.)



etergenb says:

Excellent! Congratulations!

I would love to eliminate cable TV. Unfortunately, I live in a south shadow of hills blocking transmission signals from the north. Is there any way short of satellite to solve this.

Help me get rid of cable TV!

Oct 29, 2009. 10:50 AM [REPLY](#)



deceiver says:

You've got to have that line of sight. If objects are further away then you'll be ok as enough of the signal will get through but it's hard get around a mountain.

If the hill is far enough away sometimes a tall mast can do it but if it's literally shadow close to you, then you might not have options in that direction.

Oct 29, 2009. 12:24 PM [REPLY](#)



Senseless says:

Nice Job!

Oct 29, 2009. 6:40 AM [REPLY](#)



dsandds2003 says:

Was just wondering how aluminum wire might work in place of copper. I have about 12 gauge uncoated aluminum wire. I know the copper wire around here turns green REAL quick. Or might there be something you could coat the wires with that would not interfere with the reception?

I am going to build one here. TV reception is like the cell phone reception. If you have a signal you're lucky. I know that guy on TV can't hear me now. Keep up the great work.

Oct 27, 2009. 10:34 AM [REPLY](#)



ryanfaerman says:

Copper is a better conductor than aluminum. I would imagine that when you're pulling signals from the air, you want to have the least amount of losses in the system as possible.

Will aluminum work, sure, just not as well.

Oct 27, 2009. 9:11 PM [REPLY](#)



deceiver says:

Yes, copper is a better conductor, of electricity but aluminum runs a close second and I'm not sure if it makes much of a difference with airwaves. If you look at all your TV antennas for the past 50 years they are made with aluminum tubes. Even when copper was cheap, still aluminum. I suppose that is mostly because it is lighter. A long VHF Antenna for a television on a roof made of copper would probably weigh 100lbs compared to hollow aluminum tubes.

You can carry that argument out a long ways.. if you have gold or silver use that. They're really good conductors but I'm not sure if it would matter that much.

Oct 28, 2009. 6:02 AM [REPLY](#)



wrivera6 says:

Agree! Also another reason most antennas are made of aluminum is because they are weather resistant. They do not turn green like copper does.

An interesting trivia is that the top of the Washington Monument is made of (you guessed it!) aluminum.

Oct 29, 2009. 6:39 AM [REPLY](#)



deceiver says:

Any wire would be ok. Even thin steel. The gauge isn't important to reception. But going with something larger insures it doesn't move over time. I used #14 copper house wiring for the connections between the bowtie elements and #6 for the elements themselves. And, the hdtv signal isn't affected much if at all by tarnishing. So if the copper turns color it shouldn't matter.

My guess is that #12 copper could be ok but aluminum would be softer and might be moved by the wind over time. The length, spacing between the elements and the spacing between them is important. So, any metal that will stay put and last would be fine.

Oct 27, 2009. 1:35 PM [REPLY](#)



-bp says:

stop guessing!

you can't connect aluminum to copper without galvanic action causing insulation at the joints. pick one or the other, or use 'anti-ox' from an electrical dept on the joints between aluminum and copper.

-bp

Oct 29, 2009. 11:34 AM [REPLY](#)



deceiver says:

Of course bp, mixing metals isn't good unless it's stainless steel. If one uses aluminum for the antenna elements they'd use it for the wiring also. Here we were assuming that either copper or aluminum were going to be used throughout. So, guessing is a non-issue. But thanks for clarifying this. Some people might not know.

As everyone knows, when aluminum wire was allowed in houses at one time (maybe it still is in some states) you never mixed the copper with the aluminum. The interaction over time would corrode the connections.

Oct 29, 2009. 12:29 PM [REPLY](#)



zwheel says:
But what will you do for internet? Dialup?

Oct 27, 2009. 1:14 PM [REPLY](#)



deceiver says:
Internet providers will, by law I think, let you have internet without cable tv. If they didn't then many people wouldn't have any option for internet. Here in my area of Maine I'm too far from an exchange to have DSL and dialup is unacceptable. Some people also like dish television too. So, I keep my cable internet, I have my phone service via the internet through Vonage which works exceptionally well. We have the 15.99 plan for 500 minutes each month. I never go over. We're not big phone talkers and you only get charged minutes for calls you make.

Oct 27, 2009. 2:35 PM [REPLY](#)



zwheel says:
I used to work for a cable company which charged more for internet without TV than they did for internet w/ TV. They didn't tell the customers this but their excuse to the employees at the time was that they didn't have a reliable way to filter out the basic TV channels w/out making the cable modem buggy.

Oct 28, 2009. 7:18 AM [REPLY](#)

The customers actually had limited basic TV service if they added a splitter to the line that fed the cable modem. Thus, the price difference was the same as the price of limited basic TV. The customer was buying TV but didn't know it.

I believe they have since gained the ability to filter out all TV w/o filtering out the internet. I'm pretty sure they still charge the same though. If I were a customer still however, I wouldn't trust the new filter to not harm the internet service at least a little. I no longer work there plus live in a different state with a different provider so my information is kind of old.

That's a nice antenna you built btw. I don't mean to discourage you. I'm tempted to try it myself just for fun even though we have a roommate who pays for our cable.



deceiver says:
They said they put a trap on the line outside the house. I have data from internet speed websites so I'll check after it gets disconnected.

Oct 28, 2009. 10:57 AM [REPLY](#)



RTChoke says:
Awesome work! I live in a similar area, in the woods about 30some miles from the transmitters, they come and go with the old antenna up on the roof (esp on clear nights). I think I have most of this stuff in my junk, err, shop piles, so I'm gonna bodge up a couple of these real soon.

Oct 27, 2009. 3:49 PM [REPLY](#)

I also have some transmitters on another axis, do you think adding another antenna pointed elsewhere with the combiner would be OK? They are on different freqs so shouldn't mess each other up.



deceiver says:
Probably not. I'd put them at different heights though if I could. The screen on the antenna acts as a reflector. Depending on your other signal frequency it could act as a block for the transmitted signal in that direction.

Oct 27, 2009. 8:21 PM [REPLY](#)



computerwiz_222 says:
This is a very impressive design. I sell (and occasionally build) antennas similar to this and this has to be the largest I have seen.

Oct 27, 2009. 2:31 PM [REPLY](#)

One thing I would like no note though - 60 miles is about the extent of how far you can receive a signal from. Even with absolute line of sight and the most efficient antenna, 60-75 miles is about the limit for UHF signals. This is because of the rounding of the earth. The signal ends up "striking" the side of the earth.

Occasionally, you may be able to get signals from much farther away due to isotropic reflections, but this not a reliable way of watching TV because as soon as the clouds move, the signal changes.

Very nice project!



deceiver says:
Right, I agree. that's why the 62 mile Fox movie station is the furthest I expected in my situation. But, I wanted it reliably and that's what I've got. I don't expect anything further.

Oct 27, 2009. 8:16 PM [REPLY](#)



mackjr says:
Bravo

Oct 25, 2009. 10:59 AM [REPLY](#)



iflyg550 says:
Very well done.

Oct 24, 2009. 8:54 AM [REPLY](#)



framistan says:
Excellent instructable... storebought antennas like this cost BIG BUCKS if you can find one. I worked in the cableTV industry for 14 years and i learned something of signal losses for VHF and UHF frequencies. If you attach a small "IN-LINE" amplifier up near the antenna you could boost your signal and overcome the several DB losses of the feed-line. No extra wiring is needed because an inline tv amplifier (radioshack) is powered using the existing signalwire. with this addition, you might boost that weak station up to the green. Be carefull though. This would also amplify the STRONG stations and this can cause signal distortions in THEM!

Oct 24, 2009. 5:48 AM [REPLY](#)



deceiver says:

Oct 24, 2009. 6:39 AM **REPLY**

Oh btw, One of the stations is VHF. the signal strength is very high with this antenna also. I won't have to install a fishbone one just for that station.

[view all 53 comments](#)