HAM - Longwire antenna

Autor:
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Aug 7th 2011, 20:06
WB8ZTP
Joined: Apr 4th 1998, 00:00
Total Topics: 0
Total Posts: 0 Two words: Longwire Antenna
I find very few articles about longwire antennas. Questions such as; (1) How do I get it into the second story shack through a aluminum sided house or does that matter about the siding? (2) Best length for 160 – 10 meters or is that possible? (3) Counterpoises? (4) What specs needed for a good antenna tuner? (5) Lighting protection for the longwire?

Questions like these have stopped me from putting up a longwire antenna.

Any comments on longwire antennas welcome whether the question was asked or not.

73,
Mark WB8ZTP
Aug 8th 2011, 02:35
ka9wgn
Joined: Apr 4th 1998, 00:00
Total Topics: 0
Total Posts: 0 If you can match your longwire to a coax feed, then you can use the coax to get in through the metal walls with no impact to the impedance.

I'd recommend the ARRL Antenna Book, though it is currently out of stock until early October.
Aug 8th 2011, 17:36
W1VT
Joined: Apr 4th 1998, 00:00
Total Topics: 0
Total Posts: 0 Long wires aren’t as popular as they could be because of their “issues.”

Like verticals, they are unbalanced antennas that require some sort of ground system to work against—the shield current has to go somewhere.

They can be excellent antennas for QRP work, as their issues are minimized by running low power.
The harmonic relationship of the amateur bands allows for efficient voltage feeding on lots of bands—160/80/40/20/15/10 are harmonically related.
But, at higher power levels, voltage feeding is discouraged because the voltages become excessive.

Interference can be a problem with a modest ground system—ground wires are effectively part of the antenna—radiation becomes more substantial the farther the wires are from ground. Low power will also help here—you are less likely to reach the voltage threshold of semiconductor junctions as you reduce transmitter power.

Autotuners like the Icom AH-4 specifically advise against voltage feeding—they tell you to avoid the multiples of a half wavelength that work so well for very low power or QRP work. Instead, the idea is to choose lengths that don’t result in as much voltage stress.

Zack Lau W1VT
ARRL Senior Laboratory Engineer
Aug 8th 2011, 23:16
ka9wgn
Joined: Apr 4th 1998, 00:00
Total Topics: 0
Total Posts: 0 One more thing. Once one masters the methods of a long wire antenna, they are a more agile operator since a big advantage of this antenna is its simplicity. In a major emergency, this could be the first antenna you can get up and running. Knowing how could make a difference.
Aug 9th 2011, 00:37
W1RFIAdmin
Joined: Jul 25th 2011, 14:25
Total Topics: 0
Total Posts: 0 There could be some semantic points to raise here. A "long wire" antenna is generally one that is long enough to exhibit appreciable gain over a half-wave dipole. Longwire antennas are typically designed so the lobes of that gain fall in desired directions.

Most hams don't do this when they put up end-fed wires, so their antennas are more aptly named random-wire, end fed antennas. Most are at least a quarter-wave long on the lowest frequency one wants to operate. This would, of course, be several wavelengths long on the higher bands, and the antenna would exhibit gain over a dipole.

There are indeed a number of "issues" with end-fed wires. First, the ground wire is very much an active, radiating part of the antenna. Ground forms the other half of the antenna, and the efficiency of the ground system will determine the overall efficiency of the antenna.

Because the ground wire is also part of the antenna, if this type of antenna has a ground wire more than a few feet long, the antenna will not be being fed at a current node. If the ground wire were a quarter wave length long, the antenna would be being fed at a high-impedance voltage node. Would put the equipment in your shack at a voltage node on the antenna system and it is quite likely that you'd have "RF in the shack," getting small RF burns when you touched your equipment. Naturally, this is NOT a safe condition. Your tuner and rig chassis are also a part of your antenna system, so you would have to consider the distance of the operator from the transmitter chassis when you did an RF-exposure evaluation of your station.

You can minimize some of these issues by putting a current balun or common-mode choke (search Google) at the output of your transmitter, keeping the RF on the antenna, the chassis of the tuner and on the ground wire.

Still, the antennas can be useful. I've often used random wire, end fed antennas for temporary portable work. If you were backpacking a QRP rig somewhere and wanted to be as light as possible, you could run an end fed wire and string a quarter-wave of wire on the ground to form the ground system, for example.

73,
Ed Hare, W1RFI
ARRL Lab
Technical forums moderator
Aug 9th 2011, 12:56
WB1GCM
Joined: Apr 4th 1998, 00:00
Total Topics: 0
Total Posts: 0 Mark,

About the best length. Make it as long as possible, but avoid end feeding a half wavelength or multiples of half wavelengths of wire; the impedance will be too high for almost all antenna tuners to match.

There are certain lengths of wire that will be neither a quarter wave or a have wavelength long; this is an ideal length for an all band antenna (using an antenna tuner). The shortest length that fits this description is 86 feet. If you want a longer antenna, add another 86 feet.

In my younger years, I had a 175 foot end fed wire running east-west, that I used for all bands in my old barn ham shack in the middle of an old apple orchard. The antenna was only between 30 to 40 feet up.The last 35 feet of it dropped down in an "L' shape to the second floor of the barn. My best contact was California on 160 CW with 12 watts with an

ARC-5 transmitter and matching receiver. I also earned my 10-10 number (on 10 meters) with this same antenna.

These days, I live on a much smaller piece of property! My low band antenna is an overall length of wire which is 86 feet long, configured as an "L" antenna. My ground system is good enough for it to work all the way up to 6 meters without RF feedback. It works OK on 160 and I can work Europe in the wintertime, but it works really well on 80 meters; working DX with it is like shooting fish in a barrel when the conditions are good. While the antenna works on all bands, I use other antennas for 20 meters and up.

As Ed mentioned, you must have an excellent ground system, or you will experience RF feedback.

Bob Allison
WB1GCM
ARRL Test Engineer

Sep 5th 2011, 19:02
WB8ZTP
Joined: Apr 4th 1998, 00:00
Total Topics: 0
Total Posts: 0 Thanks for everyone’s responses. I hope more folks jump into the topic with more ideas and comments. From the looks of the amount of views, it seems to be a popular subject.

73,
Mark WB8ZTP
Dec 5th 2011, 23:38
KR0ES
Joined: Dec 2nd 2011, 17:50
Total Topics: 0
Total Posts: 0 Bob,

When you state, "My ground system is good enough for it to work all the way up to 6 meters without RF feedback", I would love to have a much more in depth explanation of what steps you took to obtain that ground system with an end fed wire.
I'm in the process of putting up a 124' end fed with a matching coil in a junction box. That coil is across the coax center conductor and the shield which is attached to a groundlug as well. According to the vendor, running a wire to ground is optional but that my coaxial feed line should be at least 33 feet long. This means to me that the other half of my antenna is going to be the shield of the coax. Is this okay? Won't I have RF feedback? Therefore my question as to how a 'good enough ground' is constructed so I won't have this feedback. Details would be very helpful.

Thanks in advance.

Jaap Kroes
WB0AQW

Dec 6th 2011, 01:43
gw0nvn
Joined: Apr 4th 1998, 00:00
Total Topics: 0
Total Posts: 0 Hi Jaap,

Do you have more details on the antenna and the matching coil? Is the matching coil an inductor across the feeed point? Or is it a transformer eg a 9:1 transformer wound on a ferite core (T130-2 or T200-2)? At what height is the wire? I suspect it is similar to one a build many years ago...

Many years ago when I first had my hf licence I put up a long wire (random wire) antenna from my shack on the 1st floor (2nd floor USA) of my house runing to a pole at the end of the garden. I succeeded in obtaining the 'Worked all TV Award' on the first day.

I then decided to feed the antemma from the other end of the garden. By using a length of good quality RG213 coax from the shack out of the house down to ground level and then in a pipe along the boundary line to a mast at the bottom

of the garden. My random Wire antenna was just over 100ft long. Consisting of a 41ft vertical section, a 28ft horizontal section and finally a 42ft horizontal section at right angles to the other horizontal section. Where the coax cable would join to the antenna wire I put some earth spikes in the ground. The coax cable had a UHF Connector PL259 on the end so I used a Barrel SO 083-J clamped to the spike.

I used a homebrew noise bridge (see ARRL Handbooks)and a Sony 2001 as the detector to get an idea of the impedance of the wire on the various ham bands. It just so happened that on 40m band its impedence was about 450 ohms with a low reactive component. I then decided to make a 9:1 matching transformer as described in the ARRL Handbook (posibly the Antenna handbook) This used 16 swg enamel wire and a T200-2 core. Because of the transformer design it provided a dc path to ground which helped discharge any static build up.

The transformer had a PL259 connector on one end to connect to the SO 083-J barrel. The other end of the transformers was connected to the antenna wire.

The coax length back to the shack was about 70ft. I used a homebrew PI type atu at the shack end to adjust for the inevitable mismatches on the other bands.

I found that the antenna worked on all the hf bands. However it was best from 20m thru 160m. 20m and above I found other antennas work better. Because of the vertical and horizontal elements it worked well for local and DX. It did not cause any TVI problems. The main reasons were that the antenna wire was a greater distance away from any TV's than before.

Over the years of it's use I added some more ground rods and I laid some chicken fence under a new path which was connected to the main ground connection. Where the coax leads away from the antenna.

Unless you have a proper matching unit at the base of your long wire the coax will act as part of the antenna. 33ft of coax makes me think that the antenna system is optimised for 40m working.

Have fun

Simon GW0NVN N1XIH

Dec 6th 2011, 02:53
WB1GCM
Joined: Apr 4th 1998, 00:00
Total Topics: 0
Total Posts: 0 Jaap,

My ground system is my water main. I have copper pipes; the water hookup is a 3/4 inch copper pipe, hooked up to our community water system that is over half a mile long and one quarter of a mile wide.

One winter, my rotator frooze on my 3 L Yagi, and I thought I had a serious disadvantage on 6 meters. Using the L wire antenna, I made more contacts on 6 meters than ever before during the same VHF contest, but I didn't quite have the range that I normally did on my 3 L Yagi.

Point is, with a very good ground system, end fed wires work great. In my old Novice days in the mid 70's I had a poor ground system. Yet, I was able to do OK on 80 meters with my ground attached to the baseboard radiator in my bedroom. If nothing like that is available, you can use a counterpoise; a quarter wave on the band you want to work, or a bunch of different length wires for the bands you want to work.

The best bet is to experiment. Try different arrangements. That's the fun of being a ham. You will get bit by RF feedback if the arrangement isn't up to par.

Bob
Dec 6th 2011, 19:37
KR0ES
Joined: Dec 2nd 2011, 17:50
Total Topics: 0
Total Posts: 0 Okay, Bob and Simon,

Thank you so much for your quick responses. Since winter is almost upon us, I'm going to put the antenna up with just the minimum direction as per the vendor and when spring comes around again, I will do what Bob suggested (experiment).

Simon, the matching device appears to be a transformer with wire wound on a ferrite core. It is pretty heavy wire so it should be able take some power without a problem.

I'm getting to the age where climbing on towers and/or roofs is inadvisable for safety sake. In my early years of ham radio I had up an 80 foot tower with a Mosley Tribander. 80 and 40 were covered with half wave dipoles. After many years of inactivity and about 4 QTHs later, I find myself with a reasonably long but narrow yard. After much study of the environment, I decided the most reasonable solution would be either a multi band vertical or a fairly long end fed wire. Verticals work well with a large ground plane (radial) system for which I just didn't have space to layout properly. I've experimented with verticals in the past but never with an end fed. I have to hire someone to put it up for me and I'm designing it such that I will be able to take it down from terra firma, make mods and hoist it back up. Fingers crossed. I have an antenna tuner that should work and I will only be running 100 watts out with an old Kenwood TS-830S. Needless to say, I'm really pumped to get on the air again and learn about a whole lot of new stuff that ham radio has evolved into.

Thanks again, fellows.

Jaap
WB0AQW
Dec 14th 2011, 07:51
N7GH
Joined: Jul 21st 2008, 10:41
Total Topics: 0
Total Posts: 0 Mark,
Here is a web article on long wires, "random length". I've tried his lengths and they do work, very well on all bands, 160M through 10M, with a tuner. 20 bucks worth of wire from the hardware store and a good tuner and you're on the air!
73 de,
Les N7GH
Dec 14th 2011, 07:52
N7GH
Joined: Jul 21st 2008, 10:41
Total Topics: 0
Total Posts: 0 Well, as forgetful as I am... here's the actual link:

http://www.hamuniverse.com/randomwireantennalengths.html
Dec 14th 2011, 07:55
N7GH
Joined: Jul 21st 2008, 10:41
Total Topics: 0
Total Posts: 0 I found the 41' wire to be ample to consistently get good reports on 20M and above with freqs below 20M loosing distance with applied wave length (as expected).
N7GH clear.
Dec 17th 2011, 00:41
gw0nvn
Joined: Apr 4th 1998, 00:00
Total Topics: 0
Total Posts: 0 Hi Jaap,

With the advice from everyone here and the good equipment you have I am sure you will end up with a good working station. I think the transformer you describe is like I made and most manufacturers build into their antennas. As you say, make sure you have an easy way of raising and lowering the antenna. I still have a TS830 and it'll be a long time til I part with it.

Have a good Christmas and New Year