



Di-Dah-Dit

Official Newsletter of the
Parkersburg Amateur Radio Klub
P. O. Box 2112 Parkersburg, WV 26101

MAY 1995 P.A.R.K. MEETING

THE MEETING WAS CALLED TO ORDER AT 7:10 P.M.
INTRODUCTIONS WERE GIVEN WITH 21 MEMBERS AND GUESTS IN ATTENDANCE.

THE MINUTES FROM THE APRIL 1995 MEETING AND TREASURES REPORT WERE READ AND APPROVED.

COMMITTEE REPORTS

BLAINE (WA8IOE) REPORTED ON THE MEETING CONCERNING THE 146.97 REPEATER SITE WHICH WAS HELD AT THE HOME OF JOHN (N8NBL).

JEP (K8BOT) TALKED WITH MR. ULLMAN FROM TCI ABOUT THE PRESENT 146.97 REPEATER SITE. MR. ULLMAN WILL TAKE UNDER CONSIDERATION TO LET THE REPEATER SITE STAY WHERE IT IS AT. THE SITE IS STILL IN LIMBO AT THIS TIME.

OLD BUSINESS

CURT (K8UC) REPORTED HE HAS RECEIVED NO RESPONSE TO THE QUESTIONNAIRE CONCERNING FIELD DAY WHICH WAS PUT IN THE NEWSLETTER.

ROY (N8YYS) MADE MENTION THAT THERE WILL ONLY BE ONE MORE KLUB MEETING BEFORE FIELD DAY. SOME DISCUSSION FOLLOWED ON A FIELD DAY SITE.

LARRY (KF8NW) MADE A MOTION TO USE MC DONOUGH PARK AGAIN THIS YEAR. NO ACTION WAS TAKEN ON THE MOTION.

CURT (K8UC) TOOK A SURVEY OF KLUB MEMBERS PRESENT TO SEE WHO WOULD BE INTERESTED IN SETTING UP FOR FIELD DAY AND WHAT THEY WOULD BE WILLING TO DO.

DAVE (WD8CYV) REPORTED EARL (KB8HRG) HAD WORKED ON THE 147.39 REPEATER AND THAT IT IS WORKING GOOD AT THIS TIME.

JOHN (WD8LKT) MADE A MOTION TO ADJOURN. JERRY (KA8NJW) SECONDED THE MOTION. THE MEETING ENDED AT 7:55 P.M.

How to access HIRAM - the ARRL land-line bulletin board:

Those of you with telephone line direct-dial modems may wish to avail yourselves of the many services that ARRL HQ makes available by way of HIRAM, the ARRL BBS.

Hiram can be reached by dialing 203 666 0578, utilizing 8-n-1 parameters, from 300 (ugh!) baud up to 14,400 (gee!) baud.

Once connected, first-time users are asked to choose an appropriate password, at which time they are then granted full and complete access to Hiram.

Internet/Usenet users may contact HIRAM's SYSOP by sending email to LHURDER@ARRL.ORG. Others should contact Luck Hurder at ARRL HQ.

American Radio Relay League, Inc.
225 Main St
Newington, CT 06111
203-666-1541
203-665-7531 FAX
203-666-0578 BBS 8N1
215-5052 MCI

Klub Officers for 1995

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1st. VP	Ray Bodie N8TWV
2nd. VP	John McGuffey N8NBL
3rd. VP	Earl Hulce KB8HRG
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Tres.	Jane McGuffey N8MOW
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NL Ed.	Jerry Wharton KA8NJW
Production	Mary Britton KB8BOA

Subject: Re: lightning protection of roof towers

In article rec.radio.amatuer.misc the question is asked:

I have recently come into possession of a roof mounted tower (about 10 ft. thrust bearing, uses guy wires attached to roof, etc.) and want to mount it on the roof of my two story house. My problem is that the tower will be one of the highest structures around, and is almost certain to be struck by lightning sooner or later (at least I want to be prepared). I would like to know the best way to ground the tower.

In the ARRL handbook (and also the NEC - National Electrical Code) there is a lot of discussion about protecting the feedline by grounding the shield of the coax, using arrestors, switching them to ground when not in use etc. There is also some discussion of grounding a REAL tower. But I haven't been able to find much on roof towers. What I want to be sure (or at least as sure as possible) of is that if the antenna/tower gets hit, the lightning strike doesn't arc through the house, etc.

Some specific questions I have are:

1. What size of ground lead(s) to use for the tower? I realize that bigger is better but the cost of enormous cable is prohibitive. What is reasonable if you EXPECT or PLAN on a direct hit?

The NEC says number 8 solid is the minimum size for the downlead of a lightning rod. Consider this the smallest wire you can use. Since lightning is a pulse that has RF components through VHF, skin effect matters. A better downlead is 5 inch wide copper flashing run as straight as possible to ground, but in no case having a 90 degree or sharper bend in the path.

2. How many?

If you use the correct size, and do the bonding correctly, one is sufficient. If you aren't going to be able to inspect the run frequently, you might consider paralleling a number 8 solid wire with the 5 inch strap so that if corrosion opens one connection, you will still have a better path to ground than through your roof.

3. What paths do I run them?

The obvious answer would be the shortest, except that the shortest path is on the opposite side of the house from the shack and the feedlines. Would the resulting 'cage' effect be good or bad?

Normally, you want the shortest and *straightest* path to ground. However, ground loops can be disastrous. Make up your mind to establish a single ground point somewhere on your property and connect all ground runs to this one point. Make sure the utility grounds are also bonded to this point. Don't ever depend on earth conductivity to close a ground circuit and don't ever use a feedline shield as a ground conductor.

It's ok to have multiple grounds, but they must tie to the single point ground via low inductance, high conductivity cabling in a *star* configuration, not in a daisy chain. Daisy chaining grounds is a recipe for disaster.

Setting up a ground cage is an extreme measure of protection. To do it right is not simple. Doing it wrong can be dangerous. If you can't analyse all the current paths properly for ground loop effects, don't do it.

Bring *all* cables into your shack via a "ground window", that includes power and telephone. A ground

window is a single small area, usually a rack panel, copper plate, or the like, that each wire is attached to via an arrestor of the proper type for that kind of cable. The ground window is then connected to the master single point ground by a heavy strap or cable. This assures you that all cabling entering the shack will be at near the same potential during a strike (plus or minus the breakover voltage of the arrestors). With quality arrestors, you shouldn't ever have a voltage differential of more than 200-400 volts across your equipment. Most equipment will tolerate this kind of voltage for the few milliseconds required. Note that your entire shack may be elevated to several thousand volts above ground due to the resistive drop of your single ground lead, but as long as *every* part of the shack is elevated the same amount, no net current can flow.

3. Do I need to stand them off from the roof?

It's generally not necessary, but it won't hurt. Remember that a direct lightning stroke will typically flow 4,000 amperes or more for several milliseconds. The wire can get quite hot. I've seen number 12 solid *vaporized* by a lightning stroke. That's why you want to use at least number 8 wire or heavy strap.

4. Do I need to attach to each leg of the tower?

That depends on the tower construction. If the tower is welded, connecting to one leg is sufficient. If it is bolted or riveted, inspect it carefully for loose connections and use bond straps to make it a single conductor.

5. What about the guy wires?

Generally, *don't* ground the guy wires. If the tower is going to carry an HF antenna, you'll likely want to break guys with insulators anyway to avoid pattern disturbances.

6. Anything else I should know?

A single ground rod is not an effective ground in most soils. Use at least three no closer than 6 feet apart in a triangular arrangement. Bond them all together with your heavy strap. If you have *metal* underground water piping, tie to that too. Remember, *star* configuration. No ground should connect to another except at the *single* point connection. And no downlead should connect anywhere but at the single point.

Always *mechanically* bond ground wires and straps. Don't depend on *any* soldered connection. Solder *will* melt when lightning strikes. The NEC says there should be *no* splices in a ground run. That's perhaps a bit extreme. A *good* mechanical and electrical splice should be ok, but rather safe than have the insurance company void your claim.

I know that there's no guarantee when it comes to lightning strikes, but it is my family in the house and I want to be sure I have done everything I can to protect them.

That's a good attitude Dave. Lightning kills more people each year than any other weather related thing. Besides, the better ground field can help your HF signals *every* day.

The members and HQ staff would like to thank the following people for their contributions to this information file:

Gary Coffman, KE4ZV gary@ke4zv.uucp
Send any additional information or changes to mtracy@arrl.org.
73 from ARRL HQ.

NOTICE TO ALL VISITORS

WHAT YOU ARE ABOUT TO WITNESS IS AN AMATEUR RADIO STATION LICENSED AS _____ BY THE FEDERAL COMMUNICATIONS COMMISSION IN WASHINGTON, DC. BEFORE YOU ASK THE QUESTIONS, HERE ARE THE ANSWERS:

- 1) The total cost of this equipment cannot be discussed here as it creates marital conflicts.
- 2) No, we cannot send a message to your brother in Hong Kong. We suggest you call Western Union.
- 3) This is strictly a hobby; we do not have the facilities or the time to fool around with TV sets, radios or hi-fi. We suggest that you see a serviceman.
- 4) Yes, the antenna in the backyard is essential to the operation of the equipment.
- 5) The farthest station we have contacted has been in the Ubangiland.
- 6) The cards on the wall are called QSL cards. They are confirmation of contacts made with other stations.
- 7) It is technically impossible for this station's equipment to interfere with television reception, telephones or stereo systems. Any interference problems of that nature are caused by design flaws in the home-entertainment devices themselves.
- 8) An Amateur Radio station may only be operated by a highly qualified, technically skilled electronics expert. It takes dedication, training and intelligence to reach the level of competence that justifies one to be license by the United States Federal Government. Therefore, it is not considered inappropriate to show proper awe, respect and general obsequiousness when I discuss my hobby or operate the controls.

FURTHERMORE...

IF YOU ARE GRANTED THE EXTREME HONOR OF BEING INVITED TO SPEAK INTO THE MICROPHONE, PLEASE OBSERVE THE FOLLOWING RULES:

- 1) Speak in a low and soothing tone.
- 2) Do not disagree with me in any manner.
- 3) Say no bad words and tell no off-color jokes.
- 4) It is customary for guests to make complimentary remarks about this station and its licensed operator when talking to other hams on the air.

DO NOT TOUCH ANYTHING, TURN ANY KNOBS, SIT ON EQUIPMENT, ETC. I HAVE LOST SEVERAL VISITORS BY ELECTROCUTION IN THE PAST FEW WEEKS.

Thank you for your cooperation

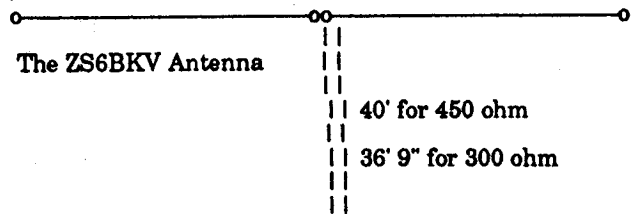
Subject: Multiband Wire Antennas
By Ed Humphries - N5RCK
Hewlett-Packard NARC Atlanta GA
edh@hpuaerca.atl.hp.com

The March 1991 issue of CQ Amateur Radio contains yet another discussion of multiband wire antennas. In his column "Radio FUNDamentals", Bill Orr, W6SAI writes about the original W9CXX multibander with its' complex copper tubing matching section. He then goes on to discuss the popular G5RV developed by Varney, which is widely built and commercially available. Orr points out the deficiencies of the G5RV: when built in the original design it delivers reasonable SWR on the 7, 14, and 24 MHz bands, but into a 75 ohm coax feedline that is awkward to load up on modern transceivers; when built with 50 ohm coax the SWR is poor on all bands, but it performs reasonably well when used with a "transmatch" antenna tuner.

The column skips over an intermediate antenna design discussed in the March 1986 issue of Ham Radio. Bill's column back then pointed out that W5ANB first proved you could successfully modify the G5RV, load it with 50 ohm coax and run without any antenna tuner. But the best design (so far HI) he discusses in both articles is the one by ZS6BKV. Brian Austin used computer modeling to help him design a 5 band tuner-less antenna. Orr's CQ column reprints the design using only the dimensions for a 300 ohm matching section (I presume TV flat lead qualifies). In his original column Orr also presented the figures for using 400 (handmade open-wire leads) or 450 ohm (ladder-line) as the matching section. Since 450 ohm ladder-line is somewhat stronger than the commonly available 300 ohm TV lead-in, I'm here giving both sets of figures so you can make your own choice.

< 90' 3" for 450 ohm matching section or 92' 2" for 300 ohm

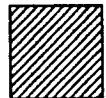
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At the end of the matching section Orr recommends a 1:1 balun; others would say that several loops of coax at the feedpoint will do as well to help keep rf off the feedline. The feedline to the transceiver is common 50 ohm coax; RG 58/U is fine for hf for most runs. This antenna should give low SWR on 7, 14, 18, and 24 MHz bands. At 28 MHz the SWR is really only good from 28.5 to 29.0. Tests showed the best SWR curves when the antenna was erected at about 42 feet above ground. When run as an inverted-V (90 degree) the resonant frequency came down 80 kHz for 14 MHz and 125 kHz for 24 and 28 MHz. The March '86 article printed SWR curves, and the March '91 article printed field patterns for all 5 covered bands.

The ARRL members and HQ staff would like to thank the following people for their contributions to this information file:
N5RCK
Send any additional information or changes to
mtracy@arrl.org.
73 from ARRL HQ.

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