

## Antenna and Tower Safety

Many amateurs enjoy building and installing their antennas and consider this one of the most enjoyable aspects of their hobby. Since antennas are generally outdoors, they are affected by such potentially hazardous weather as wind, ice and lightning. Learning about the potential hazards of towers and antennas and how to do antenna work safely will pay dividends.

*Any heavy, large and permanent structure that fails or collapses can potentially hurt or even kill somebody.* The complete installation *must* comply with all applicable structural and building codes. Professional engineers design towers to withstand code loadings—that is, dead weight, wind and ice loadings that are applicable to the environment at your particular location. The latest revision of the EIA-222 standard is the document from which professional engineers work to ensure that their tower designs are structurally safe.

To ensure structural safety and integrity, you must demonstrate that your tower has been designed by a qualified engineer to withstand EIA-222 loadings at your specific geographic area. Further, the tower, foundation, guys and anchors must be installed (and maintained) according to any drawings, instructions and specifications supplied by the professional engineer. Remember: A properly designed, installed and maintained tower should be as safe as a building or a bridge!

It is not feasible to discuss each type of antenna and tower in detail, so this section will include only highlights. For a full understanding of the specific hardware you will be working with, consult the manufacturer or supplier. You should discuss your antenna plans with a qualified engineer. The ARRL Volunteer Consulting Engineer program can steer you to a knowledgeable engineer.

### **When using slingshots or arrows to string up the antenna, be sure no one is in range before you launch.**

In addition, your town or city will probably require that you obtain a building permit to erect a tower or antenna. This is their way to help ensure that the installation follows good practices and that the installation is safe. Wise amateurs realize that an independent review of drawings and site inspections are beneficial and can result in fewer problems in the future.

Towers must have a properly engineered support, both for the tower sections themselves as well as guy wire attachments. Sometimes towers are braced to buildings for added support. The Antenna Supports chapter of *The ARRL Antenna Book* covers this subject in greater detail. Towers are available commercially in both guyed and self-supporting styles, and constructed of both steel and aluminum materials. Masts may be wood or metal. One popular and inexpensive mast used to support small antennas is the tubular mast often sold for TV antenna use. These come in telescoping sections, in heights from 20 to 50 feet.

Aluminum extension ladders are sometimes used for temporary antenna supports, such as at Field Day sites. One problem with this approach is the difficulty in holding down the bottom section while “walking up” the ladder. Do *not* try to erect this type of support alone.

Trees are sometimes pressed into service for holding one end of a wire antenna. When using slingshots or arrows to string up the antenna, be sure no one is in range before you launch.

### **Tower Tips**

- Towers have design load limitations. Make very sure the

tower you consider has the capacity to safely handle the antenna(s) you intend to install in the kind of environment that is applicable to your location.

- The antenna must be located in such a position that *it cannot possibly tangle with power lines, both during normal operation or if the structure should fall.*

- Sufficient yard space must be available to position a guyed tower properly. A rule of thumb is that the guy anchors should be between 60% and 80% of the tower height in distance from the base of the tower.

- Provisions must be made to keep children from climbing the support.

- Soil conditions at the tower site should be investigated. The footings need to be designed around actual soil conditions, particularly on a rocky site.

- Beware of used towers. Have them professionally inspected and contact the manufacturer for installation criteria.

- Check with your local building officials.

- Liability may be increased with a tower installation. Check with your insurer to ensure your coverage is adequate.

- Make sure you have all the tools needed before starting. Some specialized tools (such as a gin pole) may be required.

- The assembly crew as well as those climbing the tower during erection must wear hard hats and use appropriate personal protective equipment including gloves, boots, climbing belt or harness. Don't forget that lifelines are needed when the belt is unattached from the tower while moving.

- Assign someone in the erection crew to monitor the use of safety equipment.

- After the tower is installed, keep the installation safe. Inspection and maintenance recommended by the tower's manufacturer should be carefully followed.

- If making attachments to houses or installations on roofs, have a qualified person determine that the method is adequate and the loading conditions are satisfactory.

- Avoid metal ladders if there are any utility lines in the vicinity. Assume that any line is energized—including cable television and telephone lines.

### **Power Lines**

Hundreds of people have been killed or seriously injured when attempting to install or dismantle antennas. In virtually all cases, the victim was aware of the hazards, including electrocution, but did not take the necessary steps to eliminate the risks. Never install antennas, towers and masts near power lines. How far away is considered safe? Towers and masts should be installed twice the height of the installation away from power lines. Every electrical wire must be considered dangerous. If the installation should contact power lines, you or those around you could be killed! If you have any questions about power lines, contact your electrical utility, city inspector or a qualified professional.

If, for some reason your tower starts to fall, get away from it immediately. If it touches energized lines it may be a lethal hazard if you are in contact with the antenna. If a coworker becomes energized, do not touch the person. Instead, use an insulated wooden pole to knock the energized conductor away from them. Don't become a victim yourself! If the person is not breathing, immediately start CPR and call for emergency assistance.—*excerpted from the 2000 ARRL Handbook*