

Strike Force: Protecting Your Home From Lightning

HELP

By JEFF SEISLER

Lightning—nature's electrical fireworks—can have a devastating effect on an unprotected home. It causes extensive property damage and results in more than 200 deaths and 1,500 injuries in the United States annually. Many urban dwellers take a

casual view of lightning protection: statistically only about 1 percent of all home fires are started by lightning. Other people are deathly afraid of a lightning strike and may want to pay the price for added protection against lightning's potentially destructive force and cost.

In the Washington area there are usually 30 to 40 thunderstorm days each year, most of which occur between June and August. Though lightning protection isn't cheap, you

may want to understand the alternatives to help you decide whether to invest in a system for your home (or apartment building).

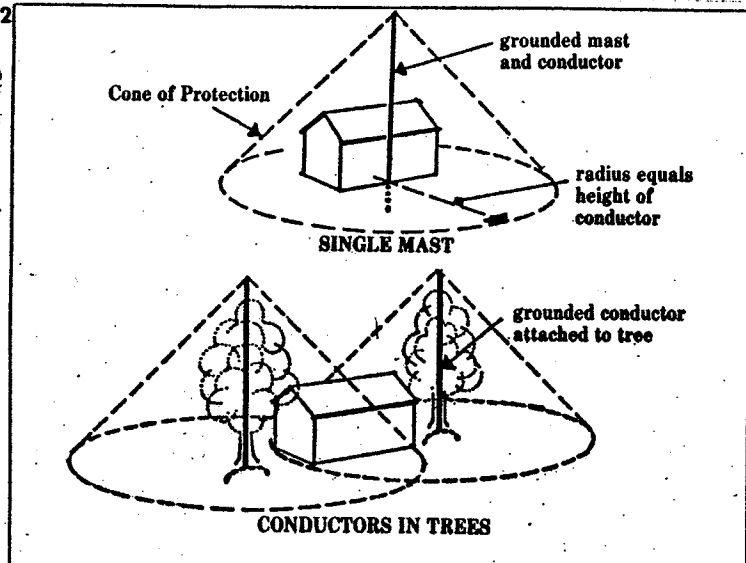
MAY THE FORCE NOT BE WITH YOU: Lightning is a discharge of electricity in the air, between a region of negative and positive charges. It occurs in snow and dust clouds, as well as thunderclouds, when cold, dense air in one region meets warm, moist air in another. A lightning flash occurs when the negatively charged portion, usually from the sky and called the "stepped leader," travels about 240 miles *per second* toward the positively charged area near the ground. A positive charged "return stroke," traveling from the ground at about 61,000 miles per second, greets the stepped leader, causing the familiar jagged light and potent electrical discharge.

About 20 percent of the 8.5 million

daily lightning flashes worldwide strike the ground. When a lightning bolt does strike the ground, it takes the shortest, easiest path and strikes with varied force. Electrical charges range from 20,000 to 200,000 amps and 10 million to 100 million volts. Your home's electric circuits, by comparison, are each wired for about 15 to 20 amps and 115/230 volts. A 100,000-amp blast, for example, can dislodge 50-ton chunks of rock. Striking the beach, lightning can turn the right mixture of sand into glass at about 3,272°F, or 1,800°C.

There are two types of ground-striking lightning. Short-duration, high-current "cold" lightning strikes with explosive force. Hitting a tree, it can instantly evaporate all of the tree's moisture, causing cracks or bomblike explosions. A cold lightning blast is measured in

CONTINUED ON PAGE 12



FROM THE LIGHTNING BOOK, DOUBLEDAY & COMPANY, INC., GARDEN CITY, N.Y. 1961

CONTINUED FROM PAGE 11

milliseconds. Long-duration, lower-current "hot" lightning sets fires, and lasts from 0.2 to 2 seconds.

WHEN LIGHTNING STRIKES:

Lightning can enter a house through television antennae, power lines, water pipes, metal vent pipes, downspouts or telephone wires. It can be the result of a direct hit or a forceful

charge arcing off a nearby tree. Fires are caused as the charge passes through a wall or across any flammable surface. If a TV antenna isn't grounded properly, it can be a fatal invitation to a lightning strike. Entering along a power line, lightning can melt a radio, explode a television and cause metal furnace parts to fuse together. Lightning following a

telephone line, most common in rural areas with long lines across open land, can result in more than just a little crackling in the receiver. Ear injuries are the most frequent of all reported lightning injuries, according to the Lightning Protection Institute. One Washington State resident reported having her tongue singed during a "lightning conversation." Most electric and telephone systems are equipped with lightning protectors, but 100 percent safety apparently cannot be achieved.

DIVERTING LIGHTNING FROM YOUR HOUSE: After flying his kite during an electrical storm, Benjamin Franklin was lucky he lived to invent the lightning rod. Motivated by his potentially fatal electrifying experiment, Franklin wrote and published the essay "How to Secure Houses Etc. From Lightning," in his 1753 Poor Richard's Almanack. Soon after, lightning rods were being set up all around the United States, and the concept and technology has changed little since then.

Lightning rods, also called conductors or "air terminals," are designed to intercept a lightning discharge before it can contact a building, and pass the electrical charge safely to the ground. They consist of three elements: the metal tip or terminal placed high enough to

intercept the lightning; a continuous metal conductor that leads downward from the tip to the ground; and a grounding rod or metal plate making a good electrical connection with the earth, buried about eight to 10 feet.

When installed, lightning rods provide a "cone of protection" approximated by a circle whose radius equals the height of the terminal, measured from the base of the lightning conductor (see illustration).

The lightning protection system typically is installed in one of several ways. A single mast or "down run" can protect a small building, such as a garage or storage shed. Lightning protection standards and codes prescribe that at least two conductors be erected at opposite corners of a residence with a perimeter—the measured distance around the base of a building—up to 250 feet. One down run per additional 100 feet of perimeter is recommended thereafter. Lightning protection also can be installed in tall trees near the house, as long as the house falls within the system's "cone of protection." This can be done by fastening the conductor right to the tree. (The terminal's tip normally sticks up higher than the highest branches.) Alternatively, lightning masts can be placed near each end of the building with

CONTINUED ON PAGE 13

a ground wire attaching the two masts. This method probably is the least common and won't be found often in urban areas.

Lightning arresters or surge suppressors are used to divert lightning from entering a house along telephone and electric lines, or through television antennae. They can be installed as part of a complete lightning protection system or installed separately. Arresters are attached and grounded to the wiring systems at a point just before the wires enter the house. Arresters can help save valuable electrical equipment and appliances from destruction by a high-voltage zap.

If you have no arrester and are concerned about your appliances,

particularly when a storm is directly overhead, you can avoid costly damage from surges by unplugging your most expensive electrical equipment.

THE COST OF LIGHTNING PROTECTION: The cost to install lightning protection depends upon a building's height, size, design, and electrical and plumbing layout. A two-terminal system typically costs \$500 to \$1,000. Arresters alone cost about \$75 to \$100 installed. Apartment building installations cost about the same because most have easily accessible, grounded steel superstructures.

The contractor you choose should be certified by the Lightning Protection

CONTINUED ON PAGE 24

Institute, which keeps close track of all its certified dealers and their installations. Watch out for the fly-by-night companies whose work can cause lightning hazards. The installation of shallow ground couplings or conductors with sharp angles or bends are signs that your installer isn't doing his job properly.

One of the local contractors among a handful listed under "Lightning Protection" in the Yellow Pages said he only installs lightning arresters and not conductors. He believes that lightning rods attract lightning and are potentially more dangerous than leaving the house unprotected. The validity of this argument has been debated since

Benjamin Franklin's days. A properly designed and installed system should, however, provide complete lightning protection.

What should you do? If you have experienced destruction by lightning, you've probably thought about or already have installed lightning protection. If your house stands prominently alone on its site, think seriously about lightning protection. Other residents of townhouses or otherwise clustered housing have to make an individual choice whether to purchase protection or play the odds against receiving a bolt from the blue.

For more information send a self-addressed stamped envelope to the

Lightning Protection Institute, P.O. Box 406, Harvard, Ill. 60333, (815) 943-7211. Lightning protection standards are available for \$8 from the National Fire Protection Association, Batterymarch Park, Quincy, Mass. 02269, (617) 328-9230, or can be obtained in many local libraries.

LIGHTNING TRIVIA: People struck by lightning often appear to die, but can be revived (they are rendered unconscious, breathless with no heartbeat) by applying continuous CPR.

• Golfers wearing metal cleats and brandishing iron clubs are very effective lightning rods. Ask Lee Trevino.

• Roy C. Sullivan, a former Shenandoah Park ranger, is the only

living person to be struck by lightning seven times. Since 1942 he lost his eyebrows, had his hair set on fire twice, and been burned on various parts of his body by lightning bolts.

• In 1769 the Church of St. Nazaire in Brescia, Italy, was struck by lightning, exploding 100 pounds of gunpowder being stored there. The blast killed several thousand people and leveled the city.

• The "most famous" lightning strike was to Apollo 12 on November 14, 1969, as the Saturn/Apollo space vehicle passed through clouds above Cape Canaveral. No harm was done to the craft. ■

Jeff Seisler is an energy analyst and management consultant in Alexandria.