

## Lightning Protection Fuses

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The question often arises “How do I know if my lightning protection (LP) system has been struck?” Lightning protection is one of the most dependable services that arborists provide. Once a tree is protected, if the system is maintained, it is rare that lightning damage will occur. So how does the arborist or client know if the system is actually working or if the tree just is not getting struck?

Currently, there are no manufactured fuse systems for tree LP system. However, you or your arborist can make one that will serve this purpose.

While fusing a LP system sounds like an easy task, in reality it is more difficult than it appears. The simplest method of fusing would be to cut the conductor and install a fuse between the two cut ends. This is not a safe practice because the fuse may actually explode when hit or tree damage may occur when the electricity jumps the gap. So instead of directly fusing the system, the typical way lightning protection is studied is by making wire loop with a flash bulb installed as a fuse. As you can imagine, there are problems both finding flash bulbs in this day and age and durability problems when they are attached to a tree.

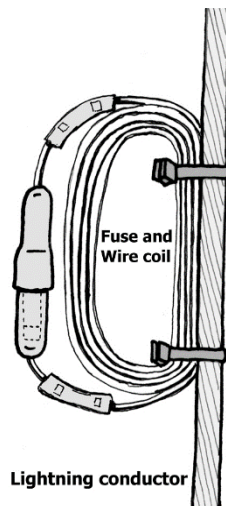
Lightning protection fuse systems work on the same principal as a transformer. As the charge comes down the conductor, a current is induced in the wire loop blowing the flash bulb or fuse. The more coils of wire present and the closer they are to the conductor, the greater the current through the coil. Induced current is directly proportional to the number of wire coils.

Over the past decades, a variety of low cost LP systems have been installed at the Bartlett Tree Research Laboratories in Charlotte, NC to study the effects of lightning on tree crowns, roots and LP conductors. Along with the LP system, a variety of fuses have been installed to monitor lightning strikes. These fuse systems ranged from commercially manufactured lightning strike counters to simple looped fuse holders.

The materials required to build a fuse system are as follows:

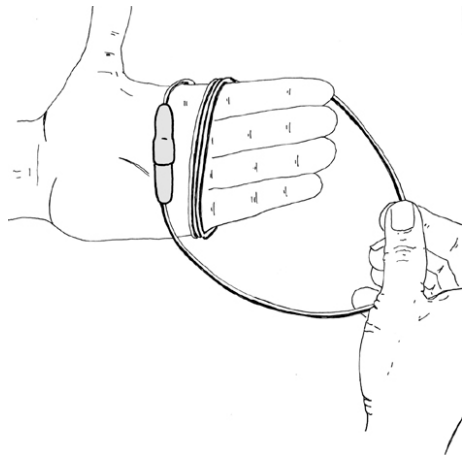
- marine quality fuse holder
- one-amp fuse
- two corrosion resistant nylon crimp connectors
- two cable ties
- 36 inches of marine grade 18 gauge insulated wire

**Figure 1: Lightning protection system fuse setup**



The wire is connected to the fuse leads using the nylon covered crimp connectors. The assembly is coiled around the hand to create five loops that are about three inches long and one and a half inches across (Figure 2). The fuse system is then tightly attached to the LP conductor using the cable ties. Whenever you want to check to see if the tree was struck, open the fuse holder and look at the fuse.

**Figure 2: Wrapping wire to form fuse coil**



Information from lightning strikes can provide valuable data that enables us to learn more about how lightning affects both trees and the systems that protect them. This may lead to lower cost LP systems and more trees being protected from this potentially devastating force of nature.



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