

## Lightning Protection Guidelines

Any time you install a system with components connected by wire, you have the possibility of lightning damage. This is caused mainly by induced voltage in the wire. A lightning strike one mile from the cable can cause a high frequency spike of up to 2KV to be induced into the wire and the components connected to the wire. Our current exchange station boards and all substation circuit boards have protection devices built in. The station devices are only effective when installed in a grounded box! **This protection should be considered the bare minimum required.** In areas of the country where lightning is common, more protection is needed – both at the head end and the station end.

You may purchase the following accessories from Zenitel for such protection:

- 1170 Transient Suppression Devices for the head end. These devices are to be mounted onto a 66 block and act as bridge clips, which aids in troubleshooting the field wiring. You need two of these for a four-wire station.
- 1171 Ground Strap. This strap is used to supply the ground for the 1170's (will provide ground for up to 10).
- 1173 Station Protection Device. This unit will terminate the four substation wires and provide a ground wire.

See drawing and the specific notes at the end of this section. This drawing shows an AlphaCom M but could actually be any system installed using home run wire!

**Note: Lightning protection is only as good as the ground it connects to!  
Ground in this case usually refers to building ground.**

**A good lightning protection installation will look well thought out. The cable flow should be logical, with cable coming in on one side and leaving on the other side. Don't bundle everything together!**

1. Mount the AlphaCom exchange in a location which has a known building ground close by. If such a ground is not available, request the building owner to have such a ground installed. Note: Equipment racks are normally grounded in this manner by code.
2. Mount the 66 blocks next to the exchange, again close to the same building ground connection. The 1171 ground strap comes with a 16 inch ground wire and should not be lengthened unless there is no other way. If you must lengthen it, use large (12 gauge) wire of no more than a few feet.
3. Both of these ground connections should be of similar length and short!

4. The wire to the field devices should be twisted pair, shielded, direct burial cable such as Belden 5541P1 or equal. You do not need to use this cable inside the facility, although it would not hurt and could help in a few cases (see note 2 at the end). You need shielded cable between the exit locations from the building to the field devices. Connect the shields of this cable to building ground where the cable enters the building. If you decide to use shielded wire from the building entrance to the 66 block location, do not connect its shield at the entrance location but rather connect it at the 66 block location to the same building ground as the intercom exchange and protection devices.
5. At the field end, install the 1173 inside the box and connect its ground wire to the box by drilling a hole and using a sheet metal screw. **Note: The box must be at earth ground!**
6. **In many lightning strike cases, the protection devices will save the system and remain functioning as well. If the strike is quite serious, the protection devices may fail and become shorted. They are designed to do this! Any time you experience a strong strike you should test the protection devices!**

#### Drawing Notes:

1. Box must be at earth ground, see NEC or local codes.
2. 1173 connected inside box with short ground wire.
3. Two twisted, shielded pair, direct burial cable.
4. Connect cable shields to building ground at building entrance.
5. Connect protection with short ground cable.
6. Connect exchange cabinet with short cable to same ground location as the protection ground.

#### Additional Notes:

1. If you are using protection devices by other manufactures, the clamping voltage of such devices should be between 50 and 60 VDC.
2. When the above refers to field station locations you should include units in parking garages, as well as any stations located in open or semi open structures. When in doubt, use shielded wire for the entire run and install as above.
3. See the National Electrical Code for detailed information on:
  - A. Building ground and what that entails.
  - B. Installation and bending radius of wire used for grounds.
  - C. Size of wire needed for grounding.
4. **If you are in an area with known or suspected lightning issues, encourage the customer to contact a specialist in this field for a site survey.**

