



BOLTEK CORPORATION

Lightning Detection



***StormTracker* Lightning Detector**
with PCI style receiver card

Installation/Operators Guide

SEE NOTICES ON REVERSE

BOLTEK LIGHTNING DETECTION

StormTracker Lightning Detector

Disclaimer

StormTracker lightning data is only approximate and should not be used for safety applications. Strike and storm locations indicated and alarm statuses may be erroneous and should not be used to safeguard personnel, equipment or data.

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THIS EQUIPMENT IS NOT TO BE USED FOR SAFETY PURPOSES

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STORMTRACKER IS NOT BE USED FOR SAFETY PURPOSES.

Warranty

Boltek Corp. warrants each new Boltek *StormTracker* Lightning Detector delivered to the customer to be free from defects in material and workmanship for a period of one year.

Should your Boltek *StormTracker* fail within the warranty period, telephone, fax, or email Boltek describing the problem you are encountering. If we can't solve the problem for you, we will give you an R.M.A. number to return the product for repair or replacement.

Introduction

Congratulations on your purchase of the *StormTracker* Lightning Detector. You will find *StormTracker* to be a useful tool in determining if there is lightning in your area, finding the location of storms, and determining whether storms are coming your way.

StormTracker uses a direction-finding antenna to receive and locate the radio signals produced by lightning. The strength of the received signal is used to calculate approximately how far the strike is away. The combination of direction and distance allows the strike to be plotted onto a radar-like screen, the receiver location being the center of the screen with distance increasing outwards from the center.

As well as showing the current lightning activity, lightning data may be replayed in fast motion, displaying several hours of storm activity in a few seconds. You can see the natural progression of storms as they form and later die out.

StormTracker consists of:

- PCI style receiver board which you will install in your computer
- direction-finding antenna
- 50 foot antenna cable
- software on CD-ROM
- manual

You will need to:

- install the receiver board in your computer
- let Windows load the device drivers for the PCI card
- install the display software onto your computer's hard drive
- configure the software
- route the antenna cable
- mount the antenna
- wait for a thunderstorm

The installation section of the manual will take you through each of these steps. After completing these steps your *StormTracker* lightning detector should be operational. If you have difficulties getting your detector to work properly the troubleshooting section will help you determine the cause of the problem.

Installation

Installation consists of three stages:

- 1) Installing the receiver board in the computer
- 2) Installing software onto your hard disk
- 3) Installing the antenna and routing the cable

StormTracker – PCI Installation Instructions

There are three steps to installing your new PCI StormTracker card:

1. Installing the StormTracker – PCI receiver card in your computer.
2. Installing the lightning display software (NexStorm/Lightning2000).
3. Installing the Windows device driver.

INSTALLING THE PCI CARD IN YOUR COMPUTER

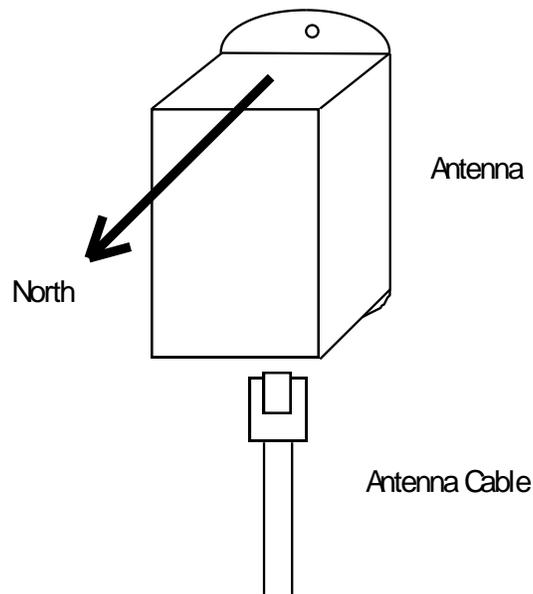
Locate a free PCI card slot on your computer motherboard. PCI connectors are usually white in color, whereas the older style ISA connectors are usually black. Plug the *StormTracker* card into the PCI slot and screw the card down. Make sure the card is fully seated in the PCI connector. Also make sure the other cards in your computer are fully seated in their connectors as plugging in a new card can unseat existing cards.

INSTALLING THE WINDOWS DISPLAY SOFTWARE/DEVICE DRIVER

Turn on your computer. When Windows restarts it will detect the new StormTracker card and ask for a device driver. Click Cancel, then insert display software disc and follow installation instructions according to software manual. Driver installation will occur during software installation.

Installing the Antenna

The antenna is housed in a small black plastic box that must be mounted vertically on a non-metallic support. The antenna cable plugs into the bottom of the antenna housing. When mounting the antenna ensure the correct side of the antenna faces north. The cable plugs into the bottom of the antenna with the front of the antenna facing north. The front of the antenna corresponds to the top of the computer screen. If the antenna does not face north the top of the computer screen will not be north.



Provided there are no large metal objects to block the radio signals, mounting the antenna 6 feet high is ok. Mounting the antenna 12 feet high is good. 20-25 feet is better.

LIGHTNING

Receiving lightning signals does not cause lightning to strike. Your LD-250 antenna is less likely to be struck by lightning than your anemometer, since the antenna does not need to be above the roof line. Still though you must exercise common sense when choosing a location for your antenna. If you mount the antenna on a ten foot pole on the highest point on your roof, with no trees or television tower nearby you are asking for lightning to strike.

Your best protection against lightning is to mount the antenna indoors. Radio waves will pass right through a wood building. Lightning is more likely to strike a tall tree, television antenna, copper plumbing vent, satellite dish, telephone line, power lines, or CB antenna. If you do mount the antenna outdoors make sure there are plenty of ground paths for lightning nearby (such as those just mentioned), and higher than the antenna.

The StormTracker PCI receiver board has surge suppression in its input to protect against voltages induced into the antenna cable. It is also a good idea to purchase a surge suppressor to plug your computer into. Try to find one that will protect your phone line as well. Lightning often enters through the telephone line. Both your computer and surge suppressor will need to be grounded.

The antenna may be mounted indoors or outdoors. Try to mount the antenna as high as possible (without making it a lightning rod). Mounting the antenna high will keep it away from noise sources and will improve the maximum range.

In a wood framed house, the second floor or attic is often a good location for the antenna. This places the antenna above the most common sources of interference: televisions, lights and appliances, yet leaves it in a good location to receive lightning signals. Mount the antenna to the drywall or attic rafter away from screws, nails, electrical wiring, and other metal objects. If your house has aluminum siding (vinyl siding is ok), foil-lined insulation, or any other metal coating, you might have problems receiving with the antenna indoors, as the metal may shield radio waves from the antenna.

DO NOT MOUNT THE ANTENNA SO AS TO ATTRACT LIGHTNING. The antenna does not need to be the highest object in the area to receive lightning signals.

DO NOT LOCATE THE ANTENNA NEAR AN OBJECT WHICH IS LIKELY TO BE STRUCK BY LIGHTNING. Objects such as television antennas, CB antennas, power lines, phone lines and tall trees are natural targets for lightning. Keep the antenna and cable away from anything which might be struck by lightning. Lightning can jump from one object to another in its search for ground.

The antenna may be mounted with nylon cable ties, or with nylon bolts through the mounting flanges (available at a hardware store). Do not use steel screws to mount your antenna, as the antenna must not be near any metal objects.

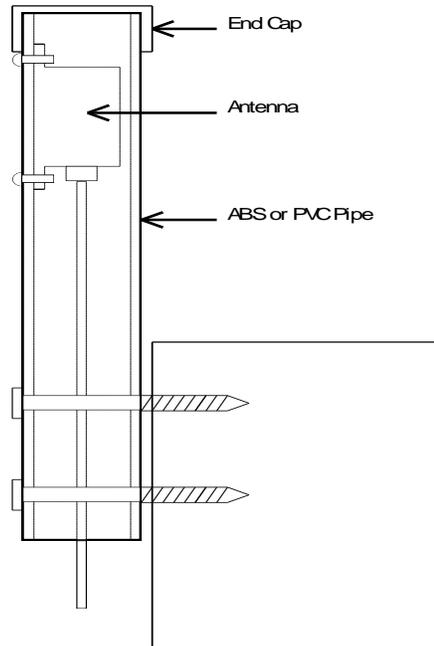
If mounting the antenna outdoors, care must be taken to protect the antenna connector from moisture. While the antenna is completely waterproof the antenna connector must be sheltered from rain. Place the antenna inside a non-metal housing such as a length of ABS or PVC pipe with an end cap covering the top. Keep a small opening on the bottom to allow condensation to drain out. ABS or PVC pipe, fittings and glue may be purchased from a hardware store plumbing department. Mark NORTH on the outside of the pipe to help in orienting the antenna correctly.

Fasten the cable to the wall or support about 6-12" below the antenna. Leave a bit of slack in the cable near the antenna so that there is no strain on the connector from the wire.

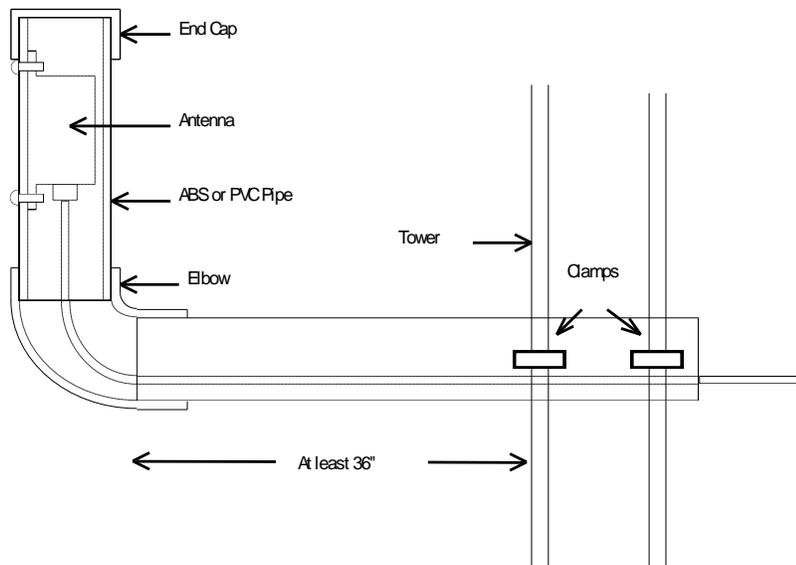
If you find the 50' antenna cable provided is not long enough you may purchase a Boltek extension cable. This allows you to locate the antenna up to 200' from your computer.

You may also purchase a replacement cable at any computer store selling network hardware. Any Category 5 cable up to 200 feet will work. See Appendix C for information on making your own antenna cable.

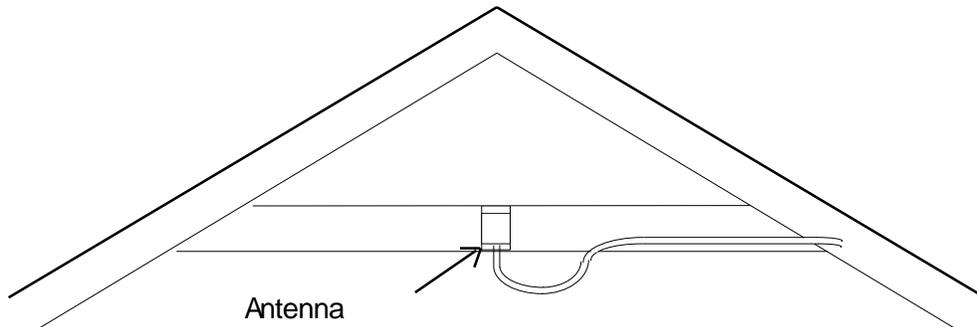
Antenna Mounting Suggestion – Outdoor



Antenna Mounting Suggestion - Outdoor



Antenna Mounting Suggestion - Attic



Antenna Mounting Examples



Here an antenna is mounted in an attic. PVC plumbing hardware is used to attach the antenna to the framing. The vertical pipe is not cemented to allow the antenna to be rotated slightly for fine-tuning direction. The front of the antenna must face exactly north.



Here an antenna is mounted in a shed using PVC plumbing hardware purchased at a local hardware store. The antenna is attached using nylon cable ties.



Here the antenna is attached to the drywall in the second floor bedroom of a house. The antenna is mounted on the wall using PVC plumbing hardware purchased at a local hardware store. The antenna is attached to the PVC pipe with nylon screws. The vertical piece of PVC pipe is not cemented so that the antenna can be rotated to fine-tune the direction.

Mount the antenna between studs to keep it away from nails and screws. Look for electrical outlets on the wall to determine if there is wiring behind the drywall. Keep the antenna away from electrical wiring, to reduce the chance of picking up noise.



Here the antenna is mounted to the side of a pole using ABS sewer pipe.



The mast is 1 ½ inch PVC while the container for the detector is 3 inch PVC mounted to a tripod on the roof.

Troubleshooting

Problem: There is a very high noise count.

Reason: There is something producing noise in the low frequency range *StormTracker* uses to detect lightning. It is most likely an electrical device near the antenna.

StormTracker is a radio receiver sensitive to all sources of radio frequency energy. Lightning is one source but there are many others. Interference can appear as either excessively large number of noises (>50 noises/minute) or as a cluster of lightning strikes which appear suddenly and do not move with time. Interference usually appears as a continuous stream of strikes and/or noises whereas a thunderstorm tends to produce randomly spaced bursts of strikes.

Solution: First try raising the Receiver Squelch slightly to see if you can make the receiver ignore the noise. The Squelch control is found on the Configure Processing screen. If you need to raise the squelch control more than half-way you will be sacrificing some range and should try to solve the noise problem.

To locate the source of the noise, first confirm the noise is coming in through the antenna. Shield the antenna from radio waves by placing an empty tin can upside down over the antenna. If the noise disappears then the antenna is picking up the noise signal. You should either relocate the antenna farther from the noise source (raising the antenna usually works best), or relocate the source of the noise. To identify the source of the noise, one by one turn off all electrical devices (including your computer monitor) until the noise stops.

If the noise does not stop when the antenna is shielded with a tin can the noise is coming in either through the antenna cable or the receiver board. Try relocating the antenna cable to see if the noise changes in any way. Try placing both the antenna and antenna cable inside a steel container close to the computer to see if the noise stops. Slowly remove the cable and begin to run it back to your desired antenna location. If the noise returns this should provide a clue as to what may be causing the noise.

If the noise continues despite the shielding, unplug the antenna cable from the receiver board. If the noise continues the receiver board is picking up noise from other boards in your computer.

You will have to change the position of the board in your computer. Increase the separation between the *StormTracker* board and any other board. Or try placing different boards next to the *StormTracker* board. Do not place the computer's video board next to the *StormTracker* board.

Noise can come from:

- televisions
- computer monitors
- lights or appliances turning on or off
- light dimmers
- electric motors

Each of these can radiate radio signals in the same frequency range that *StormTracker* uses to detect lightning.

If you are experiencing noise problems you must take steps to prevent the antenna from receiving these interfering signals. This usually requires relocating either the antenna or the source of interference.

Televisions, monitors and light dimmers will produce a continuous stream of strikes and noise. Lights and appliances turning on and off will produce a single strike or noise as the device turns on or off.

The best way to prevent interference is to separate the antenna from the source of interference. The best way to separate the antenna is vertically. It is usually best to mount the antenna as high as possible. A small amount of vertical separation is equivalent to a larger amount of horizontal separation.

A portable AM radio tuned between stations can be a useful tool in locating a noise source. Listen for buzzing and clicking sounds that correspond with a *StormTracker* noise or strike. An electrical appliance turning on or off can produce a click or popping sound. Televisions, light dimmers, arc welders, motors, and computers will make a buzzing sound. If you find something which you suspect is producing interference to *StormTracker*, turn off the device to see if the noise problem is reduced.

Problem: Very few strikes are displaying on the screen even though the strike count is very high, when in Display Recent Activity or Display Archived Data.

Reason: You are trying to display strike data faster than your computer is capable, with Skip Strikes turned on. In an attempt to keep up with the fast display rate the program is skipping over strike data rather than displaying it. There are so many strikes to display that you are skipping more strikes than you are displaying.

Solution: Either slow down the playback rate (lower minutes/second rate) or turn off Skip Strikes in the Configure Screen... menu.

Problem: Lightning strikes are being displayed but the direction is not correct.

Reason: Your antenna is not correctly oriented.

Solution: Reorient the antenna so that the front faces north. See the Installing the Antenna section of the manual for more information on antenna orientation and location.

Making an Antenna Cable

The Stormtracker PCI uses standard Category 5 (Cat5) 10baseT network cable for the antenna cable. You can purchase a replacement antenna cable from any computer store selling network hardware. Antenna cables may be up to 200 feet long.

If you have access to a crimper for RJ-45 connectors and a source of RJ-45 connectors and Category 5 network cable you can make your own custom antenna cable. Making your own cable means you are able to pull the cable through conduits, walls, etc. before you attach the connectors. This lets you drill smaller holes for the cable and protects the connectors from damage during installation.

If you make your own antenna cable you must ensure that the wire pairing is done correctly. The connectors must not only be wired straight through (non-reversing), but the twisted pairs must be located in the correct positions. If the pairing is not done correctly there will be crosstalk between the different signals on the cable and your unit will not work properly. The correct pair locations are:

Wire position 12345678

Pair 33211244

What this means is: one pair is in the center (positions 4&5), another pair is split and surrounds the first (positions 3&6), another pair is on the left (positions 1&2) and another pair is on the right (positions 7&8).

The actual color positions do not matter as long as you use the same color assignments on both ends, and you split the pairs correctly.

The wire color assignments we use is

POSITION	PAIR	COLOR
1	3	White/Green
2	3	Green
3	2	White/Orange
4	1	Blue
5	1	White/Blue
6	2	Orange
7	4	White/Brown
8	4	Brown

You can have up to 200 feet of antenna cable without using a separate antenna power supply. In special circumstances we have made custom cables up to 500 feet in length that used a separate 12VDC power supply for the antenna.

Do NOT use the pairing: 11223344. That is, wire pairs placed next to each other. This will not work.