C GPS Antenna Installation Requirements

Ixia GPS equipped systems used to provide local Stratum 1 timing signals requires the installation of a GPS antenna kit (942-0003 or 942-0005, where the facility or environment prevent the window mount antenna from functioning). This section describes the installation method we recommend for an IXIA GPS Antenna. This section also provides a scheme for installation of lightning protection for an installed antenna. In order to ensure that all of the following criteria in this manual can be met, we recommend a site survey.

Note: This is not an installation manual and should not be used in place of building codes for electronic installations applicable to specific sites.

This appendix has the following sections:

Roof Mount Antenna

The general location requirements for installation of the GPS antenna and conduit are:

Table C-1. GPS Location Requirements

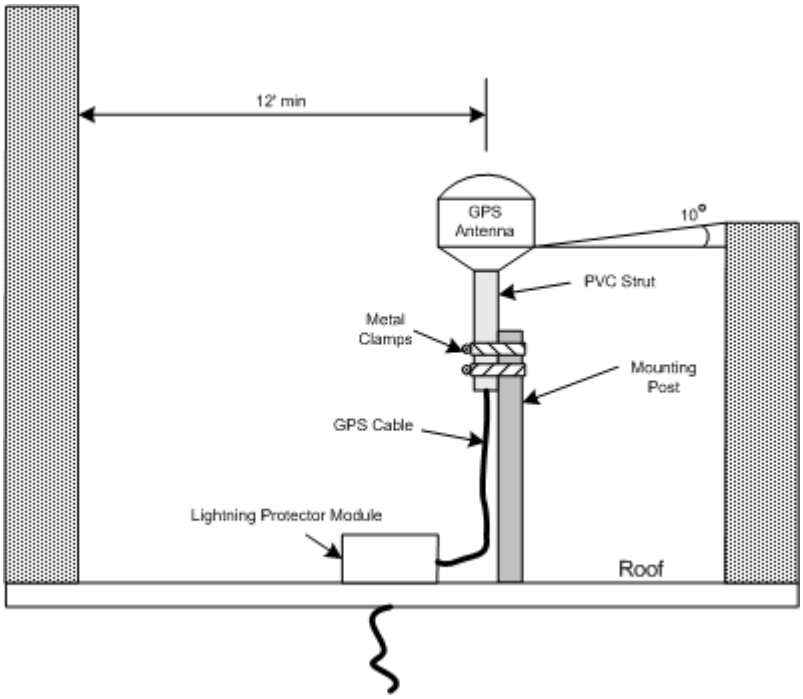
1.	Ideally, a roof area with an unobstructed 360-degree view of the sky above the horizon. At the minimum, a 180-degree view of the sky is required.
2.	Mounted away from and above a plane from items such as elevators, air conditions and other machinery.
3.	Should have the best view of the horizon that is possible. No obstructions should be within a ten-degree angle from the horizontal.
4.	There should be adequate space available on the roof to install two antennas with an absolute minimum of 10 feet between antennas.
5.	The antenna should be 12 feet away from metallic objects.

Table C-1. GPS Location Requirements

6.	Sufficient access to the roof for installation of the GPS conduit/mast and antenna.
7.	Permission to run a 2-inch PVC conduit from the GPS antenna on the roof to the building entrance point.
8.	The coax cable must be connected to the lightning protector (supplied) in the most direct fashion possible, and the lightning protector must be grounded. We recommend that this ground be interconnected to the antenna's tower ground. It is very important that the lightning protector be grounded to a low impedance (low R and low L) ground system.

One possible installation is shown in Figure C-1 on page C-2.

Figure C-1. GPS Installation Requirements



The following items are included as part of the Ixia package:

- The GPS Antenna
- GPS Cables (1 long and 1 short)
- Lightning Protector
- The PVC Strut
- Two metal clamps

The placement and construction illustrate many of the recommendations found in this section.

Conduit

We recommend the coax from the GPS antenna to the Ixia unit to be installed in a secure conduit from the point directly above the chassis to the GPS antenna. The conduit serves two purposes:

1. It protects the coax cable.
2. It provides a rigid mast on which the GPS can be mounted.

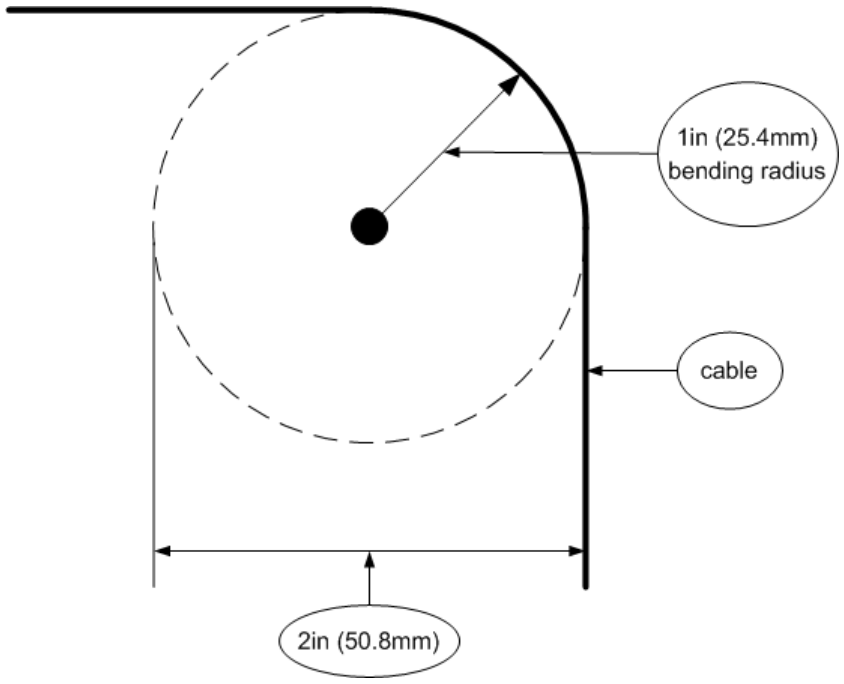
Conduit Type

The GPS conduit should be 2-inch PVC. Installation of the coaxial cable is uncomplicated within the pipe. There should be no more than four 90-degree bends between pull boxes.

Coaxial Bending Radius

The coaxial cable should be run as straight as possible to meet the manufacturer phase stability. The coaxial cable may have a greater than 1in (25.4 mm) bending radius.

Figure C-2. Coaxial Bending Radius



In order to go around a corner a conduit that has less than the required bending radius, it would be necessary to use either a junction box with an accessible elbow installed at each 90-degree turn or two 45-degree elbow connected with a piece of straight pipe. A 2-inch conduit only requires one 90-degree elbow to make the correct bending radius around a 90-degree turn.

Lightning Protection

Lightning protection for the installation is required. The lightning protector must be correctly grounded to function properly. It must be connected to a low

impedance (low R and low L) ground system. We recommend that this ground be interconnected to the tower ground and power ground to form one system.

Note: When attaching to the grounding stud (M8), use a maximum of 88.5 lbf-in. (10 N-m) of torque.

The earth ground electrode should be driven in at least 8 ft. (2.44m) into the earth. A #6 grounding wire should be used.

GPS Mast Location Requirements

Preferred Location

The preferred mounting location for the GPS antenna is an unobstructed 360-degree view of the sky above the horizon. The specific requirements are:

Table C-2. GPS Mast Preferred Location Requirements

1.	Optimal view of the sky.
2.	Not the highest point of the building so as to reduce the possibility of lightning strikes.
3.	Located at least 12 ft. from any large metal objects.
4.	Located at least 10 ft. from any other GPS antenna.
5.	Located within 30 ft. of where the coax cable enters the building.
6.	The GPS antenna mast should be mounted at least 4 feet higher than the highest horizontal **reflective surface** such as roof top mounted AC units.

Requirements if Preferred Location is Not Available

If an unobstructed 360-degree view of the sky is not available then the following requirements should be met:

Table C-3. GPS Mast Location Requirements if a Preferred Location is not Available

1.	300-degree azimuth view of the sky.
2.	No vertical obstructions to obscure the view of the antenna from the horizon for more than 10 degrees.
3.	No high-power radar signal beamed directly at the unit; this may damage the pre-amplifier in the antenna.
4.	No harmonics from a high-power, broad band transmitter within a few megahertz of the carrier frequency (1.575 GHz) should be present. This may jam the GPS receiver.

Window Mount Antenna

The GPS chassis kit includes a window mount antenna. This antenna is capable of operation in areas with a relatively unrestricted view of the sky, and low background interference from other radiators.

Mounting

Mount the antenna on the metal frame of the window. The antenna should be no lower than the lower edge of the glass. A 180-degree view of the sky is preferred, with no buildings adjacent to the window.

In the absence of a metal window frame, a nine centimeter square metal plact can be used to mount the antenna in a position above the window sill.