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General Information on GPS Antennas for Precise Time and Frequency, Inc. Products

Availability of precise time and frequency reference signals has been made possible through use of the Global Positioning System (GPS). The system consists of a constellation of 24 active satellites orbiting the earth in geosynchronous orbits (each satellite orbiting the earth approximately twice per day).

In order to provide precise positioning information, each satellite contains several atomic clocks, that are synchronized to the world time (UTC). Each satellite broadcasts a signal containing precise time and position of the satellite.

When several of these signals are received and decoded within a GPS receiver, exact position and time information can be derived. The Precise Time and Frequency, Inc. range of GPS Receivers and Network Time servers have been specifically optimized to provide exact timing and frequency references from the signals received from the satellites.

The broadcast signals from the satellites are transmitted at a frequency of 1575.42 MHz (referred to as the L1 band). In order to effectively receive and decode these signals, each GPS receiver requires a dedicated GPS antenna. To accommodate different application needs and requirements, Precise Time and Frequency, Inc. has made available several different types of antennas.

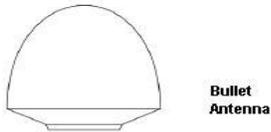
In all cases below, a good view of the sky is preferable. Typically facing towards the equator (i.e. South facing in the Northern Hemisphere, North facing in the Southern Hemisphere) gives the best view of available satellites.

Due to losses in the cable from the antenna to the receiver (typically approximately 8dB per 100ft + interface losses), the correct combination of antenna and cable length is necessary in order to assure correct operation. For proper operation the GPS receiver requires minimum signal strength at the unit antenna input connector of 18 dB. The maximum input signal strength should not be more than 30dB to avoid overdriving the GPS receiver front end.

Also, performance is enhanced with more satellites in view by utilizing special internal algorithms within the units which analyze data from all visible satellites to provide enhanced integrity of the time and frequency solution.

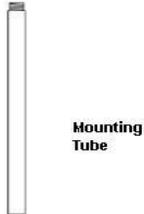
Certain of the instruments however, in particular the network time servers, can operate quite satisfactorily with only one satellite in view. In this case the window mounting antenna may be a more convenient antenna mounting solution.

Standard Bullet Antenna



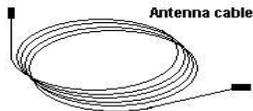
The most commonly supplied antenna is the standard bullet antenna, which is supplied as standard with all GPS receivers unless specified otherwise.

This is a 36dB gain antenna, designed for typical roof mounting applications with a clear view of the sky.



The antenna is supplied complete with 50 ft of cable, however if longer lengths are required the antenna will drive standard RG58, 50 ohm coaxial cable up to lengths of 200 ft, and still provide sufficient signal strength at the receiver input.

For longer cable lengths a lower loss cable can be used or alternatively the High Gain Antenna described below.



The mounting tube can be secured by suitable brackets, either to an existing vertical pole or via a tripod mounting foot.

High Gain Antenna for Longer cable lengths. For applications where longer cable lengths are required, a high gain antenna is available. The high gain is necessary to compensate for the additional losses that will be experienced in longer cables up to 600 ft (200 meters).

The high gain antenna has a gain of 64 dB, and mounts in the same way as shown above. Note, this antenna should not be used for cable lengths shorter than 300 ft as there is a danger of overdriving the receiver input.

Window Mounting Antenna



The window-mounting antenna is a convenient alternative for network time server applications if it is difficult to use a roof mounting antenna. Typically required accuracies in these applications are in the region of microseconds (or even milliseconds), and this performance can be delivered quite adequately from a reduced view of satellites down to just one.

This is an active antenna design, for operating in urban canyon environments and in the presence of electromagnetic fields. The Antenna gain is 24dB and is supplied with 15 ft of RG 316 shielded coaxial cable.



← Antenna

Choose a window with a good view of the sky, and ideally if possible, one that faces towards the equator (i.e South Facing in the Northern Hemisphere, North facing in the Southern Hemisphere)