

# Introduction to GNSS Antenna Set-up Methods for Campaigns

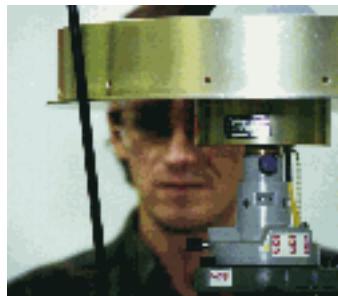
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## Introduction to GNSS Antenna Set-up Methods for Campaigns

When collecting geodetic data, the GPS antenna is set up over the particular point of interest. For high accuracy crustal applications, the actual survey mark is precisely defined, typically as a benchmark dimple about 1 mm in diameter in a steel pin inserted into stable ground. The monument itself is assumed to be stable relative to the solid Earth below. To avoid set-up error, it is critical that the GPS antenna is placed directly over the survey mark. The antenna must be level, and the antenna height must be properly documented. Proper antenna set-up over the mark is one of the single most critical components of a campaign survey, determining measurement accuracy and repeatability.

Antenna height is usually measured as either:

1. **Vertical** – the vertical distance from the survey mark to the Antenna Reference Point, or ARP, which is typically the bottom surface of the antenna housing.
2. **Slant** – the distance from the survey mark to the edge of the antenna choker or groundplane notch.



In addition, the antenna must be set up above any local obstructions that would block or degrade the incoming satellite signals, such as trees or foliage. When possible, the antenna should also be placed above any reflective surfaces to reduce multipath, the undesired reflected satellite signal that reduces GPS precision. The antenna height above the survey monument must be recorded accurately for data archiving and processing. Since a GPS antenna's physical center and electronic center (phase center) may be different depending on satellite geometry, all antennas in a survey network should be oriented in the same direction to ensure that the measurements reflect the actual distance between monuments. The antenna will either be leveled with a three脚架 (tripod), or to the use of a bubble ring surveyor when the cable connects to the tripod. Use an accurate map to determine true north, or align the antenna with a compass according to the appropriate [Survey Methods](#).

Several options exist for how to physically set up an antenna:

Tripods and tiltscrews are commonly used to set up over traditional style benchmarks where the survey point is a dimple. The set up is stable enough to be left unattended for up to 24 hours at a time, and is usually high enough to get above local obstructions such as bushes and foliage. The calibrated tiltscrew allows sub-mm accuracy. See [Tripod and Tiltscrew Set-up Procedure](#).

Booms are easier to set up, have a constant antenna height, and provide sub-cm accuracy when calibrated. However, they are less stable than tripods and are not suited to be left unattended. Booms are typically used for rapid static and kinematic surveys.

Spike mounts may also be used to set up over traditional style benchmarks where the survey point is a dipole. The set-up is stable enough to be left unattended for several days at a time, but may be too low to get above local obstructions such as buildings and foliage. Spike mounts are best suited for remote, unobstructed sites with minimal local obstructions.

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