

CHAPTER 6

USING GPS

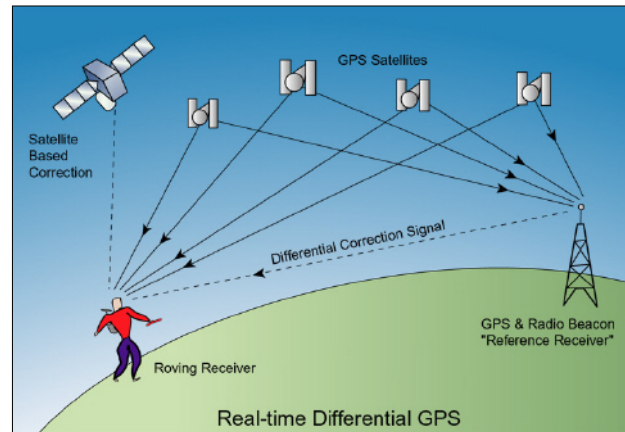
What is GPS?

GPS stands for Global Positioning System. It is a satellite-based navigation and positioning system originally developed for US military applications and, in recent years, made available for civilian use world-wide.

How does GPS work?

GPS measures the time difference between a signal sent from a satellite with a known position to a ground receiver. Four such signals will very accurately determine the position of the receiver. Twenty-four satellites, in very stable orbits at about 11,000 miles altitude constitute the heart of the system.

Your hand-held receiver searches for the signal from each of these satellites and in some cases, the signal from a satellite in geosynchronous orbit at about 23,000 miles altitude. It will read signals from any satellite within direct line of sight above the horizon. Signals from satellites 15 degrees above the horizon or higher will typically yield signals usable for accurate positioning.



GPS Accuracy

Most GPS receivers will generate a reasonably accurate position within a minute or two – often much faster. While GPS “fixes” are quite good, positional inaccuracy is great enough in most cases that you will want to describe in your site notes which side of the road you’re on (N,S,E,W) if you’re collecting data on a roadside.

Setting Up Your Receiver

You will need to set up your receiver to display geographic coordinates in **decimal degrees**. GPS receiver menus often have this setting in the *Units* tab. On Garmin Etrex receivers decimal degrees appear as the menu choice, **hddd.ddddd**. Other GPS receiver models will feature slightly different set-ups, but all are similar.

Select “**WGS 84**” or “**NAD 83**” in the map datum category of your system set-up menu. This refers to the system that GPS uses to match coordinates with ground-based mapping systems. It will sometimes be listed as “**WGS84/NAD83**.” The difference of plotted points using the two systems will be of no consequence on this project.

Reading and Recording Decimal Degrees

Geographic coordinates historically were recorded in the format, degrees-minutes-seconds of latitude measured north and south and originating at the equator and degrees-minutes-seconds of longitude measured east and west and originating at the prime meridian which runs through Greenwich, England. Thus a point determined to occur at the Lady Bird Johnson Wildflower Center would appear as 30° 11' 09.2" N, 097° 52' 26.0" W. Using decimal degree notation, it is written 30.18588°N, 097.87388°W. All points in Texas are North latitude and West longitude. We use the decimal degree format for ease of data entry and for use with online mapping applications.

Degrees of longitude are recorded as negative numbers for positions located in the western hemisphere. Thus, many mapping and data entry applications require the entry of a minus sign before the longitude value in order to differentiate it from a point in the eastern hemisphere the same distance from the prime meridian. When entering data for the tree survey online, the required minus-sign is provided by the system. Further, while properly written as a three-digit number (e.g. -097), many mapping and data entry applications require dropping any leading zeros. It is not necessary to enter the leading zero for degrees of longitude, though if you do, the database will accept the entry but drop the zero when displayed. Finally, we ask that you record five decimal places if using your own GPS. Tree locations are often only 1/10,000 of a decimal point away from one another, and when mapping trees in close proximity, this can avoid points clustering upon one another.