

# *GPS navigation*

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# Content

- 1. General information;***
- 2. Working principle;***
- 3. GPS devices;***

# General information

**The Global Positioning System (GPS) is a space-based satellite navigation system that provides location and time information in all weather conditions, anywhere on or near the earth where there is an unobstructed line of sight to four or more GPS satellites. The system provides critical capabilities to military, civil, and commercial users around the world. The United States government has created the system, maintains it, and makes it freely accessible to anyone with a GPS receiver.**

# *Parts of GPS*

**The three parts of GPS are:**

- **Satellites** (systems based on a constellation of 24 satellites orbiting the earth, twice a day, and emit continuous navigation signals);
- **Receivers;**
- **Software.**



# *Receivers and Satellites*

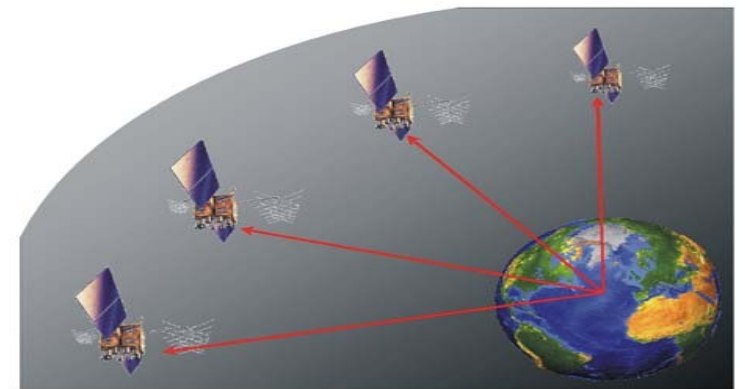
GPS units are made to communicate with GPS satellites (which have a much better view of the Earth) to find out exactly where they are on the global scale of things.

# Working principle

**Each GPS satellite transmits data that indicates its location and the current time. All GPS satellites synchronize operations so that these repeating signals are transmitted at the same instant.**

**The GPS receiver compares the time a signal has transmitted by a satellite with the time it has received. The time difference tells the GPS receiver how far away the satellite is.**

- 1. Position is calculated by triangulation;**
- 2. Distance is measured by how long a signal takes to reach your position.**



# *Calculating Distance*

**Velocity x Time = Distance**

**Radio waves travel at the speed of light, roughly 186,000 miles per second (mps)**

If it took 0.06 seconds to receive a signal transmitted by a satellite floating directly overhead, use this formula to find your distance from the satellite.

**186,000 mps x 0.06 seconds = 11,160 miles**

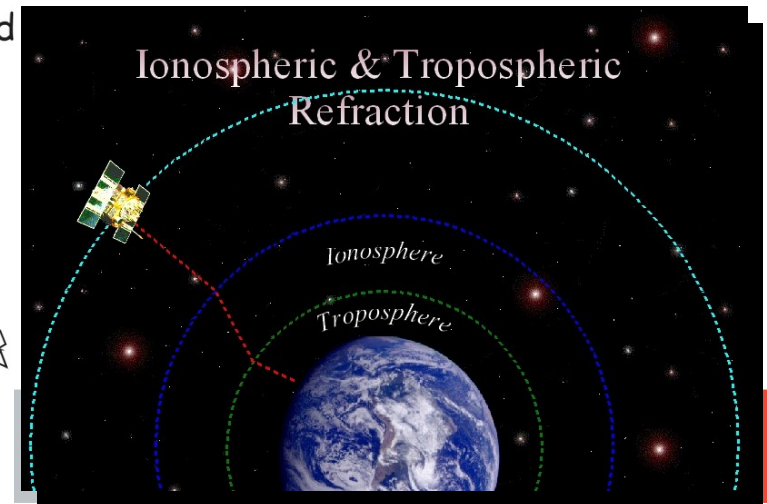
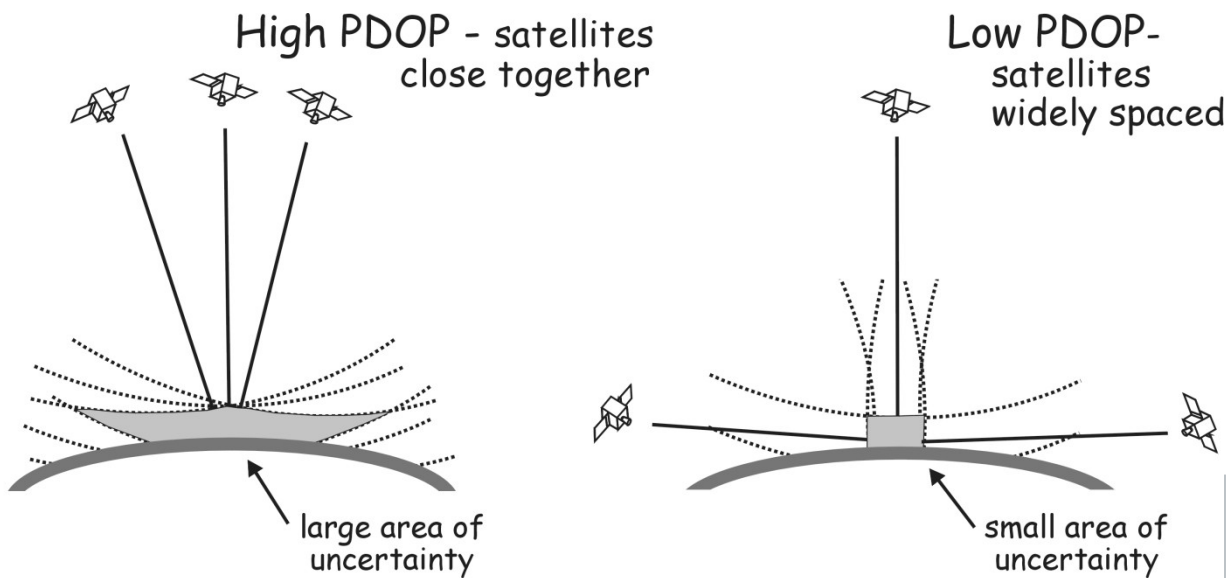
# Factors affecting accuracy

GPS satellites use Atomic Clocks for accuracy, but because of the expense, most GPS receivers do not.

Factors affecting accuracy:

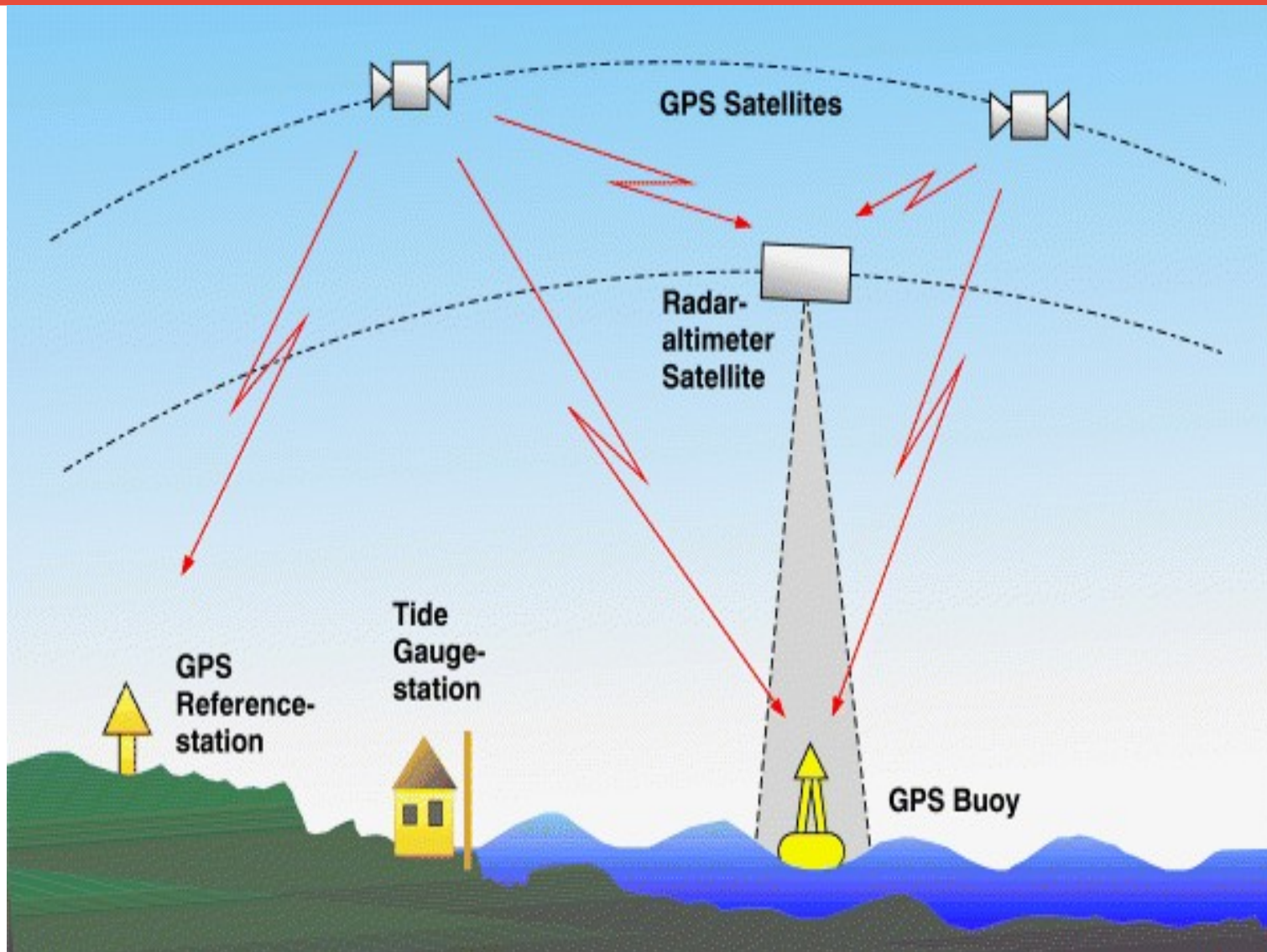
1. Timing of the signal;
2. PDOP = *Positional Dilution of Precision*;

*When the satellites are all in the same part of the sky, readings will be less accurate.*





# *The principle of operation*



# *Geodetic receivers*

## **The kit consists of:**

**Geodetic receivers — devices used for surveying work. It consists of a receiving unit (geodetic antenna, combined with the transceiver) and controller (laptop computer in industrial version). The common name for such receivers — Care Package or rover;**



# ***GPS uses***

- 1. Police and Emergency;**
- 2. Medical Services;**
- 3. Firefighters;**
- 4. Map makers;**
- 5. Science.**



**THANK YOU FOR ATTENTION!**

