



WINTHROP FORENSICS

Quarterly

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Winthrop Forensics
is the engineering firm
specializing in:

Accident Reconstruction
Biomechanical / Injury Causation Analysis
Premises Liability, Product Defects
Forensic Exhibits and Animations

In this installment, *Measurement Corner* shows you how to convert **GPS** data to the most used formats. The formats include the Classical format, the GPS format, and the Decimal Degrees format.



In response to the recent decline in temperature, the article ***WINterizing YOUR VEHICLE*** gives you tips for cold weather preparation.

Lastly, some Holiday Trivia is provided for your enjoyment.

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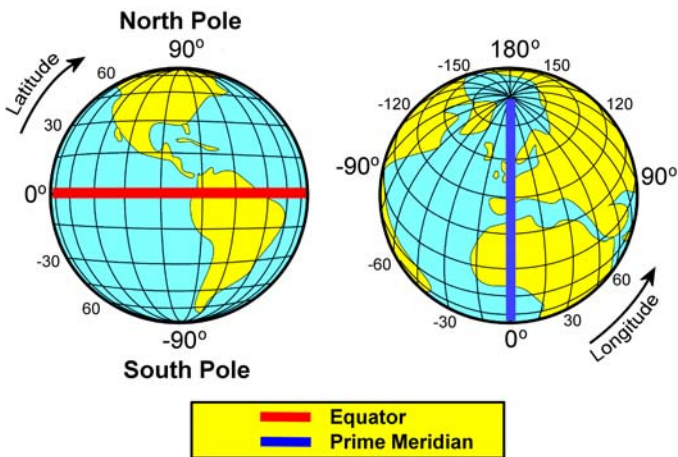
MEASUREMENT CORNER

GPS Coordinate Conversions

Quite often, you may have the geographical coordinates of an accident site or location of interest. Most often, the coordinates do not appear to be in a format that you or your GPS tool recognize. However, this problem can be easily rectified by simply converting the given geographical coordinates into a format that you can readily use. Prior to describing the conversion of the coordinates, a quick background on how geographical locations are described is as follows.

Background

Any point on earth can be specified by using an accurate coordinate system. In general practice, this coordinate system is a geographic coordinate system that uses a system of numbers and/or letters that can describe the horizontal, vertical and elevation position. The most common coordinates used are the latitude, longitude, and elevation.



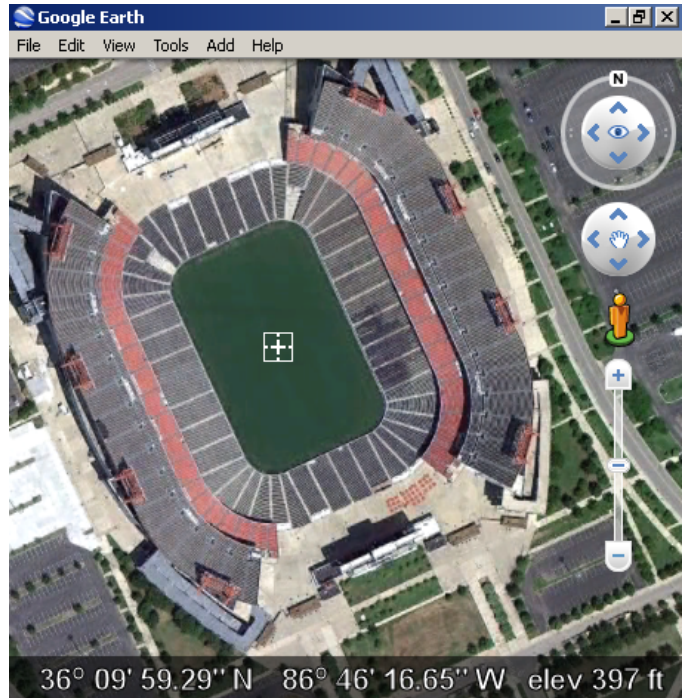
The latitude and longitude coordinates in all GPS data is based on the World Geodetic System, the standard coordinate frame for earth. From the figure above, the latitude is the vertical position in degrees measured from the equator. The latitude ranges from 90° (North Pole) to -90° (South Pole) at the poles to 0° at the Equator. Likewise, the longitude is the horizontal position in degrees measured from the Prime Meridian*. The longitude ranges from 180° to -180°, with the negative values being west of the Prime Meridian (~0°).

Common Latitude and Longitude Formats

The three most encountered formats of latitude and longitude coordinates are:

Classical format: [N/S/E/W] D° M' S"
GPS format: [+/-] D° M.M'
Decimal degrees: [+/-] D.D

Where **D** denotes Degrees, **M** denotes Minutes, and **S** denotes Seconds. In addition, we negate West and South compass directions with [-] sign.



LP Field Coordinates – Downtown Nashville, TN

For example, the following are the coordinates for the center of the Tennessee Titans LP Field:

Classical format: Lat: N 36° 09' 59.29"
Long: W 86° 46' 16.65"

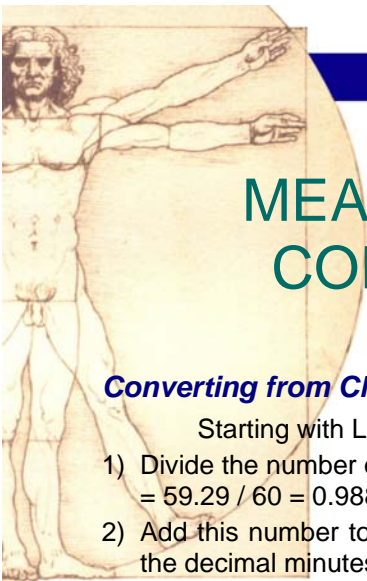
GPS format: Lat: 36° 09.9882'
Long: - 86° 46.2775'

Decimal degrees: Lat: 36.166470
Long: - 86.771292

Converting between Formats:

To convert between formats, it must be recognized that there are 60 seconds per minute and 60 minutes per degree. That is, we are working with a Base 60 number system such that all conversions between formats will be some multiple or division by 60.

* 336.3 ft east of the Greenwich meridian at the latitude of the Royal Observatory



MEASUREMENT CORNER cont.

Converting from Classical to GPS format:

Starting with Latitude of N 36° 09' 59.29"

- 1) Divide the number of seconds by 60:
= $59.29 / 60 = 0.9882$
- 2) Add this number to the number of minutes (9) to get the decimal minutes:
= $9 + 0.9882 = 9.9882$
- 3) Now we place the degrees (36) together with the decimal minutes to get:
 $36^{\circ} 09.9882'$
- 4) For the final format, since it is North, we do not need to negate the value:
 $36^{\circ} 09.9882'$

Converting from GPS to Decimal degree format

Starting with Latitude of $36^{\circ} 09.9882'$

- 1) Divide the number of decimal minutes by 60:
= $9.9882 / 60 = 0.166470$
- 2) Add this number to the number of degrees (36) to get the decimal degrees:
= $36 + 0.166470 = 36.166470$
- 3) For the final format, since it is North, we do not need to negate the value:
 36.166470

Converting from Decimal degree to GPS format

Starting with Longitude of - 86.771292

- 1) Multiply the fractional part of the longitude by 60:
= $0.771292 * 60 = 46.2775$
- 2) Now we place the degrees (86) together with the decimal minutes to get:
 $86^{\circ} 46.2775'$
- 3) For the final format, since it is West, we must negate the value:
 $- 86^{\circ} 46.2775'$

Converting from GPS to Classical format:

Starting with Longitude of - $86^{\circ} 46.2775'$

- 1) Multiply the fractional part of the minutes by 60:
= $0.2775 * 60 = 16.65$
- 2) Now we place the degrees (86), the minutes (46) and the seconds to get:
 $86^{\circ} 46' 16.65''$
- 3) For the final format, since it is West, we place in the W designator:
 $W 86^{\circ} 46' 16.65''$

HOLIDAY TRIVIA



- 1) In what year did the US postal System issue its first Christmas stamp?
 - a. 1942
 - b. 1952
 - c. 1962
 - d. 1972
- 2) What two reindeers are mentioned in the song "Here Comes Santa Claus"?
 - a. Dancer and Prancer
 - b. Donder and Blixen
 - c. Vixen and Blixen
 - d. Comet and Cupid
- 3) What was the first artificial tree made of?
 - a. Glass
 - b. Plastic
 - c. Feathers
 - d. Silk
- 4) Which US state was the first to recognize Christmas as an official holiday?
 - a. New York
 - b. Alabama
 - c. Virginia
 - d. Pennsylvania
- 5) What is the first name of Scrooge?
- 6) Which country was the first to use the tradition of Christmas trees?
- 7) Which was the first country to issue a Christmas postage stamp?
- 8) Which country is the largest exporter of Christmas trees?
- 9) Which Christmas song holds the credit as the most-selling Christmas single of all time?

WINTERizing YOUR VEHICLE

With the temperature dropping and weather getting wet, now is a good time to **WINTERize** your vehicle.

According to a survey performed by the Car Care Council, over 70 percent of motorists admit that they did not have their cars winterized in preparation for inclement weather.

However, several proactive maintenance steps can be performed to prepare your automobile for the winter months. In order to winterize your car, the these checks are recommended:

Antifreeze (Coolant)

Check the level and condition. If coolant needs flushing and refilling, now is a good time.

Battery

Inspect and clean battery posts to insure good connection.

Cell phone charger

Cell phones are prevalent. Keep a dedicated cell phone charger in your car at all times.

Oil

Check the level and condition. Refer to the vehicle manual if lower viscosity "weight" is recommended for cold weather.

Tires

Check for good tread and proper inflation.

Wipers

Inspect the wipers for wear and tear. If wipers are worn/degraded, replace with new blades.

Wiper fluid

Check the wiper fluid level. If low, fill reservoir with vehicle specified wiper fluid.

These suggested maintenance steps can be performed by the Do-It-Yourself method. However, a mechanic can perform these checks. The added benefits of having a mechanic perform these checks is that they can perform extended testing, such as battery testing and charge system checks, and exhaust checks.

To round out the winterization of your car, an emergency kit can be placed in the vehicle as well.

Emergency Kit

Typical items include but not limited to: a flashlight and extra batteries, jumper cables, paper towels, snow brush/scrapper, bottled water and snacks, a blanket and warm clothing. Sand or kitty litter can be used for traction. Lastly, a small tool kit and small shovel can be added as well.



Note:

It is recommended that any person use proper safety gear when performing any maintenance to a vehicle. This includes the use of gloves and protective eye wear.

For further and more detailed winterizing suggestions, visit Edmunds.com or search the internet using the search terms "winterize car".