

Finding a Location Using a GPS Unit

Introduction to GPS

GPS technology is frequently used for general navigation. People regularly use GPS technology in every day life and in some cases they may be unaware that it is a modified GPS unit. A great example of this is satellite navigation systems in cars, these use GPS technology along with map information to give you road directions. SatNavs and GPS units utilize a network of satellites. These satellites transmit precise microwave signals to the GPS unit, which enables a GPS receiver to determine its' location; speed and direction. A GPS receiver calculates its position by measuring the distance between itself and three or more GPS satellites using a method called triangulation. In triangulation, a microwave signal is sent out from three or more satellites to the GPS receiver, the length of time it takes to receive a single signal relates to a distance measurement. These measurements allow the GPS unit to make an accurate approximation of its location.

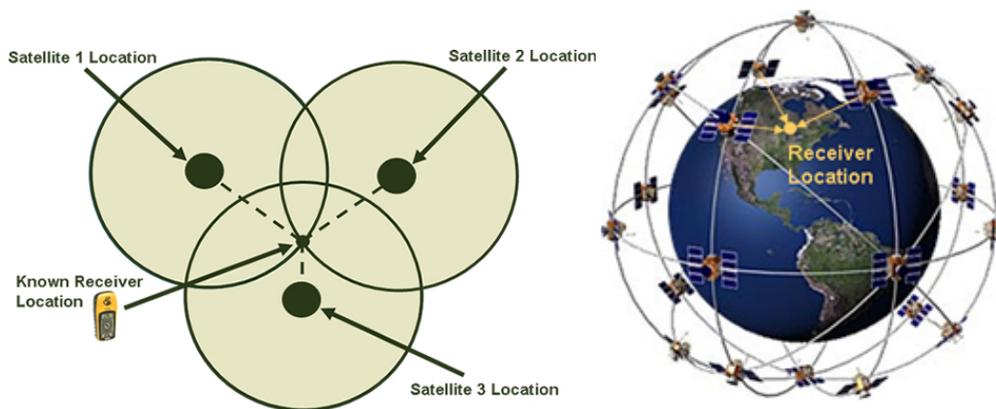


Figure 1. Method of Triangulation and Global Satellite Distribution

In this tutorial we will give you an idea of tools and functionality of a GPS unit. This should give you all the basic knowledge you will need to change the options and settings of your GPS unit and produce map locations for your study site.

GPS Layout

Before you start using your GPS unit it is important that you understand the layout of the device. There are many brands and models of GPS on the market but this tutorial features the Garmin GPS 76 (figure 2). Although different GPS software creates slight variations in their functionality, they are generally very similar. Our study (and this tutorial) only uses a few of the basic tools that are available on GPS units and it therefore, should be a fairly reliable as a guide across all makes and models.

Buttons

When you look at a GPS, you will realize that it has very few buttons. Each button can actually perform many different actions. Once you know and understand what each button does you can move around the software in the device and carryout various GPS tasks. Information on uses of each button is described in the diagram below, and later this tutorial will explain how to use them in various contexts.



Figure 2. Garmin GPS 76 Layout – Buttons and their functions

Screens

The Garmin GPS software **divides the GPS device** onto **different screens** or pages, which you can **move between using the 'Page' button**. The basic Garmin set up is divided into five screens, their basic layout and description can be seen below in figure 3 (order and additional screens may vary between units).

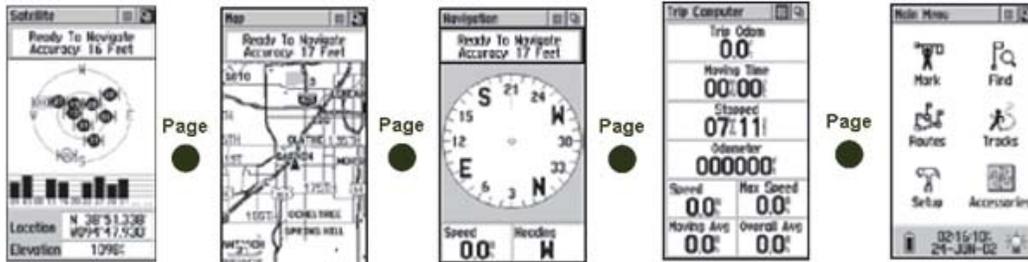


Figure 3. Screen Layouts

The **Satellite** screen provides a visual reference of satellites being tracked.

The **Map** screen displays your movements and nearby map features.

The **Navigation** screen provides guidance to your destination.

The **Trip Computer** screen provides a variety of trip and navigation data.

The **Main Menu** screen provides a directory of advanced features and settings.

Options and Settings

We require all data to be entered in a universal format, so before you carryout your study you change some of the settings on your GPS unit. The three variables you need set are;

- **Distance/speed in metric units.**
- **Coordinate units in decimal degrees**
- **DATUM set to NAD83.**

Changing these options can be done through the 'Main Menu' screen of your GPS unit. On your main menu **navigate to the 'Setup' option using the Rocker Key and click 'Enter'**. After this, **navigate to the 'Units' option and click 'Enter'**. Once you are in the 'Units' menu you can change the variables mentioned above.

- To set your coordinate format **click 'Enter' over the 'Position Format' drop down box**, you then need to **select 'hddd,dddd°'**, this is the option for decimal degrees and **click 'Enter'**. The 'Position Format' drop down box should now show 'hddd,dddd°'.
- To change the DATUM of your GPS, **click 'Enter' over the 'Map Datum' drop down box**, then **select 'NAD83' and click 'Enter' again.**
- To change 'Distance/speed' units. **Click 'Enter' over the 'Distance/speed' drop down box**, then **select 'Metric' and click 'Enter'**.

After you have changed these three variables, you are ready to use the GPS!

Using the GPS

Setting up your GPS

When you initially turn on your GPS unit, the satellite screen will appear. The unit may take up to 5 minutes to establish a position the first time you use it outside with a clear view of the sky. When the unit has acquired enough satellite signals to determine your location (i.e. at least three), a "Ready to Navigate" message will appear.

You can now **move to the 'Map' screen** by pressing the **'Page' button**, if set up correctly you should now be able to see information on signal accuracy, speed etc (see figure 4).



Figure 4. Example Map Screen – with accuracy highlighted in a red box.

Finding your Sample Site Coordinate

You could simply write down the location information that your receiver calculates and/or you can store the waypoint in the receiver. You will need to save your sample site location as a waypoint; this is useful as you can later use this point as a navigation guide (see 'finding a waypoint') and it also acts as a digital copy of your coordinate, which can be used alternative non-paper back up.

- 1) In order to save your location you need to first make sure you are standing at your sample site. Next **navigate to the 'map' screen** using the **'page' button**.
- 2) In the top right hand side of this screen there should be a **box titled 'accuracy'** (highlighted in a red box in figure 4) you need to write the **'accuracy' value down on your data sheet** (value in meters). **THIS VALUE MUST BE BELOW 5 METRES.**

To increase your accuracy, you can try several things to help. Moving around helps locate you faster. If you are under a dense canopy, it helps to track satellites in a nearby open area first and then bring the unit back to the area you were mapping. Finally, because you are in North America, there will be more satellites in the south, so you can try holding the GPS receiver facing that direction.

- 3) Once you have an accuracy value at or below 5 meters you can make an accurate waypoint. **Press and hold the 'Enter' button** on the map screen **until a 'waypoint' screen appears**. Once in this screen you can save and edit your waypoint coordinate information.
- 4) First, before you edit your waypoint, you must **write the location value onto your data sheet**. This value must be given in decimal degrees (will appear on you screen as a number followed by a '°' symbol).
- 5) In the first large box you can edit the name of your waypoint (box containing 'LAND' in figure 5), the name of the waypoint is often set as a number by default, you should **change this to a name that is easily distinguishable as your sample site** (for example use GLWW). Using the **'rocker' key highlight** this box and **click 'Enter'**, you can now use the 'rocker' to **select letters using a pop up keypad**, click 'ok' once you have selected all your desired letters. You can then repeat this same method in the comment box.
- 6) After you have edited your waypoint data **select 'ok'** using the 'rocker' key and **press 'enter'**. This will save the waypoint coordinates into the internal memory of the GPS unit.



Figure 5. Waypoint Screen - Location is given in decimal degrees yours should look identical to this.

Finding a Waypoint

If you are visiting your site multiple times you may find it beneficial to learn how to find your sample site using your digital waypoint. The 'find' tool on your GPS acts in a very similar way to a normal compass; apart from, it can automatically work out your location and will literally point you in the direction your digital waypoint coordinate.

- 1) **Click 'find'**, using the 'rocker' key **highlight 'waypoints' and press 'Enter'**.
- 2) This will move you to a screen with the list containing all the waypoints on your GPS unit. You can **search for you waypoint** by typing in its name into the digital keypad and then selecting 'ok'.
- 3) **Highlight the locations name and click 'Enter'**.
- 4) This will then take you to the waypoint screen. **Navigate to 'Goto'** using the 'Rocker' key and **click 'Enter'**.
- 5) **You should then move the 'Navigation' screen**, you can **now follow the arrow on your digital compass** until your distance from site is 0!