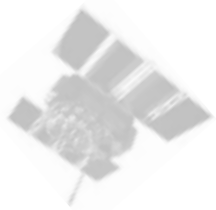
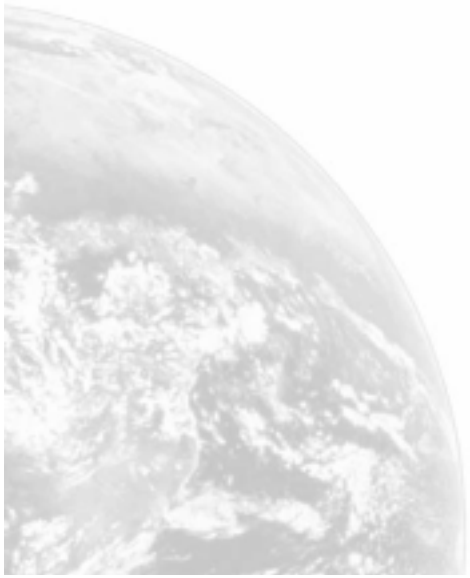
GARMIN



GPS GUIDE

for beginners



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Introduction

Have you ever been lost and wished there was an easy way to find out which way you needed to go? Ever find that perfect fishing or hunting spot and not been able to remember how to get back to it easily? How about finding yourself out hiking and not known which direction you should go to get back to your camp or car? Ever been flying along and needed to locate the nearest airport or identify the type of airspace you were in? Maybe you've been faced with the fact that it's time to pull over and ask someone for directions?

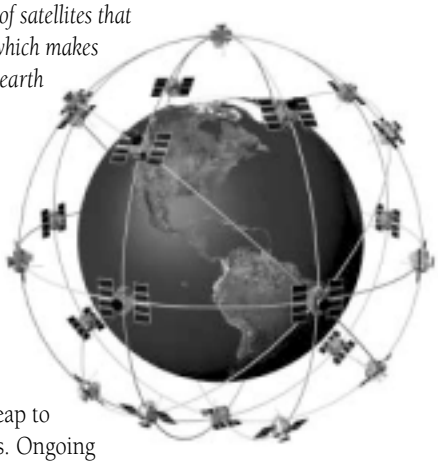
With a GARMIN GPS unit you could know where you were located on the planet at all times. From the time our first GPS handhelds supported the Coalition forces in the Gulf War to our current reputation as the first name in GPS innovation, GARMIN has helped to take GPS to new heights by going beyond the ordinary features and performance found in typical GPS receivers.

GPS technology is rapidly changing how people find their way around the Earth. Whether it be for fun, saving lives, getting there faster, or whatever use you can dream up, GPS navigation is becoming more common every day. We hope that this guide will give you enough information to get you involved in the fun that awaits you.

What is GPS?

GPS *acronym noun*

Global Positioning System. A network of satellites that continuously transmit coded information, which makes it possible to precisely identify locations on earth by measuring distance from the satellites.



As stated in the definition above, GPS stands for Global Positioning System, and refers to a group of U.S. Department of Defense satellites constantly circling the earth. The satellites transmit very low power radio signals allowing anyone with a GPS receiver to determine their location on Earth.

This remarkable system was not cheap to build, costing the U.S. billions of dollars. Ongoing maintenance, including the launch of replacement satellites, adds to the cost of the system. Amazingly, GPS actually predates the

introduction of the personal computer. Its designers may not have foreseen a day when we would be carrying small portable receivers, weighing less than a pound, that would not only tell us where we are in position coordinates (latitude/longitude), but would even display our location on an electronic map along with cities, streets and more.

These designers originally had a military application in mind. GPS receivers would aid navigation, troop deployment and artillery fire (among other applications). Fortunately, an executive decree in the 1980s made GPS available for civilian use also. Now everyone gets to enjoy the benefits of GPS! The capability is almost unlimited. Sometimes people ask if they can use the system for free-YES! (Well, it was your tax money that paid for it.) So just break out that GPS receiver, put the batteries in and dive right into the fun!

Who uses GPS?

GPS has a variety of applications on land, at sea and in the air. Basically, GPS allows you to record or create locations from places on the earth and help you navigate to and from those spots. GPS can be used everywhere except where it's impossible to receive the signal such as inside buildings; in caves, parking garages, and other subterranean locations; and underwater. The most common airborne applications include navigation by general aviation and commercial aircraft. At sea, GPS is typically used for navigation by recreational boaters and fishing enthusiasts.

Land-based applications are more diverse. The scientific community uses GPS for its precision timing capability and a myriad of other applications. Surveyors use GPS for an increasing portion of their work. GPS offers an incredible cost savings by drastically reducing setup time at the survey site. It also provides amazing accuracy. Basic survey units can offer accuracies down to one meter. More expensive systems can provide accuracies

to within a centimeter! Recreational uses of GPS are almost as varied as the number of recreational sports available. GPS is becoming increasingly popular among hikers, hunters, snowmobilers, mountain bikers, and cross-country skiers, just to name a few. If you are involved in an activity or sport where you need to keep track of where you are, find your way to a specified location, or know what direction and how fast you're going, you can benefit from the Global Positioning System.

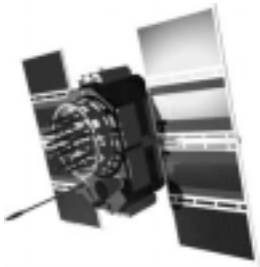
GPS is rapidly becoming commonplace in automobiles as well. Some basic systems are already in place, providing emergency roadside assistance at the push of a button (by transmitting your current position to a dispatch center). More sophisticated systems can show the vehicle's position on an electronic map display, allowing drivers to keep track of where they are and look up street addresses, restaurants, hotels and other destinations. Some systems can even automatically create a route and give turn-by-turn directions to a designated location.

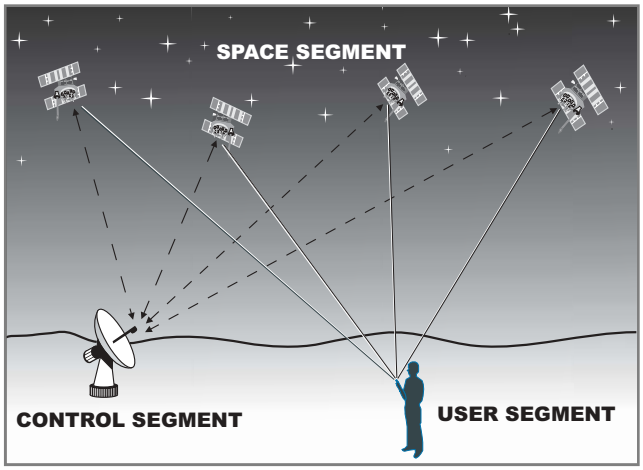
You don't have to be a rocket scientist to learn how GPS works. All you need is a little background knowledge plus the desire to explore and understand the world of GPS. Don't let terms like "pseudo-random", "anti-spoofing" and "P Code" frighten you. Let's dig right in and start to become familiar with the best navigation tool to come along since the invention of the compass.

The 3 Segments of GPS

The NAVSTAR system (the acronym for **Nav**igation **S**atellite **T**iming **a**nd **R**anging, the official U.S. Department of Defense name for GPS) consists of a space segment (the satellites), a control segment (the ground stations), and a user segment (you and your GPS receiver).

Now let's take the three parts of the system and discuss them in more detail. Then we'll look more closely at how GPS works.





• The Space Segment

The space segment, which consists of at least 24 satellites (21 active plus 3 operating spares) is the heart of the system. The satellites are in what's called a "high orbit" about 12,000 miles above the Earth's surface. Operating at such a high altitude allows the signals to cover a greater area. The satellites are arranged in their orbits so a GPS receiver on earth can always receive from at least four of them at any given time.

The satellites are travelling at speeds of 7,000 miles an hour, which allows them to circle the earth once every 12 hours. They are powered by solar energy and are built to last about 10 years. If the solar energy fails (eclipses, etc.), they have backup batteries on board to keep them running. They also have small rocket boosters to keep them flying in the correct path.

The first GPS satellites were launched into space in 1978. A full constellation of 24 satellites was achieved in 1994, completing the system. Money is in the U.S. Department of Defense budget to continue buying new satellites, sending them up to keep the system running for years to come.

Each satellite transmits low power radio signals on several frequencies (designated L1, L2, etc.). Civilian GPS receivers "listen" on the L1 frequency of 1575.42 MHz in the UHF band. The signal travels "line of sight", meaning it will pass through clouds, glass and plastic, but will not go through most solid objects such as buildings and mountains.

To give you some idea of where the L1 signal is on the radio dial, your favorite FM radio station broadcasts on a frequency somewhere between 88 and 108 MHz (and sounds much better!). The satellite signals are also very low power signals, on the order of 20-50 watts. Your local FM radio station is around 100,000 watts. Imagine trying to listen to a 50-watt radio station transmitting from 12,000 miles away! That's why it's important to have a clear view of the sky when using your GPS.

L1 contains two "pseudorandom" (a complex pattern of digital code) signals, the Protected (P) code and the Coarse/Acquisition (C/A) code. Each satellite transmits a unique code, allowing the GPS receiver to identify the signals. "Anti-spoofing" refers to the scrambling of the P code in order to prevent its unauthorized access. The P code is also called the "P (Y)" or "Y" code.

The main purpose of these coded signals is to allow for calculating the travel time from the satellite to the GPS receiver on the Earth. This travel time is also called the Time of Arrival. The travel time multiplied by the speed of light equals the satellite range (distance from the satellite to the GPS receiver). The Navigation Message (the information the satellites transmit to a receiver) contains the satellite orbital and clock information and general system status messages and an ionospheric delay model. The satellite signals are timed using highly accurate atomic clocks.

• The Control Segment

The "control" segment does what its name implies — it "controls" the GPS satellites by tracking them and then providing them with corrected orbital and clock (time) information. There are five control stations located around the world — four unmanned monitoring stations and one "master control station". The four unmanned receiving stations constantly receive data from the satellites and then send that information to the master control station. The master control station "corrects" the satellite data and, together with two other antenna sites, sends ("uplinks") the information to the GPS satellites.

• The User Segment

The user segment simply consists of you and your GPS receiver. As mentioned previously, the user segment consists of boaters, pilots, hikers, hunters, the military and anyone else who wants to know where they are, where they have been or where they are going.

GPS-How Does it Work?

• Location is Everything

Now for the fun part of how it works. The GPS receiver has to know two things if it's going to do its job. It has to know WHERE the satellites are (location) and how FAR AWAY they are (distance).

Let's first look at how the GPS receiver knows where the satellites are located in space. The GPS receiver picks up two kinds of coded information from the satellites. One type of information, called "almanac" data, contains the approximate positions (locations) of the satellites. This data is continuously transmitted and stored in the memory of the GPS receiver so it knows the orbits of the satellites and where each satellite is supposed to be. The almanac data is periodically updated with new information as the satellites move around.

Any satellite can travel slightly out of orbit, so the ground monitor stations keep track of the satellite orbits, altitude, location, and speed. The ground stations send the orbital data to the master control station, which in turn sends corrected data up to the satellites. This corrected and exact position data is called the "ephemeris" (pronounced: i-'fe-me-res) data, which is valid for about four to six hours, and is transmitted in the coded information to the GPS receiver.

So, having received the almanac and ephemeris data, the GPS receiver knows the position (location) of the satellites at all times.

• Time is of the Essence

Even though the GPS receiver knows the precise location of the satellites in space, it still needs to know how far away the satellites are (the distance) so it can determine its position on Earth. There is a simple formula that tells the receiver how far it is from each satellite:

Your distance from a given satellite object equals the velocity of the transmitted signal multiplied by the time it takes the signal to reach you (Velocity x Travel Time = Distance).

Remember as a kid how you could find out how far a thunderstorm was from you? When you saw a lightning flash you counted the number of seconds until you heard the thunder. The longer the count, the further away the storm was. GPS works on the same principle, called "Time of Arrival".

Using the same basic formula to determine distance, the receiver already knows the velocity. It's the speed of a radio wave — 186,000 miles per second (the speed of light), less any delay as the signal travels through the Earth's atmosphere.

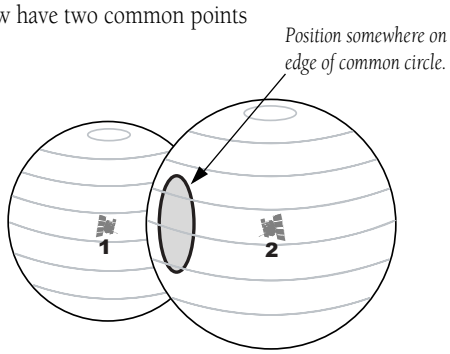
Now the GPS receiver needs to determine the time part of the formula. The answer lies in the coded signals the satellites transmit. The transmitted code is called "pseudo-random code" because it looks like a noise signal. When a satellite is generating the pseudo-random code, the GPS receiver is generating the same code and tries to match it up to the satellite's code. The receiver then compares the two codes to determine how much it needs to delay (or shift) its code to match the satellite code. This delay time (shift) is multiplied by the speed of light to get the distance.

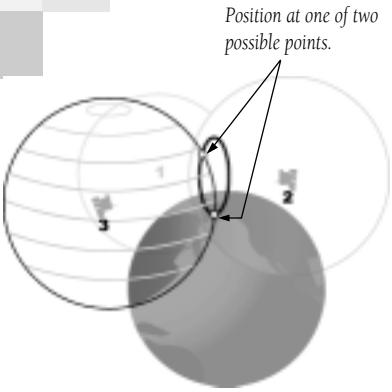
Your GPS receiver clock does not keep the time as precisely as the satellite clocks. Putting an atomic clock in your GPS receiver would make it much larger and far too expensive! So each distance measurement needs to be corrected to account for the GPS receiver's internal clock error. For this reason, the range measurement is referred to as a "pseudo-range". To determine position using pseudo-range data, a minimum of four satellites must be tracked and the four fixes must be recomputed until the clock error disappears.

• Coming Full Circle

Now that we have both satellite location and distance, the receiver can determine a position. Let's say we are 11,000 miles from one satellite. Our location would be somewhere on an imaginary sphere that has the satellite in the center with a radius of 11,000 miles. Then let's say we are 12,000 miles from another satellite. The second sphere would intersect the first sphere to create a common circle. If we add a third satellite, at a distance of 13,000 miles, we now have two common points where the three spheres intersect.

Even though there are two possible positions, they differ greatly in latitude/longitude position AND altitude. To determine which of the two common points is your actual position, you'll need to enter your approximate altitude into the GPS receiver. This will allow the receiver to calculate





a two-dimensional position (latitude, longitude). However, by adding a fourth satellite, the receiver can determine your three-dimensional position (latitude, longitude, altitude). Let's say our distance from a fourth satellite is 10,000 miles. We now have a fourth sphere intersecting the first three spheres at one common point.

Almanac Data

The unit stores data about where the satellites are located at any given time. This data is called the almanac. Sometimes when the GPS unit is not turned on for a length of time, the almanac can get outdated or "cold".

When the GPS receiver is "cold", it could take longer to acquire satellites. A receiver is considered "warm" when the data has been collected from the satellites within the last four to six hours. When you're looking for a GPS unit to buy, you may see "cold" and "warm" acquisition time specifications. If the time it takes the GPS unit to lock on to the signals and calculate a position is important to you, be sure to check the acquisition times.

Once the GPS has locked onto enough satellites to calculate a position, you are ready to begin navigating! Most units will display a position page or a page showing your position on a map (map screen) that will assist you in your navigation.

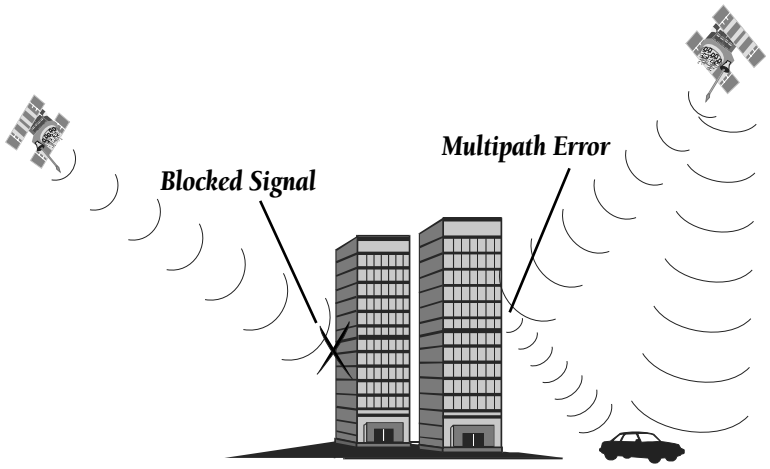
GPS Receiver Technology

Most modern GPS receivers are a parallel multi-channel design. Older single-channel designs were once popular, but were limited in their ability to continuously receive signals in the toughest environments — such as under heavy tree cover. Parallel receivers typically have from between five and 12 receiver circuits, each devoted to one particular satellite signal, so strong locks can be maintained on all the satellites at all times. Parallel-channel receivers are quick to lock onto satellites when first turned on and they are unequaled in their ability to receive the satellite signals even in difficult conditions such as dense foliage or urban settings with tall buildings.

Sources of Errors

Civilian GPS receivers have potential position errors due to the result of the accumulated errors due primarily to some of the following sources:

- **Ionosphere and troposphere delays —** The satellite signal slows as it passes through the atmosphere. The system uses a built-in "model" that calculates an average, but not an exact, amount of delay.
- **Signal multi-path —** Occurs when the GPS signal is reflected off objects such as tall buildings or large rock surfaces before it reaches the receiver. This increases the travel time of the signal, thereby causing errors.
- **Receiver clock errors —** Since it is not practical to have an atomic clock in your GPS receiver, the built-in clock can have very slight timing errors.
- **Orbital errors —** Also known as "ephemeris errors", these are inaccuracies of the satellite's reported location.
- **Number of satellites visible —** The more satellites the receiver can "see", the better the accuracy. Buildings, terrain, electronic interference, or sometimes even dense foliage can block signal reception, causing position errors or possibly no position reading at all. The clearer the view, the better the reception. GPS units will not work indoors (typically), underwater, or underground.

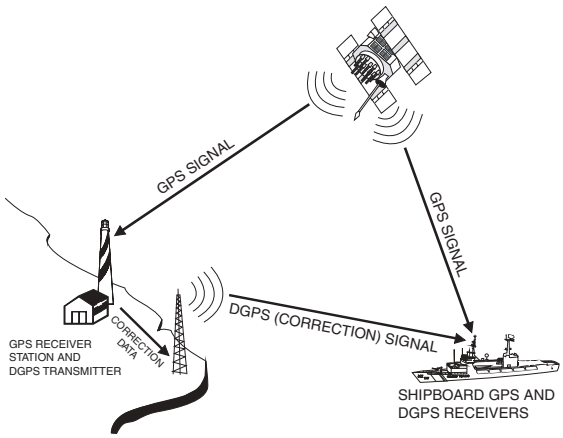


- **Satellite geometry/shading —** This refers to the relative position of the satellites at any given time. Ideal satellite geometry exists when the satellites are located at wide angles relative to each other. Poor geometry results when the satellites are located in a line or in a tight grouping.
- **Intentional degradation of the satellite signal —** The U.S. military's intentional degradation of the signal is known as "Selective Availability" (SA) and is intended to prevent military adversaries from using the highly accurate GPS signals. SA accounts for the majority of the error in the range. SA was turned off May 2, 2000, and is currently not active. This means you can expect typical GPS accuracies in the range of 6-12 meters (about 20-40 feet).

  However, accuracy can be improved by combining the GPS receiver with a Differential GPS (or DGPS) receiver, which can operate from several possible sources to help reduce some of the sources of errors described above. The next section explains DGPS and how it works.

DGPS-How Does it Work?

Differential GPS works by placing a GPS receiver (called a reference station) at a known location. Since the reference station knows its exact location, it can determine the errors in the satellite signals. It does this by measuring the ranges to each satellite using the signals received and comparing these measured ranges to the actual ranges calculated from its known position. The difference between the measured and calculated range



for each satellite in view becomes a "differential correction". The differential corrections for each tracked satellite are formatted into a correction message and transmitted to DGPS receivers. These differential corrections are then applied to the GPS receiver's calculations, removing many of the common errors and improving accuracy. The level of accuracy obtained is a function of the GPS receiver and the similarity of its "environment" to that of the reference station, especially its proximity to the station. The reference station receiver determines the error components and provides corrections to the GPS receiver in real time. Corrections can be transmitted over FM radio frequencies, by satellite, or by beacon transmitters maintained by the U.S. Coast Guard. Typical DGPS accuracy is 1-5 meters (about 3-16 feet).

WAAS

When we fly, there is one thing we all desire: SAFETY (and more legroom!) Exceptional positioning information is the key to flight safety. In deteriorating weather conditions, when visual navigation is difficult or not possible, we need the best position accuracy possible. Enter the "**W**ide **A**rea **A**ugmentation **S**ystem" (now that's a mouthful!) or simply WAAS*. "Wide Area" refers to a network of 25 ground reference stations that cover the entire U.S. and some of Canada and Mexico. Implemented by the FAA (Federal Aviation Administration) for aviation users, these 25 reference stations are located at precisely surveyed spots and compare GPS distance measurements to known values. Each reference station is linked to a master station, which puts together a correction message and broadcasts it via satellite. WAAS capable receivers typically have accuracies of 3-5 meters horizontally and 3-7 meters in altitude.

* WAAS is not operational at the time of this writing.

Mapping: Where Am I?

Have you ever looked at a map and wished you could pinpoint your exact location? Are you or is someone you know "directionally challenged"? Ever find a great hunting or fishing spot and want to get back to it easily? A GPS unit may be just what you need to know where you are and where you are going. GARMIN units are available with different types of map data. Models vary from having no map, to a basemap, to a highly detailed map.

- **Nonmapping Units**

GPS units with no map detail have a plotter screen that can show an overhead view of your location relative to any waypoints, routes, or track logs (see definitions in Navigation section) you have created. The plotter screen will aid in determining your position in relation to these items. Most GARMIN GPS receivers will have the ability to show this basic information. Some models have an additional city point database that displays city locations.

- **Basemap Units**

A GARMIN unit with a basemap will typically show interstates, U.S. and state highways, major thoroughfares in metro areas, lakes, rivers, railroads, coastlines, cities, airport locations, and exit information for the federal interstate highway system.

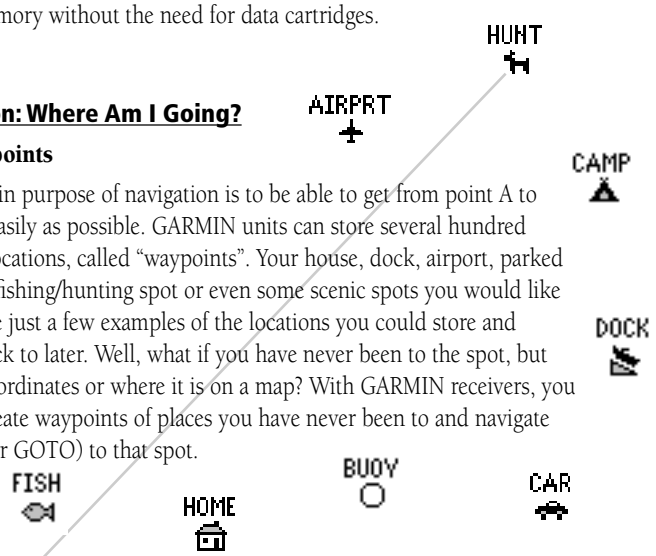
• **Mapping Units**

By stepping up to a unit with the ability to download detailed map data from CD-ROMs, on-screen information really takes a leap forward. Map data may include business and residential streets, restaurants, banks, gas stations, tourist attractions, marine navigational data, boat ramps, topographic detail, off-road trails and much, much more. Imagine being able to look up and navigate to any street address contained in a huge database using an electronic map that shows street-level detail! Map data can be incorporated into the unit either by using a data cartridge or by downloading the information directly from a CD to the GPS unit. Some units utilize GARMIN's pre-programmed G-chart™ cartridges for specific areas or regions. Others use a blank cartridge, combined with a PC and a MapSource™ CD, allowing you to select an area of detail to program into the data cartridge. Yet other units can have the data loaded directly into internal memory without the need for data cartridges.

Navigation: Where Am I Going?

• **Waypoints**

The main purpose of navigation is to be able to get from point A to point B as easily as possible. GARMIN units can store several hundred points, or locations, called "waypoints". Your house, dock, airport, parked car, a great fishing/hunting spot or even some scenic spots you would like to revisit are just a few examples of the locations you could store and navigate back to later. Well, what if you have never been to the spot, but know its coordinates or where it is on a map? With GARMIN receivers, you can even create waypoints of places you have never been to and navigate your way (or GOTO) to that spot.



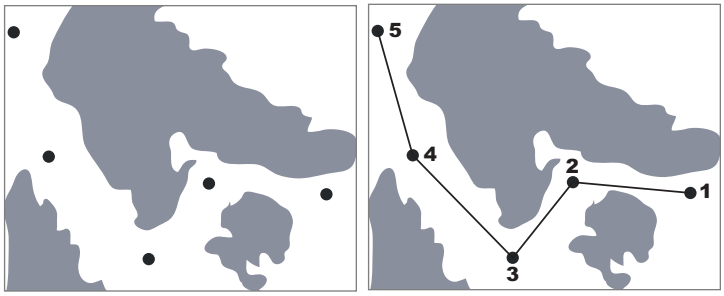
• **GOTO**

The GOTO feature is as simple as selecting a destination point and telling your GPS to "go to it." The unit will draw a straight line to that point and guide you there with a pointer arrow, compass bearing (the direction to the point), desired course line, or a 3D "highway" representation. When you are navigating to a specific place, the GPS always keeps track of

where you are, where you are going, how fast you are going, how far away you are from your destination, and how long it will take you to get there! But what if there is a mountain, island or canyon between you and your destination and you can't navigate in a straight line to your spot? You can tell the unit to go to a series of waypoints in a certain order called a "route".

• Routes

Remember the connect-the-dots pictures? You drew a line from the #1 dot to #2, to #3 and so on. Imagine that the waypoints you want to go to are the dots and the route is the line connecting the dots. Since you get to put your own numbers on the dots, you are basically saying, "I want to go from here, to here, to here, and so on, in this order!" It may not make a

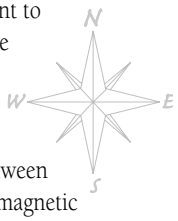


pretty picture when you look at it, but it will definitely get you where you need to go! With all GARMIN units, you can also see where you have been, displayed in the form of a "track log".

• Track Logs

As you travel along, your GPS unit will automatically record your journey in a "track log". Think of a track log as a bread crumb trail of where you have been. As you twist and turn along a forest path or through a group of islands, your every movement is being stored in the GPS. If you want to travel back along the same path you came, you can simply activate GARMIN's TracBack® feature. When activated, the unit will look at your track log and automatically create a reverse route along your same path, taking you back to where you started. You can even store this information to use over and over again, so you'll know that you are heading in the right direction!

• **True and Magnetic North**



With direction in mind, you'll need to determine if you want to use true north or magnetic north references. True north uses the North Pole as a 0° reference, whereas magnetic north uses the Magnetic North Pole, which is actually in northern Canada. If you are using your GPS along with a standard compass, you will normally set the GPS to magnetic north. The difference between true and magnetic north at your current location is known as "magnetic variation" (or magnetic declination). GARMIN receivers have a built-in model of the earth's magnetic variation and can automatically set the variation for your location anywhere on the planet. You may also choose to set the variation manually using a user-defined north setting.

• **Position Formats and Grids**

Your current location can be viewed in the GPS in the form of coordinates. Since different maps and charts use different position formats, GARMIN GPS units allow you to choose the correct coordinate system for your particular use. The most common format is latitude and longitude, which is utilized by all GARMIN units. On most models, you may choose to change the position format to use other coordinate systems.

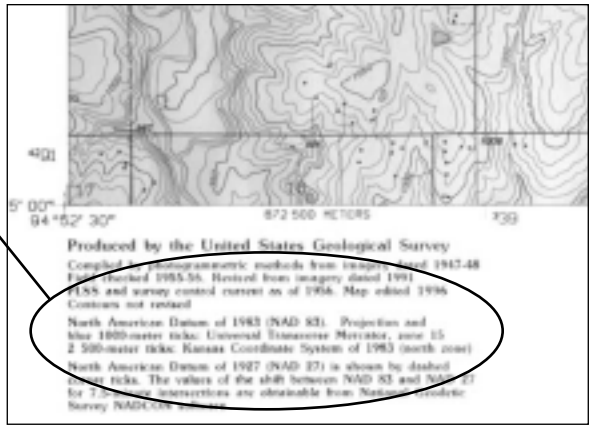
UTM/UPS (Universal Transverse Mercator/Universal Polar Stereographic) are easy-to-use metric grids that are found on most USGS topographic quadrangle maps. MGRS (Military Grid Reference System) is very similar to UTM/UPS and is used mainly with military maps. Several other grids, including a user-definable grid (for the advanced user), may also be selected on most units.

• **Map Datums**

Maps and charts are essentially grids created from a starting reference point called a datum. Many maps still being used today were originally created decades ago. Over time, technology has allowed us to improve our surveying skills and create more accurate maps. However, there is still a

need to adapt GPS receivers to use with those older maps. Most GARMIN GPS receivers include over 100 available map datums, which allow you to switch to a setting that matches your map. Using a map datum that does not match the chart you are using can result in significant differences in position information. Most good navigational charts and maps will have the datum listed, normally somewhere in the smaller, side print or in the legend. The most common US map datums are World Geodetic System 1984 (WGS 84), North American Datum 1983 (NAD 83), and North American Datum 1927 (NAD 27). When looking through a unit's list of datums, be sure to remember that they are all mathematical models of the Earth's shape used to determine a position, not actual maps built into the unit.

Map Datums On USGS Topo Map



• Complementary Navigation Aids

Even with GPS technology becoming better every day, it is still a good idea to have backup navigation. Having a paper map, a simple compass, and knowledge of manual navigation is a good, safe practice of prudent navigators! Remember, GPS is a complement to navigation and should not be the only navigational tool you use.

Purchasing Decisions

Trying to decide which GPS unit and accessories to get could be overwhelming, especially with the number of choices on the market today. Think about what you mainly want to use the unit for: boating, flying, driving, hunting, fishing, biking, hiking, etc. Since all GARMIN GPS units can show your position and basic navigation information, an inexpensive entry-level unit can be a great way to enter the world of GPS navigation. All GARMIN units also have a backlight feature which will allow you to use your GPS both day and night. Choosing a unit with more features, such as mapping detail, can provide an entirely new level of position awareness and navigation capability, while still being easy to operate. GARMIN's intuitive, menu-driven operation makes learning how to use the GPS receiver simple. In designing our GPS products, we utilize customer feedback to develop better, more user-friendly products.

Consider these issues when selecting a GPS unit:

Battery Life — If you are going to be using the unit away from an auxiliary power source, consider the weight of carrying extra batteries. Units with color displays tend to have a decreased battery life compared to grayscale displays, requiring more frequent battery changes.

Size and Weight — GARMIN units are available in an array of different sizes and shapes: small lightweight handhelds, large display chartplotters, and panel mounted aviation models.

Antenna Configuration — Are you going to be using the unit mainly in the open? How about in a car? Whether you need a unit with a built-in antenna and the capacity to attach an external antenna, a fixed-mount unit with a mountable external antenna, or an aviation antenna, GARMIN has the products to keep you tracking satellites.

DGPS Capability — Do you need the best accuracy possible? If so, combining a Differential GPS (DGPS) receiver with your GPS unit will give you the best accuracy possible. Most GARMIN GPS units are DGPS-ready and some fixed-mount marine units even have the DGPS receiver built in.

Price — What type of unit fits your price range? Keep in mind that ALL GARMIN GPS units will still allow you to mark waypoints and help you navigate to that spot. The rest is up to you to decide which features appeal to your needs. (And, of course, the features you just enjoy having!) All the way from the most basic GPS to a high-end mapping unit, GARMIN has a GPS receiver to fit just about every need!

Selecting Accessories

All GARMIN units come with the basics of what you need to get started. You can fill your accessory needs through any local GARMIN dealer or check out and purchase your unit's available accessories on the GARMIN Web site: www.garmin.com. Some accessories to consider are:

Remote Antenna — will a built-in antenna's view be shaded, such as in a boat cabin, in the cockpit of an airplane or under the roof of a car? An external antenna will allow you to use your GPS in an area where a clear view of the sky may not always be possible.

External Power Source — Even with the long battery life you get on most GARMIN products, it's always nice to save on batteries by using a cigarette lighter adapter or AC power source!

Mounts — When you need your hands free, a mount for your GPS can be useful. Many units come with a mount, and several additional mounts are available for other products in our line.

Software — Whether your need is to save your favorite waypoints or plan a trip, GARMIN's MapSource software can fit the bill! MapSource software allows you to view color maps on a personal computer, with zoom and pan functions for easy map browsing. Use the trip and waypoint management functions to create waypoints, routes, and tracks and transfer them between your PC and nearly all GARMIN GPS units. This is excellent for planning your next outdoor adventure, business trip, vacation, or recreational outing without ever leaving your house.

For those units that accept the map transfer feature, users can also select individual maps in areas of interest and download the selected maps to a compatible GARMIN GPS (See individual unit specifications for compatibility.) Simply connect your GARMIN GPS to your PC using a PC interface cable. Select the map areas on screen, and with a click of the mouse, the information downloads to your GPS. Some units require a blank 8,16, 32, 64 or 128 MB data card to download.

All MapSource products include the trip and waypoint management functions for transferring waypoints, routes and tracks. Your preference for map detail and your specific activities will determine which MapSource CD is right for you. MapSource gives you the flexibility to select the mapping coverage you need.

G-Charts — If you would like to add more marine navigation data to your GARMIN chartplotter, GARMIN offers two different types of marine cartography data cards: inland and offshore. GARMIN's G-charts also come in two sizes: standard or micro. Offshore G-charts feature complete depth contours, navaids, and port plans that show names of harbors, towns, marinas, inlets, hazards, and other data. Inland G-charts have detailed inland cartography as well as interstates, highways, county roads, boat ramps, and services.

Web site Features

Need to find out more information on GARMIN products or GPS technology? Stop by www.garmin.com to find a full-service Web site to help you with your GPS needs. You will find specifications on our entire line of products, a dealer locator to help you find where to buy GARMIN products in your area, GARMIN's online store where you may purchase accessories directly, online product registration and product testimonials. Services such as FAQs (Frequently Asked Questions), free downloads of manuals and unit operating software, links to learn more about GPS, and even job opportunities at GARMIN are just a click away! Stop by our cartography section to preview MapSource map detail or browse through our listing of available offshore and inland G-charts and much more.

Our Customer Commitment

GARMIN International aims to enrich the lives of customers, suppliers, distributors, and employees by providing the very best products that offer superior quality, safety, and operational features at affordable prices. While our immediate success has resulted from developing innovative products for a variety of markets, our long-term success is based on our commitment to support our customers after the sale. We are winning over new customers with quality products, tremendous value, superior service, and we are working hard to create more loyal GARMIN supporters for many years to come.

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