

USING YOUR GPS TO INHANCE YOUR PADDLING EXPERIENCES

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First I'll briefly explain what a GPS is and then how it works... I hope by explaining the features of a GPS, you will better understand the operations and how it can work for you.....

- What is a GPS? Gosh-darn Pricey Speedometer! Not really it's Global Positioning System
- Was called NAVSTAR when it was operated by the Dept. of Defense
- First used in 1978 by military than went public in 1980
- 21 in use w/ 3 spares now 31 up there (12,000 miles)
The "extra ones" improve accuracy for military purposes
Usually 8 in line of sight at all times
- It's a 3 part system: SPACE, GROUND and USER
 - Space; The satellite's radio sends codes to tell time, orbital position and general system information
 - Ground; 5 stations control the satellites corrects the signals and position
 - User: that's you with your GPS Unit!
- What factors are needed to make the GPS system work?
TIME and LOCATION
Time = Calculates the time it takes to receive a satellite and than computes the distance
Location= tells receiver where the satellites are in relationship to the earth
- How does the GPS find your location (balloon demo....)

First the GPS receiver needs to know the approximate location; from "cold boot" or being told time zone.

Then the first satellite tells the unit you are located somewhere along the edge of an imaginary circle on the earth's surface

A second satellite provides another imaginary overlapping circle...where the two overlap, a smaller ellipse denotes possible position

Add data from a third and it produces 2 possible points on earth...because the GPS knows approximately where it is, it will give you a location correct to 50 to 100 feet.

Add a fourth satellite yielding altitude information and the accuracy improves to 20 to 50 feet..... and so on.

Now, throw in the WAAS (Wide Area Argumentation System) of 25 ground stations in the US and we now have an accuracy of 10 to 20 feet!

OPERATION.....

Most GPS's operate from a page format however different from one brand or model to another:

- Typical pages usually include:
 - Satellite w/ graphic display
 - List of satellites
 - Strength of each
 - Accuracy
 - Elevation
 - And most importantly, Latitude and Longitude
 - Menu
 - Time of day
 - Battery condition
 - Set up
 - Tracks
 - Routes
 - Waypoints
 - Mark
 - Compass/Pointer w/ graphic display (must be moving and in the GOTO or Navigation mode)
 - Name of destination
 - Compass
 - Speed
 - Heading
 - Time, heading and speed to destination (numerical values)
 - Highway w/ graphic display
 - Name of destination
 - Compass
 - Speed
 - Heading
 - Time, heading and speed to destination (numerical values)
 -
 - Map w/graphic display
 - Graphic display of destination
 - North arrow
 - Heading arrow

Or

- Map w/actual view of map section
 - Graphic display of actual location on map
 - Graphic display of destination on map
 - North arrow
 - Heading arrow
 - Time, heading and speed to destination (numerical values)
- Trip / Computer Page
 - Customized calculated data such as;
Odometer, Speed odometer, Max. speed, Moving avg., Time moving, Time stopped, etc.

FEATURES.....

GPS features are like options on a car...the more you get, the more pricy the unit! To get a better understanding of the GPS and be able to use the GPS to enhance your paddling experiences, you need to have a brief understanding of the features. I will attempt to explain features that apply to handheld GPS's only.

All handheld GPS's are usually equipped with the following standard features:

GENERAL : All GPS's are equipped with the satellite Signal indicator, Clock, Speedometer, Odometer and Direction (not compass) indicator. Usually any time the GPS is on and locked onto the satellites and moving, all of these functions will be reported by the GPS.

WAY POINT: a point or location recorded to GPS as a coordinate
3 ways to do; place you are at currently, a place you were at and you recorded the location and a place you want to go and you inputted the coordinates from another source such as a USGS map or <http://www.satsig.net/maps/lat-long-finder.htm>

GOTO: allows operator to tell GPS where (waypoint) you want GPS to take you to.

NAVIGATION: usually comes on in conjunction with the GOTO feature... It's the calculator for the device. It allows the GPS to do and report on all sorts of time and distance calculations. Also it provides the graphics to show an actual heading vs desired heading and typically tells the operator the direction to correct.

ROUTES: Remember connecting the dots pictures? That's what a route is, a series of Way Points that are connected together. Simply put, I want to go from here to here to here to here and in this order!

TRACK LOG: As you travel along, your GPS will automatically records your position in preset time intervals. This automatic recording can be saved for future reference or you can simply ask your device to save, reverse or take you back. This becomes one of the most important features you can use...if lost, it will take you back to where you began.

FEATURES ADDED TO A STANDARD UNIT, MORE \$\$\$

COMPASS: There are two types of compass readings one can expect to obtain from a GPS and depending on features of the unit. All GPS's will provide operator with a heading as long as the unit is in motion (track log functioning). This data is referred to as a heading (direction you are going)

Another compass feature is called a Fluxgate electronic compass. This feature does not require movement, it simply works like a mechanical compass with a pointer that points to the magnetic north however electronically corrected for variation to show true north.

ALTIMETER: All GPS's use altitude as a part of a location calculation however only the higher priced units have an internal barometric altimeter. This feature has little bearing on the marine use of a GPS but will give improved accuracy from the standpoint of a more accurate 3rd dimension (altitude) to the computations of the unit.

NON-MAPPING: All basic GPS unit offer this feature. The unit has no map detail of any kind, just a plotter screen that will show an overhead view of your position as it relates to other waypoints, routes or tracks

BASE MAPPING: The next step up in map options is found in units that feature a base map. That is a unit that depicts most interstates, US and state highways and other thoroughfares. This feature allows you to see in graphic form, your location in relationship to map features. The base map feature is commonly a built in feature

MAPPING: Finally we get to the high-end devices with mapping features. Now the on-screen information takes a real leap forward. For example; With Topographic maps, small streams, swamps, hills and in some cases building are shown. Some even depict park boundaries, tides and boat landings. Other maps/charts are detailed for marine usage and depict water depths, navigation aids and tide readings as well as other marine features. Lastly other maps have been developed of highway travel and offer user information such as points of interest and other driving and food services. These maps are available as computer files and recordable to the GPS and others as prerecorded memory chips loaded to GPS as needed.

Garmin utilizes their own proprietary set of maps for their equipment. Magellan uses National Geographic for their topo maps and BlueNav or Maptec for marine use. There are a few new companies that are struggling to upset the giants with units that use USGS electronic Charts but are not really proven at this time.

MEMORY - Fixed or Recordable: As you can imagine, the above mapping features can take up a lot of memory. Units are available with programmable internal memory (usually less than 100 meg) and others now utilize microSD memory chips (up to 16 GB!) and allow for significant amounts of data to be available in a hand held

Other Considerations:

Battery type and life: Most GPS's use AA type batteries, one can argue the pros /cons of rechargeable, alkaline and standard batteries....it's your choice. In general you can expect to get 12 to 18 hours from a pair of alkaline type batteries unless you use the compass, back light or altimeter which all create a substantial drain to the batteries.

Size and weight: For all practical purposes, all handhelds are closely the same sizes. I would however concern myself with screen size.

Antenna configuration; Some units offer better antenna configurations for signal reception than others.

Waterproof: All units say they are they meet IPX-7 standards which states: The GPS case can withstand accidental immersion in one meter of water but I suggest as being careful as possible.

WAAS/DGPS; Today most units sold are equipped with the WAAS feature, if not you will sacrifice accuracy.

AND BACK TO PRICE! You get what you pay for, I suggest a getting a better unit with mapping features. When you decide which unit you want to buy, definitely check prices on line...a good site to do this is: <http://www.nextag.com/>

Accessories:

Mounts: Needed to hold on boat but requires some adaptation from standard units available on the shelf and what is needed for your boat. Consider one of the suction cup mounts but be sure to attach a safety cord.

Software: The ONLY SOFTWARE TO CONSIDER ARE THE TOPOGRAPHIC MAPS, not highway or Marine Charts. Personally I think the National Geographic topo used by Magellan is far better than Garmin's MapSource TOPO but.... the but..... . You can't interchange brands of software with other brands of equipment.

For a comprehensive understanding of the GPS, See Garmin's GPS Guide for beginners:

http://www8.garmin.com/manuals/GPSGuideforBeginners_Manual.pdf

My Personal Recommendation:

Garmin GPSMAP 60CsX, List price; \$425, On line price; \$295, Garmin's 2008 MapSource U.S. Topo; Online price \$100 and Garmin's Automotive windshield mounting bracket with suction cup mount (# 010-10457-00)

Why?

- **One of the best antennas on the market**
- **Electronic Compass**
- **Barometric altimeter**
- **Recordable microSD memory chip up to 16 GB (3 dvd's)!**
- **Able to operate between multiple preloaded mapping systems (topo, hwy. and marine).**
- **Programmable from USB or serial ports (USB is very FAST!)**