

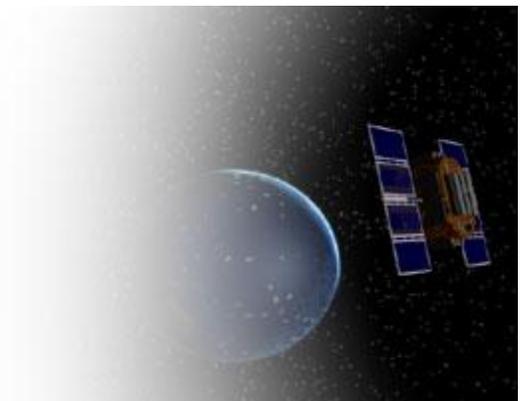


## Navigation on Horseback with GPS

*Handouts compiled by Nicole Vaugeois for the BC Competitive Trails Riders' Educational Fair, May 27, 2012*

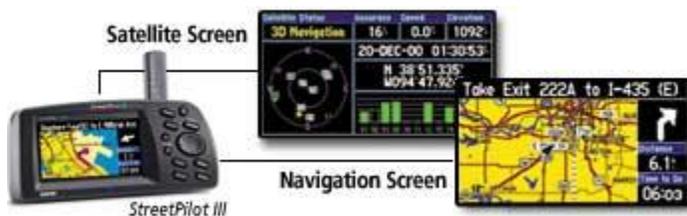
### What is GPS?

The Global Positioning System (GPS) is a satellite-based navigation system made up of a network of 24 satellites placed into orbit by the U.S. Department of Defense. GPS was originally intended for military applications, but in the 1980s, the government made the system available for civilian use. GPS works in any weather conditions, anywhere in the world, 24 hours a day. There are no subscription fees or setup charges to use GPS.



### How it works

GPS satellites circle the earth twice a day in a very precise orbit and transmit signal information to earth. GPS receivers take this information and use triangulation to calculate the user's exact location. Essentially, the GPS receiver compares the time a signal was transmitted by a satellite with the time it was received. The time difference tells the GPS receiver how far away the satellite is. Now, with distance measurements from a few more satellites, the receiver can determine the user's position and display it on the unit's electronic map.



A GPS receiver must be locked on to the signal of at least three satellites to calculate a 2D position (latitude and longitude) and track movement. With four or more satellites in view, the receiver can determine the user's 3D position

(latitude, longitude and altitude). Once the user's position has been determined, the GPS unit can calculate other information, such as speed, bearing, track, trip distance, distance to destination, sunrise and sunset time and more.

## The GPS satellite system

The 24 satellites that make up the GPS space segment are orbiting the earth about 12,000 miles above us. They are constantly moving, making two complete orbits in less than 24 hours. These satellites are travelling at speeds of roughly 7,000 miles an hour.

GPS satellites are powered by solar energy. They have backup batteries onboard to keep them running in the event of a solar eclipse, when there's no solar power. Small rocket boosters on each satellite keep them flying in the correct path.

Here are some other interesting facts about the GPS satellites (also called NAVSTAR, the official U.S. Department of Defense name for GPS):

- The first GPS satellite was launched in 1978.
- A full constellation of 24 satellites was achieved in 1994.
- Each satellite is built to last about 10 years. Replacements are constantly being built and launched into orbit.
- A GPS satellite weighs approximately 2,000 pounds and is about 17 feet across with the solar panels extended.
- Transmitter power is only 50 watts or less.

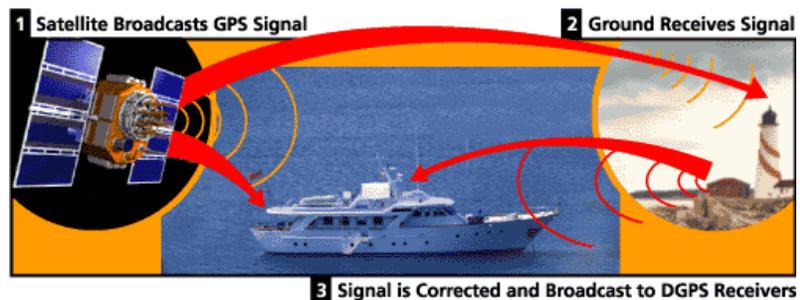


## What's the signal?

GPS satellites transmit two low power radio signals, designated L1 and L2. Civilian GPS uses the L1 frequency of 1575.42 MHz in the UHF band. The signals travel by line of sight, meaning they will pass through clouds, glass and plastic but will not go through most solid objects such as buildings and mountains.

## How accurate is GPS?

Today's GPS receivers are extremely accurate, thanks to their parallel multi-channel design. Garmin® GPS receivers are accurate to within 15 meters on average. Newer Garmin GPS receivers can improve accuracy to less than three meters on average.



# What Can A GPS Do for Horseback Riders?

Horseback riders commonly use a handheld GPS for navigation through various types of terrain with the use of real-time maps. What does it do specifically?

- It can help others locate you if you have an emergency.
- It can help you find your way through unfamiliar territory or to correct course when lost.
- It can help you understand how fast your horse travels at different gaits.
- It can help you learn to time your rides when in long distance sports.
- It can help you track your mileage.
- It can help you create maps of your favorite trails and share them with others.
- It can give you more confidence riding trails.

## Which GPS units are best for use with horses?

Riders have the option to purchase a designated GPS unit such as a GARMIN which have been specialized for tracking. Or, nowadays, many cell phones have downloadable aps that can help you locate yourself. There are numerous options (see handout).

### Pros and cons with GPS unit and phone ap?

#### GPS units

##### Pros:

- Specifically designed for outdoor use
- Numerous products including maps, parts, warranty
- Support and long term reputation
- Ability to build maps and interface with computers

##### Cons:

- Expensive
- Not always user friendly
- Maps are an add on cost to your unit

#### Phones:

##### Pros:

- Inexpensive
- Usually user friendly
- Link to your camera
- Easy to upload and share
- Can download maps and interface with websites

##### Cons:

- Advanced features like map building often not available
- Battery life
- Not always useful in thick trees or valleys
- Warrantee and support not as accessible

# What Features are Needed with a handheld GPS?

No matter how often you will use a handheld GPS for horseback riding, having the right features is important. Here are some you will want to keep in mind:

## High Sensitivity Chipset

- This is a helpful feature when you need to navigate through dense forest or canyon terrain

## Waterproof Construction

- Weather conditions can vary. Make sure you choose a model that will not get easily damaged by rain or other exposure to water.

## Basic Mapping Software

- All [handheld GPS units](#) need updated maps to give the most current and useful information. Your GPS should be able to download updates via a [computer](#) by use of a CD or Internet connection.

## SD Card

- Useful to store trail travel data and mapping information

## Color Map Display

- Even if your maps are continuously updated, they are easier to read in a color format. This feature should also include topographical maps for more detailed information.

## Other Useful Features and Items

- Electronic Compass
- Car adapter
- Rechargeable batteries
- A "SOS" feature that can transmit emergency information to telephone and email (SMS) contacts.

# GPS Devices You May Want to Consider

How do you choose a GPS for horseback riding? It may be a bit confusing. Here are some handheld models you may want to look into:

## Garmin Oregon 400t or 60 cx series

- Includes a touch screen interface, preloaded topographical maps (with expanded map capability) and an electric compass.

## DeLorme PN-40

- This model has pre-installed maps, additional topographical maps on included DVDs, a USB connector, an electronic compass and is expandable with SDHC.

### **Magellan Triton**

- It comes equipped with a 2 MP camera, voice recorder, built in maps, flashlight, SD card compatibility and an audio jack.

### **Lowrance Endura Sierra**

- This handheld GPS includes a micro-SD slot to store maps, tri-axial compass, high resolution topographical maps and extensive outdoor trail networks.

### **GPS Tracker Light Tower Personal**

- This GPS tracking device can be hung from a horse's neck or placed in a carrying back. Locate a horse by calling the tracking device via cell phone. Their location will be transmitted to you via SMS.

## **Activities to get familiar with your GPS unit:**

1. Turn your unit on
  - a. Locate your coordinates – where are you?
2. Turn tracks on
  - a. Assume you are starting a new ride and want to track your mileage.
  - b. Go to menu, hit tracks, turn ON (remember at the end of the ride you would turn this off)
  - c. Walk around a little bit and watch the track evolve. See how it follows you and drops breadcrumbs?
  - d. When done, go back to tracks and turn it off. Save your file with "Test".
3. Set a waypoint
  - a. Assume you want to develop a map or remember that something significant was on the trail.
  - b. Press "Mark". Then ENTER. Note you should remember the number and what it was so you can change it later OR if time, you can name this waypoint while out on the trail. Toggle up to the name of the waypoint and hit enter, then you can use the keyboard to change the name. Remember – each waypoint must have a unique name.
4. Get familiar with your trip data page. Reset it as though you would start a new ride – so all information is at 0. Press menu, then reset, then enter.
5. Get familiar with your stopwatch function. Get it ready for a new loop by resetting it. Pretend you are coming in at the mid way – stop it, set another lap to log your time in. Pretend you are heading out again – hit another lap.

Practice these types of exercises so that when you are on the trail, you can navigate around with your GPS easily.

## **References:**

These handouts were prepared with material from the following:

- 9 best iphone GPS aps: March 19, 2010 By Beth Ritter-Guth available at: <http://www.makeuseof.com/tag/9-iphone-gps-apps-case-lost/>
- Review: The 25 Best Outdoor iPhone Apps by Steve Casimiro available at: <http://www.adventure-journal.com/2009/02/outdoor-iphone-apps/>
- Backcountry Navigator - <http://www.backcountrynavigator.com/content/android-gps-equestrian-trails-0>