



Tips for Selecting a GPS for Cycling

(GPS – Global Positioning System)

For a sizeable number of our members the news that, due to COVID 19 restrictions, we will be going paperless for ride maps has created a great deal of anxiety. I have been cycling with GPS for the better part of a decade and I would never dream of going back. So, to help ease the transition, here are some pointers on acquiring the best GPS for your needs.

First of all, a (very) short course on how GPS works. In the case of navigational GPS units, they are just a receiver – they do not transmit anything. I cannot say the same for your Smart Phone or a Personal Locator Beacon, should you decide to use it as your navigational device. Smart Phones continuously receive and transmit location information, and this makes them very power hungry, as we all know.

Personal Locator Beacons can transmit location and status, but generally are not used for transmission except for texting and in a life-threatening emergency situation.

So, here's the beta on how GPS works.

Tracking ground stations determine the orbits of the GPS constellation of satellites via radio signals.

Orbital data, time corrections and the relative positions of all satellites are then transmitted to all of the satellites.

The satellites simultaneously transmit synchronized time and orbital data back to Earth.

Your GPS unit computes location using orbital data and the differences in arrival times of the signals of, at minimum, 4 satellites.

There are many “constellations” besides GPS. GLONASS (Russia), Beidou (China), Galileo (Europe), QZSS (Japan) and IRNSS(India) are the most prominent.

Current GPS units available in North America can utilize the GPS and GLONASS constellations, but increasingly suppliers are spec'ing their units with other constellations. Using more constellations increases location accuracy and the speed that the unit acquires 4 satellite lock.

Yes, your GPS, put simply, is a very sophisticated stopwatch. Its function is to compare transmitted time signals to determine your location on planet Earth.

Your Options

- A GPS watch.
- A GPS cycling specific bar-top computer
- A hand-held GPS
- A hand-held Personal Locator Beacon
- A Smart Phone

None of the first 3 units require any sort of subscription to use, however the service and accuracy is controlled by the U.S./Russian military. Personal Locator Beacons do require a subscription for satellite service because they can send and receive texts and transmit an S.O.S signal independent of any cell service.

Features that you may need

Colour Screen – If you plan on using your GPS for skiing, hiking, snowshoeing, boating etc. a colour screen is almost a necessity. Reading a topographic map or chart on a small monochrome screen is very challenging.

Multiband signal reception – More GPS units are able to utilize not only GPS and GLONASS but also Galileo (Europe), QZSS (Japan) and IRNSS(India).

Helically wound antenna (Handheld GPS) Provides superior reception in slot canyons, tightly spaced buildings/narrow streets. Identified by the substantial nub protruding at the top of the unit. The alternative is a ribbon antenna which excels at receiving ground station signals, but do not match the helically wound antennae in reception of satellite signals. The ribbon antenna is internal and usually wraps across the top of the unit.

The ability to load routable maps – This can be via memory built into the unit and/or Micro SD card memory expansion. Maps are very large files – so more memory is better.

Ample Waypoint capacity – Think of these as breadcrumbs describing your track/route/course. 10,000 points/200 saved tracks should be considered to be a minimum.

Points of Interest (POI) – The ability to load these locations and information data allows searches for places you might want to go to and navigate to those locations. These include, but are not limited to, restaurants, hospitals, pharmacies, grocery stores, bike shops, hotels, camp sites, police stations, local attractions etc.

Bluetooth and ANT connectivity – Allows the connection of a compatible Smart phone, temperature sensor, cadence sensor, speed sensor, heartrate sensor, power meter etc.

Tracking – Using a Bluetooth connected phone, this feature allows family and friends to track you in real-time on tours. Data charges will apply to your phone.

Push/Pull Data Transfer – Wirelessly share data with compatible connected devices. This might include favourite rides, waypoints, geocaches, POIs etc.

Adequate run time – Consider the nature of your rides. If the majority of your rides are day-rides 8 – 10 hours of run time should be enough. If long tours figure into your choice 10+ hours on a charge or easily replaceable batteries would be necessary. CAUTION – Some units will not fully operate while charging, so battery banks and solar chargers may not be an option.

Screen size - Being able to read the screen in daylight and at night should enter into your selection. Backlighting, of course, cuts into run-time – so if the screen isn't easily visible in bright sunshine and requires backlighting that can be a problem.

Waterproof rating - Our tours aren't always sunny. An IPX rating of at least IPX 7 (immersion in 1 metre of water for 30 minutes) is a common rating and should be considered a minimum. CAUTION The IPX rating often assumes that none

of the control buttons are pressed during exposure to water – check to see which controls are operable and which ones are HANDS OFF!

Electronic 3-Axis Compass – GPS does of course supply information on your direction of travel while you are moving but does not give adequate information while stopped. A 3-axis compass provides a heading (direction that you're facing while stopped) – valuable for those forks-in-road situations.

Programmable Training – This feature can be useful along with cadence, heartrate, speed, power meter, distance, and time.

Virtual Ride Partner – This is virtual rider that you program to set a certain pace or speed. When your average speed or time per kilometre drops below or above set limits a tone notifies you to slow down or go faster – essentially a coach on your handlebars.

Barometric Pressure Sensor – GPS isn't good at accurately determining altitude, so barometric pressure becomes a good backup for altitude. Really good for determining how close you are to the top of the pass. This can also be paired with weather forecasting software that warns of incoming storms.

Touch-Screen - Not absolutely necessary but fumbling for a button on a 60 kph descent isn't for the faint-of-heart. CAUTION – all of your long finger gloves will need to be touch-screen compatible. Touchscreens tend to be notoriously insensitive in extreme cold – winter fat bikers beware.

There are many more features built into GPS units, but these are the most salient features that make GPS navigation a pleasure. In looking at the preceding features you can begin to eliminate some of the contenders. So, let's look at them individually.

Wristwatch GPS

Advantages:

- The unit is always with you (unless attached to your handlebars) thereby eliminating the chances of theft.
- In terms of price, usually the lower priced, but some can rival Handhelds.
- Is easily integrated into your other off-bike activities such as walking, hiking, running, snowshoeing, skiing etc.
- Light weight
- May provide haptic (vibrating) feedback to alert the wearer to limits, upcoming turns etc.
- Doesn't take up any handlebar space.



Disadvantages

- Very difficult to navigate on such a small screen.
- Lower priced units are often monochrome.
- Memory is, almost without exception, limited to built-in memory - thereby limiting map/POI/waypoint/route/course capacity.
- Lacks the functionality of other GPS options. These are really designed for the fitness sector where navigation plays less of a role.

• Become quite bulky and heavy (due to the larger battery) in order to get good run-time. Smaller units for women are not common. Their smaller size means shorter run times

• All are rechargeable, so substituting other batteries is impossible and many will not function while being charged – so solar chargers and battery banks are not an option.

Bar-top Cycling Computers

Advantages

- Concentrates on the features for the cyclist – speed/distance, cadence, rate of climb/descent, courses/routes, heartrate, and power.
- Comparatively easy to read compared to a wristwatch unit.
- Often provides for memory expansion via a Micro SD memory card.
- Virtual Partners are common on higher priced units
- Most offer the ability for advanced workout to be programmed.
- Most can connect (tethered or Bluetooth) to online social media such as Strava, Zwift, Wahoo Fitness, Garmin Connect etc.



Disadvantages

- Takes up space on the handlebars.
- Ironically, on lower priced units, may not provide navigational features such as maps and POI. CAUTION - The features are so limited that they really don't offer much more than conventional cycling computers.
- Prices are quite steep to get all the features that you might need for touring.
- All are rechargeable, so substituting other batteries is impossible and many will not function while being charged – so solar chargers and battery banks are not an option.
- Are less suitable for off-bike activities, although they are lighter and more pocketable than Handheld GPS units.
- Their quick release handlebar mounts make them a target for thieves – so don't leave them on your bike, take it with you anytime that you're not on the bike.



Handheld GPS

Advantages

- Arguably the sweet-spot in terms of features for the dollar.
- Larger screen than most cycling computers.
- Faster processors allow for much quicker refresh and recalculation of route.
- The target user is the navigator, but many will also connect with cadence, heartrate and speed sensors.

- Using a Bluetooth connected Smart Phone you can connect to social media.

- Many run on AA batteries which are easily replaced and available around the globe. All will use rechargeable batteries, and many will charge batteries in place.

- Many will retain full functionality while charging and/or running on an external power source.

- Many will have connections for an external antenna but will often function perfectly okay without an antenna for in-vehicle navigation.

- On-board memory is currently 15 gigabyte+ and most will accept Micro SD cards of 32 gigabyte.



- Units that use a helically wound antenna provide superior satellite find and lock.

Disadvantages

- Good units with fitness parameters tend to be more expensive.

- They tend to be larger and heavier than any cycling specific computer and therefore take up more handlebar space.

- These use more power and run-times are shorter. Balancing out this is the fact that batteries can be

swapped-out quickly and easily.

- Turning off backlight, tones, 3-axis compass and lowering the refresh rate (resolution) helps extend run times with a reduction in functionality.

- Generally, these do not have haptic/voice feedback and only get-by on alert tones for hands-free/heads-up navigation. Turning off alert tones to save battery power will of course cancel alerts.

Personal Locator Beacons

Advantages

- Unmatched peace-of-mind for you and your loved ones.

- These marry GPS, a Personal Locator Beacon and Social Media.

- Allows friends and family to track you in real time.

- Text (via satellite) from anywhere in the world independent of your cell coverage.

- Most preload texts that can be sent at intervals e.g. The tour is going fine – Having a rest day today – The bike needed some repairs, so a bit of delay etc.

- Utilizes the Iridium constellation of 66 satellites which provides superior location especially in the far North and far South of the planet.

- Each text message embeds your GPS location when sent.

- When the S.O.S button is pressed in a life threatening

situation your position is transmitted to the GEOS/ International Emergency Response Coordination Centre.

- GEOS/International Emergency Response Coordination Centre (IERCC) coordinates the rescue and determines which first responders best suit the situation. The centre, in Texas, is manned 24/7/365. Parks Canada, local Search and Rescue, Police, Fire, Ambulance and the Canadian Forces may be notified in Canada. Internationally, any similar first responders will be notified when you're traveling overseas.

- Due to the nature of the device (rescue) battery life tends to be dramatically better.

- Most use Lithium-Ion rechargeable batteries. On longer tours a battery bank or solar charger can top up the built-in battery.

- Top tier units have 3-Axis electronic compass and barometric sensor.

- Subscriptions for satellite service can be put on hibernate in seasons when you're not using them.

- Packages are available to bundle SAT subscriptions with rescue insurance to reimburse you for rescue costs. A Search and Rescue and a Medevac helicopter rescue starts at about \$36,000 Canadian.



Disadvantages

- Expensive to buy and requires a subscription for satellite service.

- Navigation on lower end devices tends to be a little more rudimentary.

- Often do not include fitness monitoring.

- They are large and can take up valuable handlebar space.

- Can lead to more reckless behavior, especially for Mountain bikers where obstacles and the inherent danger of a fall is greater.

- Some (lower priced Garmin) use GPS for navigation but are unable to access any other satellite constellation for navigation. The Iridium constellation is only used for communication and rescue.

- Memory expansion is a rarity.

Smart Phones

Advantages

- The King-of-the-Hill in terms of versatility.

- Tour friendly functions such as phone, web access, dual camera, video, compass, voice record, music and turn-by-turn voice instructions plus a world of apps make the Smart Phone a real contender.

- Touch sensitive control of functions

- (As of iPhone 8S/Samsung Galaxy A51) capable of using GPS, GLONASS, GALILEO and QZSS constellations.

- Full functionality while charging so battery banks and solar chargers can be used while navigating.

- Large screen area works well with maps.
- Advanced navigational features are app dependent.

Disadvantages

- Smart Phones are very power hungry – large capacity 10,000+ milliampere hour (heavy) battery banks are a necessity on longer tours where USB mains charging is spotty (e.g., camping). Solar panels need to be quite large (heavy) to accommodate charging of most Smart Phones.
- If they are being used extensively for navigation and information an unlimited data plan is a good idea.
- (Based on experience) the refresh-rate (resolution) is not as good as a dedicated GPS. In tight winding streets lined with tall buildings the indicated position exhibits some latency.
- They have a wider footprint on the handlebars, thereby limiting space for bell and lights.
- In the event of a crash, you could lose all of your stored data.



So that sums up all of the practical options open to you, to take advantage of paper-free navigation GPS based navigation. Combine any of these with the Ride with GPS online software or Map My Ride and you have a complete package for exploring a world of rides and planning your next ride.

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