This is a Special Edition of the BAC eBulletin containing Part 2 of a three part article on Bicycle Navigation Using GPS. In the first part (available on the Club Website), I described all of the wonderful things a GPS can do to help you navigate on a bike ride and to find useful and interesting waypoints along your route. In this second part, I will describe the process of setting up your GPS before you leave home. Then, in the third part, I’ll discuss some of the things to consider when buying a GPS and some of the issues involved in mounting the GPS to your bike. I hope you find this interesting and useful. If you have any comments or additional information that you would like to share with other members, please send it to me, the Bulletin Editor.

If you’re reading this using Adobe Acrobat, you will find that the Table of Contents at the left is “live”. Just click on a topic to go to that page.

If you have an idea for an article that could be published in a future Special Edition, please write it down and send it to me, the Bulletin Editor. MS Word or plain text files sent via email would be most convenient. Photos and illustrations should be sent as JPEG or Photoshop (.psd) files. If you would prefer to use paper mail, that’s all right as well. Please send your submissions to:

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In Part 1 of this article, I described how a modern, mapping GPS device can make navigating while on your bike pretty easy and make getting lost pretty hard. But, as I mentioned, these advantages come with a price. You do have to do some homework before leaving on your trip to set up the GPS device so that it contains the proper maps, and so that it knows where you want to go when you get on your bike. Basically, you do your navigating at home sitting in front of your computer while sipping a Mocha rather than on your bike -- in the rain. The GPS permits you to trade leisure time at home for precious vacation time, allowing you to minimize time spent navigating when on the bike and to maximize the time you have to enjoy the scenery and the interesting sights you spent all your money to get to.

In this, Part 2, I will describe how I set up my GPS before a bike trip. Then, in Part 3, I'll cover some of the things to consider when buying a GPS device, and I'll describe some important issues to consider when mounting a GPS device to your bike handlebars.

**Review of “Waypoints” and “Routes”**

Before getting into the details of setting up a GPS device, it is important that we are all “speaking the same language”, so I'm going to review some of the jargon I introduced in Part 1. In particular, it's important that you understand what I mean by the words “waypoint” and “route” because they form the basis for all that follows.

Waypoints, as the name implies, are just points along the way to your destination. So, for example, the intersection of First and Main streets in Smalltown USA could be a waypoint. For the GPS, a waypoint is defined by a latitude, longitude, and a name which you assign to it. You define the waypoints to be used on your trip. Generally, you would select every...
point where you have to make a navigational decision along the way. So, continuing the example, if you intend to cycle down “First Street” and turn left onto “Main Street”, then the intersection of First and Main becomes an important waypoint for your trip. You define a waypoint like this by clicking on that location on a map displayed on your computer screen using mapping software you purchase from the same vendor that makes your GPS device.

Mathematically speaking, a "route" is just an ordered list of waypoints. The trip sheets that BAC ride leaders typically hand out describe suggested routes for each day’s ride. These trip sheets contain an ordered list of instructions: “Leave the hotel going North on Route 2”, “Turn Left onto Route 3”, “Stop at Krispy Kreme for breakfast”, etc. This example trip sheet defines three waypoints: a) the location of the hotel, b) the intersection of Routes 2 and 3, and c) the location of Krispy Kreme. So, if we defined these three waypoints with the names W01, W02, and W03, for example, then this portion of the Route would consist of these waypoints in the order W01, W02, W03.

So, defining a route consists of two parts. First, you have to select waypoints by clicking on map locations and giving the resulting waypoints names. Second, you have to group the waypoints in an ordered list that describes the route you want to take on each day’s ride.

Here’s a very important point: The "route" that YOU define is just a list of waypoints. It does not contain any information describing how to get from waypoint to waypoint. For example, if I defined a route containing two waypoints: Los Angeles and Chicago, I should not be surprised to find that there are many different paths that travel between those two waypoints. The GPS gets to choose the actual path that connects the waypoints you define. Let me say that again because it’s probably the most important point in this whole article: YOU define the route (i.e. the list of waypoints) that you want to follow, but the GPS chooses the actual path connecting those waypoints. As you will see, selecting waypoints is primarily a process of defining points that will “force” the GPS to choose the same path that you want to follow.

You may have noticed that there is some ambiguity between the terms “Route” and “Path”. Unfortunately, GPS vendors use the word “Route” to mean both things, so I am forced to do pretty much the same. However, you should keep in mind that “Routes” and "Paths" are actually two different things. Once again, a “Route” is an ordered list of waypoints that YOU define. A “Path” is the foot-by-foot track that you will follow to get from Waypoint to Waypoint and the GPS chooses that path.

Different GPS devices have different capabilities in choosing paths that connect the waypoints you select. Early GPS devices could only choose “straight-line” paths connecting waypoints. These were useful if you were flying an airplane, or if you were the proverbial flying crow, but they are not particularly useful for navigating on a bike. Many GPS devices that are currently available still have only straight-line path finding capabilities, so I will cover this type of device in some detail. More modern devices have “follow-the-roads” path finding capabilities where the path chosen by the GPS actually follows roads from waypoint to waypoint. Different GPS vendors use different terms to distinguish between these two types of path finding capabilities. Garmin uses “Direct Routing” instead of the "Route" term used by many other vendors.
of "Straight-Line-Routing" and "Auto-Routing" instead of "Follow-the-Roads Routing". I like "Straight-Line" and "Follow-the-Roads" because there’s little ambiguity in what they mean. Here’s a summary of these two different types of path finding capabilities:

**“Straight Line” vs “Follow the Roads” Routing**

Second generation GPS units do “straight-line” routing. As the name implies, these units draw a straight line between waypoints as illustrated in the figure at the left. This figure shows a simple route consisting of only 3 waypoints named, creatively, 01, 02, and 03. Imagine for a moment that you were starting out on your bike from waypoint 01 and trying to find your way to waypoint 02. Notice that the straight routing line indicates the general direction to waypoint 02, but it doesn’t give you any specific information as to which roads to follow in order to get there. So, with this type of routing, you still need a paper trip sheet with instructions describing what to do to get from 01 to 03. Of course, with this simple example, the correct route is pretty obvious, but on a real BAC trip, that’s rarely the case.

More modern GPS devices can do “follow-the-roads” routing. With “follow-the-roads” routing, illustrated below at the left, the exact path between waypoints is displayed on the GPS unit so you will know at every instant whether you are on the right road or not. This figure shows the same waypoints 01 to 03, but now they are connected with a “follow-the-roads” path line. Now there is no doubt about which roads to take!

So, here’s the first important difference between different GPS units that you will want to consider when buying one. Be sure that you understand whether the unit you are considering does “Direct” or “Follow-the-Roads” routing. I should note at this point that you actually need to buy two components that will make up your GPS “system”: the GPS device itself and the GPS mapping software that will run on your PC and enable you to set up the waypoints and routes that you will download to the GPS device. It is important that both device and software have the capability to do follow-the-roads routing if that’s what you want. For example, the Garmin “MetroGuide” software can do follow-the-roads routing and can download maps, waypoints, and routes to the Garmin Legend GPS device. BUT, the Garmin Legend CANNOT do follow-the-roads routing, so even if you have set up a path following the roads you want to travel using the MetroGuide software, all you will see on the GPS device will be straight line routes. First, choose a device that either can or cannot do follow-the-roads routing depending upon how much you want to spend, and then choose the software that has similar capabilities.

**A Word About GPS Vendors**

Handheld GPS receivers and the associated mapping software are available from at least three vendors: Garmin, Magellan, and Lowrance. I use Garmin products and so all of the discussion and illustrations for this article are based on those Garmin products. However, don’t assume that I’m recommending Garmin over some other brand. I simply don’t know much about the competing brands which may actually be superior to Garmin. You should consider all of the GPS units that are available in
order to choose the one most suitable for your purposes. I'm assuming that similar products from different vendors will have similar capabilities so that what I describe will be applicable to other products.

Creating a “Follow-the-Roads” Route

I'm going to start by describing how to lay out a route for a GPS that can do “follow-the-roads” routing. This is more complicated than laying out a “straight-line” route as you will see. I'll describe straight-line routing later.

The reason that straight-line routing is simpler is ... well, simple. There is one and only one straight line path that connects a set of waypoints. That path consist of a straight line connecting the first waypoint to the second, another straight line connecting the second waypoint to the third, and so forth. BUT, there can be a very large number of follow-the-roads paths that connect the same set of waypoints. In my previous example with only Los Angeles and Chicago as waypoints, there are probably thousands of possible paths that connect those waypoints. The goal in setting waypoints for your follow-the-roads route is to find a set that can be connected by only a single path, the path that YOU want to follow.

The figures at the left illustrates this issue. The upper figure is the same example I have been using with the three waypoints 01,02, and 03. I have set up a Route consisting of those three waypoints and the PC software has chosen the path in purple - the shortest path connecting the three waypoints. But, suppose that I didn't want to take the shortest path. Maybe I knew that there was a big hill on Eagleridge Way that I wanted to avoid by taking the longer way round. The lower figure shows that I was able to “force” the software to choose “my” path, shown in purple, by inserting another waypoint, 04, into the route.

Setting up Preferences

As I mentioned, you get to select waypoints, but the GPS software gets to choose the path connecting those waypoints. The software follows a set of rules, called “preferences”, when it computes the path connecting your waypoints. So, the first thing you need to do is to set up those preferences. The figure on the next page shows the Routing preference panel for Garmin’s “City Select” mapping software. As you can see, you can set up preferences for several aspects of the program’s operation, but we're only interested here in the Routing preferences. In the box labeled “Route Style” you select between Straight-Line (“Direct”) or Follow-the-Roads (“Auto”) routing. In the box labeled “Calculation Style” you can choose between “Faster Time” or “Shorter Distance” routing. I select “Shorter Distance”. If you choose “Faster Time” the software will try to get you onto a freeway as soon as possible - probably not what you had in mind. For “Vehicle” choose “Bicycle”. I should mention at this point that this software was designed for an automobile navigation system and it's only partially successful if you are using some other form of transportation. For example, in the box labeled “Driving Speeds”, you cannot select a speed less than 29 mph on a major highway, so the software expects you to pedal really fast! Because of this, the software's estimate of how long it will take you to get to your destination...
is meaningless for travel on a bike. An important box is labeled “Try to Avoid”. I try to avoid all of the available options when on my bike so I check all of them. So, with these preferences selected, the mapping software will try to find a path following paved roads between each pair of waypoints that satisfies your desires: Shortest Distance while avoiding highways, toll roads, etc.

But, you're not finished with preferences quite yet! Here is another very important point: Your GPS device has a set of preferences of its own, just like those in the software that runs on your PC. You must set them up to match those in the PC software. The reason for this is a source of repeated frustration for me and it probably will be for you as well. Here's why:

It turns out that when the PC mapping software transfers “waypoints” and “routes” to your handheld device, it doesn’t actually transfer the path that it has calculated. It just transfers the ordered list of waypoints. The handheld GPS device recalculates the path for itself! If the device has a different set of preferences, it will likely come up with a different path, even though it is using the same waypoints. This is the primary reason that it’s very important to select waypoints carefully.

The two lower figures at the left show the preference panels for the Garmin GPSMap60c handheld device. You can see that I have selected “Follow Road” and “Shorter Distance” to match those preferences in the PC software shown above. The other preferences, shown in the figure at the lower right, are reached by selecting “Follow Road Options...” at the bottom of the left hand figure. Again, I have chosen these
options to best match those in the PC software.

The item labeled "Off Route Recalculation" in the figure at the left deserves some comment. The purpose of this option is to try and rescue you if you stray too far from the prescribed path. If it worked, it would calculate a new path from wherever you happen to be to get you back on your desired path. Sounds good doesn't it? It would be if it worked. I have had nothing but trouble if this option is turned on. The device comes up with completely insane directions like "Make a U-Turn, Go Back 35 miles, Make Another U-Turn and Return to this Point". I'm sure that Garmin will eventually fix this portion of their software, but until then I recommend that you turn this option "On" at your peril.

This brings up another important recommendation: Never Trust Your GPS! I know that this must sound strange after I have told you how wonderful navigating by GPS is, but the fact is that this is Windows software and as with all Windows software, it ALMOST works. Because the GPS device recalculates the path each time it is turned on, it may come up with a path different from the one you were expecting. This is particularly true if you have changed any Preferences. For example, suppose that you want to use the GPS to navigate in your car to the start of a ride. Since you're driving a car, you probably don't want to follow a path that avoids highways, so you change Preferences and let the device calculate a path to the start of the bike ride. All goes well and you arrive successfully and unload your bikes. Now you ask the GPS to navigate the bike ride forgetting to reset the Preferences (I have done this dozens of times). The GPS happily computes a path that takes you immediately onto the nearest Freeway! This is an example of "cockpit error" where the software operated properly, but the user made a mistake. I have also seen examples where the path computed by the handheld software was not the same as that computed by the PC software. Always carry paper maps and check on any suspicious recommendations given by the GPS.

The best way to avoid problems with GPS path computations is to use plenty of Waypoints so that the GPS is constrained to follow the path that you want it to. Which brings us to the next topic:

Setting up Waypoints

After you have set up the software Preferences, the next step is to set up waypoints that define the path you want to take for each day's ride. You do this using your PC and the mapping software that you purchased from your GPS vendor. The figure at the left shows the toolbar from the Garmin "City Select" software. The Waypoint tool is the one that looks like a green flag. You define a waypoint by using this tool to click on a particular location on the displayed map and giving the resulting waypoint a name. For example, I have defined a single waypoint named "Hotel" on the map at the left.

Suppose that "Hotel" is where you stayed last night. Now you are trying to define the path for today's ride. Where should you put the first waypoint? It's tempting to use "Hotel" as the first waypoint. After all, isn't that where today's ride starts? It is, but there is a small problem with setting the first waypoint too close to where you actually will begin
riding. The GPS is very precise and the waypoint “Hotel” defines an exact location. Suppose that “Hotel” marks the location of the center of the hotel building. But you will start riding from the center of the hotel parking lot. So, you will start riding AWAY from “Hotel”, not towards it. The GPS expects you to ride TOWARD the first waypoint. It will insist that you turn around and go back to “Hotel” in order to start the ride properly. If you persist, the GPS will eventually “give up” and recognize that you are on your way to the second waypoint on the Route, but it’s best to avoid this problem by setting the first waypoint for every ride a short distance into the ride.

The figure at the upper left shows that I have placed the first waypoint, named “01-01”, slightly after the first left turn onto Eagleridge Way. Why didn’t I put the waypoint exactly at the intersection? There are two reasons, one involving follow-the-roads routing and one involving straight-line routing. With follow-the-roads routing, the GPS will give you turn-by-turn instructions. So, as I approach that first left turn on my bike, the GPS will tell me “Turn Left onto Eagleridge Way”. It will do this unless I have put a waypoint at that intersection. Then it will tell me “Arriving at 01-01” instead. That’s not nearly as informative as “Turn Left onto ...” so I always try to avoid placing waypoints exactly at intersections. I place them a short distance beyond the intersection instead. With straight-line routing, it’s also better to put your waypoints slightly beyond the intersection because in that way you can see which direction to turn when you get there. GPS devices that do straight-line routing do not give turn by turn directions, so if you placed the waypoint exactly at the intersection, you would have no indication of what to do when you got there.

Notice that I have named my first waypoint “01-01” indicating that this is the first waypoint on the first day’s ride. It’s a good idea to keep waypoint names as short as possible because they are displayed on the GPS device and they obscure some of the map. Another reason for using this naming scheme is that after defining all of your waypoints, you will have to assemble them into Route lists for each day’s ride. By naming the waypoints with numbers, it will be easy to pick out which waypoints make up the ride for Day 01, Day 02, and so forth.

OK, we’re ready to place our second waypoint. My intention is to cycle clockwise around the outer loop, avoiding that big hill on Eagleridge Way and exit onto North Shore Dr heading north. So, I try putting my next waypoint, “01-02”, on North Shore Dr as shown in the middle figure. The resulting path is shown in the bottom figure. The software has (correctly) chosen the shortest path between 01-01 and 01-02, not the path that I had intended. When placing waypoints, you always have to look to see if there is more than one way to travel between the waypoints that you are placing. If there is, then you better put in more waypoints so that there is only one possible way to “connect the dots” with a “shortest” path.

So, I need to insert more waypoints to better define where I want to go. I’ll try putting a new waypoint just after that right turn onto Eagleridge Dr at the lower right of the map as shown at the left. That should do it!

Unfortunately, the GPS software has a mind of its own. The path that results from these three waypoints is shown in the middle figure on the next page. The software has decided that it’s shorter to travel counter-
clockwise from 01-01 to 01-02 and then double back to 01-03 than it is to follow the clockwise path I had wanted. I hope you’re beginning to understand why I say that you have to “force” the GPS to compute the path that you intend it to.

I finally achieve success, as illustrated in the bottom figure, by inserting one more waypoint, “01-02”, on the outer loop. This waypoint has no navigational significance. It is there only to force the software to choose the “right” path.

This little exercise has illustrated most of the problems that I have encountered when trying to outsmart the GPS and get it to choose the path I want. The solution is to insert more waypoints. But there’s a limit to how many waypoints you can use in a route. For the Garmin software, you cannot have more than 50 waypoints in any route, and no more than 1,000 in total.

Once you have defined all of your waypoints, your next step is:

**Assembling Waypoints into Routes**

AFTER YOU HAVE DEFINED ALL OF YOUR WAYPOINTS, YOU HAVE TO GROUP THEM INTO LISTS THAT DESCRIBE EACH DAY’S RIDE. WITH THE GARMIN SOFTWARE, YOU DO THIS BY "EDITING" A "NEW ROUTE". SELECTING "NEW ROUTE" FROM THE "EDIT" MENU WILL BRING UP A DIALOG AS ILLUSTRATED BELOW:
This dialog allows you to “Insert” waypoints into your new Route. When you click on “Insert”, that brings up the smaller dialog that displays a list of all of the waypoints you have defined, hundreds of them. You scroll down this list until you find the next waypoint that you want to insert into your route, click on it, and then click “OK”. Repeat until you have inserted all of the waypoints for Day 01 of your trip. Now you can see why it’s advantageous to name waypoints with a number indicating which day that waypoint belongs to. That way, all of the waypoints for Day 03, for example, start with “03-“ and will be grouped together in the waypoint list.

This is a purely mechanical task and it’s a shame that Garmin has made it so difficult. You can only insert one waypoint at a time and you have to go through two different dialogs to do that. Perhaps, when Garmin gets around to finishing their software, they will allow us to insert a whole block of waypoints at one time so that the whole route can be defined in one step rather than taking dozens of clicks. But, as I said, this is Windows software.

You probably also want to give your new route a better name than that suggested by the software. Uncheck the box “Autoname” and give your route a new name - “Day01” would be appropriate for this route.

Repeat these steps for each day of your trip and you are good to go! Now all that’s left is to download your Maps, Waypoints, and Routes to your GPS device. Then, on the first day of your ride, you just tell the GPS to “Navigate Day01” and it will compute the path that it wants you to take. Keep your fingers crossed that it’s the same route you want to take! If you have selected your waypoints wisely, it will be.

There is one more thing that you might like to do before leaving on your trip. If you select one of the Routes you have created so that you are viewing the “Route Properties” as illustrated in the lower figure, and you select “Directions”, you will get a complete turn-by-turn list for that route complete with mileages. You can (should) print this out and take it along with you. It makes a great “trip sheet” and the mileages are accurate! If your GPS fails, or gets stolen, you will have this trip sheet and your paper maps to act as a backup.

The two figures at the top of the next page illustrate the “Directions” for the simple route I have been using as an example. Notice that there are turn directions for every turn, whether or not you have put a waypoint there. Also notice an annoying “feature” of the directions: The software assumes that when you arrive at a Waypoint, you are going to want to stop, get off, walk around for a while, and then get back on your bike, so that you will need directions as to what to do when you get back on. So, following each waypoint in the list there is a direction to “Get on <insert the name of the road you were already on> and Drive in Some Direction”. If you simply ignore these superfluous directions, you will get along quite nicely. I have lined out these unnecessary directions in the figure so that you can see what a nice trip sheet this makes without them (Trip Leaders take note!).

That pretty much takes care of setting up a Follow-the-Roads route. Next I’ll discuss the simpler task of setting up a Straight-Line route:
Creating a “Straight-Line” Route

Well, after the previous discussion of Follow-the-Roads routing, Straight-Line routing is going to seem pretty simple. You still have to do all of the steps outlined for Follow-the-Roads routing: setting up preferences for both PC software and the GPS device, defining all of your waypoints, and assembling those waypoints into routes. And, there is one additional task that you must do for a straight-line route. Since the routing line you see on your GPS is just a straight line between waypoints, it doesn’t give you a clue as to which roads to take to get to the next waypoint. Neither does the software provide a nice list of “directions” that you can print out. You have to write down those directions yourself! In some cases, you can use the “Trip Sheet” that the BAC ride director hands out as those directions, but I always do my own. I’ll explain why a little later. First, I’ll discuss why setting up waypoints for a straight-line route is much easier than for a follow-the-roads route.

Since straight-line routing doesn’t actually compute a path for you to follow, there is no need to place waypoints in an attempt to force the software to choose the same path you want to follow. You can put waypoints anywhere you like! There is no need to worry that the GPS software will compute a different path than the PC software. Neither software computes a path! You are entirely free to place waypoints anywhere. Of course there is a penalty to pay for this freedom. The GPS won’t warn you about upcoming turns nor will it give you turn-by-turn directions while you’re on your bike. In this mode, the GPS doesn’t know where the turns are.

Even though you can place waypoints anywhere, there are some choices that make more sense than others. As a minimum, you should put a waypoint just after every significant navigational decision. The figure at the left illustrates this for our favorite example. Notice that I have placed a waypoint just after each turn onto a new road. I put these waypoints about 100 feet past the turn. Just far enough so that it’s obvious which road I want to turn onto. So, for example, when I cycle...
up to waypoint 03, I will see it on the GPS display just to the left of the road I'm currently on. That's a pretty good clue that I'm supposed to turn left at that intersection.

In congested areas, like towns with a lot of roads close together, you may not be able to put a waypoint after every turn. If you get too many waypoints too close together, they will obscure too much of the map and you may not be able to see the roads. In this case, it would be a good idea to place waypoints close enough together so that you can always see the "next" waypoint on the GPS display. Since you will be able to see where you're going (to the "next" waypoint), and you will also be able to see the streets on the display, you can navigate to that "next" waypoint with some confidence. Once you get there, the next "next" waypoint should be visible, and so on. This is illustrated at the left.

On the open road, there may be many miles between waypoints. You may not be able to see the straight line connecting the last and the next waypoints. That line may be so far away that it's off the small GPS display. Still, you can cycle along with some confidence that when you get to the next waypoint, it will indicate to you which direction to turn.

Unless, of course, you have been distracted momentarily by the beautiful scenery and have cycled right past that waypoint without noticing it. This is why follow-the-roads routing is to be preferred, even though it is more work to set up. You can always see the purple path that you are supposed to be following. If you do miss a turn, you will soon recognize that fact because when you look at the display, you will see that you are not on the purple road any more. Straight-Line routing places more of a burden on you while you are cycling to be alert and aware of where you are at all times.

Because the GPS doesn't provide any path finding directions when in straight-line routing mode, I find that having a trip sheet is a great help when navigating a straight-line route.

Creating a Trip Sheet

This is how I set up my waypoints and create a trip sheet at the same time. As I look at the PC map display at home, I figure out each point where I will have to make a navigational decision when I'm on the bike. I place a waypoint just past each of those locations as previously described. I give the new waypoint a name, like "05-15", for the 15th waypoint on the 5th day of riding. At the same time, I write down on a piece of paper that waypoint name and a description of what I'm supposed to do when I get there. "05-15 : Turn Left onto Hwy 395" for example. This provides me with "real" directions, not just the hints furnished by waypoint placement. Having the names or numbers for the roads I'm supposed to be turning onto allows me to correlate my position with any road signs that I see. It also helps me locate where I am on a paper map. And, in a pinch, I could navigate without the GPS.

Now comes the hard part. In order to create a "real" trip sheet, I also need to know at what mileage each waypoint will occur. There are several ways to get mileage numbers. If the trip leader has provided good trip sheets, they will contain mileage estimates for the major locations on the route. Even if your GPS cannot do follow-the-roads routing, the PC software may be able to. In that case, just switch to “follow-the-roads”
With Straight-Line Routes, the “Directions” Contain “As the Crow Flies” Distances Between Waypoints

<table>
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<tr>
<td>1. 01</td>
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<td>2. 02</td>
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<td>3. 03</td>
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<td>4. 04</td>
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<td>6. 06</td>
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Routing and print out the route “directions” as previously described. They will contain accurate mileages. If your PC software cannot do follow-the-roads routing, you can still print out the “directions” for your straight-line route. These will contain the straight line mileages between waypoints which will be better than nothing.

If your GPS software can’t do follow-the-roads routing either, there are several relatively inexpensive mapping products that can. I’m particularly fond of “DeLorme Street Atlas”. Unfortunately, this only works for the USA. If all else fails, you can always measure a paper map. The reason that it’s nice to have mileages on your trip sheet is so that you can keep track of where you are. If the trip sheet says that you were supposed to make a turn at mileage 25.4, and you’re at mileage 30 and haven’t found the turn yet, you may be lost!

Here’s an example of one trip sheet I made for a recent BAC tour in Tuscany. I used Microsoft Excel.

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</tr>
<tr>
<td>5</td>
<td>3.11</td>
</tr>
<tr>
<td>6</td>
<td>3.97</td>
</tr>
<tr>
<td>7</td>
<td>4.29</td>
</tr>
<tr>
<td>8</td>
<td>1.06</td>
</tr>
</tbody>
</table>

That’s about all there is to straight-line routing. A little more pre-trip work writing out a paper trip sheet, and a little more work on the bike to prevent getting lost.

If you’re discouraged with all of the pre-trip work it takes to set up your GPS, you may be happy to hear that there’s an easier way! If I had described the easier way first, you may not have read all about the harder ways. It’s important to know about the harder way first, so that you will understand what you give up by using one of the easier ways.

An Easier Way to Set Up Routes

There are actually two easier ways to set up routes for your bike trip. The first is to use the "Route Tool". With the Garmin software, that’s the tool that looks like a series of dots connected with straight lines. With this tool, you simply click on points that define the path you want to follow. You don’t have to name these "waypoints". In fact, you cannot name them. The software assigns names automatically (and seemingly at random) and you cannot change these names. You don’t have to worry about exact "waypoint" placement because each time you click on a location, the software immediately calculates the path that results
from that placement. If that calculated path is the one you intended, then just move on and click at the next location along your path. If the calculated path isn’t the one you wanted, just delete the last point you clicked on and click on another that better defines your intended path. The figure at the left shows our example route created in this way. It took only a few seconds to do it this way.

There are two reasons this method is so fast. The first is that you see immediately whether your choice of “waypoint” placement results in the correct path. The second is that you do not have to go through the laborious process of “inserting” waypoints into your route list. The route list is created automatically as you go.

Another significant advantage of this method is that the “waypoint” names are not shown on the GPS display so they don’t obscure part of the map. This is shown in the figure at the left where the points that I clicked on are indicated simply by the small black dots along the path.

So, why wouldn’t you want to use this method? So far it sounds pretty simple. It is simple and the reason for not using it is not a strong one. Here’s why I have not used it so far: The points that you click on using this method are not true waypoints. They don’t appear in the list of waypoints on your GPS. You cannot “Find” one of these “waypoints” and so you cannot “GoTo” one of them either. Suppose that you are cycling along a nice country road somewhere when you suddenly get a “snack attack”. You use your GPS to find the nearest McDonalds and to navigate off your path to get to it. After two or three Big Macs, you get back on your bike and wish to return to your original path. There is no way you can ask the GPS to navigate back to that path because there are no waypoints along that path. If you had used the “hard” way and clicked on real waypoints and given them names and inserted them into a route list, you could ask the GPS to “Find” waypoints. It would then give you a list of waypoints with the nearest one listed first. You could then click on “GoTo” and the GPS would lead you back to the nearest waypoint and you would be back on your intended path. You give up this capability by using the Route Tool.

Another thing you give up is an easy correlation between the GPS display and your trip sheet. If you had used “real” waypoints, you would see the names of those waypoints on the GPS. Looking at your GPS, you might note that you just passed waypoint “15”. A quick glance at your paper trip sheet shows that waypoint “15” occurs just before the village of Greve where you intend to stop. You always know roughly where you are.

If the simplicity of the “Route Tool” appeals to you, I suggest that you try using it for a few local rides before you commit to using it on a real BAC trip. That way you will be familiar with setting up a route this way and will (hopefully) discovered any “features” of this method you were not expecting.

The Easiest Way to Set Up Routes

There is an even easier way to set up a route. This method gives you no control over which path you will follow, the GPS decides. Because of this, it is most suited for travel by automobile rather than by bike. I use this method when driving to the hotel at the start of the trip.
Here's all you have to do: Set up a waypoint at each place you will want to navigate to. For example, one at each hotel, the airport, train station, rental car agency, basically anywhere you will want to “Find” while on your trip. Then, when you want to go to one of these waypoints, all you have to do is tell the GPS to “GoTo” that waypoint. It will calculate a path from where you are at that moment to the waypoint. Once again, you will have no control over the path chosen.

Well, that's not entirely true. You do have some control by changing the route finding Preferences. The Preferences you have set up for your bike ride are probably not appropriate for travel by car. In the car, you probably don't want to avoid highways for instance. If you do change Preferences, be sure to reset them before you get on the bike, else you may find yourself unexpectedly getting onto a freeway on your bike.

Well, that's about all there is to setting up your GPS before you leave on your trip. It sounds like a lot of work, but remember, you will have to navigate your way in any case. Your choice is whether to do the hard part before you leave, in the comfort of your home, or wait until you are on your bike -- and lost -- in the rain.

In Part 3 of this series, I will discuss some of the factors to consider when buying a GPS and methods for mounting the GPS to your handlebars.