



GPSMAP 60

– GPSmap 60 Basics –

(last updated February 2006)

This fact sheet is designed to acquaint you with your GPS receiver so that you will become familiar with how to use it in every day natural resource management applications. It is *not* meant to give you all of the answers to all possible scenarios and instances when a GPS receiver can come in handy. For more detailed descriptions of the capabilities of the Garmin GPSmap 60 refer to the owner's manual included in the packaging with the receiver (a digital version is available from Garmin at <http://www.garmin.com/products/gpsmap60/>.)

Which GPS receiver should you use? That entirely depends on your intended use (and thus, the level of accuracy you require), your budget, and your level of experience. You can make a better decision by reading online reviews, beginning (but not ending!) with independent information sites like <http://gpsinformation.net/>.

There are many excellent brands, models and suppliers of quality GPS receivers. Here, we focus on the Garmin GPSmap 60 because it has proven exceptional useful in introductory natural resource management and agriculture GPS training programs, primarily due to its versatility and ease of use. It has a relatively large, intuitive, and transfective display that works reasonably well in sunlight and functions as long as 28 hours with two AA batteries. It is a 12-channel WAAS enabled unit with built-in quad-helix antenna for improved satellite reception and 3 meter accuracy on good days. It has 24 MB of internal memory for storing map detail. It can be connected to a laptop or desktop computer, and it can function with a handheld computer running GIS software. It is a

practical option, particularly for outdoor enthusiasts on a budget pursuing natural resource management applications.

Some fundamental considerations:

- Can I accidentally break it? *Very unlikely!* The only way to truly learn a new piece of technology is play – and when you figure something out you like, practice.
- This GPS receiver is rugged, but it has its own computer and should be treated as such.
- The GPS unit is waterproof, but that does not mean it will float. Do not submerge it for long periods of time.
- Never try to operate a vehicle and look at a GPS unit at the same time.
- *Always* carry extra batteries. You never know when the GPS unit will lose power.
- Your GPS unit comes with a detachable cable, which allows you to attach it to your computer so you can download coordinates and other pertinent information.
- If you want to connect to a handheld computer, you will need an additional, specialized cable (see the “Geospatial Tool Kit” fact sheet).
- Will I get stuck? Will my instructor get stuck? *Absolutely yes!* And it is a good thing, too. This technology is useful, but it is not “off the shelf” yet. Getting stuck is part of the package, and getting unstuck is part of the experience and it is **CENTRAL** to moving from learning about this technology to being able to take advantage of this technology.



Getting to Know Your Garmin GPSmap 60



Key Functions

1. Power

Located at the top of the GPSmap 60 next to the antennae

- Press and hold to turn power on or off
- Press briefly while turned on to turn on backlight or adjust screen contrast

2. Rocker

Works similar to a computer mouse

- Scrolls through menus
- Moves cursor, or arrow, in desired direction
- Highlights different icons

3. Out key:

- On the Map page, use this to zoom out
- Scroll or page down a page in any other mode

4. Page:

- Cycles through the main pages
 - o Satellite Page
 - o Trip Computer Page
 - o Map Page (depicted on left)
 - o Compass Page
 - o Main Menu Page
 - o You can also “Add” additional pages e.g. Area Calculator Page

5. Menu:

- Press once to see options for a particular page
- Press twice to see main menu options

6. Enter:

Similar to “Enter” on a computer keyboard (For Garmin Legend users, acts similar to click stick, but separate button from Rocker)

- Highlights and selects certain options and commands
- Use to register inputs that you want to enter
- Confirm on-screen messages

7. Quit:

Similar to an Escape key on a computer (a.k.a. the Panic button!!)

- Allows you to cancel data entry
- Allows you back up (one step at a time)
- Is *not* an “undo” feature

8. Mark:

- Mark current location as a waypoint

9. Find:

- Press briefly at any time to view the Find Page
- From the Find Page, you can navigate to waypoints you have stored (they are organized by category, e.g., waypoints, exits)
- Press and hold for a “Man Overboard” function
- Exit a page

10. In:

Similar to the out button

- On the Map page, use this to zoom out
- Scroll or Page up a page in any other mode

Getting Started: Using Your GPSmap 60

This section is a quick primer on how to get started using the GPSmap 60 receiver. It also introduces some basic functions and capabilities. After familiarizing yourself with the design of the GPS unit and its basic functions, you should consult the owner's manual for a more in-depth and thorough discussion of the functions of your receiver.

Getting Started...

Turn on your GPS receiver by pushing the power button (located on top by the antennae). The **Satellite Page** should be the first screen the GPSmap 60 loads. If another page loads, simply press the **Page** button until the satellite page appears.

It normally takes a couple of minutes for the GPS receiver to *initialize*, or obtain the signals from the satellites to determine the location.

Initially, the status window reads: "Acquiring Satellites" as it captures signals from the GPS satellites accessible from your location.

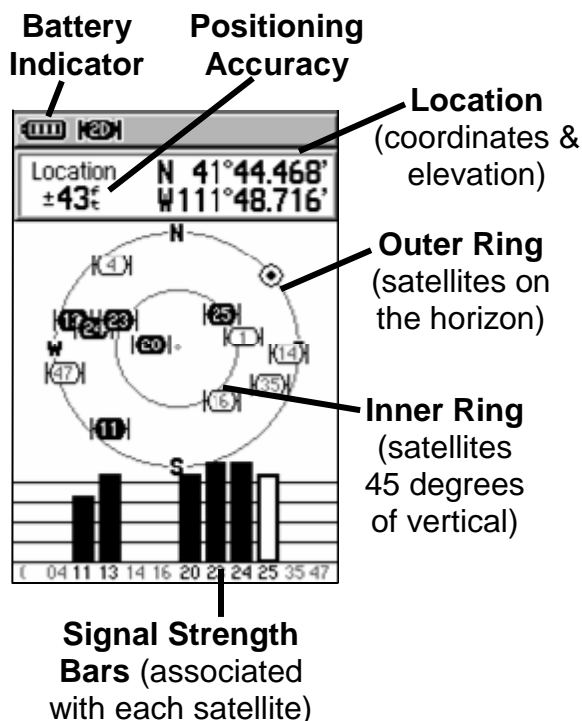
The cue that you are ready to navigate: the coordinates for your location and an estimate of accuracy will display on the top of the **Satellite Page**. (Remember, a minimum of 4 satellites are necessary – 3 to find position and one more to validate.) The GPS receiver cannot be used until it displays the location coordinates (and the symbols for satellites are no longer blinking).

Once the GPS unit is ready, a location should appear in the upper section of the satellite page, along with the elevation.

Your GPS unit has now warmed up and can now be used for a wide variety of location identification and tracking applications. For example, it can:

- mark (record) waypoints, e.g., on a trail or path
- identify and mark areas within a field or pasture or watershed for future reference
- estimate the area and/or perimeter of a field or enclosure or pasture or a patch of noxious weeds
- geolocate fence lines, gates, patches of noxious weeds, plot or transect or key area locations, etc.
- navigate back to points of interest that you have mapped in the past, or perhaps a point of interest (for which you have coordinates)
- follow a track that you have recorded in the past

Satellite Page



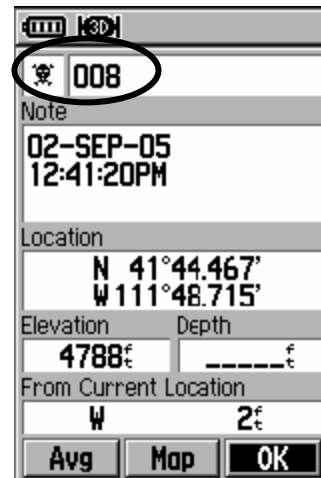
Application #1: Marking and saving waypoints

A *waypoint* is a virtual marker or a point of reference. Waypoints allow you to mark and record the coordinates for a location. Once a waypoint is recorded and saved, you can easily navigate back to it using the GPS. This can be useful to locate research plots or monitoring sites, key areas or areas of concern. It is also possible to upload waypoints to a desktop computer (after data collection) or to a handheld computer (during data collection, running in concert with the GPS receiver).

To mark and save your current location as a waypoint:

1. You can mark a waypoint from any page. However, you want to confirm you are getting a signal first. To ensure the GPS receiver is ready to navigate, go to the **Satellite Page**. It will display available satellites and current location if it has acquired adequate coverage to calculate your location.
2. Walk to where you want to obtain a waypoint (e.g., the location you wish to record).
3. Press down (briefly) the **Mark** button.
 - You have now *registered* the waypoint location. That is, if you walk away from that location, you will note that the coordinates do not change. **HOWEVER**, you have not *saved* the waypoint yet!
 - **If you are happy with the automatic label and symbol** provided by the Garmin, go to No. 6 to *save* the waypoint.
4. The GPS unit automatically assigns 3-digit ID number (an “auto-label”) sequentially to each waypoint your record. We recommend that you use this labeling system, accompanied with a datasheet or data logger where you can record other information about the location.

- However, you do have the option to customize the name of the waypoint. Press the **Rocker** (4-arrow button) to highlight the waypoint name field and press **Enter**.
- Type the new name of the waypoint, using the **Rocker** to select and enter characters from the on-screen keyboard. When finished, **Rocker** to “OK,” and press **Enter**.



Auto-label your waypoint



Manually label your waypoint

5. There is a standard marker symbol for waypoints (which we recommend under most circumstances).
 - However, you can change the marker symbol associated with the waypoint by selecting the marker field (with the **Rocker**) and scrolling through the different options, pressing enter to select the desired symbol.
6. Use the **Rocker** to scroll down to the **OK** button and press **Enter** to *save* the waypoint.

Application #2: Finding (or navigating to) a waypoint

Your GPS receiver can act as a compass and navigate you back to a previously defined waypoint.

To find the waypoint:

1. From any page, press the **Find** button on the left side of the GPS unit.
2. On the **Find Menu**, **Rocker** to Waypoints (or, for example, Cities, if you are navigating to a city stored in the unit's memory); press **Enter**.

*Note: If there are many waypoints, you can use the **Rocker** to select the beginning letter (or number) of the desired waypoint.*

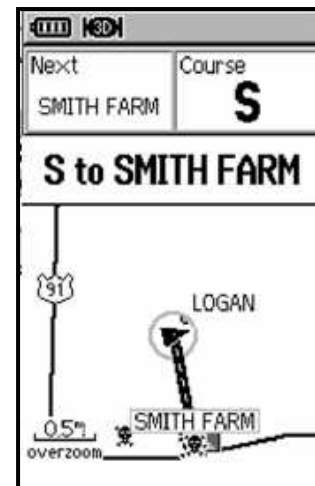
3. Use the **Rocker** to highlight the desired waypoint, and press the **Enter** button. This will bring up the waypoint information.
4. **Rocker** to the **GO TO** option to create a direct line of travel to the waypoint. Generally the GPS will default by showing you this on the **Map Page** (with some directional guidance).

Note: The direct line is only applicable when the "Off Road" option is applied. To do this: Main Menu: Ssetup: Routing: Guidance Method: Off-Road.. The other option, "Follow Road" will take you along the roads to get to your destination. This is convenient for when you're driving trying to get to a particular waypoint.

5. An alternative method is to press the **Page** button until you see the **Compass Page**. There you will see a **bearing arrow** pointing in the direction you need to travel to find the waypoint. On the top right you will see "**Dist To Next**" to help you determine how far you are from the waypoint as you move towards it.

Note: The "compass" function in this GPS unit is actually a calculation of bearing based on your

current and previous locations. Thus it only works if you are moving! Upon arrival, you may notice that you may your "Dist To Next fluctuates between 0, 1m, 2m, etc. This is a function of satellite reception (which changes slightly moment to moment).



6. To "Stop Navigation" when you arrive at the waypoint, press the **Menu** button and **Rocker** to Stop Navigation, and press the **Enter** button.

Application #3: Finding a waypoint that was defined by someone else

You might need to navigate to a waypoint that has been previously defined by someone else (i.e. a landowner, an extension agent, or other colleagues). This person may have used a different model of GPS unit and only provided you with the coordinates (or you can obtain the location off of a Geographic Information System, more commonly known as GIS, or other map).

Your GPS unit cannot guide you to a location if the coordinate pair (e.g. latitude, longitude) are not stored in memory on your GPS unit as a waypoint. There is a simple way around this problem: manually entering the coordinates of the waypoint into your GPS unit.

To enter the coordinates of a waypoint manually:

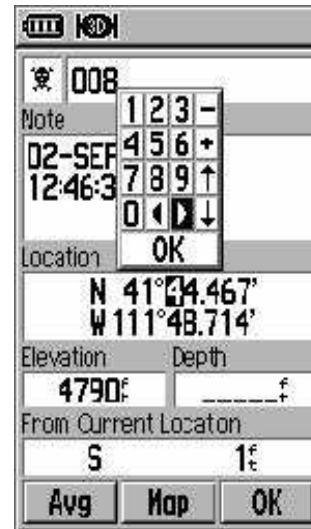
1. Press the **Mark** button to access the Mark waypoint screen.
2. Using the **Rocker**, highlight the **Location** field in the middle of the Mark Waypoint screen, and press the **Enter** button.

Note: So far things look just like they do when you want to mark a waypoint. However, what you are able to do is “edit” this waypoint with any set of coordinates you choose.

3. A **numerical keyboard window** should appear over the Mark Waypoint screen. Overwrite the coordinates you see with the new coordinates you want using the numerical keyboard.

Note: In the United States, the first (latitudinal) coordinate will always be an “N” as a prefix (as we live in the northern hemisphere). The second

(longitudinal) coordinate will always have a “W” as a prefix (we live in the western hemisphere.) If you are on the east coast of the United States and trying to find a waypoint through coordinates, then a zero goes right after the “W”.



Near the bottom of the numerical keyboard window, notice the characters < >. By pressing Enter when either of these are highlighted, you can move around the coordinates character by character, changing only those which need to be changed.

4. After you have changed each character in the coordinates, **Rocker** to **OK** in the numerical keyboard window to confirm your **Location** field edits (one character at a time).

*Note: You may wish to change the waypoint label as well. To do this, **Rocker** up to the existing label and press **Enter** for an alpha-numerical keyboard and edit the label as needed.*

5. When you are finished with the coordinates, **Rocker** to the bottom-right of the **Mark Waypoint** screen to highlight **OK**, and press **Enter** to save the new waypoint coordinates to the GPS unit memory.

*Note: If the coordinates you wish to enter are given in UTM instead of latitude and longitude, you can change the position format settings to allow for this. Press the **Menu** button twice to access the **Main Menu Page** and then **Rocker** to the **Setup icon**, then the **Units icon**, press **Enter** with **Position Format** highlighted, and then select **UTM UPS** option.*

4. Once the waypoint coordinates have been manually entered and saved, you can then use the **Go To** or **Find** function (see page 5) to navigate to that waypoint.

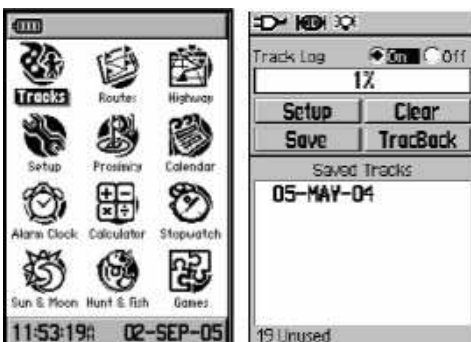
Application #4: Recording your movements and retracing your steps

Sometimes waypoints are simply not enough! While waypoints are excellent for those applications requiring the coordinates for specific points, sometimes a line feature (e.g. path, trail, fence line, etc.) is most appropriate.

The Garmin GPSmap 60 accommodates this need in several ways. Generally speaking, users tend to use the electronic trail created by the **Track** log for when you are on foot, and the ability to create a sequence of intermediate waypoints to record a **Route** when you are driving. Both of these features are available as icons on the **Main Menu Page** (which you can access either by pressing the **Page** button until it appears, or pressing the **Menu** button twice from any page. We will focus on the **Tracks** feature as it is more commonly used in natural resource management and agriculture applications.

How do I make a Track?

1. Press the **Menu** button twice to reach the **Main Menu Page** and then use the Rocker key to highlight the **Tracks** icon.



2. Press **Enter** to display the **Track Log** screen. To activate Tracks, use the **Rocker** to select the “**On**” button (and be sure to switch this to “**Off**” when you are not using Tracks). The **Track Log Meter**

shows the percentage of track log space used. (As a rule, when you begin, it is a good idea to **Clear** the current log (which will change the number to 0%).

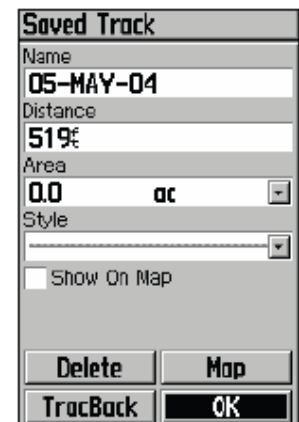
*Note: The **Setup** button allows you to tailor data collection. Because the track is made of a series of points that define your path of travel, they can be recorded in specified Time increments or Distances apart. After finishing Setup, press the **Quit** button to return to the Track Log screen.*

3. Once you have turned the **Tracks “On”** you will begin leaving an electronic trail (a series of dots often referred to as “bread crumbs”) on the **Map Page**.

4. To save the **Track Log**, return to the **Track Log** screen (see step 1). **Rocker** to the **Save** button and press **Enter**. You will be asked “Do You Want To Save the Entire Track?” – select “Yes” if you want the track representation to be everything collected since you turned Tracks “On”.

*Note: If you select “No”, you will get a screen with entire track depicted, allowing you to use the **Panning Arrow** (moved with the Rocker) to select the beginning and end of the portion of the track you actually want to save.*

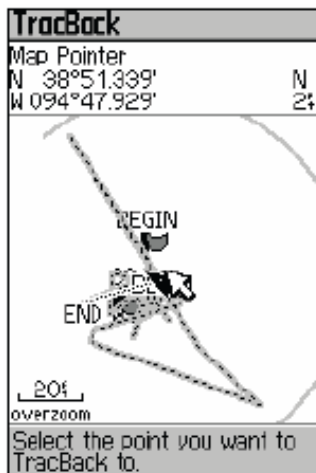
5. **Rocker** to the Save button to record the track. The **Saved Track** screen will appear. The default name for the track is today’s date (day-month-year), and if there are several in a given day, they will be number sequentially. You can change the units (distance and area). **Rocker** to the bottom left to highlight **OK** and press **Enter** to save the track.



6. To view a saved track, **Rocker** to highlight the **Map** button on the **Saved Track** screen and press **Enter** to display the **Map Page** with your selected track.

How do you retrace your steps?

1. From any page, press the **Menu** button twice to get the **Main Menu**, **Rocker** to the **Tracks** icon and press **Enter**.
2. On the **Tracks** screen, **Rocker** to the **Save Tracks** list and highlight the one you want and press **Enter**.
3. The **Saved Track** screen will appear. **Rocker** to the bottom left to highlight the **TracBack** button and press **Enter**.
4. The **TracBack** screen - a map with your entire track will appear. You need to use the **Rocker** key to move the **Panning Arrow** to the point on the map you want to “**TracBack**” to, and press **Enter** to start navigating back.



*Note: Unless you have already specified earlier, you may be promoted to choose between “**Follow Track**” (to retrace your original path) or “**Follow Road**” to route back using available roadways. Generally speaking in natural resource applications we are not in a vehicle, so we recommend you choose “**Follow Track**”. See the first “note” in Application 2 to change these settings if needed.*

5. From here, this will be much like the “Find” instructions in Application 2. You have the option of using the **Map Page** or the **Compass Page** to navigate back along your track. The **Map Page** is

allows you to visualize the “bread crumbs” and follow them.

6. An alternative method is to press the **Page** button until you see the **Compass Page**. There you will see a **bearing arrow** pointing in the direction you need to travel to find the waypoint. On the top right you will see “**Dist To Next**” to help you determine how far you are from the waypoint as you move towards it.

Note: The “compass” function in this GPS unit is actually a calculation of bearing based on your current and previous locations. Thus, it only works if you are moving! Upon arrival, you may notice that your “Dist To Next” fluctuates between 0, 1m, 2m, etc. This is a function of satellite reception (which changes slightly moment to moment).



7. To “Stop Navigation” when you arrive at the waypoint, press the **Menu** button and **Rocker** to Stop Navigation, and press the **Enter** button.

Application #5: Estimating area

Estimating area is a necessary task for many applications including agriculture, business planning, and natural resource management. The Garmin GPSmap 60 receiver has the capability to estimate area measurements, even of curved and irregularly shaped areas. The following procedure will not only generate area measurements, but will also provide perimeter measurements as well.

Note: this application uses some of the steps listed above in Application 4.

As you travel the perimeter of an area, the GPSmap 60 records track points and uses the resulting GPS track log to calculate the size of the enclosed tract. This method works well when you can reasonably transport the receiver directly along the boundary of the tract. On small and irregularly shaped tracts of land, you might want to increase the **track log interval**, which is the frequency at which track points are recorded. Otherwise, you will lose accuracy when the receiver occasionally “cuts corners” as you travel the boundary.

Increasing the track log frequency interval

1. To increase the **Track Log** interval, press **Menu** twice for reach the **Main Menu Page**. **Rocker** to the **Tracks** icon and press **Enter**. Highlight the **Setup** menu button and press **Enter**.
2. You have a few choices here. The default setting is **Record Method: Auto** (a combination of distance and time) and **Interval: Normal**. If you choose to keep the Auto setting, you can set the Interval to More often or Most often to increase the frequency of track points. Instead of Auto, you can choose to record by Distance or Time, each with its own Interval settings.

Estimating Area Measurement: The Track Log Method

1. First, we need to add a new Page to our options – the **Area Calculation Page**. To do this, press the **Menu** button twice to get the **Main Menu Page**. **Rocker** to the **Setup** icon (press **Enter**), then to the **Page Sequence** icon (press **Enter**). Now **Rocker** down the list to **<Add Page>** and press **Enter**. Select the Area Calculation, and it will appear on the list. If you press the **Page** button a few times now you will eventually see the **Area Calculation Page** is available.

2. Next, you should clear the current active track log just before you begin laying tracks. Go to: Main Menu > Tracks > Clear (If you wish to save the previous track, then save before clearing the log). See Application 4, Step 2 for details.

3. Check that the GPS receiver is ready to navigate by going to the **Satellite Page** and looking at the status window. When you have confirmed that the GPS receiver is ready to be used, push the **Page** button until you reach the **Area Calculation Page**.

5. **Start** is highlighted at the bottom of this page – press **Enter** and begin walking around the perimeter of whatever it is you require an area estimation. The screen displays your progress. Zoom in or out to view your tracks.

6. As you walk, notice that **Stop** is highlighted at the bottom of the screen now. Slightly before you return to your starting point, press **Enter** to stop making a track. The GPS receiver will automatically complete the loop (close the polygon) from your current position to your starting point. Both perimeter distance and enclosed area values will be displayed in appropriate units.

*Note: To change area units, highlight the unit abbreviation to bring up a selectable list of choices and press **Enter** when you have found what you want.*

7. If the calculated solution is of value to you, name and save the track (see Application 4, Step 4).
*Note: **BEFORE** you save this perimeter track and*

area estimation, you should record the data manually on a data sheet. Why? Once a track log is saved, the total number of track points is condensed by the GPS unit (to save memory) and thus less precision is displayed. Please be aware that you can keep all the detail if you link your GPS receiver to a handheld computer (PDA) running GIS software, which is discussed in the “Pocket PC Basics” and “Pocket PC HGIS Basics” fact sheets.

8. Don't worry if, when you're walking, trees obstruct satellite reception for a short time. The GPS unit has an algorithm to “connect the dots” on the tracks and points obtained before and after you lost reception. However, to ensure you have registered that track you have followed and attempted to record, you should view it to be certain the map is complete and no changes need to be made. (To view saved tracks, go to Main Menu > Tracks)

*Note for Garmin Legend Users: In the Garmin Legend GPS receivers, one could estimate area and perimeter by a **Route** method, but the GPSmap 60 does this through **Tracks**.*

We hope this fact sheet has helped you achieve a better understanding and working knowledge of useful everyday applications that your GPS unit can do for you.

This factsheet is considered a draft (it is under review).

The original fact sheet was written by Rachel Smith, graduate student in sustainable agriculture, Utah State University. It has been adapted for use in Arizona by Dr. Barron Orr, Assistant Professor and Geospatial Extension Specialist at the University of Arizona.