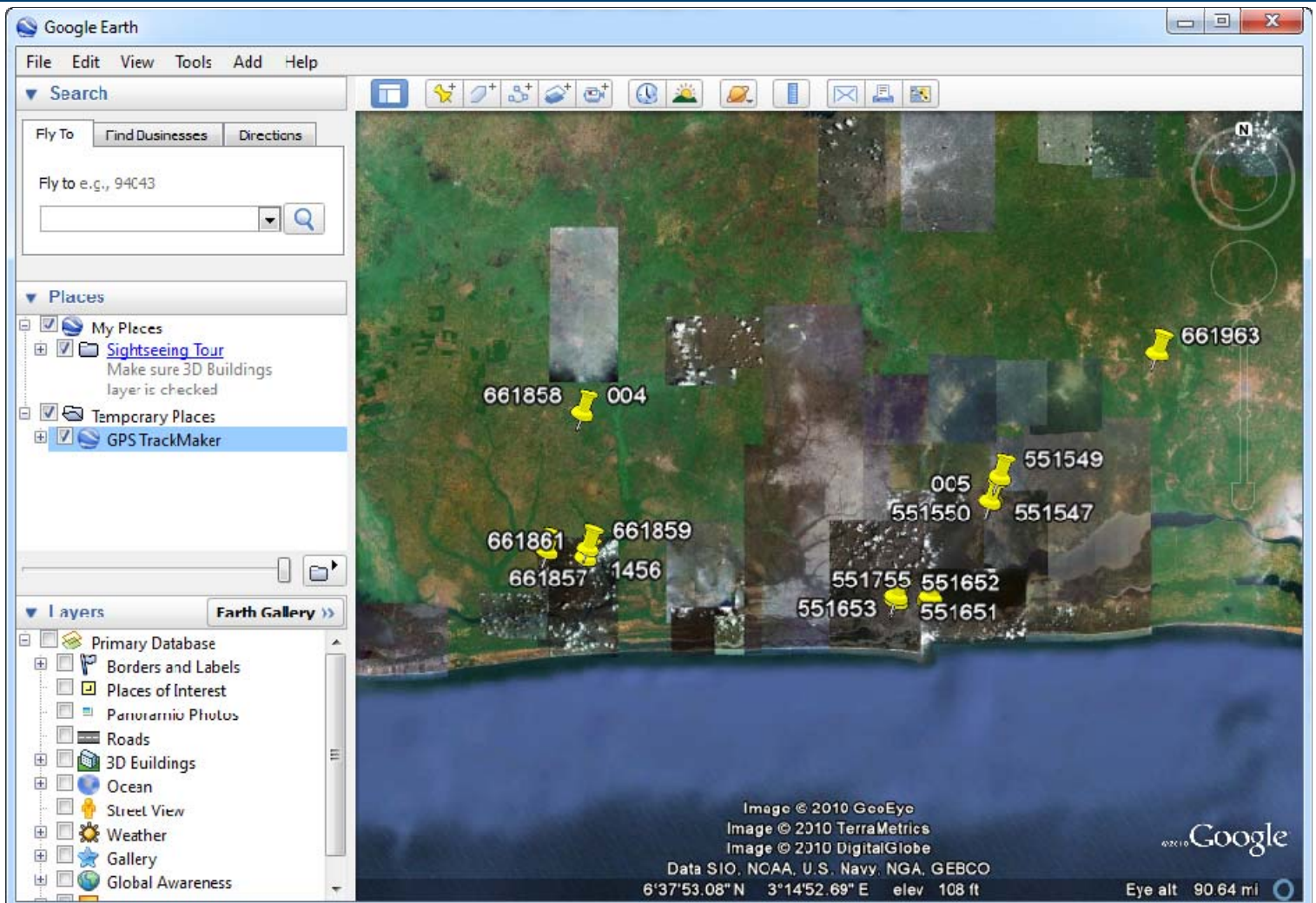




Global Positioning System Data Collection Guidelines



MARCH 2011

This publication was produced for review by the U.S. Agency for International Development. It was prepared by the USAID | DELIVER PROJECT, Task Order I.

Global Positioning System Data Collection Guidelines

USAID | DELIVER PROJECT, Task Order 1

The USAID | DELIVER PROJECT, Task Order 1, is funded by the U.S. Agency for International Development under contract no. GPO-I-01-06-00007-00, beginning September 29, 2006. Task Order 1 is implemented by John Snow, Inc., in collaboration with PATH; Crown Agents Consultancy, Inc.; Abt Associates; Fuel Logistics Group (Pty) Ltd.; UPS Supply Chain Solutions; The Manoff Group; and 3i Infotech. The project improves essential health commodity supply chains by strengthening logistics management information systems, streamlining distribution systems, identifying financial resources for procurement and supply chain operations, and enhancing forecasting and procurement planning. The project also encourages policymakers and donors to support logistics as a critical factor in the overall success of their health care mandates.

Recommended Citation

USAID | DELIVER PROJECT, Task Order 1. 2011. *Global Positioning System Data Collection Guidelines*. Arlington, Va.: USAID | DELIVER PROJECT, Task Order 1.

USAID | DELIVER PROJECT

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Introduction

Using Geographic Information Systems (GIS) information as part of a facility-based supply chain assessment helps identify logistics issues that may be specific to certain areas of a country. Overall, GIS adds value to information that is obtained with the Logistics Indicator Assessment Tool (LIAT) by increasing ways data can be used and by providing a simple method for visually demonstrating results.

GIS information is drawn from global positioning system (GPS) coordinates or waypoints, which are key data (e.g., latitude and longitude) for pinpointing a particular location. Coordinates are determined by using an electronic mapping device to capture information from GPS satellites.

This document provides basic instructions for recording health facilities' GPS coordinates using the *Garmin etrex Venture® HC*, a commercially available mapping device. A complete owner's manual, including descriptions of advanced operations and troubleshooting advice, can be downloaded from:

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



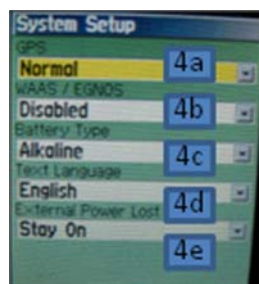
Setting Up the GPS Device for Data Collection

Before collecting waypoints for health facilities, it is important to ensure that data captured by the GPS device will fit the format that is recommended for use with the LIAT. To do this:

1. Choose  on the *Main Menu* screen.
2. Click on the *Enter/Rocker* button.



3. Choose  on the *Setup Menu* screen.
4. Using drop-down menus on the *System Setup* screen:
 - a. Set GPS to Normal.
 - b. Disable the WAAS/EGNOS option (which is used almost solely for aviation purposes in North America and Europe).
 - c. Confirm the type of battery you are using to run the device.
 - d. Confirm the language you prefer to use.
 - e. Set the External Power Lost option to Stay On.



5. Go back to the *Setup Menu* screen and choose .

6. On the *Units Setup* screen:

- a. Set the *Position Format* as *hddd.ddddd°* (decimal degrees).
- b. Set the *Map Datum* (i.e., the digital model of the earth on which the geographical coordinates will be based) to WGS 84.
- c. Set the *Distance/Speed* to *Statute* (miles) or *Metric*, depending on the unit of measurement used in the country being evaluated.
- d. Set *Elevation* to *Feet (ft/min)* if *Statute* was chosen for *Distance/Speed*. Set the *Elevation* to *Meters* if *Metric* was chosen for *Distance/Speed*.
- e. Set *Depth* to *Feet (ft/min)* if *Statute* was chosen for *Distance/Speed*. Set the *Depth* to *Meters* if *Metric* was chosen for *Distance/Speed*.



Deleting Old Waypoints

To avoid confusion, delete all waypoints stored in the GPS device before beginning a new assessment. Check with the previous users to ensure that they have documented their waypoints. Download the waypoints (see page 7 of this document) if you are unable to confirm they have been documented or if there is any doubt about the completeness or accuracy of the records that were retained.

To delete all waypoints together:

1. Choose  on the *Main Menu* screen.
2. Select .
3. Click the *Find* button.
4. Select *Delete*.
5. Select *All Symbols*.
6. Confirm *Yes* when asked: *Do you really want to delete all waypoints?**

To delete waypoints one by one:

1. Choose  on the *Main Menu* screen.
2. Select .
3. Scroll down and select the waypoint you want to delete.
4. Use the rocker to select the *Delete* button.
5. Confirm *Yes* when asked: *Do you really want to delete all waypoints?**

* It is important to note that there is no undelete option for waypoints you've deleted.

Turning on the GPS and Acquiring Satellite Signals

As soon as the GPS device is turned on, it will automatically search for satellite signals. If the device is being activated less than 100 kilometers from its last point of use, start-up will take only one to three minutes (known as a *warm start*), because signals probably will be acquired from most or all of the previously used satellites. Restarting at a distance of more than 100 kilometers generally takes longer than five minutes (known as a *cold start*).

At first, light blue-colored icons representing all satellites within a reasonable range will appear on the device's *field of view* screen.



When a constant signal is acquired from a specific satellite, its corresponding icon will turn dark blue. Once constant signals are acquired from at least four satellites (the minimum number needed to identify a waypoint), the screen will then show that the GPS unit is *ready to navigate* and will provide a waypoint for the spot-of-use. The waypoint is generally considered to be accurate to within 10 to 30 meters.

To return to the *field of view* screen at any point during use of the device, go back to the main menu and select



Choosing Where to Collect Waypoints

GPS readings that are taken in open areas outdoors are the most accurate because satellite signals can be distorted by concrete and tall obstacles. Ultimately, the decision on where to capture the waypoint for a health facility is a balance between proximity to the target location and the ability to acquire a good signal from satellites.

A GPS reading should never be taken indoors and is best captured 20 to 30 meters away from potential obstacles. If the intended GPS point is meant to represent multiple buildings, standing near the main entrance of the complex is recommended.

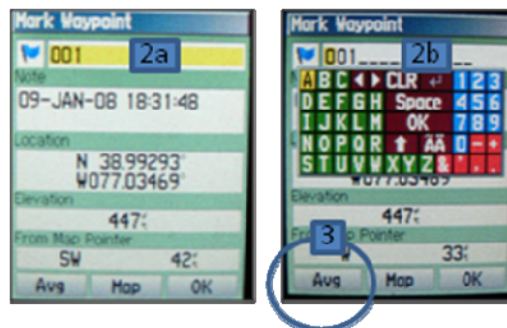
It is sometimes difficult to get an open view of the sky in urban areas due to tall buildings, and in wooded areas due to high tree canopy. If you are unable to make sufficient contact with satellites when standing at the entrance to a facility, identify the closest open area (e.g., parking lot, road intersection, or clearing) and position yourself at the center of that location. Be sure to record in your field notes the use of an alternative area for capturing the waypoint.

Heavy clouds and rain can also obstruct the ability of GPS units to receive satellite signals. Thus, waiting for obstructive weather to dissipate may be necessary when capturing waypoints.

Marking Waypoints

After you have chosen a spot for capturing a waypoint and ensured a good signal from at least four satellites, you can *mark* the waypoint for the health facility.

1. Go to the *Mark Waypoint* screen by holding down the *Enter/Rocker* button until the screen appears (approximately 2 seconds) or go to the *Main Menu* and click on .
2. On the *Mark Waypoint* screen, rename the waypoint so that it matches the facility code used in the LIAT by:
 - a. Highlighting the waypoint name (shown at right in yellow) and pressing the *Enter/Rocker* key.
 - b. Using the alpha-numeric keypad to change the name of the waypoint so that it matches the unique identifier chosen for the health facility by the assessment organizers.
3. Click on *Avg* to save the new waypoint. Then stand in the same location and wait for the GPS unit to complete collecting the location of the GPS device. The GPS point has been collected once the device returns to the *Main Menu* screen.



Reviewing and Editing Waypoints

To view and edit waypoints that have been logged:

1. Return to the *Main Menu* and choose *Find*.
2. On the *Find* screen, choose .
3. Highlight a waypoint and click the *Enter/Rocker* button to view corresponding data.
4. Edit any of the waypoint information (e.g., name, marker) by highlighting it and clicking the *Enter/Rocker* key.



Additional Options

In addition to editing waypoint information, three other options are available on the *Waypoint* screen:

1. Select *Delete*, and then click *Yes* to confirm the removal of a waypoint.
2. Select *Map* to display the waypoint on a map (the point will be shown at the center of the on-screen map).
3. Select *Go To* for a compass that will point you in the direction of the waypoint and provide its distance.

Downloading GPS Data to a Computer

To download data from the GPS device to your computer for aggregation and analysis, you must first install the appropriate USB driver, which enables access to files and programs stored on external devices. You must also install TrackMaker software, which is used to upload and download routes, tracks, and waypoints between GPS devices and computers. Additionally, TrackMaker makes it possible to save data in the correct format (.kml) and export it to Google Earth for display.

Install the correct USB driver and TrackMaker using the CD-ROMs provided with the GPS device or go to:

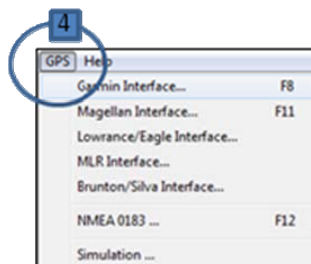
- USB driver—http://www8.garmin.com/support/download_details.jsp?id=591
- TrackMaker—<http://www.gpstm.com/downloadscontract.php>

Downloading Data

1. Plug the first GPS unit into the computer using the serial or USB cable.
2. Turn the GPS unit on. If prompted, set the GPS for indoor use.

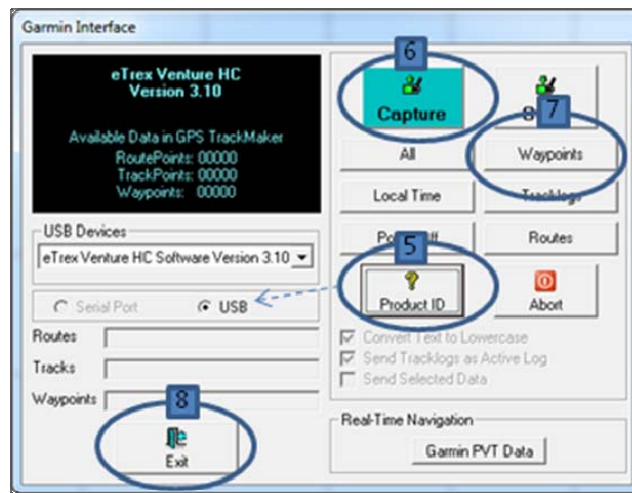


3. Click on .
4. Click on *GPS* from the menu bar and select *Garmin* to access the *Garmin Interface* screen.
5. Click on the *Product ID* button to show the GPS device's specifications. If the specifications do not appear, check to see that the GPS unit is on and that the cable is attached correctly. Alternatively, look to see whether the *USB* radio button is filled in. If not, reinstall the USB drivers.

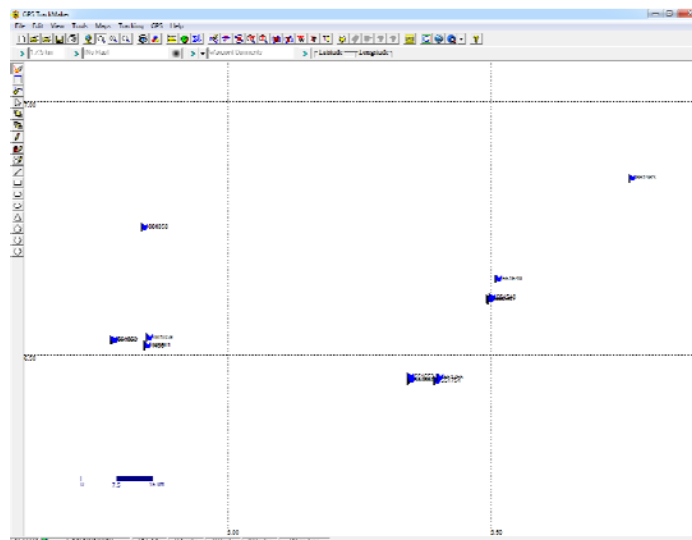


6. Click the *Capture* button.
7. Click the *Waypoints* button to download the waypoints from the GPS device. The black dialog box on the screen will show the number of waypoints that have been downloaded from the device.

8. Click the *Exit* button. At this point, the waypoints should appear on your screen similar to the example below. If they do not appear, click on the *View* tab and check the *Waypoints* selection.



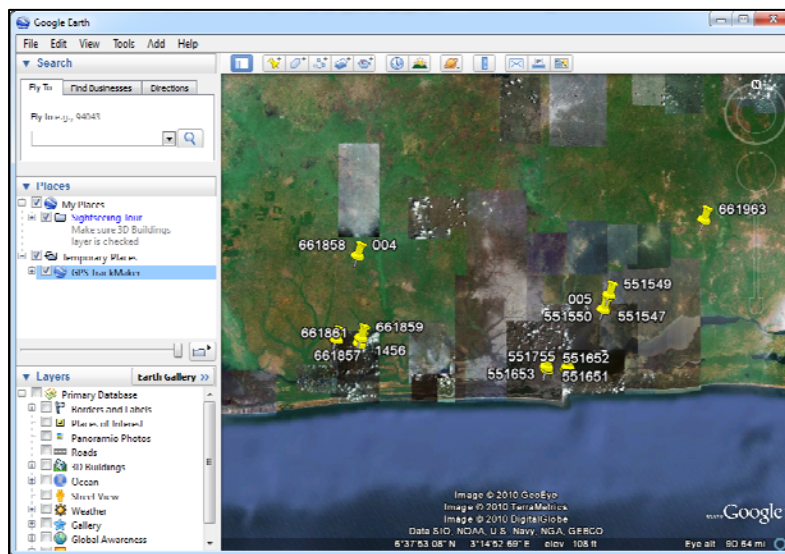
9. Go to *File* in the menu bar, and select *Save File*.
 - a. Navigate to the proper file location.
 - b. Save as a GPS TrackMaker file (.gtm). Include the survey country, year, and starting and ending waypoint numbers in the file name (e.g., Nigeria_2005_1_50.gtm).
 - c. Click *Save*.



10. Repeat this process for each GPS unit that contains waypoints for the survey.

Exporting Waypoints

1. Open the .gtm file you want to export.
2. Go to *File* in the menu bar, and select *Save File As...*
 - a. Navigate to the proper file location.
 - b. Save as a Google Earth File (.kml). Include the survey country, year, and starting and ending waypoint numbers in the file name (i.e. Nigeria_2005_1_50.kml)
 - c. Click *Save*.
3. Open Google Earth (download Google Earth from <http://earth.google.com/> if you haven't done so already).
4. Choose *File*→*Open* from the menu.
5. Navigate to your file and click *Open*. The data will then display on your screen.



References

Garmin. 2002. *eVenture Personal Navigator Owners Manual and Reference Guide*. Olathe, KS: Garmin.

ICF Macro. 2010. *Geographic Positioning Satellite (GPS) Manual for Use with Demographic and Health Surveys*. Calverton, MD: ICF Macro.

For more information, please visit deliver.jsi.com.

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