

# Tech Guide – Collecting and Working with GPS Data

(Maryland NRCS, July 2007)

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## **1. Collecting GPS Data - Garmin GPS Map 76**

### **1 – A. Charging the External Battery**

- Verify the external battery for the Beacon Receiver is charged **BEFORE** heading to the field.
- For best results, charge the external battery overnight before use.
- For replacement accessories, visit the 3D-Marketing LLC website:  
<http://www.3dllc.com/page.asp?pageid=3>

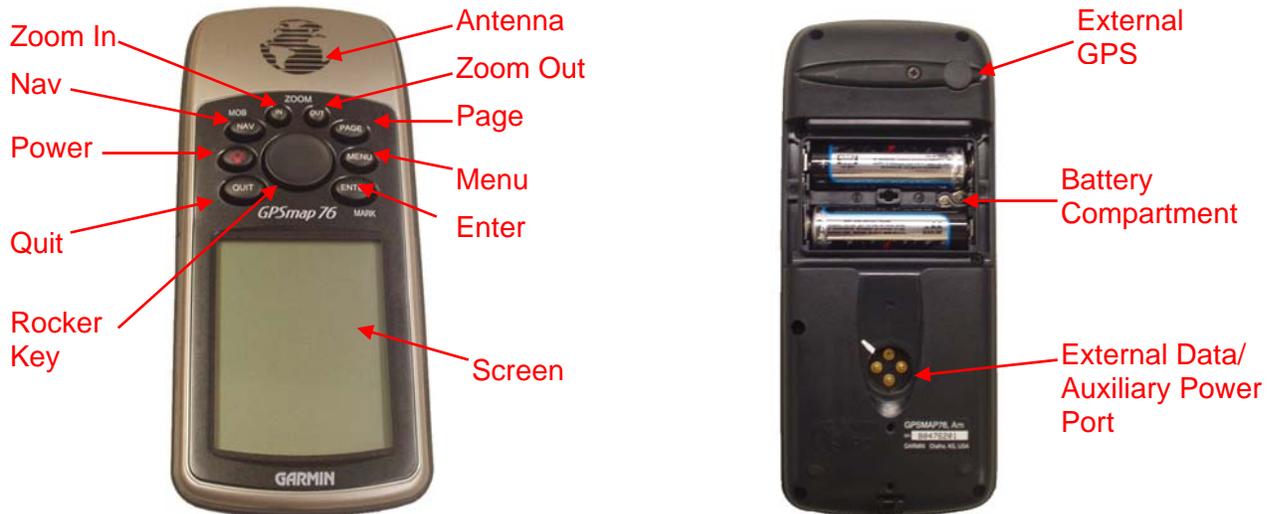
### **1 – B. Connect to the DGPS Beacon Receiver**

Connect the thin gray antenna cable from the “GPS Out” port on the beacon receiver to the external antenna port on the top of the Garmin.

- Connect the gray cable with the 4-pin Garmin connector from the ‘quadcomm’/‘octopus’ cable to the data/power port on the back of the Garmin.
- Connect the red cable with the male cigarette lighter adapter end from the ‘quadcomm’ cable to the female cigarette lighter adapter end of the battery.



## 1- C. Button Descriptions



**Power Key:** The **POWER** key is used to turn the unit on and off. Press *and hold* the Power key to turn on or off the GPS

**Rocker Key:** The **ROCKER** key is used to control the Up/Down and Left/Right movement of the cursor on the display pages and during data entry.

**Page Key:** The **PAGE** key is used to navigate forward through the 5 main display pages. The Page key will also end an operation in progress and return to one of the main pages.

**Quit Key:** The **QUIT** key is used to navigate backward through the 5 main display pages. The Quit key will also end an operation in progress and return to one of the main pages.

**Menu Key:** The **MENU** key will display the page options menu for the current page. Pressing the Menu key twice will display the main options menu.

**Enter Key:** The **ENTER** key is used to activate a data field or make a menu selection. Pressing and holding the Enter key will allow the user to capture the current position as a waypoint.

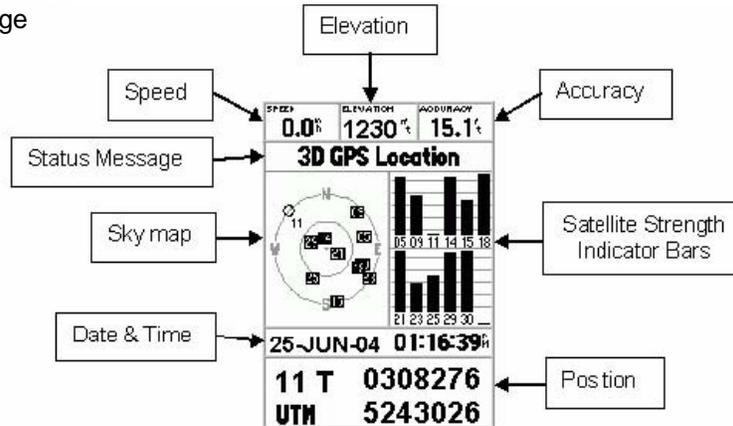
**Nav Key:** The **NAV** key is used to start or stop navigation. Holding down the **NAV** key will store the current location (a man overboard point) and give you the opportunity to begin navigating back to that point.

**Zoom In and Zoom Out Keys:** These keys allow you to view a smaller area of the displayed map in greater detail (**ZOOM IN**) or a larger area in less detail (**ZOOM OUT**).

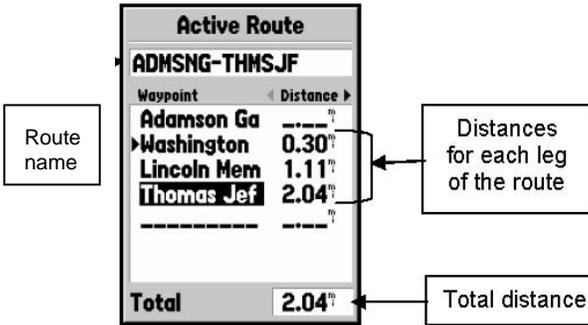
# 1 - D. Screen Descriptions

There are 5 main screens or pages on the Map76. Use the **Page** and **Quit** keys to switch between these pages.

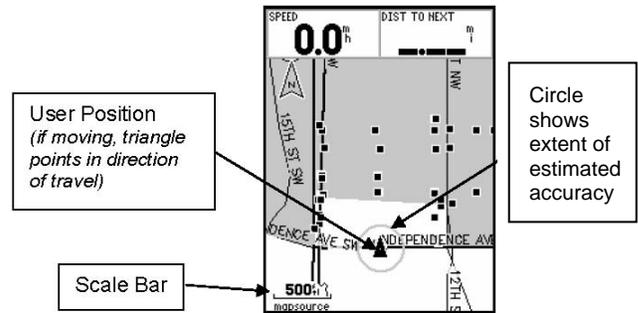
**GPS Information Page**



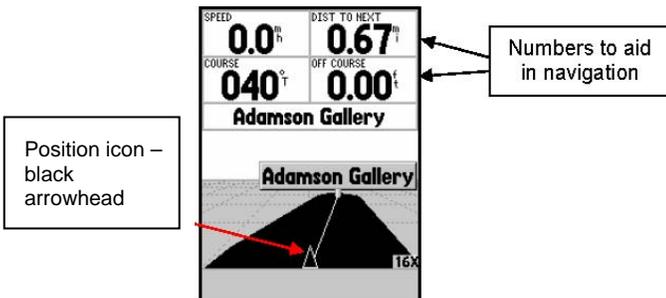
**Active Route Page**



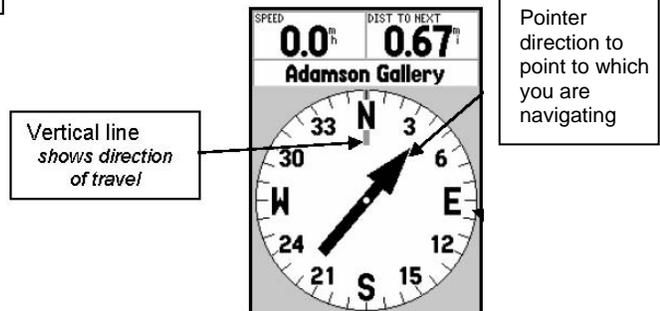
**Map Page**



**Highway Page**



**Pointer Page**

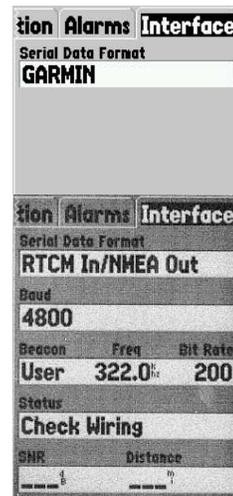


## 1 - E. GPS Unit Setup

1. Hold down the red **POWER** key until the GPS unit comes on.
2. Press the **PAGE** key twice to bring up the GPS Information screen.
3. Press the **MENU** key twice to bring up the Main Menu.
4. Highlight 'Setup' using the **ROCKER** key. Press the **ENTER** key.
  - a. Use the **ROCKER** key to move left or right to the desired tab.
  - b. Use the **ROCKER** key to move up or down to desired field. Press **ENTER**.
  - c. Use the **ROCKER** key to select the correct setting. Press **ENTER**.
5. *Location* tab.
  - a. Set *Location Format* to "**hddd'mm.mmm**".
  - b. Set *Map Datum* to "**NAD83**".
  - c. Set *North Reference* to "**True**".
7. *General* tab.
  - b. For use **without** the DGPS Beacon Receiver, set *WAAS* to "**Enabled**".
    - a. For use **with** the DGPS beacon receiver, *WAAS* should be "**Disabled**".
9. *Interface* tab.

- a. For use **without** the DGPS Beacon Receiver, set *Serial Data Format* to "**GARMIN**".
- b. For use **with** the DGPS Beacon Receiver,
  - Set *Serial Data Format* to "**RTCM In/NMEA Out**"
  - Set *Baud* to "**4800**"
  - Set *Beacon* to "**User**" and then enter a known frequency and bit rate, or select "**Scan**" and the receiver will search for a local frequency.
  - When a beacon signal is detected, 'Status' should indicate "**Receiving**".

Location	Freq.	Bit Rate
Hagerstown, MD	307	100
Annapolis, MD	301	200



Additional beacon information and coverage areas can be obtained on the US Coast Guard website at <http://www.navcen.uscg.gov/dgps/>

10. Press **QUIT** twice to return to the GPS Information screen.

## 1 - F. Simulator Mode

- Press the **MENU** key once then press **ENTER** to 'Start Simulator'.
- Use Simulator Mode to operate the Garmin receiver indoors or when practicing. This will stop the unit from trying to acquire satellites and conserve battery power.

### **1- G. Collecting Waypoints**

- Power up the Garmin.
- Wait until the accuracy reaches the required value:
  - To certify conservation practices, accuracy < or = 10 ft.
  - For conservation planning, accuracy < or = 20 ft.
- Press and hold down the **ENTER** key until the *Mark Waypoint* screen appears.
- To change the default identifier (optional), use the **ROCKER** key.
- To improve the accuracy of the waypoint (optional), press the **MENU** key, select "Average Location" and press **ENTER**. When you have enough measurements to get a good average of your position, press **ENTER**.
- Highlight 'OK' and press **ENTER** to store the waypoint.

### **Delete Waypoints**

- Press the **MENU** key twice to bring up the *Main Menu*.
- Select 'Points'. Press the **ENTER** key.
- Select 'Waypoints'. Press the **ENTER** key.
- To delete a single waypoint, highlight the desired point. Press the **MENU** key. Select 'Delete Waypoint'. Highlight 'Yes' and press **ENTER** to confirm the deletion.
- To delete all of the waypoints, press the **MENU** key. Select 'Delete All'. Highlight 'Yes' and press **ENTER** to confirm the deletion.

### **1 - H. Collecting Tracks**

- Press the **MENU** key twice to bring up the *Main Menu*.
- Select 'Tracks'. Press the **ENTER** key.
- On the *Tracks* page, press the **MENU** key. Select 'Setup Track Log' and press **ENTER**.
- To turn ON tracking, set *Recording* to '**Stop When Full**'.
- To turn OFF tracking, set *Recording* to '**Off**'
- Highlight 'OK' and press the **ENTER** key.

### **Saving the Track Log**

- From the *Tracks* page, highlight 'Save' and press the **ENTER** key.
- Choose the track to save and press the **ENTER** key.
- To view the calculated area of a saved track, rocker to the track and press **ENTER**. (NRCS policy is to calculate area/lengths measured with a GPS in ArcGIS/Customer Service Toolkit before certifying a conservation practice.)

### **Clearing the Track Log**

From the *Tracks* page, highlight 'Clear' and press the **ENTER** key. Highlight 'Yes' and press the **ENTER** key.

### **1 - I. Navigation**

- To navigate to a point, press the **NAV** key.
- Select 'Go To Point' and press **ENTER**.
- Select "Waypoints" and press **ENTER**.
- One of 2 screens will appear, *Waypoints by Name* or *Nearest Waypoints*. Use the **MENU** key to switch between the two.
- Use the **ROCKER** key to highlight the desire point and press **ENTER**. Select 'Goto' and press **ENTER**.
- Use the **PAGE** key to switch to the *Map Page*. This shows your current location as a triangle near the center of the screen and a line to the point you are navigating to.
- Use the **PAGE** key to switch to the *Pointer Page*. This shows a compass ring. The vertical line near the top of the ring indicates your direction of travel. The large pointer indicates the direction you need to travel to reach the navigation point.
- Once the point is reached, press the **NAV** key and select 'Go To Point' to find another point, or 'Stop Navigation' to end. Press the **ENTER** key.

### **1 - J. NRCS Support for Garmin GPS Map 76**

- The Garmin GPS Map 76 User's Manual can be downloaded from the Garmin website at: <http://www.garmin.com/support/userManual.jsp>
- Primary support for Garmin GPS Map 76 is provided by your state GIS specialist. Your state GIS specialist may call the NCGC Geospatial Technical Services Team representatives if they cannot answer your question.

## **2. Working with GPS Data - MN DNR Garmin Software**

### **2 – A. GPS Unit Setup for Downloading Data**

- Use the Garmin download cable (round 4-pin Garmin connector on one end, 9-pin serial connector on the other end) to connect the GPS unit to an open serial port on the computer.
- Power up the Garmin.
- Press the **MENU** key once. Scroll to 'Start Simulator' and press **ENTER**.
- Press the **MENU** twice, select 'Setup' then press **ENTER**.
- Scroll to the *Interface* tab. Set the 'Serial Data Format' to '**GARMIN**'.



### **2- B. Garmin Software Setup**

- DNR Garmin 5.1.1 is the CCE approved software for downloading and uploading GPS data to and from ArcGIS.
- The software must be installed by a system administrator.

### ***DNR Garmin 5.1.1 startup***

- Start DNR Garmin by double clicking on the desktop icon or by clicking on *Start > All Programs > DNR Garmin > DNR Garmin*.
- To enable data loading directly into and out of ArcMap, open an ArcMap document from Toolkit or ArcGIS.

### ***Set Projection***

- The first time you start DNR Garmin, a startup a window will ask if you want to set a projection. It is best to click on 'Yes'.
- Or, from the 'File' menu, click 'Set Projection'
- Set the 'POSC code' to 'ESRI' format
- Click on the 'Load PRJ' button
- Browse to C:/ArcGIS/arcexe83/Coordinate Systems/Projected Coordinate Systems/ UTM/ Nad83/ NAD 1983 UTM Zone ##N.prj (For Shepherdstown locations, use 'UTM zone 18N').
- Click 'Open', then click 'OK'

### ***Set Port, Baud Rate, and Units on the GPS menu***

- Set Port – Except the default, or choose from a number of serial ports. Or, choose 'USB' if you are using a CCE approved USB to serial converter adaptor.
- Set Baud Rate – Choose a data transmission rate in bits per second. The default for 'Garmin' is 9600 bps.
- Units – Set the output units of measure for downloading data. Choose from feet or meters.

### ***Set Waypoint Properties***

- From the DNR Garmin 'Waypoint' menu, choose 'Waypoint Properties'.
- Uncheck the fields (columns) you do *not* want saved into your data.
- Required fields are: Type, ident (identity), lat (latitude), long (longitude), y\_proj, x\_proj, comment, altitude, and model.

### ***Set Track Properties***

- From the 'Track' menu, choose 'Track Properties'.
- Uncheck the fields (columns) you do *not* want saved into your data.
- Required fields are: Type, ident (identity), lat (latitude), long (longitude), y\_proj, x\_proj, new\_seg, altitude, and model.

## **2 – C. Download GPS Data to the Computer**

- Complete the steps above to set the projection, track and waypoint properties.
- To save files to a Toolkit Customer folder, browse to the file location:  
***C:\Documents and Settings\your.name\My Customer Files  
Toolkit\folder\_name\Resource\_Maps.***

### ***Download waypoints***

- Click on the 'Waypoint' menu and select 'Download'. Wait for all of the stored waypoints to download into the edit table.

- Select the points you do *not* want to save in the data table, then click on the 'Delete Selected Record' button (red "x").
- Click on File/Save To/ ArcMap/ Shapefile layer. Browse to a folder, enter the name of the shapefile, and click SAVE.

### ***Download track logs***

- Click on the 'Track' menu and select 'Download'. Wait for all of the stored track points to download and populate the edit table.
- Select the tracks you do not want to save in the data table, then click on the 'Delete Selected Records' button (red "x"). Use Shift+Click to select all the track points in a track (tracks are separated by a blue highlighted bar and have "True" in the new\_seg field).
- Click on File > Save To > ArcMap > Shapefile layer. Browse to your location and enter the name of your shapefile. To save the track as a line, click on the 'Line' radio button then 'OK'. To save the track as a polygon, click on the 'Polygon' radio button then 'OK'.

### ***Save Contiguous Waypoints to a Line or Polygon Shapefile***

- Download your waypoints to the DNR Garmin data table.
- Click on the 'Track' radio button towards the top of the data table. Save the data to a shapefile. Now you have the option to save to a line or a polygon.

## **2 – D. Upload Spatial Data to the GPS Unit**

- You may upload a file, or upload features directly from an ArcMap project.

### ***Load ArcMap features to the DNR Garmin data table***

- Open an ArcMap session. Highlight a layer in the ArcMap Table of Contents (TOC). You can also use the ArcMap Selection menu to select individual features within the layer.
- From the DNR Garmin 'File' menu, choose Load From > ArcMap > Layer.
- An Identify Field dialogue window will appear. Select what field you want to use as the waypoint identifier.

### ***Upload to Garmin receiver***

- From the 'Waypoint' or 'Track' menu, select 'Upload.'
- If you have your receiver set to the Satellite page you will see a "Transfer Complete" message appear. If you have the receiver set to beep for messages you will also hear a beeping sound.

## **2 – E. NRCS support for DNR Garmin 5.1.1**

- DNR Garmin software was written by the Minnesota Department of Natural Resources (MN DNR). For more information about the software go to: <http://www.dnr.state.mn.us/mis/gis/index.html>
- Primary support for DNR Garmin 5.1.1 is coordinated by the state GIS staff.
- Your state GIS staff may call the NCGC Geospatial Technical Services Team representatives if they cannot answer your question.