

## Basic GPS Capture, Edit, and Navigation Using A Garmin GPSMAP76CSx

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**Notes** - The GPSMAP76CSx Owner's Manual is available on-line, and is an excellent resource.  
<http://www8.garmin.com/support/userManual.jsp?market=3&subcategory=38&product=010-00469-00>

Garmin drivers that facilitate USB connectivity can be downloaded from:  
<http://www8.garmin.com/support/collection.jsp?product=010-00469-00>

All GPS receiver pages (screens) illustrated in this document are from a Garmin GPSMAP76CSx running firmware version 3.60. Other Garmin receivers may have similar, though not identical, pages. Keypad layout and receiver specifications are found on pages 9 and 10.



**Position Format And Map Datum** - Garmin GPS receivers capture and store positions as decimal degrees of latitude and longitude referenced to the WGS84 datum. Although users can set how GPS positions are displayed on-screen, those settings have no effect on how the GPS positions are actually captured, or stored, internally.

To configure on-screen position display, press **Menu** twice, select **Setup** and press **Enter**, select **Units** and press **Enter**. Then select the **Position Format** and **Map Datum** fields in succession, and set them as desired.

For example, format **hddd.ddddd** and datum **WGS 84** (left) will capture and store GPS positions as decimal degrees of latitude and longitude referenced to the WGS84 datum, and will also display them on-screen as WGS84 decimal degrees.

Format **UTM UPS** and datum **NAD83** (right) will also capture and store GPS positions as decimal degrees of latitude and longitude referenced to the WGS84 datum, but will display them on-screen as Universal Transverse Mercator (UTM) NAD83 coordinates.



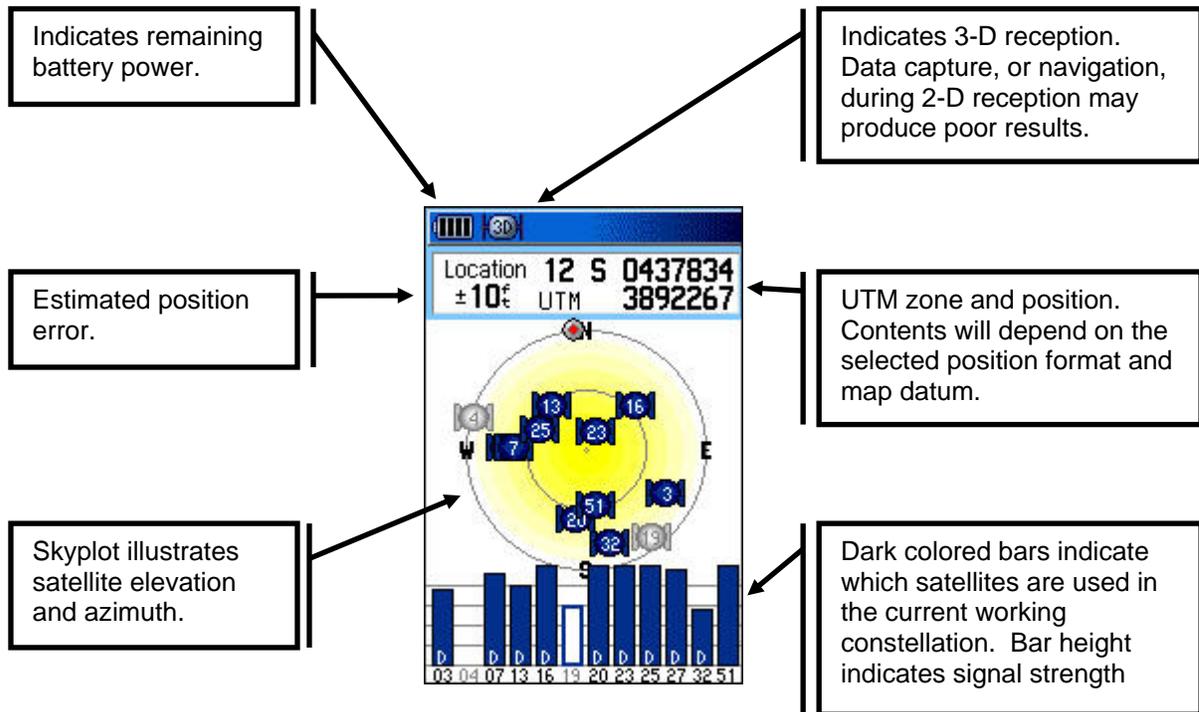
**Situations Where Position Format And Map Datum Are Critical** - A Garmin receiver's **Position Format** and **Map Datum** settings aren't typically a critical issue if users upload or download tracks and waypoints electronically using DNRGarmin or MxGPS, for instance. Remember, **Position Format** and **Map Datum** settings only affect on-screen coordinate display, not internal data capture and storage.

However, a Garmin's **Position Format** and **Map Datum** settings are critical in these three situations.

1. If users manually copy, or verbally report, GPS coordinates directly from the receiver's screen, they must also record and report the current **Position Format** and **Map Datum** settings.
2. If users manually enter waypoint coordinates into a Garmin GPS receiver, they must also make sure that the receiver's settings match the coordinates' **Position Format** and **Map Datum**.
3. If the Garmin receiver is supplying NMEA-format GPS data to ArcPad, the Garmin receiver's **Position Format** and **Map Datum** must be set to **hddd.ddddd** and **WGS 84** respectively.

**The NAD27-To-NAD83 Datum Shift** - In northern Arizona, mistaking NAD27 coordinates for NAD83 coordinates, and vice versa, results in a 210 meter error, an eighth of a mile! Coordinates given to, or received from, others without an accompanying **Position Format** and **Map Datum** are suspect.

**Interpreting The Satellite Page** - Press **Page** until the **Satellite** page is displayed. The main features of the satellite page are described below.



**WAAS** - WAAS (Wide Area Augmentation System) is a form of satellite-based real-time differential correction. If WAAS correction is enabled by the user, it may improve position quality by several meters.

Garmin receivers indicate receipt of the WAAS correction message for each individual GPS satellite by displaying a “D” in each satellite’s signal strength bar (above). WAAS correction results may be unpredictable if the correction message is not being received by every satellite in the current working constellation.

Therefore, WAAS should not be enabled if receipt of the correction message by any satellite in the current working constellation is incomplete, or intermittent.

Enabling WAAS in the example illustrated above is appropriate because each satellite in the working constellation is consistently receiving the WAAS correction message, as indicated by the “D” in its signal strength bar. Satellites 04 and 19 are visible to the GPS receiver, but are not being used to calculate positions.

Satellites 51 and 48 (not pictured) are the WAAS satellites, and will never display a “D”.

To enable or disable WAAS:

- Press **Menu** twice, select **Setup** and press **Enter**, select **System** and press **Enter**, select **WAAS/EGNOS** and set as appropriate.

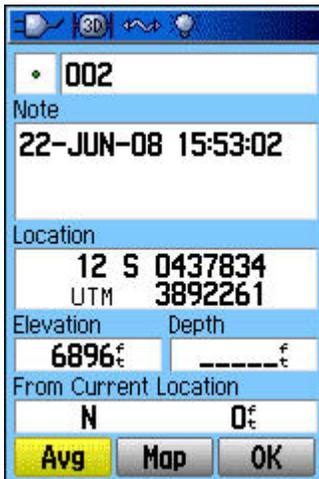
**Waypoints** - Delete all waypoints prior to a GPS session unless they are needed for ongoing work or future download.



To delete all waypoints:

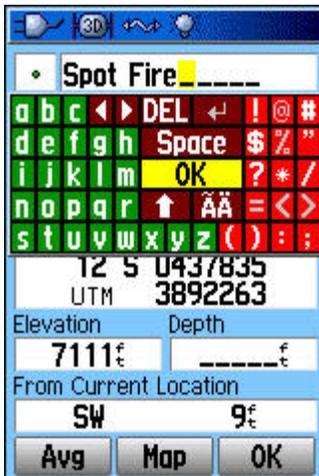
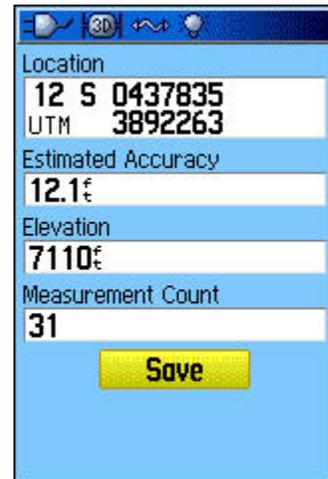
- Press **Find**, select **Waypoints**, and press **Enter**. A list of available waypoints will appear (left).
- Press **Menu**, select **Delete...**, and press **Enter**.
- Select **All Symbols** and press **Enter**, select **Yes** and press **Enter** (right).

The list of waypoints will now be empty.



To capture a new waypoint (a point feature):

- Press and hold **Mark**, select **Avg** and press **Enter** (left).
- Remain on station until a minimum of 30 positions have been captured (the **Measurement Count** field), select **Save** and press **Enter** (right). These positions will be averaged to create a single new waypoint.
- Accept the default waypoint name (a sequential number like **002**), or give the waypoint a new name.



To give the waypoint a new name:

- Select the waypoint's **ID** field with the rocker key and press **Enter**. Then, use the alpha-numeric keypad to spell out a new name of 14 characters or less, **Spot Fire** for instance.
- Select **OK** and press **Enter** to dismiss the keypad (right).
- Select **OK** and press **Enter** to complete waypoint capture.
- If desired, additional attribution can be placed in the **Note** field, but only if the timestamp is unimportant to the user.

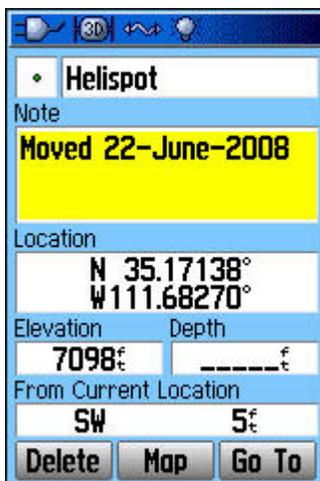
The **GPSPMAP76CSx** can accommodate 1,000 waypoints. Refer to the **GPSPMAP76CSx Owner's Manual** for additional waypoint guidance.



**Editing Waypoints** – Existing waypoints may be edited to update their **ID** or **Note** field, or their **Location**. Also, new waypoints can be created from manually entered coordinates.

To edit a waypoint's **ID** or **Note**:

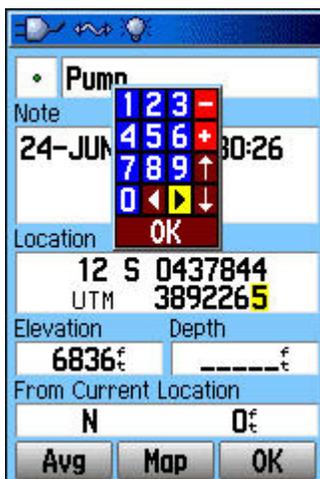
- Press **Find**, select **Waypoints**, and press **Enter**. Then, select the **ID** of the waypoint to be edited and press **Enter**.
- Use the rocker key to select the waypoint's **ID** or **Note** field, and press **Enter**. Then, use the alpha-numeric keypad to edit the field's contents.



To update a waypoint's original location to the current GPS location:

- From the **Waypoint** page, press **Menu**, select **Average Location**, and press **Enter**.
- Remain on station until a minimum of 30 positions have been captured (the **Measurement Count** field), select **Save**, and press **Enter**. These positions will be averaged to create the waypoint's new, updated location.

Notice that the helispot was 1.04 miles away prior to updating the waypoint's **Location** (above left). After update, the **From Current Location** distance is 5 feet instead of 1.04 miles (left). Also, the **Note** field was edited to indicate that the Helispot's location was updated on 22-June-2008.



Waypoints can also be created "from scratch". For example, handwritten coordinates for a pump's location can be manually entered to create a new waypoint for the pump. Remember that the receiver's **Position Format** and **Map Datum** must be set to match the coordinates' **Position Format** and **Map Datum** prior to entering the coordinates.

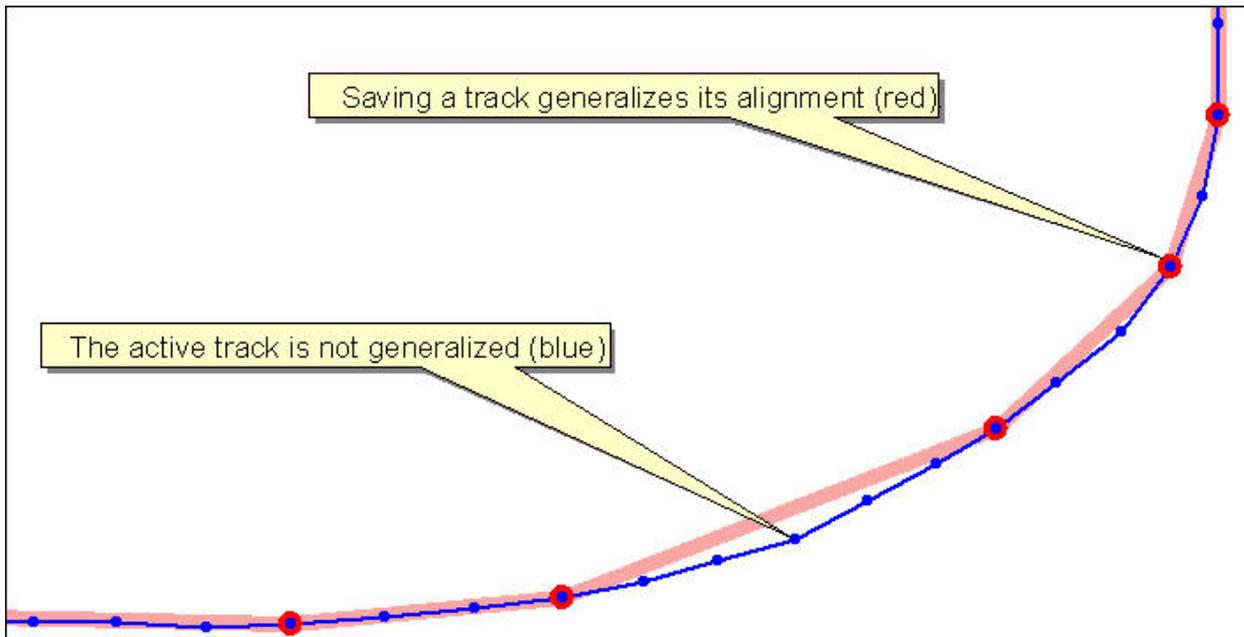
To create a new waypoint manually:

- Press and hold **Mark** to create a new "dummy" waypoint.
- Use the rocker key to move to, and edit, the waypoint's **ID** field.
- Use the rocker key to move to the **Location** field and press **Enter**. Use the numeric keypad to enter handwritten coordinates (left).
- Check coordinates for accuracy. Then select and press **OK** twice.

Refer to the **GPSMAP76CSx Owner's Manual** for additional waypoint guidance.

**Track Logs** - A track log is a sequence of GPS positions that can be converted to a line or a polygon. When the track log feature is turned on, positions are automatically captured at a regular interval into the “active” track log for as long as the GPS receiver is powered on, or until the track log feature is turned off, or until its memory is full. If desired, the active track log, or portions of it, may be sent to a “saved” track log. The GPSMAP76CSx can accommodate up to 10,000 GPS positions in the active track log, and up to 20 saved track logs.

Saved track logs have the characteristic of being a “generalized” version of the active track log. In the illustration below, an active track log is represented by the blue points and line. The corresponding saved track log is represented by the red points and line. Notice that the saved track log is not as detailed as the active track log. Users wishing to preserve the maximum amount of track log detail should not create saved track logs.



Delete all track logs prior to a GPS session unless they are needed for ongoing work or future download.



To access the **Track Log** page (left):

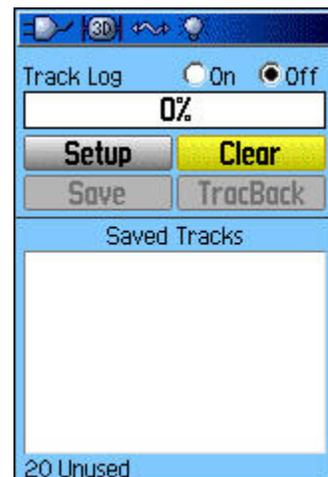
- Press **Menu** twice, select **Tracks**, and press **Enter**.

To turn the active track log on or off:

- Use the rocker key to select **On** or **Off** (left), and press **Enter**.

To delete all saved tracks (right):

- Press **Menu**, select **Delete All Saved** and press **Enter**, select **Yes** and press **Enter**. The 3 saved tracks are gone.



To clear the active track log (right):

- Select **Clear** and press **Enter**, select **Yes** and press **Enter**. The active track log is now at 0% full.

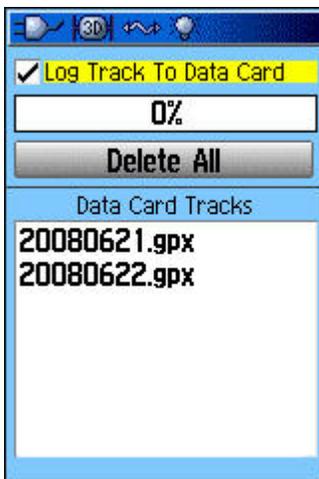


To configure the active track log:

- Select **Setup** from the **Track Log** page and press **Enter**.
- The settings illustrated at left are a good general recommendation, and indicate that the active track will continuously collect one GPS position every 5 seconds until its memory is full, and then stop. The track log will appear as a red line on the **Map** page. Set a logging **Interval** that is appropriate for your anticipated travel speed.

To capture GPS positions into the active track:

- Travel to a feature's point of beginning, turn the active track log **On**, and begin travel along the feature's alignment. Turn the active track log **Off** at the end of each feature's alignment, or when not actively following the alignment.



The GPSMAP76CSx has a micro-SD card that can hold a prodigious amount of GPS data. If users are on an extended project with no regular opportunity to download their data, they could have each day's active track log automatically transferred to the micro-SD card in GPX format. The GPX format is recognized by most GPS processing software, including DNRGarmin.

To automatically transfer each day's active track log to the micro-SD card:

- Select **Data Card Setup** in the **Track Log Setup** page (above left) and press **Enter**.
- Check the box labeled **Log Track To Data Card** (left).

Each GPX file will be named as a date in **yyyymmdd** format, and will contain that day's active track log positions.

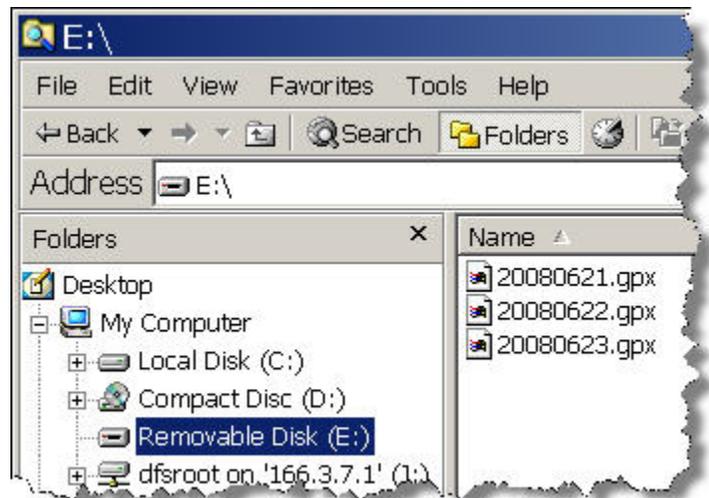
When connected to a PC via USB cable (a Garmin USB driver is required, page 1), the receiver's micro-SD card acts like a USB jump drive. To interact with GPX files on the micro-SD card:

- Press **Menu** twice, select **Setup** and press **Enter**, select **Interface** and press **Enter**, select **USB Mass Storage** and press **Enter**.

Contents of the micro-SD card will now be visible in Windows Explorer (right), and can be copied, moved, or deleted just like files on a USB jump drive.

When work is complete, release the micro-SD card's USB connection by clicking the

**Safely Remove Hardware** icon  in the PC's system tray.





To save an active track:

- Select **Save** from the **Track Log** page and press **Enter**.
- Accept the default track name (a date like **22-Jun-08**), or select the **Name** field with the rocker key, press **Enter**, and use the alpha-numeric keypad to give it a new name of 14 characters, or less. In the example at left, the saved track was re-named **Tammel Fire**. Notice that the saved track's length (1.83 miles) and enclosed area (71.6 acres) are reported.
- Select **OK** and press **Enter** to finalize the saved track.
- Saving an active track log to a saved track log creates a generalized (simplified) copy of the active track log, but it does not clear (delete) the active track log's positions.

Refer to the **GPSMAP76CSx Owner's Manual** for additional track log guidance.



**Navigating** - To navigate to a waypoint:

- Press **Find**, select **Waypoints** and press **Enter**.
- Select the waypoint **ID** representing the desired destination (left), and press **Enter**.
- Select **Go To** and press **Enter** (right).



Press **Page** until the **Compass** page appears (left). The **Compass** page features a “compass ring” and four user-selectable data fields. The **Compass** page illustrated at left indicates that:

- The destination is Safety Zone.
- Distance to the destination is 0.33 miles.
- Estimated elapsed time to arrival at the destination is 2 minutes, 3 seconds.
- Current direction of travel is about 215°.
- Bearing to the destination is about 175°.



Follow the **Compass** page’s red arrow to the destination. A beep and an on-screen arrival message will appear as the destination is approached (left).

The compass needle will always remain in an active state if the GPSMAP76CSx electronic compass has been calibrated and turned on.

If the electronic compass has been turned off, however, the compass needle relies on changes in GPS position to determine its pointing direction. Therefore, users must keep moving if an active compass needle is desired. If users stop moving, the compass needle will become erratic.

Refer to the **GPSMAP76CSx Owner’s Manual** for additional navigation and electronic compass guidance.

## GPSMAP76CSx Keypad Layout

### IN/OUT Zoom Keys

Press to zoom in or out on the Map page.

Press to scroll up or down a list on any other page.

### FIND/MOB Key

Press at any time to view the Find Menu.

Press and hold for MOB.

### POWER Key

Press and hold to turn the unit on or off.

Press and Release to adjust the backlighting.

### QUIT Key

Press to cancel data entry or exit a page.



### ROCKER Key

Press up, down, left, or right to highlight options and to enter data, or move the map panning arrow.

### PAGE Key

Press to cycle through the main pages.

Press and hold to turn the compass on or off

### MENU Key

Press to view page options.

Press twice to view the Main Menu.

### ENTER/MARK Key

Press and release to enter highlighted options, data or confirm on-screen messages.

Press and hold at any time to mark your current location as a waypoint.

## GPSMAP76CSx Specifications

### Specifications

#### Physical

**Size:** 6.2" H x 2.7" W x 1.4" D

**Weight:** 7.6 ounces (216 g) w/batteries installed.

**Display:** 1.5" W x 2.2" H, 256-color, high resolution, transreflective (160 x 240 pixels) with backlighting.

**Case:** Rugged, fully gasketed, water resistant, IEC-529, IPX7

**Temp Range:** 5 to 158°F (-15 to 70°C)\*

\*The temperature rating of the GPSMAP 76CSx may exceed the usable range of some batteries. Some batteries can rupture at high temperatures.

#### Performance

**Receiver:** WAAS/EGNOS enabled

#### Acquisition Times\*:

Approx. 1 second (warm start)

Approx. 38 seconds (cold start)

Approx. 45 seconds (factory reset)

\*On average for a stationary receiver with an open sky view.

**Update Rate:** 1/second, continuous

**Antenna:** Built-in quad helix, remote antenna capability.

**Compass:** Accuracy; +/- 5 degrees<sup>1</sup>, resolution; 1 degree

**Altimeter:** Accuracy; +/- 10 feet\*, resolution; 1 ft.

\*Subject to proper user calibration.

#### Power

**Source:** Two 1.5 volt AA batteries, USB power, 12 V Adapter Cable, or up to 36 VDC external power

**Battery Life:** Up to 18 hours (typical use)\*

\*Alkaline batteries lose a significant amount of their capacity as the temperature decreases. Use Lithium batteries when operating the GPSMAP 76CSx in below-freezing conditions. Extensive use of screen backlighting, electronic compass, and audible tones significantly reduce battery life.

#### Accuracy

**GPS:** <10 meters (33 feet) 95% typical\*

\*Subject to accuracy degradation to 100 m 2DRMS under the U.S. DoD imposed Selective Availability (SA) Program when activated.

**DGPS:** 3-5 meters (10-16 feet) 95% typical\*

\*WAAS accuracy in North America.

**Velocity:** 0.05 meter/sec steady state

**Interfaces:** NMEA 0183 version 2.3, and RS-232 and USB for PC interface

**Data Storage Life:** Indefinite: no memory battery required

**Map Storage:** Dependant on the formatted capacity of the microSD Digital Card

(A small portion of the card capacity has been used in formatting the card for use.)