

Owner's
Manual
&
Reference



GPS 45XL

Personal Navigator™

 **GARMIN®**

Software Version 3.0 or above

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GPS 45XL Personal Navigator™

OWNER'S MANUAL

Welcome to the smallest, easiest-to-use GPS navigator for marine use! The GPS 45XL represents GARMIN's continuing commitment to provide mariners or boaters with quality navigation information in a versatile, accurate and user-friendly design you'll enjoy for years to come. To get the most from your new GPS unit, it is important that you take the time to read through the owner's manual to understand the operating features of the GPS 45XL. The manual is organized into three sections for your convenience:

Section One takes you through step-by-step instructions to initialize the receiver for first time use.

Section Two introduces you to the basic features of the unit and provides a quick-start orientation to the GPS 45XL. This section has been designed to acquaint you with the unit and provide a basic working knowledge necessary to use the unit in typical conditions.

Section Three provides a detailed reference to the advanced features and operations of the GPS 45XL in a topical format. This allows you to concentrate on a specific topic quickly, without reading through entire sections of text that you may not need.

Packing List

Before getting started with your GPS receiver, check to see that your GARMIN GPS 45XL package includes the following items. If you are missing any parts, please contact your dealer immediately.

Standard Package:

- GPS 45XL Unit
- Owner's Manual
- 4 AA Batteries
- Lanyard
- Quick Reference Card
- Carrying Case

Thanks for choosing the GARMIN GPS 45XL. We hope it will help you meet all of your marine navigation needs.

CAUTION

The GPS system is operated by the government of the United States, which is solely responsible for its accuracy and maintenance. The system is subject to changes which could affect the accuracy and performance of all GPS equipment. Although the GPS 45XL is a precision electronic NAVigation AID (NAVAID), any NAVAID can be misused or misinterpreted and therefore, become unsafe.

Use the GPS 45XL at your own risk. To reduce the risk of unsafe operation, carefully review and understand all aspects of this Owner's Manual and thoroughly practice operation using the simulator mode prior to actual use. When in actual use, carefully compare indications from the GPS 45XL to all available navigation sources including the information from other NAVAIDs, visual sightings, charts, etc. For safety, always resolve any discrepancies before continuing navigation.

NOTE: This device meets requirements for Part 15 of the FCC interference limits for Class B digital devices for home or office use. It has been tested for compliance with all necessary FCC standards. This equipment generates, uses, and can radiate radio frequency energy, and if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to other equipment, which can be determined by turning the equipment off and on, the user is encouraged to try and correct the interference by relocating the equipment or connecting the equipment to a different circuit than the affected equipment. Consult an authorized dealer or other qualified service technician for additional help if these remedies do not correct the problem. Operation is subject to the following conditions: (1) This device cannot cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation. The GPS 45XL does not contain any user-serviceable parts. Repairs should only be made by an authorized GARMIN service center. Unauthorized repairs or modifications could void your warranty and your authority to operate this device under Part 15 regulations.

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The GPS 45XL is a powerful navigation tool that can guide you anywhere in the world. To better understand its operation and capabilities, it may be helpful to review the basic terms and concepts briefly explained below.

Other navigation and GPS definitions used in the manual are defined in the appropriate reference sections of the manual.

Almanac Data

Satellite constellation information (including location and health of satellites) that is transmitted to your receiver from every GPS satellite. Almanac data must be acquired before GPS navigation can begin.

Bearing

The compass direction from your position to a destination.

Course Made Good (CMG)

The bearing from the 'active from' position (your starting point) to your present position.

Crosstrack Error (XTE)

The distance you are off a desired course in either direction.

Desired Track (DTK)

The compass course between the 'from' and 'to' waypoints.

Differential GPS (DGPS)

An extension of the GPS system that uses land-based radio beacons to transmit position corrections to GPS receivers.

Estimated Time of Arrival (ETA)

The time of day of your arrival at a destination.

Estimated Time Enroute (ETE)

The time left to your destination at your present speed.

Grid

Coordinate system that projects the earth on a flat surface, using square zones for position measurements. UTM/UPS and Maidenhead formats are grid systems.

Ground Speed

The velocity you are traveling relative to a ground position.

Latitude

The north/south measurement of position perpendicular to the earth's polar axis.

Longitude

An east/west measurement of position in relation to the Prime Meridian, an imaginary circle that passes through the north and south poles.

Navigation

The process of travelling from one place to another and knowing where you are in relation to your desired course.

Position

An exact, unique location based on a geographic coordinate system.

Track (TRK)

The direction of movement relative to a ground position.

Universal Transverse Mercator (UTM)

A grid coordinate system that projects global sections onto a flat surface to measure position in specific zones.

Velocity Made Good (VMG)

The speed you are traveling in the direction of the destination.

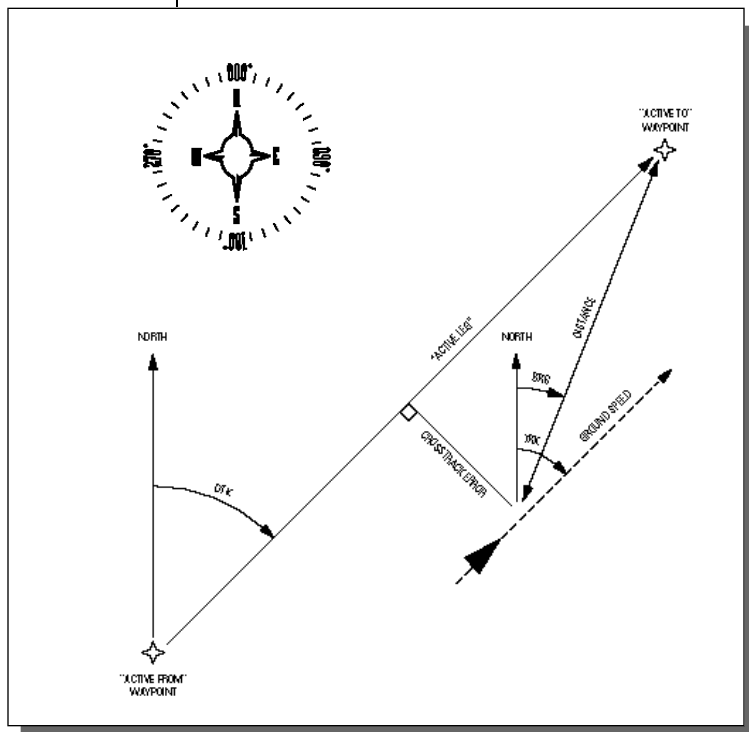
Waypoint

A specific location saved in the receiver's memory.

Getting Started

Navigation Basics

The GPS 45XL provides steering guidance and navigation information using degrees, a measurement measured in a clockwise direction from a north reference. North is described as 000° , east as 090° , south as 180° , and west as 270° . The diagram and compass rose below provide a graphic illustration of the navigation terms used by the GPS 45XL. More information on basic navigation and GPS are available at your local library or bookstore.



Getting Started with your GPS

Welcome to the exciting world of GARMINGPS! The GPS 45XL represents GARMIN's continuing commitment to provide marine users with quality navigation information in a versatile, user-friendly design they will enjoy for years to come. To get the most out of your GPS receiver, be sure to read through the initialization and Getting-Started sections of this manual, and refer to the reference section for complete details on the GPS 45XL's advanced features.

Initializing Your GPS for First-Time Use

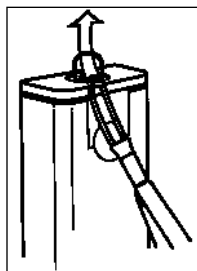
The GPS 45XL calculates your position and movement by tracking signals sent from GPS satellites. Each of the 24 GPS satellites circle the earth twice a day in a very precise orbit, and transmit information back to earth. In order to determine a position fix, your GPS 45XL needs to continuously "see" at least three satellites.

Because a GPS receiver can only see satellites above the horizon, it needs to know what satellites to look for at any given time. By using an almanac (a timetable of satellite numbers and their orbits) stored in the receiver's memory, the GPS 45XL can determine the distance and position of any GPS satellite.

To use this almanac data, your GPS receiver needs to know where you are, or be given the opportunity to "find itself". Once you initialize the unit to this position, the GPS 45XL will usually compute a fix within a few minutes.

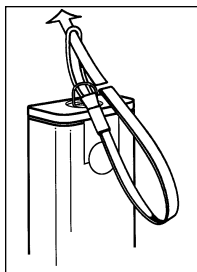
Remember, this process is only necessary under the following conditions:

- First time use from the factory.
- The receiver has been moved over 500 miles from the last calculated position with power off.
- The receiver's memory has been cleared and all stored data has been lost.



Lanyard Attachment

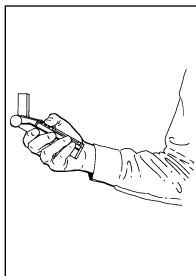
To attach the GPS 45XL's lanyard, thread the strap through the D-ring on the battery compartment cover.



Next, take the solid end of the lanyard, insert it through the slot at the other end, and tighten.

Getting Started

Acquiring Satellites



Hold the receiver parallel to the ground and rotate the antenna perpendicular to the receiver.



Welcome Page

Acquiring Satellite Signals

Because the GPS 45XL relies on satellite signals to provide you with navigation guidance, the receiver needs to have an unobstructed, clear view of the sky for best performance. What exactly does this mean? In a nutshell, the GPS receiver's view of the sky will generally determine how fast you get a position fix, or if you get a fix at all. GPS signals are relatively weak and do not travel through rocks, buildings, people, metal, and materials such as thick canvas, so you need to make sure that you're not near any of these structures or materials when acquiring satellites.

Once the GPS 45XL has calculated a position fix, you'll usually have anywhere from four to eight satellites in view. The GPS 45XL will now continuously select the best satellites in view to update your position. If some of the satellites in view get blocked or "shaded" the receiver can simply use an alternate satellite to maintain the position fix. Although a GPS receiver needs four satellites to provide a 3D fix, the GPS 45XL can maintain a 2D fix with only three satellites.


Before You Initialize

Take the GPS 45XL outside and find a large, open area (try a nearby park) that has a clear view of the sky from horizon to horizon. Hold the receiver at a comfortable height, at arm's length from your body, with the external antenna turned perpendicular to the ground.



GPS signals are blocked from reaching the receiver by buildings, rocks, metal structures, or materials such as heavy canvas. Do your best to stay away from these structures and materials.

To turn the GPS 45XL on:

1. Hold the unit so it is parallel to the ground and turn the external antenna perpendicular to the unit.
2. Press and hold  until the receiver turns on.

The welcome page will be displayed while the unit conducts a self test.

Once testing is complete, the welcome page will be replaced by the status page, with the EZinit prompt ready for you to select one of two initialization methods:

- **Select Country**—allows you to initialize the receiver by selecting your present position from a list of countries in the GPS 45XL's internal database. This usually provides a position fix in 3-5 minutes.
- **AutoLocate™**—allows the GPS 45XL to initialize itself and calculate a position fix without knowing your present position. This usually provides a position fix in 7.5-15 minutes.

If the EZinit prompt has not automatically appeared on the status page:

1. Press the **ENTER** key.

If you've already initialized the GPS 45XL and the EZinit prompt appears, highlight the 'no re-init' selection with the arrow keypad and press ENTER. The EZinit prompt may appear if you've had the unit on in normal mode while indoors, or if the antenna is shaded while acquiring satellites in normal or battery saver mode.

To initialize the receiver:

1. If the 'country' option is not highlighted, press the **▼** key repeatedly to move the field highlight to the 'country' option.
2. Press the **ENTER** key.
3. Use the **▼** key to scroll through the list options until the country of your present position appears.
4. Use the **▲** key to highlight the country/state/region you're in. If the country you're in is not listed, select another country within 500 miles of your present position.
5. Press **ENTER** to finish.

The GPS 45XL will now begin searching for the appropriate satellites for your position and should acquire a fix within 3-5 minutes. You can verify that you have acquired a fix by watching the status page transition to the position page (provided you haven't pressed any other buttons) or looking for a 2D or 3DNAV status at the top left corner of the status page.



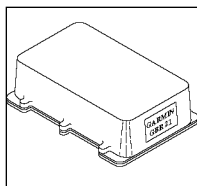
The EZinit prompt will automatically appear if the receiver needs to be initialized. The prompt may also appear during normal use if the antenna is shaded or the unit is indoors.



Use the arrow keypad to highlight the country and region or state (if necessary) of your present position from the list and press ENTER. If the country is not listed, select the closest country instead.

Getting Started

EZinit, External & DGPS Antennas



Beacon Receiver

The GARMIN GBR 21 Beacon Receiver is the recommended DPGS receiver for use with the GPS 45XL.

Other RTCM 104 v. 2.0 receivers are compatible with the GPS 45XL, but may not provide complete on-screen status or tuning control.

To prevent accidental battery power loss, the GPS 45XL will automatically shut off 10 minutes after the last key-stroke if the unit is not tracking at least one satellite and has never acquired a position fix.

If you have trouble initializing the receiver or getting a position fix, check the following:

- **Does the receiver have a clear view of the sky?**

If there are large buildings, rocks, or mountains, if there is heavy tree cover, the receiver may not be receiving enough satellite signals to calculate a fix.

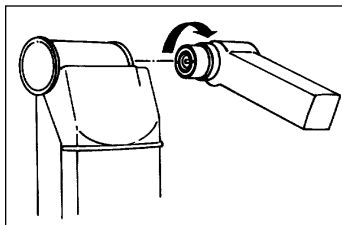
- **Have you selected the right country/state/region from the EZinit list?**

Check for the correct approximate lat/lon on the position page or reselect the appropriate country from the list to restart the initialization.

- **Have you moved more than 500 miles from the last calculated position with the receiver off?**

Reinitialize the receiver, selecting the country/state/region of your new location from the EZinit list.

External Antenna



The GPS 45XL's antenna may be removed to attach an optional external antenna or automobile antenna.

To remove the attached antenna:

1. Rotate the knurled knob (located at the bottom left of the antenna) toward the front of the unit one-quarter turn.
2. Pull the antenna gently away from the unit.
3. To install the antenna lead, mate the BNC connector notches with the mounting posts and turn the knurled knob one-quarter turn toward the back of the unit.

Getting-Started Tour

Now that your GPS receiver has been initialized, it's time to take a tour through its basic features and functions. The tour assumes that you have initialized the receiver and have not changed any of the factory settings (units of measure, selectable fields, etc.). If you have changed any of the default settings, the pictures and descriptions may not match your unit's configuration.

Powering Up and Taking a Fix

Take the GPS 45XL outside and find an open area where the receiver will have a clear view of the sky. Hold the receiver at a comfortable height, at arm's length from your body, with the external antenna turned perpendicular to the receiver.

To turn the unit on:

1. Press and hold  until the receiver turns on.

A welcome page will be displayed while the unit conducts a self test. Once testing is complete, the welcome page will be replaced by the satellite status page and the GPS 45XL will begin acquiring satellites.

Satellite Status Page

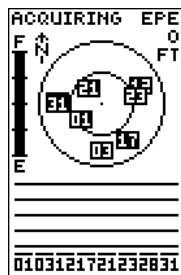
The GPS 45XL's satellite status page provides a visual reference of satellite acquisition and position. As the receiver locks onto satellites, a signal strength bar will appear for each satellite in view, with the appropriate satellite number (1-32) underneath each bar. The progress of satellite acquisition is shown in three stages:

- No signal strength bars— the GPS 45XL is looking for the satellites indicated.
- Hollow signal strength bars— the GPS 45XL has found the satellite(s) and is collecting data.
- Solid signal strength bars— the GPS 45XL has collected the necessary data and the satellite(s) is ready for use.

Note that each satellite has a 30-second data transmission that must be collected (hollow bar status) before the satellite may be used for navigation (solid bar status). Once a fix has been calculated, the GPS 45XL will then update your position, track and speed by selecting and using the best satellites in view.



Welcome Page

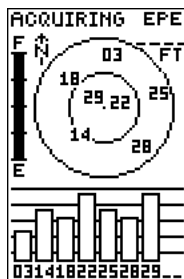


Status Page

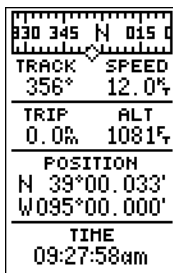
The signal strength bars at the bottom of the page will not appear until the GPS 45XL has found the satellites indicated at the bottom of the screen.

Getting Started

Sky View/ Position Page

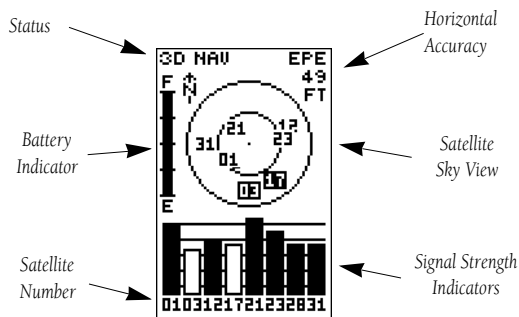


Once satellites have been found, hollow signal strength bars will be displayed while data is being collected. The hollow bars can be used to help determine if satellites are being shaded.



Position Page

In addition to displaying your position coordinates, the position page shows your track and speed over the ground. Speed and altitude data may fluctuate due to Selective Availability.



The satellite sky view shows a bird's-eye view of the position of each satellite relative to the unit's last known position. The outer circle represents the horizon (north up); the inner circle 45° above the horizon; and the center point directly overhead. You can use the sky view to help determine if any satellites are being blocked, and whether you have a current position fix (indicated by a '2D NAV' or '3D NAV' in the status field).

Once sufficient signals have been acquired, the status page will be replaced with the position page, provided you have not pressed any other buttons.

Position Page

The second page in the GPS 45XL's main page sequence is the position page. The position page shows you where you are, what direction you're heading and how fast you're going, and is particularly helpful when you do not have an active destination selected. The graphic display at the top of the page indicates your cardinal heading (while you're moving) with the track and speed indicated below.



The graphic compass display is designed to show your current track and does not serve as a true magnetic compass while you're standing still.

The rest of the page shows your current position in three dimensions: latitude, longitude and altitude. The GPS 45XL uses this basic information to mark exact positions as waypoints, which help guide you from one place to another. A trip odometer and 12/24 hour clock are also provided.

Marking a Position

Now that you've acquired a position, let's mark it as a waypoint for future reference.

1. Press the **MARK** key to capture and hold your position.



To mark a position, you must have obtained a 2D or 3D fix, or have the receiver in simulator mode. If you try to mark a position without a position fix, you will be alerted with a 'No GPS Position' message.

The mark position page will appear, showing the captured position and a default 3-digit waypoint name. Let's change the default name to something a little more meaningful, like 'HOME'.

1. Press the **▲** key twice to move the field highlight from the 'save' field to the name field.
2. Press **ENTER** and **◀** to clear the default waypoint name.
3. Press and hold the **▲** key to scroll through the alphabet until the letter 'H' appears.
4. Press the **▶** key once to move the character highlight to the next character space.
5. Repeat steps 3 and 4 until the word 'HOME' is displayed.
6. Press **ENTER** to complete entry of the name.
7. Press the **▼** key once to return the field highlight to the 'save' field.
8. Press the **ENTER** key to confirm that you want to save the position as a waypoint named 'HOME'.

The mark position page will now be replaced by the position page (the page displayed prior to pressing the **MARK** key). The 'HOME' waypoint is now stored in the GPS 45X1's memory, and will remain there until you manually remove it or clear the receiver's memory. For more on waypoint management, see pages 21-27.

| |
|----------------------|
| MARK POSITION |
| Waypoint: |
| 001 |
| N 40°23.029' |
| W074°47.032' |
| Add to route |
| number: __ |
| SAVE? |

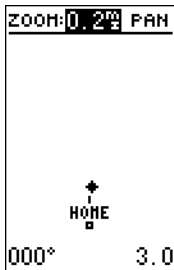
To save a waypoint with the default three digit name, simply press the **ENTER** key. The GPS 45XL will return to the page previously displayed.

| |
|-------------------------|
| MARK POSITION |
| Waypoint: |
| HOME ▶ __ |
| N 40°23.756' |
| W078°46.114' |
| Add to route |
| number: __ |
| SAVE? |

The arrow keypad is used for all data entry. Use the **UP** and **DOWN** keys to select letters, numbers or menu options; use the **LEFT** and **RIGHT** keys to move the cursor forward or backward along the line.

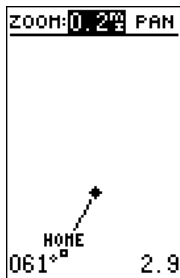
Getting Started

Position Page/ Map Page



Map Page

The map page displays your present position as a diamond icon and provides a real time graphic 'breadcrumb' display of your track right on screen.

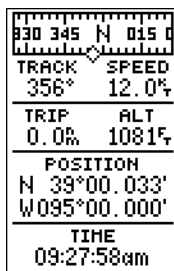


The moving map's default setting is track up orientation. 'Track up' means that your current direction of travel is always up (or towards the top of) the screen. It can also be set for north up, or desired track up orientation by using the map setup page.

Using the Position and Map Pages

Now that you've marked a position, it's time to take a brisk walk using the position and moving map pages to watch your every move. To get the most from this tutorial, you will need to walk for at least the time stated in the below steps. Since the GPS system has a margin of error of 15 meters, this will ensure you travel far enough to register useful information. You'll also get a much better indication of how the GPS 45XIs steering guidance and mapping features work to guide you wherever you go.

1. Walk in a straight line for 3-4 minutes at a fast pace and watch the position page. You can time your distance with the on-screen clock.



The direction you are moving (your track) and your speed are displayed on the upper part of the screen, just below the graphic compass display. The latitude, longitude and approximate altitude of your position--along with a resettable trip odometer--are continuously displayed in the middle of the page, with the time of day displayed below.

Now let's change the display to the moving map page and watch the track log of our walk:

1. Press the **PAGE** key to change from the position page to the map page.

Your current position is shown as the diamond in the middle of the screen. The dark circle below the diamond represents the position you created, with the line between the two showing your track.

1. Now turn 90° to your right and continue walking at a fast pace for another 2-3 minutes. Notice how the display changes, always keeping the direction you are moving at the top of the map.

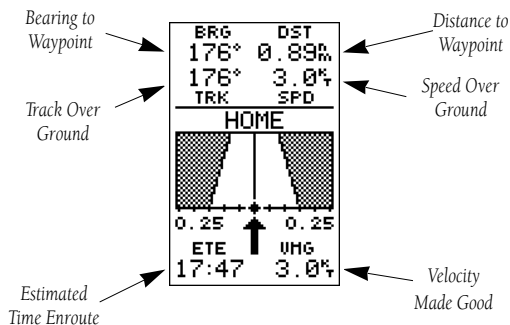
Going To a Waypoint

Once you've stored a waypoint in memory, you can use the GPS 45XL to guide you to it by performing a simple GOTO. A GOTO is really nothing more than the receiver drawing a straight-line course from your present position to the destination you've selected. To see how it works, let's try navigating back to our starting position, the HOME waypoint.

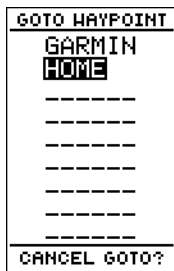
To select a GOTO destination:

1. Press the **GOTO** key.
2. The GOTO waypoint page will appear, displaying all the waypoints in memory in alphabetical order.
3. Use **▲** or **▼** to highlight the 'HOME' waypoint.
4. Press the **ENTER** key to confirm that you want to navigate to the displayed waypoint.

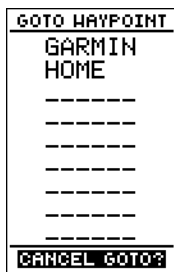
Using the Highway Page



The GPS 45XL's highway page also provides graphic steering guidance to a destination, with an emphasis on a straight line course to the desired waypoint and the distance and direction you are off course. The bearing and distance to a waypoint, along with your current track and speed are displayed at the top of the screen, with your estimated time enroute (ETE) and velocity made good (VMG), or the rate you are closing in on your destination shown at the bottom.



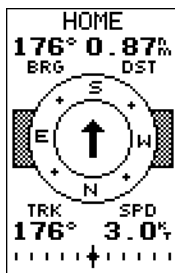
The GOTO waypoint page allows you to select your destination from a list of all available waypoints in the GPS 45XL's memory.



Once a GOTO is activated, the highway page will appear to provide steering guidance to your destination. To cancel a GOTO, highlight the cancel prompt at the bottom of the page and press ENTER.

Getting Started

Steering Guidance



Compass Page

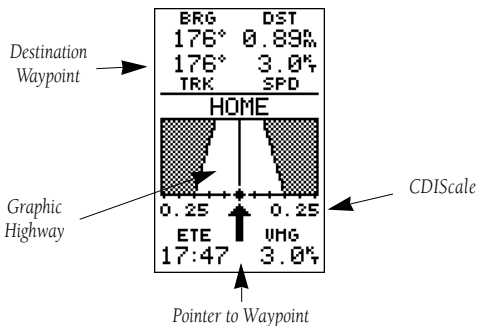
The GPS 45XL will also provide steering guidance with a compass page.



Message Page

Once you are one minute from the destination (based on your present speed and course), an arrival message will appear on the message page.

Using the Highway Page (continued)



As you head toward your destination, the middle section of the screen provides visual guidance to your waypoint on a moving graphic 'highway'. The moving arrow just below the course deviation scale always points to your selected waypoint relative to the direction you are moving.

Your present position is represented by the diamond in the center of the course deviation scale. The line down the middle of the highway represents your desired track. As you navigate toward a waypoint, the highway will actually move, indicating the direction you're off course, relative to the position diamond on the CDI scale. To stay on course, simply steer toward the center of the highway.

While navigating, you may decide to view the compass page (see picture above left) instead of the highway page.

To select the compass page:

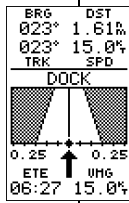
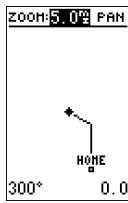
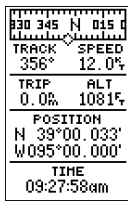
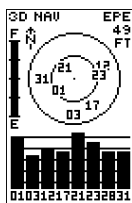
1. While viewing the highway page press **ENTER** twice.

The compass page will now become the displayed navigation page. This page provides a directional pointer to your destination, by using a rotating compass display to show direction of travel. It provides better steering guidance at slower speeds for travel with many directional changes.

To switch back to the highway page, press **ENTER** twice, again.

Scrolling Through the Main Pages

Now that you've arrived 'HOME', let's take a minute to see how the GPS 45XL's main pages work together. The GPS 45XL features five main pages, which are linked together in a chain. You can quickly scroll through the pages in either direction using the **PAGE** and **QUIT** keys.



1. Press the **PAGE** key to scroll through the five main pages in sequence.
2. Press the **QUIT** key to scroll through pages in the opposite direction.

Menu Page

You've already seen the first four pages in action by acquiring satellites, marking a position and navigating to a destination. The last page available from the main page sequence is the menu page, which provides access to the GPS 45XL's waypoint management, route, track log and setup features. The 11 submenus are divided into categories by function.

To select a submenu from the menu page:

1. Press **PAGE** or **QUIT** until the menu page appears.
2. Use the **▲** or **▼** keys to highlight the submenu you want to view.
3. Press **ENTER** to access the submenu.



Menu Page

Use the UP and DOWN keys to select a submenu from the menu page. Press ENTER to access the selected submenu.

Getting Started

Track Log/ Power Off

| | |
|---|------------------|
| TRACK LOG | |
| RECORD: | Yes |
| CRITERIA: Automatic | |
| MEMORY USED 2 of 768 points (0%) | |
| CLEAR LOG? | TRACBACK? |

Highlight the **CLEARLOG?** prompt and press **ENTER** to clear the track log. Once all 768 points are used, the oldest point will be continuously deleted to make room for the latest track log point.

| | |
|--|--|
| CLEAR LOG | |
| WARNING! | |
| all track log points will be deleted | |
| Are you sure Yes? or No? | |

Confirm the track log warning page to clear the log.

Clearing the Track Log

After you've used the GPS45XL for a few trips, you may find that your map display has become a bit messy from keeping track of your every move. To get a feel for how the menu page works, let's clear the track log (the plot points left on the map page) we've just created during the Getting Started tour.

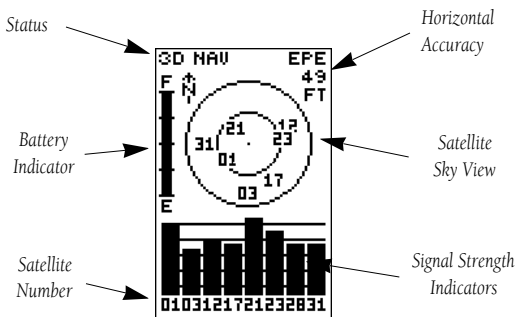
1. Press **PAGE** or **QUIT** until the menu page appears.
2. Use the **▼** key to move the field highlight to the 'TRACKLOG' option.
3. Press **ENTER** to access the track log page.
4. Press the **▲** key twice to highlight the 'CLEARLOG?' option. The clear log confirmation page will appear.
5. Use the **◀** key to highlight the 'Yes' prompt.
6. Press **ENTER** to finish.

Turning the Receiver Off

You've now gone through the basic operation of your new GPS receiver and probably know a little more than you think about how it works. We encourage you to experiment with the GPS 45XL until it becomes an extension of your own navigation skills. If you encounter any problems using the unit or want to take advantage of the GPS 45XL's more advanced features, refer to the reference section.

To turn the GPS 45XL off:

1. Press and hold the **📶** key for 3 seconds.

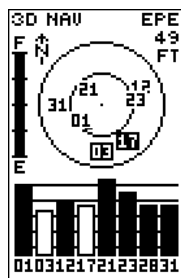
Satellite Status Page

The satellite status page displays the status of various receiver functions. The status information will help you understand what the GPS 45XL is doing at any given time, and tell you whether or not the receiver has calculated a position fix.

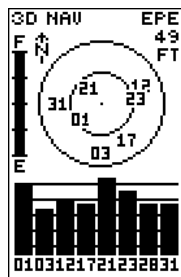
Sky View and Signal Strength Bars

The sky view and signal strength bars give you an indication of what satellites are visible to the receiver, whether or not they are being used to calculate a position fix, and the signal quality. The sky view in the center of the page shows a bird's-eye view of the position of each satellite relative to the receiver's last known position. The outer circle represents the horizon (north up); the inner circle 45° above the horizon; and the center point a position directly overhead.

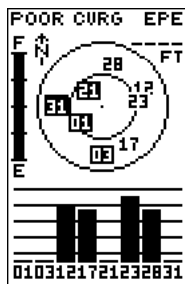
When the receiver is looking for a particular satellite, the corresponding signal strength bar will be blank and the sky view indicator will remain highlighted in reverse video. Once the receiver has found the satellite, a hollow signal strength bar will appear, indicating that the satellite has been found and the receiver is collecting data from it. The satellite number in the sky view will also change from reverse video to normal presentation. As soon as the GPS 45XL has collected the necessary data to use the satellite for positioning, the hollow bar will become solid.



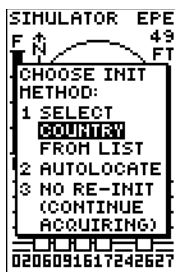
Satellites in view but not currently in use (03 & 17) will be displayed in reverse video, with the corresponding signal strength bar 'hollow'.



Once a satellite in view is usable for positioning, the satellite number will change from reverse video and the signal strength bar will become solid.



A 'Poor Coverage' status will appear if the receiver has lost the satellites required to compute a fix. Make sure the internal antenna is not covered and has a clear view of the sky.



If you travel more than 500 miles with the receiver off, you may have to reinitialize it to your new location. To access the EZinit prompt, press ENTER from the status page before the receiver has acquired any satellites.

Receiver Status and EPE

Receiver status is indicated at the top left of the screen, with the current horizontal accuracy (estimated position error, in feet or meters) at the top right. The status will show one of the following conditions:

Searching— the GPS 45XL is looking for any available satellites in view.

AutoLocate™— the GPS 45XL is initializing and collecting new almanac data. This process can take 7.5 to 15 minutes.

Acquiring— the receiver is collecting data from available satellites, but has not collected enough data to calculate a 2D fix.

2D Navigation— at least three satellites with good geometry have been locked onto and a 2-dimensional position fix (latitude and longitude) is being calculated. '2D Diff' will appear when you are receiving DGPS corrections in 2D mode.

3D Navigation— at least four satellites with good geometry have been locked onto, and your position is now being calculated in latitude, longitude and altitude. '3D Diff' will appear when you are receiving DGPS corrections in 3D mode.

Poor GPS Coverage— the receiver is no longer tracking enough satellites for a 2D or 3D fix.

Not Usable— the receiver is unusable, possibly due to incorrect initialization or abnormal satellite conditions. Turn the unit off and back on to reset.

Simulating Navigation— the receiver is in simulator mode.

EZinit Option Prompt

The satellite status page also provides access to the EZinit prompt whenever a position fix has not been calculated (the unit must be in searching, AutoLocate, acquiring, simulator or poor coverage mode). This allows you to manually reinitialize the unit (see page 5-8 for instructions), and is useful if you have travelled over 500 miles with the receiver off and you know it must be initialized to your new position (the GPS 45XL will automatically offer the EZinit prompt after 10 minutes of unsuccessful satellite acquisition).

Battery Level Indicator

The satellite status page also features a battery level indicator, located below the status field to the left of the sky view, which provides a graphic display of the condition of the internal batteries.




The battery level indicator is calibrated for alkaline batteries. Ni-Cad and lithium batteries will not accurately display the battery level due to voltage differences. No other receiver functions are affected by using Ni-Cad or lithium batteries.



It's always best to store your GPS receiver with the batteries installed to preserve the internal memory and data. The GPS 45XL features a rechargeable lithium battery that will maintain the internal memory for 3 months in the event that the batteries are removed or totally discharged.

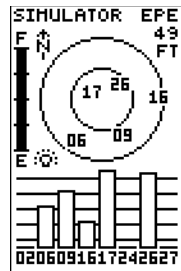
Screen Backlighting

The GPS 45XL's automatic backlight feature illuminates the screen display for a user-defined interval (the default is 15 seconds) after every keystroke. When backlighting is on, a bulb icon will appear at the bottom left of the sky view. To turn the screen backlighting on or off:

1. Press the  key.
2. To adjust the duration of screen backlighting, refer to the operation setup section (page 46).



Using the screen backlighting can greatly affect battery life. If you're using your GPS 45XL primarily in daylight hours, you should keep the backlight timeout at the default 15 second setting.



A bulb icon will appear on the status page whenever the screen backlighting is on. The backlight will turn on for the time selected after every keystroke.

Reference

Position Page

| | |
|-----------------|-------|
| 830 345 N 015 0 | |
| TRACK | SPEED |
| 356° | 25.0% |
| TRIP | ALT |
| 0.8% | 1081f |
| POSITION | |
| N 39°00.791' | |
| W095°00.000' | |
| TIME | |
| 10:24:46 | |

The speed displayed on the position page may fluctuate at slow speeds (or when you're standing still).

| | |
|-----------------|-------|
| 830 345 N 015 0 | |
| TRACK | SPEED |
| 356° | 25.0% |
| TRIP | ALT |
| 0.0% | 1081f |
| POSITION | |
| N 39°00.937' | |
| W095°00.000' | |
| TIME | |
| 10:25:07 | |

To reset the trip odometer, highlight the trip field and press ENTER. Use the LEFT arrow key to clear the distance field and press ENTER to confirm.

Position Page

The GPS 45XL's position page shows you where you are, what direction you're heading and how fast you are going (up to 99.9 mph), and is most useful when you are traveling without an active destination waypoint. A graphic compass tape at the top of the page displays your cardinal heading (while you're moving), with your current track and speed over the ground indicated below. The rest of the page shows your present position in three dimensions (latitude, longitude and altitude). The units of measure for speed, distance, position and altitude are all user-selectable through the navigation setup menu (see pages 47-48). The 12/24 hour clock and time offset options are available from the system setup menu (see page 46).

Trip Odometer

The position page also features a resettable trip odometer to measure the total distance travelled while navigating.

To reset the trip odometer:

1. Press the ▼ key until the trip field is highlighted.
2. Press **ENTER**, followed by ◀.
3. Press **ENTER** to finish.

Altitude Display

When the GPS 45XL is acquiring satellites or navigating in the 2D mode, the last known altitude will be used to compute your position. If the altitude shown is off by several hundred feet, you can manually enter your altitude for greater accuracy. Note that GPS altitudes can fluctuate due to errors.

1. Press the ▼ key until the altitude field is highlighted.
2. Press **ENTER** to begin entry of your altitude.
3. Use the ▲ and ▼ keys to enter a value in each character field, and use the ◀ and ▶ keys to move to the next character position.
4. Press the **ENTER** key to confirm the altitude.

Marking and Saving Waypoints

Knowing your present position is only part of any navigation equation. You also need to keep track of where you've been and where you are going. Waypoints serve as electronic markers that let you keep track of starting points, destinations, nav aids and any other important position.

The GPS 45XL allows you to mark, store and use up to 250 waypoints. A waypoint position can be entered by taking an instant electronic fix or by manually entering a coordinate or range and bearing in reference to an existing waypoint. If you try to mark a waypoint without having a position fix, you'll be notified with a 'No GPS Position' message.

To mark your present position:

1. Press the **MARK** key to capture your position.

The mark position page will appear, showing the captured position and a default 3-digit waypoint name.

To change the default position name :

1. Press the **▲** key twice to move the field highlight from the 'save' field to the name field.
2. Press **ENTER** to begin entry of the name. Pressing the **◀** key will clear any existing data.
3. Use the **▲** and **▼** keys to enter a value in the appropriate character field, and use the **◀** and **▶** keys to move to each character position.
4. Press **ENTER** to confirm the waypoint name. The field highlight will move to the 'route' field.

If you'd like to add this waypoint to a route:

1. Press the **ENTER** key.
2. Use the **▲** or **▼** keys to enter a route number.
3. Press the **ENTER** key to confirm the route number.
4. Press the **ENTER** key again to save the waypoint.

If you do not want to add this waypoint to a route:

1. Highlight the 'save' field and press the **ENTER** key.

| |
|----------------------|
| MARK POSITION |
| Waypoint: |
| 001 |
| N 39°09.532' |
| W095°00.000' |
| Add to route |
| number: -- |
| SAVE? |

The GPS 45XL will save new waypoints with a default three digit name.

| |
|----------------------|
| MARK POSITION |
| Waypoint: |
| REEF |
| N 39°10.112' |
| W095°00.000' |
| Add to route |
| number: 8 |
| SAVE? |

You may add a new waypoint to the end of any storage route by entering the desired route number in the route field before saving the waypoint.

Reference

Creating & Using Waypoints

| MENU |
|---------------|
| NEAREST WPTS |
| WAYPOINT LIST |
| WAYPOINT |
| ROUTES |
| DIST AND SUN |
| MESSAGES |
| SYSTEM SETUP |
| NAV SETUP |
| MAP SETUP |
| TRACK LOG |
| INTERFACE |

To select a waypoint sub-menu, highlight the desired option and press ENTER.

| NEAREST WPTS | | |
|--------------|------|------|
| WAYPNT | BRG | DST |
| REEF | 176° | 0.40 |
| FUEL | 168° | 3.41 |
| DIVE1 | 150° | 7.39 |
| DOCK | 176° | 7.89 |
| WRECK | 176° | 8.36 |
| CAR | 176° | 10.1 |
| ----- | --- | --- |
| ----- | --- | --- |
| ----- | --- | --- |

Nearest Waypoints Page

The compass heading (BRG) and distance (DST) to the nine nearest waypoints are updated continuously.

Waypoint Submenus

The GPS 45XL has three waypoint submenu pages that let you manage a large number of waypoints quickly and efficiently. The nearest waypoints, waypoint list and waypoint definition pages are accessed through the menu page.

To select a waypoint submenu page:

1. Press **PAGE** or **QUIT** until the menu page appears.
2. Use the **▲** and **▼** keys to highlight the waypoint submenu page you want to use.
3. Press **ENTER** to display the submenu page.
4. To return to the menu page, press the **PAGE** key.

Nearest Waypoints Page

The nearest waypoints page shows the nine nearest waypoints that are within 100 miles of your present position, with the bearing and range noted for each waypoint. During an emergency, the nearest waypoints page can give you the closest points of safety in your area at a glance.

The nearest waypoints page will also let you retrieve a waypoint definition page or GOTO a selected waypoint right from the list.

To review the waypoint definition page of a highlighted waypoint from the list:

1. Press the **ENTER** key.

To return to the nearest waypoint page (when the 'done' field is highlighted):

1. Press the **ENTER** key.

To GOTO a highlighted list waypoint:

1. Use the **▲** and **▼** keys to highlight a listed waypoint.
2. To select a highlighted nearest waypoint as a destination, press the **GOTO** key.
3. Once the GOTO waypoint page appears, press the **ENTER** key to confirm the selected waypoint as your destination.

Waypoint List Page

The waypoint list page provides you with a complete list of all waypoints currently stored in the GPS 45XL. The total number of used and empty waypoints is indicated above the waypoint list. From the waypoint list page, you can retrieve a waypoint definition page, delete all user-defined waypoints, or GOTO a selected waypoint. If a waypoint is currently used in a route, the lowest route number will be indicated to the left of the waypoint name.

To review the waypoint definition page of a highlighted list waypoint:

1. Press the **ENTER** key.

To return to the waypoint list page (with the 'done' field highlighted):

1. Press the **ENTER** key.

To GOTO a list waypoint:

1. Use the **▲** and **▼** keys to scroll through the list and select a waypoint.
2. To select a highlighted waypoint as a destination, press the **GOTO** key.
3. Once the GOTO waypoint page appears, press the **ENTER** key to confirm the selected waypoint as your destination.

To delete all user-defined waypoints:

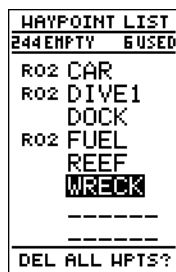
1. Use the **▲** or **▼** keys to move the cursor highlight to the 'delete all waypoints' field.
2. Press the **ENTER** key.

A warning page will appear, asking if you are sure you want to delete all user-defined waypoints and routes. If you want to continue and delete:

1. Press the **◀** key to highlight the 'Yes' field.
2. Press the **ENTER** key.
3. Press the **QUIT** key to return to the menu page.

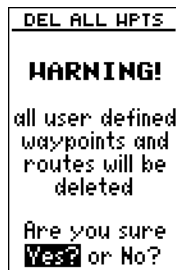
If you do not want to delete all waypoints:

1. Press **ENTER** with the 'no' field highlighted.



Waypoint List Page

The total number of used and available waypoints is indicated at the top of the page. If a listed waypoint is a route waypoint, a 'RXX' will be displayed (See RO2 above).



Deleting all user waypoints will also delete all routes stored in memory.

Reference

Creating & Using Waypoints

| WAYPOINT | |
|-----------------|-------|
| NAME: DIVE1 | |
| N 39°03.862' | |
| W094°55.890' | |
| 05-JAN-96 14:11 | |
| REF: ----- | |
| BRG | DST |
| 152° | 7.95% |
| RENAME? NEW? | |
| DELETE? DONE? | |

Waypoint Definition Page

Use the waypoint definition page to review, rename or delete stored waypoints and to create new waypoints manually.

| WAYPOINT | |
|----------------|-------|
| NAME: []----- | |
| ----- | |
| ----- | |
| REF: ----- | |
| BRG | DST |
| ----- | ----- |
| RENAME? NEW? | |
| DELETE? DONE? | |

After selecting entry of a 'NEW' waypoint, an empty waypoint screen will appear. Note: you must enter a name for the waypoint or the highlight will not advance to the next field. The name may be either an existing waypoint or a new name entered manually.

Waypoint Definition Page

The last of the three waypoint management pages is the waypoint definition page. This page lets you create new waypoints manually, or review and edit existing waypoints.

| WAYPOINT | |
|---------------------------------|-----------------------|
| Waypoint Name | NAME: DIVE1 |
| | N 39°03.862' |
| | W094°55.890' |
| | 05-JAN-96 14:11 |
| Reference Waypoint | REF: ----- |
| | BRG DST |
| | 152° 7.86% |
| Bearing from Reference Waypoint | RENAME? NEW? |
| | DELETE? DONE? |
| | ↑ Function Prompts |

Position Coordinates

Distance from Reference Waypoint

To create a new waypoint manually, you'll need to know its position coordinates or its distance and bearing from an existing waypoint.

To create a waypoint by entering coordinates:









1. If a waypoint is currently displayed in the name field, highlight 'NEW?' and press **ENTER**. Then press the **◀** key to clear the name field.
2. If a waypoint is not displayed, move the cursor to the name field and enter the new waypoint's name.
3. Use **▲** and **▼** to enter your waypoint name and use **◀** and **▶** to move to the next character position.
4. Press **ENTER** to confirm the waypoint name. The position field will now become highlighted, with the receiver's last known position shown, if one exists.
5. Press **ENTER** to begin entry of the position.
6. Use the **▲** and **▼** keys to enter your position, and use the **◀** and **▶** keys to move to each character field.
7. Press **ENTER** to confirm and save your coordinates. The default waypoint comment (UTC date and time of creation) will appear, and the highlight will move to 'DONE?'
8. Press the **ENTER** key to return to the menu page.

Reference Waypoints

To create a new waypoint manually without knowing its position coordinates, you'll need to enter its bearing and distance from an existing waypoint. The GPS 45XL will then calculate the position coordinates for you.

| WAYPOINT | |
|-----------------|---|
| NAME: DIVE1 | |
| N 39°03.862' | |
| W094°55.890' | |
| 05-JAN-96 14:11 | |
| REF: | <input checked="" type="checkbox"/> EEF__ |
| BRG | DST |
| 153° | 8.18% |
| RENAME? | NEW? |
| DELETE? | DONE? |

To create a new waypoint by referencing a stored waypoint:

1. Press  until the 'NEW?' field is highlighted.
2. Press .
3. Enter the name of your new waypoint.
4. Press the  key to confirm the waypoint name. The position field will now become highlighted, with the receiver's last known position shown.
5. Press  to move the cursor to the reference field.
6. Press  to begin entry of the reference waypoint.
7. Use the arrow keypad to enter the waypoint name.
8. Press the  key to confirm your entry.
9. Enter the bearing and distance of your new waypoint from the reference waypoint. Remember to use the  key to begin entry and confirm each field. The coordinates will be calculated and saved for your new waypoint.
10. Press the  key (with the 'done' field highlighted) to return to the menu page.

| WAYPOINT | |
|-----------------|--|
| NAME: DIVE1 | |
| N 39°03.862' | |
| W094°55.890' | |
| 05-JAN-96 14:11 | |
| REF: | ----- |
| BRG | DST |
| 153° | <input checked="" type="checkbox"/> 0.0% |
| RENAME? | NEW? |
| DELETE? | DONE? |

The GPS 45XL's advanced waypoint and planning features allow you to create new waypoints and practice navigation without ever setting foot outside.

If you create a new waypoint by entering coordinates from a map, you may want to remark the waypoint's exact position once you get there.

To re-define an existing waypoint's position coordinates from the waypoint definition page, simply highlight the DST field and press ENTER. Use the LEFT arrow key to set the distance to 0.00, and press ENTER to confirm.

The old coordinates will be replaced by the coordinates of your present position (you must have a valid 2D or 3D position fix).

| WAYPOINT | |
|---------------|-------|
| NAME: DIVE1 | |
| N 39°03.862' | |
| W094°55.890' | |
| ---LOBSTER--- | |
| REF: ----- | |
| BRG | DST |
| 155° | 9.00% |
| RENAME? | NEW? |
| DELETE? | DONE? |

The waypoint comments field will automatically assign the date and time of creation to the waypoint comments field. You may enter a 16 character user comment at any time.

| WAYPOINT | |
|--------------|-------|
| NAME: DIVE1 | |
| N 39°03.862' | |
| W094°55.890' | |
| LOBSTER | |
| REF: ----- | |
| BRG | DST |
| 155° | 9.09% |
| RENAME? | NEW? |
| DELETE? | DONE? |

To access the rename function from the waypoint definition page, highlight the 'RENAME?' prompt and press ENTER.

Editing Existing Waypoints

The waypoint definition page also allows you to change the name, coordinates, comment or reference waypoint field for a stored waypoint. (Fields shown on page 24)

To edit the name, coordinates, comment, or reference waypoint field:

1. Use ▲ and ▼ to highlight the field you want to edit.
2. Press **ENTER** to begin entry in the selected field.
3. Enter your new data.
4. Press the **ENTER** key to confirm your changes.

Waypoint Comments

Each waypoint stored in the GPS 45XL has a user-defined 16 character comment field. The default comment is the UTC date and time of the waypoint's creation.

To change or add a comment:

1. Use the ▲ and ▼ keys to highlight the comment field.
2. Press **ENTER** to begin entry of your comment.
3. Enter the comment and press the **ENTER** key to confirm.

Renaming and Deleting Waypoints

| RENAME WAYPNT |
|--------------------|
| From |
| DIVE1 |
| To: |
| DIVE4 |
| Are you sure |
| Yes? or No? |

The rename and delete function fields are located at the bottom left of the waypoint definition page (you'll need to use the ◀ key to move the field highlightout of its standard up-and-down scrolling sequence).

To rename a stored waypoint:

1. Highlight the 'RENAME?' field and press **ENTER**.
2. Enter the new waypoint name and press **ENTER**.
3. Press the **ENTER** key to confirm your changes.

To delete a stored waypoint:

| WAYPOINT | |
|-----------------|-------------|
| NAME: | REEF |
| N | 39°00.143' |
| W | 095°00.000' |
| 08-MAR-96 09:28 | |
| REF: | ----- |
| BRG | DST |
| 176° | 0.21M |
| RENAME? | NEW? |
| DELETE? | DONE? |

1. Highlight the 'DELETE?' field and press **ENTER**.
2. Press the **◀** key to select the 'YES' prompt.
3. Press **ENTER** to delete the waypoint.

Scanning Waypoints

As you manually enter a waypoint's name, the GPS 45XL's waypoint scanning feature will automatically display the first numerical or alphabetical match of the character you have entered to that point. This helps eliminate the need to always enter a waypoint's complete name.

To scan waypoints from a waypoint field:

1. Highlight the waypoint name field and press **ENTER**.
2. Press the **◀** key to clear the name field.
3. Use the **▲** and **▼** keys to scroll through waypoints.
4. If you have more than one waypoint that begins with the same letter or number, you must use the **▶** key to move to the next character positions as needed. Only the first character match is listed for each character set.
5. Once you've found the desired waypoint, press **ENTER**.

| DELETE WAYPT | |
|-----------------|--------|
| WARNING! | |
| REEF | |
| will be deleted | |
| Are you sure | |
| Yes? | or No? |

To delete a waypoint, confirm the 'Yes?' prompt. Route or active waypoints may not be deleted until they are removed from the route or the GOTO has been cancelled.

| WAYPOINT | |
|----------|-------|
| NAME: | FUEL |
| ----- | ----- |
| ----- | ----- |
| REF: | ----- |
| BRG | DST |
| ----- | ----- |
| ----- | ----- |
| RENAME? | NEW? |
| DELETE? | DONE? |

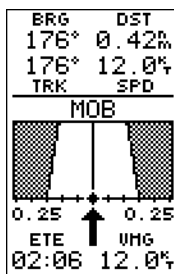
The waypoint scanning feature will offer the first waypoint that matches the character or characters you have entered to that point.

Reference

GOTO & MOB Navigation



Select a destination waypoint from the GOTO waypoint list.



Once the MOB mode has been activated, steering guidance will be provided by the compass or highway page. Activating another MOB will overwrite the previous MOB waypoint.

Selecting a GOTO Destination

The GPS 45XL provides four ways to navigate to a destination: GOTO, MOB, TracBack and route navigation. The most basic method of selecting a destination is the GOTO function, which lets you choose any stored waypoint as the destination and quickly sets a direct course from your present position.

To activate the GOTO function:

1. Press the **GOTO** key. The GOTO waypoint list, an alphabetical list of all available waypoints, will appear.
2. Use the **▲** and **▼** keys to select the waypoint you want to navigate to (it may already be highlighted).
3. Press the **ENTER** key to confirm, or **QUIT** to stop selection of a GOTO destination and return to the previous page.

Once a GOTO waypoint has been activated, the compass page or highway page will provide steering guidance to the destination until either the GOTO is cancelled or the unit has resumed navigating the active route (see page 36).

To cancel an active GOTO:

1. Press the **GOTO** key.
2. Use the arrow keypad to move the field highlight to the 'CANCELGOTO?' prompt at the bottom of the page and press **ENTER**.

Man Overboard Function

The GPS 45XL's man overboard function (MOB) lets you simultaneously mark and set a course to a position for quick response to passing positions (like the spot where your hat blew overboard).

To activate the MOB mode:

1. Press the **GOTO** key twice. The GOTO waypoint page will appear with 'MOB' selected as the default destination.
2. Press the **ENTER** key to begin MOB navigation.

The GPS 45XL will now guide you to the MOB waypoint until the MOB GOTO is cancelled (see "cancel GOTO" above). If you want to save the MOB waypoint, be sure to rename it, because it will be overwritten the next time a MOB is executed.

TracBack Navigation

The third method of navigating to a destination is by using the GPS 45XL's TracBack feature. The TracBack function allows you to quickly and easily retrace your path using the track log automatically stored in the receiver's memory. The advantage of the TracBack feature is to eliminate the need to mark waypoints along the way and manually create and activate a route back to where you began your trip.

The TracBack route is created by reducing your current track log into a route of up to 30 waypoints, and activating an inverted route along those points. Once activated, a TracBack route will lead you back to the oldest track log point stored in memory, so it's usually a good idea to clear the existing track log at the starting point of your current trip (e. g. your car or the dock) *before* you get started.

To clear the track log and define a starting point for a TracBack route:

1. From the menu page, highlight the 'TRACKLOG' option.
2. Press **ENTER** to access the track log page.
3. Use the **▲** key to highlight the 'CLEARLOG?' option.
4. Press **ENTER**. The clear log confirmation page will appear.
5. Use **◀** to highlight the 'Yes?' prompt and press **ENTER**.

To activate a TracBack route:

1. From the menu page, highlight the 'TRACKLOG' option.
2. Press **ENTER** to access the track log page.
3. Highlight the 'TRACBACK?' option and press **ENTER**.

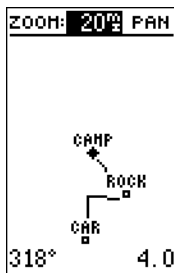
Once the TracBack function has been activated, the GPS 45XL will take the track log currently stored in memory and divide it into segments called legs. Up to 30 temporary waypoints (e.g., 'T001') will be created to mark the most significant features of the track log in order to duplicate your exact path as closely as possible. A TracBack route from your present position to the oldest track log point will be created as the active route (the active route page will appear), and provide steering guidance to each waypoint back to the starting point of your track log.

| | |
|--------------|-----|
| TRACK LOG | |
| RECORD: | Yes |
| CRITERIA: | |
| Automatic | |
| MEMORY USED | |
| 2 of 768 | |
| points (0%) | |
| CLEAR LOG? | |
| TRACBACK? | |

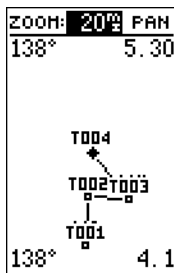
Clearing the log before you get started will define the position the TracBack function will return you to.

| | |
|--------------|-----|
| TRACK LOG | |
| RECORD: | Yes |
| CRITERIA: | |
| Automatic | |
| MEMORY USED | |
| 2 of 768 | |
| points (0%) | |
| CLEAR LOG? | |
| TRACBACK? | |

Highlight the 'TracBack' prompt and press ENTER to begin TracBack navigation. An on-screen status box will monitor the progress of the TracBack calculation.



The TracBack feature will navigate your track log back to the oldest point in the receiver's memory.



The track log will be divided into segments with temporary waypoints to create a route back to the beginning of the track log.

Tips on Creating and Using the TracBack Feature

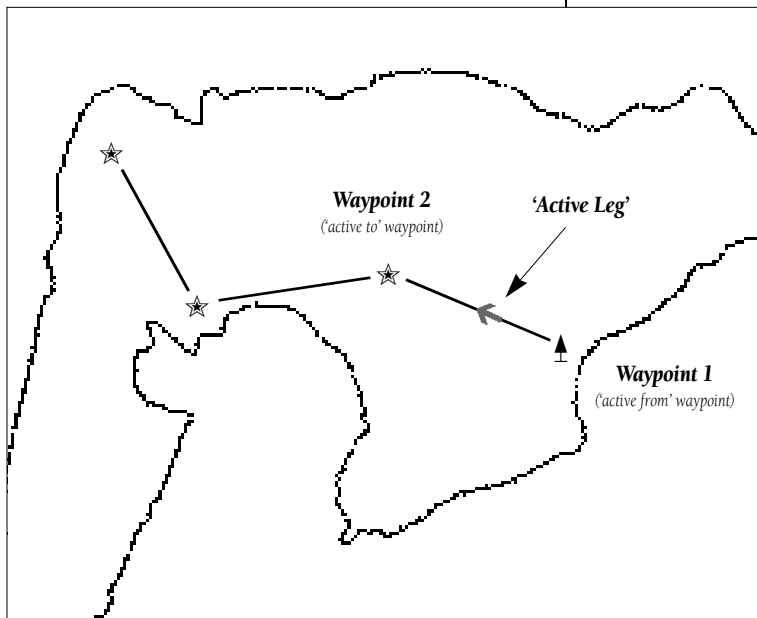
The GPS 45XL's TracBack feature is designed to help you quickly create and activate a route that follows your path back to a user-defined starting point. To get the most out of the TracBack feature, remember the following tips:

- Always clear your track log at the exact point that you want to go back to (trail head, truck, dock, etc.).
- The 'RECORD' option on the track log setup page must be set to the 'Yes' position.
- There must be at least two track log points stored in memory to create a TracBack route.
- If there are not enough available waypoints in memory to create a TracBack route, you will be alerted with a 'waypoint memory full' message, and the receiver will use any available waypoints to create a TracBack route with an emphasis on the track log closest to the destination (the oldest track log point in memory).
- If the 'CRITERIA' option on the track log setup page is set to a time interval, the TracBack route may not follow your exact path (keeping the criteria set to automatic will always provide the best TracBack route).
- If the receiver is turned off or you lose satellite coverage during your trip, the TracBack route will simply draw a straight line between any point where coverage was lost and where it resumed.
- If the changes of direction and distance of your track log are very complex, 30 waypoints may not be enough to accurately mark your exact path. The receiver will then assign the 30 waypoints to the most significant points of your track, and simplify segments with fewer changes in direction.
- If you want to save a TracBack route, copy route 0 to an open storage route before activating another TracBack. Activating another TracBack or storage route will overwrite the existing TracBack route.
- Whenever a TracBack route is activated, the receiver will automatically erase any temporary waypoints (e.g., 'T001') that are not contained in routes 1-19. If there are temporary waypoints stored in routes 1-19, the receiver will create any new temporary waypoints using the first three-digit number available.

Creating and Navigating Routes

The last form of navigating to a destination with the GPS 45XL is by creating a user-defined route. The route navigation feature lets you plan and navigate a course from one place to another using a set of pre-defined waypoints. Routes are often used when it's not practical, safe or possible to navigate a direct course to a particular destination (e.g., through a body of water or impassable terrain).

Routes are broken down and navigated in smaller segments called 'legs'. The waypoint you are going to in a leg is called the 'active to' waypoint, and the waypoint immediately behind you is called the 'active from' waypoint. The line between the 'active to' and the 'active from' waypoint is called the 'active leg'.



Whenever you activate a route with the GPS 45XL, it will automatically select the route leg closest to your position as the active leg. As you pass each waypoint in the route, the receiver will automatically sequence and select the next waypoint as the 'active to' waypoint.

| | |
|----------------------------------|--|
| MARK POSITION | |
| Waypoint: FALLS | |
| N 40°23.754' W074°46.123' | |
| Add to route number: 1 | |
| SAVE? | |

If you're heading out without a planned route, the mark function can be used to quickly create a route back to your starting point.

Create a series of waypoints along the way with the mark key and save them to an open route from the mark position page. When you're ready to head back, simply activate the route you created in inverted order (see page 34).

Route Definition Page

The GPS 45XL lets you create and store up to 20 routes of 30 waypoints each. Routes are created, copied and edited through the route definition page, which is accessed through the menu page.

To select the route definition page:

1. Press **PAGE** until the menu page appears.
2. Use the **▲** and **▼** keys to highlight the 'ROUTES' option.
3. Press the **ENTER** key to display the route definition page.
4. To return to the menu page, press **PAGE**.

| | | | | |
|----------------------|-----------------------|-------|-------------|----------------|
| ROUTE: 0 | | | | Route Number |
| ----- | | | | |
| Comment Field | NO WAYPNT DTH DST | | | |
| | 1 | ----- | ----- | Leg Distance |
| | 2 | ----- | ----- | |
| Desired Track of Leg | 3 | ----- | ----- | |
| | 4 | ----- | ----- | |
| | 5 | ----- | ----- | |
| | 6 | ----- | ----- | |
| | TOTAL DST | | 0.00 | Total Distance |
| Copy Field | COPY TO: -- | | | |
| | CLR? INV? ACT? | | | |
| | ↑ Function Prompts | | | |

The route number field is displayed at the top of the page, with a 16-character user comment below. If no user comment is entered, the field will display the first and last waypoint in the route. The waypoint list in the middle of the page accepts up to 30 waypoints for each route, with fields for desired track and distance between legs. The total distance of the route is indicated below the waypoint list.

The bottom of the route definition page features several function fields which let you copy, clear, invert or activate the displayed route. Routes 1-19 are used as storage routes, with route 0 always serving as the active route you are navigating. If you want to save a route currently in route 0, be sure to copy it to another open route, as it will be overwritten by the next route activation.

To create a route from the route definition page:

1. Highlight the route number field and press **ENTER**.
2. Enter a route number and press the **ENTER** key to confirm.
3. Press **ENTER** to begin entry of a route comment. (Note that the default [first and last waypoint] comment will only appear if the comment field is blank.)
4. Enter your comment and press the **ENTER** key.
5. Highlight the No. 1 waypoint field and press **ENTER**.
6. Enter the first waypoint of your route and press **ENTER**.
7. Continue entering the rest of your waypoints in order, using the **ENTER** key to start and confirm each field entry. The list will automatically scroll down as needed.
8. After you have entered all your waypoints, press **PAGE**.

Copying and Clearing Routes

The route definition page is also used to copy a route to another route number. This feature is useful when you make changes to the active (or TracBack) route and want to save the route for future use.

To copy a route:

1. Highlight the route number field and press **ENTER**.
2. Enter the route number to be copied and press **ENTER**.
3. Highlight the 'COPYTO' field and press **ENTER**.
4. Scroll through the available routes and select a destination route number. Only open routes will be available as choices. Press the **ENTER** key to copy the route.
5. Press the **PAGE** key to return to the menu page.

To clear a route from memory:

1. Highlight the route number field and press **ENTER**.
2. Enter the route number and press **ENTER**.
3. Select the 'CLR?' prompt and press **ENTER**.

| ROUTE: 5 | | | |
|----------------|--------|-----|------|
| NO | WAYPNT | DTH | DST |
| 1 | BAR | --- | --- |
| 2 | --- | --- | --- |
| 3 | --- | --- | --- |
| 4 | --- | --- | --- |
| 5 | --- | --- | --- |
| 6 | --- | --- | --- |
| TOTAL DST | | | 0.00 |
| COPY TO: -- | | | |
| CLR? INV? ACT? | | | |

Enter each waypoint in the order you would like to navigate them. If you enter a waypoint not stored in memory, you'll need to define the position on the waypoint definition page.

| ROUTE: 4 | | | |
|----------------|--------|------|------|
| DOCK TO DIVE1 | | | |
| NO | WAYPNT | DTH | DST |
| 1 | DOCK | 356' | 7.5 |
| 2 | REEF | 176' | 8.0 |
| 3 | WRECK | 058' | 3.6 |
| 4 | DIVE1 | --- | --- |
| 5 | --- | --- | --- |
| 6 | --- | --- | --- |
| TOTAL DST | | | 19.1 |
| COPY TO: 4? | | | |
| CLR? INV? ACT? | | | |

To copy a route, select an open storage route and press the ENTER key. If you select a route that is already used, you'll be alerted with a 'Route Full' message.

Reference

Route Navigation

CLEAR ROUTE

WARNING!

all waypoints
will be removed
from this route

Are you sure
Yes? or No?

Clearing a route only removes the waypoints from the route selected. The waypoints used will remain in the receiver's memory.

| ROUTE: 4 | | | |
|---------------|-------|------|------|
| DOCK TO DIVE1 | | | |
| NO | WAYPT | DTK | DST |
| 1 | DOCK | 356° | 7.5 |
| 2 | REEF | 176° | 8.0 |
| 3 | WRECK | 058° | 3.6 |
| 4 | DIVE1 | --- | --- |
| 5 | --- | --- | --- |
| 6 | --- | --- | --- |
| TOTAL DST | | | 19.1 |
| COPY TO: -- | | | |
| CLR? | INV? | ACT? | |

To activate a route, highlight the 'ACT?' prompt and press ENTER.

Clearing Routes (continued)

The clear route warning will appear, asking you to confirm that you want to remove all waypoints from the route.

1. Highlight the 'Yes?' field with the **◀** key.
2. Press **ENTER** to confirm your action.
3. Press **PAGE** to return to the menu page.

Activating and Inverting Routes

After a route has been entered, it can be activated in its defined sequence or inverted from the route definition page. The process of activating or inverting a stored route takes a storage route (routes 1-19) and copies it into the active route (route 0) for navigation. The storage route is now no longer needed and will be retained in its original format under its existing route number.

This system allows you to have an active route that you may edit during navigation and save as an entirely new route from the original. You will have to copy the active route to an unused storage route to save it, since new route or TracBack activation overwrites route 0.

To activate a route:

1. Select the route definition page and press the **ENTER** key to activate the route number field.
2. Enter the route number to be activated and press **ENTER**.
3. Move the field highlight to the 'ACT?' prompt and press the **ENTER** key.

Inverting a route allows you to navigate route legs in reverse order without editing the original route.

To activate a route in inverted order:

1. Follow the steps above, but select the 'INV?' prompt and press **ENTER**.

Active Route Page

Once a route has been activated, the active route page will appear, displaying the waypoint sequence of your route with the estimated time enroute (ETE) at your present speed and distance to each waypoint. As long as you are navigating an active route, the active route page will become part of the main page sequence of the unit.

The active route page will also allow you to change the ETE field to display desired track (DTK) or estimated time of arrival (ETA) for each leg. In addition you can also clear or invert the active route.

To display DTK or ETA for each leg:

1. Highlight the estimated time enroute (ETE) field and press the **ENTER** key.
2. Use the **▲** or **▼** keys to select 'DTK' or 'ETA' and press the **ENTER** key.

The active route page also allows you to clear (stop navigating) or invert the active route without using the route definition page.

To invert a route from the active route page:

1. Press the **▲** key once to move the field highlight to the 'INVERT?' prompt.
2. Press the **ENTER** key to invert the route.

To clear the active route from the active route page and stop route navigation:

1. Use the **▲** and **◀** keys to select the 'CLEAR?' prompt.
2. Press the **ENTER** key to clear the active route.

Editing Routes

Once a route has been created and stored, it can be edited at any time, even if it is the active route.

To edit a route from the active route page or the route definition page:

1. Use the **▲** and **▼** keys to select the waypoint you want to edit and press **ENTER**.

| ACTIVE ROUTE | | |
|----------------|-------|------|
| DIVE2 TO DOCK | | |
| WAYPNT | ETE | DST |
| DIVE2 | --- | --- |
| REEF | 01:37 | 0.05 |
| DOCK | 03:15 | 0.11 |
| --- | --- | --- |
| --- | --- | --- |
| --- | --- | --- |
| --- | --- | --- |
| --- | --- | --- |
| --- | --- | --- |
| CLEAR? INVERT? | | |

Active Route Page

Whenever you have an active route, the active route page will appear in the main page sequence after the compass/highway page.

| ROUTE: 6 | | | |
|----------------|--------|------|------|
| DOCK TO DIVE2 | | | |
| NO | WAYPNT | DTK | DST |
| 1 | DOCK | 047° | 0.1 |
| 2 | REEF | 320° | 0.1 |
| 3 | DIVE2 | --- | --- |
| 4 | --- | --- | --- |
| 5 | --- | --- | --- |
| 6 | --- | --- | --- |
| TOTAL DST | | | 0.11 |
| COPY TO: __ | | | |
| CLR? INV? ACT? | | | |

To edit or review a route waypoint from the active route page, highlight the desired waypoint and press **ENTER**.

```

ROUTE: 6
DOCK TO DIVER
NO WAYPT DST ACT
1 D0 REVIEW?
2 D1 INSERT?
3 D1 REMOVE?
4 CHANGE?
5 -----
6 -----
TOTAL DST 0.11
COPY TO: --
CLR? INV? ACT?

```

Use the on-screen menu to select the desired editing function.

```

GOTO WAYPOINT
CAR
DIVE1
DOCK
FUEL
REEF
WRECK
-----
-----
-----
CANCEL GOTO?

```

You can skip ahead to any route waypoint by highlighting the desired waypoint and pressing the GOTO key.

Editing Routes (continued)

An on-screen menu of editing choices will appear, with options for reviewing, inserting, deleting or changing the waypoint field highlighted. Use the ▲ and ▼ arrow keys to select among the editing choices.

Once you've selected a waypoint from the route list, choose a menu function:

1. To review the definition page for the waypoint, highlight the 'REVIEW?' prompt and press **ENTER**.
2. To add a new waypoint that precedes the selected waypoint, highlight the 'INSERT?' prompt and press **ENTER**.
3. To remove the selected waypoint, highlight the 'REMOVE?' prompt and press the **ENTER** key.
4. To replace the selected waypoint with a new waypoint, highlight the 'CHANGE?' prompt and press the **ENTER** key.

Use the route waypoint editing instructions described earlier for creating a route to complete your changes. If you are editing the active route (route 0), copy your new route version to an empty route to save it, because the active route will be overwritten by a new route activation.

If you add, delete or change the first or last waypoint of a route, the default comment (first and last waypoint) will automatically be updated after your changes.

On-Route GOTOs

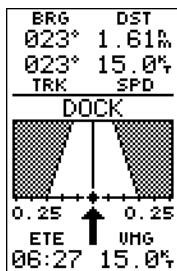
At the beginning of this section, we mentioned that the GPS 45XL will automatically select the route leg closest to your position as the active leg. This will give you steering guidance to the desired track of the active leg. If you would prefer to steer directly to a route waypoint, you can perform an 'on-route GOTO' from the active route page.

1. Use the ▲ and ▼ keys to highlight the desired route waypoint and press the **GOTO** key.
2. Once the GOTO waypoint page appears, press **ENTER** to confirm the on-route GOTO waypoint.

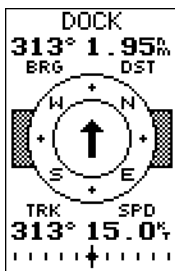
Note that after you reach the on-route GOTO waypoint, the GPS 45XL will automatically resume navigating the rest of the route in sequence.

Selecting a User-Defined Navigation Page

Once you've selected a GOTO destination or activated a MOB or route, the GPS 45XL will provide graphic steering guidance to the destination with one of two navigation pages:



Highway Page



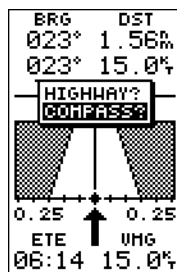
Compass Page

- The highway page (the default navigation page) provides a graphic highway that shows your movement relative to the desired course, with an emphasis on your crosstrack error, (the distance and direction you are off course.) The highway page is well suited for boating and other activities with higher speeds and straight line courses to a destination.
- The compass page provides a directional pointer to the destination, with a rotating compass graphic to display your direction of travel. The compass page is ideal for activities like trawling or entering a harbor, and provides better steering guidance for slow-speed (e.g., walking) travel with many directional changes.

Both pages provide a digital display of the bearing and distance to the destination, your current speed and track over the ground, and course deviation indicator (CDI). You can select the desired navigation page at any time.

To select the compass or highway page:

1. Press **PAGE** until the current navigation page appears.
2. Press **ENTER**. An on-screen box will appear, with the navigation page not currently in use highlighted as the default.
3. Press **ENTER** to switch the navigation screen.



To switch the navigation page to the compass presentation, press **ENTER** twice.



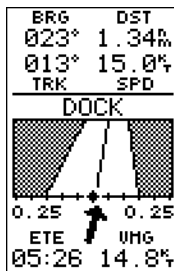
To switch the navigation page to the highway presentation, press **ENTER** twice.

Reference

Highway Page

Using the Highway Page

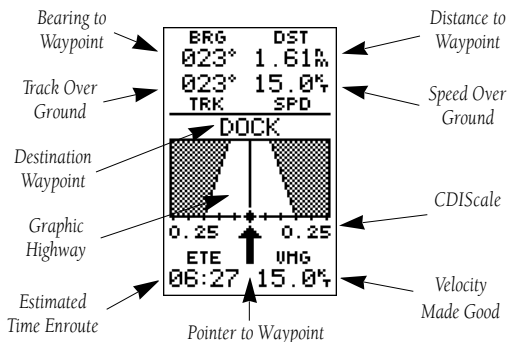
The GPS 45XL's highway page also provides graphic steering guidance to a destination, with a greater emphasis on the straight-line desired course and the distance and direction you are off course. The bearing and distance to a waypoint, along with your current track and speed are displayed at the top of the screen, with your estimated time enroute (ETE) and velocity made good (VMG, or the rate you are closing in on your destination) at the bottom.



In this example, the highway page indicates that you are off course to the right. Steer left to get back on course. Notice the emphasis of the highway page is on the desired course.



If you get too far off course, a message box will appear to indicate what course to steer to get back on course most efficiently.



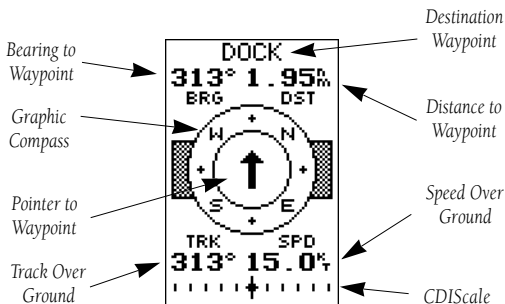
As you head toward your destination, the middle section of the screen provides visual guidance to your waypoint on a moving graphic 'highway'. The moving arrow just below the course deviation scale always points to your selected waypoint relative to the direction you are moving.

Your present position is represented by the diamond in the center of the course deviation scale. The line down the middle of the highway represents your desired track. As you navigate toward a waypoint, the highway will actually move, indicating the direction you're off course, relative to the position diamond on the CDI scale. To stay on course, simply steer toward the center of the highway.

If you do get off the desired course by more than 1/5th of the selected CDI range, the exact distance you are off course will be displayed where the CDI scale setting normally appears (see the example at right). If you get too far off course (the highway has disappeared), a message box will appear to indicate what course to steer to get back on course.

Using the Compass Page

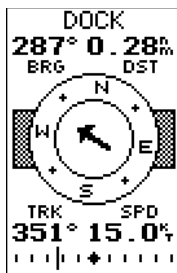
The GPS 45XL's compass page provides graphic steering guidance to a destination waypoint. The bearing (BRG) and distance (DST) to the waypoint are displayed at the top of the page, right below the destination waypoint field. The distance displayed is always the straight-line distance from your present position to the destination waypoint. The bearing indicates the exact compass heading from you to the destination.



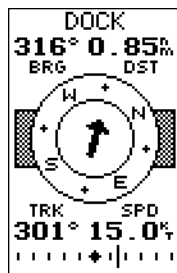
The middle of the page features a rotating 'compass' that shows your current cardinal heading while you're moving (track up), with a pointer arrow in the center to indicate the direction of the destination relative to the direction you are moving. The compass rose and pointer arrow combine to show current direction and current destination at a glance.

The bottom of the compass page displays your current track (TRK) and speed (SPD) over the ground, while the CDI (course deviation indicator) scale shows how far you are off course. The diamond in the center of the CDI scale represents your present position, while the d-bar (the moving vertical line on the scale) indicates the direction and distance you are off the desired straight-line course.

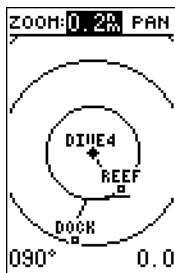
To stay on course, steer toward the d-bar until it is centered on the position diamond. The default setting of the CDI scale is +/- 0.25 miles, with each mark representing 0.05 miles of course deviation. If you do get off course by more than the selected scale, an arrow prompt will appear at the end of the scale to indicate the direction you are off course. When you are one minute away from the destination (based on your current speed and track over the ground), the GPS 45XL will alert you with a flashing on-screen message box.



In this example, the compass page indicates that you are travelling in a northerly (351°) direction and the destination waypoint is northwest (287°) of your current direction of travel.



In this example, the compass page indicates that you are travelling in a westerly (301°) direction and the destination waypoint is slightly northwest (316°) of your current direction of travel.



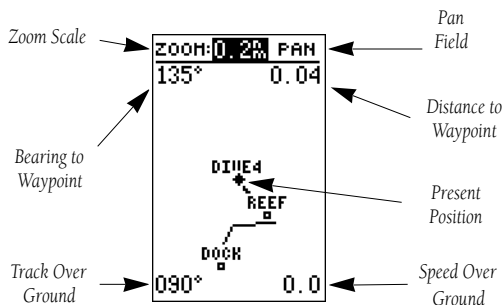
Range Rings

The GPS 45XL has on-screen range rings to help you estimate distances relative to your present position. The value of each ring is determined by the current zoom scale, and is equal to 1/5 of the selected scale.

To turn the range rings display on or off (the default setting is off), see the map setup section instructions on page 49.

Moving Map Page

The GPS 45XL features a powerful real-time moving map that can do much more than just plot your course and route. The map page also provides you with a target cursor that will let you pan ahead to nearby waypoints, determine the distance and bearing to any map position, and mark new waypoints while you navigate.



The map page can be broken down into two sections:

The zoom function and panning control fields are located at the top of the screen. There are 12 selectable zoom ranges from 0.2 to 320 miles or 0.5 to 600 km. These ranges are measured vertically.

The map portion of the page displays your present position as a diamond icon, with your track and/or route displayed as a solid line. Nearby waypoints are represented as squares, with the waypoint name also listed. You may select which of these features are shown through the map setup submenu page (see page 49 for more information).

The four corners of the map page are used to display various navigation data, including the bearing and distance to a destination waypoint and your current track and speed over the ground. The two fields at the top corners of the map show your bearing and distance to one of three selectable destinations: an active destination waypoint; a highlighted on-screen waypoint; or the panning target crosshair. If you are not navigating to a waypoint or using the panning function, the top data fields will not be displayed. Your current track and speed are shown at the bottom corners of the display.

Zooming and Panning

There are three main functions you can perform from the map page— zooming, pointing and panning. Each of these functions has its own ‘field’, which may be selected and activated for use. Whenever the map page first appears, the zoom field (at the top left) is always highlighted. The moving map has 12 map scales which are selected through the zoom function field.

To select a zoom scale:

1. Use the arrow keypad to highlight the zoom field.
2. Press the **ENTER** key to begin range selection.
3. Use **▲** or **▼** to select a range scale and press **ENTER**.

The second function field on the map page is the pan field, located at the top right of the screen. The pan function allows you to move the map with the four arrow keys to view areas outside the current map.

To activate the pan function:

1. From the zoom field, use **▶** to highlight the pan field.
2. Press the **ENTER** key to activate the pan function.
3. Use the arrow keys to move the map in any direction.

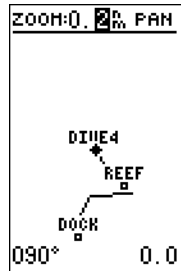
As you begin to move the map, a crosshair will appear. This crosshair will now serve as a target marker for the moving map. The distance and bearing to destination will now be replaced by the distance and bearing from your present position to the target crosshair.

As you pan around the map, you’ll notice that the target crosshair will ‘snap’ to on-screen waypoints and highlight the waypoint name. Once a waypoint name is highlighted, you can review its waypoint definition page or execute a GOTO function right from the map page.

To review the definition page for a waypoint highlighted in the map field:

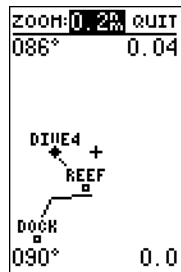
1. Press **ENTER**. Review and make any desired changes to the highlighted waypoint.

To return to the map page, press **ENTER**.



Selecting Map Scales

To change the map scale, highlight the zoom field and press **ENTER**. Use the Up and DOWN keys to select the scale.

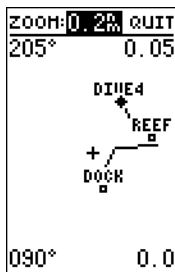


Panning Function

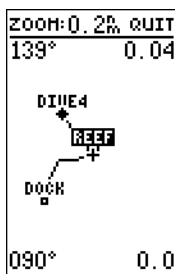
During panning mode, an on-screen crosshair will appear. Your present position will remain as a diamond icon, with the range and bearing to the crosshair displayed in the top corners of the map.

Reference

Moving Map Page



To stop panning, press the QUIT key.



On-Screen Pointing

The crosshair will 'snap' to waypoints displayed on the map, which allows you to quickly review or GOTO the selected waypoint right from the map page.

To GOTO a waypoint highlighted in the map field:

1. Press the **GOTO** key.
2. Press the **ENTER** key to confirm the GOTO waypoint page.

To stop the panning function and display the present position diamond:

1. Press the **QUIT** key.

Pointing at On-Screen Waypoints

The last field on the map page is the map itself. From the zoom or pan fields, the cursor highlight may be moved into the map display by pressing the down arrow key. The arrow keys will now move the field highlight through the map and 'point' at on-screen waypoints.

To point at a displayed waypoint:

1. Use the arrow keys to move the cursor highlight from the zoom field into the map field.
2. Once you are in the map field, use the four arrow keys to scroll through on-screen waypoints. The arrow key you use will determine the direction of your scroll. Once you have scrolled through all the waypoints, the cursor will move back to the zoom or pan function field.

Once a waypoint has been selected in the map field, its distance and bearing from your present position will be displayed at the top corners of the map page. You can also review its waypoint definition page or select it as a GOTO destination by following the same steps outlined above for waypoints highlighted on the map field. To get the most out of panning, you'll need to be able to zoom in and out while you're panning. This lets you move the map at a faster speed and zoom in for waypoint details. Once the pan function is activated, the cursor highlight moves back to the zoom field.

To adjust the zoom range while panning:

1. Press the **ENTER** key to begin range selection.
2. Use the **▲** and **▼** keys to select the desired range.
3. Press **ENTER** to return to normal panning mode.

Using the Cursor to Mark and GOTO Waypoints

During panning, the crosshair represents a target position right on the moving map, with the range and bearing to the target displayed at the top corners of the screen. You can also use the target crosshair to mark a new waypoint position or as a GOTO destination right from the map field.

To mark the target crosshair position as a new waypoint:

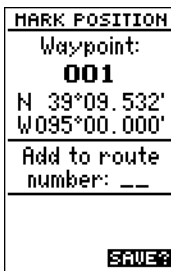
1. Press the **MARK** key to capture the position.
2. Enter a new name and route number if you wish.
3. Press the **ENTER** key to save the waypoint and return to the map page.

You can also use the target crosshair as an instant GOTO destination. Similar to the MOB mode, this function will mark and instantly set a course for a new waypoint called 'MAP'.

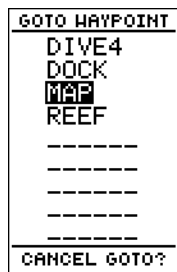
To GOTO the target crosshair:

1. Press the **GOTO** key to capture the position.
2. Press the **ENTER** key to confirm the MAP GOTO.

If you want to save the MAP waypoint, be sure to rename it, as it will be overwritten the next time a map GOTO is executed.

**Marking a Waypoint**

To mark a new waypoint with the crosshair, simply pan to the desired position and press the MARK key.

**MAPGOTO**

The crosshair may also be used to define a GOTO destination by panning to the desired position and pressing the GOTO key. If you want to save the MAP waypoint, be sure to rename it.

Reference

Menu Page

| |
|---------------|
| MENU |
| NEAREST WPTS |
| WAYPOINT LIST |
| WAYPOINT |
| ROUTES |
| DIST AND SUN |
| MESSAGES |
| SYSTEM SETUP |
| NAV SETUP |
| MAP SETUP |
| TRACK LOG |
| INTERFACE |

Menu Page

To select a submenu, use the UP and Down keys to highlight a menu option and press ENTER.

| |
|-----------------|
| DIST AND SUN |
| FROM: DOCK |
| TO: DIVE1 |
| BRG DST |
| 351° 58.05% |
| DATE: 11 MAR 96 |
| SUNRISE |
| 6:38:10am |
| SUNSET |
| 8:22:15pm |
| AT DESTINATION |

Distance/Sun Calculation

The GPS 45XL will calculate the sunrise and sunset times of any stored waypoint or your present position. To calculate, enter the date and year and press ENTER.

Menu Page

The GPS 45XL menu page provides access to submenu pages that are used to select and customize operation and navigation setup. The 11 submenus are divided into categories by function. The waypoint and route management submenus are discussed in their own respective sections. We'll now address the rest of the submenus in the order they appear on the menu page.

To select a submenu page from the menu page:

1. Highlight the submenu page you want to view.
2. Press the **ENTER** key to display the submenu page.
3. To return to the menu page, press the **QUIT** key.

Distance and Sun Calculation

The distance and sun calculation page will give you the distance and bearing between any two waypoints and will calculate the sunrise and sunset (in local time) at a destination waypoint for a particular date.

To perform a distance and sun calculation:

1. Highlight the 'from' field and enter the desired waypoint. Press **ENTER** to move to the next field.
2. Highlight the 'to' field and enter the destination waypoint. Press the **ENTER** key to calculate the range and bearing to the destination waypoint.
3. Highlight the 'date' field and enter the date for your destination. Press the **ENTER** key to display the sun information.

Message Page

The message page displays all current messages in the GPS 45XL. There are two types of messages: temporary alerts (eg., approaching a waypoint) and condition alerts (eg., battery power is low). All messages are initially indicated by a flashing on-screen box. After a temporary alert has been viewed, it is cleared. Condition alerts are displayed on the message page until the condition is resolved.

To view the message page:

1. Highlight the 'MESSAGES' field and press **ENTER**.



See appendix A for a complete list of messages.

System Setup

The first setup page is the system setup page, which is used to select the operating mode, time offset and screen preferences. The GPS 45XL has three operating modes:

- **Normal Mode** operates the unit at maximum performance, and provides a battery of life up to 12 hours on alkaline batteries.
- **Battery Saver Mode** is suitable for most applications, and extends battery life to up to 20 hours on alkaline batteries by reducing the receiver's update rate when navigational conditions permit (e.g., you're travelling a steady course without constant speed or heading variations). Since battery saver mode changes the update rate based solely on navigational conditions, the battery life will vary accordingly.
- **Simulator Mode** allows you to operate the unit without acquiring satellites, and is ideal for practicing or entering waypoints and routes while at home.



To select an operating mode:

1. Highlight the 'MODE' field and press .
2. Use the arrow keypad to select a mode and press .

Date and Time Setup

The date and time field is located directly below the mode field. Because the time shown is UTC time, you will need to enter a time offset to display the correct local time for your area. To determine the time offset for your area, note your position and refer to the chart in appendix A.

To enter the time offset:

1. Highlight the 'OFFSET' field and press the  key.
2. Enter the time offset and press . Remember to select a positive or negative indicator for your offset.

| |
|-----------------|
| SYSTEM SETUP |
| MODE: |
| BatterySave |
| DATE 18 JAN 96 |
| TIME 01:14:41pm |
| OFFSET: +00:00 |
| HOURS: 12 |
| CONTRAST: |
| ■■■■■ |
| LIGHT: 15 sec |
| tone:MSG, Key |

System Setup Page

Select battery saver mode to get the best possible battery life. Note that screen back-lighting will always have the biggest effect on battery life, regardless of operating mode.

| |
|-----------------|
| SYSTEM SETUP |
| MODE: |
| Simulator |
| DATE 18 JAN 96 |
| TIME 01:15:09pm |
| OFFSET: +00:00 |
| HOURS: 12 |
| CONTRAST: |
| ■■■■■ |
| LIGHT: 15 sec |
| tone:MSG, Key |

Time Offset

To display the correct local time, you must enter the appropriate offset from the chart at the end of Appendix A.

Reference

System Setup

| |
|-----------------------|
| SYSTEM SETUP |
| MODE: Simulator |
| DATE 19 JAN 96 |
| TIME 01:55:56pm |
| OFFSET: +00:00 |
| HOURS: 12 |
| CONTRAST: ████████ |
| LIGHT: 15 sec |
| TOPE:MSG, Key |

12/24 Hour Clock

To display the time in AM/PM format, select the 12 hour option from the 'hours' field.

| |
|-----------------------|
| SYSTEM SETUP |
| MODE: Simulator |
| DATE 19 JAN 96 |
| TIME 01:56:14pm |
| OFFSET: +00:00 |
| HOURS: 12 |
| CONTRAST: ████████ |
| LIGHT: 15 sec |
| TOPE:MSG, Key |

Screen Backlighting

To get the longest battery life, keep the screen backlighting at the default 15 second option.

Time Format

The time display shown on the system setup and position pages may be set to display the time in a 12-or 24-hour format.

To select the time format:

1. Highlight the 'HOURS' field and press the **ENTER** key.
2. Select 12-or 24-hour display, and press **ENTER** to confirm.

Screen Contrast

The GPS 45XL features adjustable screen contrast and is controlled by using an on-screen bar scale.

To set the screen contrast:

1. Move the field highlight to the 'CONTRAST' field and press the **ENTER** key.
2. Use the **◀** and **▶** keys to adjust the bar scale for the desired contrast and press the **ENTER** key.

Screen Backlighting

The screen backlight timer is adjustable for 0, 15, 30, 60, 120 and 240 seconds. The '0' setting will keep backlighting on continuously. Whenever backlighting is on, a bulb icon will appear on the status page.

To set the backlight timer:

1. Highlight the 'LIGHT' field and press the **ENTER** key.
2. Use the **▲** and **▼** keys to toggle through and select the desired setting, and press **ENTER**.
3. To turn lighting on and off, press **☹** briefly.

Tone Setting

You may choose from three settings for audible tone: messages only, messages and keystrokes, or no tone at all.

To specify a tone setting:

1. Highlight the 'TONE' field and press the **ENTER** key.
2. Use the **▲** and **▼** keys to select the desired tone and press **ENTER**.

Navigation Setup

The navigation setup page is used to select units of measurement for position format, map datum, CDI scale, and distance, speed and heading information.

Position Formats

The default position setting for the GPS 45XL is latitude and longitude in degrees and minutes (hddd°mm.mmm'). You may also select degrees, minutes and seconds (hddd°mm'ss.s"); degrees only (hddd.ddddd°); UTM/UPS coordinates; or British, German, Irish, Maidenhead, Swedish, Swiss or Taiwan grid formats.





To select a position format:

1. Highlight the 'POSITIONFRMT' field and press .
2. Use the  and  keys to select the desired setting. Confirm the setting by pressing .

Map Datums

The map datum field is located just below the position format field, and comes with a WGS 84 default setting. Although 104 total map datums are available for use (see the map datum listing in appendix B), you should only change the datum if you are using maps or charts that specify a different datum than WGS 84.





To select a map datum:


1. Highlight the 'MAPDATUM' field and press .
2. Use the  and  keys to toggle through and select the desired setting. Confirm the setting by pressing .

CDI Scale Settings

The course deviation indicator (CDI) scale definition field lets you select the +/- range of the CDI bar scale. Three scales are available: +/- 0.25, 1.25 and 5.0 miles or kilometers, with 0.25 being the default setting.


To enter a CDI scale setting:

1. Highlight the 'CDISCALE' field and press .
2. Use the  and  keys to select the desired setting.
3. Press the  key to confirm the selection.

| NAV SETUP | |
|----------------|--|
| POSITION FRMT: |  hddd°mm.mmm' |
| MAP DATUM: | WGS 84 |
| CDI SCALE: | ±0.25 |
| UNITS: | Nautical |
| HEADING: | Auto Mag E004 |

NAV Setup Page

The position format may be set to display your position in various lat/lon or grid formats.

| NAV SETUP | |
|----------------|--|
| POSITION FRMT: | hddd°mm.mmm' |
| MAP DATUM: |  WGS 84 |
| CDI SCALE: | ±0.25 |
| UNITS: | Nautical |
| HEADING: | Auto Mag E004 |

Map Datum

The GPS 45XL's default map datum is WGS 84.

WARNING: Using the wrong map datum can seriously affect the accuracy of your GPS receiver.

Reference

NAV & Map Setup

| |
|---------------------------------|
| NAV SETUP |
| POSITION FRMT: hddd°mm. mmm' |
| MAP DATUM: WGS 84 |
| CDI SCALE: ±0.25 |
| UNITS: Statute |
| HEADING: User Mag:E000 |

Magnetic Heading

To enter a user-defined magnetic variation, select the 'User Mag' option and enter the desired direction and value.

| |
|--------------------------|
| MAP SETUP |
| ORIENTATION: North Up |
| PLOTTED ITEMS |
| RINGS: No |
| ROUTE: Yes |
| NEAREST: Yes |
| NAMES: Yes |
| TRACK LOG: 250 |

Map Setup Page

The map orientation can be set to track up, north up, or desired track up. The plotted items options let you define what appears on the map display.

Units of Measure

The GPS 45XL lets you select nautical (default), statute or metric units of measure for all speed and distance fields.

To change the unit of measure:

1. Highlight the 'units' field and press the **ENTER** key.
2. Use **▲** and **▼** to select the desired unit of measure.
3. Press the **ENTER** key to confirm the selection.

Magnetic Heading Reference

The GPS 45XL's heading information can be displayed referencing magnetic north (auto or user-defined), true north or calculated grid headings. The default setting is automatic magnetic north, which is suitable for most applications.

To select a heading reference:

1. Highlight the 'HEADING' field and press **ENTER**.
2. Select the desired heading preference.
3. Press the **ENTER** key to confirm the selection.

To enter a user-defined magnetic heading:

1. Select the 'USER MAG' option and press **ENTER**.
2. Use the **▲** and **▼** keys to enter the degrees and direction of magnetic variation.
3. Press the **ENTER** key to confirm the magnetic variation value.

Map Setup and Orientation

The map setup page lets you select map orientation and specify what items are displayed. The map may be oriented to north up, the direction of current travel (track up) or the direction of an active route leg (desired track up). The default setting is track up.

To change the map orientation:

1. Highlight the 'ORIENTATION' field and press **ENTER**.
2. Use the **▲** and **▼** keys to toggle through and select the desired setting, and press **ENTER**.

Selecting Displayed Items on the Map Page

The rest of the map setup page lets you specify what items are displayed or plotted on the map page. The first four plot items may be turned on or off by selecting 'yes' or 'no' in the appropriate field:

- The 'rings' selection will display the three present position range rings on the map.
- The 'route' selection will plot the straight leg lines between waypoints of an active route and display all route waypoint names.
- The 'nearest' selection will display the nine nearest waypoints to your present position (not to the target cursor on the map).
- The 'names' selection will display the waypoint name for the nine nearest waypoints.

To turn a plotted item on or off:

1. Highlight the confirmation (Yes or No) field for the plotted item and press **ENTER**.
2. Use **▲** and **▼** to select 'yes' or 'no', and press **ENTER**.

Track Log Display

The track log option sets the number of points the unit will attempt to display on the map page. The default setting of 250 points provides good resolution with minimal screen clutter. The maximum setting is 768 points. Once you've reached the maximum number of track points, the older points will be lost as new points are added. Note that adjusting the track points displayed will not affect whether or not the receiver records a track log or the ability to create a TrackBack route.

To enter a log setting:

1. Highlight to the 'track log' field and press **ENTER**.
2. Enter a value in the 3-digit field and press **ENTER**. If you do not want to display a track, enter '000'.

Track Log Setup Page

The track log setup page lets you manage the GPS 45XI's tracking data. From this page, you can select whether or not to record a track and define how it is recorded.

| MAP SETUP | |
|---------------|----------|
| ORIENTATION: | Track Up |
| PLOTTED ITEMS | |
| RINGS: | Yes |
| ROUTE: | Yes |
| NEAREST: | Yes |
| NAMES: | Yes |
| TRACK LOG: | 250 |

Range Rings

On-screen range rings will appear on the map when the 'Rings' option is set to the 'Yes' position.

| MAP SETUP | |
|---------------|----------|
| ORIENTATION: | North Up |
| PLOTTED ITEMS | |
| RINGS: | No |
| ROUTE: | Yes |
| NEAREST: | Yes |
| NAMES: | Yes |
| TRACK LOG: | 250 |

Track Log

The track log option only defines how many points are displayed on the map. Setting the value at 000 will not prevent a track log from being recorded.

| | |
|---|-----|
| TRACK LOG | |
| RECORD: | Yes |
| CRITERIA: Automatic | |
| MEMORY USED 2 of 768 points (0%) | |
| CLEAR LOG? TRACBACK? | |

Track Log Page

Turning off the track recording option will prevent you from using the TracBack feature.

| | |
|--|--|
| CLEAR LOG | |
| WARNING! | |
| all track log points will be deleted | |
| Are you sure Yes? or No? | |

To clear the track log, confirm the 'Yes?' prompt.

Track Log Setup (continued)

To turn the track log on or off:

1. Highlight the 'RECORD' field and press **ENTER**.
2. Select 'Yes' or 'No' and press **ENTER**. NOTE: Turning the track recording off will disable the TracBack feature.

Track Criteria

The stored track criteria determines how often positions are stored in the track log. The default setting is automatic, which will store track based on resolution. This setting gives you the most efficient use of track memory and provides the most accurate TracBack route.

To change the criteria to record points based upon a specific time interval:

1. Highlight the 'CRITERIA' field and press **ENTER**.
2. Use **▲** or **▼** to select 'Time Interval' and press **ENTER**.
3. Press **ENTER** to begin entry of the interval.
4. Enter a value in hours, minutes and seconds, and press the **ENTER** key.

Managing and Clearing the Track Log

The rest of the track log setup page displays the percentage of available memory currently used to store track log data and function fields in order to clear the track log memory and activate the TracBack feature.

To clear the track log:

1. Highlight 'CLEARLOG?' and press **ENTER**.
2. A warning page will appear, and ask you to confirm your actions. Use the **◀** key to move the field highlight to the 'Yes?' field and press **ENTER**.

TracBack Function

The TracBack option lets you activate a TracBack route using the track log (see pages 29-30 for more information).

To activate a TracBack route:

1. Highlight the 'TRACBACK?' option and press **ENTER**.

Interface Setup

The interface setup page lets you specify the interfacing formats for connecting external devices. There are five interface options: GRMN/GRMN, None/None, None/NMEA, RTCM/None, and RTCM/NMEA. Each option lists the input format first, followed by the output format.

To select I/O format:

1. Highlight the I/O field and press **ENTER**.
2. Use the **▲** and **▼** keys to toggle through and select the desired setting, and press **ENTER**.

The GRMN/GRMN setting is a proprietary format that lets you exchange information such as waypoints, routes and track logs between two GARMIN GPS devices or a PC. During data transfer, the number of packets being exchanged will be displayed on screen.

To select a transfer option:

1. Highlight the 'host' field and press **ENTER**.
2. Use **▲** and **▼** to select a setting and press **ENTER**.

To disable all interfacing capabilities, select the None/None setting. If you want to output NMEA data to compatible external devices without any differential input capability, select the None/NMEA setting. Once a NMEA output setting has been selected (with or without RTCM input), the NMEA field will become highlighted. NMEA formats 0180, 0182 or 0183 (1.5 or 2.0) are available.

To select a NMEA format:

1. Press **ENTER** to begin a NMEA selection.
2. Use **▲** and **▼** to select a format, and press **ENTER**.

DGPS Interface

The last two format settings allow the differential-ready GPS 45XL to accept RTCM DGPS corrections in RTCM 104 version 2.0 format. Using DGPS corrections will improve receiver accuracy to 5-10 meters, regardless of errors induced by the government's Selective Availability (SA) program. The RTCM/NONE format will allow connection to any manually tuned beacon receiver by using the proper output interface. The baud rate is selectable from the GPS 45XL.

| INTERFACE | |
|---------------------|----------|
| None/NMEA? | |
| NMEA 0180 | |
| 300 baud | |
| BEACON RECUR | |
| FREQ | _____KHz |
| RATE | 25bps |
| DIST | ___% |
| SNR | ___dB |
| No Status | |

Interface Setup Page

The default interface setting is the GARMIN/GARMIN option, which can be used for unit-to-unit data transfer or interfacing with a GARMINPCKit.

| INTERFACE | |
|------------------|--|
| NMEA/NMEA | |
| NMEA 0183 2.0 | |
| 4800 baud | |

NMEAInterface

Once a NMEA format is selected, the baud rate will automatically be set to the proper speed. See Appendix C for a list of NMEA sentences.

```

INTERFACE
-----
RTCM/NMEA
NMEA 0183 2.0
4800 baud
-----
BEACON RECUR
FREQ: 000.0KHz
RATE : 25bps
DIST  --_ft
SNR   --dB
No Status

```

DGPSInterface

Once a RTCM option is selected, you must manually tune the beacon receiver from the frequency field.

```

MESSAGES
-----
No DGPS
Position
-----
PRESS PAGE

```

The message page will alert you to any problems relating to DGPS operation. You may also monitor the DGPS status from the status field on the interface setup page.

DGPS Interface (continued)

The RTCM/NMEA selection controls the GARMIN GBR-21 differential beacon receiver. Once a RTCM setting has been selected, the GPS 45XL will either automatically try to tune the last frequency and bit rate you selected or will switch to the default frequency of 304.0 kHz with a bit rate of 100 bps if no previous beacon has been tuned. You may also enter your own frequency and bit rate if desired.

To enter a DGPS beacon frequency:

1. Highlight the 'freq' field and press **ENTER**.
2. Enter the desired frequency and press **ENTER**.
3. Highlight the 'rate' field and press **ENTER**.
4. Use **▲** and **▼** to select the desired transmission rate.
5. Press the **ENTER** key to confirm your entry.

When the GPS 45XL is receiving DGPS corrections from the GBR-21, the 'beacon receiver' section of the I/O setup page will display the beacon frequency and signal strength, as well as the distance from the transmitter to the beacon receiver. At the bottom of the beacon receiver field, a status message will keep you informed of DGPS activity:

- A 'tuning' message will be displayed while a beacon signal is being tuned.
- Once the beacon signal has been tuned, a 'receiving' message will be displayed.
- If a beacon signal is tuned and no corrections are being received, a 'no data' message will be displayed.
- If a beacon signal cannot be tuned, a 'no status' message will be displayed.

The GPS 45XL will also display one of three alert messages concerning DGPS operation through the message page:

No DGPS Position— not enough data is available to compute a DGPS position.







No RTCM Input— the beacon receiver is not properly connected or the baud rates do not match.

RTCM Input Failed— DGPS data was being received but has been lost.

Navigation Simulator







The GPS 45XL's simulator mode lets you practice all aspects of its operation without active satellite acquisition. You can also plan and practice trips, enter new waypoints and routes, and save them for use during normal operation. The simulator is activated from the system setup page, with speed and heading controlled from the position, compass or highway pages.

To activate the simulator:

1. Highlight 'SYSTEMSETUP' and press .
2. Highlight the 'MODE' field and press .
3. Use  or  to select the simulator mode.
4. Press the  key to confirm.
5. Press  to return to the menu page.


Once the simulator mode has been activated, use the position, compass or highway page to set your speed and track. You may also enter a new position if you desire (only from the position page).

To enter track, speed and position:


1. Highlight the 'TRACK' field and press the  key.
2. Enter a track heading and press .
3. Highlight the 'SPEED' field and press .
4. Enter a speed and press .
5. Highlight the 'POSITION' field (position page only) and press .
6. Enter a position and press the  key.



The GPS 45XL does not track satellites in simulator mode. Although you can create and save waypoints and routes while using the simulator mode, never attempt to use the simulator mode for actual navigation.

| SYSTEM SETUP | |
|--------------|---|
| MODE: | Simulator |
| DATE | 21 DEC 95 |
| TIME | 15:36:37 |
| OFFSET: | +00:00 |
| HOURS: | 12 |
| CONTRAST: |  |
| LIGHT: | 15 sec |

Select the simulator mode from the operation mode options and press ENTER. You may return to normal operation by changing the operation mode or turning the unit off.

| | |
|-----------------|---|
| 330 345 N 015 0 |  |
| TRACK | SPEED |
| 356° | 00.0% |
| TRIP | ALT |
| 0.0% | 1081% |
| POSITION | |
| N 39°00.000' | |
| W095°00.000' | |
| TIME | |
| 01:22:48pm | |

Speed, Track & Position

Once simulator mode is selected, speed and track values may be entered on the position or navigation pages. A simulated position may also be entered on the position page.

Appendix A

Messages & Time Offsets

The GPS 45XL uses a flashing on-screen message indicator to alert you to important information. Whenever the message indicator appears, press PAGE to view the message page. There are two types of messages: temporary alerts and condition alerts. Temporary alerts are cleared from the message page after viewing, while condition alerts remain until the condition has been resolved. Pay careful attention to all messages for your own safety.

Active WPT Can't be Deleted—You have attempted to change the 'active to' or 'active from' waypoint. Clear the active route or GOTO before making your changes.

Accuracy has been Degraded—The accuracy of the GPS 45XL has been degraded beyond 500 meters due to poor satellite geometry or data quality. You should check other navigational sources to verify the position indicated.

Already Exists—The name you are entering already exists in the GPS 45XL's memory.

Approaching—You are one minute away from reaching a destination waypoint.

Battery Power is Low—The batteries are low and should be replaced.

No DGPS Position—Not enough data is available to compute a DGPS position.

No RTCM Input—Beacon receiver is improperly connected or baud rates do not match.

Poor GPS Coverage—The GPS 45XL cannot acquire the necessary number of satellites to compute a position. Try another location with a clearer view of the sky.

Power Down and Re-init—The GPS 45XL is not able to calculate a position due to abnormal satellite conditions. Turn the unit off and verify the last position shown by other means. Try the unit again later, possibly in a different location.

Read Only Mem has Failed—The permanent memory has failed and the unit is not operable. Take your unit to an authorized GARMIN dealer for repairs.

Received an Invalid WPT—A waypoint was received during upload transfer that has an invalid identifier.

Receiver has Failed—A failure in receiver hardware has been detected. If this message persists, do not use the unit and take it to an authorized dealer for repair.

Route is Full—You have attempted to add more than 30 waypoints to a route.

Route is not Empty—You have attempted to copy into a route already in use.

Route Waypoint Can't be Deleted—The waypoint you are trying to delete is part of a route. Delete the waypoint from the route before removing it from memory.

Route Waypoint was Deleted—A route waypoint entered does not exist in the database and has been deleted from the route.

RTCM Input has Failed—DGPS data being received has been lost. You are no longer receiving the beacon signal.

Searching the Sky—The GPS 45XL is in searching the sky for almanac data or the unit is in AutoLocate™ mode.

Route Waypoint was Deleted—A route waypoint entered does not exist in the database and has been deleted from the route.

RTCM Input has Failed—DGPS data being received has been lost. You are no longer receiving the beacon signal.

Searching the Sky—The GPS 45XL is in searching the sky for almanac data or the unit is in AutoLocate™ mode.

Stored Data was Lost—All waypoints, routes, time and almanac data has been lost due to battery failure or clearing the receiver's memory.

Transfer has been Completed—The receiver is finished uploading or downloading information to the connected device.

WPT Memory is Full—You have used all 250 waypoints in the GPS 45XL. Delete unwanted waypoints to make room for new entries.

Time Offset Chart

The table below gives approximate UTC time offset for various longitudinal zones. If you are in daylight savings time, add one hour to the offset.

| Longitudinal Zone | Offset | Longitudinal Zone | Offset |
|--------------------|--------|--------------------|--------|
| W180.0° to W172.5° | -12 | E007.5° to E022.5° | 1 |
| W172.5° to W157.5° | -11 | E022.5° to E037.5° | 2 |
| W157.5° to W142.5° | -10 | E037.5° to E052.5° | 3 |
| W142.5° to W127.5° | -9 | E052.5° to E067.5° | 4 |
| W127.5° to W112.5° | -8 | E067.5° to E082.5° | 5 |
| W112.5° to W097.5° | -7 | E082.5° to E097.5° | 6 |
| W097.5° to W082.5° | -6 | E097.5° to E112.5° | 7 |
| W082.5° to W067.5° | -5 | E112.5° to E127.5° | 8 |
| W067.5° to W052.5° | -4 | E127.5° to E142.5° | 9 |
| W052.5° to W037.5° | -3 | E142.5° to E157.5° | 10 |
| W037.5° to W022.5° | -2 | E157.5° to E172.5° | 11 |
| W022.5° to W007.5° | -1 | E172.5° to E180.0° | 12 |
| W007.5° to E007.5° | 0 | | |

Appendix B

Map Datums

The following list shows the map datums available for the GPS 45XL. Menu page abbreviations are listed first, followed by the corresponding map datum name and area. The default map datum for the GPS 45XL is WGS 84.

| | | | |
|------------------------|---|-------------------------|---|
| Adindan | Adindan- Ethiopia, Mali, Senegal, Sudan | Easter Isld 67 | Easter Island 1967 |
| Afgooye | Afgooye- Somalia | European 1950 | European 1950- Austria, Belgium, Denmark, Finland, France, Germany, Gibraltar, Greece, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland |
| AINELABD '70 | AIN ELANBD 1970- Bahrain Island, Saudi Arabia | European 1979 | European 1979- Austria, Finland, Netherlands, Norway, Spain, Sweden, Switzerland |
| Anna 1 Ast '65 | Anna 1 Astro '65- Cocos Isl. | Finland Hayfrd | Finland Hayford- Finland |
| ARC 1950 | ARC 1950- Botswana, Lesotho, Malawi, Swaziland, Zaire, Zambia, Zimbabwe | Gandajika Base | Gandajika Base- Republic of Maldives |
| ARC 1960 | ARC 1960- Kenya, Tanzania | Geod Datm '49 | Geodetic Datum '49- New Zealand |
| Ascnsn Isld '58 | Ascension Island '58- Ascension Island | Guam 1963 | Guam 1963- Guam Island |
| Astro B4 Sorol | Astro B4 Sorol Atoll- Tern Island | Gux 1 Astro | Gux 1 Astro- Guadalcanal Island |
| Astro Bcn "E" | Astro Beacon "E"- Iwo Jima | Hjorsey 1955 | Hjorsey 1955- Iceland |
| Astro Dos 71/4 | Astro Dos 71/4- St. Helena | Hong Kong '63 | Hong Kong '63- Hong Kong |
| Astr Stn '52 | Astronomic Stn '52- Marcus Island | Hu-Tzu-Shan | Hu-Tzu-Shan- Taiwan |
| Astrln Geod '66 | Australian Geod '66- Australia, Tasmania Island | Indian Bngldsh | Indian- Bangladesh, India, Nepal |
| Astrln Geod '84 | Australian Geod '84- Australia, Tasmania Island | Indian Thailand | Indian- Thailand, Vietnam |
| Bellevue (IGN) | Elate and Erromango Islands | Indonesia '74 | Indonesia 1974- Indonesia |
| Bermuda 1957 | Bermuda 1957- Bermuda Islands | Ireland 1965 | Ireland 1965- Ireland |
| Bogata Observ | Bogata Observatry- Colombia | ISTS 073 Astro | ISTS 073 ASTRO '69- Diego Garcia |
| Campo Inchspe | Campo Inchauspe- Argentina | Johnston Island | Johnston Island Kandawala Kandawala- Sri Lanka |
| Canton Ast '66 | Canton Astro 1966- Phoenix Islands | Kerguelen Islnd | Kerguelen Island |
| Cape | Cape- South Africa | Kertau 1948 | Kertau 1948- West Malaysia, Singapore |
| Cape Canavrl | Cape Canaveral- Florida, Bahama Islands | L. C. 5 Astro | Cayman Brac Island |
| Carthage | Carthage- Tunisia | Liberia 1964 | Liberia 1964- Liberia |
| CH-1903 | CH 1903- Switzerland | Luzon Mindanao | Luzon- Mindanao Island |
| Chatham 1971 | Chatham 1971- Chatham Island (New Zealand) | Luzon Philippine | Luzon- Philippines (excluding Mindanao Island) |
| Chua Astro | Chua Astro- Paraguay | Mahe 1971 | Mahe 1971- Mahe Island |
| Corrego Alegre | Corrego Alegre- Brazil | Marco Astro | Marco Astro- Salvage Island |
| Djakarta | Djakarta (Batavia)- Sumatra Island (Indonesia) | | |
| Dos 1968 | Dos 1968- Gizo Island (New Georgia Islands) | | |

| | | | |
|-------------------------|--|------------------------|---|
| Massawa | Massawa- Eritrea (Ethiopia) | | |
| Merchich | Merchich- Morocco | | |
| Midway Ast '61 | Midway Astro '61- Midway | | |
| Minna | Minna- Nigeria | | |
| NAD27 Alaska | North American 1927- Alaska | | |
| NAD27 Bahamas | North American 1927- Bahamas (excluding San Salvador Island) | | |
| NAD27 Canada | North American 1927- Canada and Newfoundland | | |
| NAD27 Canal Zone | North Am. 1927- Canal Zone | | |
| NAD27 Caribbn | North American 1927- Caribbean (Barbados, Caicos Islands, Cuba, Dom. Rep., Grand Cayman, Jamaica, Leeward and Turks Islands) | Prov S Chln '63 | Prov So Chilean '63- S. Chile |
| | | Puerto Rico | Puerto Rico & Virgin Islands |
| | | Qatar National | Qatar National- Qatar |
| | | Qornoq | Qornoq- South Greenland |
| NAD27 Central | North American 1927- Central America (Belize, Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua) | Reunion | Reunion- Mascarene Island |
| | | Rome 1940 | Rome 1940- Sardinia Island |
| NAD27 CONUS | North Am. 1927- Mean Value | RT 90 | Sweden |
| NAD27 Cuba | North American 1927- Cuba | Santo (Dos) | Santo (Dos)- Espirito Santo Island |
| NAD27 Grnland | North American 1927- Greenland (Hayes Peninsula) | Sao Braz | Sao Braz- Sao Miguel, Santa Maria Islands (Azores) |
| NAD27 Mexico | N. American 1927- Mexico | Sapper Hill '43 | Sapper Hill 1943- East Falkland Island |
| NAD27 San Sal | North American 1927- San Salvador Island | Schwarzeck | Schwarzeck- Namibia |
| NAD83 | North American 1983- Alaska, Canada, Central America, CONUS, Mexico | 5th Amrcn '69 | South American '69- Argentina, Bolivia, Brazil, Chile, Colombia, Ecuador, Guyana, Paraguay, Peru, Venezuela, Trinidad and Tobago |
| Nhrwn Masirah | Nahrwn- Masirah Island (Oman) | South Asia | South Asia- Singapore |
| Nhrwn Saudi A | Nahrwn- Saudi Arabia | SE Base | Southeast Base- Porto Santo and Madiera Islands |
| Nhrwn United A | Nahrwn- United Arab Emirates | SW Base | Southwest Base- Faial, Graciosa, Pico, Sao Jorge and Terceira Islands (Azores) |
| Naparima BWI | Naparima BWI- Trinidad and Tobago | Timbalai 1948 | Timbalai 1948- Brunei and E. Malaysia (Sarawak and Sabah) |
| Obsrvtorio '66 | Observatorio 1966- Corvo and Flores Islands (Azores) | Tokyo | Tokyo- Japan, Korea, Okinawa |
| Old Egyptian | Old Egyptian- Egypt | Tristan Ast '68 | Tristan Astro 1968- Tristan da Cunha |
| Old Hawaiian | Old Hawaiian- Mean Value | Viti Levu 1916 | Viti Levu 1916- Viti Levu/ Fiji Islands |
| Oman | Oman- Oman | Wake-Eniwetok | Wake-Eniwetok- Marshall Isl. |
| Ord Srvy GB | Old Survey Grt Britn- England, Isle of Man, Scotland, Shetland Isl., Wales | WGS 72 | World Geodetic System 1972 |
| Pico De Las Nv | Canary Islands | WGS 84 | World Geodetic System 1984 |
| Pitcairn Ast '67 | Pitcairn Astro '67- Pitcairn Isl. | Zanderij | Zanderij- Surinam |
| Prov S Am '56 | Prov So Amrcn '56- Bolivia, Chile, Colombia, Ecuador, Guyana, Peru, Venezuela | | |

The GPS 45XL is constructed of high quality materials and should not require user maintenance. Should your unit ever need repair, please take it to an authorized GARMIN service center. The GPS45XL has no user-serviceable parts. Never attempt any repairs yourself. To protect your GPS 45XL, keep it in its carrying case when not in use, and never allow gasoline or other solvents to come into contact with the case. Clean the case and lens with a soft cloth and a household window cleaner.

PHYSICAL

| | |
|--------------------|--|
| Case: | Waterproof, dry nitrogen-filled |
| Size: | 6.15"H x 2"W x 1.23"D (15.6 x 5.1 x 1.23 cm) |
| Weight: | Approx 9.5 ounces (269g) w/ batteries |
| Temperature Range: | 5° to 158°F (-15° to 70°C) |

PERFORMANCE

| | |
|--------------------|--|
| Receiver: | Differential-ready MultiTrac8™ |
| Acquisition Time: | Approx. 20 seconds (warm start) Approx. 2 minutes (cold start) Approx. 7.5 minutes (AutoLocate™) |
| Update Rate: | 1/second, continuous |
| Position Accuracy: | 5-10 meters (16-33 ft.) with DGPS corrections* 15 meters (49 ft.) RMS** |
| Velocity Accuracy: | 0.1 knot RMS steady state (90 knots/103 mph max.) |
| Dynamics: | Performs to specification to 3g's |

POWER

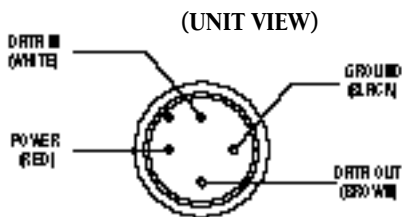
| | |
|----------------------|--|
| Input: | Four 1.5 volt AA batteries or 10-40vDC |
| Current Consumption: | 0.16 amps max. |
| Battery Life: | Up to 12 hours (normal mode) |
| (w/ alk. batt.) | Up to 20 hours (battery saver mode) |

NOTE: Alkaline batteries lose a significant amount of their capacity as temperature decreases. If you're using the GPS 45XL in below freezing temperatures, use lithium batteries for longer battery life. Extensive use of screen backlighting will significantly reduce battery life.

Specifications subject to change without notice.

* With optional GARMINGBR 21 Beacon Receiver Input.

** Subject to accuracy degradation to 100m 2DRMS under the US DOD-imposed Selective Availability Program.



Three optional cables are available to connect the GPS45XL to an external power source or interface with another unit or PC:

- Cigarette Lighter Adapter— Allows connection to a 12- volt DC cigarette lighter plug.
- Data Cross-Load Cable— Allows data transfer between GPS 38/40/45/45XL units.
- PC Kit Data Cable— PC interface cable with 9-pin 'D' serial data connector.

The following interface formats are supported by the GPS 45XL for driving three NMEA devices:

NMEA 0180 NMEA 0182

NMEA 0183 version 1.5

Approved sentences:

GPBWC, GPGLL, GPRMB, GPRMC, GPXTE, GPVTG,
GPWPL, GPBOD

Proprietary sentences:

PGRMM (map datum), PGRMZ (altitude), PSLIB
(beacon rec. control)

NMEA 0183 version 2.0

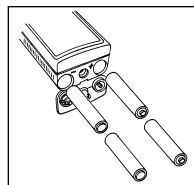
Approved sentences:

GPGGA, GPGLL, GPGSA, GPGSV, GPRMB, GPRMC,
GPRTS, GPWPL, GPBOD

Proprietary sentences:

PGRME (estimated error), PGRMM (map datum),
PGRMZ (altitude), PSLIB (beacon receiver control)

DGPS corrections are accepted on RTCM-104 v. 2.0 format. The GARMIN GBR 21 is the recommended beacon receiver for use with the GPS 45XL. Other receivers with the correct RTCM format may be used, but may not correctly display status or allow tuning control.



The GPS 45XL comes with 4 AA alkaline batteries. After approximately 12 hours of operation in normal mode or 20 hours of operation in battery-saver mode, the batteries will need to be replaced. Rechargeable ni-cad or lithium batteries may also be used. Note that the battery level indicator is calibrated for alkaline batteries, and ni-cad or lithium batteries will only show battery life at partial scale.

To replace batteries:

Remove the battery cover by turning the thumb loop at the bottom of the unit 1/4 turn counter-clockwise. Remove used batteries and insert new batteries into position. The battery pole you can still see should match the symbol marked on the case. Replace and secure the battery cover by turning the thumb loop 1/4 turn clockwise.

Appendix D

Accessories

GARMIN offers a full line of accessories for the GPS 45XL, which are available from your local dealer or GARMIN direct. Orders may be placed Monday through Friday from 8AM-5PM CST by calling 1-800-800-1020, or by fax at 1-913-397-8282.

Name _____

Address _____

City _____ State _____ Zip _____

Country _____ Daytime Phone _____

Method of Payment

Visa MC AMEX Discover

Account # _____ Expires _____

Authorized Signature _____

| DESCRIPTION | PART # | PRICE | QTY | EXT. PRICE |
|-----------------------|--------------|----------|-----|------------|
| Swivel Mount Bracket | 010-10048-00 | \$45.00 | | |
| Remote Marine Antenna | 010-10052-00 | \$160.00 | | |
| Cig. Lighter Adapter | 010-10085-00 | \$25.00 | | |
| Data Transfer Cable | 320-00040-00 | \$37.00 | | |
| Owner's Manual | 190-00070-00 | \$15.00 | | |
| Quick Reference Card | 190-00070-01 | \$4.50 | | |
| PC Kit w/ cable | 010-10054-00 | \$99.00 | | |

Subtotal

Shipping (Ground)* & Handling- \$5.00 US, \$35 International

CA, FL, KS & NJ add Sales Tax

Total Due

***Express shipping available. Please call for pricing.**

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GARMIN LIMITED WARRANTY

GARMIN warrants this product to be free from defects in materials and workmanship for one year from the date of purchase. GARMIN International, Inc. will at its sole option, repair or replace any components which fail in normal use. Such repairs or replacement will be made at no charge to the customer for parts or labor. The customer is, however, responsible for any transportation costs. This warranty does not cover failures due to abuse, misuse, accident or unauthorized alteration or repairs. GARMIN International, Inc. assumes no responsibility for special, incidental, punitive or consequential damages, or loss of use.

The warranties and remedies contained herein are exclusive and in lieu of all other warranties expressed or implied, including any liability arising under warranty of merchantability or fitness for a particular purpose, statutory or otherwise. This warranty gives you specific legal rights, which may vary from state to state.

To obtain warranty service, call the GARMIN Customer Service department for a returned merchandise tracking number. The unit should be securely packaged with the tracking number clearly marked on the outside of the package, and sent freight prepaid and insured to a GARMIN warranty service station. A copy of the original sales receipt is required as the proof of purchase for warranty and flat rate repairs.

Once your standard warranty expires, GARMIN's flat rate service policy provides a low cost, fast-turnaround factory repair for three additional years. The flat rate is set at the time of purchase, and costs you nothing until you need it. If your GPS should ever need service or repair, return it to a GARMIN service center.

The flat rate service policy applies to the original owner, and is void if the product exhibits any evidence of physical abuse, neglect or intentional damage determined at the sole discretion of GARMIN.

A copy of the original sales receipt is required to verify the service rate in effect at the time of purchase. If a receipt is not available or not included with the unit, it will be repaired at the current three year flat rate.

Software and database updates are not included in the warranty or flat rate program. GARMIN may, however, change the operating software and/or database at its discretion at no additional cost. Unit repair or replacement will be made at the sole discretion of GARMIN.



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