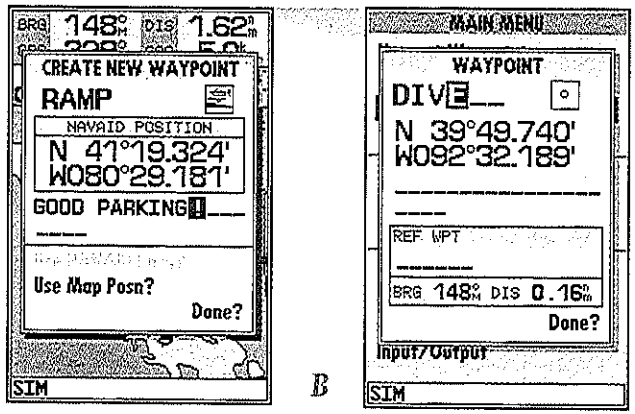
SECTION 6 WAYPOINTS

Creating Waypoints On Map & By Text



A B

A. Once a position has been selected on map, the create new waypoint page will appear. Here you can change the waypoint name, symbol or comment before saving the waypoint.

B. To create a waypoint by text entry, start by entering the new waypoint's name.

Creating Waypoints On Map

Waypoints may also be quickly created from the map display, which allows you to "point and shoot" at any map position to create a new waypoint.

To create a new waypoint on map:

1. Use the keypad to move the cursor to the desired map position. If you want to create the new waypoint at an on-screen navaid, highlight the navaid on the map display.
2. Press EDIT ENTER.
3. To accept the waypoint with the default name, symbol and comment, press EDIT ENTER. If you are creating a waypoint at an on-screen navaid, the default symbol and comment will automatically reflect the selected navaid's name and symbol.
4. To change the name, symbol or comment, highlight the appropriate field and press EDIT ENTER.
5. After entering and confirming your changes, move the field highlight back to the 'Done?' prompt and press EDIT ENTER.

Creating Waypoints By Text Entry

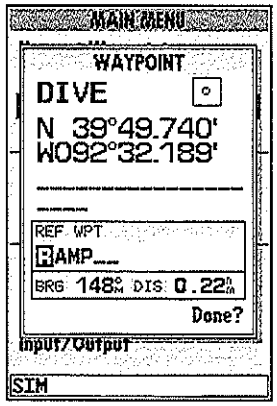
Waypoints may also be created by manually entering a position's coordinates or referencing a stored waypoint through the 'Create Waypoint' submenu option on the Main Menu Page.

To create a new waypoint by manually entering its coordinates:

1. Press MENU twice to display the Main Menu Page.
2. Highlight the 'Create Waypoint' option and press EDIT ENTER. The waypoint definition page will appear, with the next available waypoint number and the receiver's last known position as the default name and position.
3. Use the keypad to enter the new waypoint name, icon, position, and comment. Press EDIT ENTER after the last character in each section.
4. When you have finished entering all your waypoint data, use the keypad to highlight the 'Done' prompt and press EDIT ENTER.

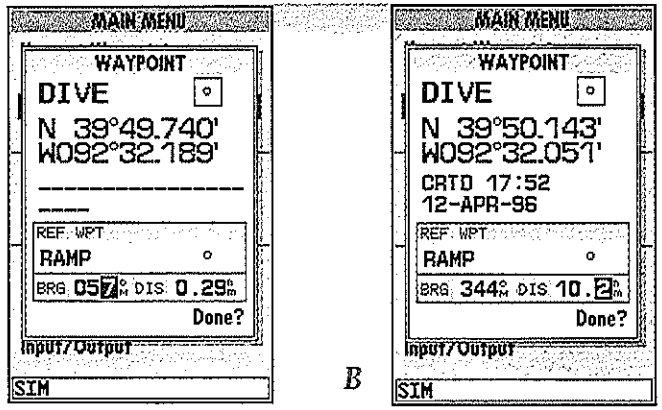
Reference Waypoints

A new waypoint may also be created without knowing position coordinates by entering its range and bearing from an existing waypoint or your present position. The GPSMAP 230 will then calculate the position coordinates for you, using the reference selected.



To create a new waypoint using a reference waypoint:

1. Select the 'Create Waypoint' option from the Main Menu Page and press EDIT ENTER.
2. Enter the name, icon, and comment for the new waypoint.
3. Highlight the reference waypoint field and press EDIT ENTER.
4. Enter the name of the reference waypoint using the keypad, or press MENU to select the waypoint from the nearest list, waypoint list, or map display. Leave the reference field blank to use your present position.
5. Press EDIT ENTER to begin entry of the bearing from your reference waypoint to the new waypoint position. Enter the bearing and press EDIT ENTER.
6. Press EDIT ENTER to begin entry of the distance from your reference waypoint to the new waypoint position. Enter the distance and press EDIT ENTER. The position for the new waypoint will automatically be calculated.
7. Highlight the 'Done' prompt and press EDIT ENTER to finish.



A B

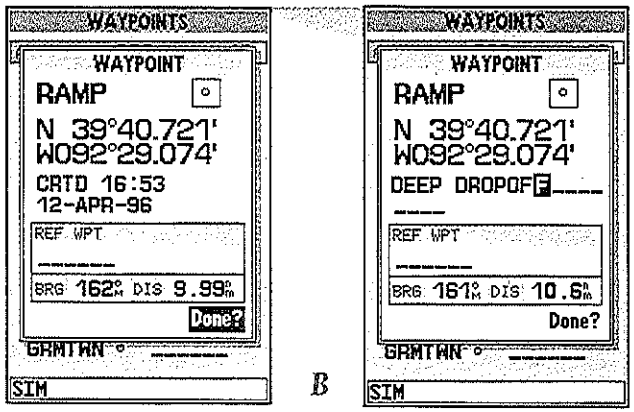
A. Enter the bearing from the reference waypoint to the new waypoint in the 'BRG' field.

B. Enter the distance from the reference waypoint to the new waypoint in the 'DIS' field.

SECTION 6

WAYPOINTS

Reviewing & Editing Waypoints



A B

A. The waypoint definition page will appear whenever a waypoint is selected from the map or a waypoint list.

B. A 20-character custom waypoint comment may be assigned to every waypoint. The default comment is the date and time of creation.

Reviewing & Editing Waypoints By Text

Once you have created and stored a waypoint, it may be modified, reviewed, renamed, or deleted at any time through the waypoint definition page. The waypoint definition page is available for any stored waypoint by highlighting the desired waypoint from the map display or selecting it from any waypoint list and pressing the EDIT ENTER key.

To access the waypoint definition page:

1. Use the keypad to highlight the desired waypoint on the map display (or any waypoint list).
2. Press EDIT ENTER to display the waypoint definition page.

From the waypoint definition page, you may change the waypoint symbol, position coordinates, or the waypoint comment for the selected waypoint.

To change the waypoint symbol:

1. Highlight the waypoint symbol field and press EDIT ENTER.
2. Use the keypad to select the desired symbol and press EDIT ENTER to confirm.

To change the position coordinates:

1. Highlight the coordinates field and press EDIT ENTER.
2. Use the keypad to edit the coordinates and press EDIT ENTER to confirm.

To change the waypoint comment:

1. Highlight the comment field and press EDIT ENTER.
2. Use the LEFT arrow of the keypad to clear the comment field.
3. Use the keypad to enter a comment (up to 16 characters).
4. Press EDIT ENTER to confirm.

Waypoint Definition Page Options

The waypoint definition page also features an options page that allows you to edit the selected waypoint on the map display, rename the selected waypoint or delete the waypoint from memory.

To display the waypoint definition page options:

1. Press the MENU key.

To review/edit the selected waypoint from the map display:

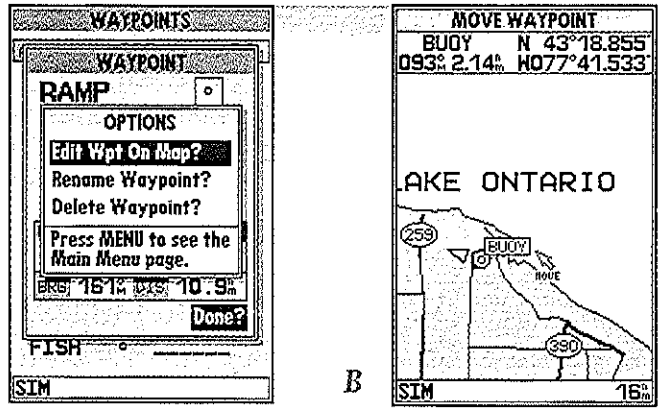
1. Highlight the 'Edit Wpt On Map?' option and press EDIT/ENTER.
2. The selected waypoint will appear on the map display, with the waypoint name and coordinates shown at the top of the map, along with the distance and bearing to the waypoint from your present position.
3. To move the selected waypoint's position, press EDIT/ENTER. A 'MOVE' label will now appear under the cursor arrow.
4. Use the keypad to move the cursor arrow to the desired position. The cursor's coordinates, along with the distance and bearing from the waypoint's position, will be displayed at the top of the map display.
5. Press EDIT/ENTER to set the waypoint's new position, and QUIT to return to the waypoint definition page.

To rename the selected waypoint:

1. Highlight the 'Rename Waypoint?' option and press EDIT/ENTER.
2. Enter the new waypoint name and press EDIT/ENTER.
3. Press EDIT/ENTER to confirm the 'Yes' prompt.

To delete the selected waypoint:

1. Highlight the 'Delete Waypoint?' option and press EDIT/ENTER.
2. Press EDIT/ENTER to confirm.



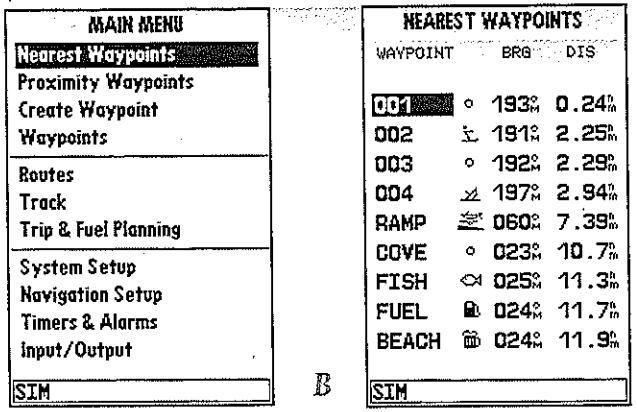
A. To review or edit a waypoint on the map display, select the 'Edit Wpt On Map?' option.

B. To move the selected waypoint, press EDIT/ENTER. Use the arrow keypad to select the new position, and press EDIT/ENTER to finish.

SECTION 6

WAYPOINTS

Waypoint Submenus & Nearest Waypoints



A B

A. *The Menu Page features four waypoint submenus.*

B. *The nearest waypoint list continuously updates to show the nine nearest waypoints to your present position.*

Waypoint Submenus

The GPSMAP 230's Main Menu Page features four waypoint submenus that let you manage a large number of waypoints quickly and efficiently. The submenus also provide a continuously updated nearest waypoints list and a proximity waypoint alarm function that can be used to define an alarm circle around submerged hazards, shallow waters, etc.

To access the Main Menu Page waypoint submenus:

1. Press MENU twice.

The first waypoint submenu is the **nearest waypoints list**, which shows the nine nearest waypoints that are within 100 miles of your present position. The nearest waypoints are continuously updated to your present position, and provide quick access to the closest points of safety in emergency situations.

To scroll through and review the nearest waypoint list:

1. Highlight the 'Nearest Waypoints' option and press ENTER.
2. Use the keypad to scroll through the list in either direction.
3. Press ENTER to review the highlighted waypoint.
4. To return to the waypoint list, highlight the 'Done?' prompt and press ENTER.
5. The field highlight will automatically scroll to the next waypoint. If you want to review each waypoint, you can scroll through any waypoint list by pressing the ENTER key repeatedly.

To select a nearest waypoint as a GOTO destination:

1. Use the key to select the desired GOTO waypoint.
2. Press GOTO, followed by ENTER.

Proximity Waypoints

The Proximity Waypoints list lets you define an alarm circle around a stored waypoint position, and can be used to help you avoid reefs, rocks, or restricted waters. Up to nine waypoints may be listed, with a maximum alarm radius of 99.99 nautical or statute miles or kilometers. If a proximity alarm circle overlaps with an existing alarm circle, a 'Proximity Overlap' message will appear each time the unit is turned on. If you enter an alarm circle overlap, you will only be alerted to the closest proximity waypoint.

To enter a proximity waypoint:

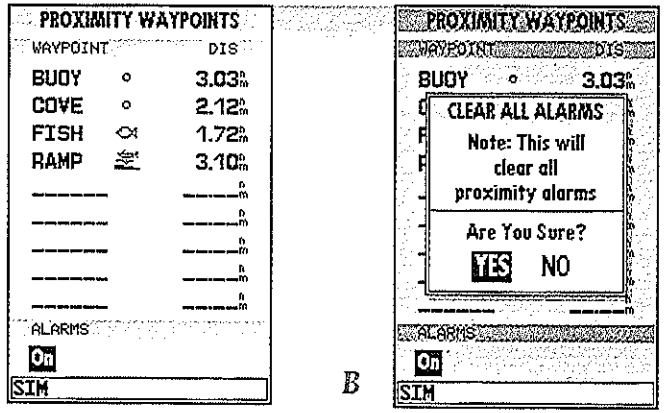
1. Highlight the Proximity Waypoint option and press EDIT ENTER.
2. Use the keypad key to highlight the first blank waypoint field and press EDIT ENTER.
3. Enter the name of the proximity waypoint using the keypad, or press MENU to select the waypoint from the nearest waypoint list, waypoint list, or map display.
4. Press EDIT ENTER to confirm. The distance field will now be highlighted.
5. Press EDIT ENTER to begin entry of the proximity radius.
6. Use the keypad to enter a distance value (to 99.99 units) and press EDIT ENTER.

To turn proximity alarms on or off:

1. Use the keypad to highlight the alarms on/off field and press EDIT ENTER.
2. Select the desired setting and press EDIT ENTER.

To remove a proximity waypoint from the list:

1. Use the keypad to highlight the waypoint to be removed.
2. Press MENU.
3. Highlight the 'Clear Alarm?' field and press EDIT ENTER.
4. To clear all proximity waypoints, select the 'Clear All' option and press EDIT ENTER.



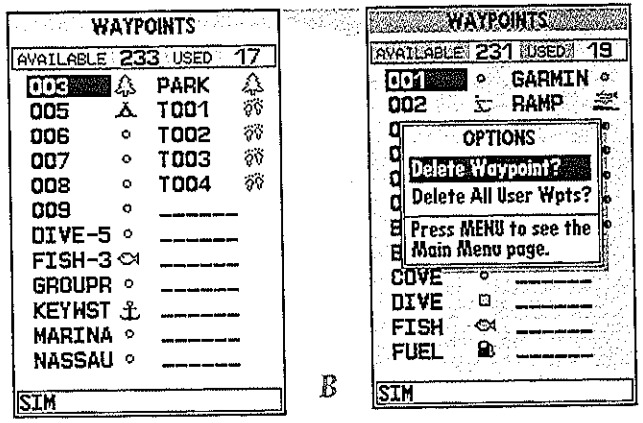
A B

A. Whenever you enter a proximity waypoint's alarm circle, a 'PRX' indicator will appear in the status bar (the alarms option must be set to the 'On' position). Once you've left the alarm circle, the proximity indicator will automatically reset.

B. To clear all proximity waypoints, select the 'Clear All?' option from the proximity options page. Finish the deletion by confirming the 'Yes' prompt.

SECTION 6 WAYPOINTS

Create Waypoint & Waypoint List



A B

A. The waypoints list displays all waypoints stored in memory in a two-column format. Temporary waypoints created by the TracBack feature are assigned a 'TXXX' name and a footprint symbol.

B. The waypoints list options page lets you delete individual waypoints or the entire waypoint list.

Create Waypoint

The third waypoint submenu available from the Main Menu Page is the 'Create Waypoint' submenu, which allows you to create a new waypoint by manually entering coordinates. Instructions for using the create waypoint submenu are provided on page 36.

Waypoint List

The last waypoint category available from the Main Menu Page is the **waypoints list**, which displays a master list of all waypoints currently stored in memory. From the waypoints list, you may review, edit, rename, or delete individual waypoints; or delete all user waypoints. The total number of stored and available waypoints is displayed at the top of the waypoints page, with the stored waypoints arranged in numerical/alphabetical order and listed in two columns in the center of the page.

To scroll through and review the waypoint list:

1. Highlight the 'Waypoints' option from the Main Menu Page and press EDIT ENTER.
2. Use the keypad to scroll through the list in the desired direction.
3. Press EDIT ENTER to review the highlighted waypoint.
4. Press EDIT ENTER to return to the list.

To delete an individual waypoint from the list:

1. Use the keypad to highlight the waypoint to be deleted and press MENU.
2. Press EDIT ENTER.
3. Press the EDIT ENTER key to confirm the deletion warning.

To delete the entire waypoint list:

1. Press the MENU key to select the options window.
2. Highlight the 'Delete All User Wpts?' option and press EDIT ENTER.
3. Use the keypad to highlight the 'YES' prompt and press EDIT ENTER to confirm.

Going to a Destination

The GPSMAP 230 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 select a waypoint as your destination and quickly sets a direct course from your present position. The GOTO key can be used in three ways: from a list of waypoints, directly from the map display and from a list of GOTO options. Pressing the GOTO key once displays a list of all waypoints in memory, from which you can select a single destination waypoint.

To activate a GOTO from the waypoint list:

1. Press the GOTO key.
2. Select a waypoint and press ENTER.

Selecting a GOTO On Map

Pressing the GOTO key twice allows you to graphically select an on-screen waypoint, navaid, or cursor position as a destination. A graphical GOTO may be used to select one of three options from the map display: an existing waypoint, an on-screen navaid, or a cursor position. If you are selecting a navaid or a new position as the GOTO destination, the GPSMAP 230 will automatically create or move the waypoint named 'MAP' at the navaid or map position.

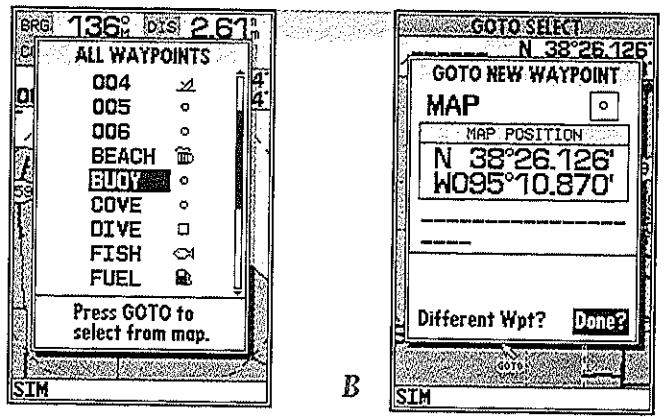
To activate a GOTO from the map display:

1. Press the GOTO key twice.
2. To select an existing user waypoint, highlight the waypoint on screen and press ENTER.
3. To select a navaid, highlight the navaid on screen and press ENTER. The 'GOTO NEW WAYPOINT' page will appear, displaying the navaid position as a 'MAP' waypoint, with the navaid symbol and text as the default icon and waypoint comment. Press ENTER to save the waypoint and begin navigation.
4. To select a cursor position as your destination, move the arrow cursor to the desired position and press ENTER. The 'GOTO NEW WAYPOINT' page will appear and display the position as the 'MAP' waypoint. Press ENTER to save the waypoint and begin navigation.

GOTO/MOB

SECTION 7

Selecting a GOTO Destination



A B

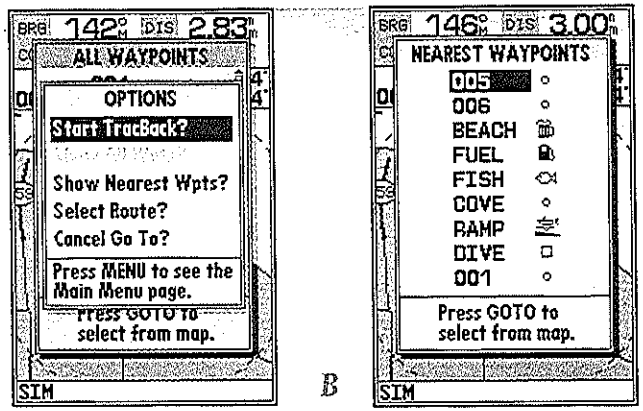
A. Press GOTO once to select a destination from a list of waypoints.

B. Press GOTO twice to select a destination waypoint with the map cursor. If you are not selecting an existing waypoint as your destination, a new waypoint named 'MAP' will be created. Keep in mind that the MAP waypoint will be overwritten for each MAP GOTO. This allows you to navigate to on-screen navaids without permanently storing the navaid as a waypoint. If you want to save the MAP waypoint, rename it following the steps on page 39.

SECTION 7

GOTO/MOB

GOTO Options



A B

A. The GOTO options page lets you start a TracBack route, select a destination from the nearest list, select a route to activate, or cancel the current GOTO destination.

B. The nearest waypoints list limits waypoint choices to provide quick access to nearby anchorages, facilities, etc. which are stored as waypoints.

GOTO Key Options

The GOTO options page provides a list of additional GOTO options that let you start a TracBack route, select a destination waypoint from the nearest waypoints list, select a route to navigate, or cancel the current GOTO destination.

To display the GOTO options:

1. Press MENU.

To select a menu option:

1. Highlight the desired option and press EDIT ENTER.

The following options are available:

- **Start TracBack?—** allows you to create and start navigation of a TracBack route back to the oldest track log point in memory (see pages 45-46 for more on using the TracBack function).
- **Show All Wpts?—** displays the GOTO waypoint list.
- **Show Nearest Waypoints?—** allows you to select the GOTO destination from a list of the nine nearest waypoints to your present position.

To select a nearest waypoint as a GOTO destination:

1. Highlight the 'Show Nearest Waypoints' option and press EDIT ENTER.
2. Select the desired waypoint and press EDIT ENTER.

- **Select Route?—** allows you to quickly select a stored route for navigation.

To select a route to navigate:

1. Highlight the 'Select Route' option and press EDIT ENTER.
2. Select the desired route and press EDIT ENTER.

- **Cancel GOTO?—** cancels the current GOTO destination and resumes navigation of any previously selected route.

MOB

The GPSMAP 230's **man overboard function** (MOB) lets you simultaneously mark and set a course to a position for quick response to emergency situations.

To activate the MOB function:

1. Press the MOB key.
2. Press the ENTER key to confirm and begin navigating to the MOB position.

Once a MOB has been activated, a MOB icon will appear on the map display, and the destination field on the Map Page will display the bearing, distance, and ETE to the MOB position based on your present speed and course.

To stop navigation to the MOB position:

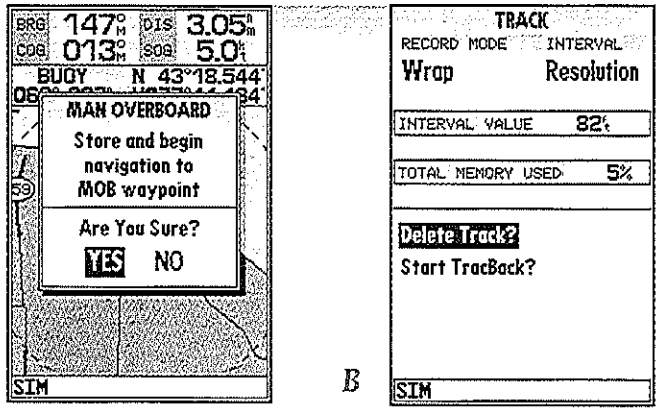
1. Press the GOTO key, followed by MENU, to display the GOTO options page.
2. Select the 'Cancel GOTO' option and press ENTER.

TracBack Navigation

The third method of navigating to a destination is by using the GPSMAP 230's **TracBack** feature. The TracBack function allows you to retrace your path using the track log automatically stored in the receiver's memory, which will eliminate the need to store waypoints along the way. TracBack routes are created by reducing your 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 good idea to clear the existing track log at the start of your current trip (e.g., your dock) before you get started.

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

1. Press the MENU key twice to display the Main Menu Page.
2. Highlight the 'Track' option and press ENTER.
3. Select the 'Delete Track?' option and press ENTER.
4. Highlight the 'Yes' field and press ENTER.



A B

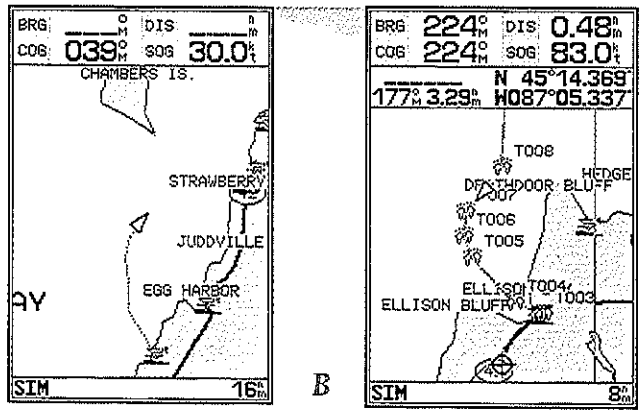
A. The GPSMAP 230's MOB mode can be used to set a course to a passing spot for quick response to emergency situations, fish strikes, etc.

B. To define a starting point for a TracBack route, clear the track log.

SECTION 7

GOTO/MOB

TracBack Navigation



A B

A. The TracBack feature uses your track log to create a route back to where you started.

B. Once a TracBack is activated, the track log is divided into segments using temporary waypoints, and an inverted route is activated back to the oldest track log point in memory.

To activate a TracBack route:

1. Press the GOTO key, followed by the MENU key.
2. Highlight the 'Start TracBack?' option and press ENTER.

Once a TracBack has been activated, the GPSMAP 230 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. To get the most out of the TracBack feature, remember the following tips:

- Always clear the track log at the point that you want to go back to (dock, etc.).
- The 'RECORD' option on the track log setup page must be set to 'Fill' or 'Wrap'.
- 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 available waypoints to create a route with an emphasis on the track log closest to the destination.
- If the track log interval is set to the 'Time' option, the route may not follow your exact path (keep the interval set to 'resolution' for best performance).
- If the receiver is turned off or satellite coverage is lost during your trip, the TracBack will 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 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.
- Whenever a TracBack route is activated, the receiver will automatically erase any temporary waypoints (e.g., 'T001') that are not contained in routes 1-20. If there are temporary waypoints stored in routes 1-20, the receiver will create any new temporary waypoints using the first three-digit number available.

Routes

The last way to navigate to a destination is to create a user-defined route. The GARMIN GPSMAP 230 system lets you create and store up to 20 reversible routes (numbered 1-20), with up to 30 waypoints each. Routes can be created and modified right from the Map Page, allowing you to see each route on-screen as you create, review, modify, or navigate the route. All of the GPSMAP 230's route functions are accessed through the main menu.

To create a route on the map:

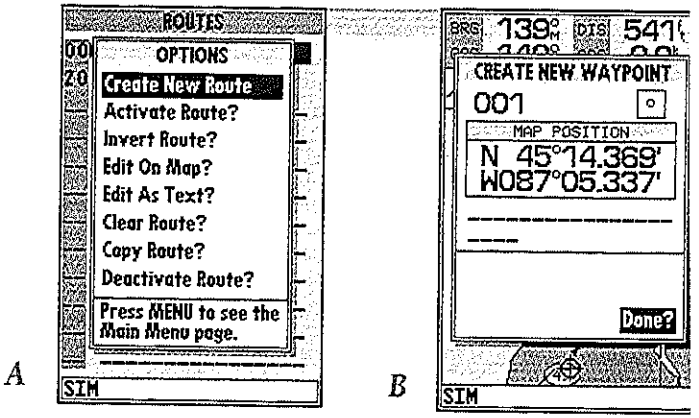
1. Press the MENU key twice to display the Main Menu Page.
2. Highlight the 'Routes' field and press EDIT ENTER. The routes page will appear, showing all the routes currently stored in memory.
3. Press the MENU key to display the route options page.
4. Press EDIT ENTER to select the 'Create New Route' option.

The route edit page will appear, with the cursor displayed as an arrow pointer, and will allow you to select your route waypoints using one of two methods:

5. To add an existing waypoint or navaid to the route, use the arrow pointer to highlight the desired waypoint on screen and press EDIT ENTER.
6. To add a new waypoint to the route, use the arrow pointer to select the desired map position and press EDIT ENTER. Press EDIT ENTER again to confirm the new waypoint.

As you add each new waypoint to the route, the **data window** at the top of the map display will show the route number you are creating, along with the first and last route waypoints of the route. A route line will appear on the map to indicate each completed leg, and a dotted line will appear to indicate the distance and bearing to the arrow pointer from the last route waypoint.

7. Repeat steps 5 and 6 until you have finished defining all route waypoints.
8. Press QUIT to finish and enter review mode, or PAGE to return to the main page sequence.



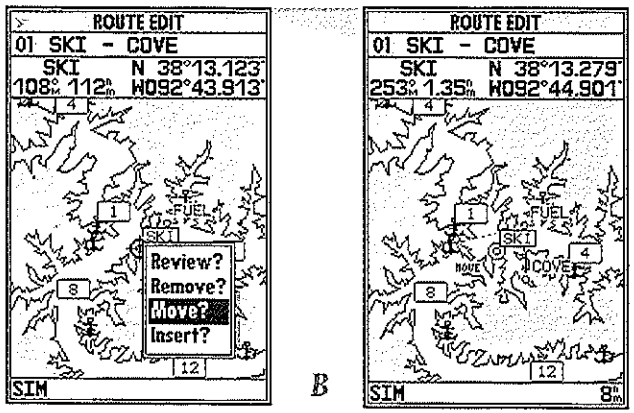
A B

A. The route options page provides access to the GPSMAP 230's route functions.

B. Use the arrow pointer and EDIT/ENTER to add waypoints to the route. The create waypoint page will appear whenever you have selected a position that is not already stored as a waypoint.

SECTION 8 ROUTES

Reviewing & Editing Routes On Map



A B

A. *To move a route waypoint, select the 'Move?' option and press EDIT/ENTER.*

B. *Move the arrow cursor to the new waypoint position and press EDIT/ENTER to confirm.*

Once a route has been created on the map (and the QUIT key has been pressed to finish), the map display will automatically enter the route review mode. The arrow pointer will be replaced by the map cursor, located at the last route waypoint. The route edit mode allows you to review and modify the route displayed through a pop-up window menu for each waypoint. You may also use the cursor to select an individual route leg and insert a new route waypoint.

To edit a route waypoint:

1. Use the cursor to highlight the desired route waypoint and press EDIT/ENTER.

A pop-up menu of editing choices will appear, with options for reviewing, removing, moving, or inserting a route waypoint.

To review a route waypoint:

1. Highlight the 'Review?' option and press EDIT/ENTER.

To remove a route waypoint:

1. Highlight the 'Remove?' option and press EDIT/ENTER.

To move a route waypoint:

1. Highlight the 'Move?' option and press EDIT/ENTER.
2. Move the cursor to the new map position and press EDIT/ENTER.

To insert new route waypoint(s) at the beginning or end of the route:

1. Select the first (to add waypoints to the beginning of the route) or last (to add waypoints to the end of the route) route waypoint with the map cursor, and press EDIT/ENTER.
2. Highlight the 'Insert?' option and press EDIT/ENTER.
3. Move the cursor to the new waypoint position and press EDIT/ENTER.
4. If you are not inserting an existing waypoint, press EDIT/ENTER to confirm the new waypoint.
5. Repeat steps 3 and 4 to insert additional waypoints, or press QUIT to finish.

The GPSMAP 230's route edit mode also allows you to insert a new route waypoint in any route leg using the map cursor.

To insert a new waypoint between two existing route waypoints:

1. Use the cursor to select the leg you want to insert the new waypoint in (the route line will change to a dotted line when the leg is selected) and press EDIT/ENTER.
2. Move the cursor to the new map position and press EDIT/ENTER.
3. If you are not inserting an existing waypoint, press EDIT/ENTER to confirm the new waypoint.

The route edit options page provides access to a variety of functions which can be used to review, activate, invert, or edit the route as text and adjust the map view of the selected route.

To display the route edit options:

1. Press MENU.

To select a menu option:

1. Highlight the desired option and press EDIT/ENTER.

The following options are available:

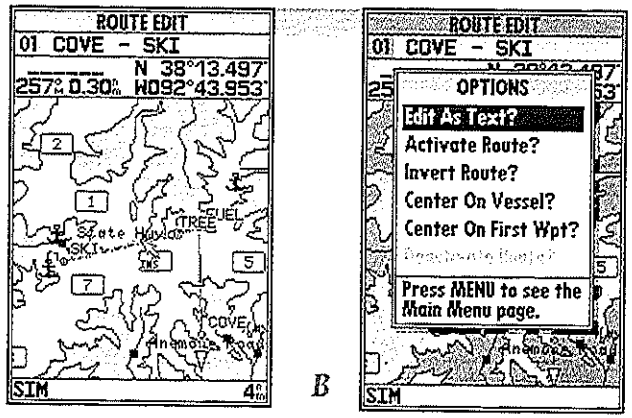
- **Edit As Text?—** allows you to modify a route by text entry.

To edit a route by text entry:

1. Highlight the 'Edit As Text?' option and press EDIT/ENTER. The text edit page will appear, showing a list of all route waypoints, with the desired track and distance of each leg displayed.
2. Select the route waypoint you want to review or change and press EDIT/ENTER. A pop-up menu with four route editing options will appear.

To review the selected waypoint:

1. Highlight the 'Review?' option and press EDIT/ENTER.



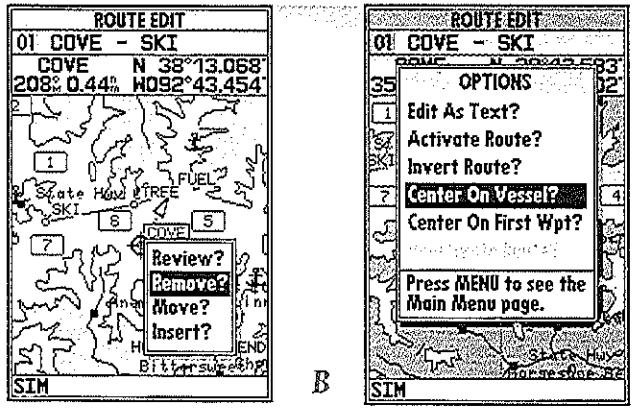
A B

A. A new route waypoint may be inserted into any route leg by pointing to the new waypoint or position and pressing EDIT/ENTER.

B. The 'Edit As Text?' option allows you to review and modify waypoints by text data entry.

SECTION 8 ROUTES

Editing Routes & Route Editing Options



A B

A. *To remove a route waypoint, highlight the waypoint on the map, press EDIT/ENTER, and select the 'Remove?' option from the pop-up window.*

B. *The route edit options page lets you activate, invert, or deactivate the route you are editing. The 'Center On Vessel' and 'Center On First Wpt' options redraw the map to display the desired option.*

To insert a new waypoint before the selected route waypoint:

1. Highlight the 'Insert?' option and press EDIT ENTER.
2. Enter the name of the new waypoint using the keypad, or press MENU to select the new waypoint from the nearest list, waypoint list, or map display.
3. Press EDIT ENTER to finish.

To remove the selected route waypoint:

1. Highlight the 'Remove?' option and press EDIT ENTER.

To change the selected route waypoint:

1. Highlight the 'Change?' option and press EDIT ENTER.
2. Enter the name of the new waypoint using the keypad, or press MENU to select the new waypoint from the nearest list, waypoint list, or map display.
3. Press EDIT ENTER to finish.

The **route edit options page** features five more functions. These functions may be selected by highlighting the desired function and pressing EDIT ENTER:

- **Activate Route?—** activates the route you are editing and begins navigation.
- **Invert Route?—** activates the route you are editing in reverse order and begins navigation.
- **Center On Vessel?—** redraws route edit map with your vessel in the center of the display.
- **Center On First Wpt?—** redraws route edit map with the first route waypoint in the center of the display.
- **Deactivate Route?—** stops navigation of the route currently selected.

To exit the route edit mode and return to the route list page, press the QUIT key.

Route List Page

The GPSMAP 230's **route list page** displays all the routes currently stored in memory in numerical order, with the route number and comment displayed. Route 00 is always reserved for the TracBack route, while routes 1-20 serve as storage routes (route 20 is stored as the GPSMAP tour route, which may be deleted at any time). From the list, you may enter your own 16-character route comment and select a specific route for activation, editing, or other management functions.

To enter a custom route comment:

1. Highlight the desired route and press EDIT/ENTER.
2. Press the left arrow key of the keypad to clear the comment field.
3. Use the keypad to enter the new route comment and press EDIT/ENTER.

Once you have selected a route from the route page, additional functions for that route are available from the route options page.

To display the route options:

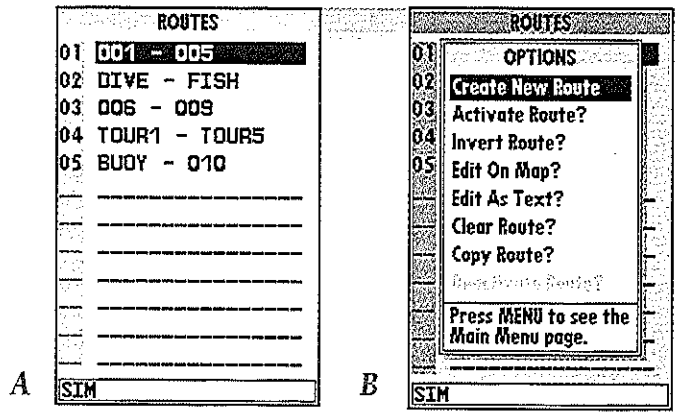
1. Press MENU.

To select a menu option:

1. Highlight the desired option and press EDIT/ENTER.

The following options are available from the route list page:

- **Create New Route?—** allows you to create a new route (see page 47).
- **Activate Route?—** activates the selected route and begins navigation.
- **Invert Route?—** activates the selected route in reverse order and begins navigation.
- **Edit On Map?—** allows you to edit the selected route on the map (see pages 48-49 for specific instructions).
- **Edit As Text?—** allows you to edit the selected route by text (see pages 49-50 for specific instructions).



A B

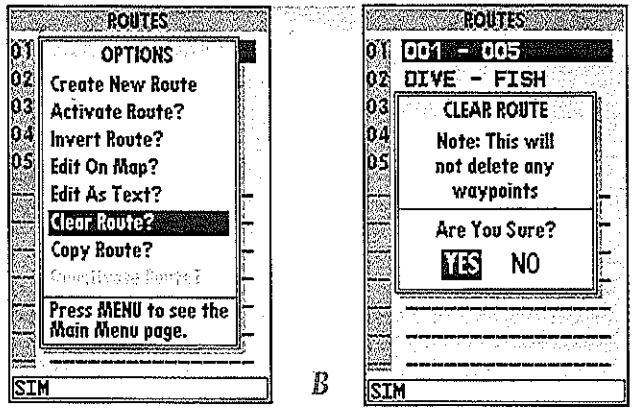
A. The route list page displays each route stored in memory, along with a 16-character user comment. The default comment is the name of the first and last route waypoint.

B. The route list options page provides quick access to many route functions, including activating and deactivating a selected route.

SECTION 8

ROUTES

Route List Options



A B

A. To delete all waypoints from a selected route, highlight the 'Clear Route?' option and press EDIT/ENTER.

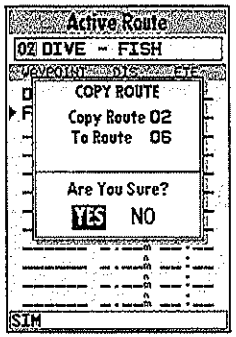
B. Once a route is cleared, all waypoints are removed from the route. They are still stored in memory, however.

Route List Page Options (cont.)

- **Clear Route?—** allows you to clear all waypoints from the selected route.

To clear the selected route:

1. Highlight the 'Clear Route?' option and press EDIT ENTER.
2. Press EDIT ENTER to confirm the clear route warning.



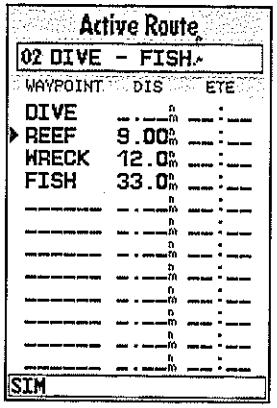
- **Copy Route?—** allows you to copy the waypoints of a selected route to another route. The route copy function can be used to copy a TracBack route (route 00) to another route in order to either prevent losing the route the next time a TracBack route is activated, or save a modified version of an existing route without losing the original.

To copy a route:

1. Highlight the 'Copy Route?' option and press EDIT ENTER. The selected route will appear as the 'copy from' route, and the first open storage route will appear as the 'copy to' route.
2. Press EDIT ENTER to confirm. (If you'd like to change the route number that is being copied or the open route which is being copied to, highlight the appropriate field and press EDIT ENTER; select the new route number and press EDIT ENTER.

- **Deactivate Route?—** stops navigation of the route you are currently navigating.

Active Route Page



Whenever you have activated a route in the GPSMAP 230 system, the **active route page** will appear in the main page sequence. The active route page shows each waypoint of the active route, with the waypoint name, desired track, cumulative distance and ETE or ETA for each waypoint from your present position. The current destination waypoint, the "active to" waypoint, is marked with an arrow icon. As you navigate a route, the waypoint list will automatically update to indicate the next "active to" waypoint first.

From the active route page, you can:

- **Change the route comment-** see page 51 for instructions.
- **Edit the route on map-** see pages 47-48 for instructions.

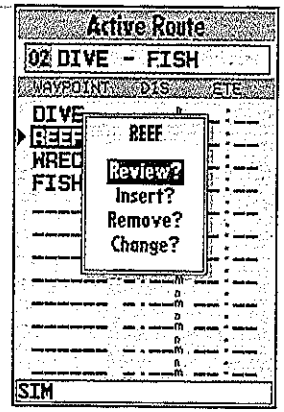
Additional functions for the active route are available from the **active route options page**.

To display the active route options:

1. Press MENU.

To select a menu option:

1. Highlight the desired option and press EDIT ENTER.



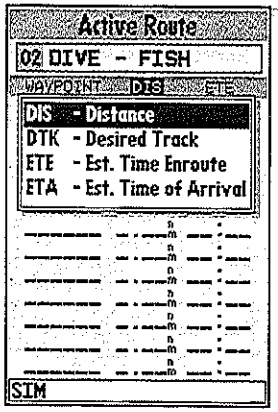
Each waypoint on the active route page may be reviewed, deleted, or changed right from the active route page. To edit an active route waypoint, highlight the desired waypoint and press EDIT/ENTER.

Select the desired function from the pop-up menu and press EDIT/ENTER.

SECTION 8

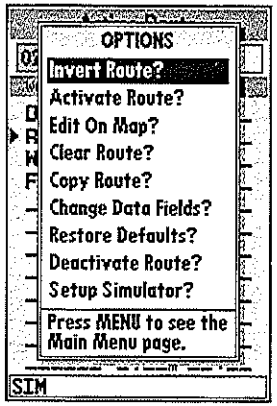
ROUTES

Active Route Page Options



The 'Change Data Fields?' option lets you specify what information is displayed for each route waypoint. Four data options are available: distance, desired track, and ETA or ETE to each route waypoint.

Active Route Page Options



The following options are available from the active route page:

- **Invert Route?—** activates the active route in reverse order and begins navigation.
- **Activate Route?—** reactivates the active route and selects the route leg closest to your current position as the new active leg.
- **Edit On Map?—** allows you to edit the selected route on map (see pages 48-49 for specific instructions).
- **Clear Route?—** allows you to clear all waypoints from the selected route.
- **Copy Route?—** allows you to copy the waypoints of the active route to another route.
- **Change Data Fields?—** allows you to define the data displayed in the distance and ETE fields. Four data options are available:
  - DIS– distance to active wpt
  - DTK– desired track
  - ETE– estimated time enroute
  - ETA– estimated time of arrival
- **Restore Defaults?—** resets all active route page options to the factory settings.
- **Deactivate Route?—** stops navigation of the route you are currently navigating.
- **Setup Simulator?—** allows you to define speed, course, and position values while in simulator mode. See the Getting-Started Tour for more on using the simulator mode.

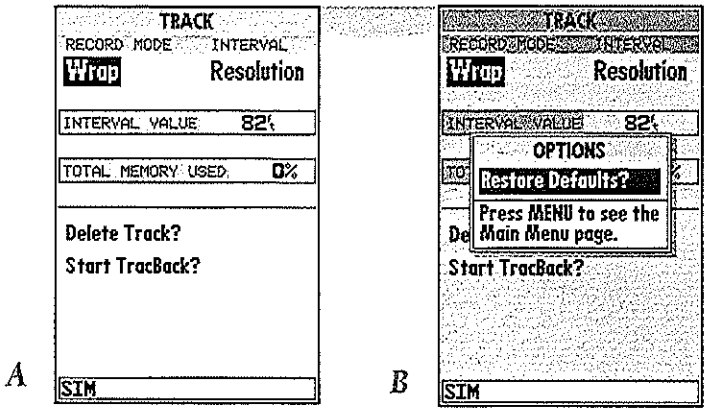
Track Log Submenu

The Main Menu Page's **track submenu** lets you specify whether or not to record a track plot (an electronic recording of your path) and define how it is recorded. It also provides an indicator of the track memory used and selects functions to clear the track memory and start a TracBack route. The following functions are available:

- **Record Mode—** lets you select one of three track recording options:
  - Off– No track log will be recorded. Note that selecting the 'Off' setting will prevent you from using the TracBack feature.
  - Fill– a track log will be recorded until the track memory is full.
  - Wrap– A track log will be continuously recorded, wrapping through the available memory (replacing the oldest track data with new data).
- **Interval—** defines the frequency with which the track plot is recorded. Three interval settings are available:
  - Time– records track plot based on a user-defined time interval.
  - Resolution– records track plot based upon a user-defined variance from your course over ground. The resolution option is the default setting and is recommended for the most efficient use of memory and TracBack performance. The distance value (entered in the interval field) is the maximum error allowed from the true course before recording a track point.
  - Distance– records track based on a user-defined distance between points.
- **Interval Value—** defines the distance or time used to record the track log.
- **Delete Track?—** allows you to clear the track log currently stored in memory.
- **Start TracBack?—** converts the current track log into an inverted route and begins route navigation along the track log.

To reset all track options to the default settings:

1. Press MENU, followed by EDIT ENTER.



A B

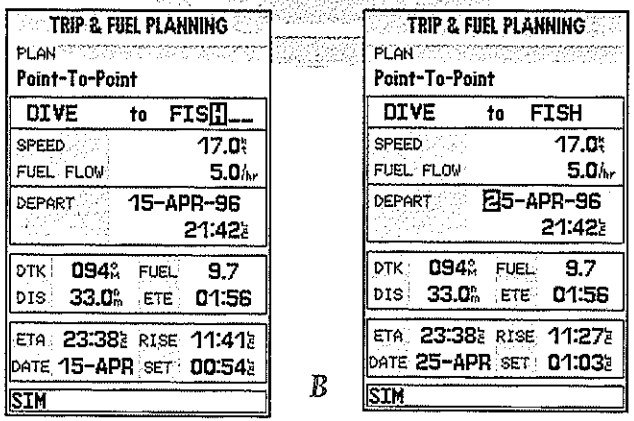
A. The 'Wrap' option will continuously record a track log, and replace the oldest track log point with new data. The 'Fill' option will record a track log until the memory is full.

B. The track submenu's default settings may be quickly restored from the track options page.

SECTION 9

SETUP MENUS

Trip & Fuel Planning



A. *To perform point-to-point planning, enter a 'TO' and 'FROM' waypoint, or leave the field blank if you want to use your present position.*

B. *Enter a date and time for your departure. The sunrise/sunset and ETA at the 'TO' waypoint will be displayed at the bottom of the page.*

Trip and Fuel Planning

The GPSMAP 230's **trip and fuel planning submenu** lets you plan and review distance, fuel, and ETE/ETA information between any two waypoints; your present position and a stored waypoint; or any part of a stored route. Sunrise and sunset information is also provided. Two planning modes are available: point-to-point and route planning.

To use the point-to-point planning mode:

1. Highlight the 'Trip & Fuel Planning' option from the Main Menu Page and press ENTER.
2. If the plan field is not set to 'Point-To-Point', press the MENU key and select it from the options page.
3. Highlight the first waypoint field and press ENTER. Press the left arrow key to clear the field, and use the keypad to enter the name of the starting waypoint. You may leave the waypoint field blank to use your present position, or press the MENU key to select the waypoint from the nearest list, the waypoint list, or the map display. Press ENTER to confirm the waypoint.
4. Move the field highlight to the second waypoint field and follow the steps above to select the destination waypoint.
5. Enter a speed for your trip in the speed field, or press MENU to select your current SOG for the speed value.
6. Enter an hourly fuel flow (if desired) in the fuel field, and press ENTER.
7. Enter the date and time of your departure (the default date and time will be the current date and time in UTC or local time, whichever you have selected) and press ENTER.

The bottom of the page will now display the desired track and distance between the two points; the estimated time enroute and fuel required; the date and time of your arrival; and the sunrise and sunset times at the destination for the date of arrival.

The **route planning mode** lets you calculate the same planning information for any route stored in memory, in leg or cumulative leg, or route totals.

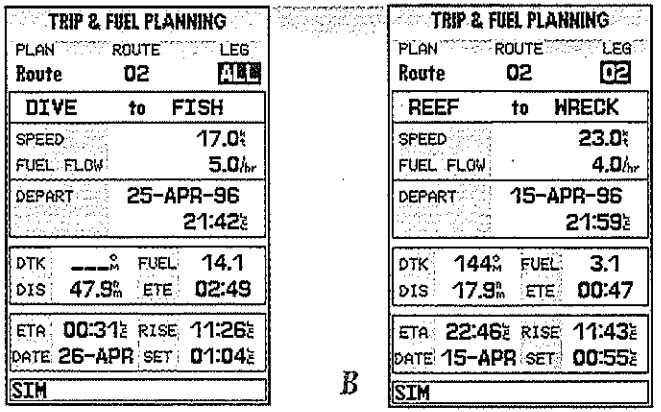
To use the route planning mode:

1. Highlight the 'Trip & Fuel Planning' option from the Main Menu and press EDIT ENTER.
2. If the plan field is not set to 'Route', press MENU and select it from the options page.
3. Highlight the route number field and press EDIT ENTER.
4. Use the keypad to select the route you want to plan and press EDIT ENTER.
5. Highlight the leg field and press EDIT ENTER.
6. To plan the cumulative totals for the all route legs, select the 'ALL' option—or use the keypad to select a specific route leg to plan. Press EDIT ENTER to confirm.
7. Enter a speed for your trip, or press MENU to select your current SOG for the speed value.
8. Enter an hourly fuel flow (if desired) in the fuel field, and press EDIT ENTER.
9. Enter the date and time of your departure (the default date and time will be the current date and time in UTC or local time, whichever you have selected) and press EDIT ENTER.

The bottom of the page will now display the planning information for the route leg selected or the cumulative values for the entire route. The route planning mode will also let you plan cumulative totals for multiple route legs by using the 'Hold First Waypoint?' selection from the options window.

To plan multiple route legs:

1. Follow steps 1 through 6 above to select the last route leg you want to plan. For example, select leg 03 if you want to plan cumulative totals for the first three legs of the route (without including the rest of the route).
2. Enter the speed, fuel and date/time values as described in steps 7-9 above.
3. Press the MENU key to display the options page.
4. Select the 'Hold First Waypoint?' option and press EDIT ENTER. The cumulative totals from the first route waypoint to the end of the selective leg will appear at the bottom of the page.

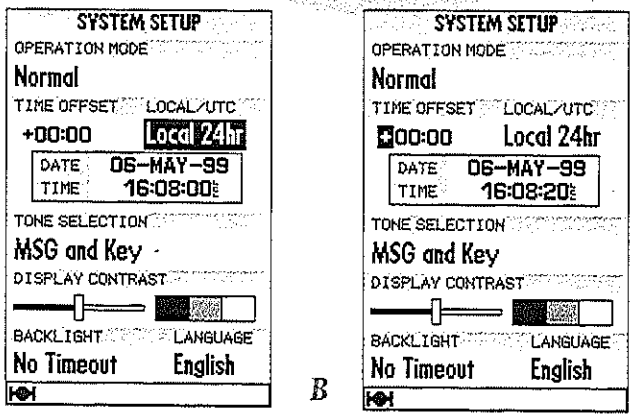


A. To plan cumulative totals for an entire route, select the 'All' option from the leg field.

B. To plan cumulative totals through a particular leg, select the 'Hold First Waypoint?' option from the Trip and Fuel Planning options page. Then enter the last leg you want to plan in the leg field.

SECTION 9 SETUP MENUS

Sunrise/Sunset Planning & System Setup



A B

A. *The system setup submenu provides access to the GPSMAP 230's time formats and contrast/backlight controls.*

B. *When entering a time offset, be sure to select a positive or negative indicator to the left of the offset value.*

The fuel and trip planning submenu also allows you to calculate the sunrise and sunset times for your present position or any waypoint for a selected date.

To use the sunrise/sunset planner:

1. Highlight 'Trip & Fuel Planning' option from the main menu and press EDIT ENTER.
2. Highlight the first waypoint field and press EDIT ENTER. Press the left arrow key to clear the field, and use the keypad to enter the name of the desired waypoint. You may leave the waypoint field blank to use your present position, or press the MENU key to select the waypoint from the nearest list, the waypoint list, or the map display. To calculate the sunrise/sunset for your present position, leave both waypoint fields blank.
3. Press EDIT ENTER to confirm.
4. Highlight the date field and press EDIT ENTER.
5. Enter the date you want sunrise/sunset information for (the current date and year will be used as the default setting) and press EDIT ENTER. The sunrise and sunset times for the arrival date will be displayed at the bottom right of the planning page.

Setup Submenus

The last four options available from the Main Menu Page provide access to the various system, navigation, alarm, and interface settings of the GPSMAP 230. The **system setup submenu** is used to select the operating mode, date and time formats, tone preferences, backlight timeout, display contrast and the display language.

- **Operational Mode** lets you select between normal operation and simulator mode. The GPSMAP 230's system only pretends to track satellites in simulator mode, and should not be used for actual navigation. Waypoints and routes created in simulator mode are saved in memory and are available for use in normal mode.

- **Time Offset** provides a data entry field to enter the time difference between UTC time and the local time. (See Appendix F for a list of time offsets.) When entering a time offset, be sure to select a positive or negative offset. Note that entering an offset will not automatically display local time. The *local* setting from the Date/Time Selection submenu must be selected.

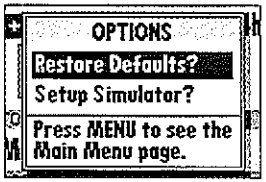
- **Local/UTC** lets you choose to display the date and time in UTC (Greenwich Mean Time) time or local time offset from UTC time. The default setting is local with a '0' offset. (If you are boating in the United States, be sure to enter a negative time indicator in front of the appropriate time offset for your location).

- **Tone Selection** lets you select an audible tone to sound for either messages and keystroke confirmation (the default setting), messages only, or not to sound at all (the tone selection does not affect the external alarm operation).

- **Display Contrast** provides a slide bar to adjust the LCD screen contrast in order to compensate for changes in temperature or lighting conditions.

- **Backlight Timeout** provides an automatic shutoff for the GPSMAP 230's screen backlighting. Six settings are available: No Timeout (the backlight will stay on until it is turned off), 15 seconds (default setting); 30 seconds; and 1, 2, or 4 minutes. Keeping the timeout at the lowest acceptable setting will prolong the life of the backlight.

- **Language** lets you select one of nine languages that the unit can display. The available lanaguages are; English, Danish, Finnish, French, German, Italian, Portuguese, Spanish, Swedish.



The system setup page also features an options page that allows you to quickly reset all the system setup options to the factory default settings and define speed, course and position values while in simulator mode (see Getting-Started Tour).

To view the system setup page options:

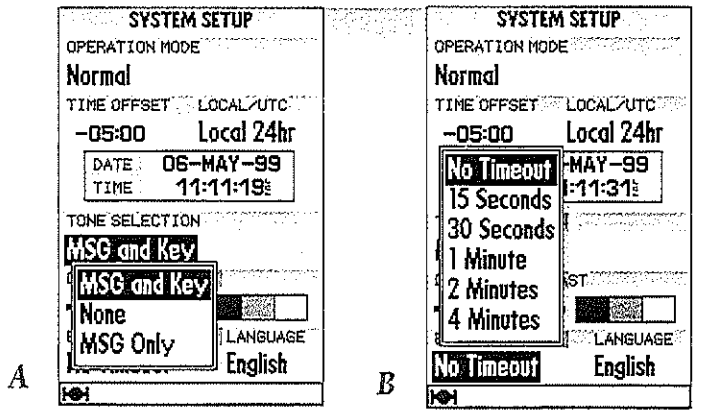
1. Press the MENU key.

To restore the default settings:

1. Highlight the 'Restore Defaults?' option, and press EDIT ENTER.

SETUP MENUS SECTION 9

System Setup & System Setup Options



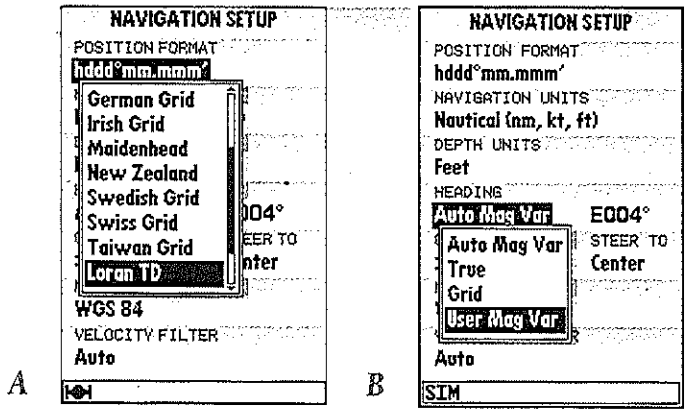
A. The tone preference will not affect external alarm operation.

B. Keeping the backlight timeout at the lowest acceptable setting will prolong the useful life of the backlight.

SECTION 9

SETUP MENUS

Navigation Setup



A B

A. The GPSMAP 230 will also display position coordinates in eight grid formats.

B. To enter a user magnetic variation, select the 'User Mag Var' option and enter a direction and value in the variation field.

Navigation Setup

The navigation setup submenu is used to select a variety of navigation information including: position format, units of measure, and heading preferences. This submenu is also used to select map datums, set the CDI scale and adjust the built-in velocity filter. The following options are available:

- **Position Format** lets you select the coordinate system used to display position. The following formats are available:
  - hddd.ddddd° (degrees)
  - hddd°mm'ss.s" (deg/min/sec)
  - German grid
  - Maidenhead
  - Swiss grid
  - UTM/UPS grid
  - hddd°mm.mmm' (degrees and minutes)
  - British grid
  - Irish grid
  - Swedish grid
  - Taiwan grid
  - Loran TD

For more information on the Loran TD positon format see Appendix ? on page ?

- **Navigation Units** selects the format for speed and distance measurements. You may select from nautical, statute, or metric formats. (The default setting is nautical.)
- **Depth Units** selects the format for depth contour display on G-chart offshore chart cartridges. Depth contours can be displayed in feet, meters, or fathoms. (The default setting is feet.)
- **Heading** lets you select what reference is used in calculating heading information. You can select to reference automatic magnetic variation, true north, grid heading, or user magnetic variation. (The default setting is automatic.)

To enter a user magnetic variation:

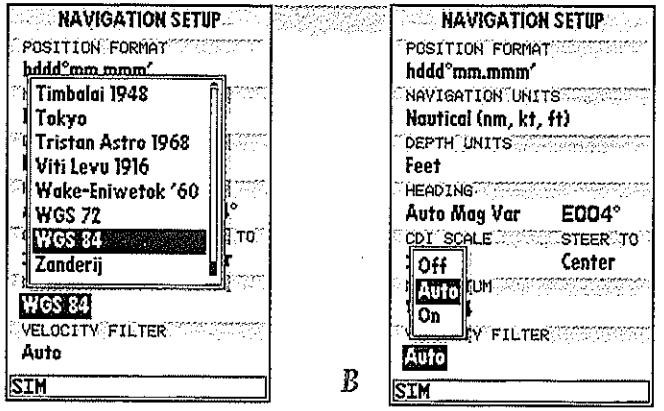
1. Highlight the 'Heading' field and press EDIT ENTER. Select the 'User Mag Var' option and press EDIT ENTER.
2. Press EDIT ENTER to access the variation field, and use the keypad to enter the desired variation. Press EDIT ENTER to confirm.

- **CDI Scale** provides a list of six CDI scale settings for the map page CDI: +/-0.10, 0.50, 1.0 (default), 5.0, 10.0, and 25.0 miles or kilometers. The scale represents the distance from the center of the scale to either end of the scale.

- **CDI Steer To** allows you select a steer-to-center or steer-to-D-Bar orientation for graphic steering guidance. The steer-to-center selection displays your position as the vertical line on the scale, and your desired track as the center of the scale. The steer to D-Bar option displays your position as the center of the scale, with the desired track as the vertical line. The default setting is steer to center.
- **Map Datum** provides a list of the available map datums for use with the GPSMAP system. For a list of the available GPSMAP datums, see Appendix D. The default setting is WGS 84.
- **Velocity Filter** allows you to select the GPSMAP's response time to changes in track or ground speed. Three settings are available: automatic, on, or off. The 'auto' (default) setting will monitor the changes in your current track and speed and adjust the receiver's response time automatically. The 'on' setting allows you to manually enter a response time up to 240 seconds. Selecting a higher setting may be desirable in slow-speed applications with frequent changes in track.

To enter a user defined velocity filter value:

1. Highlight the 'Velocity' field and press EDIT ENTER. Select the 'On' option and press EDIT ENTER.
2. Highlight the time value field.
3. Press EDIT ENTER.
4. Enter a value in seconds (up to 240) and press EDIT ENTER to confirm.



A B

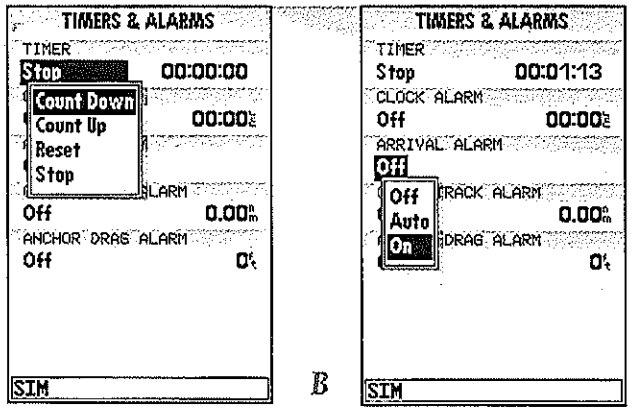
A. *CAUTION! Using the incorrect map datum can seriously effect the accuracy of your GPS receiver. The GPS datum should always match the datum of the local chart you are using. If no datum information is indicated on the charts you are using, contact the chart manufacturer.*

B. *Keeping the velocity filter on the 'Auto' setting will allow the GPSMAP 230 to automatically monitor and adjust the response time for track and speed calculations.*

SECTION 9

SETUP MENUS

Timers & Alarms



A B

A. *The timer field can be set to count down from a specified interval or provide a running count of elapsed time.*

B. *The 'On' setting of the arrival alarm will cause the alarm to sound only for the final destination waypoint of a route at the distance specified.*

Timers & Alarms Setup

The timer & alarms submenu is used to control various alarm/timer settings.

- **Timer** sounds an alarm when an entered interval (up to 99:59:59) has expired, or provides a continuous running clock timer to 99:59:59.

To use the countdown timer:

1. Select the 'Count Down' menu option.
2. Enter the desired time interval in the interval field, and press EDIT/ENTER.
3. Once the count down time has expired, an alarm message will appear, and the timer will automatically switch to the count up mode.
4. To reset the timer, select the reset option and press EDIT/ENTER.

- **Clock Alarm** provides an alarm for the system clock. To use the clock alarm, select the 'On' option and enter the desired time of day in the time field.

- **Arrival Alarm** lets you specify an alarm to sound when you're a specified distance away from a destination waypoint. Three options are available:
  - Off- No arrival alarm will sound.
  - Auto- An arrival alarm will sound one minute before the destination, based upon your current speed and course over ground.
  - On- An arrival alarm will sound at the alarm distance specified in the distance field for the destination waypoint (the 'On' setting will only provide an arrival alarm for the final destination waypoint of the active route).

- **Crosstrack Alarm** provides an alarm for crosstrack error (XTK) when your vessel is off course by more than a specified distance, up to 99.99 (units).

- **Anchor Drag Alarm** lets you specify an alarm to sound when you've exceeded a specified drift distance, up to 9999 (units). Whenever the anchor alarm is triggered, an anchor icon will appear in the status bar.

Input/Output Submenu

The Input/Output submenu lets you control interface settings for connecting external NMEA devices, a DGPS receiver, or a personal computer. The 'Input/Output Format' field, at the top of the page, lets you specify one of seven interface formats:

Data Transfer is a proprietary interface that allows you to exchange data such as waypoints, routes, and track logs between GPSMAP units or a GARMIN PC kit.

No In/NMEA Out provides navigation information to a compatible NMEA device such as an autopilot or radar. NMEA 0180, 0182, 0183 v.1.5 and 0183 v.2.0 output options are available. See Appendix B for additional NMEA sentence information.

No In/No Out provides no interfacing capabilities.

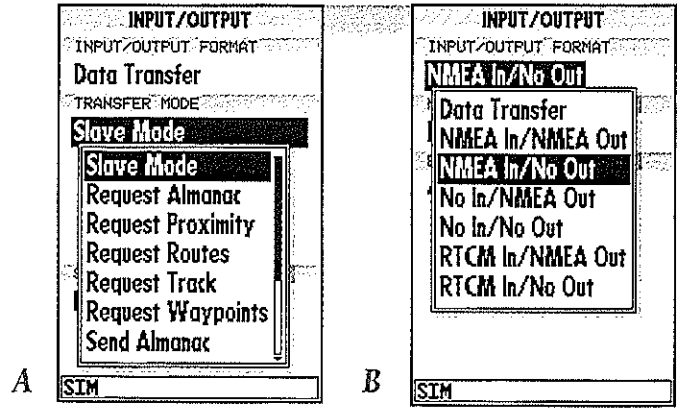
RTCM In/NMEA Out allows DGPS beacon receiver input and also provides selectable NMEA output.

RTCM In/No Out allows DGPS beacon receiver input, with no output capabilities.

NMEA In/No Out allows input from a NMEA compatible external device, such as a Yeoman© Plotter, with no output capabilities.

NMEA In/NMEA Out provides the same input capabilities as NMEA IN, with selectable NMEA output.

When the 'Data Transfer' option is selected, you'll need to specify what information to request or send to the remote unit through the 'Transfer Mode' field. The 'slave' setting lets you control all data transfer from the 'external' GPS receiver, or PC while the other settings request or send specific data from the primary unit.



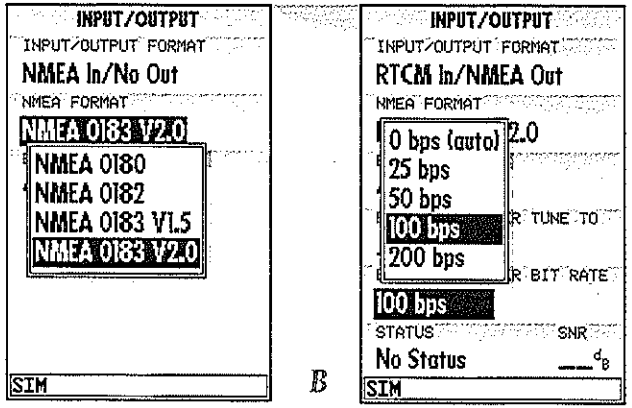
A. *The data transfer options allow you to send or receive almanac data, proximity waypoints, routes, track log data, and waypoints to another GARMIN GPS or PC Kit.*

B. *The NMEA In setting allows you to accept NMEA data from a Yeoman plotter or other compatible device.*

SECTION 9

SETUP MENUS

NMEA & DGPS Setup



A. Select the desired format from the NMEA field. The baud rate will automatically be set to the appropriate speed.

B. After entering a DGPS frequency, set the bit rate to the speed indicated on the USCG station chart. DGPS coverage, frequencies, and bit rates are available from the Coast Guard's automated FAX service (703-313-5920).

Using NMEA & DGPS Interface Settings

If you are using an NMEA interface format, the NMEA format must be specified in the NMEA format field that will automatically appear when an NMEA option is selected. The appropriate baud rate will be set automatically.

To select an NMEA format:

1. Select a NMEA IN/OUT format from the options page.
2. Highlight the NMEA Format field and press EDIT ENTER.
3. Select a NMEA sentence format and press EDIT ENTER.
4. The baud rate will automatically be set to the appropriate speed. If you have selected an NMEA IN/OUT setting, you must use the same NMEA format for both the input and output device.

Tuning DGPS Stations

If the I/O Format is set to accept RTCM input/NMEA Output for connecting a differential-ready GPS beacon receiver, you will need to tune a frequency in the tuning field and select a bit rate. The default frequency will be 304.0 kHz, with a bit rate of 100 bps, or the last DGPS frequency/bit rate selected.

To tune a DGPS frequency:

1. Select the 'RTCM In/NMEA Out' format from the options page.
2. Highlight the beacon receiver frequency field and press EDIT ENTER.
3. Enter the desired frequency and press EDIT ENTER. If you are using an automatically-tuned DGPS receiver, you may enter 000.0 for the frequency.
4. Press EDIT ENTER to select a bit rate. Five bit rates are available: 0 (used for automatically-tuned DGPS receivers), 25, 50, 100 and 200 bps. Press EDIT ENTER to confirm. The DGPS status, along with the signal-to-noise ratio of the tuned station, will be displayed at the bottom of the page.

Installing & Removing G-chart Cartridges

The GARMIN GPSMAP 230 system uses G-chart offshore or inland cartography to display digital charts on-screen. G-chart cartridges are installed in the card slot located at the bottom right of the GPSMAP unit. G-chart cartridges may be installed or removed at any time, whether the unit is on or off.

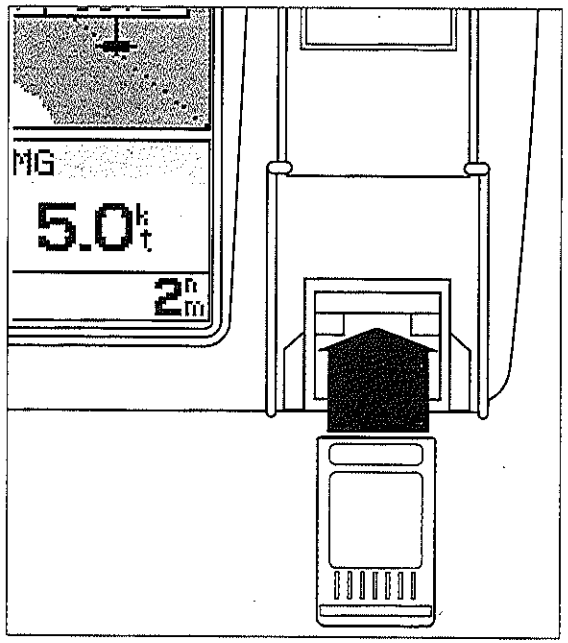
To install a G-chart cartridge:

1. Open the cartridge door on the GPSMAP 230 unit.
2. Insert the card (label facing front and G-chart logo at top) into the slot.
3. Use your thumb to firmly push the cartridge into place. If your GPSMAP 230 is on, a confirmation tone will sound when the cartridge has been properly installed and accepted.
4. Close the door (Note: The door will not close unless the G-chart is fully inserted.).

If you insert a G-chart cartridge and get a 'card format not recognized' message, try removing the card and reinserting it. If the card is still not recognized, contact the dealer you purchased it from for assistance. G-chart cartridges are not waterproof, should not be exposed to moisture or excessive static charges, and should be stored in the anti-static bag supplied with the cartridge.

To remove a G-chart cartridge:

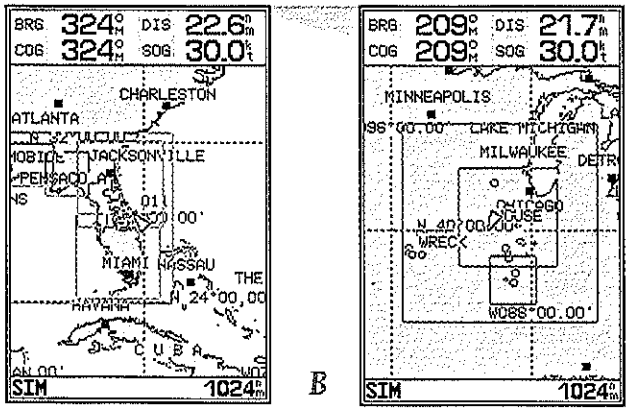
1. Open the cartridge door.
2. Grasp the card at the bottom groove and pull firmly.
3. If your GPSMAP is on, a confirmation tone will sound when the G-chart cartridge has been removed.



SECTION 10

G-CHARTS

Using G-chart Cartography



A B

A. *Map outlines for G-chart offshore cartography.*

B. *Map outlines for G-chart inland cartography.*

Note*: The smaller boxes located within larger boxes indicate areas of greater detail.*

Using G-chart Cartography

Once a G-chart cartridge has been inserted, the map coverage outlines for the cartridge will automatically appear on-screen. Keep in mind that the display will not automatically scroll to the map area or zoom to a level where you can see the coverage outlines. If you do not immediately see the outlines, scroll the cursor to the broad geographic area covered by the chart and zoom out to another map scale.

The large outlined box shown is the main chart, which serves as the boundary area for the entire cartridge. The small outlined box inside the main box are subcharts, which provide more detailed coverage of the area indicated. To view the detailed cartography of any subchart, scroll the cursor to the subchart outline and use the IN key to zoom in to smaller range scales. If the map outlines still do not appear, check the 'Map Outlines' setting on the map options page to make sure they are set to appear (see page 26).

Whenever you zoom past the usable range of the current electronic chart, the range field will display 'Ovr Zm' or 'No Map'. These warnings indicate that although you may still have cartography, you should exercise extreme caution using the data. See page 25 for more information on Overzoom and No Map modes.

When a G-chart cartridge is installed, the GPSMAP 230's system will automatically use the best available chart for display. As you enter and exit various subcharts, the system will automatically display the appropriate chart for the area you are in. When you leave the area covered by the main map of a cartridge, the GPSMAP 230 will default back to using the built-in 64 nm database if it is available at the current scale.

If you are not seeing certain map items (navaids, depth contours, etc. on offshore cartridges; highways, boat ramps, etc. on inland cartridges), check the map configuration settings available from the map options page.

Installing the GPSMAP 230

The GPSMAP 180 must be properly installed according to the following instructions to get the best possible performance. The GPS antenna should be installed first, followed by the display unit. To complete the installation, you'll need the appropriate fasteners for your installation, and a 1" x 14-thread marine antenna mount available at most marine dealers.

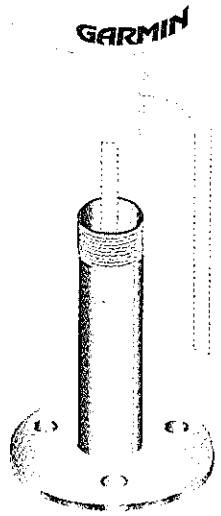
Mounting the GPS antenna

The antenna should be mounted in a location that has a clear, unobstructed view of the sky in all directions to ensure the best reception. Avoid mounting the antenna where it will be shaded by the boat's superstructure, a radome antenna, or mast. Sailboat users should avoid mounting the antenna high on the mast to prevent inaccurate speed readings caused by excessive heeling. Most marine VHF and loran antennas will not seriously degrade the GPS antenna's reception. Never paint the antenna or clean it with harsh solvents.

The GARMIN antenna screws directly onto any standard 1" x 14-thread antenna mount. If you need to raise the antenna to avoid shading, try using a 1" x 14-thread extension mast available at most marine dealers.

To install the GPS antenna:

1. Screw the antenna directly onto the 1" x 14-thread mount.
2. Route the cable to the mounting location of the display unit. Use the appropriate tie-wraps, escutcheon plates, and sealant to secure the cable along the route and through any bulkhead or deck.
3. Once the GPSMAP unit has been installed, connect the cable to the antenna connector on the back of the display unit. Make sure that you turn the antenna-connector locking ring 1/4 turn clockwise to lock the cable into place.



It is possible to route the coaxial cable either through, or outside the antenna mount. The BNC connector on the coaxial cable can be removed, and the coaxial cable shortned to ease installation. If the BNC connector is removed, it must be replaced with a new BNC connector.

SECTION A

APPENDIX

Installation

Mounting the GPSMAP 230 Unit

The GPSMAP 230's water-resistant case is suitable for mounting in exposed locations or at the nav station. The unit comes with a mounting bracket and a gimbal mount to allow surface or overhead mounting. When choosing a location for the display unit, make sure you consider the following conditions:

- There should be at least a 3" (7.5 cm) clearance behind the case to allow connection of the antenna and power/data cables.
- The unit should not be mounted where it is exposed to excessive temperatures for extended periods (see page 71).
- You should provide adequate clearance for the G-chart cartridge to slide out completely.
- The mounting surface should be heavy enough to support the unit and protect it from excessive vibration and shock.
- For flush mounting, make sure the flat panel is between 0.04" and 0.30" (1.0 to 7.6 mm) thick if you intend to use the cam lobe built into the mounting bracket.

To surface mount the GPSMAP unit:

1. Place the gimbal mount in the desired location.
2. Mark and drill the four mounting holes for the fastener you are using. Note that the GPSMAP 230 may also be used with a Johnny Ray JR-300 swivel mount.
3. Fasten the gimbal mount to the surface using the appropriate fasteners.
4. Insert the GPSMAP 230 into the gimbal mount. The mount is designed for a tight fit to provide additional support when swiveling the unit.
5. Screw the two mounting knobs through the gimbal mount and into the mounting bracket.
6. Connect the power/data and antenna cables to the back of the unit, making sure the locking rings are tightened on both connectors.

To flush mount the GPSMAP 230

1. Remove the four M5 screws from the back of the unit and remove the mounting bracket .
2. Using the mounting template provided in the box, determine the location where you want to mount the unit and tape the template in place.
3. Using a hammer and center punch, mark the centers of the mounting screw holes.
4. Drill the four 0.25" screw holes, using a 1/4" drill bit
5. Cut the center relief section from the panel.
6. From the front, place the GPSMAP 230 into the relief hole until the unit rests flush against the mounting surface.
7. Secure the unit to the mounting surface using M5 screws.

Note: For thick mounting surfaces, insert the M5 screws directly thru the four drilled holes (figure 1). For thin panels, place the mounting bracket on the back side of the panel for more support (figure 2).

8. Attatch the power/data cable and antenna connectors.

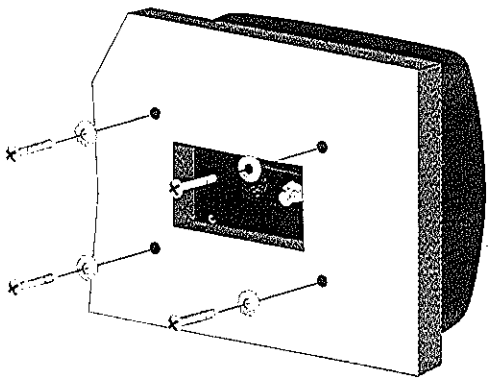


Figure 1

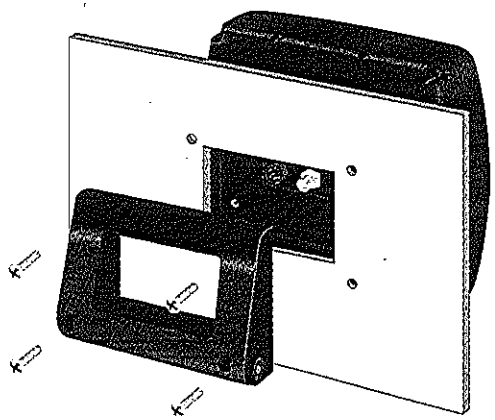
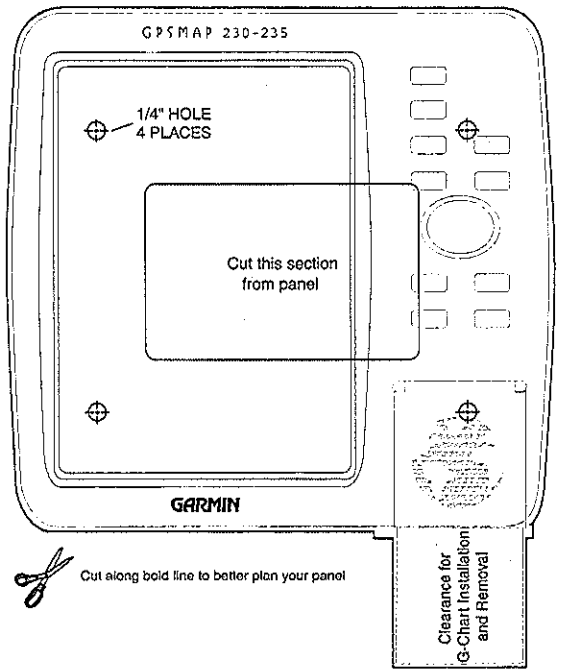


Figure 2

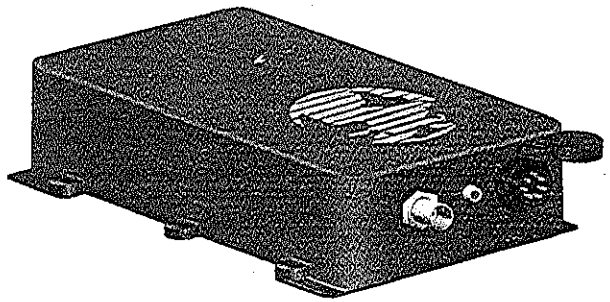
Mounting Template



Mounting template provided in box

SECTION **B** **APPENDIX**

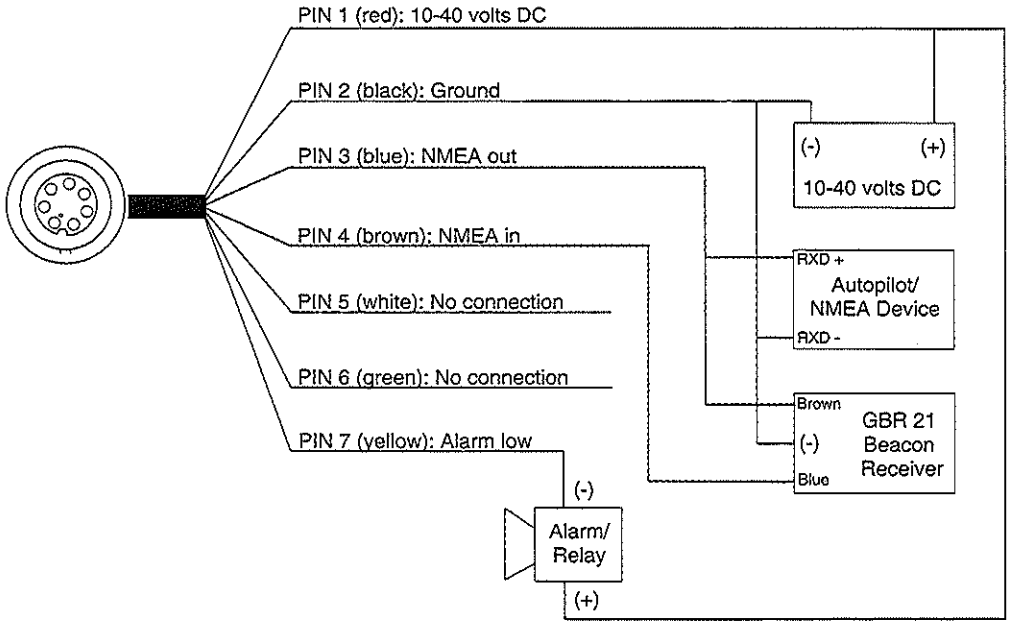
Wiring & Specifications



DGPS corrections are accepted in RTCM-104 v. 2.0 format through the NMEA In (BROWN) harness lead. The GARMIN GBR 21 is the recommended beacon receiver for use with the GPSMAP system. Other receivers with the correct RTCM format may be used, but may not correctly display status or allow tuning control from the GPSMAP unit.

Connecting the Power/Data Cable

The power/data cable connects the GPSMAP 230 to a 10-40 volt DC system and provides interface capabilities for connecting external devices, including an external alarm. The color code in the diagram below indicates the appropriate harness connections.



The following formats are supported for connection to up to 3 NMEA devices:

- NMEA 0180/NMEA 0182
- NMEA 0183 version 1.5

  Approved sentences— GPBWC, GPGLL, GPRMB, GPRMC, GPXTE, GPVTG, GPWPL, GPBOD

  Proprietary sentences— PGRMM, PGRMZ (alt.), PSLIB (beacon receiver control input)
- NMEA 0183 version 2.0

  Approved sentences— GPGGA, GPGLL, GPGSA, GPGSV, GPRMB, GPRMC, GPRTE, GPWPL, GPBOD

  Proprietary sentences— PGRME (estimated error), PGRMM (map datum)
  PGRMZ (altitude), PSLIB (beacon rec. control input)

GPSMAP 230 Specifications

PHYSICAL

Case:	Gasketed Construction
Size:	7.55"H x 7.7"W x 2.57"D (19.18 cm x 19.56 cm x 6.53 cm)
Weight:	2.0 Lbs (.907 Kg)
Temperature Range:	5° to 158°F (-15° to 70°C)

PERFORMANCE (GPSMAP 230)

Receiver:	12-channel PhaseTrac12
Acquisition Time:	Approx. 15 seconds (warm) Approx. 45 seconds (cold) Approx. 5 minutes (AutoLocate™) Approx. 5 minutes (Search the sky)
Update Rate:	1/second, continuous
Position Accuracy:	1-5 meters (3-16 ft.)* 15 meters (49 ft.) RMS**
Velocity Accuracy:	0.1 knot RMS steady state, 90 knots max.
Dynamics:	Performs to specification to $6g^3$

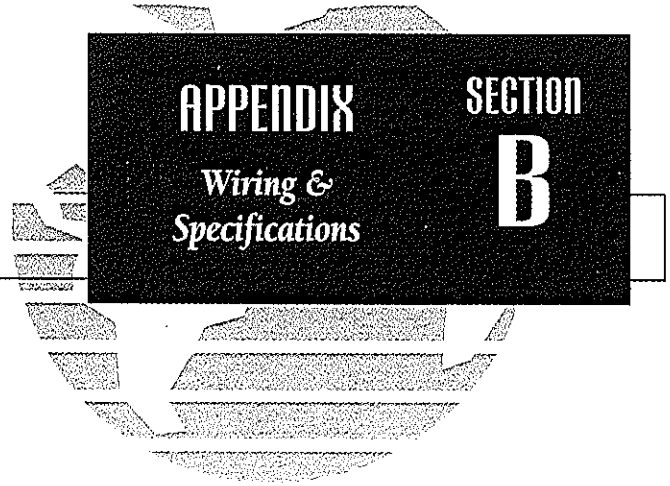
POWER

Input:	10-40v DC
Usage:	10 watts max.

Specifications subject to change without notice.

* With optional GARMIN GBR 21 Beacon Receiver Input.

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



WARNING!

The temperature range for the GPSMAP 230 is -4 to +158°F (-20 to 70°C). Extended exposure to temperatures exceeding this range (in storage or operating conditions) may cause failure of the LCD screen. This type of failure and related consequences are NOT covered by the manufacturer's limited warranty.

SECTION C APPENDIX

Messages

The GPSMAP 230 uses an on-screen message prompt to alert you to important information. Whenever a message appears, press the PAGE *key to view the message.*

Alarm Clock—The alarm clock has sounded.

Anchor Drag Alarm—You have drifted out of the specified distance range.

Approaching—You are less than one minute away from reaching a destination waypoint at your present speed over ground.

Arrival At—You have arrived at the destination waypoint.

Can't Change An Active Waypoint—You have attempted to change the "active to" or "active from" waypoint. Clear the active route or GOTO before making your changes.

Card Format is Not Recognized—The cartridge inserted is not readable by the GPSMAP system and may be damaged. Reinsert the cartridge to make sure it is properly installed. If the cartridge is still not recognized, call the G-chart information line at 1-800-427-6460.

Cross-Track Alarm—You have exceeded the off-course distance specified in the CDI setup.

Data Transfer is Complete—The receiver is finished uploading or downloading information to the connected device.

Database Memory has Failed—The built-in 64 nm database has failed. See an authorized service center for repair.

Degraded Accuracy—The accuracy of your GPSMAP system 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.

Max Calibration Is 5000mt (16,400 ft)—You have exceeded the maximum possible map calibration.

Memory Battery Power is Low—The internal battery that stores waypoints, routes, and track plots needs to be replaced. Take your unit to an authorized GARMIN service center for installation of a new battery.

Need Altitude—Your GPSMAP system needs the altitude to maintain a position fix due to poor satellite coverage. Enter your approximate altitude on the initialize position page.

Need to Select Init Method—The GPSMAP 230 needs to be initialized to your present position. See pages 1-2 for complete instructions on initialization.

No Differential GPS Position—Not enough data is being received to compute a DGPS position.

Oscillator Needs Adjustment—The GPSMAP 230 has detected excessive drift in its internal oscillator, which may result in longer acquisition times. Take the unit to an authorized GARMIN service center for adjustment.

Poor GPS Coverage—The GPSMAP 230 cannot acquire the necessary number of satellites to compute a position.

Power Down and Re-init—The GPSMAP 230 cannot calculate a position due to abnormal satellite conditions. Power down and verify the last position shown by other means.

Proximity Alarm—You have entered the alarm radius for the proximity waypoint indicated.

Proximity List Full—You have used all nine proximity waypoints.

Proximity Overlaps Another Prox Wypt—The alarm radius specified overlaps the area specified for another proximity waypoint.

RAM has Failed—The random access memory has failed and the unit is not operable. Take your unit to an authorized GARMIN service center for repairs.

ROM has Failed—The unit's permanent memory has failed and the unit is not operable. Take your unit to an authorized GARMIN service center for repairs.

Received Invalid Waypoint—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.

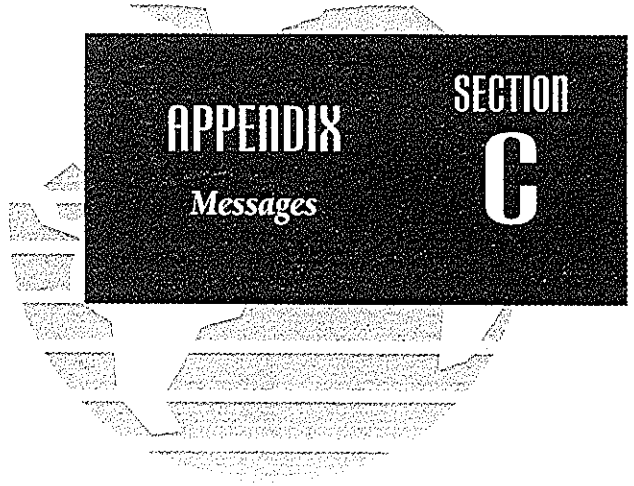
Route Already Exists—The route number you are trying to copy to is already used.

Route Does Not Exist—The route number you are trying to use or copy is not defined.

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

Route Memory is Full—You have attempted to create more than 20 routes.

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 GPSMAP 230 is searching the sky for almanac data.

Stored Data was Lost—All waypoints, routes and almanac data has been lost due to internal battery failure.

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

Timer Has Expired—The countdown timer has expired.

Track Memory is Full—The track memory is full and no additional track plot will be recorded until the track memory has been cleared or set to wrap mode.

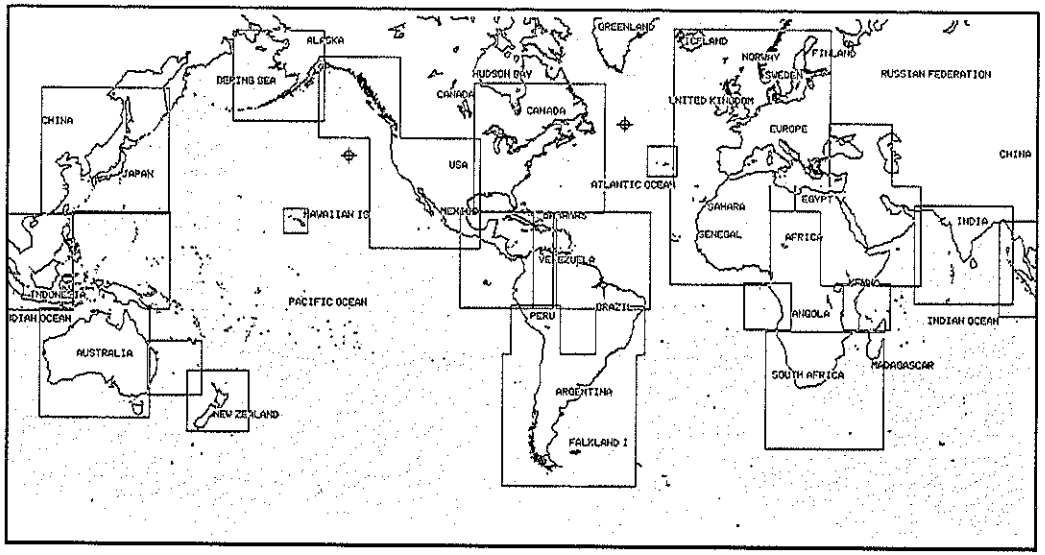
Wypt Already Exists—The waypoint name you've entered already exists in memory.

Waypoint Memory is Full—You have used all 250 waypoints in the GPSMAP 230 system.

SECTION D APPENDIX

Map Datums

The GPSMAP 230's built-in worldwide database includes chart coverage down to 64 nm (120 km) for the areas outlined above. Note that the GPSMAP database is only valid to 68°15' of latitude. The maximum cursor latitude is 85°05', and the maximum waypoint latitude is 89°24.543 north or south.



Adindan	Adindan- Ethiopia, Mali, Senegal, Sudan
Afgooye	Afgooye- Somalia
AIN EL ABD '70	AIN EL ANBD 1970- Bahrain Island, Saudi Arabia
Anna 1 Ast '65	Anna 1 Astro '65- Cocos I.
ARC 1950	ARC 1950- Botswana, Lesotho, Malawi, Swaziland, Zaire, Zambia, Zimbabwe
ARC 1960	Kenya, Tanzania
Ascnsn Isld '58	Ascension Island '58- Ascension Island
Astro B4 Sorol	Sorol Atoll- Tern Island
Astro Bcn "E"	Astro Beacon "E"- Iwo Jima
Astro Dos 71/4	Astro Dos 71/4- St. Helena
Astr Stn '52	Astronomic Stn '52- Marcus Island
Astrln Geod '66	Australian Geod '66- Australia, Tasmania Island
Astrln Geod '84	Australian Geod '84- Australia, Tasmania Island
Austria	Austria
Bellevue (IGN)	Efate and Erromango Islands
Bermuda 1957	Bermuda 1957- Bermuda Islands
Bogata Observ	Bogata Obsrvatry- Colombia
Campo Inchspe	Campo Inchauspe- Argentina
Canton Ast '66	Canton Astro 1966- Phoenix Islands
Cape	Cape- South Africa
Cape Canavrl	Cape Canaveral- Florida, Bahama Islands
Carthage	Carthage- Tunisia
CH-1903	CH 1903- Switzerland
Chatham 1971	Chatham 1971- Chatham Island (New Zealand)
Chua Astro	Chua Astro- Paraguay

Corrego Alegr	Corrego Alegre- Brazil
Djakarta	Djakarta (Batavia)- Sumatra Island (Indonesia)
Dos 1968	Dos 1968- Gizo Island (New Georgia Islands)
Easter Isld 67	Easter Island 1967
European 1950	European 1950- Austria, Belgium, Denmark, Finland, France, Germany, Gibraltar, Greece, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland
European 1979	European 1979- Austria, Finland, Netherlands, Norway, Spain, Sweden, Switzerland
Finland Hayfrd	Finland Hayford- Finland
Gandajika Base	Gandajika Base- Republic of Maldives
Geod Datm '49	Geodetic Datum '49- New Zealand
Guam 1963	Guam 1963- Guam Island
Gux 1 Astro	Guadalcanal Island
Hjorsey 1955	Hjorsey 1955- Iceland
Hong Kong '63	Hong Kong
Hu-Tzu-Shan	Taiwan
Indian Bngldsh	Indian- Bangladesh, India, Nepal
Indian Thailand	Indian- Thailand, Vietnam
Indonesia '74	Indonesia '74
Ireland 1965	Ireland 1965- Ireland
ISTS 073 Astro	ISTS 073 ASTRO '69- Diego Garcia
Johnston Island	Johnston Island Kandawala
Kandawala	Kandawala- Sri Lanka
	Sri-Lanka
Kerguelen Islnd	Kerguelen Island
Kertau 1948	West Malaysia, Singapore
L. C. 5 Astro	Cayman Brac Island
Liberia 1964	Liberia 1964- Liberia
Luzon Mindanao	Luzon- Mindanao Island
Luzon Philippine	Luzon- Philippines (excluding Mindanao Isl.)
Mahe 1971	Mahe 1971- Mahe Island
Marco Astro	Marco Astro- Salvage Isl.
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 Caribbean	North American 1927- Caribbean (Barbados, Caicos Islands, Cuba, Dom. Rep., Grd. Cayman, Jamaica, Leeward and Turks Islands)
NAD27 Central	North American 1927- Central America (Belize, Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua)
NAD27 CONUS	North Am. 1927- Mean Value (CONUS)
NAD27 Cuba	North American 1927- Cuba

APPENDIX SECTION D

Map Datums

SECTION D APPENDIX

Map Datums

NAD27 Greenland	North American 1927- Greenland (Hayes Peninsula)
NAD27 Mexico	N. American 1927- Mexico
NAD27 San Salvadr	North American 1927- San Salvador Island
NAD83	North American 1983- Alaska, Canada, Central America, CONUS, Mexico
Nahrwn Masirah Ilnd	Nahrwn- Masirah Island (Oman)
Nahrwn Saudi Arbia	Nahrwn- Saudi Arabia
Nahrwn United Arab	Nahrwn- United Arab Emirates
Naparima BWI	Naparima BWI- Trinidad and Tobago
Obsrvtorio '66	Observatorio 1966- Corvo and Flores Islands (Azores)
Old Egyptian	Old Egyptian- Egypt
Old Hawaiian	Old Hawaiian- Mean Value
Oman	Oman- Oman
Ord Srvy Grt Britn	Old Survey Grt Britn- England, Isle of Man, Scotland, Shetland Isl., Wales
Pico De Las Nieves	Canary Islands
Potsdam	Germany
Pitcairn Astro '67	Pitcairn Astro '67- Pitcairn
Prov So Amricn '56	Prov So Amricn '56- Bolivia, Chile,Colombia, Ecuador, Guyana, Peru, Venezuela
Prov So Chilean '63	So Chilean '63- S. Chile
Puerto Rico	Puerto Rico & Virgin Isl.
Qatar National	Qatar National- Qatar
Qornoq	Qornoq- South Greenland
Reunion	Reunion- Mascarene Island
Rome 1940	Rome 1940- Sardinia Isl.
RT 90	Sweden
Santo (Dos)	Santo (Dos)- Espirito Santo
Sao Braz	Sao Braz- Sao Miguel, Santa Maria Islands
Sapper Hill '43	Sapper Hill 1943- East Falkland Island
Schwarzeck	Schwarzeck- Namibia
South American '69	S. American '69- Argentina, Bolivia, Brazil, Chile, Colombia, Ecuador, Guyana, Paraguay, Peru, Venezuela, Trin/Tobago
South Asia	South Asia- Singapore
Southeast Base	Southeast Base- Porto Santo and Madiera Islands
Southwest Base	Southwest Base- Faial, Graciosa, Pico, Sao Jorge and Terceira Islands
Timbalai 1948	Timbalai 1948- Brunei and E. Malaysia (Sarawak and Sabah)
Tokyo	Tokyo- Japan, Korea, Okinawa
Tristan Astro '68	Tristan Astro 1968- Tristan da Cunha
Viti Levu 1916	Viti Levu 1916- Viti Levu/ Fiji Islands
Wake-Eniwetok	Wake-Eniwetok- Marshall
WGS 72	World Geodetic System 72
WGS 84	World Geodetic System 84
Zanderij	Zanderij- Surinam

Almanac Data—The 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 (BRG)—The compass direction from your position to a destination.

Course Over Ground (COG)—Direction of movement relative to a ground position.

Crosstrack Error (XTK)—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 remaining to your destination at your present speed.

Grid—A coordinate system that projects the earth on a flat surface, using square zones for position measurements.

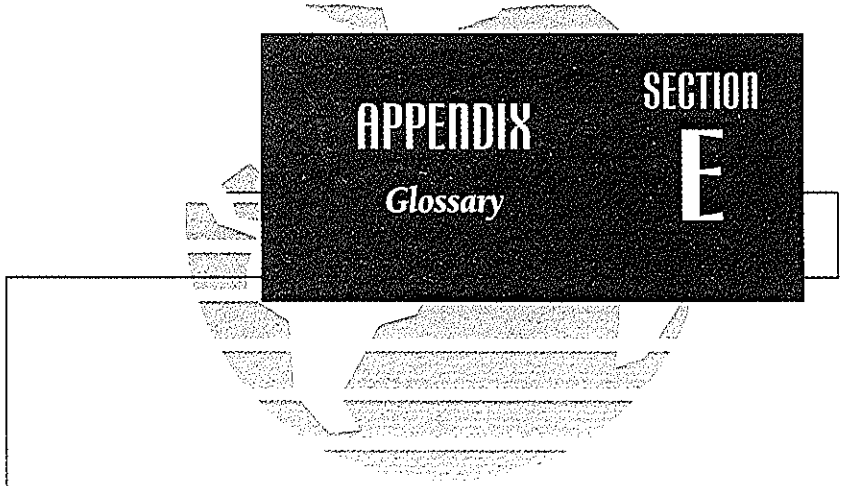
Ground Speed (SOG)—The velocity you are traveling relative to a ground position.

Latitude—A 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.

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

Turn (TRN)— The difference and direction in degrees between the bearing to your destination and your course over ground. The TRN value is used to indicate what direction, and how many degrees, to turn to get back on course.



SECTION E

APPENDIX

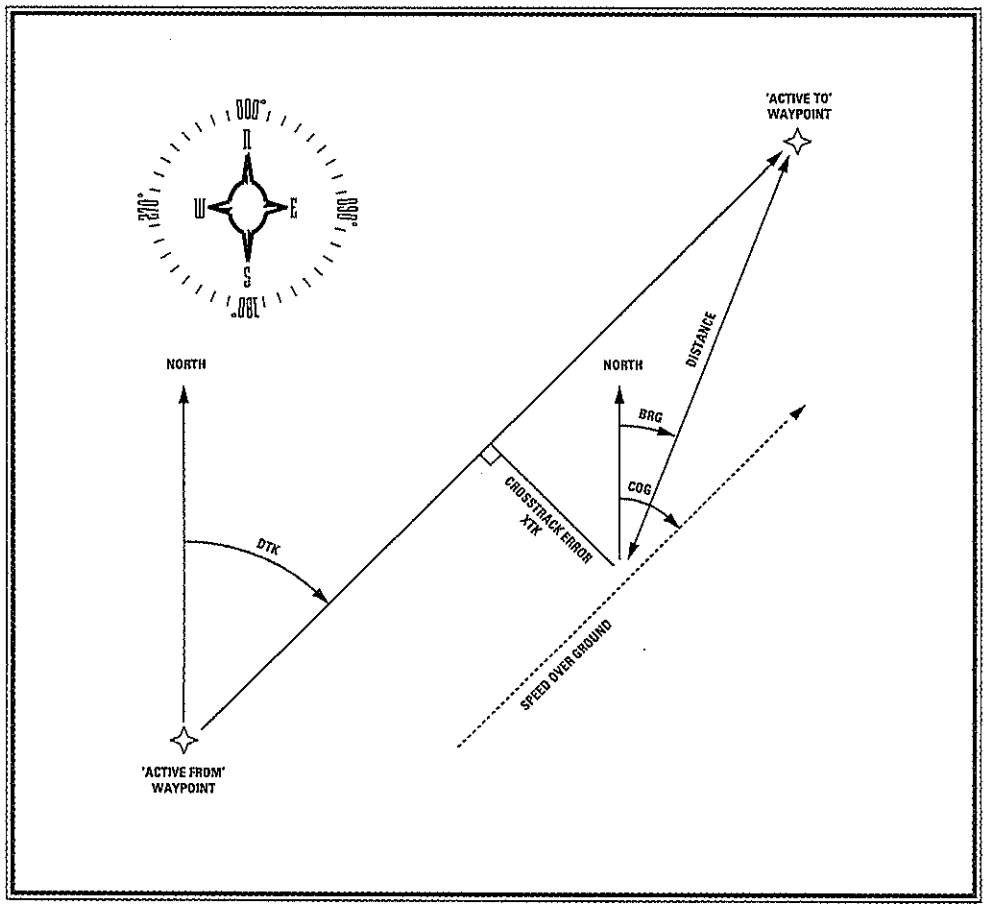
Glossary

Universal Time Coordinated (UTC)— The time of day at the prime meridian (0° longitude) in Greenwich, England.

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.



The chart below gives an approximate UTC time offset for the various longitudinal zones. Check with local charts for more detailed information. If you are in daylight savings time, add one hour to the offset.

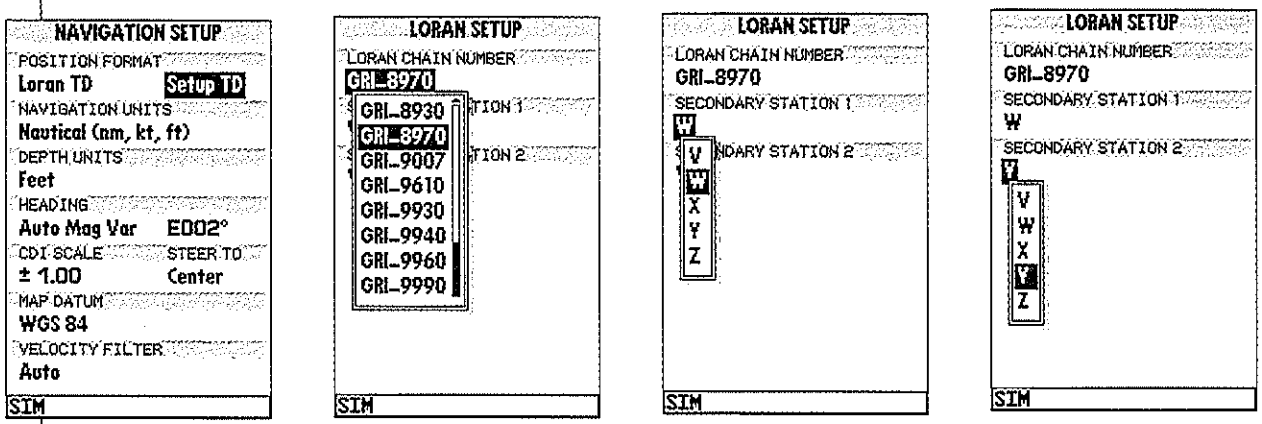
Longitudinal Zone	Offset
W180.0° to W172.5°	-12
W172.5° to W157.5°	-11
W157.5° to W142.5°	-10
W142.5° to W127.5°	-9
W127.5° to W112.5°	-8
W112.5° to W097.5°	-7
W097.5° to W082.5°	-6
W082.5° to W067.5°	-5
W067.5° to W052.5°	-4
W052.5° to W037.5°	-3
W037.5° to W022.5°	-2
W022.5° to W007.5°	-1
W007.5° to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

SECTION G

APPENDIX

Loran TD Position Format

When creating new waypoints using Loran TD coordinates you must set the correct loran chain number and secondary stations in the Setup TD field before storing the waypoint. After the waypoint is stored in unit memory, it will always reference the loran chain number and secondary stations currently selected in the Setup TD field. If you enter a different loran chain number or change the secondary stations in the Setup TD field, the active waypoint information will reflect those changes. Since the GPSMAP 230 does not rely on the loran signal for navigation, it can reference a different GRI chain and/or secondary stations and still navigate to the location stored in memory.



To change the Setup TD settings::

1. Highlight the 'Setup TD' field and press EDIT ENTER.
2. Select the field to change and press EDIT ENTER.
3. Highlight the new setting and press EDIT ENTER.