



GlobalNav 310TM

INSTALLATION AND OPERATION INSTRUCTIONS

 **LOWRANCE ELECTRONICS, INC.**
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WARNING!

USE THIS UNIT ONLY AS AN AID TO NAVIGATION. A CAREFUL NAVIGATOR NEVER RELIES ON ONLY ONE METHOD TO OBTAIN POSITION INFORMATION.

Never use this product while operating a vehicle.

CAUTION

When showing navigation data to a position (waypoint), this unit will show the shortest, most direct path to the waypoint. It provides navigation data to the waypoint regardless of obstructions. Therefore, the prudent navigator will not only take advantage of all available navigation tools when travelling to a waypoint, but will also visually check to make certain a clear, safe path to the waypoint is always available.

The storage temperature for your unit is from -4 degrees to +167 degrees Fahrenheit (-20 to +75 degrees Celsius). Extended storage temperatures higher or lower than specified will cause the liquid crystal display to fail. Neither this type of failure nor its consequences are covered by the warranty. For more information, consult the factory customer service department.

All features and specifications subject to change without notice.

Lowrance Electronics may find it necessary to change or end our policies, regulations, and special offers at any time. We reserve the right to do so without notice.

All screens in this manual are simulated.

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HOW TO OBTAIN SERVICE - INTERNATIONAL	INSIDE BACK COVER
HOW TO OBTAIN SERVICE - U.S.A. ONLY	BACK COVER

Congratulations!

You have purchased one of the finest 12-channel GPS receivers Lowrance® has ever made. With its large LCD screen, easy to use menus, and outstanding performance, we think you'll be happy with your GlobalNav 310™ for many years.

GPS works from satellites that transmit information to the world at very high frequencies. One disadvantage to this frequency is that it's "line-of-sight". In other words, the signals don't bounce around like your local radio or television. If you don't have a clear view of the sky, or if you're inside a metal boat dock or garage, the unit probably won't be able to pick up the signals from the satellites. This is common among all GPS receivers.

Like most GPS receivers, your GlobalNav 310 doesn't have a compass or any other navigation aid built into it. It relies solely on the signals from the satellites to determine its position. Speed, direction of travel, and distance are all calculated from position information. Therefore, in order for it to determine the direction you're travelling, you must be moving, and the faster - the better. This is not to say the unit won't work at walking speeds - it will. But the faster you travel, the easier it is for the unit to determine your direction.

Another factor that influences the GPS' position and navigation capabilities is called selective availability or S/A. This is small errors purposefully injected into the transmitted signal from the satellites. The government does this to degrade the system's accuracy to civilian and foreign users. Even with S/A, GPS is the most accurate navigation system ever invented on such a large scale. The Government's accuracy specification is 100 meters horizontally and 150 meters vertically 95% of the time. In other words, the position shown on your GlobalNav 310 could be up to 100 meters in any direction from your actual position, and the altitude could be plus or minus 150 meters from what's shown on the screen, 95% of the time.

There are two ways around the S/A problem. One is to have the government simply turn it off. In fact, there is growing pressure on them to do that, but it's not likely to happen anytime soon. The other method is to purchase a DGPS receiver and connect it to your GlobalNav 310. A DGPS receiver (commonly called a beacon receiver), picks up correction signals broadcast from ground stations. The GlobalNav 310 takes these corrections and applies them to the position and altitude screens, giving you much better accuracy.

Even with S/A on, and without a DGPS receiver, your GlobalNav 310 gives you outstanding position and navigation information.

Please sit down with the unit and this manual and familiarize yourself with them before using the GlobalNav 310 in the "real world". A simulator is built in, which lets you practice.

INSTALLATION

INSTALLATION - Bracket

You can install the GlobalNav 310 on the top of a dash or from an overhead with the supplied bracket. It can also be installed in the dash with an optional IDA-3 mounting kit. A swivel bracket is included that converts the GlobalNav 310's gimbal bracket to a swivel mount. You can mount it in any convenient location, provided there is clearance when it's tilted for the best viewing angle.

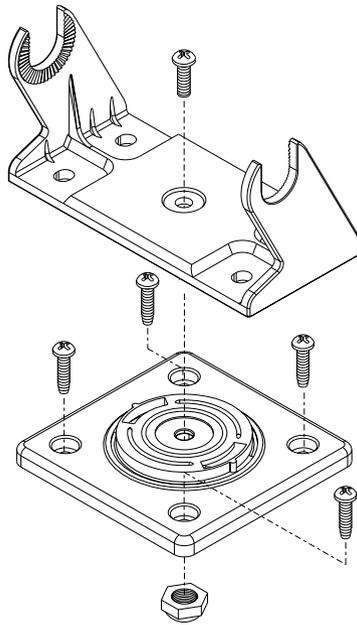
Bracket Installation - No Swivel

Holes in the bracket's base allow wood screw or through bolt mounting. It may be necessary to place a piece of plywood on the back side of thin panels to reinforce the panel. Make certain there is enough room behind the unit to attach the power and antenna cables.

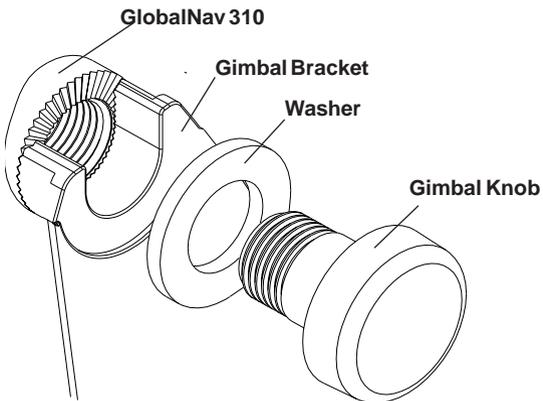
Drill a hole in the dash for the power and antenna cables. The best location for this hole is immediately under the gimbal bracket. This way, the bracket covers the hole. The smallest hole the power and antenna cable connector can pass through is 3/4". Route the cables to the unit by passing them through the hole from under the dash. Slide the bracket over the hole, then route the cables out the slot in the back of the bracket. Finally, fasten the bracket to the dash.

Bracket Installation - With Swivel

1. Place the swivel bracket on the dash or console in the desired mounting location. Make certain there is enough room for the unit to rotate. Using the swivel bracket's base as a template, mark the four mounting holes for drilling. Remove the bracket and drill the holes in the mounting surface for the #10 mounting screws.
2. Install the large locknut into the bottom of the swivel bracket. Place the swivel bracket onto the mounting surface and attach it using the four supplied #10 screws.
3. Pass the large screw through the gimbal bracket and the swivel bracket. Thread it into the large locknut and tighten it. Don't tighten it too tight, or the gimbal bracket won't swivel.



Attach the GlobalNav 310 to the gimbal bracket using the supplied gimbal knobs and washers as shown below.



POWER

The GlobalNav 310 will operate from a 12-volt DC system. (9 to 15 volts DC.) You can connect the power cable to an accessory buss under the dash, however, to keep electrical noise interference to a minimum, we recommend you wire the power cable directly to the battery through the supplied 2-amp fuse.

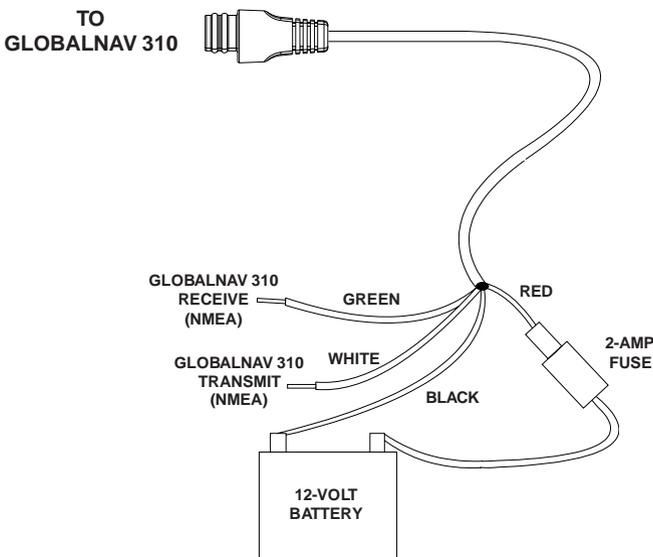
CAUTION!

Do not connect this product to a power source without using a fuse! Failure to use the fuse can cause damage to your unit and will void the warranty.

Follow the wiring diagram below. If the wires on the power cable are not long enough to reach the battery, use 18 gauge wire to lengthen the power cable.

The power cable's green wire is used to receive data from a DGPS receiver. The white wire is used to transmit data to a DGPS receiver or other electronic equipment. If you are not connecting the GlobalNav 310 to another device, tape the ends of these wires and secure them where they will not short to one another. See the NMEA/DGPS section in this manual for more information.

(Note: If your power cable has six wires, tape and secure the extra wires, also. They are not used on this product.)



ANTENNA

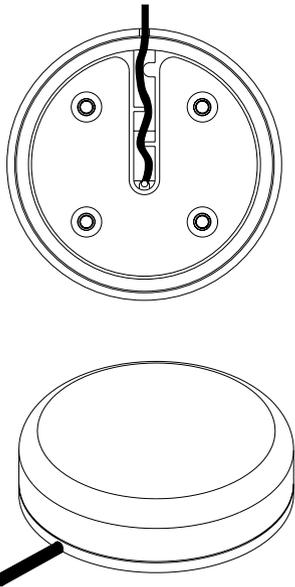
The GlobalNav 310's antenna can be mounted on any flat surface, provided you have access behind the surface for the mounting screws. A magnet is also supplied that can be epoxied to the bottom of the antenna, allowing it to be used on off-road vehicles. A pole mount adapter lets you mount the antenna on a pole or swivel mount.

ANTENNA INSTALLATION

Surface Mount

The antenna can be easily installed on any flat surface that is at least 90 mm (3 1/2") wide. Make certain that a clear view of the sky is available at the selected location. Since the GPS signals travel "line-of-sight", nearly anything blocking the antenna can potentially obstruct the unit from finding a satellite.

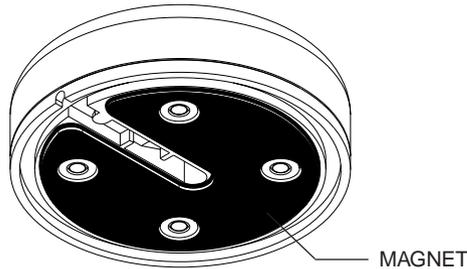
Once you've determined the mounting location, use the template on page 51 in this manual to drill the holes for the screws. The screws, supplied with the GlobalNav 310, are 4mm x 30mm. (about 1 1/8" long). Drill 4.75 mm (3/16") holes for the mounting screws. If you route the cable through the mounting surface, you'll need to drill a 25 mm (1") hole for the cable. There is a notch in the antenna housing that allows the cable to pass through to the outside, instead of routing it through the mounting surface.



After drilling the holes, pass the o-ring over the antenna cable and press it into the groove on the bottom of the antenna housing. Now attach the antenna to the mounting surface, using 4mm screws and the supplied lock washers. Route the cable to the GlobalNav 310 and the antenna installation is finished.

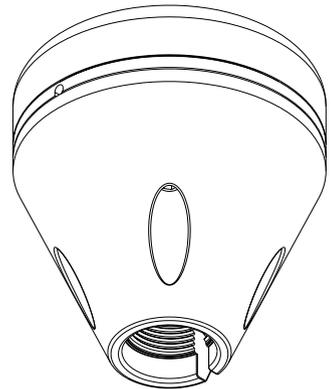
Magnet Mount

A magnet lets you temporarily mount the antenna on any ferrous metal surface. (such as a car) To use the magnet, simply epoxy it to the bottom of the antenna, using the epoxy supplied with your GlobalNav 310. Carefully follow the instructions on the epoxy package and apply it to the magnet. Then carefully press the magnet to the bottom of the antenna housing. After the epoxy cures (in about 30 minutes), the antenna is ready for use.



Pole Mount

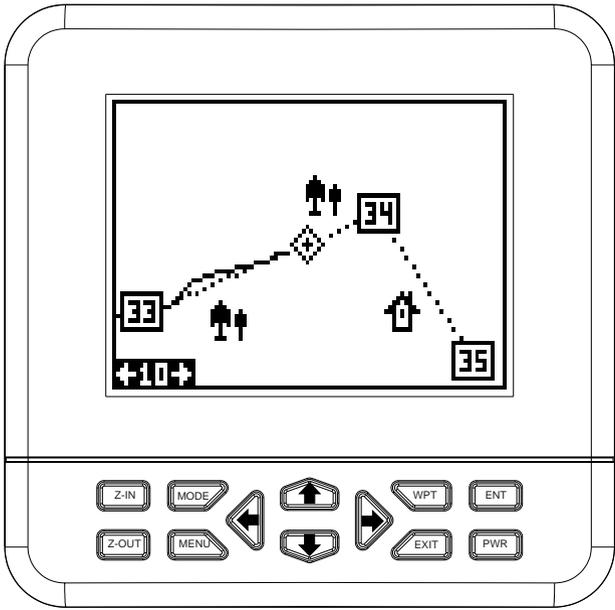
The antenna attaches to the pole mount adapter with the supplied 4 mm screws. You can route the antenna cable through the slot in the side of the antenna, or pass it down through the pole mount adapter. A slot next to the threads in the pole mount adapter places the cable next to the pole where it can be easily routed down the pole to the GlobalNav 310. The threads on the pole mount adapter accept a standard marine antenna mount.



POLE MOUNT

KEYBOARD

The keyboard has twelve keys. The arrow keys are tied to most of the features, letting you easily move the plotter's cursor, navigate through the menus, make selections from menus, and other tasks.



The WPT key lets you create, save, and recall waypoints and routes. The MODE key switches the unit between the three major displays: windows, navigation, and plotter. To select different features, or to modify functions, press the MENU key. The Z-IN and Z-OUT keys zoom-in and zoom-out your view on the plotter screen. The ENT and EXIT keys let you enter or erase selections. The PWR key turns the GlobalNav 310 on and off.

Note: To prevent an accidental power shutdown, you must hold the PWR key down for a few seconds in order to turn the unit off.

OPERATION

Turning Power On

To turn the GlobalNav 310 on, simply press the PWR key. A screen similar to the one at right appears. Read the message on the screen, then press the EXIT key to erase it. The GlobalNav 310 is now ready for use.

```
DO NOT RELY ON
THIS PRODUCT AS
YOUR PRIMARY
SOURCE OF
NAVIGATION.

PRESS EXIT
```

MENUS

Most of the Lowrance View's adjustments and features are found on "menus". Pressing the MENU key lets you view the menus. Different menu items are added to the basic list, depending on which mode (plotter, navigation, or windows) the unit is in. This gives you the features that are specific to the mode you are in, but also has items that are used on all modes.

Using the arrow keys moves the black box to highlight different menus on the list. Pressing the right arrow key selects the menu.

```
+ GPS SETUP
  SYSTEM SETUP
  ALARMS/CDI
  ROUTES +
  PLOTTER OPTS
+ WPT/ICON OPTS
```

To erase a menu, press the EXIT key.

Finding Your Position

Cold Start

When the GlobalNav 310 is turned on for the very first time, it doesn't know where it is, nor what the local time or date is. If you tell it your position, time, and date, the unit will take much less time to lock-on to the satellites and give you a fix or position.

However, if you don't want to push buttons at this time, that's fine. The GlobalNav 310 will lock onto the satellites and give you a position without any input from you. This is called a "cold-start". It simply means that the unit is searching without help for the satellites that are in orbit. A cold-start can take up to 2 minutes to acquire enough satellite data to determine your position, although it typically takes less time than that.

Once it locks on to the satellites and finds your position, it stores the satellite data in its memory. The next time you use the unit, it should take much less time to lock on.

To use your GlobalNav 310, first make certain you have a clear view of the sky, free from any obstructions such as trees, carport, or a covered boat dock.

Press the PWR key. Read the message on the screen, then press the EXIT key to erase the message. A screen similar to the one at right appears.



This is windows group "A". Your track (TRK), or direction of travel is shown in the upper right corner of this screen. Bearing to a waypoint (BRG), Course over ground (CRS), and cross track error (XTK) are all shown on this screen. You must recall a waypoint to use the bearing, course, and cross track error windows. As you wait for it to find your position, you'll see numbers flashing on the display. Anytime you see flashing numbers, it means the GlobalNav 310 does not have a position! Do not rely on any data that is flashing! When the numbers stop flashing, the unit has locked on to the satellites and the position is good.

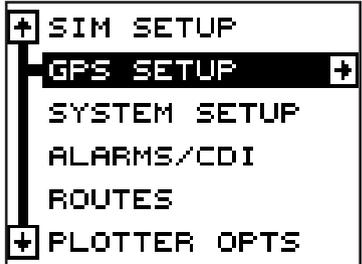
That's all you have to do to find your position. All time displays may not be correct when the cold start method is used. See the initialization section for details on changing the time.

Finding Your Position

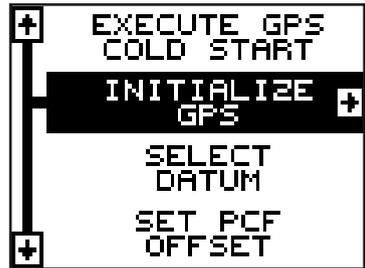
Initialization

A cold-start as described above can take over 5 minutes to find your position. A faster method is to initialize the GlobalNav 310 manually. To do this, first press the PWR key. Next, read the messages on the screen and press the EXIT key to erase them. Now press the MENU key.

Press the up or down arrow keys until the "GPS SETUP" menu is highlighted as shown at right. Now press the right arrow key. The screen shown at the top of the next page appears.



Using the down arrow key, highlight the "Initialize GPS Receiver" menu, then press the right arrow key. The screen shown below appears.



This is the GPS initialization screen. The position, altitude, time, and date the GlobalNav 310 is currently using to find the satellites is shown at the bottom of this screen. Changing these values to your local position and time will speed the position lock.



To change the position, press the right arrow key while the "EDIT LAT/LON" box is highlighted. The screen shown at right appears.



If your latitude is south, press the up or down arrow key to change it. If it is north, press the right arrow key to move the change box to the first number in the latitude. Now press the up arrow key to increase the number or the down arrow key to decrease it. Once the first number in the latitude is set, press the right arrow key once to move to the next number in the latitude.



Keep pressing the arrow keys until the latitude and longitude are set to your local position. (Note: This position does not have to be very accurate. If you can get it within one degree of your actual position, that will be fine.) When it's set, press the ENT key. The GlobalNav 310 accepts your entry and returns to the GPS setup menu.

Now change the local time and date if they're incorrect on this screen. (Don't worry about altitude.) When everything is acceptable, press the EXIT key repeatedly to return to a mode screen. The GlobalNav 310 will instantly use the data you entered to find the satellites in the sky. (The unit knows which satellites will be available at the position, date, and time you entered. Therefore, it will only look for those satellites, making the search time much shorter than a cold start which looks for all of the satellites until it finds three.)



Once the GlobalNav 310 finds and locks on to three satellites, it stops flashing the numbers on the display. (Note: Altitude will still flash until the unit locks on to the fourth satellite. It takes four satellites to determine altitude.)

IMPORTANT!

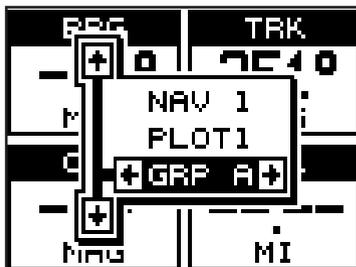
If the data shown in digital numbers on any screen is flashing, it means that data is invalid. **DO NOT RELY ON ANY NUMBER THAT ARE FLASHING!** Usually, this happens when the GlobalNav 310 has lost its lock on the satellites. The data that is flashing was the last known when the unit lost its navigational capability.

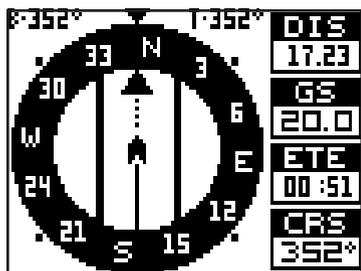
DO NOT NAVIGATE WITH THIS UNIT UNTIL THE DATA STOPS FLASHING!

POSITION/NAVIGATION DISPLAYS

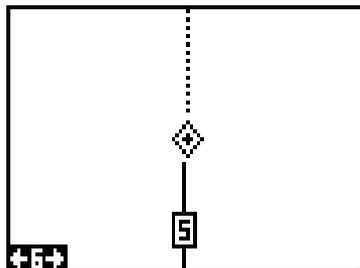
The GlobalNav 310 has navigation, plotter, and windows group modes. These screens were designed to show data that is used most often.

The three default displays are shown on the next page. To change displays, simply press the MODE key. A screen similar to the one at right appears. Now press the up or down arrow keys to change modes. (The windows display is shown





NAV-1



PLOT-1



GROUP A

as "GRP" (groups). For example, Group A is the first windows group on the MODE menu.) Press the right arrow key to see more screens on each mode. When the desired screen appears, press the EXIT key to clear the menu.

Note: For a list of abbreviations used on the displays, see the back of this manual.

Navigation Screens

There are two navigation screens. Nav screen number one shows a graphical view of your trip, the other screen shows all navigation details in large digital numbers. You can customize the navigation screens to show different data than the ones chosen by Lowrance. See the "Customize Screen" section for more details.

Nav Screen #1

This screen is dominated by a compass rose (See the screen at the top of the next page.) Your position is in the center of the circle, designated by an arrow that always points straight up. Your track (direction of travel) is indicated by an arrow pointing down toward the compass rose at the top center of the screen. Your track in digital numbers is also shown to the right of the arrow. On the screen at the top of the next page, the track is

348°. The line extending behind the arrow in the center shows your track history, or path you've travelled.

Your speed over ground or Ground Speed (GS) shows in the digital box to the right of the circle.

The screen looks like this when you're not navigating to a waypoint. (See page 35 for information on waypoint navigation.) If you navigate to a waypoint, the screen looks like the one below.

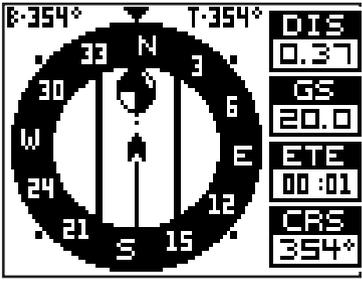
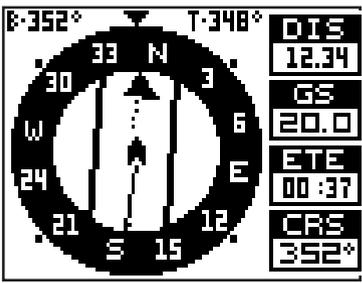
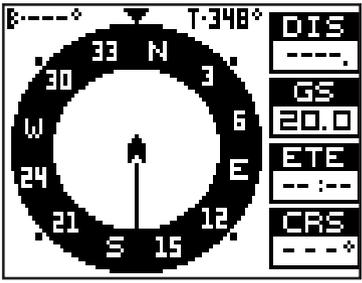
The bearing to the destination waypoint is shown in the upper left corner of the screen. Bearing is also shown by the large arrow pointing up to the compass.

The lines on either side of the present position arrow show the cross track error range. In other words, (using the screen above as an example) if the arrow crosses the line on either side, you are .10 miles to the left or right of the desired course.

A circle depicting your destination appears on the screen as you approach the waypoint.

The digital boxes on the screen's right side show (from top to bottom) your distance to go to the destination (DIS), ground speed (GS), estimated time en route (ETE), and course (CRS).

Course (CRS) is the bearing from your starting location to your destination. (Remember, course has nothing to do with your present position, except for your starting location.) It's shown as a dotted line on the NAV 1 display. This is shown as a reminder so that if you deviate from your original course, you can easily return to it. (A "course" is a proposed path over the ground. A "track" is your actual path over ground.)



Nav Screen #2

The navigation screen shows navigation information in large digital numbers. To view this screen, press the MODE key, then press the up arrow key until the black box surrounds the "NAV 1" label. Now press the right arrow key. A screen similar to the one at right appears. Press the EXIT key to erase the mode menu.

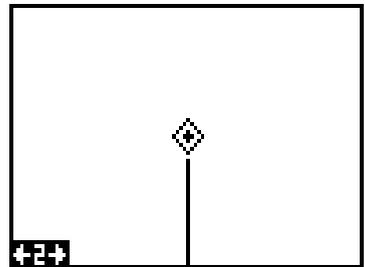
TRK 352° MAG	BRG 352° MAG
CRS 352°	DIS 17.00
GS 20.0	VMG 20.0
ALT 0	XTK 0.00

This screen is composed of eight digital display boxes, showing your track (TRK), and ground speed (GS). The other boxes show navigation data when a waypoint is recalled, including bearing to the waypoint (BRG), course (CRS), Altitude (ALT), distance to waypoint (DIS), velocity made good (VMG), and cross track error (XTK).

Plotter

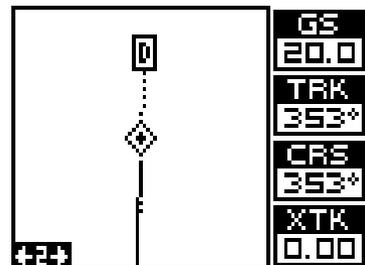
The plotter lets you see your course and track from a "birds-eye" view. If you've recalled a waypoint, the plotter show your starting location, present position, and destination. However, you don't have to recall a waypoint to use the plotter.

To use the plotter, simply press the MODE key, then press the up or down arrow keys until the "Plot" label is highlighted. Press the EXIT key to erase the mode menu. A screen similar to the one at right appears. This is plot-1. The diamond flashing in the center of the screen is your present position. The solid line extending from the diamond is your track, or path you've travelled. The plotter's range is shown in the lower left corner of the screen. In this example, the plotter's range is two miles from the left edge of the screen to the right.



There are two different plotter screens available. Map screen number 1 shows by default. Your current position displays at the center of the screen by a cross surrounded by a flashing diamond.

To view the other plotter screen, press the MODE key. Press the up or down ar-



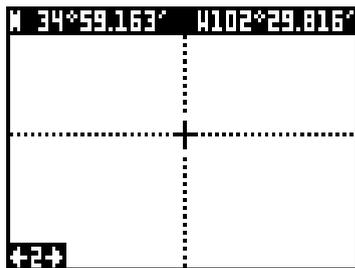
row key to move the black box to the "PLOT" label. Now press the right arrow or left arrow key to select plot 2. This screen (as shown at the bottom of the previous page) has navigation data displayed on the right side of the screen in digital numbers. This data is active whenever you've recalled a waypoint. Press the EXIT key to erase the mode menu.

This screen shows ground speed (GS), track (TRK), course (CRS), and cross track error (XTK).

Use the Z-IN and Z-OUT keys to enlarge or reduce the plotter area. This changes the plotter's range. The available ranges are: 0.1, 0.15, 0.2, 0.3, 0.4, 0.6, 0.8, 1, 1.5, 2, 3, 4, 5, 6, 8, 10, 15, 20, 30, 40, 60, 80, 100, 150, 200, 300, 400, 600, 800, 1000, 1500, 2000, 3000, and 4000 miles.

Cursor

Pressing an arrow key while the plotter is on shows two dotted lines that intersect at your present position. These dotted lines are called a "cursor" and have a variety of uses.

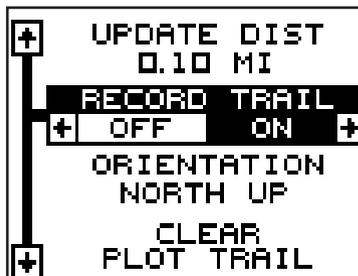


You can move the cursor around the display by pressing the arrow keys in the direction you want it to move. This lets you view different areas of the plotter, away from your present position. When it's turned on, the zoom-in and zoom-out keys work from the cursor's position - not the present position, so you can zoom in on any detail, anywhere while navigating. The latitude/longitude of the cursor shows in the box at the top of the plot-1 screen whenever the cursor is activated. The cursor is also used to place and erase icons and waypoints.

Press the EXIT key to erase the cursor.

PLOTTER OPTIONS

The GlobalNav 310 lets you customize the plotter using the "plotter options" menu. To use this menu, first press the MENU key, then use the up or down arrow keys to highlight the "Plotter Opts" label. Finally, press the right arrow key. The screen shown at right appears.



Record Trail On / Off

The line extending from the present position diamond on the plotter is called the plot trail. As each dot on the trail is placed on the screen, it's also saved in memory. The plot trail recording can be turned off, if desired. To turn it off, press the up or down arrow key until the "Record Trail" menu is highlighted and press the left arrow key. Press the EXIT key to return to the main menu.



Clear Current Plot Trail

To erase the plot trail extending from your present position, highlight the "ClearPlot Trail" menu, then press the right arrow key. A message box appears, asking you if you really want to erase the plot trail. Follow the directions on this message box. The GlobalNav 310 returns to the plotter screen after the message box clears.

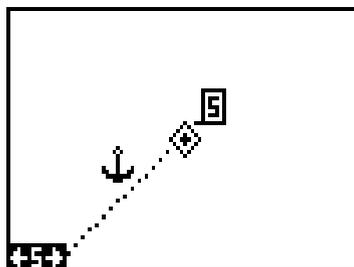
Plotter Orientation

Normally, the GlobalNav 310 shows the plotter with north always at the top of the screen. This is the way most maps and charts are printed on paper. This is fine if you're always travelling due north. Waypoints you see to your left corresponds to the left side of the plotter, to your right is shown on the right side of the plotter, and so on.

However, if you travel any other direction, the plotter doesn't line up with your view of the world.

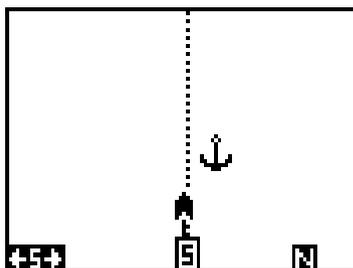
To correct this problem, this unit has a track-up mode that rotates the plotter as you turn. Thus, what you see on the left side of the screen should always be to your left, and so on. It also has a course-up mode that keeps the plotter at the same orientation as your initial bearing to the waypoint.

In the examples shown at right and on the next page, we're travelling southeast (about 210° magnetic). In the north-up view (at right), the present position indicator appears to move towards the lower left corner of the screen. The anchor icon shown on the left side of the screen is actually on our right. North is always at the top center of this screen.



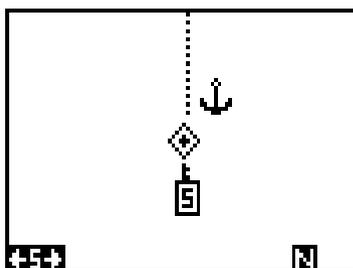
NORTH-UP MODE

In the track-up view at right, the present position moves straight towards the top of the display. As you can see, the anchor icon is now shown in its proper orientation - to our right. A "N" shows to help you see which direction is north when the track-up mode is on. Remember, in the track-up mode, the screen rotates as you change direction. It always keeps your direction of travel (track) heading towards the top of the screen.



TRACK-UP MODE

In the course-up mode shown at right, the screen is locked into your original bearing to the recalled waypoint, regardless of your track.



COURSE-UP MODE

To select the desired mode, highlight the "ORIENTATION" label on the "Plotter Options" menu, then press the left or right arrow keys until the desired mode appears. Press the EXIT key to leave this menu

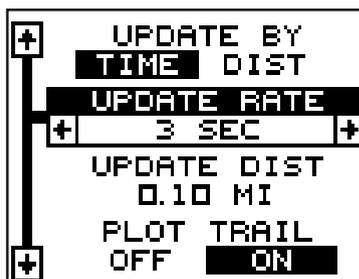
Plotter Update

The plotter places a dot on your trail as you move. It determines when to place a dot depending on either time or distance. By default, it places a dot every three seconds.

To change the update method from time to distance, highlight the "Update By" label, then press the right arrow key. This moves the label from "TIME" to "DIST".

If you want to change the update time or distance, simply highlight the desired menu, then press the left or right arrow keys until the desired setting appears.

Press the EXIT key to return to a navigation, plotter, or windows screen.

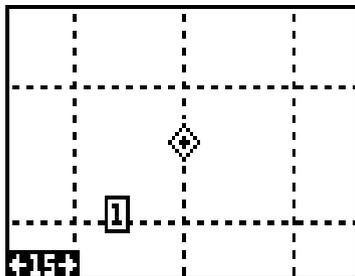


Grid Lines

The GlobalNav 310 can place grid lines on the plotter to help you see your position, or the position of waypoints and icons.

To do this, highlight the "Grid Lines" label on the "Plotter Opts" menu, then press the right arrow key to turn them on. Press the EXIT key to exit this menu.

A plotter screen similar to the one at right appears. The grid lines appear as vertical and horizontal dashed lines.

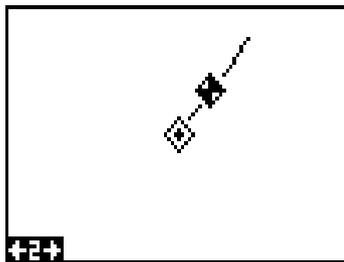
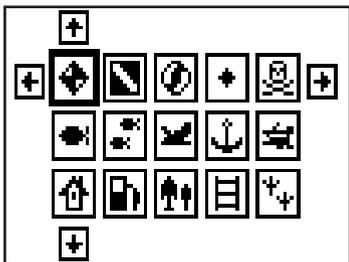


ICONS

The GlobalNav 310 has fifteen symbols or "icons" available. These icons can be placed anywhere on the plotter screens. These can be used to mark fishing spots, boat ramps, rest stops, or whatever. You can place an icon at your present position, or at the cursor location.

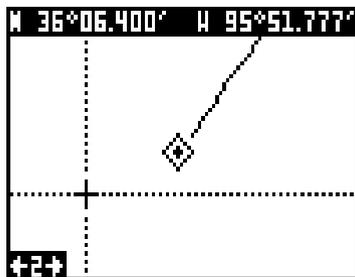
Place Icon - Present Position

To place an icon at your present position, simply press the ENT key. The screen shown at right appears. Use the arrow keys to move the black box to the desired icon. Now press the ENT key. The plotter screen appears with the icon you selected placed at your position when you first pressed the ENT key, not your present position.

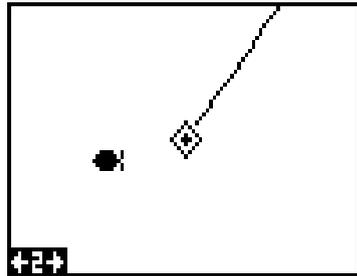


Place Icon - Cursor Location

To place an icon at cursor's location, first use the arrow keys to move the cursor to the position that you want to place the icon, as shown at right. Next, press the ENT key. Now select the desired icon using the arrow keys. When it's selected,



press the ENT key. The plotter screen reappears with the icon at the cursor's location. Press the EXIT key to erase the cursor. On the screen shown at right, the large fish icon was selected and placed at the cursor location.



Erase Icons

To erase an icon from the screen, first press the MENU key, then select the "WPT/Icon Opts" menu. A screen similar to the one at right appears.

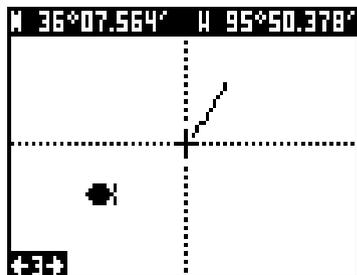


There are three methods used to erase icons from the screen. You can delete all of the icons, regardless of their position on the display, delete all of the icons of a certain type, or selectively erase individual icons.

To erase all of the icons, highlight the "Delete All Icons" menu, then press the right arrow key. A message appears, asking you if you want to delete all icons. Press the right arrow key to erase them. The unit returns to the plotter screen with all icons deleted.

To remove only icons of a certain type, highlight the "Delete Icons By Type" label. Press the right arrow key. The icon selection menu appears. Use the arrow keys to highlight the icon style that you wish to erase. Press the ENT key when you're ready to erase the icons. A message appears, asking you if you want to delete the icons of that type. Press the left arrow key to erase them. The unit returns to the plotter screen with all icons of the type you selected erased.

To remove only certain icons, highlight the "Delete Icons From Plotter" label. Press the right arrow key. The unit returns to the plotter screen with the cursor centered on your present position as shown at right. Use the arrow keys to move the cursor to the icon on the map that you wish to erase. Press the ENT



key to erase the icon. If you wish to delete another icon, move the cursor over it and press the ENT key. When you're finished, press the EXIT key to erase the cursor.

WINDOWS

This feature gives you 15 different groups of windows so you can use the best navigation display for your situation.

To use the windows feature, press the MODE key, then highlight the "GROUP A" label as shown below. Group "A" is visible in the background when you switch to the windows groups. To view each group, simply press the right or left arrow key while the mode menu is showing. Each group shows in the background as you press the arrow keys. When you see the group you want to use, simply press the EXIT key to erase the mode menu.

Special Windows

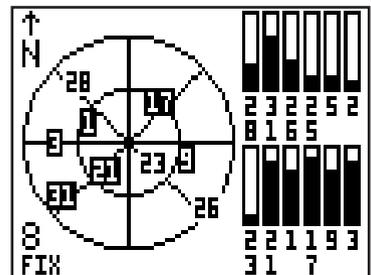
Although most of the windows used in the GlobalNav 310 are self-explanatory, there are several windows that have special features or can be used in unique ways. The following section describes these windows.

Satellite Information Screen (Group A)

This screen shows technical information about the status of the GPS receiver. The receiver has twelve channels. Data for each channel is shown as bar graphs on the right side of the display. Every satellite in the constellation has a number assigned to it, called the PRN. The bar graph is above each satellite's number. The higher the bar on the graph, the better the signal is being received from the satellite.

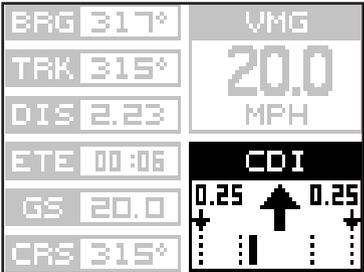
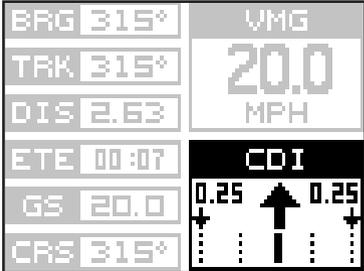
Each satellite is also shown on the circular graph on the left side of the screen. This shows you not only which satellites are in your area, but also their direction from your position, and their elevation (distance above the horizon.) The small inner circle represents 45° above the horizon and the large outer circle represents the horizon. A satellite is straight above you when it is at the intersection of the horizontal and vertical lines that pass through the circles.

The FIX number in the lower left corner of the screen show the quality of fix. If the FIX is 9, then it's the best you can get. A FIX of 1 is the worst.



COURSE DEVIATION INDICATOR (CDI)

The CDI shows your distance to the left or right of the desired course. You must recall a waypoint or run a route to use the CDI. The arrow in the center of the box shows the direction to the destination. For example, if you're travelling straight towards the destination, the arrow points straight up. If you turn to the right, the arrow points to the left, showing that the destination is to your left. The smaller arrows pointing down on each side show the CDI's range. The default is 0.25 mile. The small vertical bar beneath the arrow shows the distance off course and represents the course line. If the bar moves to the left, then you are too far to the *right* of the desired course line, and vice-versa. On the indicator shown at right, we are about 0.1 mile to the right of the desired course. (Each dotted vertical line represents 0.175 mile.) You can adjust the CDI's range through the "ALARMS/CDI" menu.



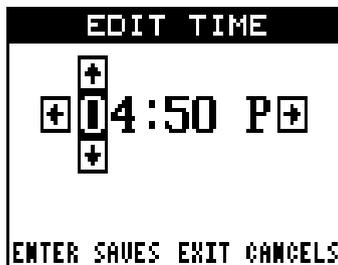
Using the CDI with a map helps you visualize your position in relation to the course. The CDI is on several of the 310's windows and can be programmed to show on any window group.

CLOCK

Whenever a clock, timer, or alarm is showing on a display, new items appear in the list when you press the MENU key. These items let you set the clock's time, alarms, or the timers.

Clock Set

If the time shown on the clock display is not your local time, change it using the "Clock Set" function. To do this, press the MENU key, then highlight the "Set Clock" label. Press the right arrow key. The screen at right appears.



Using the right and left arrow keys, move the black box to the first number in the time that you want to change. Now press the up or down arrow keys until the desired number shows. Continue until the time shown in the display is correct, then press the ENT key. This enters the new time and clears the set clock menu.

Clock Alarm

You can set the alarm on group "J" (that works just like an alarm clock), by using the "Clock Alarm" menu. To set this alarm, press the MENU key while group "J" is showing, then highlight the "Clk Alm Set" label. Press the right arrow key. The screen at right appears. Using the right and left arrow keys, move the black box to the first number in the time that you want to set. Now press the up or down



arrow keys until the desired number shows. Continue until the time shown in the display is correct, then press the ENT key. The alarm is now set.

To turn the alarm on, press the MENU key, then highlight the "CLK ALM" menu. Press the right arrow key. The alarm is now activated.

When the alarm goes off, an audible tone sounds along with a flashing message on the screen. Press the EXIT key to turn the alarm off.

Note: The GlobalNav 310 must be on in order for the alarms to work. In other words, if you set the alarm to go off at 7:00 a.m., then the GlobalNav 310 will have to be on at 7:00 a.m., also.

Timers

The GlobalNav 310 has two timers built in. One is a countdown timer and the other is a count-up timer. The countdown timer counts down from the time you put in to zero. The count-up timer starts at zero and counts up to the time you entered.

To set either timer, first switch to a window group with a timer. Next, press the MENU key, then highlight the desired timer set menu. In this example, we're setting the countdown timer. Now press the right arrow key. A screen similar to the one at right appears.



Using the right and left arrow keys, move the black box to the first number in the time that you want to set. (The time is in hours, minutes, and seconds) Now press the up or down arrow keys until the desired number shows. Continue until the time shown in the display is correct, then press the ENT key.

To start the timer, press the MENU key, then move the black box to the "Dn Tmr Off On" label. Press the right arrow key to start the timer. The timer continues counting until you stop it. If you turn the up timer's alarm on (press the right arrow key when the black box is on the (Up ALM...Off/On label), it will sound a tone when it reaches the time you entered in the up timer set menu. Press the EXIT key to silence the alarm.

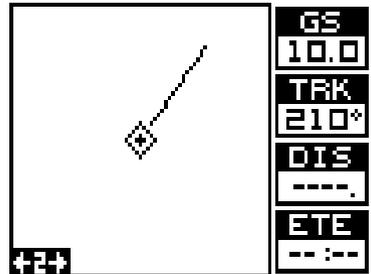
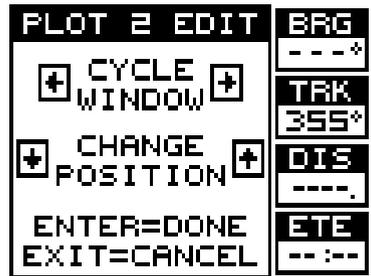
You can reset either alarm to the time you originally set by pressing the MENU key, then moving the black box to either the "Up Tmr Reset" or "DN Tmr Reset" label, then press the right arrow key.

REPROGRAM BOXES

The digital boxes on the PLOT-2 and both NAV screens can be reprogrammed. The changes you make to the screen will remain in memory, even if all power is removed from the unit. You can, however, return the boxes to the factory settings from the "Preset Groups" item in the "System Setup" menu.

To customize a screen, first switch to the screen that you want to customize. Next, press the MENU key, then highlight the "Reprgrm Boxes" menu. Press the right arrow key. The screen shown at the top of the next page appears. In this example, we'll change Plot-2.

This is the plot-2 edit screen. The “BRG” box in the upper right corner flashes, which means it’s ready for change. If you don’t want to change this box, simply press the up or down arrow key to move to the box that you do want to change. In this example, we will change the BRG box to ground speed, or GS. To do this, simply press the left or right arrow key while the box is flashing. The box changes each time the arrow key is pressed. When the desired box appears, then you can change another box or save your changes by pressing the ENT key. If you want to leave this screen without saving the changes, simply press the EXIT key. In this example, we simply changed the BRG to GS, then pressed the ENT key. The screen at right is the final version. Use this same method to change the NAV screens.

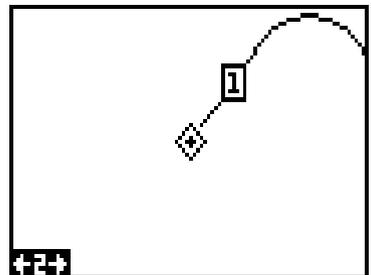


WAYPOINTS

The GlobalNav 310 gives you the capability of creating your own database of locations, called “waypoints”. You can save your present position, cursor position, or enter a latitude/longitude and save it as a waypoint. It can store up to 250 waypoints.

Saving Your Present Position as a Waypoint (Quick Save Method)

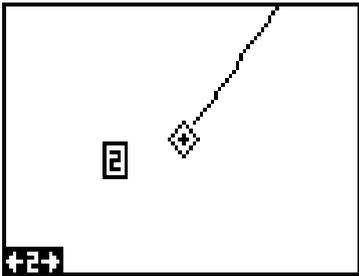
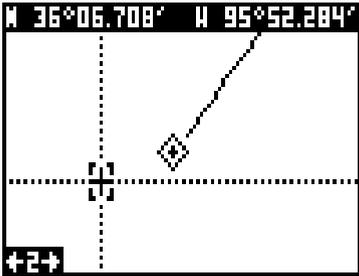
To save your present position, simply press the WPT key twice. This puts your current position into the first available waypoint number on the list. A message appears on the display telling you the waypoint number it just used. This also momentarily places you in the database menu. Anytime a database menu is showing, simply press the WPT key once and the unit will store your present position in the waypoint list.



Every time you save a waypoint, the date and time are logged along with the position data. It’s also placed on the plotter as shown above. In this case, waypoint number one was assigned when we quick-saved our position.

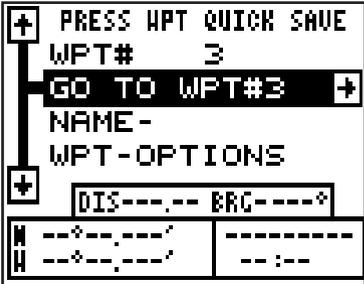
Saving The Cursor Position as a Waypoint

When the cursor is showing on the plotter and you press the WPT key twice, the GlobalNav 310 puts the *cursor's* position into the first available waypoint number. A message appears on the display telling you the waypoint number it just used. Wait a few seconds and the menu will clear automatically or press the EXIT key to erase the waypoint menu.

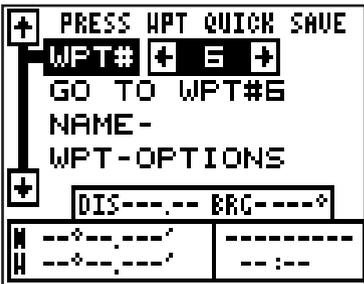


Saving Your Present Position as a Waypoint (Select Number Method)

The method shown above doesn't let you choose the waypoint number. You can pick the waypoint number, then save your present position. To do this, first press the WPT key once. A screen similar to the one at right appears.

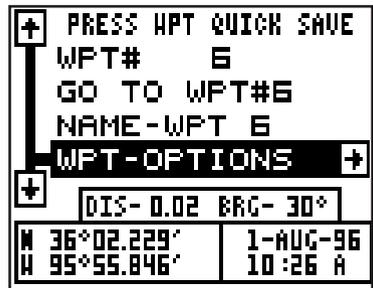
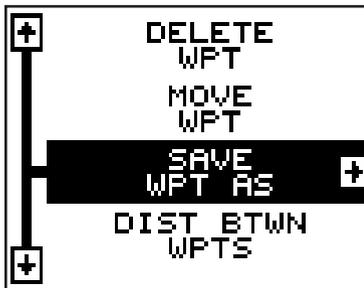


Now press the up arrow key once. This is the waypoint number selection menu. Press the left or right arrow keys until the waypoint number appears that you wish to store your present position. In this example, we're going to store a position as waypoint number 6.



Now press the down arrow key until the "WPT Options" label is highlighted. Press the right arrow key. A screen similar to the one shown at the top of the next page appears.

Highlight the “Save Position As” label as shown below left and press the right arrow key when you’re at the location you wish to save. This saves your present position under the waypoint number you selected on the first page.



Saving Cursor Position as a Waypoint (Select Number Method)

To save the cursor position under a specific waypoint number, first position the cursor at the desired position. Then follow the previous instructions for saving your present position as a waypoint using the select number method. Remember, the *method* of saving your present position and the cursor’s position is identical.

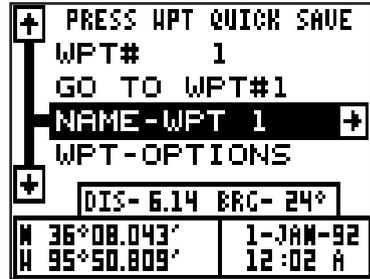
Edit Lat/Lon

The GlobalNav 310 lets you enter any latitude/longitude using the keyboard and save it under any waypoint number, from 1 to 250. You can also change any waypoint’s position using this method. To do this, first select the waypoint number that you want to save a position under from the waypoint menu. In this example, we’ll use waypoint number 10. Next, highlight the “WPT-Options” menu and press the right arrow key. Now highlight the “Edit Lat-Lon” menu and press the right arrow key. The screen shown above appears. Using the left and right arrow keys, highlight each number in the position and change it using the up and down arrow keys. When you’re ready to save this position and return to the waypoint screen, press the ENT key. The location you entered shows at the bottom of the screen under the waypoint number you selected. Note: You can also use this method to change the position of an existing waypoint.



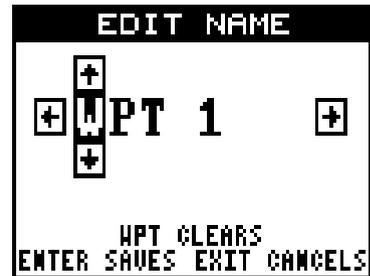
WAYPOINT NAMES

The GlobalNav 310 automatically assigns the waypoint number as a name when the waypoint position is saved. You can find a waypoint by highlighting the "Name" label on the waypoint menu as shown at right. Now press the right or left arrow keys to scroll through the saved waypoints. Only waypoints that have a position will show using this method.



Edit Name

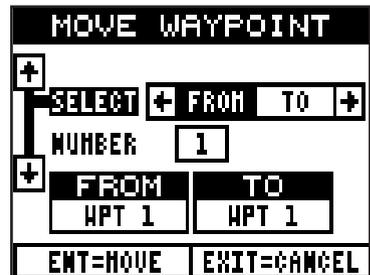
The GlobalNav 310 also lets you assign a name to each waypoint. The name can have up to eight characters. To name a waypoint, first select the waypoint number that you wish to name. (Note: A waypoint must have a position stored before you can name it.) Now highlight the "WPT Options" label and press the right arrow key. Finally, highlight the "EDIT NAME" label and press the right arrow key. A screen similar to the one at right appears.



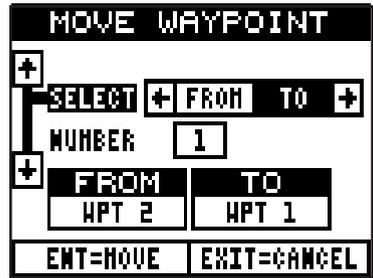
Press the up or down arrow keys to select the first letter in the name. Press the right arrow key to move the black box to the next position in the name. Repeat this sequence until you've entered all of the letters in the waypoint name. Press the ENT key to accept this name, the WPT key to erase all characters in the name, or the EXIT key to leave this screen without saving any changes.

MOVE A WAYPOINT

You can move all information from one waypoint number to another. In this example, we'll move all of the information in waypoint number 2 to waypoint number 10. To do this, highlight the waypoint options menu and press the right arrow key. Now highlight the "Move WPT" label. Press the right arrow key. The screen shown at right appears. The black box is resting on the "Select From" label. Now press the down arrow key until the number 2 appears beneath the "FROM" label. Now press



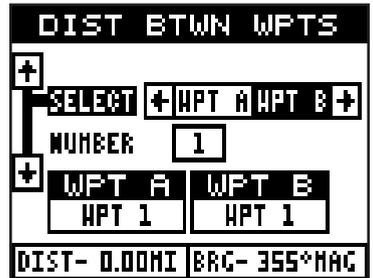
the up arrow key, then the right arrow key. This highlights the “TO” label, as shown at right. Press the down arrow key, then press the right arrow key until the desired waypoint number shows in the box. When everything on this page is correct, press the ENT key.



Note: The names in the “From” and “To” boxes are not the waypoint numbers - they are the waypoint names. When a waypoint is moved from one number to another, the new waypoint number gets the old waypoint name. For example, moving waypoint number 2 to waypoint number 10 deposits the name “WPT 2” in waypoint 10’s name field.

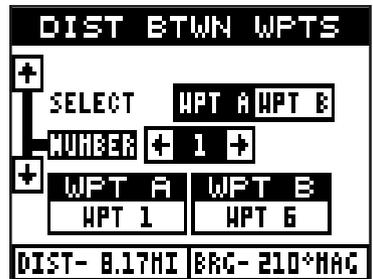
DISTANCE BETWEEN WAYPOINTS

The GlobalNav 310 can easily give you the distance between two user waypoints. To do this, first press the WPT key, highlight the “Wpt Options” menu and press the right arrow key, then highlight the “Dist Btwn WPTS” label and press the right arrow key. The screen at right appears.



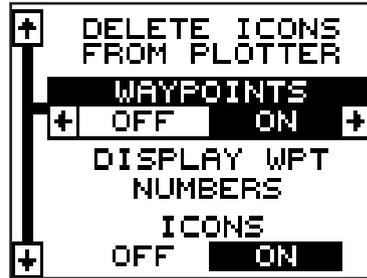
The black box is resting on the “Select WPT B” label. Now press the down arrow key to highlight the waypoint number label.

Once you have the first waypoint showing on the screen, then you need to choose the other waypoint that you’re going to measure. Move the black box back to the “Select” label at the top of the screen, then press the left arrow key to select “A”. Now choose the waypoint that you wish measure. The distance and bearing from the first waypoint “A” to the second waypoint “B” shows at the bottom of the screen. You can select more waypoints to measure at this time or press the EXIT key to erase this screen.



WAYPOINT OPTIONS

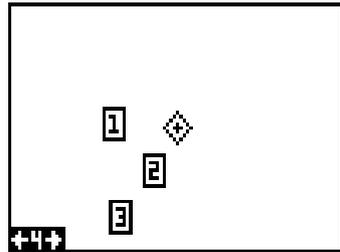
You can customize the look of the waypoints on the plotter, or even turn them off. To do this, first press the MENU key, then highlight the “WPT/Icon Opts” label. Press the right arrow key. The screen shown at right appears.



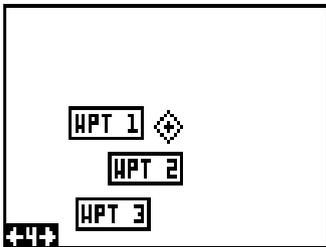
To keep the waypoints from showing on the plotter, simply press the right arrow key when the “Waypoints” label is highlighted as shown above.

To change the method waypoints show on the plotter, highlight the “Display WPT” label. The default is numbers. In other words, when the waypoint shows on the plotter, it’s number appears in a box, showing both it’s identity and location. You can change this from number to name, or simply an empty box (position) showing no identifiable name or number.

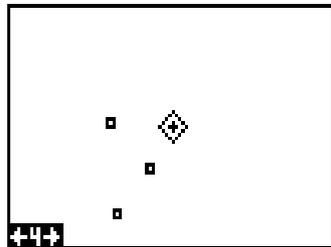
Change the waypoint’s display by highlighting the “Display WPT” label, then press the right or left arrow key until the desired display appears. When it does, press the EXIT key. This erases the menu and returns to the plotter with your selection.



WAYPOINT NUMBERS



WAYPOINT NAMES



WAYPOINT POSITION

Delete a Waypoint

To erase all of the information in a waypoint, simply press the WPT key, then select the waypoint you want to delete. Now highlight the “Wpt-Options” label and press the right arrow key. Finally, highlight the “Delete WPT” label and press the right arrow key. A message appears, asking if you really want to delete this waypoint. Press the right arrow key to delete it, the left to exit without deleting the waypoint.

ROUTES

You can connect several user waypoints together to form a route. When you recall the route, the GlobalNav 310 will show you navigation information to the first waypoint in the route, then when you reach that waypoint, it switches to the next waypoint, and so on until you reach the last waypoint in the route.

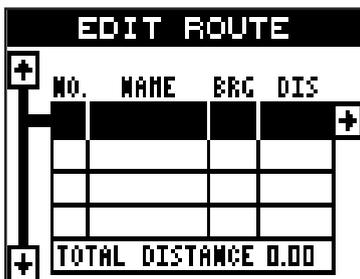
To create a route, first press the MENU key, highlight the "ROUTES" label, and press the right arrow key. A new menu appears with the "Plan Route" label already highlighted. Press the right arrow key. The screen shown at right appears.



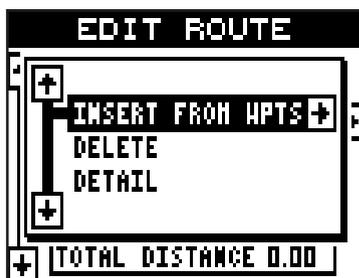
This unit can store up to twenty different routes. Route number one shows on this page. If you wish to create a route using a different number, simply press the left or right arrow keys until the desired route number appears. In this example, however, we'll use route number one.

At the bottom of this menu is the "Edit Name" label. If you wish to name the route, highlight that label, then press the right arrow key. Use the arrow keys to name the route, (you can use up to eight characters in the name) then press the ENT key when you're finished.

Now highlight the "Edit Route" label and press the right arrow key. The screen shown at right appears. This is the waypoint list screen. This shows all of the waypoints that form the route. To select the first waypoint in the route, press the right arrow key. A new menu appears as shown at the top of the next page.

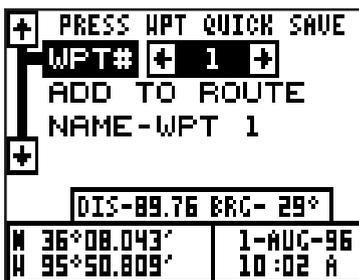


This menu lets you go to the waypoint selection menu, delete a waypoint from the route, or see details about any waypoint in the route. Since we want to add a waypoint to the route, press the right arrow key on the "Insert From WPTS" label. The screen shown below appears.

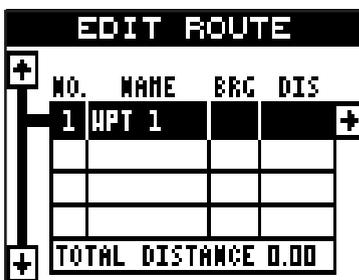


Select Waypoints

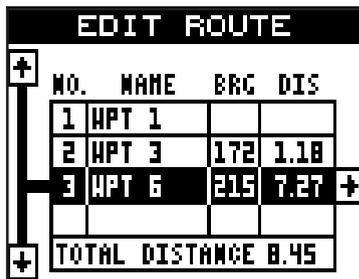
Select the first waypoint either by using the waypoint name or waypoint number menus. As you move through the list of saved waypoints, their date and time saved, position, and distance and bearing from your present position show at the bottom of the screen. When the desired waypoint appears that you want to use as the first waypoint on the route, move the black box to the "Add WPT To Route" label, then press the right arrow key. The unit returns to the route planning screen with this waypoint placed in the first location on the list as shown at right.



To add more waypoints to the route, simply press the down arrow key to the next position on the list and press the right arrow key. Continue until all of the waypoints have been added to the route.



As you add waypoints to the list, their bearing and distance from each other is shown to the right of the waypoint name. On the screen at right, waypoint 6 is on a bearing of 215° and 7.27 miles from waypoint 3. The total route distance is shown at the bottom of this screen.

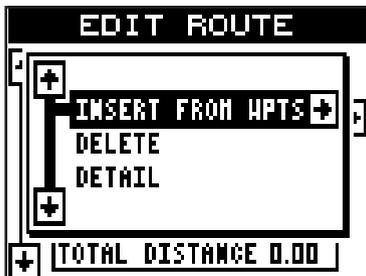


Finishing the Route

When you've selected all of the waypoints for the route, simply press the EXIT key until you return to the navigation, plotter, or windows screen. Your route is saved in memory.

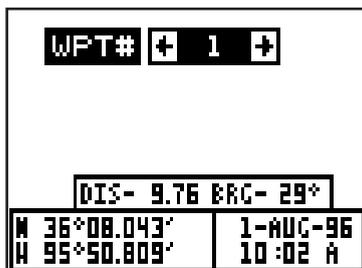
Delete a Waypoint

To delete a waypoint from a route, first select the route from the "Route Planning" or "Run Route" menus, then highlight the waypoint that you want to remove from the route's list. Now press the right arrow key. The screen shown at right appears. Highlight the "Delete" label on this menu and press the right arrow key. The unit returns to the route list with the waypoint removed from the list. (Note: This doesn't delete the waypoint from the database, it only removes it from the route.)



Waypoint Detail

To view the position, bearing, distance, and other information about a waypoint saved in a route, first select the route from the "Route Planning" or "Run Route" menus, then highlight the desired waypoint from the route's list. Now press the right arrow key. The screen shown above appears. Move the black box to the "Detail" label and press the right arrow key. The screen at right appears.



This screen shows the waypoint's name, number creation time and date, icon, position, distance, and bearing from your present position. When you're finished viewing this information, press the EXIT key to erase it.

Following a Route

To follow a route, first recall it by pressing the MENU key, highlighting the "ROUTES" label, pressing the right arrow key, then highlighting the "RUN ROUTE" label and press the right arrow key. The screen shown at right appears.



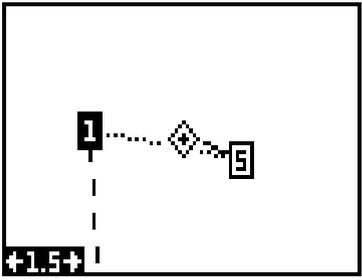
The black box is on the "Route # 1" label. If this isn't the route you want to use, press the right or left arrow keys to switch to another one. Before starting the route, you'll need to decide if you want to start at the beginning and travel forward or start at the last waypoint in the route and travel backwards (reverse) to the first waypoint. The default is forward. Next, highlight the "Start Route" label and press the right arrow key. The screen shown below appears.

Once you determine which direction in the route you want to go, you'll need to determine the first waypoint in the list you want to start the route. Usually, it's the first waypoint, however the GlobalNav 310 gives you several options. The default starting waypoint is the first one in the list. However, by pressing the right arrow key, the word "AUTO" appears in the "Select First WPT" list. This starts the route with the waypoint that's closest to your present position. You can start at any waypoint in the route. As you change the number, the selected starting waypoint is highlighted on the list.

WPT=DETAIL		ENT=RUN	
SELECT FIRST WPT		←	1
NO.	NAME	BAC	DIS
1	WPT 1		
2	WPT 3	172	1.18
3	WPT 6	215	7.27
TOTAL DISTANCE		8.45	

If you want to see details about the highlighted waypoint, press the WPT key.

When you have everything on this screen set as desired, press the ENT key to start the GlobalNav 310 navigating to the first waypoint on the route.



As you travel to the first waypoint, the unit shows navigation data to the waypoint. If you use the plotter, as shown at right, the unit draws a dotted line from your starting position (shown by the "S"), and a dashed line from the first waypoint to each of the other waypoints in the route. When you enter the radius set by the arrival alarm, the GlobalNav 310 automatically switches to the next waypoint on the list, showing navigation data to that waypoint, and so on until the last waypoint on the route list has been reached. (Note: The arrival alarm does not have to be turned on in order to use the route feature.)

Skip Waypoint

The GlobalNav 310 lets you skip a waypoint in a route without stopping the route. To do this, first press the MENU key, then highlight the “Routes” menu and press the right arrow key, then highlight the “Skip WPT” label and press the right arrow key. The unit returns to the navigation, plotter, or windows screen with navigation data showing to the next waypoint on the list.



Delete a Route

To erase a route, first press the MENU key, then highlight the “Routes” menu and press the right arrow key, highlight the “Plan Route” label and press the right arrow key. The screen shown at right appears. Now select the route you want to erase by pressing the right or left arrow keys. When the desired route number appears, then highlight the “Delete Route” label and press the right arrow key. A message appears, asking if you really want to erase the route. If you press the right arrow key, the route will be erased.

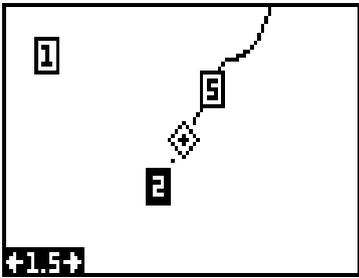
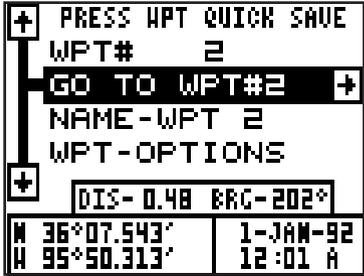


NAVIGATION

Navigate To a Waypoint

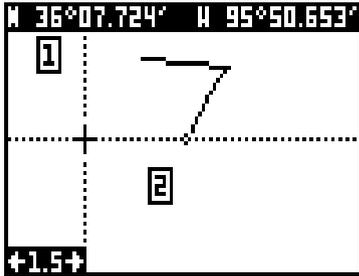
The GlobalNav 310 makes it easy to navigate to any waypoint. First, press the WPT key, then press the right or left arrow keys until the desired waypoint appears. Now highlight the “Go To WPT#” label and press the right arrow key. The unit immediately returns to the navigation, plotter, or windows screen and shows navigation information to the selected location.

In this example, we recalled waypoint number 2. Switching to a plotter screen (shown at the top of the next page) shows our starting location “S”, the recalled waypoint “2”, and our present position.



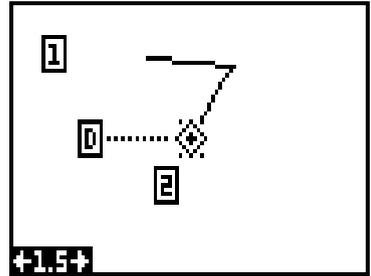
Navigating to a cursor location

The GlobalNav 310 lets you navigation to a location without storing it in the waypoint database by using the plotter and cursor. To do this, first switch to the plotter screen. Now move the cursor to the location that you want to navigate to. Next, press the MENU key. A new menu appears on the list: “Go To Cursor”. Press the right arrow key. The GlobalNav 310 shows nav data to the cursor location (shown as “D” on the plotter). See the screen at the top of the next page.



Navigating to a Waypoint using the Plotter

The unique “birds-eye” view used by the plotter gives you an easy way to navigate to a waypoint. On the screen shown at right, the diamond with a cross in it is your present position. The box with the “S” in it was your starting location when you recalled the waypoint. The dotted line is called a track line and is the



shortest path from the starting location to the destination. The “D” is the cursor destination, the number with a box around it is the waypoint. If you follow the track line, you’ll reach the destination, covering the shortest distance in the least time.

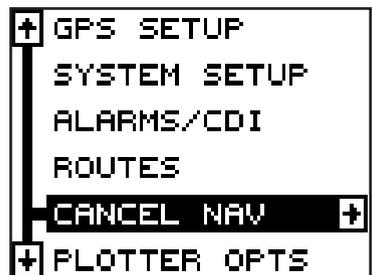
CAUTION!

The GlobalNav 310 does NOT take land features, altitudes, restricted or prohibited areas, or any other feature into account when it projects the track line on the screen. Therefore, you must use care when navigating on the track line and avoid any object that may be in your path to the destination.

CANCEL NAVIGATION

The GlobalNav 310 continues to navigate to a recalled waypoint, the last waypoint in a route, or the cursor position until you stop it.

To stop the navigation function, press the MENU key, then press the up or down arrow keys until the “Cancel Navigation” label is highlighted. Press the right arrow key. The unit stops showing navigation information.



SYSTEM SETUP

The GlobalNav 310 has several menus and commands listed under the “System Setup” label on the main menu. These commands affect the basic operation of the unit. To use them, press the MENU key, then highlight the “System Setup” label. Press the right arrow key. The screen shown at right appears.



SPEAKER

You can turn the speaker off. Turning the speaker off also turns off the audible portion of the alarms.

To turn the speaker off, highlight the “Sound” label on the “System Setup” menu as shown above. Now press the left arrow key to turn the speaker off. Repeat these steps to turn the speaker on. Press the EXIT key to erase this screen.

CONTRAST

To adjust the display’s contrast, highlight the “Cont” label on the “System Setup” menu as shown above. Press the right or left arrow keys until the screen’s contrast is best for the lighting conditions. Press the EXIT key to erase this screen.

Units of Measure

The GlobalNav 310 can show its data in many different formats. For example, distance can be displayed in statute miles (MI), nautical miles (NM), or kilometers (KM).

The following can be changed on the Units of Measure menu: (Defaults shown in **bold**)

- Distance **miles**, nautical miles, kilometers
- Speed **miles per hour**, knots, kilometers per hour
- Bearing **magnetic**, true
- Altitude **feet**, meters
- Clock **12-hour (a.m.-p.m.)**, 24 hour
- Position Format **degrees, minutes, and thousands of a minute**
degrees, minutes, seconds
UTM
standard military grid reference system
alternate military grid reference system

To change a unit of measure, first select the "Set Units" from the "System Setup" menu. The screen shown at right appears. Highlight the desired selection, then press the left or right arrow key. You can change one or all of the settings on this page. When you're finished, press the EXIT key.



Position Format

To change the position format, highlight the "Position Format" label on the Units of Measure menu, (shown above) then press the right arrow key. A screen similar to the one at right appears.



The GlobalNav 310 can show the position in degrees, minutes, and thousandths of a minute (36 28.700') or degrees, minutes, seconds, and tenths of a second (36 28' 40.9"). It can also show position in UTM's (Universal Transverse Mercator) projection, British, Irish, and Military Grid systems.

UTM's are marked on USGS topographic charts. This system divides the Earth into 60 zones, each approximately 6 degrees wide in longitude. Their unit of measure is in meters. For example, 30 N means that the position shown to the left of the "N" is in grid 30, and it's north of the equator.



British and Irish grid systems are the national coordinate system used only in their respective countries.



Note: In order to use either the British or Irish grid systems, you must be in the U.K.

The GlobalNav 310 can use the military grid reference system (MGRS). It uses two grid lettering schemes, which are referred to as standard and alternate MGRS on the GlobalNav 310. Your position and datum in use determines which one to use. In general, if the datum you're using is valid for your present position, then use the standard MGRS, otherwise use the alternate MGRS.



Press the up or down arrow keys to highlight the desired position format. Press the EXIT key to both select the format and erase the position format menu.



NMEA / DGPS

The GlobalNav 310 transmits data through the data port in the back of the unit using NMEA 0183 format, version 1.5 or 2.0. This data is used by other electronic devices such as marine autopilots for position and steering information.

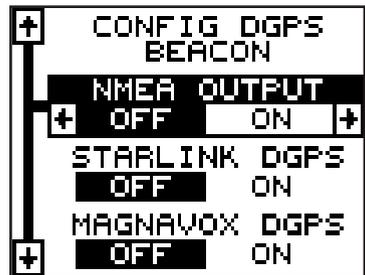
DGPS on the other hand, is a data input. DGPS is an acronym for Differential Global Positioning System. Currently, it relies on a system of ground-based transmitters that send correction signals to small DGPS receivers. DGPS gives you more accurate positions than is otherwise possible.

All wiring connections to the GlobalNav 310 are made to its power cable. See the sample wiring diagrams on the next page for general wiring procedures. Read your other product's owner's manual for more wiring information.

Once the cables are wired, turn the GlobalNav 310 on, press the menu key, and select NMEA / DGPS from the System Setup menu. A screen similar to the one at right appears.

NMEA OUTPUT

To turn the NMEA output on, highlight the "NMEA OUTPUT" menu, then press the right arrow key. If your other equipment works, then no setup will need to be performed. If your other equipment doesn't recognize the NMEA data being sent by the GlobalNav 310 and the wiring is correct, then you may need to change the NMEA or the serial communication settings.

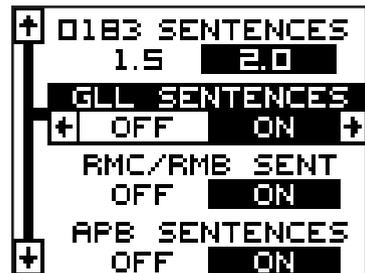


Configure NMEA Output

Highlight the "Configure NMEA Output" menu, then press the right arrow key. A screen similar to the one at right appears.

NMEA 0183 Version

There are two versions of the NMEA data, 1.5 and 2.0. If your other equipment requires 2.0, press the right arrow key to select it.



RMC/RMB, GLL, APB, GGA, GSA/GSV Sentences

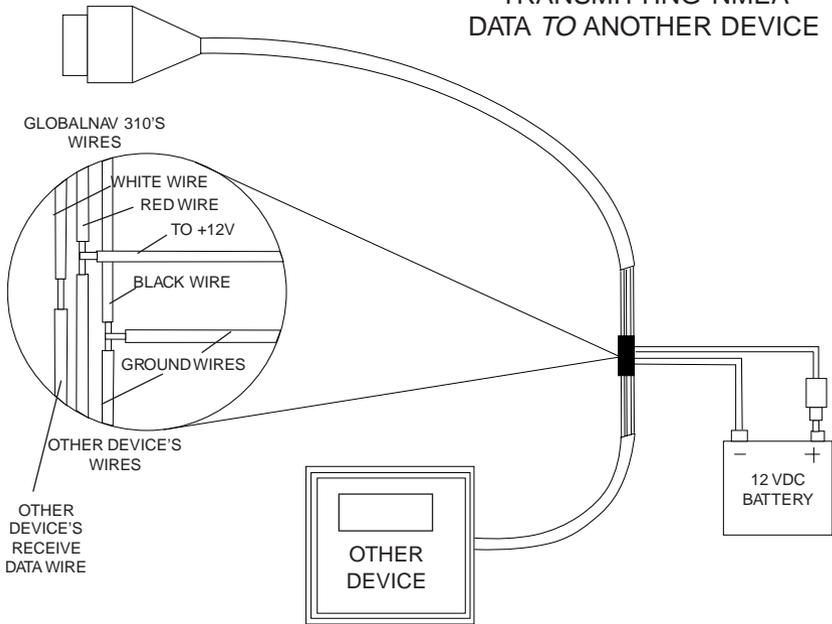
Some equipment requires different sentence. The GlobalNav 310's default setting for these sentences is on. In other words, it automatically sends these sentences when NMEA is turned on. To turn any of these off, move the black box to the desired menu and press the left arrow key. Press the EXIT key when you're finished with this screen.

DGPS

The GlobalNav 310 will recognize Starlink® and Magnavox® DGPS automatic receivers. If you have either one of these receivers, simply highlight the "Starlink DGPS" or "Magnavox DGPS" on the NMEA / DGPS menu and press the right arrow key to turn it on. (Note: If you have a Magnavox

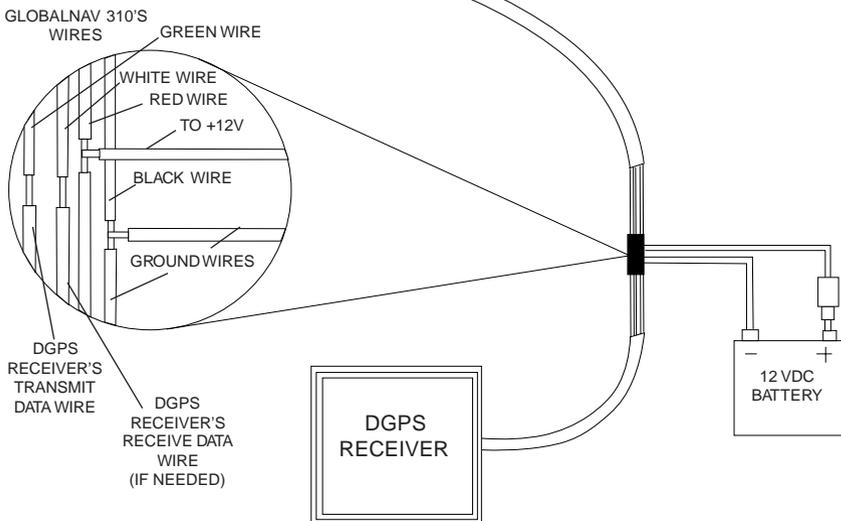
TO GLOBALNAV 310

GLOBALNAV 310 TRANSMITTING NMEA DATA TO ANOTHER DEVICE



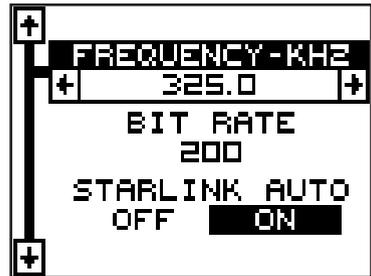
TO GLOBALNAV 310

GLOBALNAV 310 RECEIVING DATA FROM A DGPS RECEIVER



DGPS receiver connected, the GlobalNav 310 can't send NMEA data.) With the exception of serial communications, typically no other setup needs to be made with these receivers.

If you have any other Magnavox or Starlink compatible DGPS receiver connected to the GlobalNav 310, you may need to change the settings. To do this, move the black box to the "Configure DGPS Beacon Receiver" label and press the right arrow key. A screen similar to the one at right appears.

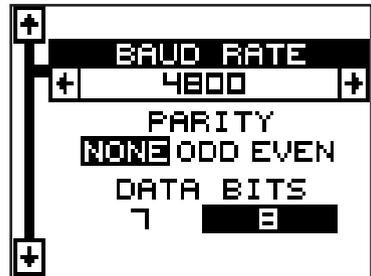


These menus select the beacon receiver's frequency and bit rate (in bits per second). If you are using a Starlink receiver, turning the auto mode on causes the GlobalNav 310 to auto-detect the frequency and bit rate.

To change one of these settings, simply highlight the menu item you wish to change, then press the right or left arrow key until the desired number appears. Press the EXIT key when you're finished.

SERIAL COMMUNICATIONS SETUP

To set the data port, move the black box to the "Setup Com" on the System Setup menu. Press the right arrow key. The screen shown at right appears.



Check your DGPS receiver's manual for the proper data settings. Highlight the menu item you need to change. Press the left or right arrow keys to change them. The serial port defaults are 4800 baud, no parity, and 8 data bits. Press the EXIT key to erase this menu.

RESET OPTIONS

To return the GlobalNav 310 to its original factory settings, highlight the "Pre-set Options" menu on the System Setup screen. Now press the right arrow key. A message appears, asking if you want to restore the original options. Press the right arrow key if you do, the left arrow key to quit.



If you restore the unit to the factory settings, all options such as contrast, alarms, and other system choices are returned to their default values. However, no waypoints, routes, or icons are erased.

SYSTEM INFO

The system information screen shows the release date and the version number of the code stored inside the GlobalNav 310. To view this screen, highlight the "System Info" label on the "System Setup" menu. Now press the right arrow key. A screen similar to the one at right appears. Press the EXIT key when you're finished reading this screen.



GPS SETUP

The GPS Setup menu has sub-menus that affect the GPS receiver. From these menus you can turn the simulator on or off, set the update rate, initialize the GPS receiver, do a self-test on the receiver, and do a cold-start. (Note: The "Initialize GPS receiver" is covered in the "Finding Your Position" section in the front of this manual.



To view these menu items, press the MENU key, then highlight the "GPS Setup" menu. Press the right arrow key. The screen shown above appears.

Execute GPS Cold Start

When the GlobalNav 310 is turned on for the first time "out of the box", it automatically sends a "cold-start" message to the GPS receiver. You can also send a cold start message to the receiver at any time.

If the unit can't lock on to the satellites using the data you've given it, or if it has trouble finding the satellites, perhaps it is using the wrong data. This can happen if you've entered the wrong data by accident when ini-

tializing the receiver. For example, if you entered east longitude instead of west. Or if you've moved a long distance with the unit turned off.

To send a cold start message to the receiver, highlight the "Execute GPS Cold Start" label, then press the right arrow key. A message appears, asking you if you really want to do a cold start. Follow the instructions on this message page.



The unit will begin searching for the satellites. It can take as long as 5 minutes for it to lock on to the necessary satellites. Remember, when it does, your local time and possibly date can be wrong. Use the method shown in the initialization section at the front of this manual to change them, if needed. Once this is done, an internal clock will keep the correct time, even when the unit is turned off. The GPS system updates this clock when the unit is locked on to the satellites.

DATUM

Maps and charts are based on a survey of the area that's covered by the map or chart. These surveys are called "Datums". Maps that are created using different datums will show the same latitude/longitude in slightly different locations.

All datums are named. The GPS system is based on the WGS-84 datum, which covers the entire world. Other datums may also cover the entire world, or just a small portion. By default, the GlobalNav 310 shows your position on the map using the WGS-84 datum. However, it can show your position using one of 189 different datums.

To change the datum, first press the MENU key, then highlight the "GPS Setup" label and press the right arrow key. Now highlight the "Select Datum" label. Finally, press the right arrow key again. A screen similar to the one at right appears.



The WGS-84 label is highlighted. To change it, simply press the up or down arrow keys to highlight the desired datum, then press the ENT key. This selects the datum and erases the select datum menu.

PCF (Position Correction Factor)

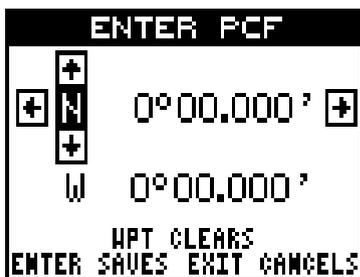
Another method used to make your display match a chart or map is called “PCF” or Position Correction Factor. This unit gives you the capability to move or offset the position shown on the display to match one on the chart. The unit will add this offset to all position and navigation displays at all times.

Remember, the position error on any radio navigation system is very dynamic and the PCF offset should never be used in an attempt to cancel the error.

In general terms, PCF should only be used if your map indicates what the possible error is. **PCF should always be reset to zero when you're finished with the chart.**

For example, suppose you are stopped at a location that is accurately marked on a chart. Your unit shows a longitude position that is .244 minutes east of the one on the chart and .047 minutes north latitude. Using the PCF feature, you can make the GlobalNav 310 match the chart you're using. If you move, the unit will continuously add the change to all position, navigation, and mapping displays. This makes it more closely match the datum used by the chart. For this reason, you should be careful when entering the PCF offset. It's saved in memory and doesn't change when the unit is turned off. However, resetting the unit does erase the PCF offset.

To change the PCF offset, first press the MENU key, then highlight the “GPS Setup” label and press the right arrow key. Now highlight the “Set PCF Offset” label. Finally, press the right arrow key again. A screen similar to the one at right appears.



Now enter the correction for your location. Remember, this is the difference between the location shown on the present position display and the position shown on the chart. In this example, we entered 0 degrees, 0.047 minutes north latitude and 0 degrees, 0.244 minutes east longitude. That is the difference between the present position shown by the GlobalNav 310 and the one on our chart.



After you've entered the latitude/longitude correction, press the ENT key to accept it. The GlobalNav 310 erases the PCF entry screen and returns to the navigation or mapping screens with the correction factor applied.

POSITION PINING

When using a GPS receiver at extremely low speeds, it can have trouble determining your course over ground, or direction you're travelling. This is due in large part to SA, or selective availability. SA is small inaccuracies purposefully put into the GPS satellite's signal by the government. This cause wide variations in the track display and other navigation displays when using the unit at slow speeds.

If you're using the GlobalNav 310 without DGPS and stop, the position pinning feature locks the present position indicator on the plotter until you've moved a short distance or exceed a very slow speed. This prevents the "wandering" plot trail seen when you're stopped with position pinning turned off. This also affects the navigational displays.

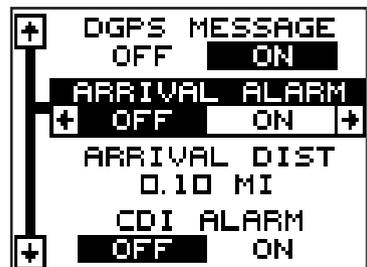
The easiest way to see the effects of S/A is to stand still with the GlobalNav 310 turned on and watch your plot trail with position pinning turned off. You'll see the present position change, speed increase and decrease, and a random plot trail on the plotter's screen.

To turn the position pinning feature off, press the MENU key, then highlight the "GPS Setup" label and press the right arrow key. Now highlight the "Pos Pining" label. Finally, press the left arrow key.

ALARMS

This unit has several alarms. You can set an arrival alarm to sound a warning tone when you cross a preset distance from a waypoint. For example, if you have the arrival alarm set to .1 mile, then the alarm will sound when you come within .1 mile of the recalled waypoint. The course deviation indicator alarm (CDI) can sound a warning when your track drifts too far to the right or left of the line to the waypoint. For example, if the alarm is set to .1 mile, then the alarm will sound if you drift .1 of a mile or more to the right or left of the line to the waypoint. The anchor alarm sounds a warning when you drift outside of a preset radius. Again, using the .1 mile as an example, if you're anchored and your boat moves more than .1 of a mile, the alarm will sound.

To use any of these alarms, first press



the MENU key, then select the “ALARMS/CDI” menu. A screen similar to the one shown at right appears. Press the up or down arrow key to move the black box to the desired alarm, then press the right arrow key to turn it on.

To adjust an alarm’s distance, move the black box to the alarm’s “DIST” menu item, then press the right or left arrow keys to increase or decrease the alarm’s distance.

When you’re finished adjusting the alarms, press the EXIT key to erase this menu.

Important Alarm Notes:

Anchor Alarm - Since civilian users don’t receive the accuracy given to military users, the anchor alarm may sound even when you’re sitting still. This typically happens when using small (less than .05 mile) anchor alarm ranges. If you have a DGPS beacon receiver connected to the GlobalNav 310, smaller ranges may be usable.

Arrival Alarm - If you set the arrival alarm’s distance to zero (0), and you run a route (see the routes section), the GlobalNav 310 may not show navigation data to the next waypoint, once you arrive at the first one. If you use the routes feature, never set the arrival alarm to zero.

MESSAGES

On the GPS Alarms menu are the position and DGPS message selections. When turned on, the position message appears for a few seconds whenever the GlobalNav 310 locks onto the satellites and shows a position. It also appears when the unit loses the lock onto the satellites and cannot navigate. Pressing the EXIT key erases these messages.

The DGPS message appears whenever the unit begins or stops using DGPS data to help determine your position.

The default setting for these messages is “on”. To turn either message off, select the “GPS Alarms” menu from the main menu, then move the black box to the desired message and press the left arrow key. Press the EXIT key to erase this screen.

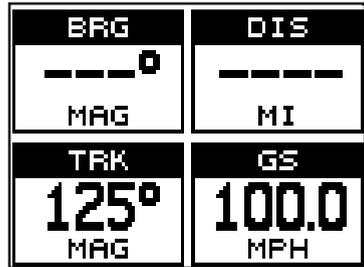
BACKLIGHT

The AirMap’s display and keyboard have lights that can be turned on for night use. To turn the lights on, simply press the PWR key. To turn them off, press the PWR key again.

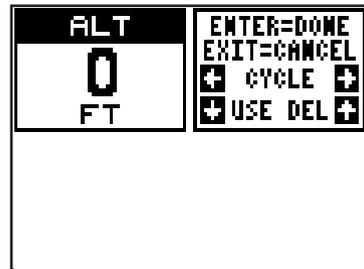
REPROGRAM WINDOW GROUPS

You can customize the window groups to meet your own needs. The GlobalNav 310 gives you 35 different windows that can be rearranged into many combinations.

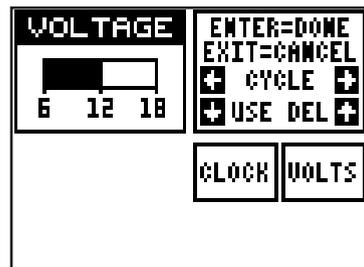
To reprogram a group, first go to the modes menu and select the group that you wish to change. In this example, we're reprogramming group "A".



Next, press the MENU key, highlight the "Reprogram Groups" label and press the right arrow key. A screen similar to the one shown at right appears.

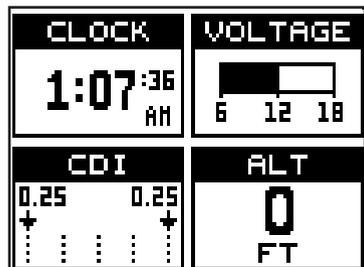


The altitude window appears in the upper left corner. To view a different window, press the left or right arrow key. When the desired window appears, press the down arrow key to select it. In this example, we selected the digital clock. The GlobalNav 310 will add this window to the selected group. It then shows the selected window's position, as shown at right.



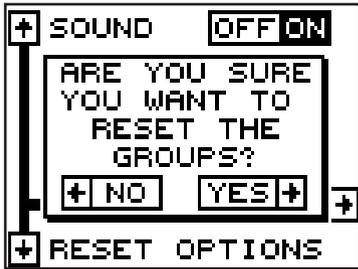
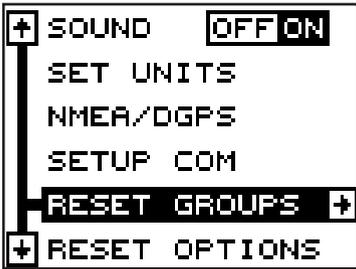
If you want to delete a window from a group, simply press the up arrow key.

Continue selecting windows in this manner until all of the desired windows have been added to the group. When the last window has been added, the GlobalNav 310 returns to normal operation with your reprogrammed group showing on the screen, as shown at right.



RESET GROUPS

To restore all windows groups to their factory settings, first press the MENU key, then highlight the “System Setup” label and press the right arrow key. Now highlight the “Reset Groups” label on this menu. Press the right arrow key. A message appears, asking if you really want to do this. Press the right arrow key to continue, or the left arrow key to exit without resetting the groups.



SIMULATOR

A simulator is built into the GlobalNav 310 that has several options. You can use nearly all of the unit's features - even save and recall waypoints. This is useful for trip planning.

To use the simulator, press the MENU key, then press the up or down arrow keys until the "Simulator Setup" menu is surrounded by the black box. Now press the right arrow key. The screen shown at right appears.

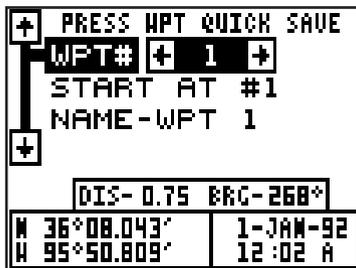


If you simply press the right arrow key, turning the simulator on, the GlobalNav 310 will start from your present position and follow a track of 355° at 100 miles per hour.

To change either the track or speed, highlight the one you want to change, then press the right or left arrow key. When the numbers are correct, press the EXIT key.

Starting Position

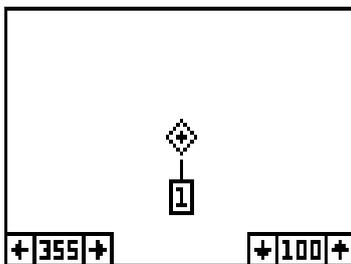
Normally, the starting position for the simulator is your present position. If you want to change the starting position, highlight the "Set Starting Waypoint" label on the Simulator Setup menu, then press the right arrow key. The screen shown at right appears.



You can select any waypoint as the simulator's starting point. Select the starting point by pressing the right arrow key on the "WPT#" label until the desired starting waypoint number appears. Now highlight the "Start At" label and press the right arrow key. The GlobalNav 310 returns to the Simulator Setup menu.

Use Arrow Keys to Steer

This option lets you change both the course and speed on the screen as the simulator is running. To do this, highlight the "User Arrows to Steer" label on the Simulator Setup screen, then press the right arrow key. The screen shown at right appears. Use the up and down arrow



keys to increase or decrease the speed. Use the right and left arrow keys to change the track. Press the EXIT key to erase these menus.

When you're finished changing the track and speed, press the EXIT key to erase the menus.

To turn the simulator off, press the MENU key, then move the black box to the "Simulator Setup" label. Finally, press the left arrow key.

Note: Your plot trail will be erased when you turn the simulator on or off.

DEFINITION OF TERMS/ABBREVIATIONS

Due to space considerations, the digital displays use abbreviations for some names. They are as follows:

- ALT Altitude - Your height above sea level.
- BRG Bearing - The direction from your present position to a waypoint.
- CLOCK Your local time.
- TRK Track - The direction you're travelling.
- DIS Distance - Distance remaining between your present position and a waypoint.
- DNT/UPT Countdown timer (DNT) and Count up timer (UPT)
- ETE Estimated Time En route
- FIX A measure of your receiver's position quality. A fix of 1 is bad, 9 is the best.
- ICON A symbol you can place on the map, representing a landmark.
- POSITION Your present position.
- GS Ground Speed - Your actual speed.
- TTG Time To Go - Time remaining at your present speed until you reach a waypoint.
- VOLTS Electrical system voltage.
- VMG Velocity Made Good - Your ground speed towards a recalled waypoint, airport, etc.
- XTK CrossTrack Error - Shows your distance to the **side** of the desired course line.

WINDOWS

The following is a listing of windows groups A through O.

BRG 353° MAG	DIS 46.52 MI
TRK 353° MAG	GS 20.0 MPH

GROUP "A"

BRG 353° MAG	DIS 46.47 MI
TRK 353° MAG	GS 20.0
	ETE 02:19
	CDI

GROUP "B"

BRG 353° MAG	DIS 46.43 MI
TRK 353° MAG	ETE 02:19 :17

GROUP "C"

BRG 353°	VMG 20.0 MPH
TRK 353°	
DIS 46.39	
ETE 02:19	CDI
GS 20.0	0.25 ↑ 0.25
CRS 353°	↑

GROUP "D"

VMG 20.0 MPH	DIS 46.35 MI
ETE 02:19 :02	CDI 0.25 ↑ 0.25

GROUP "E"

BRG 353° MAG	DIS 46.31 MI
TRK 353° MAG	VMG 20.0 MPH

GROUP "F"

POSITION	
N 36°28.142'	
W 95°52.943'	
BRG 353°	GS 20.0
TRK 353°	ETE 02:18
DIS 46.26	CDI

GROUP "G"

POSITION	
N 36°28.191'	
W 95°52.945'	
DIS 46.20	CDI
ETE 02:18	0.25 ↑ 0.25
CRS 353°	↑

GROUP "H"

BRG 353°	CLOCK
TRK 353°	1:33:07 AM
DIS 46.15	
GS 20.0	ETA
XTK 0.00	3:51:34 AM
CDI ··◆··	

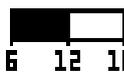
GROUP "I"

ETA	CLOCK
3:51:33 AM	TIME
	1:33:17 AM
ETE	ALARM OFF
02:18:17	12:00:00 AM

GROUP "J"

UP TIMER	ON TIMER
STOPPED	STOPPED
0:00:00	0:00:00
ALARM OFF	INITIAL
0:00:00	0:00:00

GROUP "K"

ALT	
0 FT	
UTC	VOLTAGE
1:33:38	

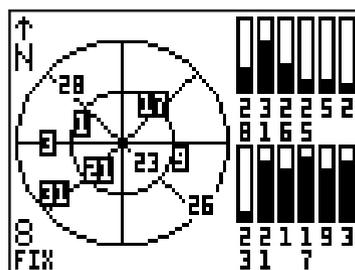
GROUP "L"

DGPS			INFO		
CHN	PRN	STAT	CHN	PRN	STAT
1	20	-	7	20	-
2	20	-	8	20	-
3	20	-	9	20	-
4	20	-	10	20	-
5	20	-	11	20	-
6	20	-	12	20	-

GROUP "M"

DGPS STATUS	
DGPS OFF	
ID	SIGNAL
---	---
FREQ	SNR
--- KHZ	--- DB
RATE	AGE
--- BPS	--- SEC

GROUP "N"



GROUP "O"

Lowrance's UPS Return Service - U.S.A. Only

Lowrance Electronics and United Parcel Service (UPS) are proud to offer all of our customers free shipping for all units sent to us for repair or service. If you have to send this unit to the factory, and you are in the continental United States, use the enclosed UPS shipping label for easy, free shipping to our factory customer service department. There are six easy steps:

1. Call Lowrance at the toll-free number on the back of this manual for a Return Authorization (RA) number and instructions about what accessories to return. **Do not return a product to the factory without a Return Authorization (RA) Number!**
2. Pack your unit and any accessories in the original shipping container, if possible. **Be sure to include proof of purchase for warranty verification!**
3. Write a brief note detailing the problem you're having with the unit. Please include your name, address, and daytime telephone number.
4. Please include payment for non-warranty repairs. Check, money order, Visa, or MasterCard may be used.
5. Fill in your name, address, zip code, date, and RA number in the blanks provided on the UPS form included with your unit.
6. Attach the label to the shipping box, tear off the tab for your receipt and give the package to any UPS driver or take the package to any UPS Customer Center. You will not be charged for this shipment.

That's it! Your unit will be shipped to Lowrance's customer service department at no charge to you. Units under warranty will be returned to you at no charge.

NOTE!

Lowrance will pay UPS surface shipping charges both to and from the factory for this unit in the event it needs repair. Your unit is insured against loss or shipping damage when you use the enclosed UPS label.

This UPS shipping offer is good only in the continental United States (excludes Alaska and Hawaii).

**KEEP THIS LABEL!
YOU WILL NEED IT IF YOU EVER NEED TO RETURN YOUR UNIT
TO THE FACTORY FOR REPAIR.**

Accessory Ordering Information

To order accessories such as power cables, please contact:

1) Your local marine dealer. Most quality dealers that handle marine electronic equipment should be able to assist you with these items. Consult your local telephone directory for listings.

2) LEI Extras, Inc. P.O. Box 129 Catoosa, OK 74015-0129
or call
800-324-0045
(USA orders only.)

Lowrance Electronics may find it necessary to change or end our shipping policies, regulations, and special offers at any time. We reserve the right to do so without notice.

LOWRANCE ELECTRONICS FULL ONE-YEAR WARRANTY

"We", "our", or "us" refers to LOWRANCE ELECTRONICS, INC., the manufacturer of this product. "You" or "your" refers to the first person who purchases this product as a consumer item for personal, family, or household use.

We warrant this product against defects or malfunctions in materials and workmanship, and against failure to conform to this product's written specifications, all for one year (1) from the date of original purchase by you. WE MAKE NO OTHER EXPRESS WARRANTY OR REPRESENTATION OF ANY KIND WHATSOEVER CONCERNING THIS PRODUCT. Your remedies under this warranty will be available so long as you can show in a reasonable manner that any defect or malfunction in materials or workmanship, or any non-conformity with the product's written specifications, occurred within one year from the date of your original purchase, which must be substantiated by a dated sales receipt or sales slip. Any such defect, malfunction, or non-conformity which occurs within one year from your original purchase date will either be repaired without charge or be replaced with a new product identical or reasonably equivalent to this product, at our option, within a reasonable time after our receipt of the product. If such defect, malfunction, or non-conformity remains after a reasonable number of attempts to repair by us, you may elect to obtain without charge a replacement of the product or a refund for the product. THIS REPAIR, REPLACEMENT, OR REFUND (AS JUST DESCRIBED) IS THE EXCLUSIVE REMEDY AVAILABLE TO YOU AGAINST US FOR ANY DEFECT, MALFUNCTION, OR NON-CONFORMITY CONCERNING THE PRODUCT OR FOR ANY LOSS OR DAMAGE RESULTING FROM ANY OTHER CAUSE WHATSOEVER. WE WILL NOT UNDER ANY CIRCUMSTANCES BE LIABLE TO ANYONE FOR ANY SPECIAL, CONSEQUENTIAL, INCIDENTAL, OR OTHER INDIRECT DAMAGE OF ANY KIND.

Some states do not allow the exclusion or limitation of incidental or consequential damages, so the above limitations or exclusions may not apply to you.

This warranty does NOT apply in the following circumstances: (1) when the product has been serviced or repaired by anyone other than us, (2) when the product has been connected, installed, combined, altered, adjusted, or handled in a manner other than according to the instructions furnished with the product, (3) when any serial number has been effaced, altered, or removed, or (4) when any defect, problem, loss, or damage has resulted from any accident, misuse, negligence, or carelessness, or from any failure to provide reasonable and necessary maintenance in accordance with the instructions of the owner's manual for the product.

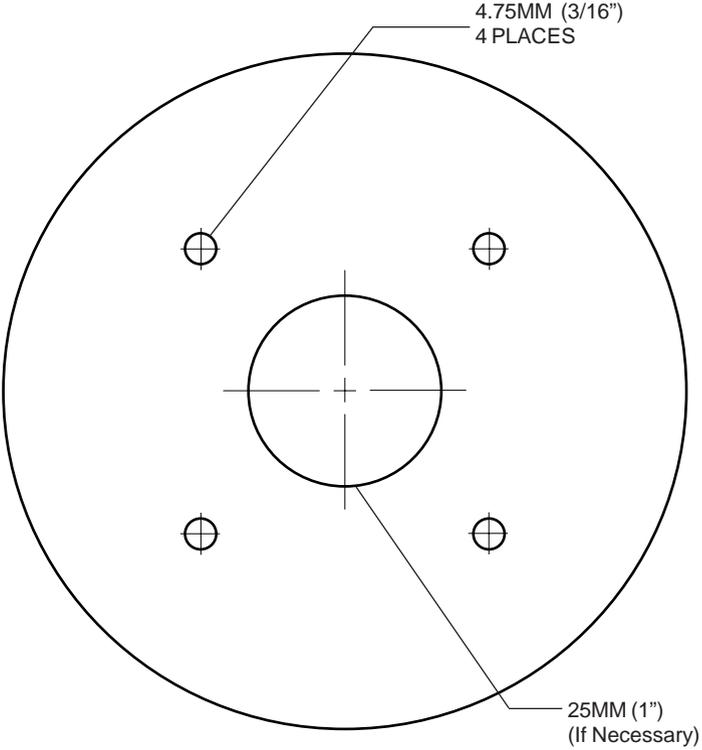
We reserve the right to make changes or improvements in our products from time to time without incurring the obligation to install such improvements or changes on equipment or items previously manufactured.

This warranty gives you specific legal rights and you may also have other rights which may vary from state to state.

REMINDER: You must retain the sales slip or sales receipt proving the date of your original purchase in case warranty service is ever required.

LOWRANCE ELECTRONICS
PO BOX 669 CATOOSA, OK 74015
(800) 324-1354

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ANTENNA MODULE TEMPLATE

How to Obtain Service (Canadian Customers Only)

We back your investment in quality products with quick, expert service and genuine Lowrance replacement parts. If you need service or repairs, contact the Lowrance Factory Customer Service Department at the toll-free number listed below. A technician may be able to solve the problem and save you the inconvenience of returning your unit. You will be asked for your unit's serial number.

800-324-1354

Canada Only. Monday through Friday 8:00 A.M. - 8:00 P.M. Central Time.

When sending a product for repair, please do the following:

1. Always use the original shipping container and filler material the product was packed in when shipping your product.
2. Always insure the parcel against damage or loss during shipment. Lowrance does not assume responsibility for goods lost or damaged in transit.
3. For proper testing, repair, and service, send a brief note with the product describing the problem. Be sure to include your name, return shipping address, and a daytime telephone number.

How to Obtain Service (International Customers Only - Except Canada)

If you need service or repairs, contact the dealer in the country you purchased your unit.

**WARRANTY REPAIR WILL BE HONORED ONLY IN THE
COUNTRY UNIT WAS PURCHASED.**

Please follow the shipping instructions shown below on this page if you have to mail your unit to the dealer. For proper testing, repair, and service, send a brief note with the product describing the problem. Be sure to include your name, return shipping address, and a daytime telephone number.

Accessory Ordering Information - All Countries

To order accessories such as power cables or transducers, please contact:

1. Your local dealer. Most quality dealers that handle GPS navigation equipment should be able to assist you with these items. Consult your local telephone directory for listings.
2. Canadian customers only can write:
Lowrance/Lowrance Canada, 919 Matheson Blvd., E. Mississauga, Ontario
L4W2R7
or fax 416-629-3118

How to Obtain Service - U.S.A. Only

We back your investment in quality products with quick, expert service and genuine Lowrance® replacement parts. If you're in the United States and you have questions, please contact the Factory Customer Service Department using our toll-free number listed below. You must send the unit to the factory for warranty service or repair. Please call the factory before sending the unit. You will be asked for your unit's serial number. Use the following toll-free number:

800-324-1354

U.S.A. only. Monday through Friday 8:00 A.M. - 8:00 P.M. Central time, except holidays.

Your unit is covered by a full one-year warranty. (See page 56 inside this manual for complete warranty details.) If your unit fails and the failure is not covered by the original warranty, Lowrance has a flat-rate repair policy that covers your unit and accessories packed with the unit at the factory. There is a 180-day warranty on all non-warranty repairs from the factory, which is similar to the original warranty, but is for 180 days rather than one year. For further details, please call us at the above number.

Lowrance also gives you free UPS shipping from anywhere in the continental United States both to and from the factory for all warranty repairs. You can also use the enclosed UPS shipping label for non-warranty shipments. See page 54 for more information. Remember, non-warranty repairs are subject to Lowrance's published flat-rate charges and 180-day warranty.

