

Northstar *6000i*

Quickstart Guide and Reference Manual

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This chapter introduces this manual and explains a few things you should know to keep your Northstar *6000i* in top operating condition.

Welcome to the Northstar 6000i

The 6000i has several requirements that must be met to ensure safe and proper operation. Installation and interfacing of the 6000i should be handled by a marine technician using the guidelines found in the Northstar 6000i Installation Manual.

Congratulations on your purchase of the Northstar 6000i Integrated Navigation System! The 6000i is a full-featured color GPS/vector charting system – easy to use, but meeting your marine navigation needs in a comprehensive, logical manner. Optional Northstar radar and fish finding modules round out the 6000i's capabilities.

The 6000i enhances GPS with the Wide Area Augmentation System (WAAS) or optional radiobeacon differential position navigation for superb accuracy, and offers a high-resolution full-color screen with Navionics cartography and video overlay.

Major functions are accessed with a single keypress. By reducing the attention required to navigate, you can devote more time to simply enjoying your trip.

For information on installing, interfacing, and troubleshooting the 6000i, please see the *Northstar 6000i Installation Manual* (part number GM6KIM) or contact your local authorized Northstar dealer.

Using this manual

This manual is divided into two main sections:

- The **Quickstart Guide** begins on page 7 and has all the basic information you need to operate the 6000i. Be sure to read this section as you start using the unit.
- A **Reference Section** starts on page 23. Use this when you need more information about any of the unit's functions – you'll find answers here to


any questions about getting the most from your 6000i.

Check the mini table of contents at the beginning of each chapter to quickly locate a topic you need help with.

It's best to read this manual with the 6000i set up and running so you can try out the various functions and see the results.

Conventions

This manual uses certain conventions to provide a consistent means of recognizing specific information, as follows:

-  is the universal caution symbol for caution and warning information related to your personal safety or possible damage to the system. The **CAUTION** and **WARNING** notes contain critical information—please read them!
- The phrase “Press a key” means push briefly and release, unless otherwise specified.
- Text written like “**CHART**” generally refers to named keys on the *6000i*'s front panel. Text written like “**More info**” generally refers to the *6000i*'s menu keys at the right side of the screen.
- Whenever this manual tells you to press **ENTER** to perform a function, you can press **CLEAR** instead if you decide not to perform that function. These keys are abbreviated **ENT** and **CLR** on the *6000i*.

Networking the *6000i*

Northstar's N2 networking technology lets you connect two or more *6000i* units in order to share navigation data (including radar and sounder data) and all waypoints and routes between the units. The system can be operated from any connected unit, and all changes to routes and waypoints are reflected on all the networked units. Networking is fully automatic on the *6000i*; no special steps are necessary.

In an N2 network, one display unit is designated as the master, and all others as slaves. The only restrictions on N2 networking are the following:

- there must be one and only one master unit operating in a network
- all units must have the same software version.

If, for example, a slave unit is turned on before the master, a message is displayed reminding you to turn on the master unit before using the slave. In case the master unit is not available (removed for service, for example), brief instructions show how to temporarily convert a slave into a master unit.

For details on networking, see *N2 Networking*, starting on page 149.

Interfacing the 6000i

The 6000i can be connected to a wide variety of compatible marine devices, including Northstar's echo sounder and radar. A qualified marine electronics tech-

nician should perform these installations. For details, contact your local authorized Northstar dealer.

Maintaining the 6000i

Basic maintenance

To help retain the 6000i's best possible performance, Northstar recommends the following:

- be sure to keep the cartridge access door closed at all times, except when you're changing the chart cartridge, to prevent moisture and dirt from entering the 6000i
- don't change the cartridge while the 6000i is exposed to water spray, rain, or moisture of any kind
- keep spare cartridges in a safe, watertight place where they won't be misplaced
- keep fingerprints off the display screen (remove any prints with a lens cleaning cloth)
- remove dirt and grime using a soft cloth and Windex or soap and water

- don't scratch the display by wiping a sandy or salty cloth across it
- use the 6000i's protective plastic sunshield when not in use (excessive heat from the sun can cause damage)
- don't open the 6000i's case—there aren't any user-serviceable parts inside
- always keep the rear connectors' plastic caps on when they are not in use (the connectors are not waterproof unless covered)

Cleaning the display screen

Be careful when cleaning the glass window covering the display screen. Although the window is scratch-resistant, you may damage the anti-reflective coating if you use a dry cloth to wipe dirt off. Always use a damp cloth with plenty of water to remove salt or dirt. To remove any oil or

Pre-packaged moist towelettes (especially those containing a small amount of alcohol) are excellent for cleaning the 6000i's display window. You might want to keep a supply on hand to wipe off fingerprints and other smudges.

grease on the screen, use a clean, dry microfiber-type lens cleaning cloth or a small amount of window cleaner.

Avoid touching the window with your fingers. The natural oils from your hand

will temporarily affect the characteristics of the screen and cause your fingerprints to appear as bright reflections. Fingerprints will disappear when you clean the screen as described in the previous paragraph.

Technical support

Northstar products are manufactured and serviced by BNT Marine Electronics.

If you need technical support, or have any other questions after you've followed the instructions in this manual, you can contact the factory as follows:

by Telephone:

978/897-6600 or 800/628-4487

by E-mail:

Service: service@NorthstarNav.com

Sales: sales@NorthstarNav.com

by Fax:

Service: 978/897-1595

Sales: 978/897-7241

by U.S. mail:

Northstar
30 Sudbury Road
Acton, MA 01720 USA

Additional information is available at Northstar's website:

www.NorthstarNav.com

Hearing from you

Your feedback is important and helps ensure that this manual is a valuable resource for all *6000i* users. Send your questions, comments, or suggestions about this manual to:

manuals@NorthstarNav.com

Service and repair

In case of a *6000i* operating problem, you can contact your dealer or return the *6000i* to the factory for diagnosis and repair. When calling, be sure to have your *6000i*'s serial number and software revision available. In describing a problem, be as

complete and accurate as possible. Before returning the *6000i* for repair, you may want to save your waypoints and routes. If the unit is properly networked to another *6000i* display, a copy of your waypoints and routes is already saved in the other unit. You can also transfer data to a Northstar 900 series navigator or to a PC as described on pages 80 and 83.

NOTE:

To prevent delays, it's critical that you first obtain a Return Materials Authorization (RMA) number from our Service Department before returning your 6000i.

Shipments to Northstar should be made to the following address:

**Northstar Service Department
30 Sudbury Road
Acton, MA 01720**

If you have special overnight or second-day shipping requirements, please call for turnaround time and freight costs before you ship your *6000i*.

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This section gives an overview of each of the *6000i*'s major functions and the basic information you need to begin using them.

We suggest you read this section carefully as you first use the *6000i*, and then refer to the following Reference Sections, as necessary, to answer any questions you may have.

Turning the 6000i on and off

CAUTION!



Use caution when navigating with electronic charts. Although every effort has been made to ensure that the data the 6000i uses is as close as possible to paper charts, errors and omissions are inevitable. The captain is responsible for cross-checking the 6000i against other sources of navigation data.

Turning the 6000i on

To turn the 6000i on, gently and briefly press the **PWR** key. (See Figure 1 on page 10 for a picture of the controls.)

The 6000i beeps and displays its start-up screen, and then performs a series of self-tests to check its critical components and functions.

Next, a message warns against relying on the 6000i's chart cartography as the only means of safe navigation. Acknowledge the warning message by pressing the **CHART** key.

Now you're ready to get underway with your 6000i!

If this 6000i was recently used at or near its present location, it will usually be ready to navigate within one minute after it is turned on.

Turning the 6000i off

To turn the 6000i off, press and hold the **PWR** key for a few seconds until the screen goes dark.

Introducing the display screen

Adjusting the brightness

To adjust the screen's brightness, briefly press the **PWR** key. Then press the cursor pad upward to brighten the screen, or downward to darken it.

After reaching maximum brightness, you can release and press the cursor pad again to increase the contrast, making the screen even more readable under full sunlight conditions.

If the 6000i becomes too hot due to high ambient temperature and strong sunlight, the display screen may automatically dim to prevent overheating. You can temporarily override the auto-dim function at any time just by increasing the brightness. The 6000i may dim again to avoid exceeding the maximum internal temperature.

Special display windows

Occasionally, the *6000i* needs to tell you something or ask permission to do something. When this happens, an information or question window appears on the screen. This window may contain an alarm icon, or an *INFO* icon or a large question mark along with a message for you to read.

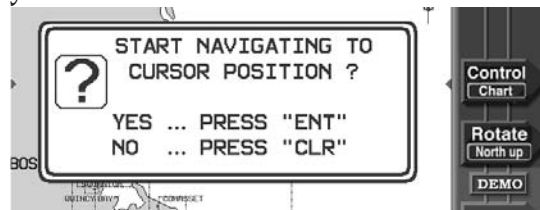
Question windows



A question window appears when the *6000i* needs a response from you. Respond to a question window by pressing the **ENTER** key to answer yes, or the **CLEAR** key to answer no. Most of the other keys, including the function keys, are temporarily inactive while the *6000i* displays a question window.

Introducing the controls

Feel free to try any of the *6000i*'s controls! You can't hurt anything, and you'll only learn more about how to use the *6000i* more efficiently. The *6000i* always asks you to verify what you're doing before it changes or deletes information. You'll be asked to confirm your action *before* anything happens that may affect the *6000i*'s operation. You can always press **CLEAR** to cancel a function if you change your mind.



Using **ENTER** and **CLEAR**

Function keys

Figure 1 on page 10 illustrates the locations of the *6000i*'s controls.

The six keys below the screen access the unit's major functions. These are **CHART**, **POSITION**, and **STEER**, and the optional functions **RADAR**, **SOUNDER** and **VIDEO**. Press one at any time to instantly display that function on the full screen, then use the menu keys at the right edge of the screen to control the function.

The **WAYPTS/ROUTES** key accesses the *6000i*'s database of stored position information.

The **STAR** key accesses the alarm screen and miscellaneous functions including TideTrack and setup commands.

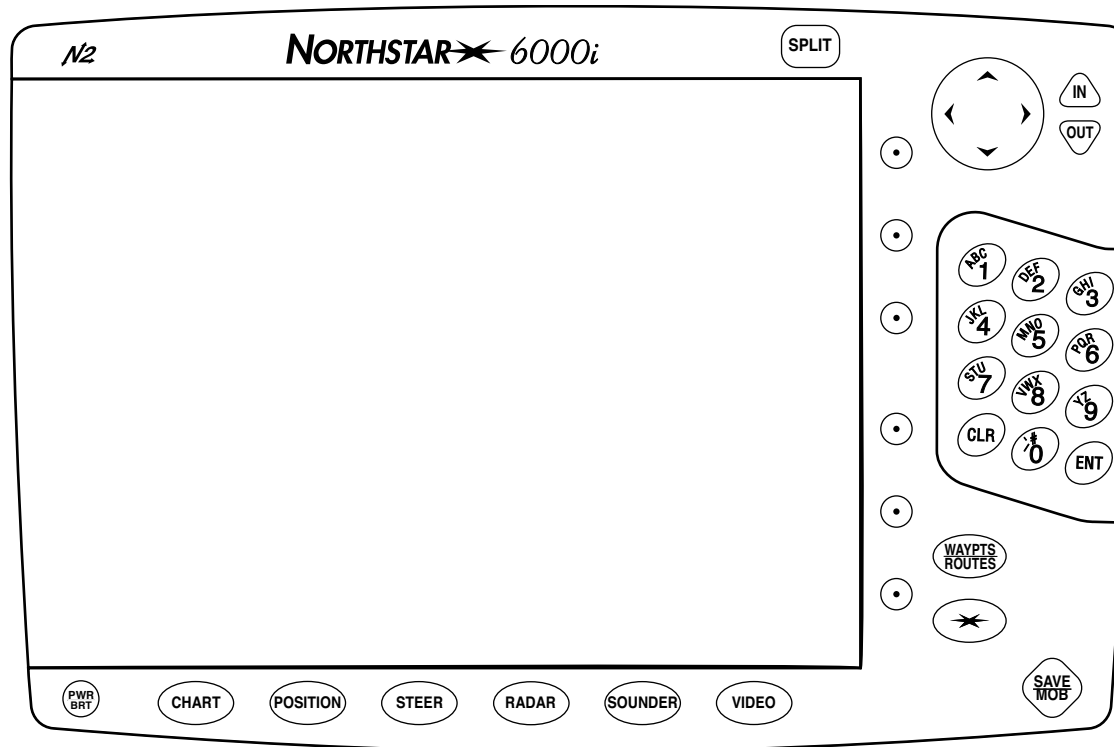


Figure 1: 6000i controls

Split screen feature

If you have the radar, echo sounder or video options installed, press the **SPLIT** key to split the screen into two or more sections, each with a different function

displayed. See page 20 for more information.

Menu keys

The six round keys at the right of the screen take on different functions, depending on the screen displayed. Each active key is labeled on the screen.

You can press **CLEAR** to hide the labels and display more data on the *CHART*, *STEER*,

SPLIT, and *SOUNDER* screens. To show the labels again, press any menu key. On the *CHART* screen, you can also hide the info bar (see *Displaying numeric data on the chart screen*, on page 17) by pressing **CLEAR** a second time, while the menu keys are hidden.

Navionics chart cartridges

The *6000i* contains a built-in, low-resolution map that covers the entire world, but without much detail. This map can give you an approximate idea of your location with respect to land areas, but nav aids are not included.

For more detailed charting data, you can to purchase one or more Navionics chart cartridges:

- *Classic cartridges* include several charts covering a specific geographic region
- *Gold chart cartridges* add nearly all of the additional data from printed charts, including shaded areas indicating depths

Cartridges with the XL3 designation contain charts for more than one region. Only one region can be used at a time. The user selects the desired region as described in *Navionics XL3 charts*, on page 25.

Navionics is a major producer of high-quality, high-resolution “seamless” digital charts. Virtually every major port and most popular boating areas are available on these cartridges, and new charts are constantly being added. To obtain Navionics charts, contact your authorized Northstar dealer.

It's important to realize that you can use *either* Classic *or* Gold charts at any given time. To switch cartridge types, turn the unit off, change the cartridge, and turn it back on. If you have two or more *6000is* networked, it's the master's cartridge that configures the network for Classic or Gold. You cannot use different cartridge types simultaneously.

Inserting a chart cartridge

The cartridge slot is located behind the 6000i's keypad, which opens as shown in Figure 2. The latch is at the left edge of the door. Push it to the right to open the door.

The cartridge only fits correctly one way. If it doesn't slide in smoothly, try the other way. Insert the cartridge gently but firmly with one straight, smooth motion. A cartridge can be safely inserted or removed while the 6000i is turned on.

Be sure to close the door securely to avoid water penetration!

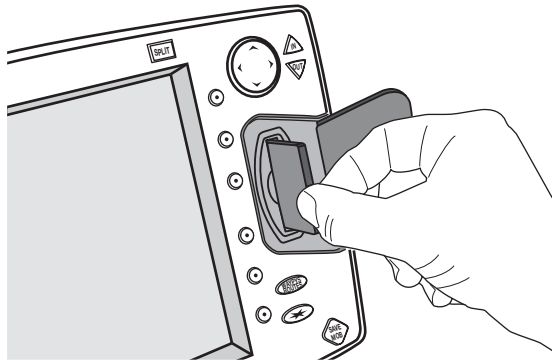


Figure 2: Inserting the chart cartridge

Showing the cartridge name and date

Press the **CHART** key, and then the **Chart setup** menu key at the right of the **CHART** screen. The cartridge name and date are

shown at the left of the **CHART STATUS** screen. The cartridge name displayed on the left of the screen is its Navionics catalog number.

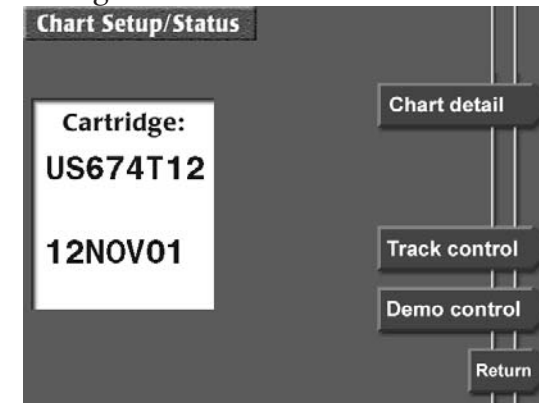


Chart Setup/status screen

Some older cartridges may not have this information; in this case, the word *PRESENT* is shown in place of the name and date. If no chart cartridge is installed, the words *NONE INSERTED* are shown.

It usually takes 15 seconds or so to load chart data after the 6000i is turned on or after a new cartridge is inserted.

Accessing the regions contained in Navionics XL3 series cartridges is described on page 25.

Using the additional data on Gold charts is described in *Setting up the chart screen (Gold Charts)*, starting on page 33.

Displaying the chart screen

After the *6000i* completes its start-up sequence, press the **CHART** function key to acknowledge the warning message and display the *CHART* screen.

You'll soon see your present position represented by a black triangular vessel symbol in the center of the chart. If you're not receiving GPS signals, you can use Demo Mode, as described on page 16.

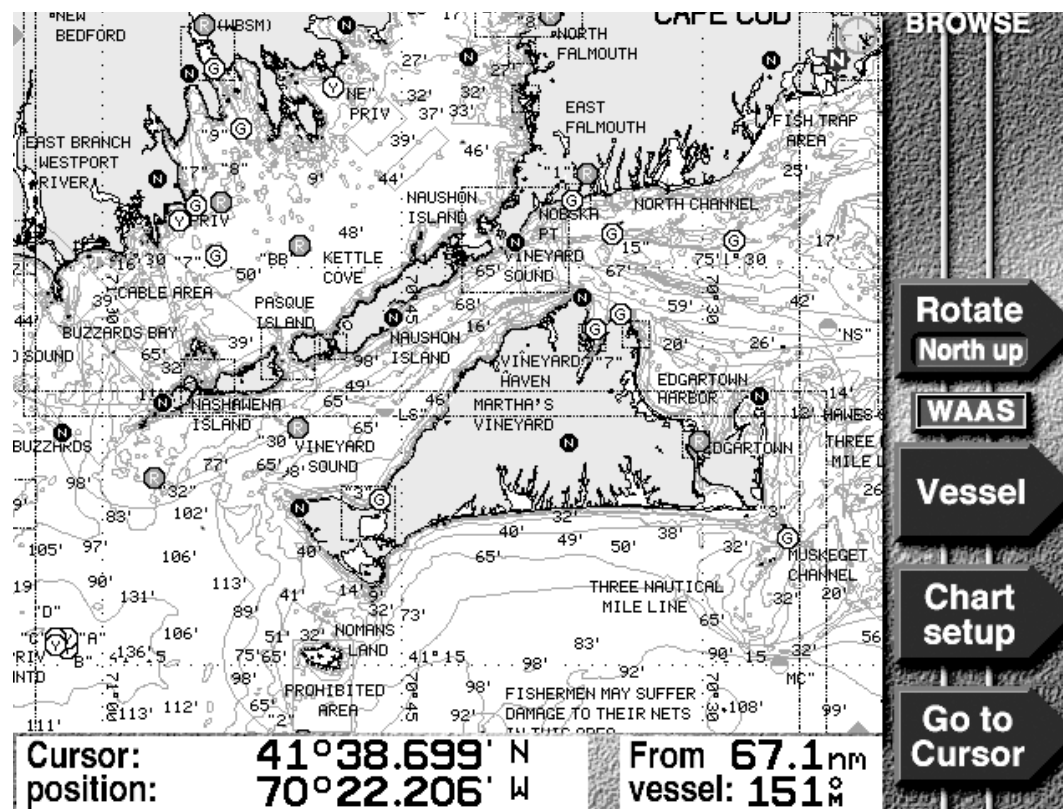


Chart screen (classic chart shown)

By the way,

If you're not receiving GPS signals, you can use Demo Mode to simulate real-life conditions, including motion. See *Using demo mode*, on page 16.



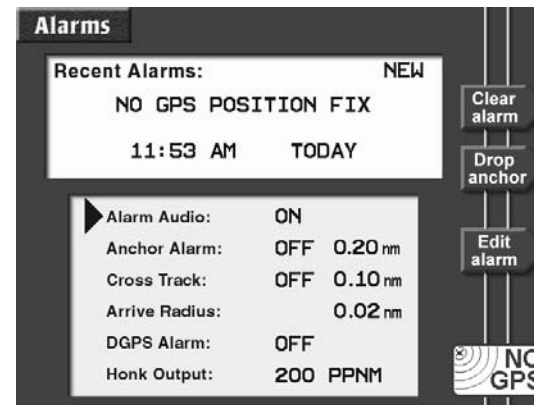
The 6000i's CHART screen displays your vessel's present position (or any position you designate with the cursor pad) in relation to land masses, nav aids, and any waypoints and routes you have entered. As you navigate, your vessel remains in the center of the CHART screen, and the chart moves underneath your vessel.

Clearing a GPS or WAAS alarm

If the 6000i isn't able to obtain a position from GPS within three minutes, you'll see a flashing **NO GPS** alarm icon on the right side of the screen. This means the 6000i has an alarm message that needs your acknowledgement: Press the **STAR** function key to display the *Alarms* screen.

The alarm message NO GPS POSITION FIX is shown in the Recent Alarms box. This message advises you that the 6000i is in the process of acquiring satellite information necessary for displaying a position fix.

The word **NEW** in the upper right corner of the screen tells you this message hasn't yet been acknowledged. To acknowledge this or any message alarm, press the **Clear alarm** menu key. As soon as the 6000i acquires its signals, you'll be ready to go.



Alarms screen

For details about alarms, see *Alarms*, starting on page 138.

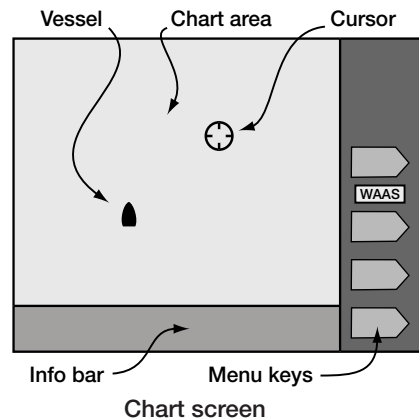
Using the chart

Your vessel is normally shown in the center of the chart screen. If your vessel is moving, the symbol will point in the direction of your Course Over Ground (COG). (If your vessel isn't moving, the 6000i can't determine your COG, so the direction of the vessel symbol won't mean anything.)

White areas represent water and brown areas are land. Avoidance areas and a lat/lon grid may be displayed. If you're using a chart cartridge, nav aids and depth contours are shown as well as landmark names.

To zoom in and see more details about your position, press the **IN** key. To zoom out (more area and less detail), press **OUT**.

Use the cursor pad to display the red cursor and designate waypoints or move the chart to a different area. Press **Vessel** to recenter the chart on your vessel.



The *WAAS* (or *DGPS*) indicator on the right side of the screen means the *6000i* is currently receiving *WAAS* (or optional radiobeacon) signals.

Chart plotter functions

The menu keys at the right of the chart screen perform the following navigation functions (not all keys are shown all the time):

- display any available overlays, such as radar
- rotate the chart to north-up, course-up, leg-up or heading-up (heading-up requires an optional heading sensor)
- restart the desired track line to run directly from your position to the waypoint, “zeroing” the cross-track error display
- return from “Browse” mode (cursor on-screen) to “Vessel” mode (vessel centered)
- change the options available for the chart screen
- display additional position information in the *INFO BAR* at the bottom of the screen
- go to a waypoint, nav aid, or unmarked point you select on the chart screen by pressing the cursor pad

Displaying other information

On the *CHART* screen, you can display your current route, track history, waypoints and avoidance points, a lat/lon grid, a radar overlay, or other chart details. For Classic charts, see *Setting up the chart screen (Classic charts)*, on page 31. For Gold charts, see *Setting up the chart screen (Gold Charts)*, on page 33.

Alarms

The Northstar 6000i alerts you to conditions that may require attention. Some alerts are strictly informative, such as nearing a waypoint, and some warn of conditions such as loss of navigation signals. The unit alerts you with a beeping sound and a flashing symbol in the lower

right corner of the screen. Many alarms automatically clear themselves after a few seconds. Others remain flashing until you press a key on the *ALARM* screen or until the condition clears. See *Alarms*, starting on page 138 for a listing of all alarms and the meaning of each.

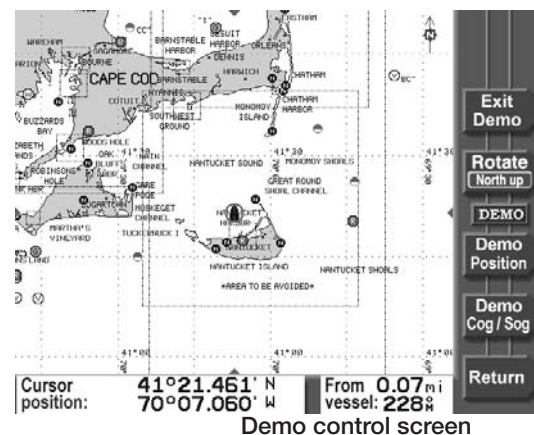
Using demo mode

Simulated radar and echo-sounding signals can also be displayed when in demo mode.

You can use demo mode to simulate a stationary position, or simulate navigating to a location you select on the *CHART* screen. Demo mode is useful for training, and could be used for dead reckoning in the event that GPS signals should ever fail.

To access the demo control screen, display the *CHART* screen and press **Chart setup**, then press **Demo control**.

To place your vessel at a simulated position and enter demo mode, press the cursor pad to move the cursor to the desired position on the chart. Zoom out if you need to see more area. Press **Demo Position** and **ENTER**. Your vessel symbol will now be stationary at this position.



To simulate motion from this point to another location, press the cursor pad to move the cursor to the destination, then press the **Demo COG/SOG** key. To change the vessel's speed from the standard 12

knots, use the keypad to enter the new speed. Finally, press **ENTER** to start moving to the demo cursor location.

To view the *CHART* screen while in demo mode, press **Return** twice.

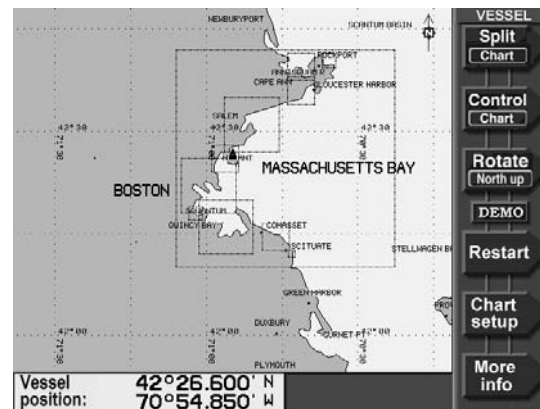
The word Demo always appears on the right side of the CHART screen when you're in demo mode.

To leave demo mode, go back to the *DEMO CONTROL* screen as described above, and press **Exit Demo**.

This key returns you directly to the active CHART screen.

Displaying numeric data on the chart screen

To display numeric information directly on the chart screen, press the **More Info** menu key to display an “info bar” at the bottom of the screen. (If the **More Info** key is not visible, press **Vessel** to restore it.)



Vessel lat/lon displayed on chart screen

Each additional press of the **More Info** key shows the following information:

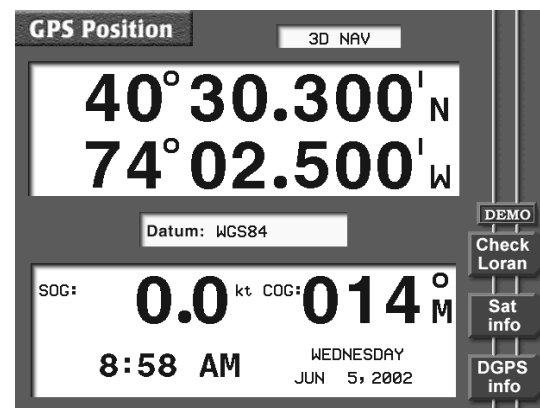
- your vessel's present Speed-Over-Ground (SOG), Course-Over-Ground (COG), and (optionally) heading (HDG)
- your vessel's distance (*Dist*) and bearing (*Brg*) to the current waypoint, if any, along with a cross-track indicator
- your vessel's position in lat/lon (or TDs, if you've enabled loran)
- the Speed-Through-Water (STW), water depth and temperature, as measured by the optional echo sounder

Displaying numeric data on the position screen

To display your position, speed, course, and time with large, easily read digits, press **POSITION**. The *GPS POSITION* screen shows the following information:

- your vessel's position in lat/lon (or TDs, if enabled)
- your vessel's present SOG and COG
- current time, day, and date
- geodetic datum (for details, see *Choosing a geodetic datum*, starting on page 158)

For details about using this screen, see *Position coordinates*, starting on page 43.



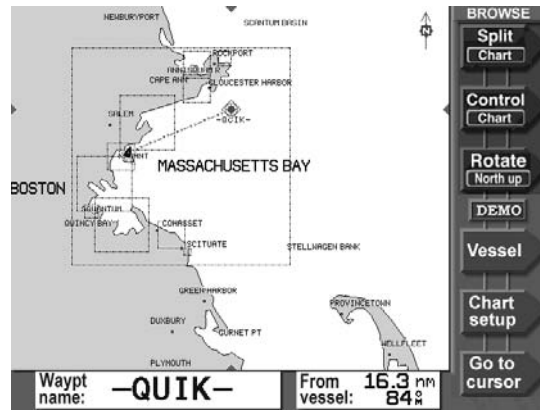
GPS position screen

Going immediately to a quick waypoint

The Northstar 6000i can guide you directly to any point on the *CHART* screen that you designate. "Point-and-shoot" navigation, as it is called, is often the easiest way to go to a waypoint or a series of waypoints: Just select the points right on the chart and go to them, one after another. This technique provides the most flexibility in deciding where you want to travel. Simply move the cursor wherever you want, press a key, and you're navigating.

1. Press the **CHART** key to display the *CHART* screen.
2. Press the cursor pad to move the cursor to the desired spot on the chart.
3. Press **Go to cursor**.
4. Press **ENTER**.

The 6000i displays a track line to the new waypoint named -QUIK-, and guides you directly to this point.



Navigating

Watch your progress on the chart screen, or press **STEER** to stay accurately on the straight-line course to the waypoint (see *Steering to a waypoint*, starting on page 54).

That's all you have to do to use the *6000i* in its simplest form. To learn more about navigating to waypoints, See *Navigating to Waypoints*, starting on page 51.

Radar

Using the optional Northstar radar you can determine where other boats or ships, navigational markers, land masses, flocks of birds, and other objects are located in relation to your vessel, and you can track their movements.

The radar won't be operational until you turn on the radar transmitter. See *Displaying radar*, starting on page 87.

If a Northstar radar unit is interfaced to the *6000i*, press **RADAR** to see the radar image.

If a radar unit is not operating or not connected, you can simulate radar signals

for your area by using Demo Mode as described on page 16.

Press **Adjust Radar** to make operating adjustments to the radar system as described in *Using the radar adjustment keys*, starting on page 94.

Press **Radar Markers** to set the radar's Electronic Bearing Lines, Range Rings, etc. as described in *Using the Radar Markers keys*, starting on page 98.

On the *CHART* screen, you can press **Radar overlay** to superimpose the radar image on

the chart screen. More information on radar starts on page 85.

For information on installing radar and making it operational, see the *Northstar*

Radar Installation Manual (part number GMRadIM). For the 2 kW Northstar radar, see P/N GMKRad2KIM.

The echo sounder

If your *6000i* is equipped with Northstar's optional echo sounder, press **SOUNDER** to display the full *ECHO SOUNDER* screen.

For the simplest operation, press **Automatic**, and select the desired transducer frequency and zoom modes. More information about sounder setup and operation starts on page 104.

Split function

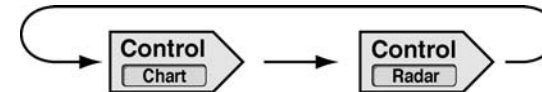
The SPLIT key

You can *split* the screen to display several navigation functions on the screen at the same time. For example, you could display the chart, sounder and radar images simultaneously.

Press the **SPLIT** key to split the screen into two or more sections, each with a different function displayed. Press **SPLIT** a second time to display several combinations of functions to choose from. Press the menu key to select the split you want to use.

The Control key

When the screen is split to show more than one function, you can press **Control** to select which of the displayed functions is controlled by the menu keys.



The **Control** key is also available when the radar overlay is in use.

The STAR key: alarms, TideTrack and setup

Using the alarms

The *6000i* has several alarms that automatically alert you to certain situations. For example, the *6000i* lets you know when you're approaching a waypoint by sounding a beep and flashing an alarm icon on the screen. The icon explains the reason for the alarm. Most of the common alarms automatically cancel themselves after ten seconds or after the condition ends. For details, see *Alarms*, starting on page 138.

Using TideTrack™

Press the **STAR** key twice to display the *6000i's* *Tide Track* screen, a 24-hour tide

graph for any of over 3,000 NOAA tide stations covering the entire U.S. coastline, including Alaska and Hawaii, plus much of the eastern and western Canadian coastline. You can display tides for today or any other date. For details about TideTrack, see *TideTrack™*, starting on page 146.

Setup functions

Additional presses of the **STAR** key access the *6000i's* various setup and customization functions. These functions are described beginning on page 156.

SAVE and Man Overboard (MOB)

Pressing **SAVE/MOB** always saves your present position as a waypoint.

Saving waypoints

Press **SAVE** briefly to save a waypoint. The new waypoint is given a name such as **-S002-**, where the letter **S** indicates a saved

waypoint, and the three-digit number increases by one every time you save a waypoint.

You can limit the number of saved waypoints that will be stored. Use the *MAX SAVED WAYPT #* function in the *DISPLAY OPTIONS* menu (see *The number of saved waypoints*, on page 155).

When the three-digit number reaches the specified maximum, it wraps back to **001** and overwrites the older waypoint that has the same number.

Any saved waypoints that you want to keep or use in a route should be renamed before they are overwritten (see *Editing waypoints*, starting on page 70).

Saving routes

You can set the *6000i* to automatically save a sequence of waypoints as a route. Each time you press **SAVE**, your position will be recorded as an additional waypoint in the route. See *Saving a route as you travel*, starting on page 74 for details.

Man Overboard

Press and hold the **SAVE/MOB** for at least four seconds (until you see the “Man Overboard” window) to save your position as a waypoint named **-MOB-** and immediately start navigating to it. The *6000i* switches to a zoomed-in chart screen showing your vessel and the MOB waypoint. You can use any of the unit’s functions to return to the location of the waypoint.

Press any key to go back to normal operation.

1

Reference section 1
Using the Chart Screen

- Using electronic charts 24
- Zooming in and out 25
- Using the cursor on the chart screen 27
- Comparing vessel and browse modes 28
- Rotating the chart 29
- Setting up the chart screen (Classic charts) 31
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- Using Gold charts 36
- Changing the track control 39
- Using the course predictor line 40
- Using the distance and bearing calculator 40

This section explains the electronic chart, the two chart modes (Vessel and Browse), the various chart symbols and their meanings, and how to set up both Classic Charts and Gold Charts to display the data you need.

Using electronic charts

Please be
careful!

Don't become over-confident when using electronic charts. Always be cautious!

Each Navionics chart cartridge contains electronic chart data from several paper charts. *Classic charts* have basic information from the original paper charts, although spot depth soundings, some nav aids, and other data may be missing. *Gold charts* provide much additional data such as obstructions, traffic areas and shaded depth areas. When used with appropriate caution, electronic charts open up a world of navigational accuracy and simplicity.

Chart boundaries

The *6000i* displays the boundary line of each chart on the *CHART* screen. You can turn these lines off if you prefer (see *Choosing the chart details*, starting on page 32).

If you move from a highly detailed chart to a less detailed one, you may see a sudden change in the detail shown on the screen, just as if you had changed from one detailed paper chart to a less detailed one. The displayed boundary lines may help indicate when this change in detail is going to happen.

Nav aids

The nav aids on the *CHART* screen represent a variety of standard “aids to

navigation” used on coastal and inland waterways throughout the United States. Nav aids are displayed on the *CHART* screen as colored circles. Most of these aids are buoys, lights, lighthouses, and daybeacons, which typically are maintained by the U.S. Coast Guard. Nav aids warn you of hidden dangers, such as underwater hazards, and to help you safely navigate specific waterways and channels.

When you move the cursor onto a nav aid, the *6000i* displays a description in the *info bar* at the bottom of the screen, along with the distance and bearing from your vessel to the nav aid.

Buoys

Buoys are the most common type of nav aid found along the coast and on your charts. The *6000i* shows green and red channel marker buoys as green and red circles, respectively.

Approach buoys are shown as circles with black on the upper half and white on the lower half.

Sound buoys (featuring an audible signal, such as a bell, gong, or whistle) are identified by a description in the *info bar*.

CAUTION!



Nav aids have been converted from official paper charts into the electronic format on your screen, and therefore aren't necessarily as accurate as the paper charts. In some areas, only the most important nav aids may be shown.

Navionics XL3 charts

Navionics XL3 series chart cartridges contain several chart *regions* in each cartridge. When you're using these cartridges, select the region you wish to use by displaying the *CHART* screen and pressing the **CHART** key a second time. A list of available regions is displayed. Press the menu key corresponding to the desired region. (Under some conditions this selection screen is shown automatically when you insert the XL3 cartridge.)

Using XL3 charts on multiple networked displays

A master *6000i* unit displays the regions from the cartridge plugged into it. A slave unit displays all the regions from the master's cartridge, plus those from its own cartridge, if any. Cartridges plugged into a slave unit can only be used on that one unit.

Note that selecting a region on one unit does not cause other units to switch to the same region. Each unit is independent with regard to region selection.

- If you have two or more units installed side-by-side, you can navigate with one unit while using another unit for trip planning in another region.



Zooming in and out

To get a closer look at the chart area around your vessel or around the cursor, press the **IN** key to zoom in. To see a wider area, press **OUT** to zoom out. Each press of **IN** or **OUT** approximately halves or doubles the chart scale.

Each chart has a maximum usable level of magnification. When you zoom in one step past that level, a portion of the chart screen and much of its text and symbols are doubled in size to fill the screen for easier viewing from a distance.

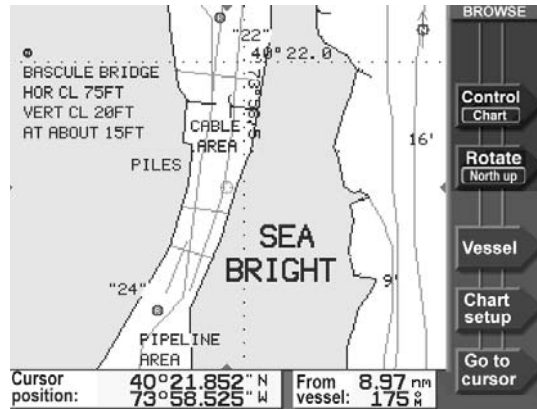


Chart data doubled in size

If you zoom in still further, the 6000i removes all chart detail from the screen for safety reasons, leaving only your vessel, its track, user-entered waypoints, and the lat/lon grid.

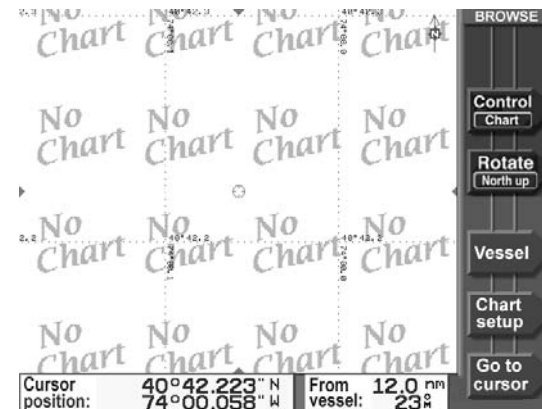


Chart data removed from screen

As a reminder that no land, charted hazards or nav aids are shown, the 6000i faintly displays the words *No Chart* multiple times across the screen. Even without any chart data displayed, you can still use the 6000i as a precision plotter.

NOTE:

Whenever the radar overlay is turned on, the scales of the chart and the radar are locked together so that the images will line up. If you change the scale of one, the scale of the other changes automatically.

Using the cursor on the chart screen

Press the cursor pad to display the red cursor symbol on the *CHART* screen. Continue pressing the cursor pad to move the cursor across the screen.



If you have trouble finding the cursor in a busy part of the CHART screen, just look at the edges of the screen for the red cursor pointers: They line up with the cursor.

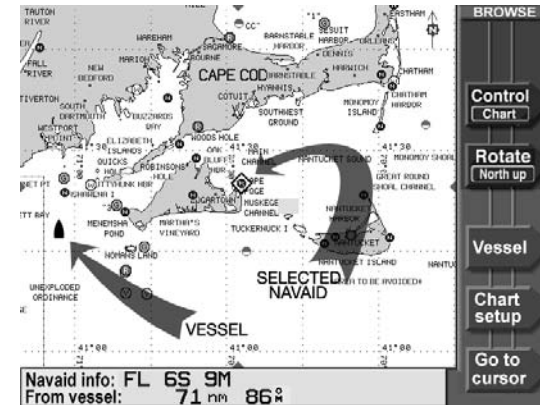
When you press the cursor pad, the *6000i* switches to *browse mode*, described on page 28.

If you move the cursor onto a waypoint or navaid, that point is *selected*, as indicated by a diamond-shaped box around the point. Information about the selected point appears in the info bar at the bottom of the screen.



After pressing the cursor pad to move the cursor to a point on the chart, you can press **Go to cursor** and **ENTER** to start navigating to the designated cursor location.

*If you placed the cursor on a waypoint or nav aid, this menu key would read **Go to waypoint** or **Go to nav aid**.*



Selecting a navaid with the cursor

You can use the cursor to:

- select a nav aid or waypoint, to:
 - > show its name, lat/lon, and distance and bearing
 - > navigate to it
 - > add it to a route
- designate a point on the chart, to:
 - > show its lat/lon
 - > navigate to it
 - > add it to a route
 - > store as a waypoint
- select a leg of a route to follow or edit
- view a new area of the chart by moving the cursor to the edge of the screen

Additional functions are available with Gold Charts. You can also select various

obstructions, and display additional information about them.

Comparing vessel and browse modes

The 6000i offers two display modes:

- vessel (your vessel is centered on the screen)
- browse (a cursor is displayed, which you can move to designate points or explore other areas of the chart)

To switch from vessel mode to browse mode, press the cursor pad. To switch back to vessel mode, press the **Vessel** menu key.

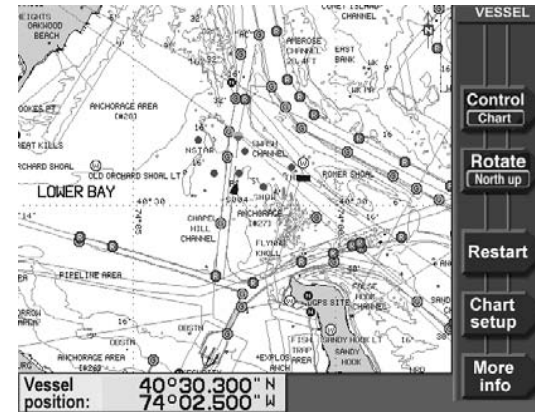
Vessel mode

The word **VESSEL** in the upper right corner of the screen means you are currently using Vessel mode.

Vessel mode is the primary screen for navigating – the chart moves automatically under your vessel, which remains centered on the screen. It provides a continuous view of your surroundings.

When your vessel's position moves to the edge of a chart, its icon may move from the center of the screen.

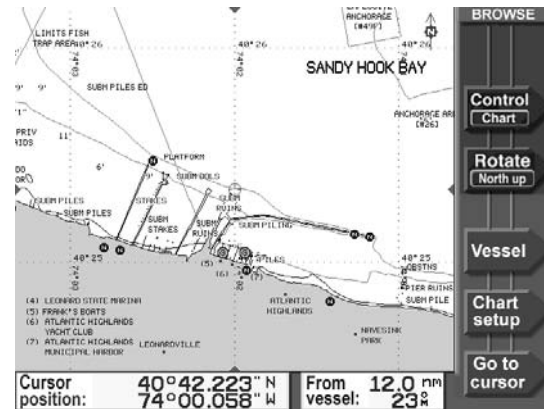
Press **More info** to display your position coordinates in the info bar at the bottom of the screen. You can also display your SOG, COG, or distance and bearing to the current waypoint (if any).



Vessel mode

Browse mode

The word *BROWSE* in the upper right corner of the screen means you are currently using Browse mode.



Browse mode

In browse mode, you can use the cursor to look at other areas of the chart, and designate points you want to navigate to.

The info bar at the bottom of the screen displays the position coordinates of the cursor, and the distance and bearing from your vessel to the cursor.

Rotating the chart

Press the **Rotate** key to change the angle of the charts displayed on the *CHART* screen. As long as you're in vessel mode, you can rotate the chart to any of the following angles:

- **North-up** – No rotation.
- **Course-up** – As your vessel changes its direction of travel, the chart rotates to keep your COG straight up on the screen. Course-up represents your true

COG as determined by the GPS receiver.

The 6000i ignores any course changes if your speed is under half a knot.

The chart reacts very slowly to turns of less than 5°, to avoid annoying small rotations.

Your COG is often different from your vessel's heading, so what you see

straight ahead on the horizon may be different from what's displayed on the screen.

- **Heading-up** – This rotation is available only if you have a heading sensor installed and enabled. The chart rotates as you travel to keep your heading straight up on the screen. When you select heading-up, the heading line on the radar image points straight upwards. The heading line allows you to compare the radar image or the chart with the view in front of the vessel.
- **Leg-up** – The direction of the current leg to a waypoint points straight upwards on the screen. The 6000i rotates the chart whenever you start navigating on a new leg, even if you haven't turned the vessel yet.

Exception: If you select leg-up when you aren't currently following a leg, the 6000i uses course-up until you start navigating along a leg.

When you're viewing a rotated chart, the text from the Navionics cartridge is tilted to match the rotation angle in order to avoid text overlap.

Using chart rotation in browse mode

Chart rotation is most useful in vessel mode. In browse mode, rotation is stabi-

lized to keep the chart and cursor from jumping while you're browsing around on the chart.

- **Course-up or Heading-up:** Suppose you're displaying the charts as course-up or heading-up and you press the cursor pad to use browse mode. While in browse mode, the chart rotation freezes. If your vessel changes course, you won't see the chart rotate to the new direction until you return to vessel mode by pressing the **Vessel** key. Only in vessel mode will the chart rotate to follow your course angle.
- **Leg-up:** If you're displaying charts in browse mode as **leg-up** and the 6000i switches to a new leg, the chart will immediately rotate to the direction of that new leg, unless you're actively pressing the cursor pad.

NOTES:

If you're displaying a rotated chart, you may occasionally see the edges of the chart, at an angle, displayed as a black line with white space on the other side. When the vessel or cursor crosses the line, the display will switch to a new chart (if available).

The edges of other charts in the 6000i's built-in world atlas are shown, in addition to those in your local cartridge. These

edges are shown as black or red dashed lines.

The lat/lon grid is labelled only when the chart is north-up.

How rotating affects the chart and radar

The rotation of the chart and the rotation of the radar image interact under certain circumstances, as described below. Assume that the chart and radar are both north-up at the start:

If the Chart screen's in...	And the radar image is...	
	Overlaid on the chart	Not overlaid
Browse mode	The chart can't rotate in Browse mode. If you change the Control key to Radar , the chart's mode automatically switches to vessel mode and rotated as described below).	The chart can't rotate, but the radar can rotate. Chart and radar can have different rotations.
Vessel mode	Chart and radar both rotate together. If you change the rotation of one, the other automatically changes to match.	Chart and radar can both rotate. Chart and radar can have different rotations.

Setting up the chart screen (Classic charts)

From the *CHART SETUP/STATUS* screen you can select the details on the *CHART* screen, adjust the *6000i*'s track control, and control Demo Mode to simulate navigation and radar.

Press the **Chart Setup** menu key on the *CHART* screen. Setup options are displayed, along with the chart cartridge's name and date.

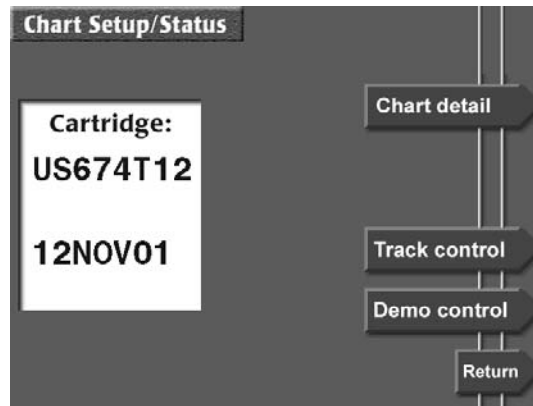


Chart Setup/Status screen

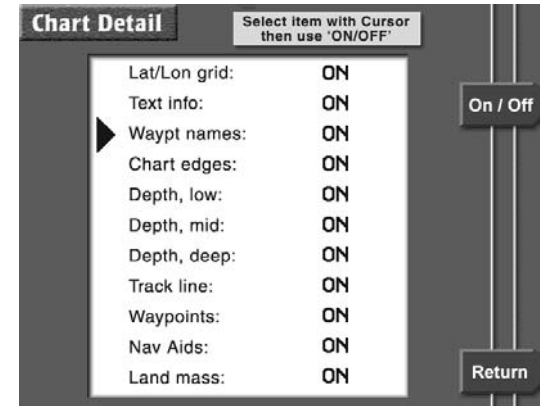


Chart Detail screen

Choosing the chart details

To set up the chart details, press the **Chart detail** menu key to display the *CHART DETAIL* screen.

To change any option, press the cursor pad to move the cursor triangle to the desired item, then press the **On/Off** menu key to change the item. An item that is turned off is shown with two dashes.

Lat/lon grid

The *ON* setting displays lat/lon lines on the *CHART* screen. Turn lat/lon lines off when these lines add excessive clutter to your screen.

Text info

The *ON* setting displays the names of local cities, towns, harbors, channels, bodies of water, etc.

Waypoint names

The *ON* setting displays the name of each waypoint below its symbol. The *OFF* setting displays just the symbol itself.

Chart edges

The *ON* setting displays the outlines of the charts that are on the installed Navionics chart cartridge or the built-in maps. Chart edges are shown as dotted lines.

If the chart currently in use is rotated, its edges are shown as solid lines.

Depth (low, mid and deep)

The *ON* setting displays depth contour lines for low, mid, and deep water areas.

Track line

The *ON* setting displays your vessel's track points (the course you've already traveled). For more track display options, see *Changing the track control* below.

Waypoints

The *ON* setting displays your waypoints on the *CHART* screen, and the *OFF* setting

turns them off, with the exception of waypoints on a displayed route.

Nav aids

The *ON* setting displays nav aids from the Navionics chart cartridge, and the *OFF* setting hides the nav aids.

Land masses

The *ON* setting displays the coloring of land masses to contrast between water and land. The *OFF* setting shows only coastline, without the coloring.

Setting up the chart screen (Gold Charts)

If you have a Gold Chart cartridge installed, the *CHART SETUP/STATUS* screen

- selects the details displayed on the *CHART* screen
- customizes the way depths are displayed
- adjusts the *6000i's* track function
- controls Demo Mode to simulate navigation and radar.

Press the **Chart Setup** menu key on the *CHART* screen. (Make sure you're in *VESSEL* mode – press the **Vessel** menu key if necessary). Setup options are displayed,

along with the chart cartridge's name and date.

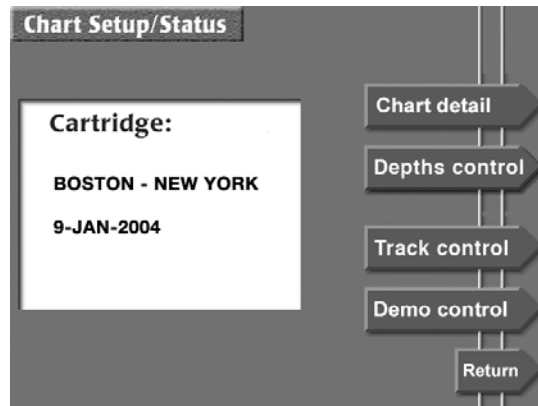


Chart Setup/Status screen

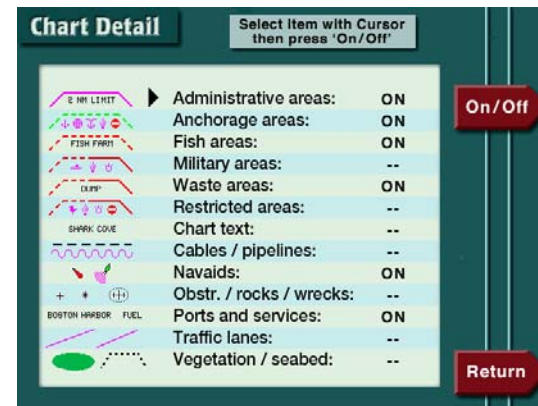


Chart Detail screen

Choosing the chart details

To set up the chart details for Gold charts, press the **Chart detail** menu key.

A few samples of the data that might be displayed are shown for each option.

To change any option, press the cursor pad to move the cursor triangle to the desired item, then press the **On/Off** menu key to change the item. An item that is turned off is shown with two dashes.

Administrative areas

Anchorage areas

Fish areas

Military areas

Waste areas

Restricted areas

The areas listed above can be individually turned on or off. The areas may be filled with color, patterns, or symbols indicating their usage. Descriptive text identifies the area in many cases.

Chart text

The *ON* setting displays the names of local cities, towns, harbors, channels, bodies of water and other text items.

Cables / pipelines

The *ON* setting displays above-the-surface and underwater cables and pipes.

Nav aids

The *ON* setting displays nav aids from the Navionics chart cartridge, and the *OFF* setting hides the nav aids.

Obstructions / rocks / wrecks

Charted objects are shown.

Ports and services

Locations of ports, their names, and many available services are shown.

Traffic lanes

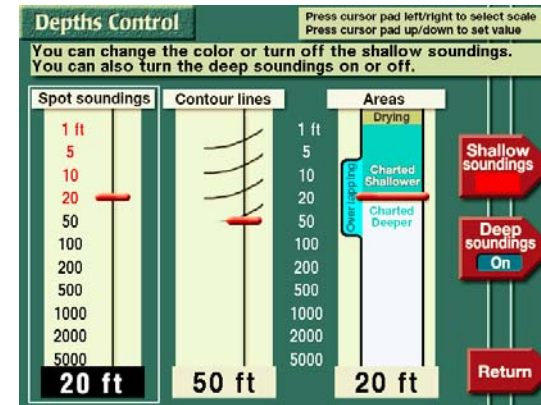
Lanes where special rules may be in effect are shown.

Vegetation / seabed

Surface vegetation and seabed composition descriptions are shown.

Displaying depths

Press **Depths control** on the *CHART DETAIL* screen to choose how water depths are displayed. You can control the display of spot soundings, depth contour lines, and shaded areas. Press the cursor pad left or right to choose the soundings, contours or areas column. Then press the cursor pad up or down to move the slider as described below.



Depths control screen

Spot soundings

Spot soundings in shallow areas can be displayed in black or red digits, or not displayed at all. Spot soundings in deep water can be displayed or hidden.

Press the cursor pad up or down to set the depth you wish to be considered as shallow.

Press the **Shallow soundings** key to choose whether shallow digits are red, black, or not displayed. Press the **Deep soundings** key to choose whether or not deep soundings are displayed.

Note that the absence of soundings in a particular area does not guarantee deep water – it's possible that soundings are simply missing from that area.

Depth contour lines

Depth contour lines can be displayed in shallow areas only, or not at all.

Press the cursor pad up or down to set the depth you wish to be considered as shallow.

Press **Contour lines** to choose whether or not contour lines are displayed

Shaded areas

Navionics Gold Charts contain additional depth information that can be used to color shallow areas of water. You can choose the depth where the coloring starts.

This feature can be useful when you want to remain in water that is deeper than, for example, 20 feet. The *6000i* can color water deeper than 20 feet in a very light blue (nearly white), and water shallower than 20 feet in dark blue.

Between these two areas, there will often be another area of water shaded with a

brighter medium blue. Very often, the special contour lines stored in your cartridge for this purpose will not match exactly the depth you chose to indicate. Areas that straddle your chosen depth are displayed this way. In some locations, these areas may be quite large.

Drying areas are displayed in a medium brown.

Color	Meaning
Brown	Drying area
Dark blue	Shallow
Medium Blue	Overlap or unknown
Very light blue	Deep

Press the cursor pad to the right to select the *AREAS* column, and press it up or down to choose the minimum depth you want to be notified of. Areas surveyed deeper than this depth are displayed in very light blue.

Using Gold charts

Restrictions

There are a few important restrictions on using Gold Charts.

The most important is that you can not use Gold and Classic charts at the same time. The *6000i* configures itself for one or the

other type when it is turned on, based on the type of cartridge currently inserted.

To change cartridge types, turn the unit off, insert the new cartridge, and turn the unit back on.

If multiple *6000i*'s are connected with the N2 network, all units must use the same type of chart. The chart in the master unit at the time it is turned on determines whether the system configures itself for Classic or Gold charts.

Also, if you have several *6000i*'s networked together using Gold Charts, a very large amount of information must be shared between units. As a result, there may be occasional short times when radar and sounder data is suspended during chart data transmission. A status message is displayed on the radar and sounder screens at these times.

First use of a cartridge

The first time a new Gold Chart cartridge is used, the *6000i* reads the cartridge data and indexes it for faster access. We strongly recommend performing the following procedure once for each new Gold Chart cartridge:

1. Insert the cartridge.
2. Press the **CHART** key (twice, if necessary) to display the *Chart Region* screen.

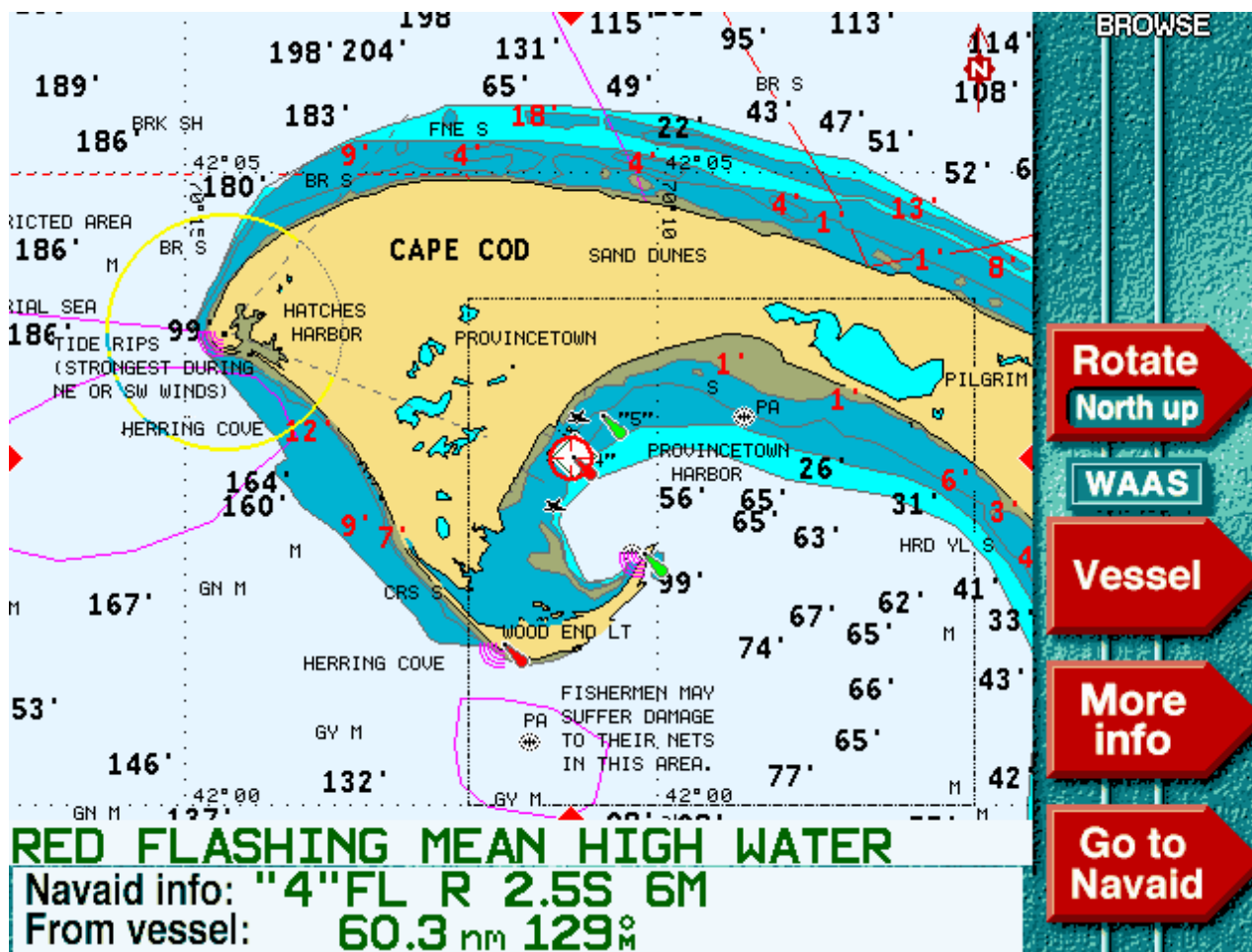
3. Press a menu key to select the first chart region.
4. Wait until the flashing **CHART LOAD** alert turns off (about 20 or 30 seconds).
5. Repeat steps 2, 3, and 4 for all remaining regions.

The Northstar *6000i* will now be able to access the cartridge data rapidly.

Additional information

Large scale charts typically do not contain spot soundings, depth contours and shaded depth areas. In smaller scale charts, the data source may omit contours and shaded areas deeper than 10 meters (33 feet). Areas not present in the data source are shown as very light blue.

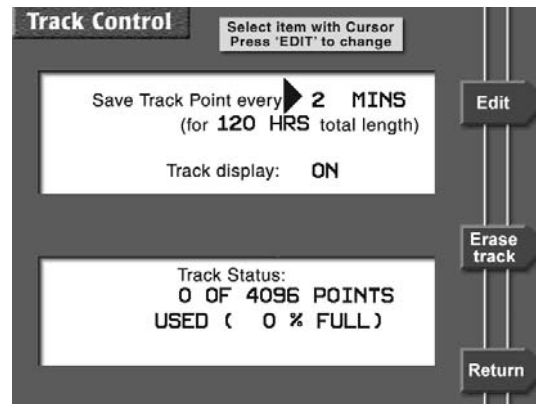
Gold Charts contain much additional information about nav aids and various types of obstructions. When a nav aid or obstruction is selected by placing the cursor on top of it, this information may be displayed by pressing the **More info** menu key. An additional info bar is displayed below the chart, showing the text associated with the object. In some cases, there is more text than can be displayed in a single info bar. Press **More info** additional times to display any remaining text, and then turn the info bar off.



Gold chart display, with a light selected

Changing the track control

The *6000i* displays your track history as a series of dots indicating the path you've recently traveled. You can choose how often to store a position fix as a point in your track history. The *6000i* stores up to 4,096 position fixes. When it reaches this limit, the *6000i* starts erasing the oldest points to make room for your new points. The more often you mark your track, the faster you fill up the track memory. The maximum track length depends on how often points are stored.



Track Control screen

To display the *TRACK CONTROL* screen, press **Track control** on the *CHART SETUP/STATUS* screen.

You can choose among the following options for point storage, and the corresponding track length:

- every 1 second for 60 minutes total
- every 2 seconds for 120 minutes total
- every 4 seconds for 4 hours total
- every 8 seconds for 8 hours total
- every 20 seconds for 20 hours total
- every 40 seconds for 40 hours total
- every 1 minute for 60 hours total
- every 2 minutes for 120 hours total

- or -

- *FREEZE TRACK* (stops the storage of additional points, keeping the track unchanged)

To clear the entire track history, press **Erase Track** and **ENTER**.

To remove the track display from the *CHART* screen while the *6000i* continues to record the track in its memory, set the *Track line* option on the *CHART DETAIL* screen to *OFF*. To resume viewing your track, change this option to *ON*.

To change any of these options, use the cursor pad to move the arrow to the field you want to change, then press **Edit**. Press

the cursor pad to display the option you want. Press **ENTER** to lock in the selection.

Press **Return** twice to return to the *CHART* screen.

Using the course predictor line

The chart, 3D steer, and radar screens also display a *course predictor line* that indicates where your vessel will be in a few minutes if you maintain your current course and speed. The predictor line extends out from your vessel in the direction of your Course Over Ground. Its length is determined by your speed and the number of minutes you specify on the Navigation Setup Options screen. You can also turn the line off. The line never extends beyond 100 nm.

To use the predictor line, simply select the number of minutes you prefer the line to represent as follows:

1. Press **STAR** several times to display the *OPTIONS/SERVICE INFO* screen.
2. Press **Navigation options**.
3. Select the **Predictor Line** using the cursor pad.
4. Press **Edit**.
5. Use the cursor pad to display the desired line length.
6. Press **ENTER**.

Then, just watch the predictor line on the chart, 3D steer or radar screen to determine where your current course will take you.

Using the distance and bearing calculator

You can quickly check the distance and bearing between any two points on the *CHART* screen. You can also use this function to make new waypoints that you define by their distance and bearing from another point.

1. Press **WAYPTS/ROUTES**.

2. Press **Distance and Bearing**.

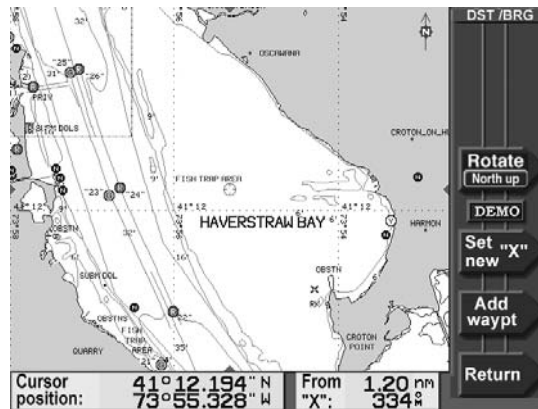
The 6000i displays your present position at the center of the CHART screen with the cursor directly over it.

3. Press the cursor pad to move the cursor to the first location.

The distance and bearing from your position to the cursor is displayed in the info bar.

4. To measure the distance and bearing from the cursor to another point, press **Set new "X."**

A new "X," or starting point, is displayed at that location. As you move the cursor, the distance and bearing from the "X" point to the cursor's position are displayed in the info bar.



Distance and Bearing screen

If you want to make a waypoint at the cursor location, press **Add waypt**, then enter its name, symbol, and any description on the *NEW WAYPOINT* screen. Press **ENTER** to save it.

2

POSITION

Reference section 2 **Position coordinates**

- Displaying position, COG, and speed** 44
- Using GPS** 44
- Using DGPS or WAAS** 46
- Using loran** 47
- Using Phantom Loran** 49

The **POSITION** key displays your position coordinates (from GPS, loran or Phantom Loran) and lets you check out GPS or loran signal status. COG, SOG, and time of day are also displayed.

Displaying position, COG, and speed

The 6000i uses a high-performance GPS receiver as its primary source of position data, with accuracy enhanced by either the WAAS satellite system, or an optional radiobeacon differential receiver, or both. Depending on the additional optional receivers that are connected, the 6000i can determine and display position coordinates in several different ways:

- as lat/lon coordinates
 - > from GPS satellites alone
 - > from GPS enhanced by the radiobeacon differential system
 - > from GPS enhanced by WAAS satellites
 - > from loran
- as loran coordinates
 - > from a loran receiver connected to the 6000i
 - > calculated from the GPS coordinates ("Phantom Loran")

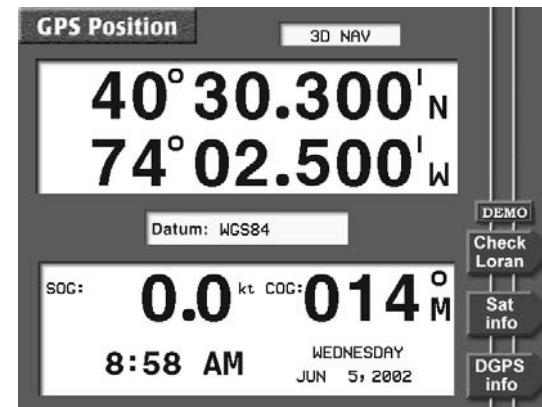
Using GPS

Position, COG, and SOG are calculated from the received satellite data, as well as time and date. To display this position information numerically, press the **POSITION** key.

You'll see your lat/lon coordinates on the *GPS POSITION* screen.

If GPS data isn't available, you'll see dashes instead of numbers.

You can display lat/lon as either degrees, minutes, and seconds, or as degrees, minutes, and thousandths of minutes. For instructions, see *Changing your display settings*, starting on page 154.



GPS position screen

The time of day, and today's day and date are displayed at the bottom of the screen. You can display time in a 12- or 24-hour format (see *12- or 24-hour clock*, on page 155). To designate the time zone for your area, see *Changing the time zone*, on page 166.

SOG and COG readings are the result of instantaneous measurements from the satellite signals. GPS speed is updated every second. For extremely stable readings, you can average these readings over several seconds by changing the GPS speed averaging value (see *Changing your receiver settings*, on page 160).

The name of the datum currently in use is displayed in the center of the screen. The datum describes any adjustment made to the standard WGS-84 position reported by the GPS receiver. You can choose a different datum using the Navigations Options setup screen (see *Choosing a geodetic datum*, on page 158). You may wish to do this in order to match a paper chart or other information based on a different reference system. New charts use the NAD83 or WGS84 datum, which are nearly identical.

WARNING:
Using the wrong datum can significantly reduce accuracy.

A brief status summary of the GPS receiver is displayed at the top of the screen. Table 1 describes the GPS status messages.

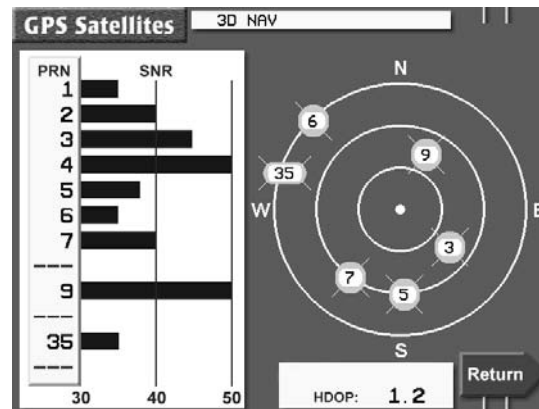
Table 1: GPS status messages

Message	Meaning
COMM FAIL	the GPS receiver or its communication link has a problem
3D NAV	navigating with 4 or more satellites in 3-D mode
2D NAV	navigating with 3 satellites in 2-D mode
ACQUIRE	trying to acquire satellites

Viewing GPS satellite status

To display more information about the signals received from the GPS satellites, press **Sat info** on the *GPS POSITION* screen. The *GPS SATELLITES* screen shows the received Signal-to-Noise Ratio (SNR) for each satellite (the higher the SNR, the better the quality of the satellite signals), and a map indicating where the satellites are currently located in the sky. The satellites are identified by their PRN number, a one- or two-digit number assigned by the U.S. government. GPS satellites are repre-

sented by circles; WAAS satellites are represented by hexagons.



Satellite status screen

The center of the satellite map represents the center of the sky, and the outermost ring is the horizon. The view is looking down from above, with east to your right and west to your left.

HDOP (Horizontal Dilution of Precision) is a technical measure of the quality of your position fix. It is calculated from the satellites' current positions. You'll usually see an invalid HDOP value displayed immediately after the 6000i is turned on, before it's ready to navigate. HDOP can range from an ideal value of slightly less than one, up to poor values of 10 or more. Any value less than two indicates an excellent satellite configuration.

Using DGPS or WAAS

When using the 6000i with standard WAAS or an external radiobeacon DGPS receiver, you'll usually see position measurements accurate to about one to three meters, speed measurements accurate to about 0.1 knot, and COG measurements accurate to about 0.5 degree. WAAS or DGPS corrections remove most of the errors caused by atmospheric variations.

When the WAAS or DGPS indicator is displayed at the right edge of the screen, the 6000i is using this higher level of accu-

racy. When you require this additional accuracy, be sure to check often to verify that either the WAAS or DGPS indicator is present.

For most applications, the built-in WAAS receiver automatically supplies highly accurate navigation data. DGPS corrections are available only from a user-supplied external DGPS receiver using the SC-104 data format. No DGPS signal status is displayed.

Using loran

Many users have lists of fishing spots and other waypoints that were recorded using loran time differences (TDs). The 6000i lets you continue using this invaluable data.

By interfacing your loran receiver to the 6000i, you can use the 6000i's chart plotting and advanced navigating features with actual loran coordinates.

If you don't have a loran receiver, you can still use the Phantom Loran feature described on page 49. With it, the 6000i calculates "Phantom" loran coordinates from GPS position information.

If you don't plan to use loran, you can skip these sections.

NOTE:

The loran you use must support the standard NMEA 0183 "RMA" output data sentence structure. The Northstar 800 loran supports NMEA 0183 and is an ideal choice to use with the 6000i.

Selecting and displaying loran

To display loran time differences (TDs) from a connected loran receiver:

1. Press the **STAR** key several times to display the *OPTIONS/SERVICE INFO* screen.

2. Press **Navigation Options**, then select the *Navigation Source* field.
3. Press **Edit**, then press the cursor pad to display *EXTERNAL LRN* as the position source.
4. Press **Enter** and then **Return**.
5. Press **POSITION** to display the *LRAN POSITION* screen.



Press **L/L TDS** several times to display either the particular pair of TDs you want to use, or the loran-derived latitude/longitude.

Setting the loran GRI

The *6000i* can convert the loran's TDs to latitude/longitude position fixes, if you set the four-digit loran Group Repetition Interval (GRI) shown on the screen to match the GRI being used by your loran receiver. To change the GRI, press **Set GRI** on the *LORAN POSITION* screen and press the cursor pad to display the available GRIs one at a time. When the displayed GRI is correct, press **ENTER**.

Checking GPS status

To display GPS coordinates and signal status, press **Check GPS**. The *6000i* continues to navigate using loran, and will display loran data the next time you display the *LORAN POSITION* screen.

Viewing loran status

To check the quality of signals being received by your loran, press **Loran info** on the *LORAN POSITION* screen. The Signal-to-Noise ratio (SNR) for each loran transmitting station is displayed graphically on the *LORAN INFO* screen.

Viewing loran warning indicators

Table 2 shows the loran warning indicators obtained from any Northstar 800 loran

receiver. They are displayed to the right of each TD. (These indicators are available only from Northstar 800 series lorans.)

Table 2: Northstar 800 series loran warning indicators

Indicator	Meaning
<i>SNR</i>	Signal-to-Noise Ratio is low—use caution.
<i>BLNK</i>	The Coast Guard is transmitting a blink signal, indicating a probable transmitter problem.
<i>CYC</i>	The receiver has detected a possible cycle slip.
<i>LOCK</i>	The loran has locked onto the loran track point (this isn't a warning indicator, but an indication of normal performance).

The *L/L* indicators to the left of the TDs designate the two TDs that the loran receiver has chosen for calculating latitude and longitude.

The *F/L* indicator to the left of a TD indicates that the user has forced that TD to be used for calculating latitude and longitude.

Returning to GPS navigation

To return to using GPS signals for navigation, repeat the steps shown for selecting

loran in *Selecting and displaying loran*, on page 47, but choose GPS instead of loran.

Using Phantom Loran

If you have lists of fishing spots and other waypoints that you recorded as loran time differences (TDs), but you no longer have a loran receiver, the *6000i* can automatically convert its GPS coordinates into TDs—in real time, as you travel. You can display your current position as TDs or navigate to waypoints using TDs. The accuracy from this conversion is generally 500 to 1500 feet.

This feature, called Phantom Loran, can help your transition from loran to GPS. You can use the *6000i* to simulate the full operation of a loran receiver, using all of the *6000i*'s navigation functions as if it were actually receiving loran signals.

These calculated TDs won't exactly match the positions of previously recorded TDs obtained directly from actual loran signals. In most areas, TD errors shouldn't exceed one microsecond. However, larger errors are possible in areas with poor station geometry, or for which the *6000i* doesn't have accurate, factory-programmed ASF correction points.

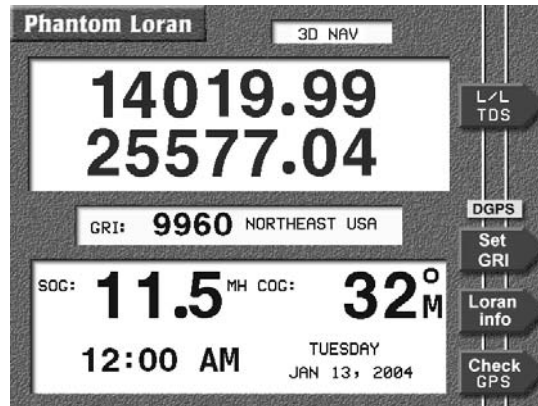
Selecting Phantom Loran

To display position coordinates as Phantom Loran TDs:

1. Press the **STAR** key to display the *OPTIONS/SERVICE INFO* screen.
2. Press **Navigation Options**, then highlight the *NAVIGATION SOURCE* option.
3. Press **Edit**, then press the cursor pad to select *PHANTOM LRN*.
4. Press **ENTER**, then press **Return**.
5. Press **POSITION** to display the *LORAN POSITION* screen.

Setting the Phantom Loran GRI

Press **Set GRI** to change the GRI to be used in calculating the displayed TDs. Press the cursor pad to display the available GRIs one at a time. When the GRI is correct, press **ENTER**.



Phantom Loran screen

Press **L/L TDS** several times to display either the particular pair of TDs you want to use, or the GPS-derived latitude/longitude.

3



Reference section 3
Navigating to Waypoints

- Introducing waypoints 52**
- Designating a waypoint 52**
- Steering to a waypoint 54**
- The course predictor line 57**
- Navigating along routes 57**
- Restarting the track line 59**
- The NAV LOG screen 59**

A waypoint is a specific point you designate either by entering its coordinates or by pointing to it on the chart using the cursor. Hundreds of waypoints can be stored in the *6000i's* memory, and can be strung together to form a variety of routes.

Introducing waypoints

To store a route, see page 71.

A *waypoint* is a point (a location) that you've entered into the *6000i*'s memory. The waypoint is displayed on the chart with the symbol you've chosen. In contrast, the term *nav aid* refers to a point that's permanently stored on the Navionics chart cartridge.

Here are some of the functions you can perform with waypoints:

- go to a point on the *CHART* screen in one step (making a "quick" waypoint)
- store waypoints into the *6000i*
- go to these waypoints
- string these waypoints together to form routes
- edit or erase waypoints or routes
- plot waypoints on a chart
- transfer waypoints and routes from the *6000i* to a PC or an older Northstar navigator, and back again

Designating a waypoint

You can designate waypoints in any of the following ways:

- use the cursor on the *CHART* screen to select an existing waypoint or create a new waypoint
- enter numeric position coordinates
- select an existing waypoint from a list

You can also string together several waypoints to form a *route*, and let the *6000i* guide you from one waypoint to the next (see *Introducing routes*, on page 71).

Designating a waypoint on the chart screen

You can go to a waypoint by moving the cursor to that point on the chart – either selecting an existing waypoint on the *CHART* screen, or designating any other location on the *CHART* screen:

1. On the *CHART* screen, move the cursor pad to choose an existing waypoint or nav aid, or any unmarked chart position.
2. Press **Go to waypt.** (If you didn't choose a waypoint, the key will read **Go to cursor** or **Go to navaid.**)
3. Press **ENTER.**

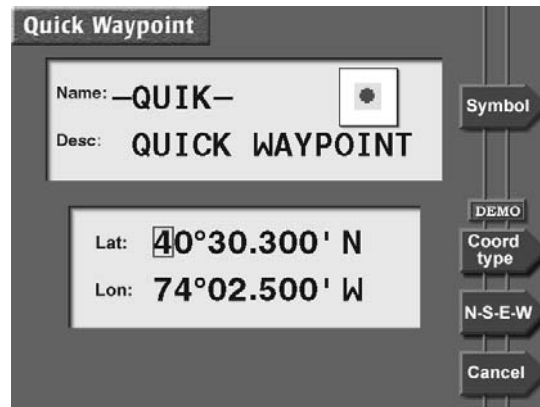
If you selected an existing waypoint, the 6000i begins guiding you directly to it.

If you chose a new cursor location, the 6000i makes a new waypoint named -QUIK-, and guides you directly to it. Repeating this same procedure will create a new -QUIK- waypoint that overwrites the existing one; therefore, you may want to save the -QUIK- waypoint as a regular waypoint by renaming it. See *Editing waypoints*, starting on page 70.

Entering a waypoint's position coordinates

You can use the keypad to enter waypoint coordinates, and then go to that waypoint:

1. Press **WAYPTS/ROUTES**, then press **Quick waypoint** to display the *QUICK WAYPOINT* screen.



Quik waypoint screen

2. If necessary, select the type of coordinates you want to enter by pressing the **Coord type** menu key:

- lat/lon
- distance and bearing from “here” (your present position), or from any waypoint stored in the 6000i
- loran TDs (make sure the GRI displayed is correct, and change it if necessary)

3. Use the keypad to enter the waypoint's coordinates.

The initial position shown is your latest fix.

If you wish, you can now give the -QUIK- waypoint a unique name after you've entered its coordinates, since the next -QUIK- waypoint you make will overwrite this one: Just move the cursor to the name field and change the name from -QUIK- to a unique permanent name before continuing.

4. Press **ENTER** twice.

The 6000i begins guiding you directly to the waypoint.

Using previously stored waypoints

If you have already stored waypoints as described starting on page 65, you can select one of these and navigate to it.

1. Press **WAYPTS/ROUTES**, then press **Waypoints**.

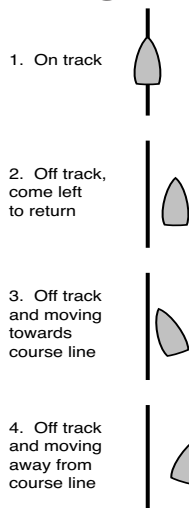
2. Press **Next view** to display the most convenient view. You can select a waypoint from the chart view, or from one of the waypoint lists (often the *local* list, since the waypoints you navigate to are usually nearby). See *Displaying waypoints*, starting on page 64
3. Press the cursor pad to select the waypoint you want to navigate to.
4. Press **Go to**, then press **ENTER**.

The 6000i begins guiding you directly to the waypoint.

Waypoints (local)			8 Waypts
			0 % Full
-QUIK-	0.73 _{nm}	029 ^o M	Go to Add Edit Coord option Next view
QUICK WAYPOINT			
NEWBRY	1.13 _{nm}	336 ^o M	
FISH	1.14 _{nm}	083 ^o M	
SANDBR	5.70 _{nm}	103 ^o M	

Local waypoints list

Steering to a waypoint



If your *6000i* is interfaced to an autopilot, it can steer your vessel automatically along a track line directly to the active waypoint.

To steer the vessel yourself, press the **STEER** key. The *6000i* displays a picture of your vessel and the desired track line. Just steer to keep the vessel close to the track line (see examples at left).

This precise navigation is especially useful for following a harbor channel or a line between shoals and sandbars.

You can also steer using the CHART screen when you just want to get to a

waypoint and don't need to stay precisely on the designated course line.

The following is also displayed:

- distance and bearing to the waypoint
- Speed-Over-Ground (SOG)
- Course-Over-Ground (COG)

If you exceed the cross-track alarm distance, the *6000i* issues an alarm. To display this alarm message, press the **STAR** key. To clear the alarm, press **Clear alarm**.

There are two versions of the steering screen. The *2D SCREEN* is a simple graphic display of cross-track distance. The *3D*

SCREEN is similar, but from an “overhead” perspective view that also shows nearby waypoints. Press **STEER** a second time to switch between the screens.

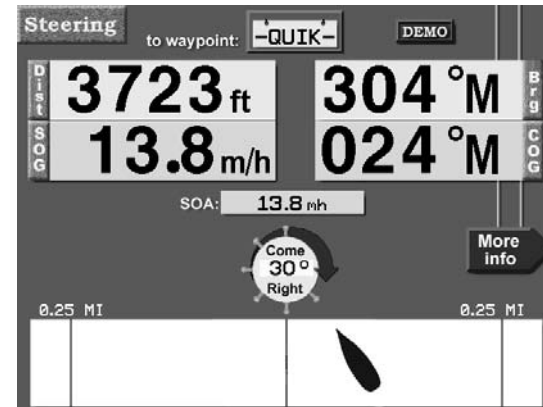
The 2D steering screen

The 2D STEERING screen uses a traditional two-dimensional display that shows your cross-track distance – how far your vessel is from your intended track line (the center line of the display). The vessel symbol on the display rotates as your vessel turns, showing whether you are moving closer to the line or further from the line.

Ideally, you’ll keep the vessel symbol close to the track line and parallel to it.

The scale of the cross-track display is shown in the lower corners of the screen. To adjust the cross-track scale, see *Choosing the cross-track scale*, on page 159.

*Note that the heading correction display on the 2D screen (showing “Come 30° Right,” below) indicates the heading change needed to sail parallel to the desired track line. This is the correction to make **after** you are on the line.*



2D Steer screen – approaching the track line

The direction in which your vessel symbol is pointing tells you the direction you’re actually travelling (your COG). The direction may not be the same as your heading, if any current or wind is present.

When the 6000i sequences to a new leg of a route, your vessel symbol will immediately show your COG relative to the

new leg. It points straight ahead once you've finished the turn.



2D Steer screen — vessel on track

The distance and bearing to the waypoint, and your Speed-Over-Ground (SOG) and Course-Over-Ground (COG) are displayed at in the upper half of the screen. Your 6000i may show an arrow to the right of the SOG display, pointing upwards when the trend of your speed is increasing, and down when it's decreasing.

When you're less than a mile away from a destination waypoint, you can show the distance to the waypoint in feet (or meters) by setting the 6000i's steering precision option to *high*. For details, see *Changing the steering precision*, on page 159.

You can display additional information in the center of the 2D STEERING screen by

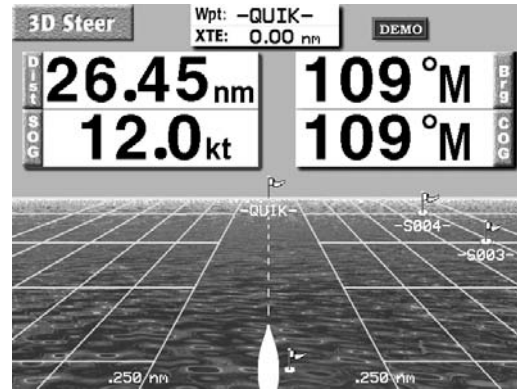
pressing **More info** to cycle through the three choices:

- Estimated Time Enroute (ETE) to the waypoint, and Estimated Time and Date of Arrival (ETA)
- Speed of Advance (SOA), and graphical heading correction
- Waypoint name, description, and position coordinates

The 3D steering screen

The 3D STEERING screen is similar to the 2D STEERING screen. It displays a three-dimensional view of your vessel with the current waypoint, the course line to the waypoint, and the locations of any other nearby waypoints ahead of your vessel.

You can use the **ZOOM** keys to zoom in and out on this screen.



3D Steer screen

The course predictor line

The course predictor line (see *Using the course predictor line*, on page 40) provides another effective way to navigate a course line or even to navigate directly to a point on the chart. On the chart or radar screen, just keep the end of the predictor line near the intended course line, and your vessel will steer towards and gently merge with the line.

The predictor line is also shown on the 3D steer screen. Here, it is often curved to represent the actual track on the 3D grid. The center of the line is black when you are not navigating to a waypoint, and yellow when you are navigating to a waypoint. If the line would extend beyond the displayed horizon, it is not shown.

Navigating along routes

To follow a previously stored route, press **WAYPTS/ROUTES**, then press **Routes** to display the *ROUTES* list. Press the cursor

pad to select the route you want to follow, then press **Go**. The *6000i* displays a chart showing the chosen route.

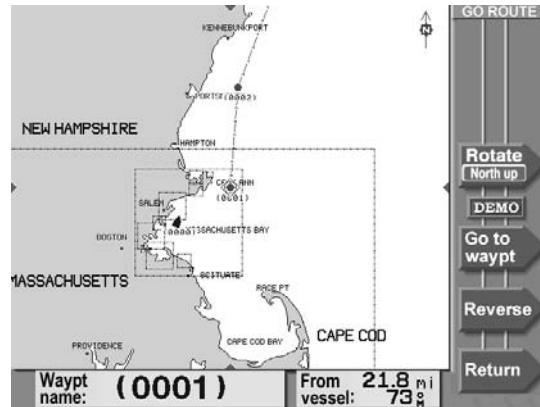


Chart screen, showing a route

From here, you can do the following:

- select a starting waypoint or leg
- start following the route
- reverse the route

Selecting the starting point

The nearest waypoint in the route is automatically selected as the starting point. To choose a different waypoint or route leg, press the cursor pad and select it on the chart. You can zoom **IN** or **OUT** to see a smaller or larger area of the route.

Starting a route

To go directly to the selected waypoint in the route, press **Go to waypt**, then press **ENTER**. The *6000i* calculates a track line from your present position to the selected route waypoint. Your cross track error starts at zero.

If you wish to start navigating along a route leg, rather than directly to a waypoint, select the leg by moving the cursor onto the leg, then press **Follow leg** and press **ENTER**. In this case, your initial cross-track error is your distance from that leg. The leg you're currently navigating along is displayed with arrows indicating your chosen direction of travel; other legs are displayed with fewer arrows.

Reversing a route

To follow the route in the reverse direction, press **Reverse** before starting the route. The direction of the route and its arrows will change from end to end.

Restarting the track line

When travelling from one waypoint to another, you may find you've gone off your planned track line. Maybe you avoided an obstacle or drifted slightly off-course. Whenever you're off-track, you can get back by one of two methods:

- after passing the obstacle, you can steer your vessel back to the original track line by using the cross-track error display, and simply continue to the waypoint (Track 1 in Figure 3)
- after passing the obstacle, if you don't need to return to your original track line, you can go directly to the next waypoint by using the *6000i*'s restart function (Track 2 in Figure 3)

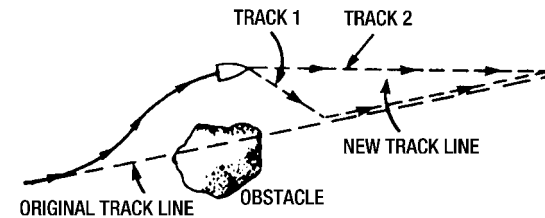


Figure 3: Restarting the course line

To restart your track line from your present position, press **Restart** and **ENTER**. **Restart** is found on the *CHART* screen (in vessel mode only), on the *STEER* screen, and on the *NAVLOG* screen.

The *6000i* calculates a new track line from your present position directly to the next waypoint, and resets your cross-track error to zero.

The NAV LOG screen

The *NAVLOG* screen displays the waypoints in your current trip and lets you easily make changes to them. To access the screen, press the **Navlog** key on the *STEER* screen.

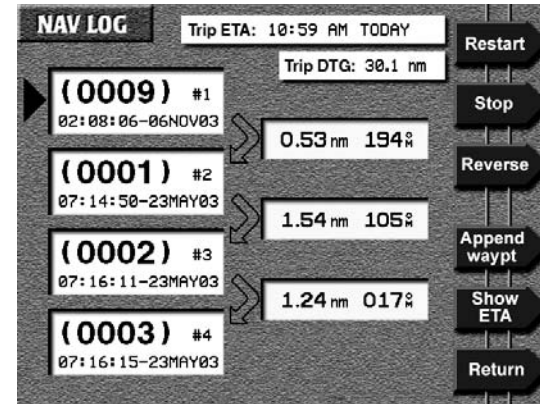
The navlog helps you plan and log your trip, using three main functions:

- displaying your progress along your trip

- allowing you to easily change the rest of your trip (add waypoints to a route, or reverse the entire trip)
- allowing you to sequence to the next leg, if you've chosen manual waypoint sequencing

The nav log contains the series of waypoints that you follow along your route and displays them in sequential order. When you navigate to these waypoints, or along an already stored route, the series of waypoints is copied into the nav log, which acts as a kind of "scratch pad" to monitor your progress. You can change the nav log's route in any way you want without affecting the original route, which remains safely stored in the 6000i.

To see the waypoints you're currently navigating along, press the **Navlog** key on the *STEER* screen.



Navlog screen

The *NAV LOG* screen shows the list of waypoints, the length and bearing of each leg, and the direction of your next trip leg.

Press the cursor pad to scan the waypoints in the list.

To display either a waypoint's description or its estimated time of arrival (ETA), press the **Show waypt desc** or **Show waypt ETA** menu key. For waypoints you haven't passed yet, the times of arrival shown are estimates based on your current speed. For waypoints you've already passed, actual times of arrival are shown. The 6000i updates this information as you travel.

NOTE:

Estimated times are just estimates, which may be inaccurate if your SOG changes, either intentionally or by passing through varying currents.

Your ETA at the last waypoint (your destination) is shown at the top of the screen. A darkened arrow connecting the right ends of two waypoint boxes indicates you've completed that leg of the trip.

Changing your trip

Adding waypoints to your trip

You can add waypoints to your trip at any time:

1. On the *NAV LOG* screen, press the **Append waypt** menu key to display a chart view of the trip waypoints on the *APPEND WAYPT* screen.
2. Press the cursor pad to select the desired waypoint.
3. Press the **Select waypt** menu key, then press the **ENTER** key to add the waypoint to the nav log.

NOTE:

Any waypoints added in this manner aren't permanently added to the original route stored in the 6000i. To permanently change a route, you must use the

edit-route function. (For details, see "Editing a route" starting on page 100.)

4. Repeat these steps for any more waypoints you want to add.

NOTE:

If you go to a waypoint or along a route by using the 6000i's GO TO function, the unit automatically enters and organizes the waypoints in the nav log.

Reversing your trip

You can reverse your trip at any time. Pressing the **Reverse** menu key on the *NAV LOG* screen lets you travel the trip in the opposite direction.

Stopping and restarting navigation

Stopping navigation

Whenever you press the nav log's **Stop** menu key, the 6000i stops navigating, and won't display distance and bearing to waypoints or ETA or ETE.

Restarting navigation

You can restart navigation along any leg or to any waypoint of the trip. On the *NAV LOG* screen, move the cursor arrow to highlight the waypoint or leg. When you select a waypoint, a triangle points to the waypoint.

When you select a leg, an arrow points from the first waypoint to the second. Press the **Restart** menu key.

4



Reference section 4

Creating waypoints and routes

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This chapter explains how to create new waypoints and modify existing ones, how to make a route from stored waypoints, and how to create a route by saving it as you travel. You'll also learn how to change a route by inserting, removing or changing the order of its waypoints.

Displaying waypoints

To display waypoints, press the **WAYPTS/ROUTES** key, then **Waypoints**. You can press **Next view** to step through the four available waypoint screens listed below:

- waypoints displayed on the chart
- a list of up to 30 *local* waypoints, sorted by distance (nearest first)
- a list of *all* waypoints, sorted alphabetically
- a list of up to 30 local *avoidance* waypoints, sorted by distance (nearest first)

The waypoint screen type is shown in the upper right corner.

Waypoints on the chart screen

The *WAYPOINTS CHART* screen displays your waypoints graphically. You can press the cursor pad to display other areas of the chart, and press the **OUT** or **IN** zoom keys to see more or less chart area.

NOTE:

If you've turned off the display of waypoints on the CHART screen, you'll only see waypoints that are currently in use for navigation.

Waypoints on the local list

The *WAYPOINTS (LOCAL)* screen displays up to 30 of the closest waypoints (within 100 nm) in order of their distance from your present position. This list is particularly useful for working with the waypoints in your area. Often these are the only waypoints you may be interested in at the moment.

Waypoints on the alpha list

The *WAYPOINTS (ALPHA)* screen displays all stored waypoints in alphabetical order. Waypoints with a digit as the first character appear at the beginning of the list. Those starting with a dash or parenthesis are at the end.

Waypoints on the avoidance list

The *WAYPOINTS (AVOIDANCE)* screen displays up to 30 of the closest avoidance waypoints (within 100 nm) in order of distance from your present position.

Using the waypoint lists

After you've stored a few waypoints in the *6000i*, you can press the cursor pad to

move up or down within a waypoint list to select individual waypoints.

When you display a waypoint list, you can see their coordinates in any of the following ways by pressing the **Coord option** menu key:

- as lat/lon coordinates
- as distance and bearing from your position (often the most useful way to

display coordinates, since it may be easier to visualize “3 miles north” than lat/lon digits)

- as loran time differences

The small letter “S” to the right of the waypoint name tells you that the displayed coordinates, either lat/lon or TDs, were the ones used to originally store the waypoint.

Creating new waypoints

There are two easy ways to create a new waypoint:

- numerically – by entering position coordinates as lat/lon, loran TDs, or distance and bearing on the *NEW WAYPOINT* screen
- from the chart – by pointing to the waypoint’s location on the *CHART* screen

enter a description of up to 16 characters on the line below the name.

Assigning a symbol

You can give the waypoint a symbol so you can easily identify it on the *CHART* screen. When creating or editing waypoints, you can choose from any one of

Assigning a name and description

To permanently store a waypoint, you must give it a *name*. The name can be from one to six characters long, and must be different from all the other waypoint names stored in the *6000i*. You can also

16 symbols, eight of which are shown below.

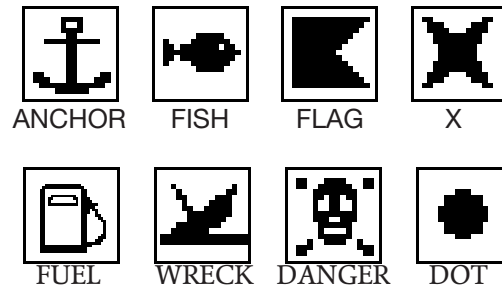
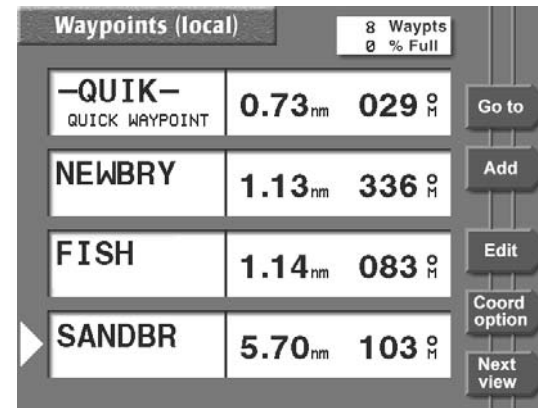


Figure 4: Waypoint symbols

Entering waypoints numerically

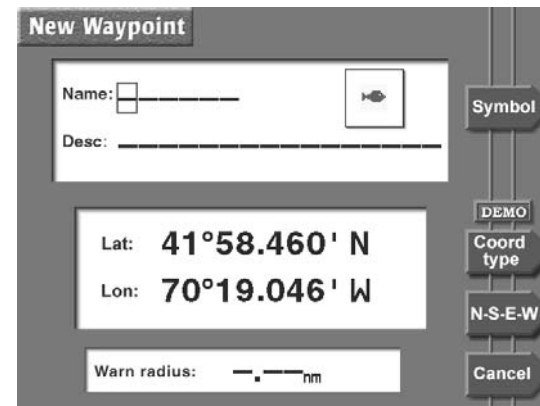
To enter waypoints numerically:

1. Press **WAYPTS/ROUTES**.
2. Press **Waypoints**.



Local Waypoints screen

3. Press **Add** to display the *NEW WAYPOINT* screen.



New Waypoint screen

4. Enter a waypoint name and optional description.

Press (several times if necessary) the key on the 6000i keypad that contains the letter or digit you wish to enter. Press the cursor pad when necessary to move the cursor to the next character.

5. Choose a symbol for the waypoint by repeatedly pressing **Symbol**.
6. Enter the waypoint's coordinates. To switch between displaying coordinates as lat/lon, as loran TDs, or as distance and bearing coordinates, press **Coord type**:
 - For **lat/lon**, the **N-S-E-W** key lets you manually change the hemisphere, if necessary.
 - For **loran TDs**, enter any valid pair of TDs and the GRI for the pair. After entering the GRI, check the name of the GRI that's automatically displayed to ensure it's correct.
 - For **distance and bearing from your present position**, leave the *From* point set to *-HERE-*, and enter the bearing and the distance to the desired waypoint.
 - For **distance and bearing from a waypoint**, press the **From** menu key to display a chart screen. Press the cursor pad to select the desired waypoint and press **Select waypt**, or create a new waypoint at the cursor location by pressing **Add**

waypt followed by **Select waypt**. Enter the bearing and the distance from the designated waypoint to your new waypoint.

*If you change your mind and want to return to specifying distance and bearing from your **present position** instead of from another waypoint, press **From vessel** on the chart screen.*

7. Press **ENTER** to permanently store the new waypoint.

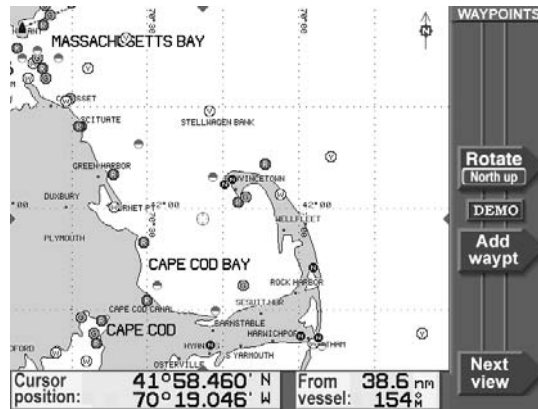
NOTE:

Don't enter a number into the Warn radius box unless you want to make this waypoint an avoidance point, as described in the next section.

Entering waypoints on a chart screen

To enter waypoints on a *CHART* screen:

1. Press **WAYPTS/ROUTES**.
2. Press **Waypoints**. If necessary, press **Next view** to display the *WAYPOINTS CHART* screen.



Waypoints chart screen

3. Press the cursor pad to move the cursor to the position of the new waypoint. You can zoom in or out, as necessary, to precisely place your waypoint.

4. Press **Add waypt** to capture the cursor coordinates and display the *NEW WAYPOINT* screen.
5. Now follow the instructions above for **entering a waypoint numerically**, starting with Step 4. The coordinates of the cursor (Step 6) will be already entered — don't change them unless you mean to.

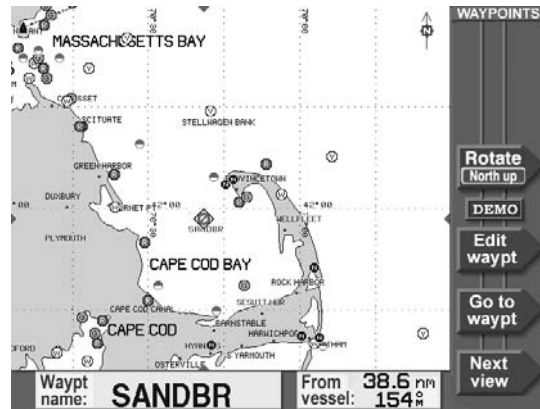
Creating avoidance-area waypoints

You can make *avoidance areas* from new or existing waypoints. Then, if you travel into a designated avoidance area, the 6000i will sound a beep and flash an alarm on the screen.

The 6000i displays an avoidance area on the *CHART* screen as a waypoint surrounded by a circle. The circle is the avoidance area's warning radius, which you set when you create or edit the

waypoint. You can use the international "slashed circle" no-entry symbol as the avoidance point's symbol to help you quickly see it on the chart.

The waypoint is treated as an avoidance point only if you specify a warning radius larger than zero. In other words, just assigning the slashed circle symbol to a waypoint doesn't cause the 6000i to treat that waypoint as an avoidance point.




to respond by turning or stopping after you hear the alarm, and to allow for the typical accuracy of the navigation source in use.

Setting the avoidance-area alarm

The *6000i* will sound an audio alarm when you enter an avoidance area, provided you've turned on the audio alarm. (See "Alarm audio" on page 142.)

CAUTION!



The avoidance alarm is only an extra safety feature to help alert you to possible hazards. It doesn't replace local knowledge, proper use of charts, the person on watch, or any other aspects of good seamanship that are required to safely navigate.

To make any waypoint act as an avoidance point, enter a number in the *WARN RADIUS* box at the bottom of the *NEW WAYPOINT OR EDIT WAYPOINT* screen. The warning radius can be from 0.1nm to 4.99 nm.

Be sure to allow a little extra distance around the hazard area so you'll have time

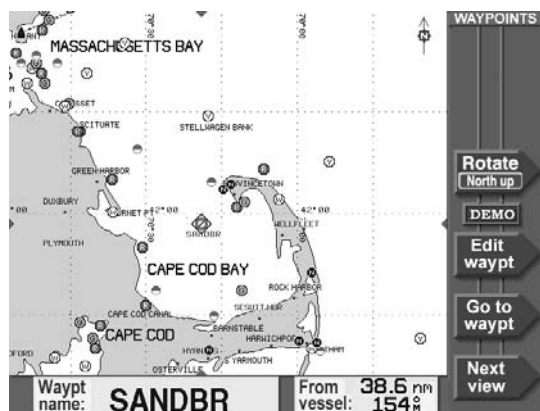
Editing waypoints

You can change any information about an existing waypoint (except for the type of coordinates used to save it) or erase it entirely by using the 6000i's waypoint editing function.

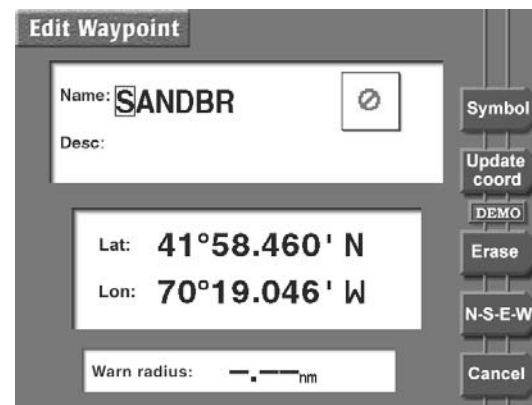
Changing waypoints

To change a waypoint's name, description, position coordinates, or warning radius:

1. Press **WAYPTS/ROUTES**, then **Waypoints**. If necessary, press **Next view** to display the waypoint screen you want.
2. Select the waypoint by highlighting it with the cursor pad.



3. To edit the waypoint, press **Edit**. (On the *WAYPOINTS CHART* screen, the key is labelled **Edit waypt**.)



The *EDIT WAYPOINT* screen appears, allowing you to make changes just as if you were entering a new waypoint. Press **ENTER** when done.

If the waypoint is in an active navplan, you must stop navigating before editing it.

NOTE:

If you move the waypoint, any routes containing this waypoint will be changed to reflect the waypoint's new position.

A warning is displayed before any routes are changed.

Erasing waypoints

To permanently erase the waypoint, press **Erase** on the *EDIT WAYPT* screen, then **ENTER**.

*You can't erase a waypoint if it's used in a route—you must first remove it from the route. For details about editing routes, see *Editing a route*, starting on page 76.*

Updating waypoint coordinates

You can “fine tune” a waypoint’s position by actually sailing to the exact desired position and setting the waypoint’s stored coordinates to your present position. You can do this on the *WAYPOINTS CHART* screen or any of the waypoint list screens.

To update the waypoint’s coordinates to your exact position, display the *EDIT WAYPOINT* screen for the waypoint as described above. When your position is correct, press **Update coord** and **ENTER**.

Introducing routes

A *route* is a sequence of waypoints that you designate. Routes can be used to perform the following functions:

- as guidance through a channel or harbor
- as a quick and efficient path to good fishing spots
- as the best way around a permanent obstacle, such as an island
- as guidance on a single long voyage with various “legs” to food and fuel stops along the way, or to other temporary destinations

Waypoints in a route are connected by straight lines called *legs*. The *6000i* can

follow route legs in a forward or backward direction. You can start following a route in either of two ways:

- go directly to any waypoint in the route, then automatically continue on the next leg (cross-track distance starts at zero, because you’re on the course line from your present position to the waypoint)
- start along any leg of the route (cross-track distance starts at your distance from the leg)

See “Navigating along routes” beginning on page 57.

You can create a route in three different ways:

- use the *CHART* screen to choose a sequence of waypoints
- use a waypoint list to choose a sequence of waypoints
- save a route's waypoints as you travel

Route and waypoint capacity

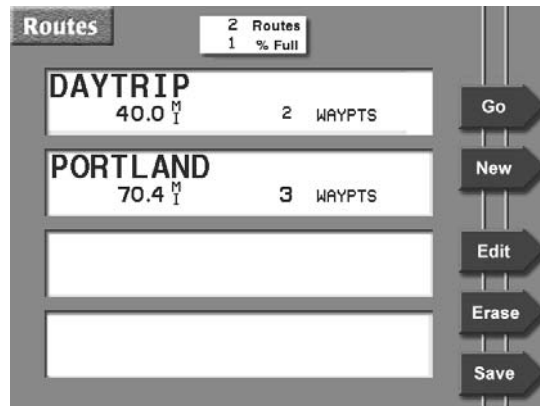
A route can have up to 35 waypoints. You can store as many as 500 routes in the *6000i*, but the maximum number depends on the number of stored waypoints. Each route takes up space that otherwise could be occupied by one or two waypoints.

Creating a route from the chart

To create a route graphically from the *CHART* screen:

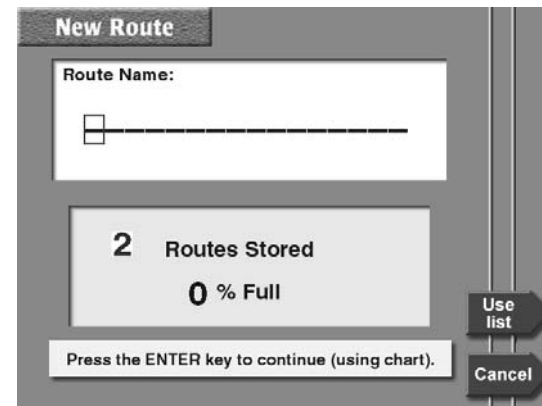
1. Press **WAYPTS/ROUTES**, and then press **Routes**.

The names of any previously stored routes are shown on the routes list.



Routes list screen

2. Press **New** to display the *NEW ROUTE* screen.



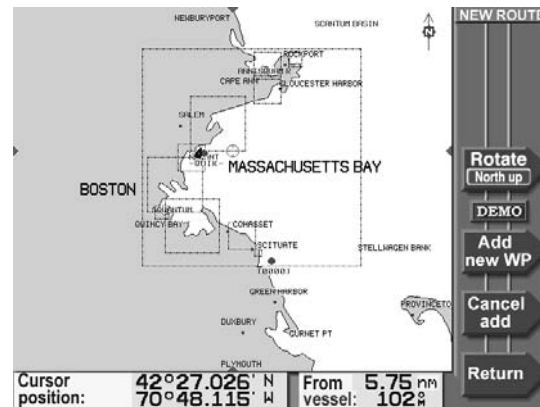
New Route screen

3. Enter the name of the new route using the keypad and cursor pad.

4. If the **Use Chart** menu key is displayed, press it to change from list-based entry to chart-based entry.
5. Press **ENTER**.

The NEW ROUTE chart screen is displayed; you may now start selecting waypoints for the new route.

6. To add waypoints to the route, move the cursor to the first waypoint's location, which can be a nav aid, an existing waypoint, or any unmarked point on the chart. Press **Add new WP**. (If an existing waypoint is selected, the menu key will read **Add waypt.**)



New Route chart screen

Newly created waypoints are named (0001), (0002), etc. The parentheses indicate that the waypoint was automati-

cally named, and the four-digit number uniquely identifies each waypoint. Also, each new waypoint is automatically given a description showing the time and date you stored the waypoint.

7. Continue creating the route by moving the cursor to each desired waypoint location and pressing either **Add waypt** or **Add new WP**. A line is drawn on the *new route* screen connecting the waypoints, with small arrows indicating the direction of the route.
8. At any time, you can press **Cancel add** to stop appending waypoints, and then select a route leg or waypoint to continue editing a different part of the route.
9. When you're done, press **Return** to switch to the *NEW ROUTE* screen to see all of the route's waypoints.

Creating routes from a list of waypoints

To create a route from a list of existing waypoints:

1. Press **WAYPTS/ROUTES**, then press **Routes**.
2. Press **New** to display the *NEW ROUTE* screen.
3. Enter the name of the route using the keypad and cursor pad.
4. If the **Use list** menu key is displayed, press it to change from chart-based editing to list-based editing.
5. Press **ENTER**.
6. Press **Insert**.

The SELECT WAYPT screen appears, listing all of your stored waypoints.

7. If you want to switch between the *LOCAL* and *ALPHA* lists, press **Next view**.
8. Move the cursor to select the desired waypoint, then press **ENTER** to place the waypoint in your route. Or, press **New** to create a new waypoint, then add it to the route.
9. Repeat Steps 7 and 8 until your new route is complete.

*To see or edit the route on the CHART screen at any time, press **Chart**. Press **Return** to go back to the *NEW ROUTE* entry screen.*

Saving a route as you travel

To make a record of a trip that you may want to repeat later, you can save waypoints into a route as you travel by pressing the **SAVE/MOB** key every time you pass a point you want to store in the route.

The save-route function makes this a very simple process: First, you tell the *6000i* that you want to save a route as you travel, then you press **SAVE/MOB** as you pass each new waypoint, then you tell it to stop

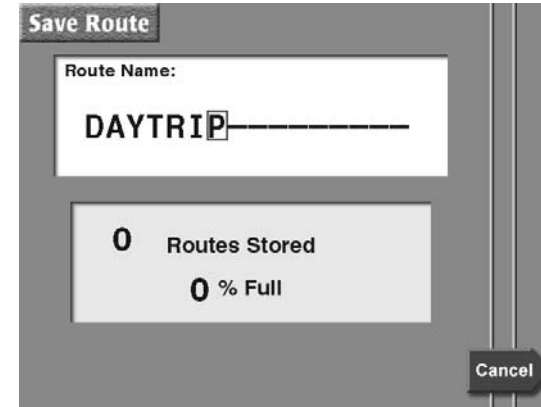
saving the route when you reach the end of the route.

To begin saving a route as you travel:

1. Press **WAYPTS/ROUTES**, and then press **Routes** to display the *ROUTES* screen:



Routes screen



Save Route setup screen

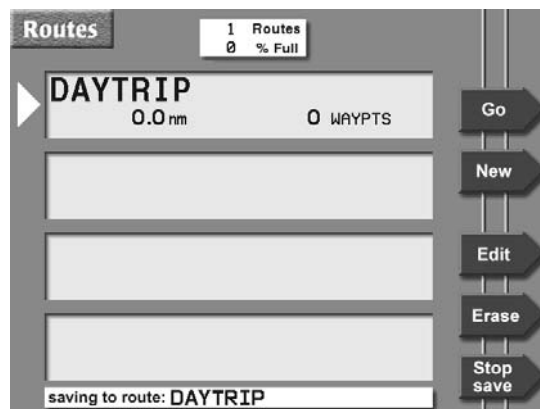
2. Press the **Save** menu key to set up saving a route automatically.

The SAVE ROUTE screen is displayed, asking you to enter the name of the new route to be saved.

If you use the name of any existing route, waypoints will be added to the end of that route.

Enter the name of the route to be saved using the keypad and cursor pad, then press **ENTER** twice.

The unit displays the message “saving to route:” at the bottom of the ROUTES screen, confirming the name of the route being saved.



Routes screen — saving a route

- As you pass the location of each desired waypoint, press **SAVE/MOB**.

The vessel's location will be saved as a waypoint, and the waypoint will automatically be added to the route being saved. The waypoint is stored with a name similar to (0001). The parentheses indicate that the waypoint was automatically named, and the four-digit number uniquely identifies each waypoint. Each

waypoint is also given a description with the time and date you stored the waypoint.

NOTE:

While you're automatically saving a route, you can also access all of the unit's navigation functions (except you can't edit the route you're presently saving).

*To check whether you're still saving a route, press **WAYPTS/ROUTES**, then **Routes** to display the **ROUTES** screen. If you're still saving a route, the message "saving to route:" is displayed at the bottom of the screen.*

If the route becomes full (35 waypoints), you may want to stop saving to this route and start a second one.

To stop saving a route:

- Press **WAYPTS/ROUTES**, then press **Routes**.
- Press **Stop save** and **ENTER** twice.

Editing a route

You can make changes to a route graphically using the **CHART** screen or you can change it using a list of its waypoints.

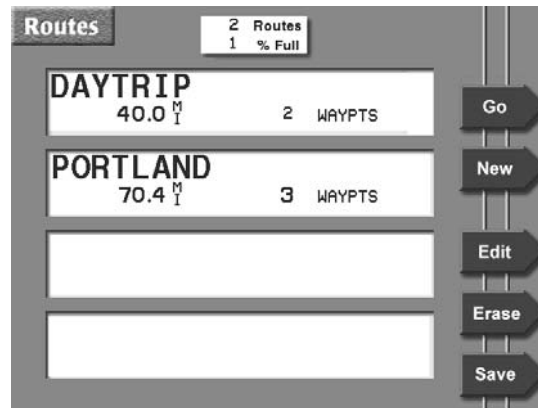
You can make any of the following changes:

- change the route name

- add new or existing waypoints to the beginning, middle, or end of the route
- remove waypoints from the route
- erase the entire route

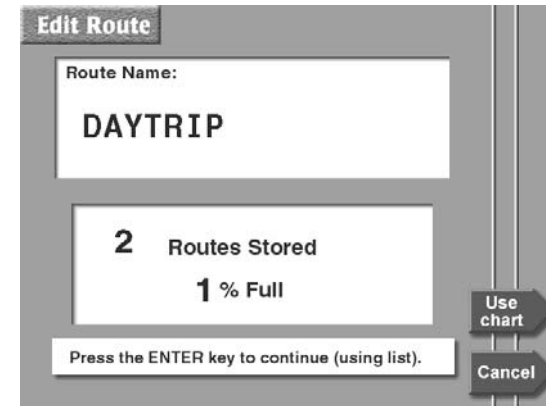
To edit a route:

1. Press **WAYPTS/ROUTES**, then press **ROUTES** to display the *ROUTES* screen.



Routes screen

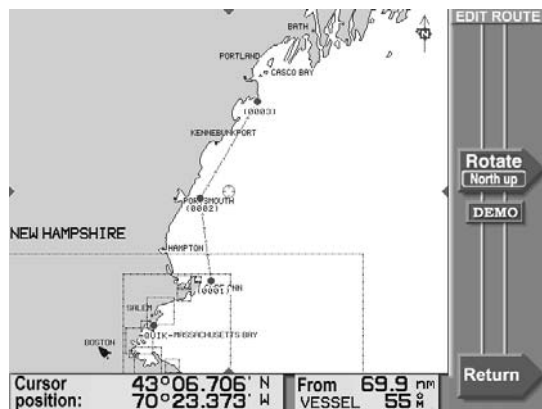
2. Press the cursor pad to select the route you want to change, then press **Edit**. The name of the route is displayed on the *EDIT ROUTE* screen.



Edit Route screen

3. If you want to change the route's name, do so now.
4. Press **Use chart** or **Use list** to change the edit method, if desired.
5. Press **ENTER**.

You can alternate between list and chart editing at any time.



Editing a route on the chart

The direction of the route is indicated by a series of small arrows in each leg, and the cursor is in the middle of the screen.

Editing from the chart is described below; editing from a list of waypoints is described in *Editing a route using a waypoints list*, starting on page 79.

Editing a route using the chart

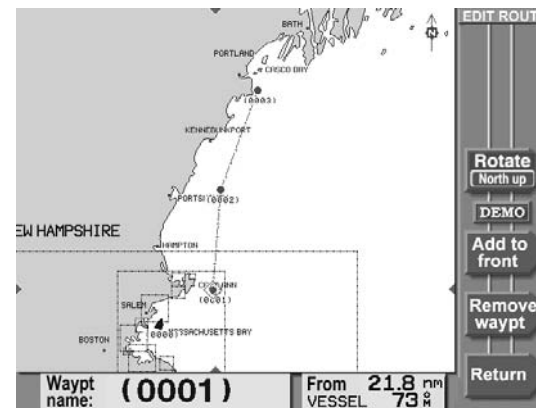
After you have accessed a route as described above, you can add or remove waypoints using the chart as follows:

Adding waypoints to a route

You can add waypoints to the end of a route, or to the beginning, or the middle,

depending on the choice you make in step one below.

1. Press the cursor pad to move the cursor onto the route's last waypoint (or first waypoint, or a leg).



Waypoint (0001) selected in the route

2. Press **Add to end** (or **Add to front** or **Split leg**).
3. Move the cursor to the location that you want to add to the route (either an existing waypoint, or any other spot).

As you move the cursor, the 6000i displays the new route leg as a dotted line to the cursor position.

4. Press a menu key once to add the waypoint:
 - If you selected an existing waypoint, the key is marked **Add waypt**.

- otherwise, the key will read **Add new WP**.
 - If you're adding to the middle of a route, the key is marked **Insert new WP**.
5. Repeat for each new waypoint or cursor location you want to add to the route.
 6. When you're finished, press **Cancel add**.
*Instead, you can press **Return** to switch to list-based editing.*

Removing waypoints from a route

To remove waypoints from the route (the waypoint is not erased from the *6000i*):

1. Move the cursor to the waypoint you want to remove, then press **Remove waypt**.
*Even if you remove all the waypoints from a route, the 6000i still retains the empty route. To remove the route entirely, see *Erasing an entire route*, on page 80.*
2. When done, press **Return** to go to list-based editing.

Editing a route using a waypoints list

After you have accessed a route, as described in *Editing a route*, starting on page 76, you can add or remove waypoints using the waypoints list as follows:

Adding waypoints to a route

1. Press the cursor pad to move the pointer at the left side of the screen to the spot *in between* two existing waypoints where you want to insert a new waypoint.

*(To add a waypoint to the beginning of the route, be sure to position the pointer **above** the first waypoint, not right onto it.)*

2. Press **Insert** to display the *SELECT WAYPT* screen that lists all your stored waypoints. To switch between the *LOCAL* and *ALPHA* lists, press **Next view**.

Note: you can't add an avoidance point to a route.

3. Move the cursor to select the desired waypoint, then press **ENTER** to add the waypoint to the route.

Removing waypoints from a route

1. Press the cursor pad to move the left-hand pointer directly onto the waypoint you want to remove.
2. Press **Remove**.
3. Press **ENTER**.

Erasing an entire route

To erase a route:

1. On the *ROUTES* screen, press the cursor pad to select the route you want to erase.
2. Press **Erase**.
3. Press **ENTER**.

Editing a route you're navigating along

When you follow a route, the route's waypoints are copied to the *navplan* for safekeeping. The navplan is displayed on

most chart screens and on the *NAVLOG* screen.

If you change a route you're navigating along, the 6000i stores the changes, but they won't appear in the navplan you're following. To activate these changes in your current navigation, you must start following the route again.

If you edit the coordinates of a waypoint directly in the navplan, you'll receive a warning, as this might result in an unsafe path. You cannot erase a waypoint that is in a route or the navplan; it must be removed from the route first.

Transferring waypoints/routes to other units

Networked 6000i's automatically share data. This section only applies to transferring data to or from the older Northstar units.

The 6000i's import/export function lets you transfer all waypoints and routes between a 6000i and a Northstar 941, 951, 952, 957 or 958.

NOTE:

To import or export waypoints and routes to and from older 900-series Northstar units, these older units must contain software version 3.12 or higher. To obtain any

necessary upgrades, please see your authorized Northstar dealer.

You can perform the transfer from either unit. **The other unit can remain in normal operation, including the displaying of different screens, as long as you do not edit any of its waypoints or routes during the transfer.** It is preferable to stop navigating on the receiving unit by pressing **STEER**, **Navlog**, and then **Stop**.

The unit you operate to perform the transfer is called the "control unit." The instructions here apply to operating the

6000i; if you choose to operate the controls on an older unit to perform the transfer, the instructions may be slightly different.

Be sure to choose the right function for what you want to do: *import* waypoints and routes *from the second unit*, or *export* waypoints and routes *to the second unit*.

Connecting the two units

The two units must be properly connected with the correct cabling and port settings. For interfacing information, contact your authorized Northstar dealer. To enable transfers on the 6000i, go to the *PORT SETUP* screen, change the *AUX PORT* to "D/B XFER," and turn the unit off and then on.

Transferring waypoints and routes

When you transfer waypoints, the *entire contents* of one unit's database are moved into the other. They will be added to the waypoints and routes already in the receiving unit. If any exact waypoint or route name matches exist, the waypoints or routes from one unit will *overwrite* the waypoints or routes already in the other.

NOTE:

If you press any function key on the control unit during the transfer, the message "Transfer aborted by key hit" will be displayed, and the process will be aborted.

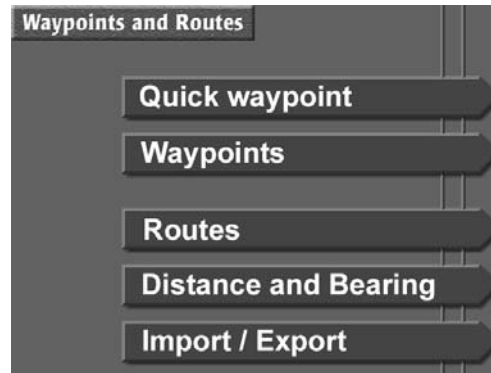
The control unit will then display the requested function. You can press any key on the second unit, however, without interrupting the transfer process.

*To intentionally stop the transfer at any time, press the **Stop** key. The control unit will display the message "Transfer aborted by key hit." Waypoints and routes transferred up to that point are in the receiving unit (be aware that routes may not contain all of their waypoints due to the transfer interruption). Press the **Start** key again to restart the entire transfer process from the beginning.*

1. Choose the unit you'd like to use as the control unit. The instructions below are for a 6000i.

Remember: You can use either of the two units because both units are capable of importing or exporting waypoints and routes. Make sure the second unit is on.

2. At the control unit, press **WAYPTS/ROUTES**.



Waypoints and routes screen

3. Press **Import/Export**.
4. Decide whether you want to *import* waypoints into the control unit, or *export* them to the second unit.



Import/Export screen

5. Press **Import** or **Export** to display the *IMPORT* or *EXPORT DATA* screen.

The status bar in the center of the screen displays the message “Ready to transfer” to show that the transfer is ready to start.

6. Before transferring, you can check the communication link between the two units by pressing **Test comm**.

The status bar should display the message “Remote link ok.”

7. To move waypoints and routes in the direction you’ve chosen, press **Start**.

The status bar displays the message “Transferring” and shows the number of waypoints and routes already transmitted against the total number. The progress bar, located below the status bar, graphically displays the percentage completed.

If there’s a problem with the transfer process, the following messages may appear:

If the second unit is not ready, the control unit displays “Couldn’t get remote waypt/route count” or “Transfer aborted by communication timeout” and the status-bar message “Communication error.”

If the sending unit doesn't have any waypoints and routes, the control unit displays the dialog-box message "No waypoints or routes to transfer" and the status-bar message "No transfer done."

If the receiving unit is completely full of waypoints and routes with no more room available, the master unit displays the

dialog-box message "Status error [002] database full."

8. If the transfer is successful, the control unit's status bar displays the message "Transfer complete."

You can now press any key to resume normal operations.

Transferring waypoints to and from a PC

If you've stored many waypoints or routes in the *6000i*, or if these waypoints are the only record you have of these important locations, you may want to keep a separate copy on your Personal Computer.

You can transfer waypoints and routes to your PC using Northstar's loader cable (part number 1100-LC) and the included PC software. Using available third-party software, you can copy, edit or plot your waypoints and routes. Most importantly, you can reload them from your PC into your *6000i* if they're accidentally erased or lost due to equipment failure. For transfer software and instructions, and cable ordering information, contact your authorized Northstar dealer.

5

RADAR

Reference section 5 **Radar**

How radar works	86
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This chapter first describes radar briefly, and then explains how to display, control, and adjust the *6000i's* radar..

How radar works

The word “radar” is an acronym for “Radio Detecting and Ranging.” A radio transmitter sends out a very short microwave pulse, and then a receiver listens for that signal’s echo when it’s bounced back from a target in its path. Targets, which may be other boats or ships, navigational markers, flocks of birds, or land masses, are displayed on the 6000i’s screen. By

knowing how long it takes for a signal to return, the distance to a target can be determined. As the radar antenna scans through a 360-degree rotation, it shows the target’s location relative to your position. By watching repeated scans of a target, such as another vessel, you can see how that target is moving.

Northstar radar models

There are two types of radar units from Northstar. The 4kW, 6kW, 12 kW and 25kW units all are operated in the same way. The new 2kW Northstar radar works slightly differently, and these differences are clearly indicated in this manual. The major differences are:

- in the 2kW radar, auto modes do not continuously adjust themselves
- ranges of manual settings are different between the two types of units
- the 2kW unit does not have a STC curve adjustment

Turning the radar transmitter on and off

Each time you turn on the Northstar 6000i, the radar transmitter must be turned on separately, as a safety feature.

When you first press the **RADAR** key after turning the system on, the unit displays:

*The Radar TX is off.
Do you want to turn it on?*

Press **ENTER** to turn it on, or **CLEAR** to access the radar adjustment pages without turning the transmitter on.

NOTE:

The radar remains in standby mode for a minute and a half after power is applied.

You can also turn the transmitter on or off using the menu keys:

1. Press **RADAR** to display the radar screen.
2. Press **Radar TX** so it indicates **On** or **Off**, as desired.

NOTE:

Even though the transmitter has been turned off, the radar is still in standby mode and draws power.

Displaying radar

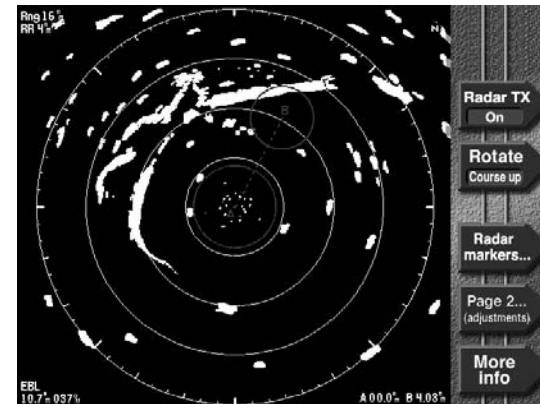
The radar image includes:

- A north indicator to show the direction of true or magnetic north.
- The current radar scale, shown by the numbers in the upper left corner of the radar image. **Rng** is the distance from the center to the largest range ring, and **RR** is the spacing between the range rings.
- A dashed white heading line. This line indicates your heading, not Course-Over-Ground, and can be used to compare the radar presentation with the view in front of the vessel.
- A gray course predictor line.

For information about rotating and scaling the radar, see *Changing radar scale and rotation*, starting on page 90.

A special demo mode for simulating radar echoes based on the chart information is available. Radar demo mode is activated whenever the chart demo is turned on.

Note:
It's important that you do **not** use Demo Mode when a radar is interfaced to the Northstar 6000i.

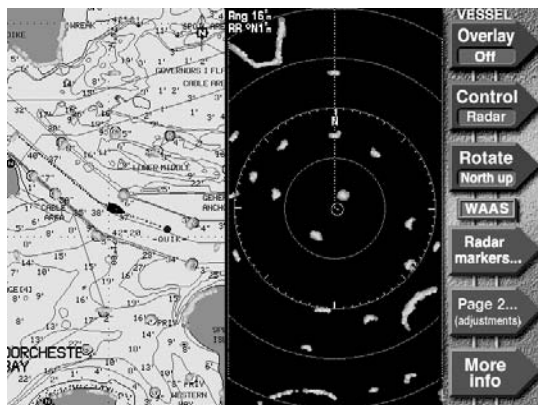


Radar screen

Using the radar's main menu keys

The radar's main menu keys allow you to:

- overlay the radar image on the chart (if the chart is also displayed)
- switch control between the radar and chart (if the chart is also displayed)
- rotate the radar image
- access the radar markers
- access the radar adjustment pages
- show more navigation information on the info bar at the bottom of the screen



Radar screen (split)

Controlling radar

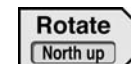
In order to control the radar, the **Control** key (if present) must indicate **Radar**.



If necessary, press the **Control** key repeatedly until it indicates **Radar**.

Rotating the radar image

Press **Rotate** repeatedly to choose the screen rotation.



You can choose north up, course-up, heading-up, or leg-up. For more information, see *Changing radar scale and rotation*, on page 90.

Adjusting the radar

Press the **Page 2** key to display the first of several pages of radar adjustments.



For more information about using these keys, see *Using the radar adjustment keys*, on page 94.

Using the radar markers

Press **Radar Markers** to display the controls for the 6000i's electronic bearing



lines (EBLs), variable range markers (VRMs), and guard zones. For more information about using these keys, see *Using the Radar Markers keys*, starting on page 98.

Transmitter control

When the radar image is displayed full-screen by pressing the **RADAR** key, a menu key allows you to turn the radar transmitter on or off.



Viewing more info

Press **More info** to display an "info bar" at the bottom of the screen. Each additional

press of **More info** shows the following information:

- your vessel's present Speed-Over-Ground (SOG), Course-Over-Ground (COG), and heading
- your vessel's distance (*dist*) and bearing (*brg*) to the current waypoint, if any, along with a steering indicator
- your vessel's position in lat/lon (or TDs, if enabled)
- the water depth, water temperature, and Speed Through Water (STW) reading from the sounder (if interfaced)

Overlaying radar on the chart

To overlay radar onto the chart, press **CHART** to switch to the chart screen, then press **Overlay** to display **Radar** in the key's blue box.

Radar can be displayed on the main radar screen, or as an overlay on the chart screen, or as part of a split screen. All radar functions are controlled in the same way, regardless of how radar is displayed. Just press the **Control** key so that it displays **Control Radar**.

Setting radar transparency

When you overlay a radar image on a chart, you can choose whether the radar should be opaque (the chart doesn't show through) or transparent (the chart shows through faintly):

1. Press **Page 2**, then **Page 3**, **Page 4** and **Prefs...**
2. Press **Fade** to select **Off** (no transparency), **Medium**, or **High** (maximum transparency).

To remove the radar overlay, press the **Overlay** key on the radar's "Page 1" so that it displays **Off**.

Changing radar scale and rotation

Changing the scale

To change the radar's scale, press the **IN** key to zoom in (smaller area, more detail) or the **OUT** key to zoom out (wider area, less detail).

Using zoom on a split screen

If there's no radar overlay on the chart, the chart and radar are scaled separately. Zooming in on the chart, for example, has no effect on the radar's scale. If the **Control** key indicates **Radar**, you're zooming the radar; if it indicates **Chart**, you're zooming the chart.

However, if the radar overlay is turned on, the chart and radar scales are locked together. When you zoom in on the chart, radar scale changes to match the chart.

Rotating the radar image

To rotate the radar image, press the **ROTATE** key repeatedly until it indicates

the rotation you want; you have the same options as for a *CHART* screen.

The rotation of the chart and the rotation of the radar interact under certain circumstances, as described in the table below. If the **Control** key indicates **Radar**, you're rotating the radar; if it indicates **Chart**, you're rotating the chart.

If the Chart screen's in...	And the radar image is...	
	Overlaid on the chart	Not overlaid
Browse mode	The chart can't rotate in Browse mode. If you change the Control key to Radar , the chart's mode automatically switches to vessel mode and rotated as described below).	The chart can't rotate, but the radar can rotate. Chart and radar can have different rotations.
Vessel mode	Chart and radar both rotate together. If you change the rotation of one, the other automatically changes to match.	Chart and radar can both rotate. Chart and radar can have different rotations.

Setting user preferences

Press **Page 2**, **Page 3**, **Page 4**, and the **Prefs...** key from the main radar screen to display menu keys for controlling:

- range rings
- bearings
- echo colors
- sweep type
- fade (transparency)

Range rings

Range rings are concentric circles around your vessel that can be used to measure

distance from your vessel. The spacing of the range rings is shown in the upper left-hand corner of the radar image (identified by "RR."

Press **Range Rings** to turn the range rings on or off.



Bearings

Press **Bearings** to display the fixed EBL's bearing digits as relative to:

- the vessel heading, or

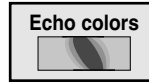


- north (either true or magnetic north as selected in the Navigation Setup screen)

analog sweep (displays data in a way that simulates the appearance of a traditional radar sweep line).

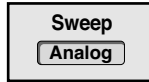
Echo colors

Press Echo Colors to choose the color scheme that will be used to display radar echoes.



Sweep type

Press Sweep type to choose between digital quadrant update (displays data as it is received from the radar) and



Fade

When you overlay a radar image on a chart, you can choose whether the radar should be opaque (the chart doesn't show through) or transparent (the chart shows through faintly). Press **Fade** repeatedly to select **Off** (opaque), **Medium**, or **High** (maximum transparency).



Operating modes

The Northstar radar can be set to any of several operating modes. These modes control the gain and clutter settings. For most situations, one of the automatic modes will provide a good picture, and the radar will normally adjust itself for an excellent image. Range Rider mode can be used to further improve the picture, if necessary. The available modes are listed below:

- **Auto 1** and **Auto 2** are for normal, open-water use. The two automatic modes can be optimized for two different conditions.
- **Harbor** automatically optimizes the radar settings for use in a harbor.
- **Range Rider** is a Northstar exclusive feature recommended when manual settings are required. The user can freely make any needed gain and clutter adjustments, and these settings are "remembered" for each range. When the range is selected again, the last-used gain and clutter settings for that range is reapplied.
- **Manual** is a fully manual function in which the user usually needs to adjust

the settings each time the range is changed.

While in Range Rider mode, the Sea State control can be used to adjust the sea clutter for all ranges (see *Sea State*, starting on page 96).

Automatic modes

This section does not apply to the 2kW radar.

In automatic mode, the unit continuously evaluates its settings and adjusts them as necessary to obtain the best image. Gain and clutter are evaluated separately in various areas of the screen, and the settings are optimized for each area. Breaking waves often cause stronger clutter echoes on one side of the vessel than on the other, and automatic mode can optimize the image for each area.

Use the automatic settings to adjust the desired appearance of the radar image to your preference. The will radar attempt to maintain this appearance over a variety of conditions by monitoring the signals and making adjustments as conditions change.

You can store two sets of image appearance settings: one called **Auto 1** and one called **Auto 2**. Automatic settings are stored individually for each range.

Fine tuning automatic settings

This section does not apply to the 2kW radar.

The appearance settings should have been adjusted during installation, but you may wish to fine tune them as follows:

To set the appearance of the sea clutter or gain controls for Auto1, Auto2 and Harbor modes:

1. From the main radar page, press **Page 2**.
2. Press **Mode** if necessary until it reads **Auto 1, Auto 2, or Harbor**.
3. Set the **Sea clutter** or **Gain** to automatic if necessary by pressing the key so that it reads "Auto."
4. Use the keypad or cursor pad to enter a new value to change the appearance.
5. If necessary, continue adjusting the image until it looks the way you want it.
6. Repeat steps 4 and 5 for each range setting

Manual settings

Even if the mode is set to automatic, any gain or clutter setting can be overridden and set to manual. Each adjustment key is labeled Manual or Auto. Simply press each key to change its mode.

Manual settings directly control Rain Clutter, Sea Clutter and Gain. They may be applied in either of two ways, depending on the setting of the Mode control on this screen.

- Mode = Manual: settings are applied directly as entered
- Mode = Range Rider: settings are saved separately for each range, and the last-used settings for each range are reapplied when that range is selected.

To set the appearance of the sea clutter or gain controls in manual mode:

1. From the main radar page, press **Page 2**.

2. Press **Mode** if necessary until it reads **Range Rider** or **Manual**.
3. Use the keypad or cursor pad to enter a new value to change the appearance.
4. If necessary, continue adjusting the image until it looks the way you want it.

The modes of rain clutter and sea clutter are always locked together: if the user sets one to manual, the other automatically switches to manual, and vice-versa.

More information on using these settings is given *Radar adjustments on Page 2*, starting on page 95.

Using the radar adjustment keys

Press **Page 2** to display the first of several pages of radar adjustments. Most of these adjustments correspond to conventional radar adjustments and are used in the same way. All settings are retained while the system is turned off.



Using the keys

Settings that have only a very few values are adjusted by repeatedly pressing the menu key to cycle through the available choices.

Settings with a large adjustment range are entered with the keypad or cursor pad. The menu key for these adjustments must be activated by pressing once, changing the key from blue to red. (Any key that is red is active and will respond immediately. A blue key must first be pressed to activate it.)

To make an adjustment to the radar (such as rain clutter, or gain, etc.), use the following procedure:

1. Press the key (such as **Gain**) to activate it (the key changes from blue to red).

2. If a numerical value appears, you can change it by:
 - pressing the cursor pad up and down (changes affect the display immediately after the cursor pad is released), or
 - using the numeric keys on the keypad to enter the value, or
 - in some cases, pressing the menu key again

Radar adjustments on Page 2

Press the keys to adjust the mode, rain clutter, sea clutter, or gain.



Press the **Mode** key to select the operating mode as described on page 92.

Rain Clutter controls the strength of the clutter echoes returned from rainfall or snow. Higher values suppress more clutter. Rain Clutter can be set to automatic or manual mode. Press the activated **Rain clutter** key to switch modes. The rain clutter setting can be entered on the keypad or by using the cursor pad. Manual settings range from 0 to 99 (0 to 8 on the 2kW unit). Higher settings suppress more rain echoes.



Sea Clutter controls the strength of the clutter echoes returned from the ocean surface. Higher values suppress more clutter. Sea Clutter can be set to automatic or manual mode. Press the activated **Sea clutter** key to switch modes. The sea clutter setting can be entered on the keypad or by using the cursor pad. Manual settings range from 0 to 214 (0 to 255 on the 2kW unit). Automatic settings range from 0 to 50 (0 to 255 on the 2kW unit) and are **unrelated** to the manual setting numbers.



Gain controls the strength of all echoes, and should be adjusted for a pleasing and useful image. Higher values display brighter echoes. Gain can be set to automatic or manual mode. Press the activated **Gain** key to switch modes. The gain setting can be entered on the keypad or by using the cursor pad. Manual settings range from 0 to 299. Automatic settings range from 0 to 50 and are **unrelated** to the manual setting numbers. (*Settings for the 2kW unit range from 0 to 255*). Manual gain adjustments will be different for each range scale. Longer ranges generally require more gain.



If speckling appears on the screen, you may wish to decrease the gain a bit or increase the sea clutter setting.

Radar adjustments on Page 3

Press the following keys to adjust the radar transmitter, the transparency (fade) of the radar overlay on a chart, the radar trails, and the visibility of echoes.

Sea State

The Sea State control is available only when the Mode control is set to Range Rider.

Sea State adjusts sea clutter for all ranges up or down slightly to correspond with the expected echoes from whitecaps and breaking waves. The normal or "0" setting applies no changes, and is used when the sea state is the same as when the gain and clutter settings were entered. Positive numbers can be used when the sea is rougher, and negative numbers when the sea state is calmer.

To set the Sea State:

1. From the main radar screen, press **Page 2** and **Page 3**.
2. Press **Sea State**.
3. Use the cursor pad to enter a new number.

Press **Done** to go back to the main radar screen.

Interference rejection

Certain types of interference (for example, from radars on other vessels) can be lessened by using the interference rejection filter. Press **Interference Rejection** repeatedly to select **Off**, **1** (low), **2** (medium), or **3** (high).



Trails

Trails on the radar image help you track the motion of moving targets. Press **Trails** repeatedly to select how often trail points are recorded: every 15 seconds, 30 seconds, every minute, 3 minutes, 6 minutes, always (points are recorded continuously), or off (points are not recorded).



If trails are left on continuously, the recorded points may eventually fill up a large part of the screen. Zooming in or out will erase all recorded trail points.

Expand

Press **Expand** to turn echo expansion off or on. Select **On** to make small echoes appear larger and easier to see.



Radar adjustments on Page 4

Press **Radar TX** to turn the radar transmitter **On** or **Off**.

The radar transmitter is automatically turned off every time you shut down the *6000i*. Turning the transmitter off when it is not in use saves electrical power and allows you to work safely in the vicinity of the rotating antenna.



Prefs...

Press to display the user preferences menu keys (see *Setting user preferences*, on page 91).

Install...

Press to display the installation settings menu keys. These keys are described in the Northstar radar installation manual (P/N GMKRadIM) and settings should not be changed unless their functions are fully understood.

Restore...

Press to display the restore menu keys (see *Restore factory settings*, on page 97).

Installation settings

These keys are described in the Northstar radar installation manual, P/N GMKRadIM (*GMKRad2KIM for the 2kW unit*), and settings should not be changed unless their functions are fully understood.

Tuning page

These keys are described in the Northstar radar installation manual, P/N GMKRadIM (*GMKRad2KIM for the 2kW unit*), and settings should not be changed unless their functions are fully understood.

Restore factory settings

The Restore functions can be used to set many adjustments back to their factory-set values. Press the **Restore...** key to access these keys.

Restore Auto, Restore Harbor, Restore Range Rider and Restore Manual each set the Clutter and Gain adjustments back to the factory settings for the specified operating modes.

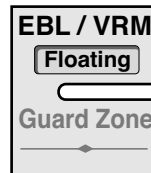
Restore Factory Settings sets the following values:

mode: **Auto 1**
rain clutter, sea clutter and gain are set to
useful values for each range
interference rejection: **Off**
trails: **Off**
expansion: **Off**
range rings on/off: **On**

bearings: **True/mag**
echo colors: **The first set** (green)
sweep: **Analog**
fade: **Off**
STC curve: **4** (*not present on 2kW model*)
tune mode: **Auto**
tune preset: **79** (*not on 2kW model*)

Using the Radar Markers keys

Press **Radar Markers** to display controls for the 6000i's electronic bearing lines (EBLs), variable range markers (VRMs), and guard zones. The two upper menu keys select whether you control the EBL/VRMs or the Guard Zones for adjustments. When finished, press **Done** to return to the main radar menu keys. All settings are retained while the system is turned off.



Electronic Bearing Lines (EBLs)

Electronic bearing lines (EBLs) are markers that you can place on top of the radar image to aid in navigation and to keep track of your surroundings. The 6000i uses two types of EBLs: fixed and floating.

The *fixed* EBL is a blue line from your present position (Point "A") to Point "B."

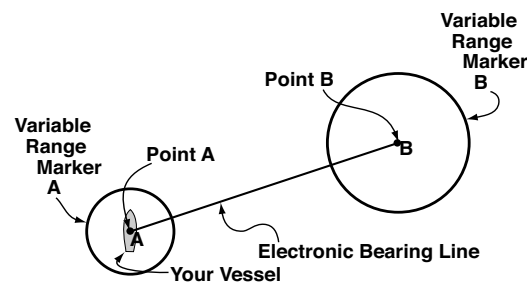


Figure 5: Fixed EBL

You can move Point B to a point of interest using the cursor pad. At the end of the line, a blue circle called a variable range marker (VRM B) surrounds Point B. Another VRM circle (called VRM A) surrounds your vessel's position.

You can change the size of each VRM to measure distances from Point A or Point B to any point of interest on the screen.

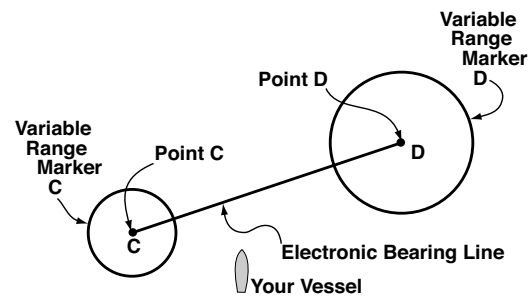


Figure 6: Floating EBL

The *floating* EBL is a pink line connecting Point C and Point D. It's similar to the fixed EBL, except that both points can be moved, to allow measuring distances between any two points on the screen. Again, there's a variable range marker at each end of the line.

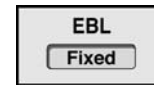
The following information about the EBLs and VRMs appears on your screen:

- In the upper right-hand corner, you'll see:
 - > The coordinates of Point A, B, C or D (whichever point you selected)
 - > The ETE and ETA to the selected point
- In the bottom right-hand corner, you'll see the radius of the VRM(s). These numbers are color coded blue for the fixed EBL and pink for the floating EBL.
- In the bottom left-hand corner, you'll see the length of the electronic bearing line(s). These numbers are also color

coded blue for the fixed EBL and pink for the floating EBL.

Press the following keys to adjust the electronic bearing lines.

Press **EBL** to select either the fixed or the floating EBL. The selected EBL can be adjusted with the following two controls:



Press **Visibility** to show or hide the EBL selected above. When an EBL is hidden, its **Edit** key is also unavailable.



Press **Edit** repeatedly to select what part of the EBL is controlled by the cursor pad:



For the fixed EBL, select:

- Point B – to move the point at the far end of the fixed EBL
- VRM A – to control the size of the VRM circle at the vessel
- VRM B – to control the size of the VRM circle at point B

For the floating EBL, select:

- Point C– to move the point at one end of the EBL
- Point D – to move the point at the other end of the EBL

- VRM C – to control the size of the VRM circle at point C
- VRM D – to control the size of the VRM circle at point D

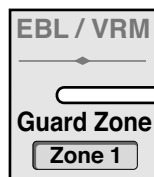
Shortcut for moving the fixed EBL

On page 1 of the radar screen, you can use the cursor pad to change the position of the fixed EBL and read the measurements displayed.

Guard zones

Press the **Guard Zone** menu key to control this feature.

You can designate up to three guard zones that the 6000i monitors for radar echoes. Any echoes inside a guard zone and as strong as or stronger than the designated trigger level are displayed in red and cause an alarm. Each zone is bounded by red lines – an inner and an outer arc centered on the vessel, and two straight lines extending outward from the vessel as shown in Figure 7.



You can turn each zone on or off, change its boundaries, and set the echo strength that will cause an alarm.

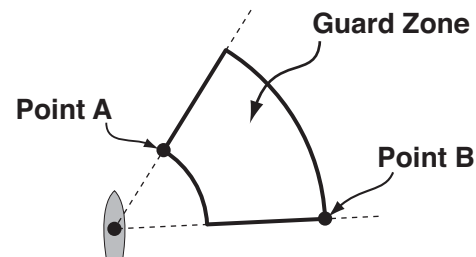


Figure 7: Guard zone

Press the following keys to adjust each guard zone.

Press **Guard Zone** repeatedly to select zone 1, 2, or 3 for adjustment.



Press **Visibility** to show or hide the zone selected above. When a zone is hidden, it doesn't alarm and its **Edit** and **Trigger Level** keys aren't available.



You can set the boundary and size of each guard zone by moving Point A and Point B. Press **Edit** to select Point A or Point B. Then press the **CURSOR PAD** to move the selected point and create an arc-shaped zone.



As you change Point A or B, the coordinates of that point are updated in the upper right-hand corner of the screen.

Press **Trigger Level** repeatedly to set the signal strength that causes an alarm: low, medium, high, or off (no alarm).



The alarm is temporarily turned off while you are displaying the radar markers menu keys. It automatically turns back on after a minute passes with no further adjustments, or when you press **Done**.

6



Reference section 6 **Echo sounding**

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The Northstar 490 Echo Sounder connects with a Northstar navigator and a transducer to add echo sounding capability to the Northstar 6000i. See the *Northstar 490 Installation Manual* (part number GM491) or the Airmar website (www.airmar.com) for recommended transducers.

Welcome to the Northstar 490 Echo Sounder

CAUTION!



Proper installation and configuration of your Northstar 490 is of utmost importance for accurate and effective performance under a variety of conditions. To get the best performance from your 490, Northstar strongly recommends installation and set-up be performed by a qualified marine technician. For installation procedures, see the Northstar 490 Echo Sounder Installation Manual (Part Number GM491).

How echo sounding works

An echo sounder produces high-voltage electrical pulses that the transducer converts into sound waves (called “pings”). When a sound wave hits and reflects off an object, such as fish, debris, seaweed, or the seabed, the reflected sound wave (an “echo”) returns back to the transducer along an imaginary vertical line called a “water column.” The transducer converts this echo into a tiny electrical pulse. The 490 digitizes these pulses and sends them to the navigator, so that echo sounding pictures of the water and seabed can be displayed and analyzed on the echo

sounder screen. The echo sounding system lets you see a real-time cross section of what’s happening underneath your vessel.

The model 490-S is a 600-watt single channel echo sounder designed to be used with a transducer having a single ceramic element capable of 50 and 200 kHz.

The model 490-D is a 1000-watt dual channel echo sounder designed to be used with a transducer having dual ceramic elements, one each for 50 and 200 kHz.

The 490 module automatically turns on and off as the 6000i is turned on and off.

Setting up the 490

Your 490 should be installed by a qualified marine technician. Your satisfaction with the system’s performance will be greatly influenced by the practical knowledge and experience of the installer. Unlike GPS or other marine electronics systems, echo sounder installation is as much an art as it is a science.

The installation procedure includes setting the 6000i’s AUX port to the 490 option, and then setting the following options:

- the transducer’s depth
- the speed and temperature

- the calibration for the speed sensor
- the calibration for the temperature sensor
- the gain calibration for the transducer

You may wish to change the following options from time to time to match your personal preferences:

- depth units (feet, meters, or fathoms) on the screen
- temperature units (Celsius or Fahrenheit) on the screen
- temperature scale (lowest and highest) on the screen
- automatic saving of **fish##** or **therm##** waypoints when the 490 detects the presence of fish or a certain water temperature that you've set

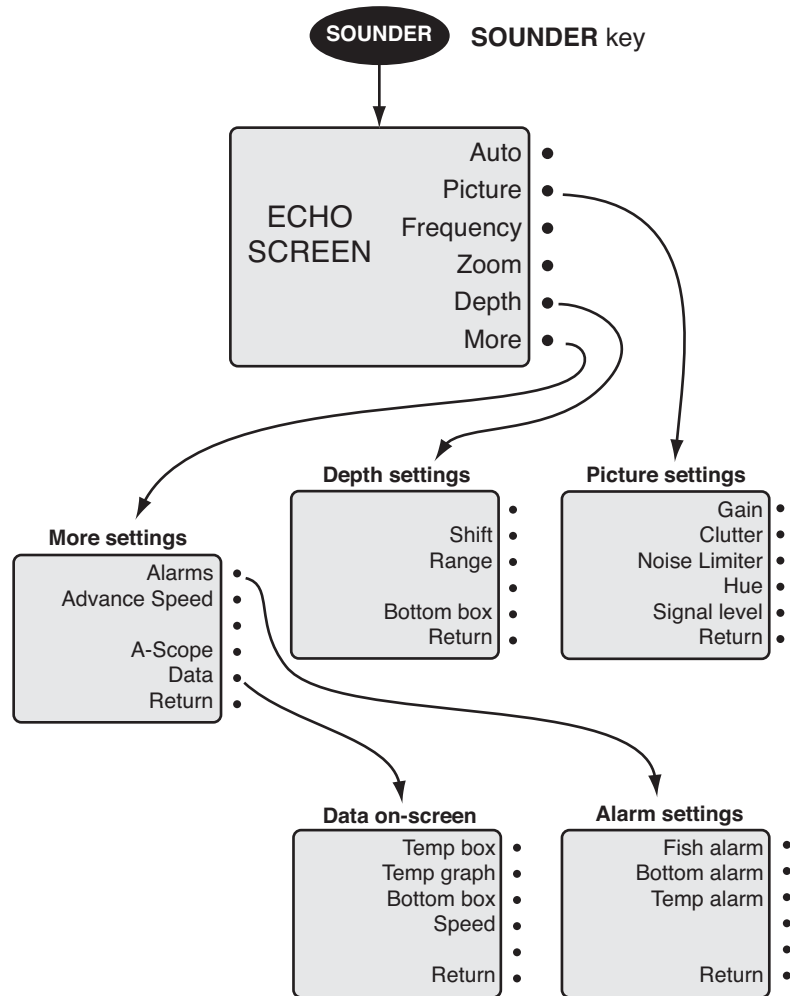


Figure 8: Echo sounder menu structure

Displaying the echo sounder's picture

To see the echo sounding screen at any time, press **SOUNDER**. You'll see live echoes moving across the screen.

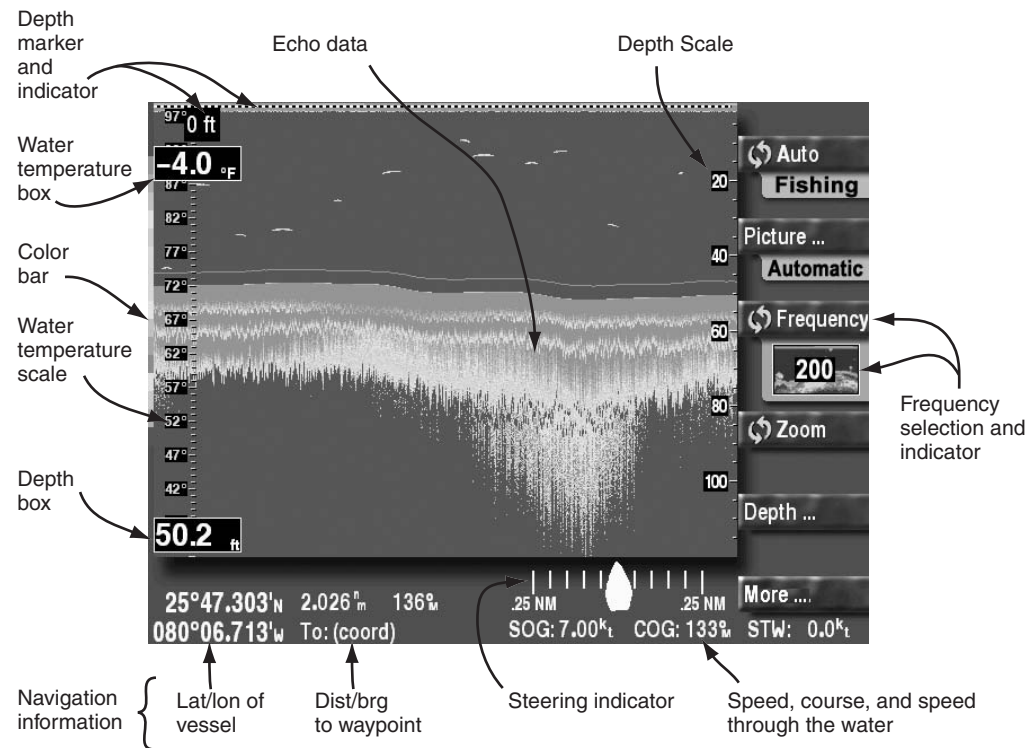


Figure 9: Illustrated SOUNDER screen

You can also review old echoes using Northstar's exclusive SoundTrac™ feature.

For details, see *Viewing past echoes using SoundTrac*, on page 127.

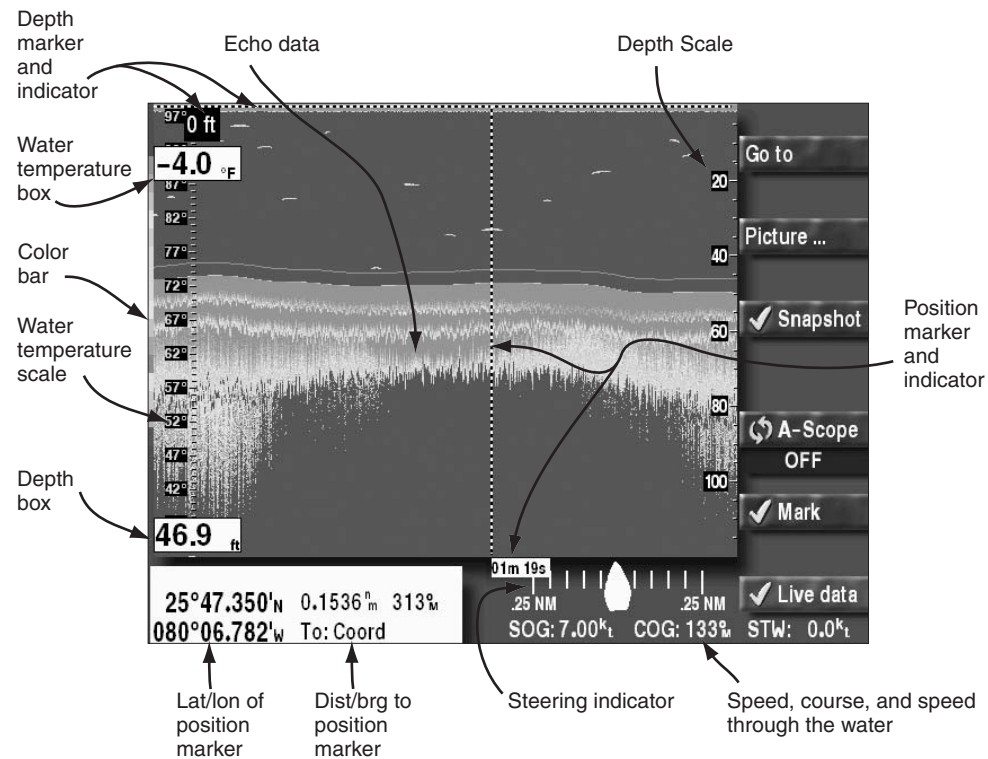


Figure 11: Illustrated Soundtrac screen

Using demo mode

The echo sounder can be operated in “demo mode” for training and familiarization. Simulated echo data generated by the 490 will be displayed.

To enter demo mode:

*The **SAVE** and **MOB** functions always work normally. Moreover, whenever you press either of these keys, the corresponding *SAVE##* or *MOB##* waypoints will be displayed automatically on the echo sounder’s picture, as well as on the chart screen.*

1. Press the **STAR** key to display the *OPTIONS/SERVICE INFO* screen, and then press **Sounder Options**.
2. Press the cursor pad down to select Demo mode, then press **Edit**.

3. Press the cursor pad up or down to highlight “On,” then press **Enter**.

While in demo mode, the word “Demo” appears in the upper-right corner of the SOUNDER screen.

To leave demo mode, repeat this procedure, selecting “Off” instead of “On.”

Using automatic mode

To operate the echo sounder automatically, just press **Auto**. All of the 490's adjustments will be set to produce a useful picture under most conditions. When you're too busy to optimize the settings manually, the echo sounder can automatically set the optimal gain, clutter, and range settings, to show an excellent picture from the surface to the bottom.

When you select Auto, the range setting may change from time to time to keep the seabed in view as the water depth changes.

It is recommended that the 490 be operated automatically whenever possible. The 490 can reliably detect the seabed depth only when it controls the gain and clutter settings.

Cruising or fishing

Automatic mode has two variations: *autocruising* and *autofishing*.

- autocruising optimizes the gain and clutter for tracking the bottom, with less emphasis on any fish in the water
- autofishing optimizes the gain and clutter for searching for fish

Press **Auto** to switch between autocruising and autofishing. The setting is shown by the colored tab below the menu key.

The status tabs

Colored status tabs just below the **Auto** and **Picture** keys are green when the echo sounder is operating fully automatically. They turn yellow to show one or more settings has been set manually.

Manually overriding automatic mode

You can always manually change any of the echo sounder's settings: the gain, clutter, noise limiter, shift, and range. (Manually setting the gain causes the range to be controlled manually.)

Changing the appearance of the picture (colors, gain, clutter, and the noise limiter) is described in *The picture menu*, starting on page 117.

Setting the range and shift is described in *Changing the depth settings*, starting on page 121.

Changing the frequency of echoes

The 490 uses two transducer frequencies: 50 kHz and 200 kHz. The advantages and disadvantages of each frequency are shown below.

Table 3: 50 kHz vs. 200 kHz

50 kHz	200 kHz
Longer wavelength goes deeper, but with somewhat lower resolution.	Shorter wavelength provides a sharper picture, but can't go as deep.
Less resolution is better at finding big fish, but may miss the bait fish.	Finer resolution is better at finding small fish (baitfish) and subtle bottom details.
Wider beam is good for seeing fish not directly beneath the boat.	Narrower beam is very focused. Reduces the influence of a rough sea.

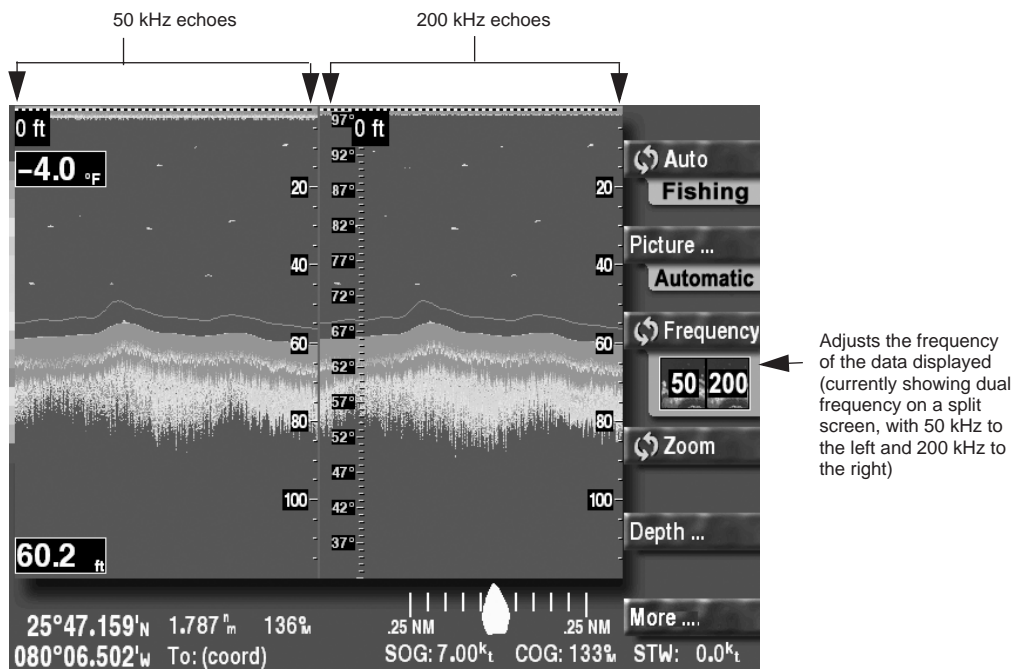
You can choose from four settings for the transducer frequency:

- 50 kHz displayed on a full screen

- 200 kHz displayed on a full screen
- 50 kHz on the left half of the screen, and 200 on the right
- 200 kHz on the left half of the screen, and 50 on the right

There are two reasons why you might want to operate with your preferred frequency on the *right* side of the screen:

- the zoom function magnifies the frequency on the right side
- when adjusting the picture, you can see the effect of changes on the right side



Echo screen with both frequencies displayed

To choose the transducer frequency, press **Frequency** until the desired combination is shown.

When you change the frequency, echoes already on the screen don't change, they just move off the screen as they are replaced by echoes at the new frequency.

A dual-frequency screen is split into two halves separated by a gray vertical line in the center.

When using the zoom feature (which also splits the screen into halves), both sides of the screen always display the *same* frequency.

Zooming in and out

The echo sounder's zoom feature expands a portion of the echoes. You can examine closely any part of the water column to determine the composition of the bottom or look at the echoes of fish, rocks, or wrecks. When fishing, the zoom function is useful for showing a detailed view of any echoes below the vessel.

Choosing a zoom mode

Press the **Zoom** menu key on the *ECHO* screen to select one of the four zoom modes (or turn the zoom feature off):

- bottom zoom
- bottom lock
- bottom lock/center
- marker zoom

The current zoom mode is displayed below the **Zoom** key.

The original unzoomed echoes are on the right side, and the magnified area is shown on the left side of the screen.

Choosing the zoom scale

Press **IN** to zoom in and increase the magnification of the echoes you see below

the top edge of the marker. Press **OUT** to zoom out and increase the amount of water seen.

Six depth ranges are available for the magnified echoes: 15', 30', 60', 120', 240' and 480'. Similar scales are available for the other depth units.

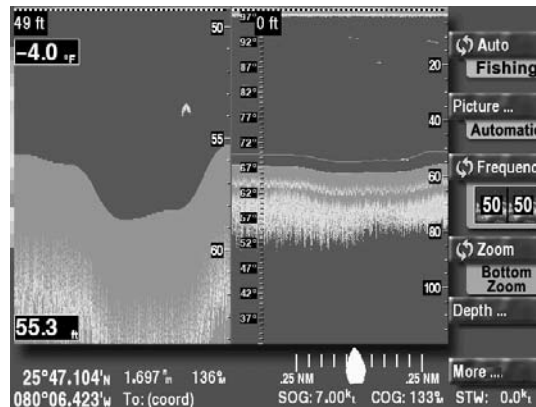
When zoom is in use, only a single frequency is displayed. Unzoomed echoes are on the right, and the same frequency is shown magnified on the left.

You cannot zoom out to a scale that shows more water than the original picture. For example, if the original picture is set to a scale of 50 feet, the only zoom scales available will be 15 feet and 30 feet.

Bottom zoom

When you select *bottom zoom*, the contour of the bottom is magnified, clearly displaying canyon edges and echoes near the seabed. The 490 automatically locates the seabed and displays it on the lower left side of the screen (normal echoes are displayed on the right side).

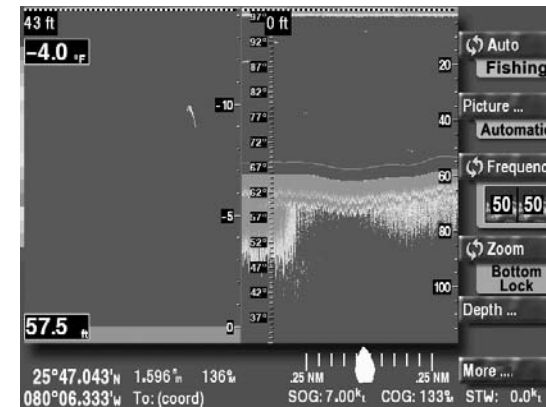
If the seabed moves out of the lower half of the screen (for example, if you travel into deeper water), the 490 automatically repositions the bottom back into the lower half. You'll see the zoomed image jump up or down from time to time, as the 490 keeps the seabed displayed on the screen.



Bottom lock/center zoom

Bottom lock zoom

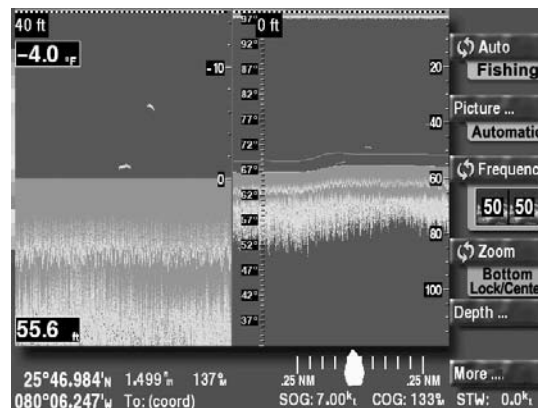
Bottom lock zoom is similar to bottom zoom, except the magnified sea bottom is flattened out and displayed on the left side of the screen at the lower edge. You can see any fish that are swimming near the bottom.



Bottom lock zoom

Bottom lock/center zoom

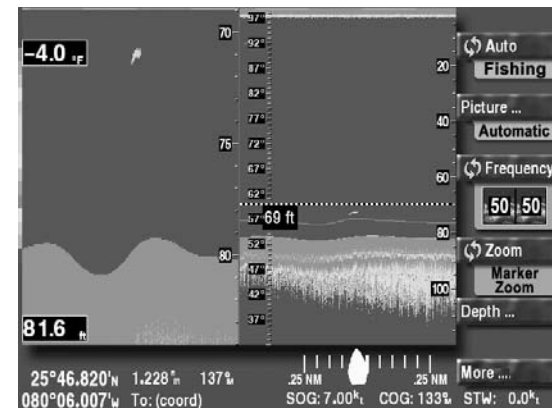
When you select *bottom lock/center zoom*, the flattened-out sea bottom is displayed in the center of the screen. You can see any fish near the bottom – as with the bottom lock zoom – and also examine the seabed's composition.



Bottom lock/center zoom

Marker zoom

When you select *marker zoom*, you can choose the part of the water column to magnify. The top edge of the magnified area is determined by the location of the depth marker. To move the depth marker, press the cursor pad up or down.



Marker zoom

Leaving zoom mode

To return to the normal unzoomed display, just press **Zoom** repeatedly until you have cycled through all the zoom modes.

Echo Sounder setup

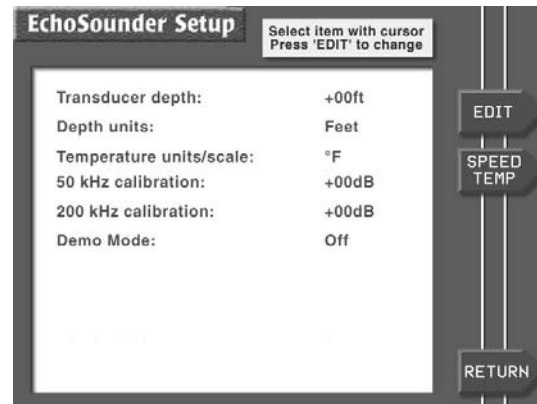
Several setup functions are available to configure the echo sounder.

CAUTION:

Be careful not to change any of the functions that are not described here unless you first read about them and understand their functions in the Northstar 490 Installation Manual.

Accessing the setup screen

To display the echo sounder setup screen, press the **STAR** key to display the *OPTIONS/SERVICE INFO* screen, and then press **Sounder Options**.



Echo Sounder Setup screen

Transducer depth

This option specifies how far below the surface of the water the transducer is mounted. The number is added to all depths measured by the 490 so they will refer to depth from the surface, not from the transducer. This value should have been set correctly during installation and should not be changed.

Depth units

You can change the depth units to feet, meters, or fathoms:

1. Press the cursor pad up or down to highlight the *Depth Units* option.
2. Press **Edit**.
3. Press the cursor pad up or down to display the desired units.
4. Press **ENTER**.

The temperature graph's units and scale

You can change the highest and lowest water temperatures that will be displayed on the temperature graph:

1. Press the cursor pad up or down to highlight the temperature scale option.
2. Press **Edit**.
3. Press the cursor pad up or down to highlight °C or °F, as desired, then press **ENTER**.
4. To change the endpoints of the scale, press the cursor pad to the right.
5. Enter two digits for the lower temperature limit using the keypad.
6. Enter two digits for the upper limit.
7. Press **ENTER**.

Transducer calibrations

These functions are set during installation and should not be changed unless they are known to need adjustment.

The 50 kHz and 200kHz calibrations are used to equalize the signal strengths of the two frequencies.

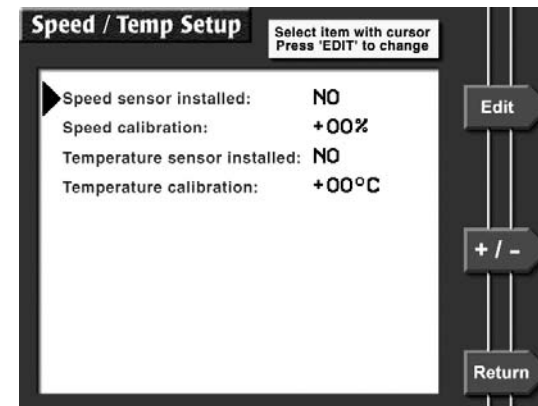
Demo mode

To activate Demo mode, see *Using demo mode*, on page 108.

Speed and temperature sensor setup

These functions are set during installation and should not be changed unless they are known to need adjustment.

From the *ECHO SOUNDER SETUP* screen, press **Speed/Temp** to access the *SENSOR SETUP* screen.



Bottom lock/center zoom

To simplify operation, the “sensor installed” options can be set to “No” to remove all references to temperature and speed from all the screens.

Highlight the appropriate line and press **Edit** to change the option.

Speed calibration is entered as a percentage from -99% to +99% to make the speed

read lower or higher than the uncalibrated value.

NOTE:

You **must** enable the speed setting under the Data menu on the ECHO SOUNDER screen.

Temperature is calibrated by entering the temperature error as a number of degrees from -99 to +99. This offset is added to the uncalibrated temperature before it is displayed or graphed.

The picture menu

You can adjust the appearance of echoes in five different ways:

- gain (for high intensity echoes)
- clutter (for low intensity echoes)
- noise limiter (for interference)
- hue (to choose colors and white level)
- signal level (to remove weak echoes)

Gain and clutter changes are applied only to new echoes as they appear on the right side of the screen—earlier echoes are not affected.

NOTE:

When you override the gain's automatic settings, the tabs on the **Picture** key and **Auto** key change from green to yellow, indicating the system is no longer in automatic mode. When you turn the noise limiter on, only the **Picture** key tab changes from green to yellow. Changing the hue or adjusting the signal level has

no effect on the operating mode (the tabs remain green).

Adjusting the gain (strong echoes)

The *gain* setting selects the echo strengths that will be displayed using the *topmost* color in the color bar at the left edge of the screen (the *strongest* echoes). Any echoes stronger than this selection will use the same color and no detail can be distinguished. The gain is usually set so that strong seabed echoes are displayed in brown, the strongest level.

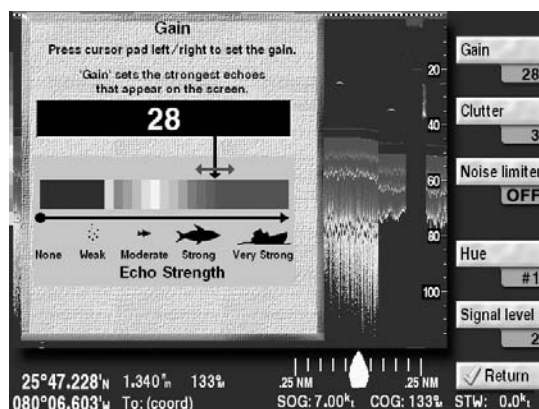
The gain can be also be set automatically by pressing **Auto**. This provides an excellent picture under most conditions, and allows the 490 to reliably detect the seabed depth.

Gain is normally adjusted together with *clutter*, as described on the next page.

To adjust the gain:

1. Press **Picture**.
2. Press **Gain**.
3. Press the cursor pad left or right to adjust the gain, or use the keypad to manually enter the desired gain value. The available settings range from zero (minimum) to 75 (maximum).

When you adjust the gain, the color of the **Auto** and **Picture** key tabs changes from green to yellow, since the echo sounder is no longer in automatic mode. Also, a yellow tab appears under the **Depth** key, indicating that the range setting is no longer automatically controlled and that the 490 may not always identify the bottom reliably.



Gain window

The window shows the effect of adjusting the gain. The fish symbols near the bottom of the window represent various echo strengths, and the expanding and contracting color bar above shows the colors that will be used to display echoes of these strengths. As you adjust the gain to obtain the best looking picture, also watch the real echoes on the right side of the screen.

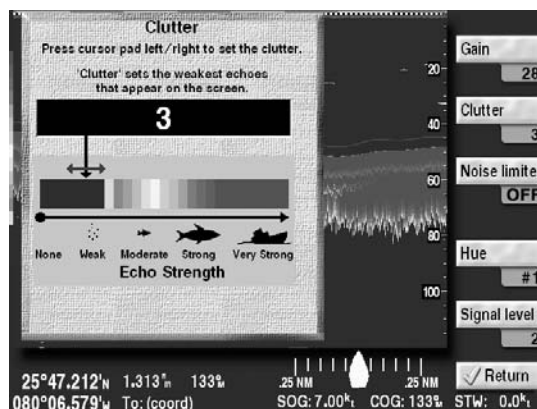
4. Press **Return** to go back to the *SOUNDER* screen.

Adjusting the clutter (weak echoes)

The *clutter* setting selects the echo strength that will be displayed using the *bottom* colors of the color bar (the *weaker* echoes). Any echoes weaker than this selection are displayed. If you select a clutter value of 5, for example, all weak and moderate echoes are suppressed. You might choose this setting to eliminate high levels of background noise and echoes from turbulence or plankton. A setting of 0 allows all echoes to be displayed.

To adjust the clutter:

1. At the *SOUNDER* screen, press **Picture**.
2. Press **Clutter**.
3. Press the cursor pad left or right to adjust the clutter, or use the keypad to manually enter the desired clutter value. The available settings range from zero (shows all echoes) to nine (suppresses many echoes).



Clutter window

4. Press **Return** to go back to the *SOUNDER* screen.

*When you adjust the clutter, the color of the **Auto** and **Picture** key tabs changes from green to yellow, since the echo sounder is no longer in fully automatic mode.*

Adjusting the signal level (weak echoes)

As with the **Clutter** key, the **Signal level** key controls the appearance of low level noise in the picture. Whereas clutter compresses or expands the available colors to fit the desired signal range, Signal Level completely removes the weaker colors and their echoes.

To adjust the signal level:

1. On the *SOUNDER* screen, press **Picture**.
2. Press **Signal level**.
3. Press the cursor pad up or down to remove the weaker color levels from the picture, or use the keypad to manually enter the desired signal level.

The available settings range from 1 (minimum) to 5 (maximum). For example, if you select a signal level of 3, echo strengths of 0 through 3 are all displayed using the same color as the background.

4. Press **Return** to go back to the *SOUNDER* screen.

Suppressing interference (the noise limiter)

The *noise limiter* reduces the adverse effects of interference caused by other nearby echo sounders or electronic devices. However, the noise limiter may cause some very weak echoes to be made smaller or be entirely eliminated, since it removes any echoes that aren't sustained for at least two pings.

To turn on the noise limiter:

1. At the *SOUNDER* screen, press **Picture**.
2. Press **Noise limiter**.

3. Press the cursor pad up to turn the noise limiter on (or press **Noise limiter** again).
4. Press the **Return** key to go back to the *SOUNDER* screen.

*Turning the noise limiter on changes a portion of the **Picture** key tab from green to yellow, as a reminder.*

Selecting the color bar (hue) and white level

The *color bar* displayed at the extreme left of the *ECHO* screen shows the range of colors used to display various echo strengths. Weaker echoes are displayed with colors near the bottom of the scale, and stronger echoes are displayed with colors near the top.

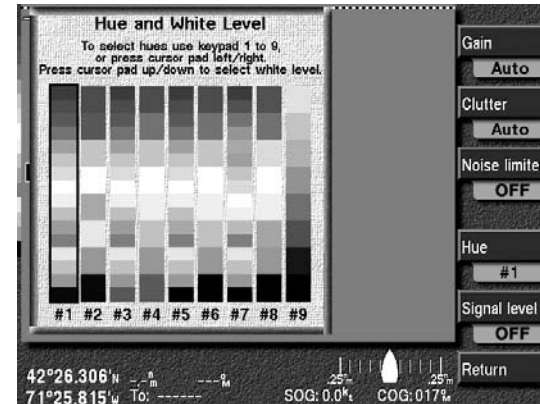
You can choose any one of nine palettes of colors to represent the echo strengths from weakest to strongest.

- Color bar #1 is the one most often used.
- Color bar #2 is similar but with fewer colors, to aid visibility under some conditions.
- Color bars # 3-8 are additional variations with different background colors.
- Color bar #9 uses a monochrome scale, ranging from dark to bright.

Selecting the color bar (hue)

To select the color bar:

1. On the *SOUNDER* screen, press **Picture**.
2. Press **Hue**.
3. Press the cursor pad left or right to select the color bar desired, or use the keypad to manually enter the number of the color bar. The selected color bar is outlined with a flashing rectangle



Hue and white level window

4. Press **Return** to go back to the *SOUNDER* screen.

Setting the white level

You can replace any single color in the color bar with white. On the *HUE AND WHITE*

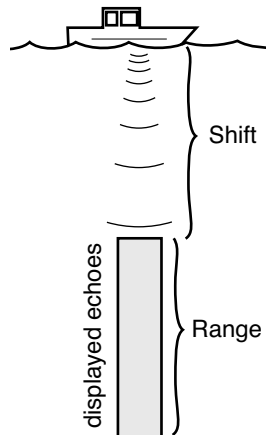
LEVEL window, press the cursor pad up or down to select that color.

To remove the white level and return to using all the colors on the color bar, press the cursor pad down until the white level moves off the color bar.

Changing the depth settings

You can adjust the shallowest and deepest echoes to be shown on the *ECHO* screen. In automatic mode, the echo sounder sets these values based on its current environment. However, you can manually override these auto values for your specific needs at any time. There are two depth settings:

- shift (how far below the surface the echo sounder picture starts)
- range (the depth covered by the echo sounder picture from the top of the screen to the bottom of the screen)



The shift and range settings are controlled by a screen that graphically shows the exact effect of your settings.

A sliding vertical bar shows the portion of the water that the echo sounder displays on the screen, based on the shift and range settings.

In the large rectangle on the right, the blue area at the top (with waves) represents the surface of the water, and the brown area below represents the seabed.

The number at the bottom is the depth of the picture, and the seabed depth is also labelled.

The smaller rectangle inside the larger one represents the echo sounder's picture. As you move the shift and range settings, this rectangle adjusts to show what you will see on the echo screen.

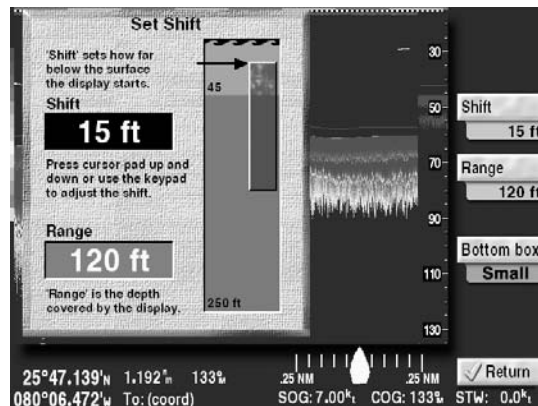
*Adjusting the shift or range changes the **Auto** and **Depth** status tabs from green to yellow, since the echo sounder is no longer in fully automatic mode.*

Setting the picture's shift (starting depth)

The *shift* setting adjusts the depth of the top edge of echoes pictured on the *SOUNDER* screen. You can "shift" the entire picture up and down to start at the surface of the water, 20 feet down, or any other depth you choose.

To set the shift value:

1. At the *SOUNDER* screen, press **Depth**.



Shift window

2. Press **Shift**.

The SET SHIFT window shows a picture of the current shift settings (and range). The large white number in the black box shows the current shift value. A horizontal black arrow points to the value that the shift window adjusts: the depth at which the echosounder picture starts, relative to the surface of the water.

3. Press the cursor pad up or down to shift the starting depth, or use the keypad to enter the digits of the desired depth. If you type the number on the keypad, wait a moment for the system to enter the number.

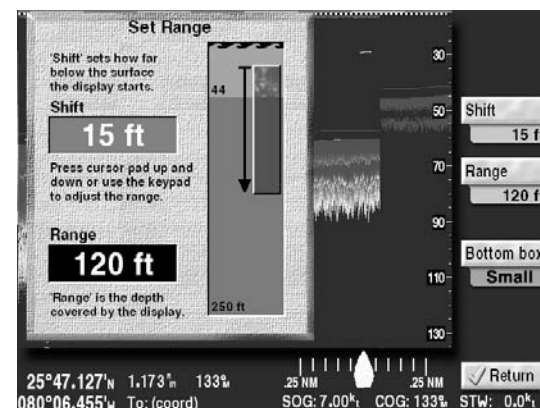
4. Press **Return** to go back to the *SOUNDER* screen.

Setting the picture's range

The *range* setting adjusts the overall depth covered by the echo sounder picture, from the top of its display to the bottom. The range can be set automatically (by pressing **Auto**), or manually on the *SET RANGE* window.

To set the range:

1. Press **Depth**.
2. Press **Range**.



Range window

The vertical black arrow in the SET RANGE window indicates the values that this window adjusts: the range of the echo sounder picture.

The white number in the black box indicates the current range setting.

3. Press the cursor pad up or down to adjust the range, or use the keypad to manually enter the desired range.
4. Press **Return** to go back to the *SOUNDER* screen.

Viewing the seabed depth

The seabed depth (the “bottom”) is displayed numerically in a black box at the left edge of the *echo* screen.

You can change the size and location of the depth box:

1. Press **Depth**.

2. To cycle through the size choices, repeatedly press **Bottom box**. To move the box up and down, press the cursor pad.
3. Press **Return** to go back to the *SOUNDER* screen.

*The depth box can also be adjusted by pressing **More**, then pressing **Data**.*

You cannot change the size of the depth box on the SoundTrac screen.

Using the depth marker

You can use the *depth marker* to accurately measure the depth of an echo. To display the depth marker—a dashed horizontal line—and move this marker up or down, press the cursor pad down on the main echo screen. Attached to the depth marker line is a small black box which displays the marker’s exact depth.

The depth marker also affects the Marker Zoom display (see *Marker zoom*, on page 114).

Using the MORE key

Pressing the **MORE** key accesses the following functions:

- alarms (described in Chapter 7)

- advance speed
- A-scope

- data (numeric and graphic information on the *SOUNDER* screen)

When the menu function is in use, the *SOUNDER* screen only moves twice per second, giving the picture a less-smooth appearance. Press **Return** to go back to the main screen for a normal, smooth appearance.

Changing the advance speed

Advance speed refers to the speed at which the vertical scan lines move from right to left across the *SOUNDER* screen. There are five advance speeds (plus the **Stop** setting, which freezes the advance of all data):

- *2/1* - two identical lines of data are displayed for every ping
- *1/1* - one line of data is displayed for every ping
- *1/2* - one line of data is displayed for every two pings
- *1/4* - one line of data is displayed for every four pings
- *1/8* - one line of data is displayed for every eight pings

For speeds 1/2, 1/4, and 1/8, each displayed line of data is the average of 2, 4, or 8 pings, respectively.

To set the advance speed:

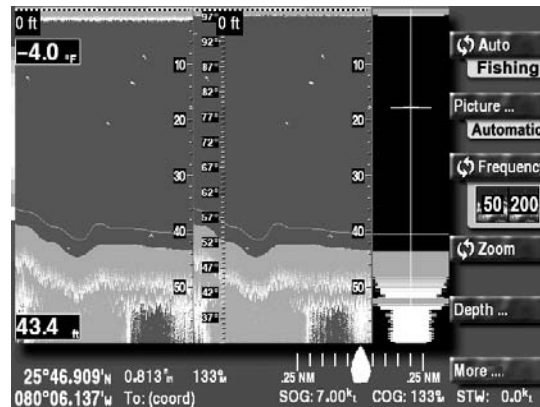
1. At the *SOUNDER* screen, press **More**, then press **Advance spd**.
2. Keep pressing **Advance spd** to select the desired advance speed.
3. Press **Return** to go back to the *SOUNDER* screen.

Displaying the A-scope

The echo sounder's *A-scope* lets you look closely at present or past echoes by horizontally magnifying the echo from each ping.

To display the A-scope:

1. Press **More**.
2. Press **A-scope** to turn the A-Scope on or off.



A-scope

The A-scope appears on the far right-hand side of the screen, magnifying one water column.

The A-scope with dual frequencies

If you're displaying both 50 and 200 kHz echoes, the A-scope magnifies echoes from the frequency shown on the right side of the screen.

The A-scope with zoom mode

If you're in zoom mode, the A-scope magnifies the unzoomed echoes on the right side of the screen.

The A-Scope with SoundTrac

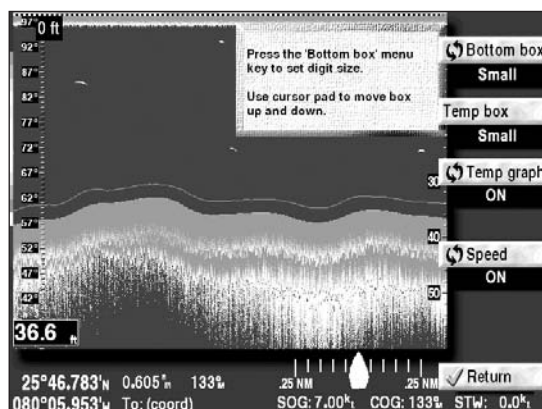
If you have pressed the cursor pad to the left to show the position marker, the A-Scope magnifies the water column at the position marker location.

Setting the ECHO screen data

Numeric and graphic information can be displayed on top of the echoes, including bottom depth, water temperature, and speed through the water (STW).

To access these functions, press **More**, and then **Data**.

Note that the temperature and speed menu keys don't appear if the sensors are not configured.



Echo screen data selections

Bottom depth box

Press **BOTTOM BOX** to set the size and location of the box displaying the bottom depth (white numbers on a black background).

Press this key again to cycle through the available sizes: small, medium, large, and huge.

Press the cursor pad up and down to set the position of the box along the left edge of the screen.

Temperature box

Press the **Temp box** key to set the size and location of the box displaying the water temperature (white numbers on a black background).

Press this key again to cycle through the available sizes: off, small, medium, large, and huge.

Press the cursor pad up and down to set the position of the box along the left edge of the screen.

Temperature graph

Press **Temp graph** to turn the temperature graph on or off.

The temperature graph displays an orange temperature scale at the left of the screen, and an orange line tracing out the varying water temperature measurements, superimposed on the echoes.

Speed through the water

Press **Speed** to turn the Speed Through the Water display on or off. STW is displayed on the bottom right corner of the screen.

Viewing past echoes using SoundTrac

On the *SOUNDTRAC* screen, you can use Northstar's exclusive SoundTrac feature to look back and examine past echo data.

To enable SoundTrac:

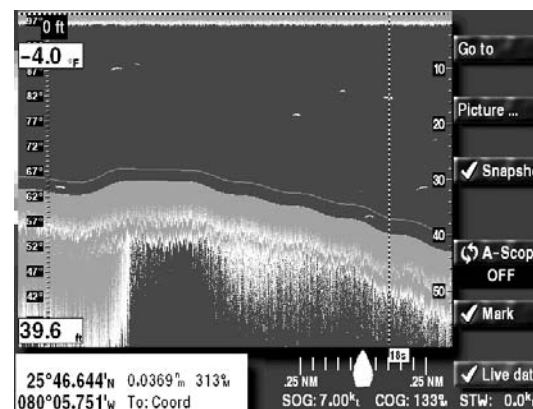
1. At the main *SOUNDER* screen, press the cursor pad to the left.

The position marker — a dashed vertical line — is now displayed.

2. To move back to echoes that were displayed within the past few minutes, continue pressing and holding the cursor pad to the left.

*The **6000i** recalls echoes from the last 3000 pings.*

As you move the position marker with the cursor pad, the marker speed accelerates to quickly scroll to the desired location.



SoundTrac screen

The lat/lon of the position marker is displayed at the bottom of the picture, along with the time elapsed since the ping, and the distance and bearing from your present position to the marker (assuming the navigator is providing position data). As you move the position marker left and right, these coordinates change accordingly.

NOTE:

When you use the position marker on a split screen (showing either two frequencies, or zoom mode), each half of the

screen has a position marker. Both markers designate the same physical location.

The number of minutes of past echo data available depends on two factors:

- the depth of the water
- the advance speed

In deeper water, the 490 pings at a slower rate, so the echo sounder saves data over a longer period of time. A slower advance speed will have the same effect.

Echo sounding alarms

The echo sounder's alarms work just like all other alarms: they are displayed as a flashing alarm icon on the screen, with details shown on the *ALARM* screen accessed with the **STAR** key. (See *Alarms*, starting on page 138.)

To alert you automatically in situations related to echo sounding, you can set three types of alarms:

- fish alarm
- seabed bottom alarm
- temperature alarm

Setting the fish alarm

When the fish alarm is on, an alarm sounds if an echo returns from either inside or outside specific upper and lower limits you've set.

You can selectively limit the size of the fish you want to be notified about by adjusting the alarm's echo strength level. Using this feature, you'll only be alerted to the presence of fish that meet your minimum size requirements.

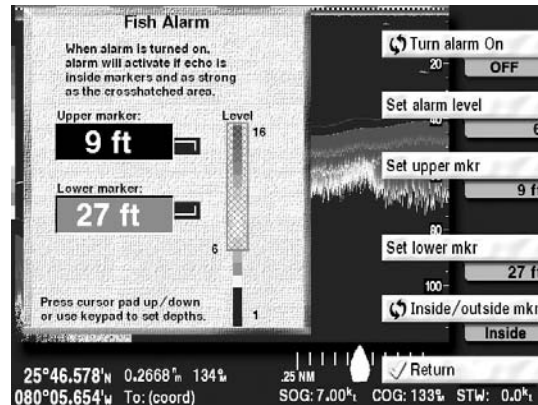
You may further narrow your fish alarms to notify you of the presence of fish within (or outside) a certain depth range. Only those fish that are detected inside (or outside) of that range will trigger the alarm.

When fish are detected, the alert tone sounds and the flashing **FISH** alarm icon is displayed. This message clears automatically after 20 seconds and the alarm is rearmed.

To access the fish alarm settings:

1. At the *SOUNDER* screen, press **More**.
2. Press **Alarm**.

3. Press **Fish alarm**.



Fish alarm window

Setting the alarm's echo strength level

To set the fish alarm's minimum echo-strength level:

1. At the *FISH ALARM* window, press **Set alarm level**.
2. Press the cursor pad up or down to set the echo strength level from 1 to 15, as represented on the vertical color bar.

Echoes that are strong enough to be within the crosshatched area on the vertical bar will cause an alarm (weaker echoes will be ignored).

Setting the upper and lower marker depths

The fish alarm will sound only when there are echoes inside (or optionally, outside) the upper and lower markers. These markers are displayed on the *SOUNDER* screen.

To set the markers:

1. Press **Set upper mkr**.
The upper marker window is highlighted in black, ready to be set.
2. Press the cursor pad up or down to set the depth, or use the keypad to manually enter the desired depth.
*The depth setting is displayed in the tab below the **Set upper mkr** key.*
3. Press **Set lower mkr** and set the depth of the lower marker in the same way.

Now you must tell the *6000i* whether you wish to be notified of fish detected **inside** the depth range you've set, or **outside** that range.

Setting inside or outside fish markers

If you designate the markers as *inside* markers, the fish alarm sounds when fish are detected within these markers. If you set these markers as *outside* markers, the fish alarm sounds when fish are detected outside of these markers.

To set the markers to inside or outside, at the *FISH ALARM* window, press **Inside/outside mkr**s to switch between the inside and outside settings. The setting is displayed in the tab below the key.

Turning the fish alarm on and off

To turn the alarm on, at the *FISH ALARM* window, press **Turn alarm on**. Generally, you'll want to turn the alarm on *after* making all the other settings.

The setting that is in effect is displayed in the tab below the key.

To turn the alarm off, press **Turn alarm off**.

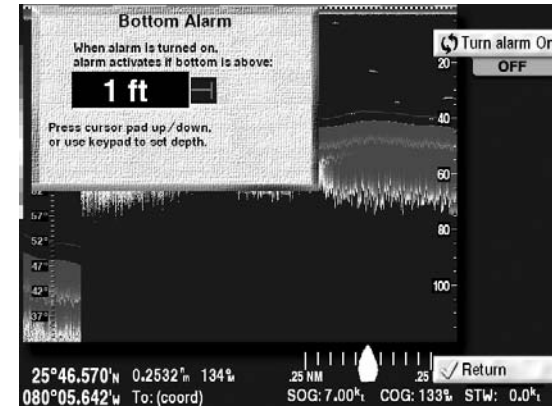
Setting the bottom alarm

When the bottom alarm is set, an alarm sounds if the echo sounder detects that the bottom is shallower than the limit you've set.

When a shallow bottom is detected, the alert tone sounds and the flashing alarm icon **BOTTOM** is displayed. This message clears automatically after 20 seconds, and the alarm is reset.

To access the bottom alarm:

1. At the *SOUNDER* screen, press **More**.
2. Press **Alarm**.
3. Press **Bottom alarm**.



Bottom alarm window

Now you may set the depth at which you want to be notified about a shallow bottom.

Setting the bottom level

When the bottom is shallower than the depth you have set, the bottom alarm will sound.

To set the bottom level, at the *BOTTOM ALARM* window, press the cursor pad up or down to set the depth, or use the keypad to manually enter the desired depth.

NOTE:

The 490's depth indicator reflects the depth below your vessel's transducer, not below the keel. Ask your installer for the exact distance between your transducer

and your keel. This value must then always be manually added to the 490's depth indicator, or entered into the transducer's depth setting on the ECHO SOUNDER SETUP screen for a reading that doesn't need to be corrected.

Turning the bottom alarm on and off

To turn the alarm on, at the *BOTTOM ALARM* window, press **Turn alarm on**. To turn the alarm off, press **Turn alarm off**.

Setting the temperature alarm

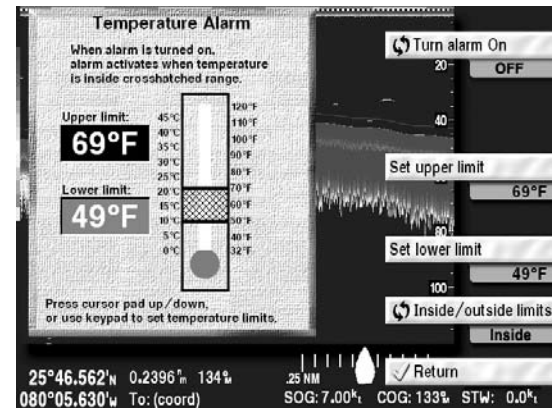
When the temperature alarm is set, an alarm sounds if the echo sounder detects that the water temperature has either risen above or dropped below the limit you've set.

This alarm isn't present unless a temperature sensor is installed and configured.

When the temperature alarm sounds, the flashing alarm icon **THERM** is displayed. This message clears automatically after 20 seconds and the alarm is reset

To set the temperature alarm:

1. At the *SOUNDER* screen, press **More**.
2. Press **Alarm**.
3. Press **Temp alarm**.



Temperature alarm window

Setting the upper and lower temperature limits

You can set the upper and lower temperature limits. When the water temperature is either inside or outside these limits, the temperature alarm will sound.

To set the upper temperature limit:

1. At the *TEMPERATURE ALARM* window, press **Set upper limit**.

The upper limit window is highlighted in black.

2. Press the cursor pad up or down to set the temperature, or use the keypad to manually enter the desired temperature.

*The temperature is displayed in the tab just below the **Set upper limit** key.*

Set the lower temperature limit in the same way, after pressing **Set lower limit**.

Setting inside or outside temperature limits

If you set the upper and lower temperature limits as *inside* limits, the temperature alarm sounds when the measured temperature is within these limits. If you set these limits as *outside* limits, the temperature alarm sounds when the measured temperature is outside of these limits.

Press **Inside/outside limits** on the *TEMPERATURE ALARM* window to switch between the inside and outside settings. The current setting is displayed in the tab just below the key.

Turning the temperature alarm on and off

To turn the alarm on, at the *TEMPERATURE ALARM* window, press **Turn alarm on**. To turn the alarm off, press **Turn alarm off**.

Troubleshooting the echo sounder

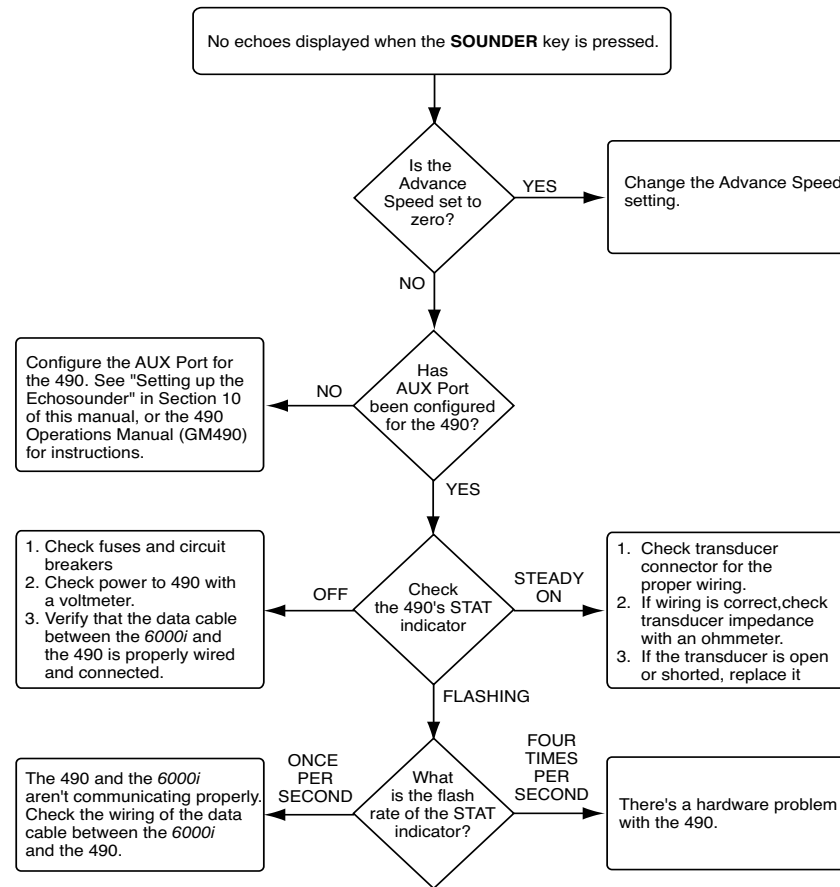


Figure 12: Troubleshooting the echo sounder

Maintaining the transducer

Do not expose a transducer to gasoline or clean it with strong solvents, as either of these can penetrate and degrade the housing. If a transducer will be exposed to salt water, coat it with anti-fouling paint to prevent sea growth. To clean a transducer of sand, debris, or sea growth, use a stiff brush or putty knife. If necessary, wet-sand with finer grade wet or dry paper. Use sanding sparingly, as repeated sanding may affect a transducer's performance at high speeds. Check the transducer periodically.

7



Reference section 7 **Video**

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Displaying video	136

Video sources

The Northstar 6000i can display video signals from a variety of sources. TV cameras, videotape, and DVD players all can display their images on the 6000i's screen as long as the signals conform to NTSC or PAL standards.

Just connect the video source's cable to the BNC connector on the back of the 6000i, and the signals are available for display. If you have more than one signal you'd like

to see, you can use a video switch available at many electronics stores.

Video signals are not carried over the N2 network. A separate video cable must be run to each 6000i display.

Video can be displayed full-screen, or as a video window superimposed on the primary navigation screens (*CHART*, *POSITION*, *STEER*, *RADAR* and *SOUNDER*). You can set the size of the video window, as well as its transparency.

Displaying video

To display a video signal from a connected source, press the **VIDEO** key.

The full-screen video image works just like any other function – press **VIDEO** to display it and press any other function key to switch to another screen.

If no video signal is present, color bars are displayed.

Video window

To turn on the *video window* (a small window displayed on top of the other navigation screens), press the **VIDEO** key a

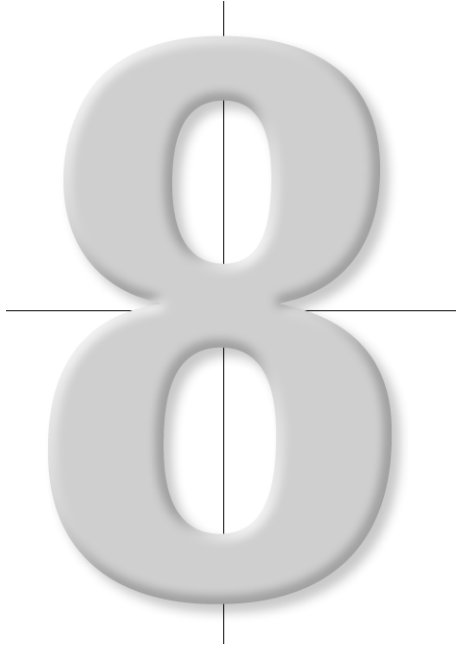
second time. The video control screen appears.

To turn the video window on or off, press the **Video** menu key.

Configure the video window as follows:

- set the window's position on the screen using the cursor pad
- set the window's size with the keypad
- set the video transparency using the **IN** and **OUT** keys.

If you make the video window transparent, you will be able to see through it to the screen underneath.



Reference section 8
Alarms and TideTrack

Alarms 138
TideTrack™ 146

Alarms

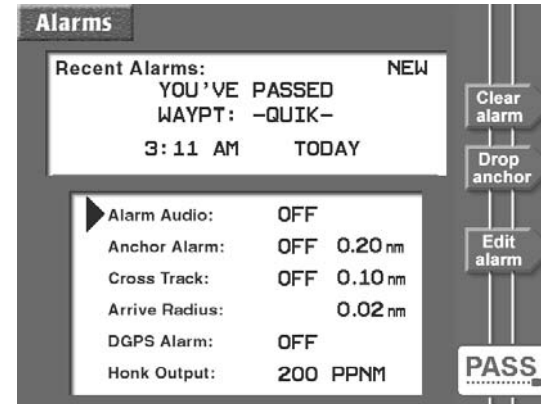
Alarms automatically alert you to certain situations, for example, when you're approaching a waypoint, or entering an avoidance area, or when you've lost position fixes. The 6000i displays an alarm in two ways:

- as an alarm icon flashing on the display screen. (For a detailed explanation of these alarm icons, see Table 4 on page 139.)
- as an alarm message on the *ALARMS* screen

Also, whenever an alarm icon appears on any screen, an audible alarm will sound if you've turned on the alarm audio. Each alarm has a distinctive beep that's based on Morse code. If you're choosing whether to keep the alarm audio on or off, remember that the audio beep may be a necessity when you're unable to look at the display screen.

Displaying alarm messages

To display more information about current and previous alarms, press the **STAR** key.



Alarm screen, showing "passed" alarm

New alarm messages

The word *NEW* in the *Recent Alarms* box tells you that the alarm shown hasn't been acknowledged, or "cleared" yet (see "Clearing alarms" below). There may also be other uncleared alarms that you should acknowledge by clearing.

Recent alarm messages

The 6000i keeps a record of the most recent alarm from each main category (such as anchor, avoidance, communications, cross track, GPS signals, and waypoints) enabling you to "browse" through older alarm messages that have not been acknowledged. Each successive

press of **Clear alarm** will show you the most recent alarm message from each category.

Clearing alarms

Clearing an alarm means removing the flashing alarm icon as well as the word *new* from the display of that alarm on the *ALARMS* screen. To manually clear an alarm (and to see other alarms that may need clearing), press the **Clear alarm** key on the *ALARMS* screen.

There are two types of alarms:

- Auto-clearing alarms automatically clear after the alarm condition

disappears, or in some cases, after a short time-out period (typically about 10 seconds). Most alarms are auto-clearing; however, they can also be manually cleared, if desired.

- Alarms that require manual clearing stay on-screen until you clear them on the *alarms* screen. Some serious alarms, such as loss of position fixes, will repeat at intervals.

All of the *6000i's* alarms are described in Table 4 below.

Table 4: 6000i alarms




ALARM ICON	ALARM MESSAGE	ACTIVATED WHEN . . .	CONTROLLED ON ALARM SCREEN?	CLEAR AFTER TIME-OUT?	CLEAR WHEN OK?
	YOUR ANCHOR MAY BE DRAGGING	Vessel has moved outside the radius limit set in the <i>anchor</i> alarm.	YES	No	No
	YOU'VE ARRIVED AT WAYPT: 'NAME'	Vessel has entered the arrive radius of an active waypoint. This alarm is shown only if you're navigating to a single waypoint, or if you've chosen manual waypoint switching.	No	10 seconds	YES
	YOU'VE ENTERED AVOID ZONE	Vessel has entered the warning radius of an avoidance waypoint.	No	No	No

Table 4: 6000i alarms (continued)








ALARM ICON	ALARM MESSAGE	ACTIVATED WHEN . . .	CONTROLLED ON ALARM SCREEN?	CLEAR AFTER TIME-OUT?	CLEAR WHEN OK?
	NOW NAVIGATING TO WAYPT: 'NAME'	Vessel has switched to the next leg of the route.	No	10 seconds	YES
	YOU'RE CLOSE TO WAYPT: 'NAME'	Vessel is within 900 feet of entering the arrive radius of the current waypoint.	No	YES, 10 seconds	YES
	CROSS-TRACK LIMITS EXCEEDED	Vessel has exceeded the off-course limit set in the <i>cross track</i> alarm.	YES	No	YES
	!!DEMO MODE IS ON!!	You've powered-up the unit while already in demo mode, or a networked unit has selected demo mode.	No	No	YES
	NO WAAS/DGPS	DGPS or WAAS corrections have become unusable.	YES	No	YES
	BIG JUMP IN GPS POSITION	Your GPS position suddenly "jumps" an unreasonable amount based on the vessel's speed.	No	YES, 30 seconds	No
	NO GPS POSITION FIX	GPS position fix is unavailable and GPS or Phantom Ioran is the chosen position source. This alarm is delayed for three minutes at power-up.	No	No	YES

Table 4: 6000i alarms (continued)












ALARM ICON	ALARM MESSAGE	ACTIVATED WHEN . . .	CONTROLLED ON ALARM SCREEN?	CLEAR AFTER TIME-OUT?	CLEAR WHEN OK?
	GPS COMMUNICATION FAILURE	The GPS receiver may have failed.	No	No	No
	NO LORAN POSITION FIX	Position fix from an external loran receiver is unavailable and external loran is the chosen position source. This alarm is delayed for three minutes at power-up.	No	No	YES
	LORAN COMMUNICATION FAILURE	The 6000i hasn't received any messages from the external loran receiver for over 30 seconds.	No	No	No
	YOU'VE PASSED WAYPT: 'NAME'	Vessel has passed abeam of the active waypoint — without entering the arrive radius. This alarm only appears if there are NO future waypoints, or if waypoint switching is manual.	No	YES, 10 seconds	YES
	POOR LORAN SIGNALS	BLINK, CYCLE or LOW SNR detected by the external loran used as the position source.	No	No	YES
	NO NETWORK	A 6000i designated as a slave and requiring a master to be present on the network is not receiving networking signals.	No	No	YES
Sounder alarms (shown only if the sounder is enabled)					

Table 4: 6000i alarms (continued)

ALARM ICON	ALARM MESSAGE	ACTIVATED WHEN . . .	CONTROLLED ON ALARM SCREEN?	CLEAR AFTER TIME-OUT?	CLEAR WHEN OK?
	BOTTOM COLLISION!	Echo sounder detects that the seabed is higher than the specific limit you've set.	No	Within 20 seconds after the seabed falls below the alarm zone	YES
	TEMPERATURE ALARM	Water temperature reaches the condition specified.	No		
	FISH ALARM	Echoes are detected within the specified depth range.	No		
Radar alarms (shown only if radar is enabled)					
	RADAR GUARD VIOLATION	Radar echoes are received within the guard zone.	No	No	No
	RADAR DATA NOT AVAILABLE	The 6000i hasn't received radar data for several seconds.	No	No	YES
	NO HEADING DATA	The 6000i is not receiving data from the heading sensor.	No	No	No

Alarm audio

You can turn the alarm audio on so that the 6000i will beep when any alarm goes

off, or you can turn the audio off completely so that you'll only see alarm icons and messages displayed on the screen:

1. On the alarm screen, press the cursor pad to select *Alarm Audio*, then press **Edit alarm**.
2. Press the cursor pad to display *OFF* or *ON*, then press **ENTER**.

Anchor alarm

The anchor alarm will signal when your vessel moves a certain distance from the position of your vessel when you pressed the **Drop anchor** key. You can turn the anchor alarm on or off, and set the distance that you can drift without triggering the alarm. The default setting is 0.20 nautical miles (about 1200 feet). You can set the anchor alarm to as little as 0.01 nm, but be sure to allow for drifting the length of the anchor chain, plus a safety factor to allow for any GPS or Ioran inaccuracy.

NOTE:

Remember to turn off the anchor alarm before you intentionally move away from the anchor-drop point.

To set the anchor alarm:

1. Press **Drop anchor** where you've dropped the anchor. A waypoint named *ANCR* is created at this location.
2. Press **ENTER**.
3. Press the cursor pad to highlight *Anchor Alarm*, then press **Edit alarm**.

4. Press the cursor pad to turn the alarm to *on*.
5. Set the distance your vessel can normally be expected to move on its anchor chain by pressing the cursor pad to the right, and using the keypad to enter the distance. (Remember to add a safety factor to allow for GPS or Ioran inaccuracy.)
6. Press **ENTER**.

Cross-track alarm

The cross-track alarm will signal if your vessel moves beyond a certain distance from the desired track line. The default setting is 0.10 nautical miles (about 600 feet). You can set the cross track to as little as 0.01 nm (about 60 feet).

To set the cross-track alarm:

1. On the alarm screen, press the cursor pad to highlight *Cross Track*, then press **Edit alarm**.
2. Press the cursor pad to turn the alarm to *on*.
3. To set the cross-track distance limit, press the cursor pad right, and use the keypad to enter the distance, then press **ENTER**.

Arrive radius

The arrive radius defines a circle around your current active waypoint. The default setting for the radius is 0.20 nautical miles,

or about 1200 feet. You can set the radius to as little as 0.01 nm (approximately 60 feet).

Either of two alarms may be triggered when the vessel enters the arrive radius:

- If you're following a route and have chosen automatic waypoint switching, the 6000i displays the *CHANGING* alarm icon and switches to the next leg.

Automatic waypoint switching will also occur if you cross the perpendicular at the end of the current leg.

- If there are no more waypoints in the route, or if you've chosen manual waypoint switching, the ARRIVE alarm is triggered.

To set the arrive radius:

1. On the alarm screen, press the cursor pad to highlight *Arrive Radius*, then press **Edit alarm**.
2. To set the distance around waypoints, use the keypad to enter the distance, then press **ENTER**.

DGPS alarm

The DGPS alarm will signal if you were using GPS or Phantom loran fixes, but valid, usable beacon or WAAS differential corrections haven't been received within the time limit you've specified in the DGPS

data time-out setting. To adjust this setting, See *Choosing a DGPS corrections time-out*, on page 162.

To turn on the DGPS alarm, press the cursor pad to highlight *DGPS ALARM*, then press **Edit alarm**. Press the cursor pad to turn the alarm to *ON*, then press **ENTER**.

Setting alarms to honk

You can connect a loud external alarm to the 6000i, to help you hear alarms in noisy situations. This function is called "honking." You can set the 6000i to honk when the anchor alarm is activated, or when any alarm is activated. See the *Northstar 6000i Installation Manual* for instructions for connecting an external alarm.

Note: The honk output signal can also be programmed to generate a 200 pulse-per-nautical-mile speed log signal, or it can be programmed to control DC power for the radar or sounder module.

If the honk output is used elsewhere, you can't use it for external alarms.

To turn on the honk output:

1. On the *ALARMS* screen, press the cursor pad to highlight *Honk Output*, then press **Edit alarm**.

2. Press the cursor pad to select *ANCHOR ALM*, or *ALL ALARMS*, as desired.
3. Press **ENTER**.

Anchor alarm

If the anchor alarm is set to honk, a continuous honking sequence begins when:

- your vessel moves outside the specified anchor-alarm radius
- or -
- the navigation source (for example, GPS signals) becomes unavailable, creating an uncertainty in the *6000i* as to whether it's inside the anchor watch radius or not

If your vessel moves outside the anchor-alarm radius, then for the next 10 seconds the anchor drag icon begins flashing and the alarm automatically beeps (you'll hear the beeping only if you've set the *Alarm Audio* to *On*). The honk sequence consists of a honk every 15 seconds. The first honk is 1 second long; the second is 2 seconds, the third 3 seconds, and so forth.

This honk cycle repeats until you manually clear the anchor alarm. This honk does *not* automatically clear under any conditions. To clear the alarm, press the **STAR** key to display the *ALARMS* screen, then press **Clear alarm**. You may also want to set the anchor alarm back to the *off* setting.

Honking for all alarms

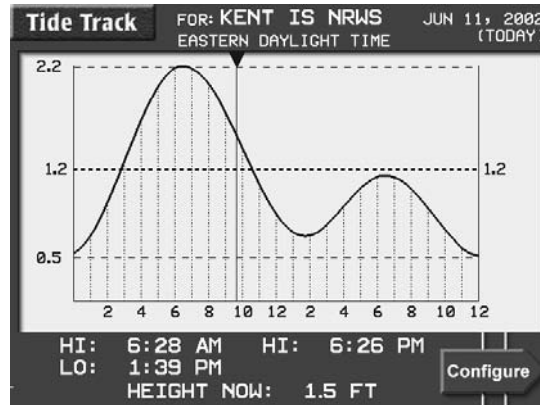
If all alarms are set to honk, any alarm will cause the external alarm to sound for half a second, followed by silence for half a second. This honking sequence stops when the alarms are cleared.

To set all alarms to honk:

1. Press the cursor pad to highlight *Honk Output*, then press **Edit alarm**.
2. Press the cursor pad to select *ALL ALARMS*, then press **ENTER**.
3. Set the *Alarm Audio* to *ON* if it's currently off.

TideTrack™

The 6000i calculates tide information for any of over 3,540 NOS/NOAA tide stations. To display this information, press the **STAR** key until you see the *tide track* screen.



Tide Track screen

The entire U.S. coastline – including Alaska and Hawaii – is covered, plus many Caribbean islands and eastern and western Canada. Tides can be displayed for any date up to the year 2010. Data is from the official tide-table predictions and should be about as accurate as the printed tables. For more information about tides, see *Tide Tables* published by the NOS/NOAA, Rockville, Maryland 20852.

The TideTrack screen

The name of the selected NOAA tide station and the selected day are shown at the top of the screen.

A graph of the water height for the selected tide station during any 24-hour period is displayed.

Press the cursor pad up or down to move a horizontal measurement line to any spot on the tide graph. The line is labelled with the exact height that it represents.

Maximum and minimum heights are shown as dashed horizontal lines labeled with the height in feet. Mean Lower Low Water (MLLW) is shown as a solid line near the bottom of the graph. A solid vertical line and arrow points to the tide level at the current time.

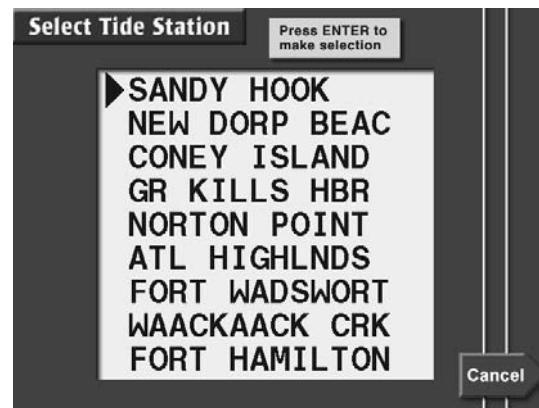
Just below the tide graph is the time scale, showing the vessel's local time (LCL) for each point, and (if the station is in a different time zone) the time at the tide station (TID).

At the bottom of the screen, the times of the day's high and low tides are listed for that location, along with the tide height at the present time.

Choosing a nearby tide station

You can choose from any of the nine tide stations closest to your present position.

1. On the *TIDE TRACK* screen, press **CONFIGURE**.
2. Press **Choose closest tide station**.
The 6000i searches for the nine stations closest to your present position and displays this list with the closest station at the top.
3. Press the cursor pad to select the desired station, then press **ENTER** twice to display the tides for that station on the *TIDE TRACK* screen.



Tide Station Selection screen

Choosing a tide station from the chart

You can also choose a tide station by moving the cursor to any location along the U.S. coastline.

1. On the **Tide track** screen, press **Configure**.
2. Press **Choose tide station from chart**.
3. Press the cursor pad to select the general coastline location for which you want tide information, then press **ENTER** to display a list of the nine tide stations closest to this cursor location.
4. Press the cursor pad to select the desired station, then press **ENTER** twice to display the tides for that station on the *TIDE TRACK* screen.

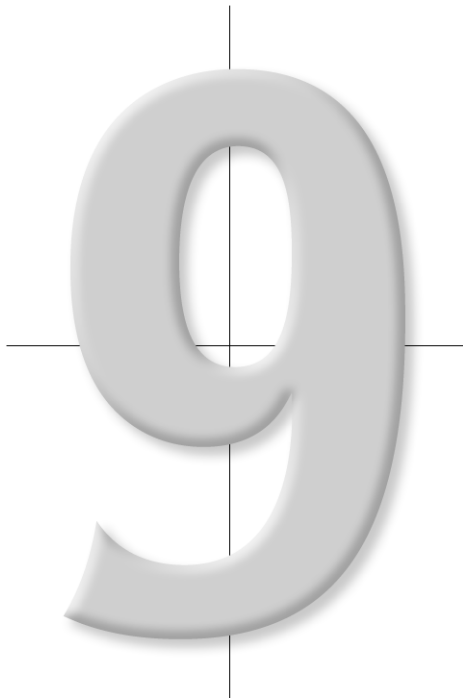
Choosing a specific date

The *TIDE TRACK* screen normally displays tide information for today's date. To display these tides for a different date, you can either press the cursor pad right or left to move the date forward or backwards by one day, or select a new date as follows:

1. Press **Configure**, then press **New date**. The first digit of the current date flashes.
2. Press the cursor pad to move to the month or digit you want to change. To change a digit, press that key on the key-

pad. To change the month, press the cursor pad up or down.

3. When the date is correct, press **ENTER** twice to display the tides for the new date.



Reference section 9
N2 Networking

General information 150
Restrictions 150

General information

Northstar's N2 Networking is a major step forward in integrating the major sensors and displays on your vessel. Waypoints and routes are shared among all networked displays, without any work on the user's part. Any changes made to a route or waypoint instantly appear in all connected units. If a unit is turned off while changes are being made, those changes are auto-

matically copied into that unit when it is turned back on.

Navigation can be started from any unit, and your progress and steering screens are displayed on any unit. In addition, radar and sounder images are sent in real time to all 6000i displays on the network, and the radar and the sounder can be controlled from any of the connected units.

Restrictions

In an N2 network, one unit is designated as the master, and all others as slaves. The GPS antenna is connected to the master unit. The only restrictions on N2 networking are the following:

- there must be one and only one master unit operating in a network
- all units must have the same software version.

If, for example, a slave unit is turned on before the master, a message is displayed reminding the user to turn on the master unit before using the slave. In case the master unit is not available (in for service, for example), brief instructions show how to temporarily convert a slave into a master unit.

In normal use, this means that as long as the master is turned on, everything works automatically.

Radar overlays

The *6000i's* radar overlay function matches the radar scale to the chart scale so that the radar image can be superimposed on the chart. Only one display unit at a time can display the radar overlay, since multiple units may show charts at different scales, or may even be using different chart cartridges.

Whenever you turn on radar overlay, any other unit that is displaying the radar overlay will switch it off and display **Suspend** in that unit's **Overlay** menu key.

Pressing the **Overlay** key on any unit will restore the radar overlay function on that unit and switch it off on other units.

The remainder of this section tells what to do if you experience one of the rare occurrences where networking stops working.

Master unit unavailable

If your master unit becomes unavailable due to a failure or other reason, you can replace it with any other *6000i* on the vessel.

The GPS antenna and any necessary NMEA devices must be connected to the replacement unit. In many situations, it will be easiest to move the replacement unit to the location of the master and physically replace it.

Configuring the replacement as a master

To function in an N2 network, the replacement unit must be designated as a master unit. To do this:

1. Turn the unit on while pressing the **STAR** key. Hold the **STAR** key until the special service screen is displayed (about a minute or so).
2. Press the “**9**” key on the keypad to switch the master/slave designation.
3. Press **ENTER**.

The unit will turn on and operate as a master unit.

After the original master unit is restored, the replacement unit should be set back to slave status.

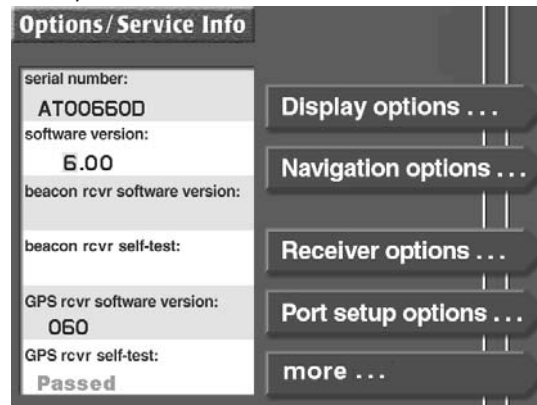
10

Reference section 10 **Setup**

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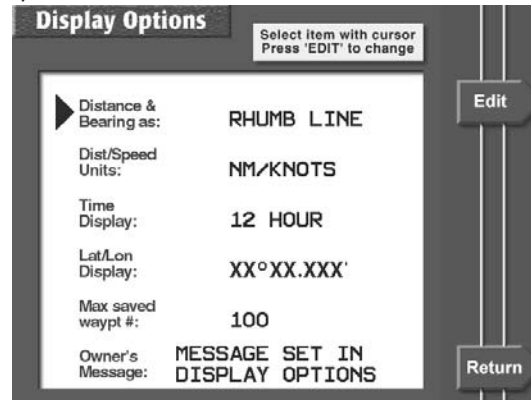
Changing your display settings

To access the 6000i's display options, press the **STAR** key several times until you see the *Options/Service Info* screen.



Options and Service Info screen

Press **Display options** to access the *Display Options* screen.



Display Options screen

Changing the settings

To change any of the options (explained in detail on the following pages), select the option by pressing the cursor pad to move the arrow at the left of the screen, then press **Edit**. The selected option flashes, waiting for you to change it using the cursor pad or the keypad. Once you've made the change, press **ENTER**.

Rhumb line or great circle calculations

You can set the 6000i to calculate the distance and initial bearing to your intended destination along either a Great Circle route or a rhumb line.

The shortest distance between any two points on the surface of a sphere is called a Great Circle route. It appears as a straight line on a globe, but as a curved line on a Mercator chart.

Rhumb line navigation maintains a constant true direction to your destination (seen as a straight line on a Mercator chart), but makes a longer route to travel over great distances than the Great Circle calculation.

Great Circle and rhumb line navigation are virtually the same if the start and end

points are closer than 100 nm. You can approximate a longer great circle using a series of shorter rhumb lines. All legs are drawn as straight lines on the chart screens.

Distance and speed units

Distances and speeds can be displayed in any of the following units of measurement:

- nautical miles, feet, and knots
- kilometers, meters, and kilometers per hour
- statute miles, feet, and miles per hour

12- or 24-hour clock

Time of day can be displayed in either a 12- or 24-hour format. This option affects all of the time-related displays, including high and low tides, sunrise/sunset, and ETA.

Lat/lon precision

Latitude and longitude can be displayed as either degrees, minutes, and seconds (XX° XX' XX"), or as degrees, minutes, and thousandths of minutes (XX° XX.XXX').

The number of saved waypoints

When you save a waypoint by pressing the **SAVE** key, the *6000i* automatically assigns a sequential waypoint number (such as –S001–) to each point stored. When this number passes the number you set in the *Max saved waypt* option (the factory default setting is 100 saved waypoints), it restarts at the number 1, and overwrites the old saved waypoint previously designated number 1. For many applications, you may want to set this maximum number to a small value, such as five or ten, as long as you promptly rename any saved waypoints you want to save permanently—before they're overwritten.

You can enter a number up to 199 for the maximum number of saved waypoints. For one- or two-digit values, enter zero as the first digit(s).

When being saved to a route, waypoints are automatically assigned four-digit numbers; these waypoints can be overwritten only during a database IMPORT operation.

Entering a personalized owner's message

To provide your *6000i* with a substantial measure of theft protection, you can enter a personalized owner identification message that is displayed every time the

unit is turned on. To enter or change this message, you need an access code that Northstar sends you when you return your product registration card. Once you've received your registered-owner access code, you can enter your owner ID message:

1. From the Display Options menu select the *Owner's Message* option and press **Edit**.
2. Enter the access code from your Northstar owner's card, then press **ENTER**. The first

character block of the owner's message flashes.

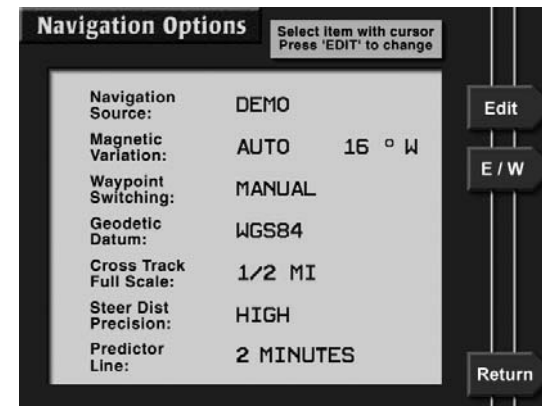
3. Enter your message using the keypad and cursor pad, then press **ENTER**.

Your message can be changed only by entering your access code number and repeating the above procedure. The *6000i* gives you three attempts at entering the correct access code; after that, all operations freeze, requiring you to turn power off, then turn it back on again to resume functioning.

Changing your navigation settings

To access the *958*'s navigation options, press the **STAR** key until you see the *OPTIONS/SERVICE INFO* screen.

Press **Navigation options** to access the *NAVIGATION OPTIONS* screen.



Navigation Options screen

Changing the settings

To change any of the options (fully described in the following pages), select it by pressing the cursor pad to move the arrow at the left of the screen, then press **Edit**. The selected option flashes, waiting for you to change it using the cursor pad or the keypad. Press **ENTER** to finalize your changes.

Choosing a navigation source

The 6000i's position screens and waypoint navigation are based on position information obtained from one of the following navigation sources:

- GPS – choose this to use GPS position data
- Phantom Loran – choose this to see your GPS position displayed as loran TDs (any available GPS differential corrections will also be used in the calculation of the Phantom Loran TDs)
- external loran – choose this to use a loran receiver connected to the 6000i

NOTE:

This option includes a setting for demo mode. For instructions on demo mode, see Using demo mode, on page 16.

Choosing magnetic variation

A compass naturally points to the *magnetic* north pole, several hundred miles from the Earth's *geographic* north pole. The difference between the angles to the two poles is known as *magnetic variation*.

You can display bearings as true (relative to north) or magnetic (to match your compass). The 6000i can calculate the magnetic variation for your position automatically, or you can enter it manually.

Push the cursor pad up or down to choose:

- true – no variation applied (true bearings are usually required when using a gyrocompass)
- automatic – the unit calculates variation automatically according to your location and the date

The factory default setting is “automatic.” Under most conditions, you’ll want the 6000i to calculate the variation automatically for your position, since the automatically calculated variation is usually entirely adequate.

- manual setting – press the cursor pad to the right, enter three digits representing your variation from 0 to 180, and press **E / W** to select the direction.

The manual setting (1° to 180°) is available when the display must match an older or less accurate chart, or in remote areas (such as above 70° north latitude) where the variation calculations can be significantly off.

Switching waypoints manually or automatically

You can set waypoint switching to:

- automatic – the 6000i automatically switches to the next waypoint upon arrival at each waypoint
- manual – you manually switch to the next waypoint

When set to automatic, the 6000i displays the new distance and bearing information for the next waypoint when you arrive at the previous one. It immediately stops navigating when you pass a lone waypoint or the last waypoint in a route.

NOTE:

For instructions on changing the waypoint arrival distance, see Arrive radius, on page 143.

You may want to switch waypoints manually if you're maneuvering around a waypoint in search of a lobster trap, or trying to find a buoy in a thick fog. Manual switching lets you keep a continuous

display of distance and bearing information for the current waypoint. With manual switching, you must manually change to the next waypoint every time you arrive at the current waypoint:

1. Press **STEER** and then **Nav log**.
2. Select the next leg or waypoint if necessary.
3. Press **Restart** and then **ENTER**.

Choosing a geodetic datum

A variety of lat/lon coordinate models is used by cartographers to produce the world's navigation charts. Each model is called a datum. The 6000i's geodetic datum option contains all referenced datums, according to Defense Mapping Agency publications.

You should always be sure that the current datum matches your Nav-Chart cartridge. All Navionics charts for the last few years use the WGS84 datum. A few old charts from South America and other areas use other datums. If you choose a datum other than WGS84, an offset will be applied, but only to the GPS lat/lon of your vessel's position. The vessel will be moved on the chart, but not waypoints, routes, or track points.

To change the datum reference:

1. On the *NAVIGATION OPTIONS* screen, select the **Geodetic datum** option and press **Edit**.
2. Press the cursor pad up or down to scan through the alphabetic listing.
3. When you see your choice, press **ENTER**.
For a list of the available datums, see Appendix C at the back of this manual.

NOTE:

You can specify a different datum for the 6000i's output ports than the one set for the positional display. For instructions on how to do this, see the Northstar 6000i Installation Manual (part number GM6KIM).

Choosing the cross-track scale

You can set the *Cross-track Full Scale* option to suit your particular needs—whether you're navigating out in open water or trying to maneuver in a tight channel. Cross-track scale is the total left-to-right distance shown on the *2D STEER* screen. For example, a cross-track full scale setting of 1,000 feet displays 500 feet on either side of your track line.

Table 5 shows the choices for the cross-track full scale, depending on the distance and speed units that you've set on the *DISPLAY OPTIONS* screen.

Table 5: Cross-track scale options

Dist/speed units setting	Cross-track full scale setting
MI/MPH	you can choose 1000 FT, 2000 FT, or 1/2 MI
NM/KNOTS	you can choose 1000 FT, 2000 FT, or 1/2 NM
KM/KPH	you can choose 200 M, 1KM, or 2KM

To change the crosstrack full scale setting:

1. On the *NAVIGATION OPTIONS* screen, choose the *cross track full scale* option and press **Edit**.
2. Press the cursor pad to make your choice.
3. Press **ENTER**.

Changing the steering precision

The *Steer Dist Precision* option adds precision to the distance-to-waypoint and cross-track error displays on the *STEERING* and *3-D STEER* screens. The "normal" setting displays these distances in hundredths of miles or kilometers. If you change the setting to "high," these distances change to feet (or meters) whenever they're under one mile or kilometer.

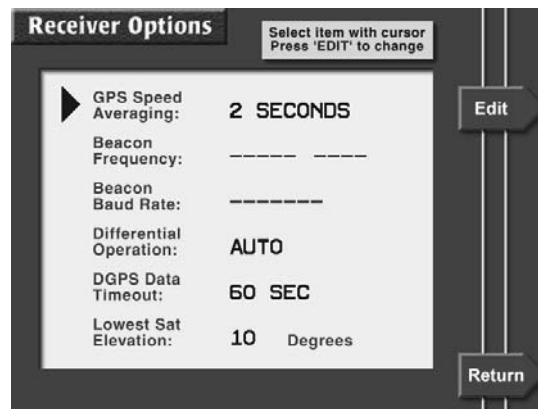
Course Predictor Line

This setting controls the length of the predictor line described in *Using the course predictor line*, on page 40.

Changing your receiver settings

To access the *6000i's* receiver options, press the **STAR** key until you see the *OPTIONS/SERVICE INFO* screen.

Press **Receiver options** to access the *RECEIVER OPTIONS* screen.



Receiver Options screen

Changing the settings

To change any of the options (fully described in the following pages), select it by pressing the cursor pad to move the arrow at the left of the screen, then press **Edit**. The selected option flashes, waiting for you to change it using the cursor pad or the keypad. Press **ENTER** when done.

Choosing the speed averaging time

When you're using uncorrected GPS, you may see that your Speed-Over-Ground readings are slightly erratic, varying by up to several knots. The *6000i's* GPS speed averaging function can help steady these readings by lengthening the time over which your speed is averaged, from two to ten seconds. Averaging can also be turned off for the quickest possible reaction time.

Shorter averaging times provide a faster display of speed changes, but with less accuracy. A longer averaging time is useful at lower speeds when you require the

steadiest readings and highest accuracy, such as when you want to trawl at a certain optimum speed.

Choosing beacon frequency and baud rate (optional equipment)

Differential corrections are invaluable for navigating in narrow or congested areas, such as ports and waterways, or whenever you require extreme accuracy in order to locate a particular spot.

WAAS is one source of accurate corrections received directly from satellites. If you need an alternate source, you can interface your *6000i* with an optional external Northstar beacon receiver. A beacon receiver takes corrections broadcast by shore-based marine radiobeacons situated along most of the U.S. coastline and uses those corrections to further enhance the accuracy of GPS. Beacon frequencies are automatically selected as you move from one differential coverage area to another, or as weather conditions change. The receiver constantly evaluates the quality of the radiobeacon signals, and selects the best station.

Automatic mode

Automatic differential mode can normally be used at all times. One receiver channel tracks the best available differential signal

and sends DGPS corrections to the *6000i*'s GPS receiver. Another channel continuously scans the entire differential frequency band (283.5 to 325kHz), evaluating available DGPS signals.

If the signal that's received and monitored by Channel 1 degrades for any reason (such as bad weather between your vessel and the transmitter), the *6000i* tries to select a better frequency from the directory it has compiled. This function allows it to switch to the best differential signal *before* your GPS accuracy is affected.

Manual mode

Although the need is rare, you can manually override the beacon receiver's automatic mode at any time. In manual mode, the beacon receiver uses only the selected station.

To manually choose a differential station, you must select the frequency of the desired station:

1. On the *RECEIVER OPTIONS* screen, highlight the *Beacon Frequency* option and press **Edit**.
2. Change the settings from *AUTO* to *MANUAL*. A differential transmitter frequency appears to the right of the word *MANUAL*.
3. Press the cursor pad to the right to highlight the digits you want to change. Enter

the appropriate frequency—any value between 283.5kHz and 325kHz—and press **ENTER**.

NOTE:

You can also manually set the baud rate (the transmitter's data transmission speed) for the selected differential frequency. However, Northstar strongly recommends leaving the beacon baud rate setting at Auto.

NOTE:

The 6000i can manually control a non-Northstar external differential receiver as long as the receiver supports the MX50R control protocol. Check the manufacturer's instructions to see if they support this control protocol before connecting to a 6000i.

Setting differential operation

The 6000i's differential operation setting has four options for differential information:

- auto – the 6000i evaluates available WAAS and radiobeacon corrections and uses whichever provides the higher accuracy
- WAAS – the 6000i uses only WAAS differential corrections
- disabled – the 6000i doesn't use any differential corrections

- radiobeacon – the 6000i uses radiobeacon corrections only

Choosing a DGPS corrections time-out

The DGPS data time-out setting determines how long the 6000i will continue to use old DGPS corrections if no new corrections are received due to bad weather, extreme distance from beacon, etc.

If the time-out period ends without any new corrections, the 6000i reverts to standard GPS navigation, displays the *old corrections* status message on the *DGPS STATUS* screen, and displays the *DGPS lost* alarm. DGPS will automatically resume when the 6000i receives valid corrections.

Under normal operating conditions, you should set the time-out to one minute (the factory default) to guarantee the best accuracy. A time-out of 30 seconds or less is often too short and can cause false alarms. Generally, one minute provides good navigation accuracy, and is best left unchanged.

In bad weather – where you may need to tolerate a minor loss of accuracy – you can increase the value up to a maximum of four minutes, which lets the 6000i ignore occasional brief outages of differential reception.

Adjusting satellite elevation

The *lowest sat elevation* option is used mainly for technical applications, in which the *6000i* must track all visible satellites regardless of how low they are on the horizon. In other instances where high-precision fixes are necessary, you can increase this setting to “hide” any low satel-

lites, thereby preventing their use as sources of GPS position information, and avoiding potential errors.

This option is adjustable from 0° to 25°, in 5° increments, but Northstar recommends leaving this option at the factory setting of 5°.

Changing your port settings

You can interface the *6000i* directly to a variety of external equipment, such as the Northstar 490 “black box” for fishfinding, autopilots, depth sounders, PC’s, and so on. The *6000i*’s ports meet the specifications of most navigation devices, providing you with a customized setup for interfacing with practically any NMEA 0183-compatible equipment.

The *6000i* is interfaced with other equipment through its data transmission ports:

two NMEA ports (labeled NMEA) and one auxiliary port (labeled AUX). To see a summary of the wiring information for these ports, press the **STAR** key to display the *OPTIONS/SERVICE INFO* screen, then **Port setup options** and **Wiring info**.

For details about interfacing the *6000i*, contact your local authorized Northstar dealer.

Setting up the echosounder

For the echosounder to work with the *6000i*, you must configure the echosounder to the *6000i*’s AUX port and then set up the AUX port for fishfinding:

1. Press the **STAR** key to display the *OPTIONS/SERVICE INFO* screen.
2. Press **Port setup options**.
3. Press **Edit**.

4. Set the **AUX port** option to “490.”
5. Press **ENTER**.
6. To activate this setting, turn the *6000i* off and back on again.

Setting up radar

To use radar with the system, you must connect the Northstar radar to the *6000i*'s Port 2 and configure the port:

To set up Port 2 for radar:

1. Press the **STAR** key to display the **Options/service info** screen.
2. Press **Port setup options**.

3. Press **Port 2 Setup**,
4. Press **Edit**.
5. Set the output format to “Radar” by using the cursor pad up or down.
6. Press **ENTER**.

If an optional heading sensor is used, it must be connected to the same *6000i* as the radar.

Installing software updates

You can install current software updates by obtaining a software update cartridge from Northstar or your local authorized Northstar dealer.

CAUTION!



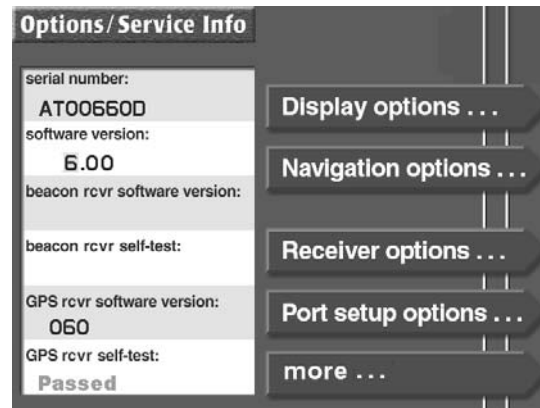
Do not remove the card or turn the unit off while the update is in progress or your 6000i system will be corrupted.

Update all slave units before updating the master unit.

1. Press the **STAR** key to display the **Options/service info** screen.
2. Press **More**.
3. On the *MORE OPTIONS/SERVICE INFO* screen, press **Software update**.
4. On the *SOFTWARE UPDATE* screen, press **Start Update** and follow any instructions on your screen.

Displaying system information

To see your unit's serial number, software versions, and receiver self-test results, press the **STAR** key until you see the **Options/Service info** screen.



Beacon receiver self-test

If your *6000i* is connected to an optional Northstar radiobeacon receiver, the receiver is automatically tested each time the unit is turned on. The message *PASSED* or *FAILED* is displayed in the *beacon rcvr self test* field. In many cases, a failure is caused by an open or shorted antenna cable, which can be repaired in the field. If this isn't the source of the

failure, you may have to return the unit to the factory for service.

GPS receiver self-test

If the GPS receiver's self-test message is *failed*, you may have to return the unit to the factory for service.

Testing the 6000i's keypad

A built-in keypad test lets you check the integrity of all the unit's keys except the **PWR** and **SAVE/MOB** keys (pressing **SAVE/MOB** during the keypad test saves a waypoint instead of testing the keys).

1. On the *OPTIONS/SERVICE INFO* screen, press **More** to display the *MORE OPTIONS / SERVICE INFO* screen.
2. Press **Diagnostics**, then **Keypad**. Pressing each key identifies it on the screen.
3. When you're done, **press and hold** the cursor pad up or down until the unit displays the *MORE OPTIONS/SERVICE INFO* screen again.

N2 status screen

The N2 status screen lists all operating units connected to the N2 network for troubleshooting:

1. On the *OPTIONS/SERVICE INFO* screen, press **More** to display the *MORE OPTIONS / SERVICE INFO* screen.
2. Press **N2 status**. All units are listed with their model number and serial number.

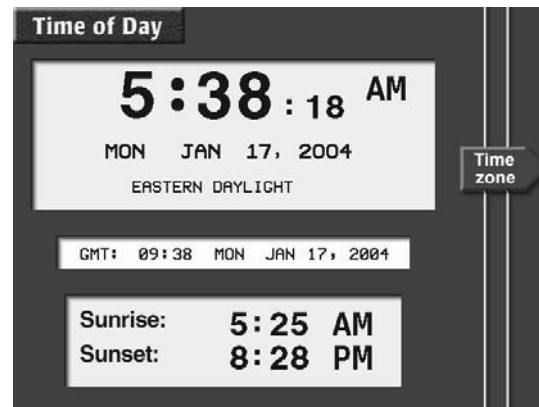
The unit you are currently operating is identified with the text “(me).”

Using the LCD test key

From the *DIAGNOSTICS* screen, press **LCD test**. This function is used for factory testing of the unit's screen, and it simply displays a blank screen. Press any function key to return to another screen.

Changing the time zone

Press the **STAR** key until you see the *TIME OF DAY* screen. The time, date, local time zone, and time of today's sunrise and sunset are shown.



The current time is displayed in the center of the screen. When shipped from the

factory, the time zone is set to “GMT” (Greenwich Mean Time).

Note that the day of the week in Greenwich, England may be different from the day in your local time zone.

To change the time zone used for all of the *6000i*'s time displays, press **Time zone**, and use the cursor pad to select the desired zone and standard or daylight time. Press **ENTER** to use the new time zone.

Appendix A – Datum list

The following pages list all of the datums available in the *6000i*, together with the mathematical parameters for each.

Datum ID	Datum name	ELLIPSOID	delta x	delta y	delta z
ADI_MN	ADINDAN Mean–Africa	CL1880	-166	-15	204
ADI_E	ADINDAN–Ethiopia	CL1880	-165	-11	206
ADI_MA	ADINDAN–Mali	CL1880	-123	-20	220
ADI_SE	ADINDAN–Senegal	CL1880	-128	-18	224
ADI_SU	ADINDAN–Sudan	CL1880	-161	-14	205
AFG	AFGOOYE–Somalia	KRASS	-43	-163	45
AIN	AIN EL ABD 1970–Bahrain Island	INTL	-150	-251	-2
ANA	ANNA 1 ASTRO 1965–Cocos Islands	AUSTR	-491	-22	435
ARC50_MN	ARC 1950 mean value	CL1880	-143	-90	-294
ARC50_B	ARC 1950–Botswana	CL1880	-138	-105	-289
ARC50_L	ARC 1950–Lesotho	CL1880	-125	-108	-295
ARC50_M	ARC 1950–Malawi	CL1880	-161	-73	-317
ARC50_S	ARC 1950–Swaziland	CL1880	-134	-105	-295
ARC50_ZR	ARC 1950–Zaire	CL1880	-169	-19	-278
ARC50_ZM	ARC 1950–Zambia	CL1880	-147	-74	-283
ARC50_ZB	ARC 1950–Zimbabwe	CL1880	-142	-96	-293
ARC60_MN	ARC-1960 mean value	CL1880	-160	-8	-300
ARC60_K	ARC 1960–Kenya	CL1880	-161	-7	-300
ARC60_T	ARC 1960–Tanzania	CL1880	-158	-12	-299
ASC	Ascension Island 1958	INTL	-207	107	52
ABE	Astro Beacon “E” (Pacific Isl.)	INTL	145	75	-272
AB4	Astro B4 Sorol Atoll (Hawaiian Islands)	INTL	114	-116	-333
AD714	Astro Dos 71/4 (Atlantic Isl.)	INTL	-320	550	-494
AS52	Astronomic Station 1952	INTL	124	-234	-25
AG66	Australian Geodetic 1966	AUSTR	-133	-48	148
AG84	Australian Geodetic 1984	AUSTR	-134	-48	149
BEL	Bellevue (IGN)	INTL	-127	-769	472
BER	Bermuda 1957	CL1866	-73	213	296
BOG	Bogota Observatory (Colombia)	INTL	307	304	-318
CMI	Campo Inchauspe	INTL	-148	136	90
CA66	Canton Astro 1966	INTL	298	-304	-375
CAPE	Cape (South Africa)	CL1880	-136	-108	-292
CC_MN	Cape Canaveral mean value	CL1866	-2	150	181
CARTH	Carthage	CL1880	-263	6	431
CHAT	Chatham 1971 (S.W. Pac. Isl.)	INTL	175	-38	113
CHUA	Chua-Astro	INTL	-134	229	-29
CORR	Corrego-Allegre	INTL	-206	172	-6
DJAK	Djakarta (Batavia)	B1841	-377	681	-50
DOS68	DOS 1968 (S.W. Pac. Isl.)	INTL	230	-199	-752
EI67	Easter Island 1967	INTL	211	147	111
EUR50_MN	European 1950–mean value	INTL	-87	-98	-121

Datum ID	Datum name	ELLIPSOID	delta x	delta y	delta z
EUR50_WE	European 1950–Western Europe	INTL	-87	-96	-120
EUR50_CY	European 1950–Cyprus	INTL	-104	-101	-140
EUR50_EG	European 1950–Egypt	INTL	-130	-117	-151
EUR50_GB	European 1950–England	INTL	-86	-96	-120
EUR50_GR	European 1950–Greece	INTL	-84	-95	-130
EUR50_IR	European 1950–Iran	INTL	-117	-132	-164
EUR50_SA	European 1950–Sardinia	INTL	-97	-103	-120
EUR50_SI	European 1950–Sicily	INTL	-97	-88	-135
EUR50_NF	European 1950–Norway and Finland	INTL	-87	-95	-120
EUR50_PS	European 1950–Portugal and Spain	INTL	-88	-109	-122
EUR79	European 1979	INTL	-86	-98	-119
GAND	Gandajika Base (Indian Ocean)	INTL	-133	-321	50
GD49	Geodetic Datum 1949	INTL	84	-22	209
GUAM63	Guam 1963	CL1866	-100	-248	259
GUX	Gux 1 Astro	INTL	252	-209	-751
HJOR	Hjorsey 1955–Iceland	INTL	-73	46	-86
HK	Hong Kong 1963	INTL	-156	-271	-189
IND_TV	Indian (Thailand/Vietnam)	EVRSST	214	836	303
IND_BIN	Indian (Bangladesh/India/Nepal)	EVRSST	289	734	257
IRE65	Ireland 1965	AIRYM	506	-122	611
ISTS	ISTS 073 Astro 1969	INTL	208	-435	-229
JI61	Johnston Island 1961	INTL	191	-77	-204
JAND	Kandawala–Sri Lanka	EVRSST	-97	787	86
KERG	Kerguelen Island (Indian Ocean)	INTL	145	-187	103
KERT	Kertau 1948 (Malaysia)	EVRSST	-11	851	5
KKJ	KKJ (Finnish)	FINN	-78	-231	-97
LC5A	L.C. 5 Astro (Caribbean)	CL1866	42	124	147
LIB64	Liberia 1964	CL1880	-90	40	88
LUZ_P	Luzon–Phillipines	CL1866	-133	-77	-51
LUZ_M	Luzon–Mindanao Island	CL1866	-133	-79	-72
MAHE	Mahe 1971 (Indian Ocean)	CL1880	41	-220	-134
MASI	Marco Astro–Salvage Islands	INTL	-289	-124	60
MASS	Massawa (Africa)	B1841	639	405	60
MERCH	Merchich (Africa)	CL1880	31	146	47
MA61	Midway Astro 1961	INTL	912	-58	1227
MINA	Minna (Africa)	CL1880	-92	-93	122
NAH_O	Nahrwan–Masirah Island (Oman)	CL1880	-247	-148	369
NAH_UA	Nahrwan–United Arab Emirates	CL1880	-249	-156	381
NAH_SA	Nahrwan–Saudi Arabia	CL1880	-231	-196	482
NAP	Naparima BWI (Trinidad and Tobago)	INTL	-2	374	172
NAD27_MN	North American 1927–CONUS mean value	CL1866	-8	160	176
NAD27_WU	North American 1927–Western U.S.	CL1866	-8	159	175
NAD27_EU	North American 1927–Eastern U.S.	CL1866	-9	161	179
NAD27_AK	North American 1927–Alaska	CL1866	-5	135	172

Datum ID	Datum name	ELLIPSOID	delta x	delta y	delta z
NAD27_BH	North American 1927–Bahamas	CL1866	-4	154	178
NAD27_SS	North American 1927–San Salvador Island	CL1866	1	140	165
NAD27_CN	North American 1927–Canada	CL1866	-10	158	187
NAD27_AB	North American 1927–Alberta and B.C.	CL1866	-7	162	188
NAD27_EC	North American 1927–East Canada	CL1866	-22	160	190
NAD27_MO	North American 1927–Manitoba and Ontario	CL1866	-9	157	184
NAD27_NE	North American 1927–N.W. Terrs. & Sask.	CL1866	4	159	188
NAD27_YK	North American 1927–Yukon	CL1866	-7	139	181
NAD27_CZ	North American 1927–Canal Zone	CL1866	0	125	201
NAD27_CR	North American 1927–Caribbean	CL1866	-7	152	178
NAD27_CA	North American 1927–Central America	CL1866	0	125	194
NAD27_CU	North American 1927–Cuba	CL1866	-9	152	178
NAD27_GR	North American 1927–Greenland	CL1866	11	114	195
NAD27_MX	North American 1927–Mexico	CL1866	-12	130	190
NAD83	North American 1983	GRS80	0	0	0
OB1966	Observatorio 1966 (Atl. Isl.)	INTL	-425	-169	81
OEG	Old Egyptian	HELM	-130	110	-13
OHW_MN	Old Hawaiian–mean value	CL1866	61	-285	-181
OHW_HW	Old Hawaiian–Hawaii	CL1866	89	-279	-183
OHW_KA	Old Hawaiian–Kauai	CL1866	45	-290	-172
OHW_MA	Old Hawaiian–Maui	CL1866	65	-290	-190
OHW_OA	Old Hawaiian–Oahu	CL1866	56	-284	-181
OMAN	Oman	CL1880	-346	-1	224
OSGB_MN	Ordin. Survey of Gr. Britain 1936–mean value	AIRY	375	-111	431
OSGB_E	Ordin. Survey of Great Britain 1936 –England	AIRY	371	-112	434
OSGB_IM	Ordin. Survey of G. B. 1936–Isle of Man, Wales	AIRY	371	-111	434
OSGB_SSI	Ord. Surv of G.B. 1936–Scot. & Shetlnd Islands	AIRY	384	-111	425
OSGB_WL	Ordinance Survey of Great Britain 1936–Wales	AIRY	370	-108	434
PDLN	Pico De Las Nieves–Canary Islands	INTL	-307	-92	127
PA67	Pitcairn Astrological–1967	INTL	185	165	42
PSC63	Provisional S. Chilean 1963	INTL	16	196	93
PSA56_MN	Provisional S. American 1956–mean value	INTL	-288	175	-376
PSA56_BO	Provisional S. American 1956–Bolivia	INTL	-270	188	-388
PSA56_NC	Provisional S. American 1956–N. Chile	INTL	-270	183	-390
PSA56_SC	Provisional S. American 1956–S. Chile	INTL	-305	243	-442
PSA56_CO	Provisional S. American 1956–Columbia	INTL	-282	169	-371
PSA56_EC	Provisional S. American 1956–Ecuador	INTL	-278	171	-367
PSA56_GY	Provisional S. American 1956–Guyana	INTL	-298	159	-369
PSA56_PR	Provisional S. American 1956–Peru	INTL	-279	175	-379
PSA56_VN	Provisional S. American 1956–Venezuela	INTL	-295	173	-371
PRICO	Puerto Rico	CL1866	11	72	-101
QUAT	Qatar National	INTL	-128	-283	22
QORN	Qornoq (Greenland)	INTL	164	138	-189
REUN	Reunion (Indian Ocean)	INTL	94	-948	-1262

Datum ID	Datum name	ELLIPSOID	delta x	delta y	delta z
ROME	Rome 1940	INTL	-225	-65	9
SDOS	Santo (DOS) (S.W. Pacific Isl.)	INTL	170	42	84
SBRAZ	Sao Braz (Atl. Isl.)	INTL	-203	141	53
SHILL	Sapper Hill 1943	INTL	-355	16	74
SCHW	Schwarzeck (Namibia)	B1841N	616	97	-251
SA69_MN	South American 1969–mean value	SA1969	-57	1	-41
SA69_AG	South American 1969–Argentina	SA1969	-62	-1	-37
SA69_BO	South American 1969–Bolivia	SA1969	-61	2	-48
SA69_BR	South American 1969–Brazil	SA1969	-60	-2	-41
SA69_CH	South American 1969–Chile	SA1969	-75	-1	-44
SA69_CO	South American 1969–Colombia	SA1969	-44	6	-36
SA69_EC	South American 1969–Ecuador	SA1969	-48	3	-44
SA69_GY	South American 1969–Guyana	SA1969	-53	3	-47
SA69_PA	South American 1969–Paraguay	SA1969	-61	2	-33
SA69_PR	South American 1969–Peru	SA1969	-58	0	-44
SA69_TT	South American 1969–Trinidad and Tobago	SA1969	-45	12	-33
SA69_VZ	South American 1969–Venezuela	SA1969	-45	8	-33
SASIA	South Asia	FS1960M	7	-10	-26
SEBAS	Southeast Base	INTL	-499	-249	314
SWBAS	Southwest Base	INTL	-104	167	-38
TIMB	Timbalai 1948 (Malaysia)	EVRST	-689	691	-46
TOK_MN	Tokyo mean value	B1841	-128	481	664
TOK_JP	Tokyo–Japan	B1841	-123	483	662
TOK_KR	Tokyo–Korea	B1841	-128	481	665
TOK_OK	Tokyo–Okinawa	B1841	-135	478	661
TA68	Tristan Astrological 1968 (S. Atl.)	INTL	-632	438	-609
VL16	Viti Levu 1916 (S.W. Pac. Isl.)	CL1880	51	391	-36
WE60	Wake-Eniwetok 1960	HOUGH	101	52	-39
WGS72	WGS 1972	WGS-72	0	0	4.5
WGS84	WGS 1984	WGS	0	0	0
ZAND	Zanderij (S. America)	INTL	-265	120	-358

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