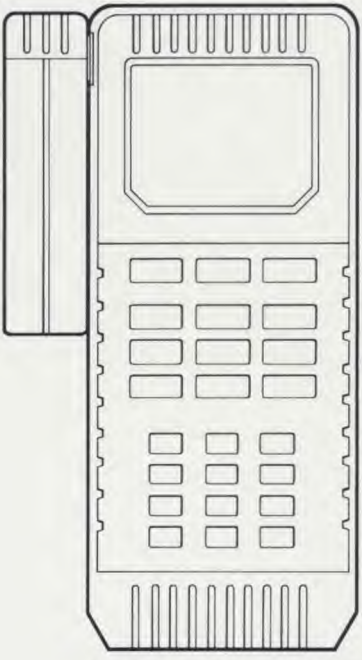
MAGELLAN™
SYSTEMS CORPORATION

GPS NAV *5000*™

User Guide



GPS NAV *5000*™

MAGELLAN GPS
NAV 5000™

USER GUIDE

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Part No. 22-10029-000

WARNINGS

A measure of knowledge by the user is required for proper and safe use of the **Magellan GPS NAV 5000™.** READ THE USER GUIDE & WARRANTY COMPLETELY.

Use Good Judgment

This product is an excellent navigation aid, but it does not replace the need for careful orienteering and good judgement. Never rely solely on one device for navigating.

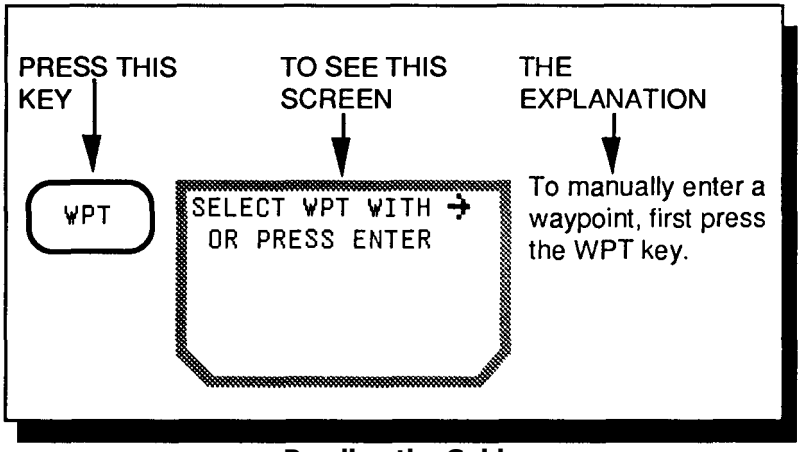
Use Care to Avoid Inaccuracies

The Global Positioning System (GPS) is operated by the U.S. Government, which is solely responsible for the accuracy and the maintenance of GPS. Certain conditions can make the system less accurate, such as changes in the orbit or health of a satellite.

Accuracy can also be affected by poor satellite geometry. WHEN THE ACCURACY WARNING APPEARS ON THE SCREEN, USE THIS DATA WITH EXTREME CAUTION.

THE GLOBAL POSITIONING SYSTEM IS STILL DEVELOPMENTAL. The government can make changes to the system which could affect the performance of GPS receivers. Such a change could require a modification to your NAV 5000. **If you have returned the Registration/Warranty card to Magellan, you will have the opportunity to upgrade your unit and/or software.**

Throughout this User Guide, the pattern graphic/graphic/text is used to explain and describe the key sequences used to operate the unit. Specifically, the keys pressed are shown, followed by the screen as it appears after the keys are pressed. The text repeats the instructions that were described graphically.



Reading the Guide

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

—Reorient or relocate the receiving antenna.
—Increase the separation between the equipment and receiver.
—Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
—Consult the dealer or an experienced radio/TV technician for help.

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CHAPTER 1
INTRODUCTION

This chapter contains a description of the NAV 5000, its specifications and accessories, and the Global Positioning System (GPS).

THE NAV 5000

The NAV 5000 is an affordable, hand-held GPS receiver that is fast, powerful, and accurate, yet very easy to use. The NAV 5000 uses five channels working simultaneously to locate and collect data from the GPS satellites. The unit's gallium arsenide circuitry rapidly processes the data received from the satellites to compute current location (LAT/LON), altitude, and velocity and navigation data in under 1 minute, and updates the data every second.

The NAV 5000 can be set to use any of three modes to calculate positions: two-dimensional (2D), three-dimensional (3D), and the Automatic (AUTO) Mode. In 2D, the unit uses 3 satellites to calculate latitude and longitude: altitude is a user-entered variable. In 3D, the unit uses 4 satellites to calculate latitude, longitude, and altitude. In the Automatic Mode, the unit uses 3D whenever 4 satellites are available; when only 3 satellites are available, the unit switches to 2D.

The NAV 5000 also stores an initial position, last fix, the four most recent fixes, and up to 100 waypoints that are created by the user. Most of these positions can be used to enter a route and to estimate the coordinates and bearing of a distant location.

The NAV 5000 was developed primarily for marine use. It supports most devices that conform to NMEA (National Marine Electronic Association) standards 0180 or 0183. This includes devices such as autopilots, plotters, and sounders.

Though a fast, powerful navigation tool, the NAV 5000 is very easy to use. Most functions can be accessed by pressing only one clearly marked key. Other functions, such as the NMEA control and Sat Status, are accessed through the auxiliary keys.

THE GPS SYSTEM

The Global Positioning System (GPS) is a highly accurate, worldwide navigation and positioning system that can be used 24 hours a day. Designed at the impetus of the US Department of Defense and primarily for military use, GPS is available to a variety of users worldwide, including recreational boaters, fishing and shipping fleets, general and commercial aviation, surveyors, and engineers.

The system is based on a constellation of satellites that, when complete, will consist of 21 satellites and 3 working spares orbiting the Earth twice a day in six orbital planes. Each satellite is in a fixed orbit approximately 10,900 nautical miles above the Earth, and inclined at 55 degrees from the equator.

Data Transmission

Each satellite continuously transmits two types of orbit data: Almanac and Ephemeris. Almanac data contains the health and approximate location of every satellite in the system. Ephemeris data contains the precise orbital parameters of each satellite. A GPS receiver gathers Almanac data from any available satellite; using information from the Almanac, the receiver then determines which set of satellites will give the best geometries for a position fix.

The satellites also transmit two codes. The encrypted code (P-Code) is the more accurate of the two, and is reserved for military use.

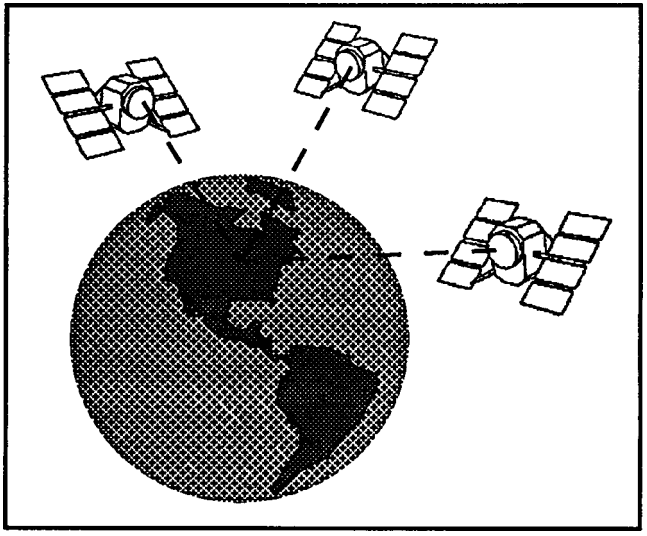
The unprotected code (Coarse Acquisition, or C/A Code) is intended for public access. It is also used to determine the precise range of the user from each satellite, which is the first step in calculating a position fix.

All transmissions from the satellites are in real time.

How a Position Fix is Obtained

Navigation with the Global Positioning System and a well-designed GPS receiver is very simple. The receiver uses data collected from three or four satellites to solve a fundamental geometric equation and presents it in navigation displays.

First, the unit determines which satellites to use to obtain the position fix and then the receiver obtains Ephemeris data from those satellites. (Three satellites are used in 2D; a fourth satellite is used in 3D to determine altitude.)



THE GLOBAL POSITIONING SYSTEM

The receiver then assesses the transmission time and signal quality from each satellite, and multiplies the difference in the transmission time by the speed of light (186,000 miles per second) to arrive at an estimate of the satellite's distance from the receiver (range). Next, the unit calculates (by triangulation) and displays the position fix.

Although accuracy varies slightly with satellite constellation geometry, a position fix accuracy of 25 meters or better is typical with C/A Code receivers.

Interference

GPS uses a high frequency radio signal (1575.42 MHz) that operates in a wave environment where there is little interfering radiation. Also, GPS uses spread spectrum technology to protect its navigation signals. The GPS signal is therefore extremely resistant to conditions that disturb other electronic navigation systems. In general, weather conditions, on-board electronics, passing ships, on-shore electronic installations, on-board engine ignition, and portable radio receivers do not affect the GPS signal.

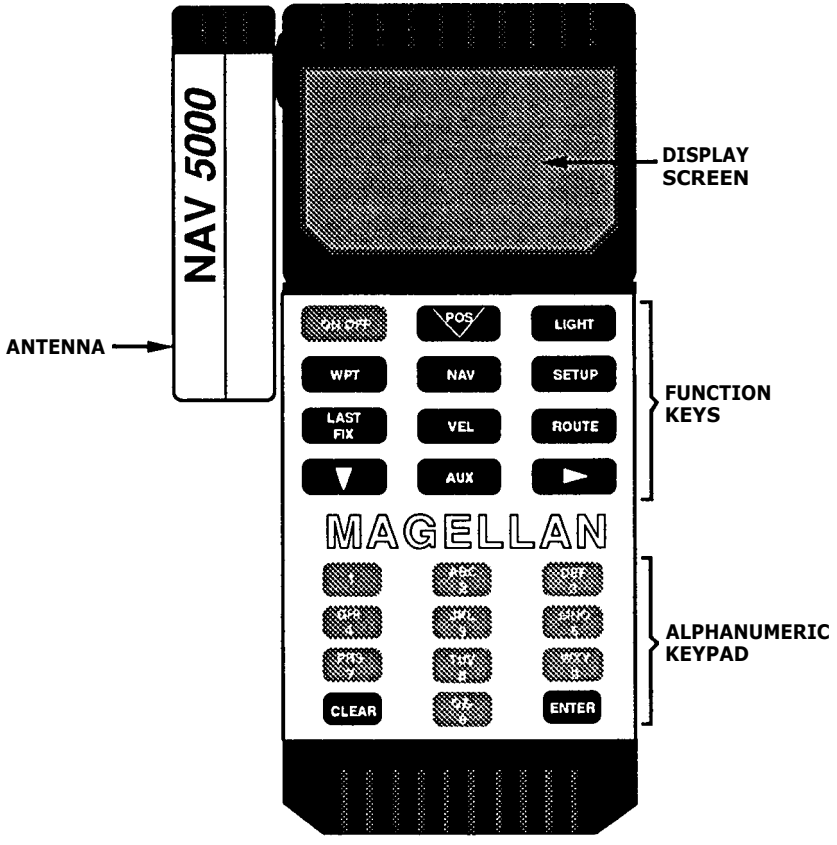
Monitoring and Controlling GPS

GPS is operated by the US Air Force from a master control station in Colorado, USA. The facility is equipped for satellite monitoring, telemetry, tracking, command and control, data uploading, and navigation message generation.

Monitor stations and ground antennas throughout the world passively track the GPS satellites and relay data to the master control station. Exact satellite position and signal-data accuracy can therefore be constantly updated and maintained. Minor discrepancies between where the satellite "thinks" it is and where the monitor station "knows" it is can also be adjusted.

If any satellite emits erroneous data or is otherwise not operating properly, a ground station marks it "unhealthy." The affected satellite broadcasts its status to the GPS receiver, which is programmed to ignore an unhealthy satellite and use the next best satellite to obtain a position fix.

The master control station can selectively degrade satellite data. This degradation, or Selective Availability (SA), can cause positioning errors of 100 meters (2D RMS).



GPS RECEIVER

SPECIFICATIONS

Physical Characteristics

Unit Size:	3.5" x 8.75" x 2.13" (excluding antenna); (13.8 cm x 34.5 cm x 8.4 cm) 5.0" x 9.0" x 2.5" (bracket-mounted) (19.7 cm x 35.4 cm x 9.8 cm)
Weight:	30 ounces (.85 kg) with batteries
Display:	4 line, 16 character, alphanumeric, backlit LCD
LCD Dimension:	2.56" x 1.77" (6.5 cm x 4.5 cm) 0.28" (0.70 cm) high digits (w/cursor)
LCD Operating Temperature:	-10°C to 60°C
Case:	Waterproof (Battery Compartment is splashproof.)
Buoyancy:	Specific Gravity compared to seawater = 0.8 (it floats)
Safe Storage Temperature:	-40°C to 70°C
GPS Exterior Antenna:	3.5" (8.89 cm) diameter x 3.5" (8.89 cm) height, plus 50 feet (15.24 meters) of cable. (Part of Quick-Release Bracket Mounting Kit.)

Data Characteristics

Accuracy:	Position — 15 meters RMS in 2D. (Accuracy of fixes can be affected by the periodic adjustments to GPS satellites by the US Government, and is subject to change in accordance with the Department of Defense Civil GPS user policy.) Velocity —±0.1 Knots (HDOP<2, C/N_o>47 dB-Hz, 2D)

Velocity:	0 to 825 Knots (0 to 951 mph)
Time to First Fix:	55 seconds typical (cold start) 35 seconds typical (warm start)
Update Rate:	1 second (2D) typical
Memory:	100 user-stored waypoints, initial position, and 5 last fixes
Modes of Operation:	2D (solves for LAT, LON, and time with a user-entered altitude using best 3 satellites) OR 3D (solves for LAT, LON, Attitude, and time using best 4 satellites) OR Automatic (uses 2D or 3D, depending on number of available satellites.

Electrical Characteristics

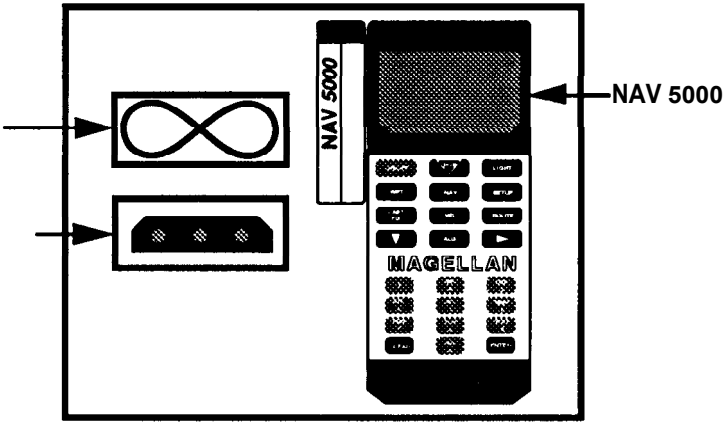
Power Requirements:	6 AA alkaline batteries (internal), 10 to 15 DC with adapter 115 volts AC±10%, with adapter
Power Consumption:	160 mA without backlight 185 mA with backlight

PACKING LIST

When you receive your NAV 5000 Basic Package, you should have all of the following:

- Magellan Nav 5000 unit, 1
- Battery Clips, 2 —1 in unit and 1 spare
- Batteries, 6 — in unit
- Lanyard, 1
- Field Card, 1
- User Guide, 1
- Warranty/Registration Card, 1
- Faststart

If any of these items is missing, contact your dealer.



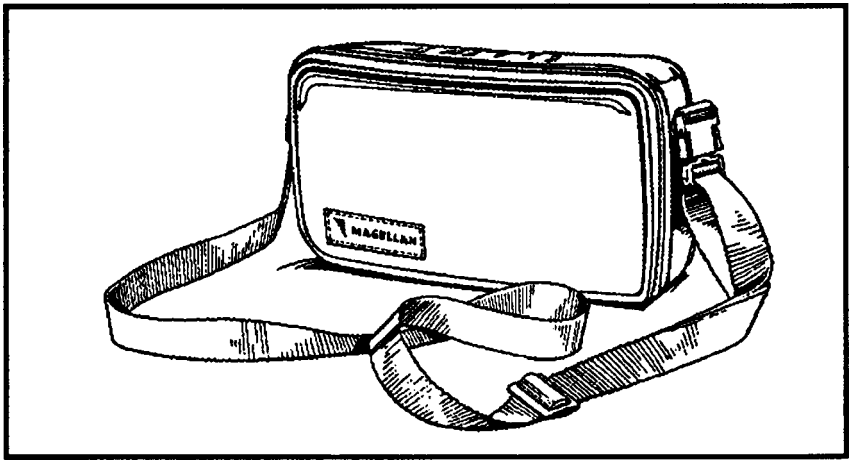
MAGELLAN GPS NAV 5000

ACCESSORIES

The NAV 5000 has several accessories, including spare battery clips and power adapters. The two most commonly used accessories are described below. All accessories for the NAV 5000 are available from your Magellan dealer.

Carrying Case

The sturdy carrying case, illustrated below, holds the unit, an extra battery clip, and the field card. The case can be worn over the shoulder or on your belt, and is an excellent storage container when the unit is not in use.



NAV 5000 CARRYING CASE

Quick-Release Bracket Mounting Kit

The Quick-Release Bracket Mounting Kit allows you to operate the NAV 5000 inside a wheelhouse or cabin by attaching the NAV 5000 to an external antenna. The kit includes:

- Unit Holder
- GPS Antenna Coupler
- U-Bracket, with mounting hardware
- Exterior Antenna with 50 feet of cable
- DC/Antenna Interface Box
- Installation Instructions

The components of this kit are also available separately.

CHAPTER 2
Getting Ready to Use the NAV 5000

Before your NAV 5000 is ready for use, there are several setup tasks that must be completed. This chapter describes these tasks in the order in which they should be performed.

BATTERIES

The NAV 5000 requires six (6) AA alkaline batteries for operation. The batteries are used to operate the unit without an external power source. (See Battery Saver on page 5-12.)

Magellan Systems Corporation recommends Eveready Energizer™ batteries.

We do not recommend that you operate the NAV 5000 with nickel cadmium (NiCad) batteries. NiCads have a much shorter life than alkaline batteries; in the NAV 5000, they last only about 3.5 hours. Also, the power drop at the end of NiCad battery life is so rapid that there may be no warning before the unit's memory is lost. Use NiCad batteries at your own risk.

The NAV 5000 is shipped with alkaline batteries already installed.

Loading the Alkaline Batteries

The unit must be operated with six (6) AA alkaline batteries. Use the procedure below to load batteries.

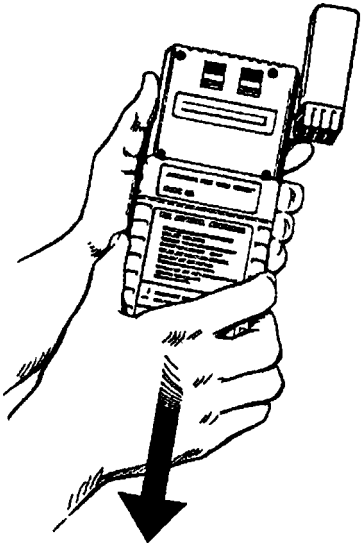
1. Put the batteries in the extra battery clip. Be sure the batteries are oriented as shown on the clip.

2 Be sure the unit is off.

3. If the unit was being operated on external power, also disconnect the NAV 5000 from the external power source.

4. Holding the unit as shown in the illustration below, pull the battery cover firmly towards the bottom of the unit until it stops, then lift the door off. To create a seal against moisture, the cover fits snugly, and will not move easily.

5. Remove the old battery clip. Insert the new clip in the battery compartment; it will fit only with the open side facing you and the clip's external contacts on the right.



OPENING THE BATTERY COVER

WARNING

The unit cannot maintain its memory without batteries very long. Memory loss may occur in as little as two minutes.

6. Remove any dirt, sand, or other foreign matter from the battery compartment seal.

7. Replace the battery cover. Position the cover over the battery clip and push up firmly until the door settles into place. Be sure the door is secure.

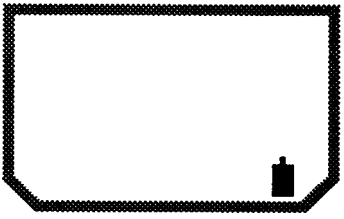
Battery Operation

When operated from battery power, the unit operates continuously once POS, NAV, or VEL has been pressed, updating the position fix every second. The unit remains on until it is turned off with the ON/OFF button or the batteries wear out. Continuous Operation is a very heavy drain on the batteries; you can expect about 10 hours' use from alkaline batteries in continuous operation.

The unit has a Battery Saver feature, which allows you to reduce the drain on the batteries. When the Battery Saver is on and POS is pressed, the unit takes position fixes for two minutes. lf no other keys are pressed, the unit then shuts itself off.

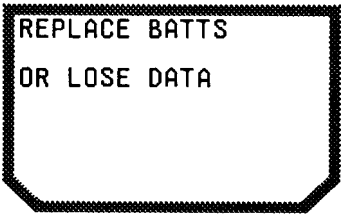
Refer to page 5-12 to turn the Battery Saver on.

Battery Warning



There are two battery warnings. The first is a symbol that appears when the batteries are low. This symbol remains on all displays until the batteries are replaced.

If the Battery Saver is off, when the first battery warning appears, the unit is able to operate continuously for up to 30 minutes. lf the Battery Saver is on, you can turn the unit on and obtain position fixes 15 more times.



The second warning is added when the batteries become dangerously low. lf the batteries are not replaced, information stored in the unit's memory may be lost.

EXTERNAL POWER OPERATION

The NAV 5000 can be operated from an external AC or DC power supply. When being run on external power, the unit operates continuously until the unit is turned off (with the ON/OFF button) or external power is lost.

It should be noted that when the unit is being operated from external power, the batteries are bypassed. **At no time are alkaline or NiCad batteries recharged in the unit.**

Use only Magellan equipment to connect the unit to an external power source. All Magellan adapters and interfaces have been designed to supply the unit with the correct level of DC voltage; the use of any other equipment may harm the unit and void the warranty.

Power Adapters

The unit is connected to an external power source with one of several Magellan adapters. Discuss your needs with your Magellan dealer to be sure you purchase the correct adapter.

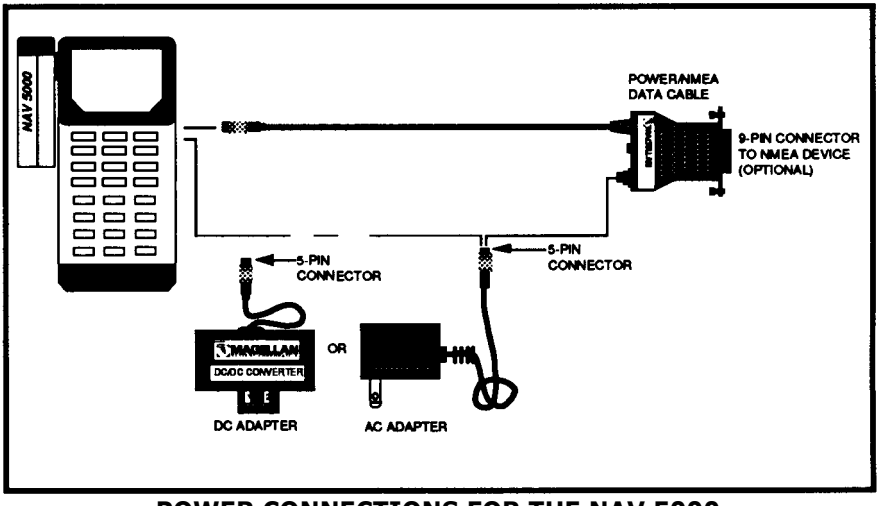
Currently, AC adapters are available for 110 volts, 220 volts, and 240 volts. There is also a regulated 12-volt DC adapter.

Connecting to an External Power Source

Refer to the drawing below to connect the unit to an external power source.

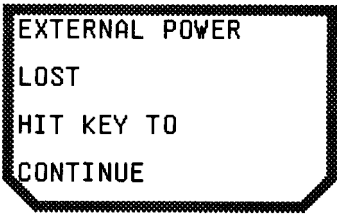
WARNING

Be sure the unit is off before connecting or disconnecting the external power supply. Failure to observe this precaution may result in lost memory or a frozen display.



POWER CONNECTIONS FOR THE NAV 5000

The external power jack is located on the right side of the unit, opposite the antenna. Insert the five-pin connector of the adapter into the power jack.



This message appears when the level of external power being supplied to the unit is below minimum requirements. The unit is operating on battery power.

WARNING

Use only Magellan power adapters to connect your unit to external power supplies. Use of other adapters will void the warranty and may severely damage the unit.

INITIALIZATION

The NAV 5000 responds more quickly when used within 300 miles (482.7 km) of its initialized position or last fix.

To initialize, you must know your location (latitude and longitude) within 300 miles (482.7 km). You should also know your altitude as accurately as possible. (Note that normal tidal fluctuations do not affect this measurement.) It you do not know your position, call your local marine electronics dealer, or consult an atlas or chart.

Although you can obtain a position fix without entering an initial position, the unit obtains the first position fix more quickly if a correct initial position was entered. It is also possible to operate without having entered an altitude, but this will affect the accuracy of the position fixes, especially in 2D operation. Therefore, regardless of which mode you plan to use, an altitude should be entered. When a 2D position fix is obtained, the value entered will be used as the default altitude, and will allow the unit to obtain more accurate fixes. If you will be using the Automatic Mode, an altitude should be entered for the initial position because the unit may use either 3D or 2D to obtain fixes.

If no altitude is entered, the unit assumes that altitude is 0.

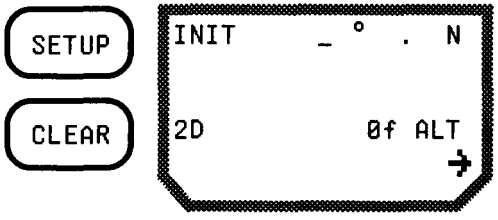
NOTE

If you will be using an external antenna, enter the antenna's altitude when installed. Antenna altitude is altitude (your height above sea level) plus the height of the antenna installation above you.

It is also possible to initialize by using the Sky Search (AUX 5) function to establish your position automatically. This method takes about 15 minutes. It should be noted that the unit gets the first position fix more quickly when an initial position is entered manually. (See page 5-8.)

NOTE

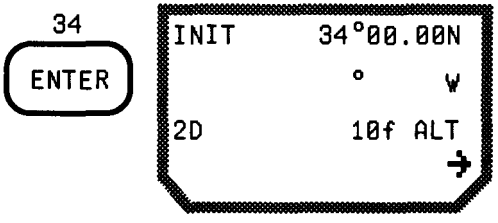
It is recommended that you read the SETUP section in Chapter 4 to fully customize your unit. This section is intended to provide only enough information to set the initial position.



Press the SETUP key. If a position is already entered, press the CLEAR key to erase it.

NOTE

The unit was initialized at the factory; this is usually cleared before the unit is shipped. DO NOT use the factory coordinates as your initial position.

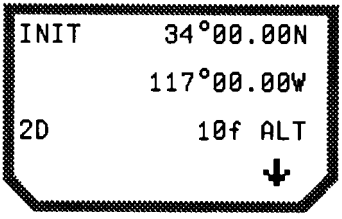


Enter your approximate position within 300 miles (latitude and longitude). For example, to enter a latitude of 34°00.00N, key in 3, 4, and ENTER. Trailing zeroes are entered automatically. (If you prefer, enter all zeroes manually.) Use the RIGHT ARROW to toggle between

N and S, if necessary.
Press ENTER.

NOTE

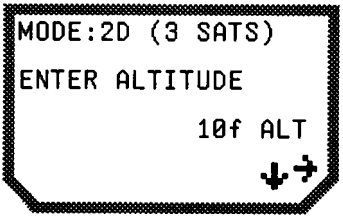
The default hemispheres (before initialization or after memory loss) are North and West. The unit assumes that the hemispheres you choose here (or the hemispheres calculated in LASTFX, whichever is more recent) are current. These hemispheres are offered as your first choice when you enter a waypoint manually.



Enter the longitude by pressing the numbers on the keypad. Use the RIGHT ARROW to toggle between E and W. Press ENTER.

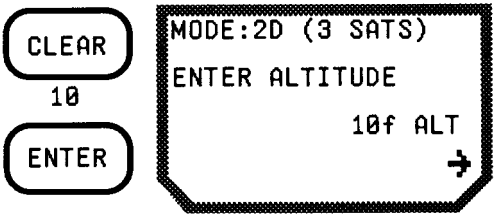
WARNING

The coordinates used here may not be your position. You MUST know your position within 300 miles. If you are unable to learn your position, press AUX 5 to initiate Sky Search.



From the initial position screen, press the DOWN ARROW to go to the mode/altitude display. Press the RIGHT ARROW to choose 2D, 3D, or AUTO Modes.

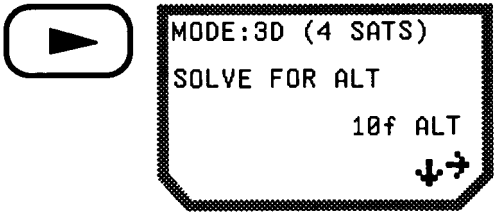
Remember that in 2D the unit calculates latitude and longitude only, and altitude is a user-entered value. In 2D, the unit is able to calculate more accurate position fixes when an altitude is entered at the mode/ altitude display than is possible without a user-entered altitude. (Operation in the 2D Mode is recommended for marine use.) In 3D, altitude is calculated by the unit. In the Automatic Mode, the unit uses 3D when 4 satellites are visible and 2D when only 3 satellites are visible.



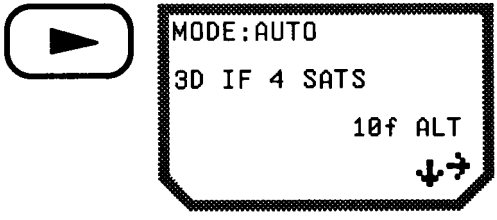
Press CLEAR to erase the old altitude. Key in the new altitude. (Use the RIGHT ARROW to toggle between positive and negative values.) Press ENTER to store the altitude.

NOTE

If you operate the unit in the Automatic Mode, you must enter an altitude.



If you will be using the unit in 3D, press the RIGHT ARROW to change to 3D. Note that an altitude is also displayed here. If you want to, you can change it as described above.



If you will be using the unit in the Automatic Mode, press the RIGHT ARROW to change to AUTO. Press CLEAR to enter a new altitude as described above.

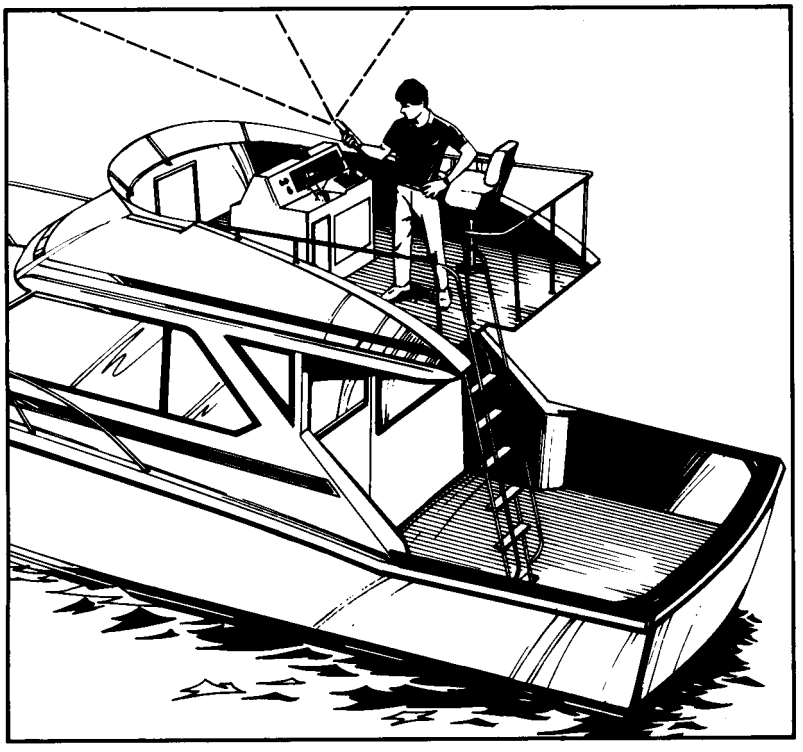
NOTE

If you will be using an external antenna be sure to enter antenna altitude. Antenna altitude is altitude (<u>your</u> height above sea level) plus the height for the antenna installation above you.

Press any function key to exit SETUP.

ORIENTING THE ANTENNA

In order to obtain a position fix or collect an Almanac, the unit must be held or placed in direct view of the satellites overhead. Hold the unit upright or rotate the antenna up as shown in the figure below.

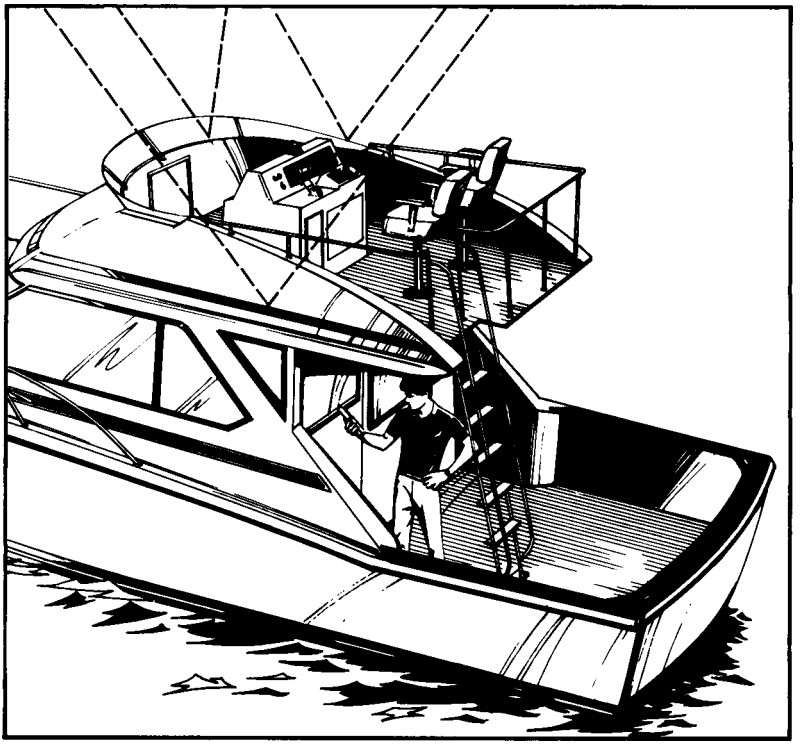


GIVE THE ANTENNA A DIRECT VIEW OF SATELLITES

NOTE

If your signal appears to be blocked, sometimes moving a few feet in any direction will let you receive a signal. This is especially true in an area of dense or overhanging vegetation or structures.

The unit will not receive signals if its view of the satellites is blocked by objects or people, or if you attempt to use it inside without an external antenna.



OBSTRUCTIONS BLOCK THE SIGNALS

For ease and comfort of operation, a holder is available for the unit, which can be mounted to the boat.

COLLECTING AN ALMANAC

The Almanac is a schedule of satellite availability stored in the NAV 5000's memory. This means that before you obtain a position fix, the unit already knows which satellites are scheduled to be in view (given your last position or initialized position) and where in the sky to look for them.

Almanac information is maintained by all satellites, and is updated as required by GPS system operators to reflect current conditions. Almanac information can be collected from any satellite. The NAV 5000 refreshes its Almanac each time POS, NAV, or VEL is pressed. Therefore, when the unit is in frequent use, it maintains a current Almanac.

When the unit has not been used recently (generally, nine months or more), its Almanac may be out of date. The unit can still obtain a

position fix, however. When POS is pressed the unit will locate a satellite and update its Almanac before calculating a fix. The unit also collects an Almanac when POS is pressed and it does not have an Almanac. (See page 4-10).

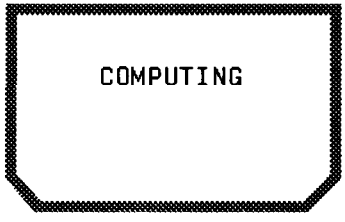
NOTE

The NAV 5000 is shipped with an Almanac. You should therefore have no difficulty getting your first position fix once the unit has been properly initialized.

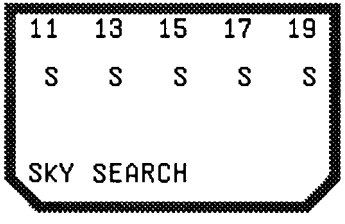
If you need to collect a new Almanac, be aware that it takes about 12-1/2 minutes to collect a complete Almanac once a satellite signal has been located. (Be sure you have a clear view of the sky.) Since the receiver is on while the Almanac is being collected, this can be a heavy drain on your batteries. You might want to connect the unit to extemal power to collect an Almanac.

If the unit has lost its memory, it must be reinitialized and a new Almanac collected. There are several ways to do this. One is to initialize the unit as described on page 2-5 and collect an Almanac with AUX 5 (see page 5-8).

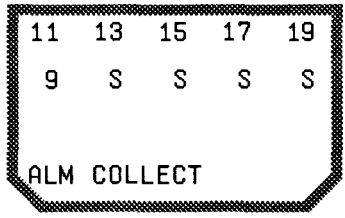
You can also press POS. The unit will locate a satellite, collect an Almanac, and calculate a position fix.



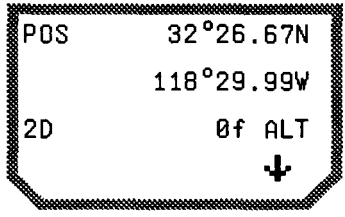
Press POS. The unit tries to determine which satellite is scheduled to be overhead.



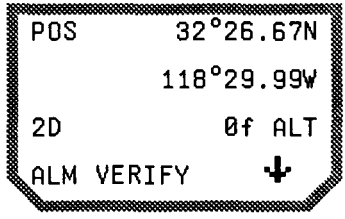
Since there is no Almanac or initial position, the unit enters Sky Search. The receiver searches for satellites in a prescribed pattern until one is located.



The ALM COLLECT message appears on the display when a satellite has been located and acquired, and the unit is collecting an Almanac.



When the unit has located and acquired three satellites, it calculates a 2D position fix. Altitude is assumed to be 0; the fix may therefore not be accurate unless you are at sea level.

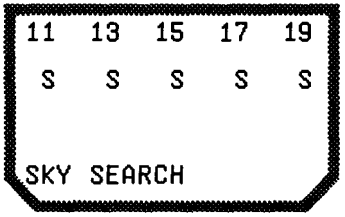


The unit then checks the Almanac to be sure that it is both complete and accurate do not turn the unit off, and maintain a clear view of the sky until this message disappears.

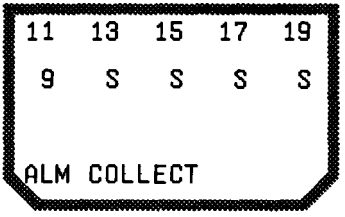
Since all non-default SETUP parameters were lost when memory was lost, you must reenter them. Be sure to reenter your altitude or antenna altitude also.

You can also reinitialize the unit and collect an Almanac by pressing AUX 5. The unit will locate a satellite, collect an Almanac, and calculate an initial position.

Press AUX, 5, and ENTER.



Press ENTER again to initiate Sky Search. The receiver searches for satellites in a prescribed pattern until one is located.



The ALM COLLECT message appears on the display when a satellite has been located and acquired, and the unit is collecting an Almanac. DO NOT turn the unit off until this message disappears.

It takes approximately 12-1/2 minutes to locate a satellite and collect an Almanac. If the signal is interrupted during Sky Search, however, the unit requires more time to locate a satellite and collect an Almanac. We recommend that you collect an Almanac before getting under way.

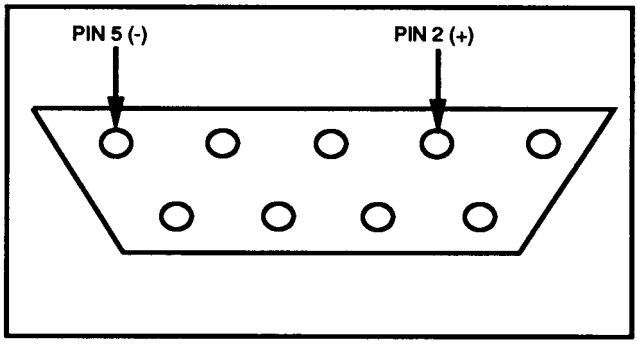
CONNECTING TO AN EXTERNAL DEVICE (NMEA)

The NAV 5000 can interface with various autopilots, plotters, sounders, and radars through its National Marine Electronics Association (NMEA) interface. The NAV 5000 supports NMEA standards 0180 and 0183.

The jack on the side of the NAV 5000 provides a connection for both external power and for NMEA support. The optional Power/NMEA Data Cable has three receptacles on one end. One receptacle is for the 5-pin AC adapter. Another is an RCA jack for the old-style power adapters. The third receptacle is to connect to the NMEA device of your choice. (See illustration on page 2-4.)

NMEA Pin Positlons

To connect the NAV 5000 to NMEA 0180 or 0183 devices you will have to purchase a 9-pin connector (male DB-9) to mate with the Power/NMEA Data Cable. They are readily available at any electronics or marine electronics store. The wires should be soldered into the pins shown on page 2-14.



9-PIN CONNECTOR

NMEA Setup

To prepare the unit to support an NMEA device, press AUX 6. Follow the message prompts to activate the dataport and select the output message that is required by your equipment. (See page 5-9.)

Activating NMEA Support

The unit supports NMEA devices only when it is in continuous operation (Battery Saver off or using external power), the dataport is on, output has been activated by pressing POS, NAV, or VEL, and position fixes are being obtained.

Do not turn the external device on until you are sure the unit is emitting data. Data is emitted only after the unit has obtained its first fix (usually within 1 minute), and is then updated every 2 seconds.

Successful NMEA support of external devices requires that the following parameters be set:

- cables are connected
- unit is ON
- route is set
- unit is operating with Battery Saver off or from extemal power
- dataport is on and set to a message output acceptable to your device
- external device is turned on
- unit is getting position fixes

ENTERING DATA

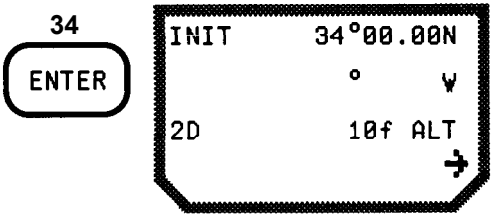
Information must be entered into the unit from the alphanumeric keypad to enter an initial position, to manually enter a waypoint, or to

name or retrieve a waypoint.

Look at the keypad. It is arranged in the same way as your telephone keypad (reverse 10-key). Each key is assigned to a number and two or three letters.

To enter a position (either as an initial position or to enter a waypoint manually), simply press the appropriate alphanumeric keys until the entire coordinate is entered, then press ENTER.

If you pressed the wrong key, press CLEAR and choose another.

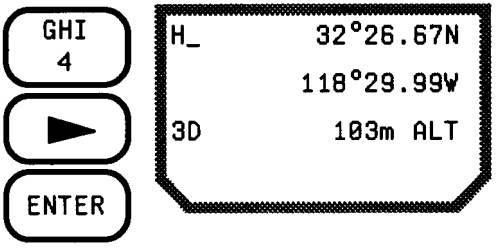


Key in the coordinate, using the RIGHT ARROW to toggle between hemispheres. Press ENTER. Trailing zeroes are added by the unit automatically.

NOTE

Only numbers are available when entering position coordinates. Letters are available only when entering a Waypoint name and when WPT has been pressed. You cannot enter a letter as a coordinate.

Waypoint names are entered by pressing an alphanumeric key, then pressing the RIGHT ARROW until the desired character appears on the screen.



To enter a letter, press the key on which the letter appears. The first letter assigned to that key appears on the display.

Toggle through the key assignments with the RIGHT ARROW. (The assignment order for the key shown is G, H, I, 4, G, H....) Press ENTER when the letter you want is displayed.

CHAPTER 3
BASIC OPERATION

This chapter contains a brief description of the NAV 5000 features you will use most often. It is not intended to describe any feature fully or to describe all of the unit's features or options.

To fully understand the NAV 5000 and what it can do, you must read Chapters 4 and 5.

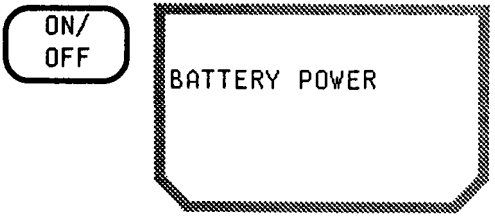
This chapter briefly describes how to:

- obtain a position fix
- enter waypoints
- set a route
- obtain navigation data
- get velocity
- determine the quality of a position fix
- adjust display brightness
- get more information on the satellites
- support an NMEA device

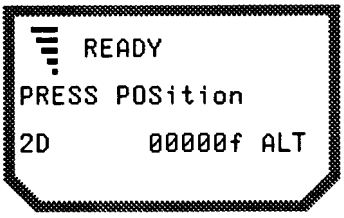
If you have not already done so, initialize your unit as described in Chapter 2, Initialization.

OBTAINING A POSITION FIX

How to obtain a position fix is described fully starting with page 4-10. (Be sure you have a clear view of the sky.)

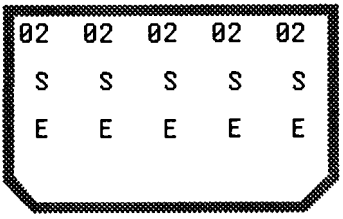


When the unit is first turned on, it displays its power source for a few seconds.

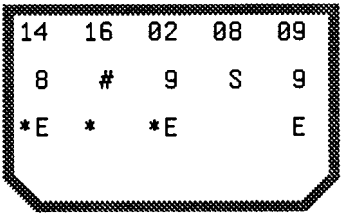


When the display shows this message, the unit is ready to operate.

POS

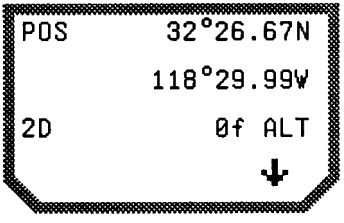


Press POS. The unit starts the Instafix™ satellite search algorithm. Instafix™ devotes all five channels to the search for the satellite directly overhead, given your last fix or initial position.

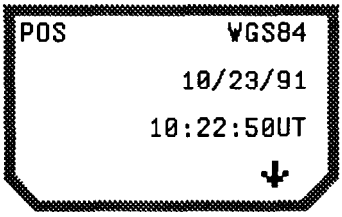


Once that satellite is located the unit acquires Ephemeris data from it and begins to search for other satellites that should be in view. The unit also selects the satellites that will give the best geometry for a fix.

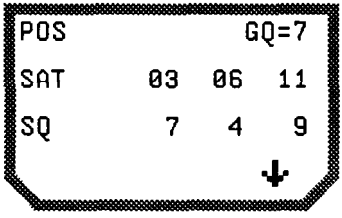
When enough satellites to take a position fix have been found and acquired, the unit computes a position fix. When the unit has been set to 2D operation, this occurs when 3 satellites have been acquired. In 3D operation, the fix is made when 4 satellites have been acquired. In Automatic, the unit operates in 3D if 4 satellites are available, and 2D when only 3 satellites are available. The first fix is usually obtained in about 55 seconds.



The position fix is shown on three display screens. The first screen displays the latitude, longitude, altitude, and mode. In 2D altitude is a user-entered value; altitude is computed in 3D.



Press the DOWN ARROW to view the current datum and the date and time the fix was taken.



Press the DOWN ARROW again to view which satellites were used to take the fix, the signal quality from each satellite, and the geometric quality of the fix.

Press the DOWN ARROW again to return to the first display.

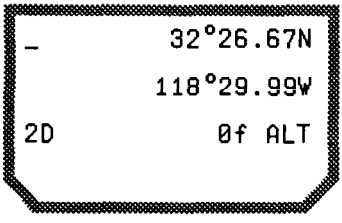
ENTERING A WAYPOINT

A waypoint is a position that is stored in the unit's memory. Once stored, the position can then be used for navigation. The NAV 5000 can store up to 100 waypoints.

Waypoints can be entered by storing a position fix as a waypoint, or by entering it manually.

Saving a Position

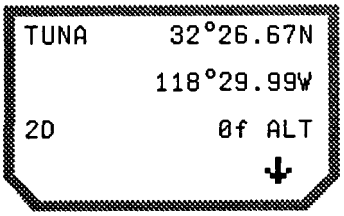
When you want to save a position as a waypoint, first display the position on the screen. Display your current position with POS, the last fix with LAST FIX, or a backup fix with LAST FIX and the RIGHT ARROW.



When the desired position is displayed, press ENTER. The cursor appears in the upper left corner of the display.

TUNA

ENTER

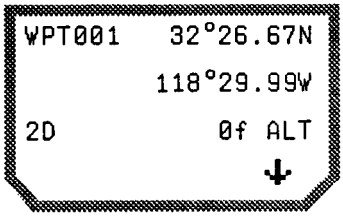


Key in a one- to six-character waypoint name, using the alphanumeric keys as described on page 2-14, then press ENTER.

OR

ENTER

ENTER

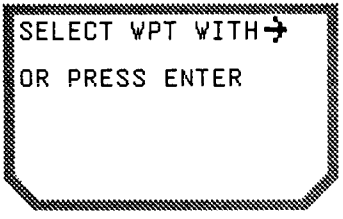


Press ENTER twice for the NAV 5000 to name the waypoint automatically. The name will be in the format WPTxxx, where xxx is 001 through 099, in sequence.

Entering a Position Manually

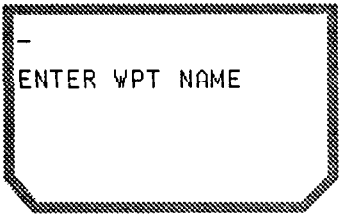
Waypoints can also be entered manually.

WPT



Press WPT.

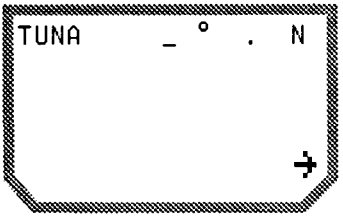
ENTER



Press ENTER.

TUNA

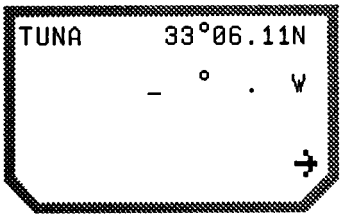
ENTER



Key in the name you want to use for this Waypoint and press ENTER, or press ENTER twice to name the Waypoint automatically.

330611

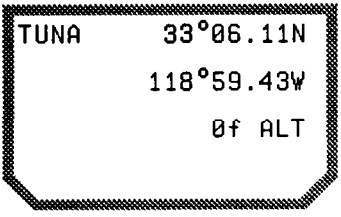
ENTER



Key in the latitude. Use the RIGHT ARROW to toggle between North and South. Press ENTER.

1185943

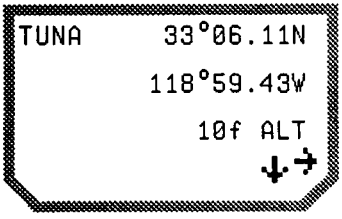
ENTER



Key in the longitude. Use the RIGHT ARROW to toggle between East and West. Press ENTER. The default altitude is displayed.

10

ENTER



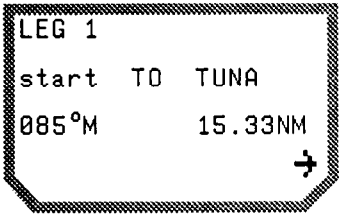
Press ENTER to accept the default altitude, or key in a new altitude. Use the RIGHT ARROW to toggle to a negative altitude (below sea level). Press ENTER.

Refer to page 4-42 for more information an waypoints.

SETTING A ROUTE

To navigate between two places, create a route that uses two waypoints as the start and destination. You can divide your route into two to ten legs.

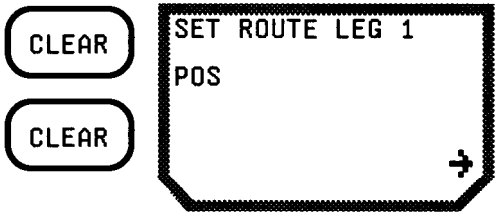
ROUTE



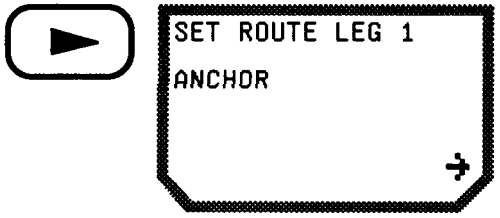
Press ROUTE. The current leg of an existing route is displayed. This route must be cleared before continuing.

NOTE

If there is no existing route, this screen is not displayed. You will see the screen below instead. You do not have to "Clear."



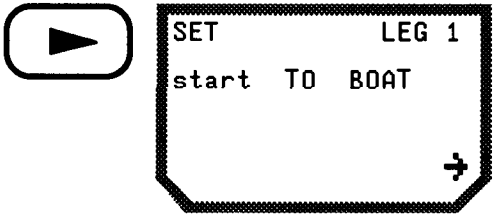
Press CLEAR twice. The unit automatically displays the most recent position fix.



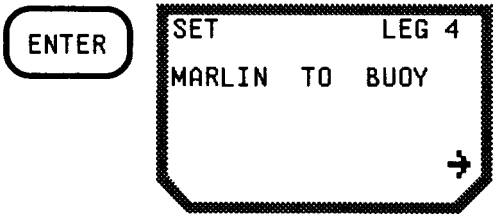
Press the RIGHT ARROW to scroll through the waypoints until the position you want to use as start is displayed.

If you prefer, press the first letter of the waypoint and ENTER, and begin scrolling from there.

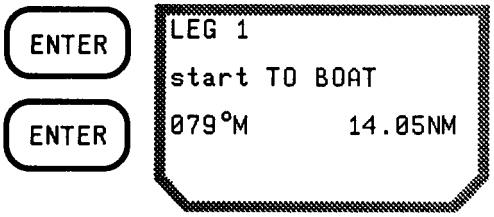
Press ENTER to accept the displayed waypoint as the starting point. The cursor immediately goes to the destination field. If "POS" was selected, it is renamed "start."



Choose a waypoint as the destination by pressing the RIGHT ARROW until the desired position is displayed. (Only POS and waypoints are available as destinations.)



Press ENTER to continue and set the next leg. Repeat the steps above to enter a start and destination for each leg.

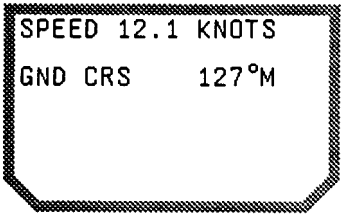


When all of the legs have been entered, press ENTER twice. The display returns to the first leg.

For more detail, refer to Route in Chapter 4, starting at page 4-18.

GETTING VELOCITY

Velocity information is available only in continuous operation, and only when your speed exceeds 0.2 knots.



Press VEL to obtain speed and ground course information.

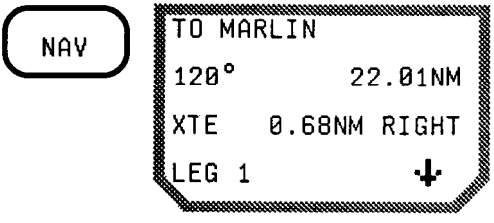
For more detail, refer to page 4-41.

GETTING NAVIGATION DATA

The unit can obtain navigation data only when a route has been set. Navigation data available includes Bearing, Distance to destination, Steering, Time To Go, and Cross Track Error data.

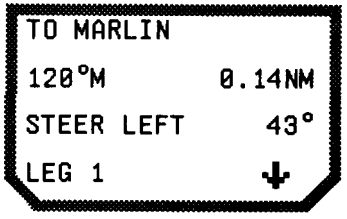
NOTE

You must be traveling at least 0.2 knots to get Bearing- and Steering-related data.

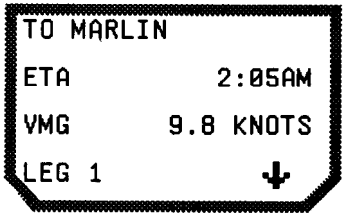


Press NAV to navigate to your first destination. NAV data is shown an four display screens. The first shows Bearing, Distance to destination waypoint,

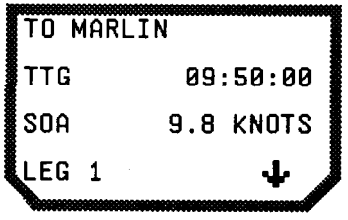
Cross Track Error, whether you are to the right or left of your route leg, and which leg you are on.



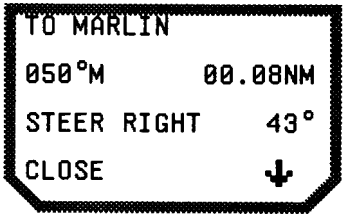
Press the DOWN ARROW to see Steering.



Press the DOWN ARROW again to see Estimated Time of Arrival (ETA) and Velocity Made Good (VMG).



Press the DOWN ARROW to see Time To Go (TTG) and Speed Of Advance (SOA).



When you are within 500 feet of your destination, the NAV 5000 beeps and displays the message "CLOSE."

NOTE

Only Distance to destination is available when you are within 60 feet (18.3 meters) of your destination.

Refer to page 4-4 for further information.

DETERMINING THE QUALITY OF THE FIX

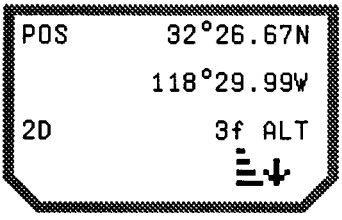
The quality of the fix is affected by the strength of the signals being received from the satellites and the geometry of the satellite set used to obtain the fix.

Signal Quality

The Signal quality (SQ) is an indication of the carrier-to-noise ratio of the signal being received from a satellite. It is displayed on the receiver status screen and on the last screen of the position display.

Signal quality ranges from 0 to 9, with 9 being the best. When SQ is 4 or greater, the signal is strong enough that the unit will not lose its lock on it. SQ can sometimes be improved by moving the antenna; even a few inches can improve SQ greatly.

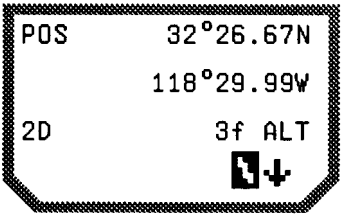
The signal quality has almost no bearing on accuracy. It is provided to alert you to a condition that may affect the unit's ability to maintain a lock on the satellites currently being used.



When this symbol appears on the bottom right of the display, the signal quality of one or more satellites used for the fix is 3 or less.

Geometric Quality

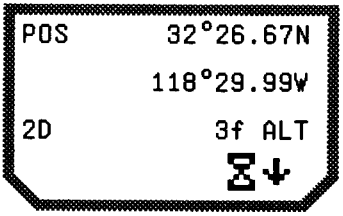
Geometric quality is a measurement of the geometry of the satellites used to triangulate the position. The further apart the satellites are, the better the geometry of the fix. Geometric quality ranges from 0 to 9, with 9 being best. When the GQ is 7 or better, the geometry should not affect accuracy.



When this symbol appears on the display, the geometry of the fix is 3 or less. The accuracy of this fix is extremely poor, and it should not be used for navigation.

Dated Information

If the unit loses a satellite signal and no other satellite is available, the unit cannot update the position fix. The NAV 5000 displays the most recent position fix with an hourglass symbol in the lower right corner.



This symbol appears when the unit is displaying old information. The fix displayed is not current, and should not be used for navigation.

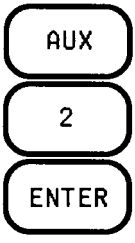
ADJUSTING DISPLAY BRIGHTNESS

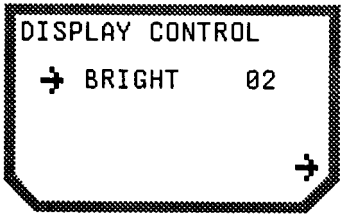
The display on the NAV 5000 can be backlit by pressing LIGHT on the function keypad. The display remains lit until LIGHT is pressed again or until the unit is turned off.

NOTE

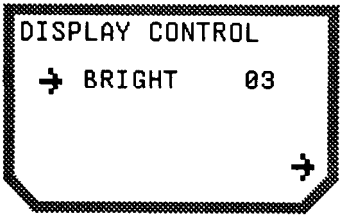
Using the light is a heavy drain on the unit's batteries.

The brightness of the display when the light is on can also be adjusted.





Press AUX, 2 and ENTER. If the light is not already on, also press LIGHT.



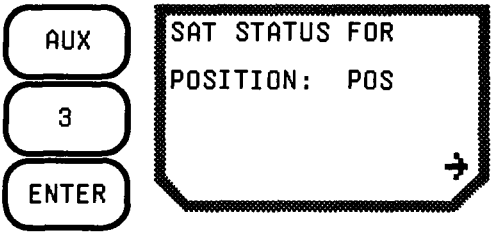
Press the RIGHT ARROW to adjust the brightness. Adjustment levels range from 1 to 15.

OBTAINING INFORMATION ON THE SATELLITES

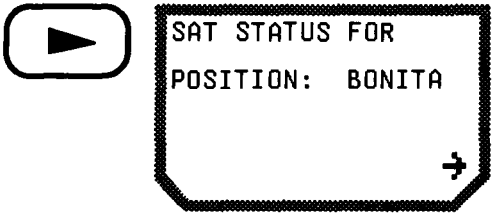
Some information on the satellites is available in the position displays. More information can be obtained with the Satellite Status and the Satellite Schedule functions.

Satellite Status

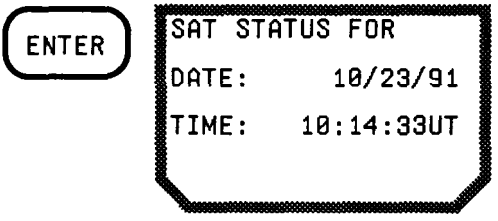
Satellite Status contains information on a satellites's health and current status, and displays the elevation and azimuth of satellites that are above the horizon.



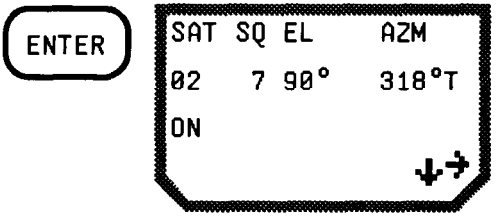
Press AUX, 3, and ENTER.



Press the RIGHT ARROW to select any saved position.



Press ENTER. The current date and time is displayed. You may enter another date and time, if you want.



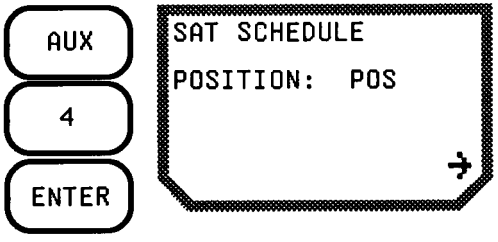
Press ENTER. The display shows information about the first satellite. Press the RIGHT ARROW to toggle between on and off for this satellite. Press the DOWN ARROW to go to the next satellite. There is a value for SQ when the satellite

displayed was used in a recent position fix.

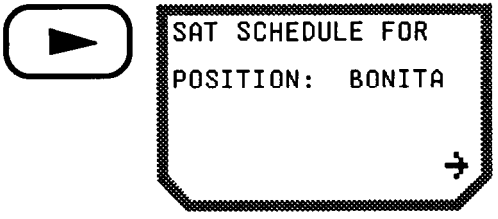
Refer to page 5-3 for more detail.

Satellite Schedule

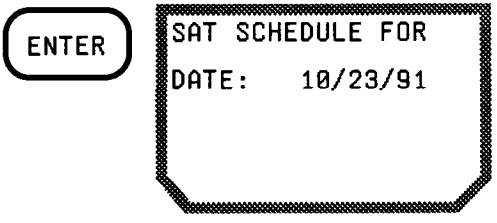
Until the global positioning system is complete, you may not be able to use the unit 24 hours a day in all locations. The Satellite Schedule computes the windows in which enough satellites will be available to take a position fix, given the location and date you enter, and the current mode (2D or 3D).



Press AUX, 4, and ENTER.



Press the RIGHT ARROW to choose a position. You may choose from last fix, initial position, and waypoints.



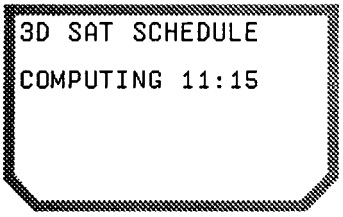
When the position you want is displayed, press ENTER. Enter the date you want the schedule for, then press ENTER.

OR

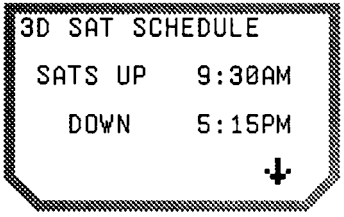
Press ENTER to accept the current date.

NOTE

Enter any date that is within 9 months of the date on which you last used the unit for more than a few minutes.



Press ENTER to begin computing. As the schedule is computed the time is marked off in 15 minute intervals.



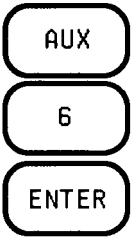
When computations are complete, a "window of availability" appears on the display. This is the time when there will be enough satellites available to get a position fix. If there is more than one window the DOWN ARROW appears on the display.

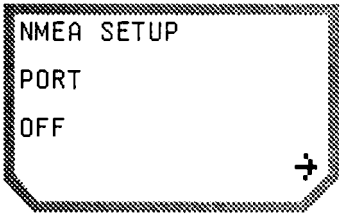
See page 5-6 for more information.

SUPPORTING NMEA DEVICES

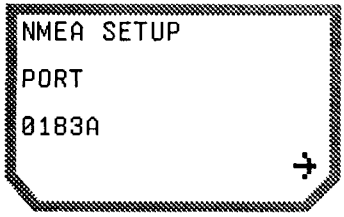
The unit can support NMEA devices when the Battery Saver is off or the unit is operating from external power, and the dataport is turned on. AUX 6 allows you to activate the dataport and select the outgoing message format your NMEA device requires.

The NAV 5000 supports devices that accept 0180 or 0183 messages.





Press AUX, 6, and ENTER.



Press the RIGHT ARROW to select the outgoing message format. Choose between, 0183A, 0183B, 0183C, 0180, or OFF.

NOTE

The unit must be operating with the Battery Saver off or from external power to support NMEA devices.

Refer to page 5-9 for more information an NMEA support.

CHAPTER 4
Function Keys

The function keys are used to operate the NAV 5000 and to access information. The keys discussed in this chapter are described in alphabetical order.

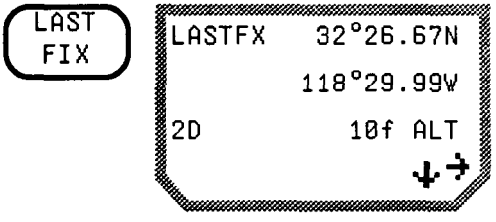
LAST FIX

Five of the most recent position fixes are saved in a temporary file as LASTFX, FIX-02, FIX-03, FIX-04, and FIX-05. The position fixes can be viewed by pressing LAST FIX. Each time this file is updated, the last fix and backup fixes advance one place, and the position fix that was saved as FIX-05 is discarded.

All position fix updates are not retained. When the Battery Saver is on (unit operates for 2 minutes), the last position fix taken is stored as LASTFX. When the Battery Saver is off or when the unit is being operated from external power, the unit saves one fix every 10 minutes as LASTFX.

LASTFX and any of the backup fixes can be stored as waypoints (see page 4-42) and then used to define a Route (see page 4-18).

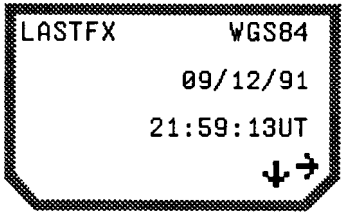
The Last Fix



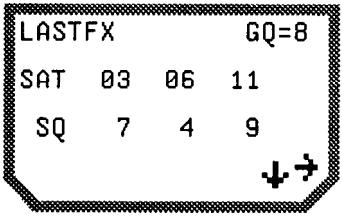
Press LAST FIX to display the coordinates of your most recent position fix. The screen also displays the mode (2D, 3D or AUTO) on the lower left, and altitude on the lower right.

NOTE

If the first screen displays the accuracy warning symbol and the unit beeps, GQ was 3 or less. Check the third position screen to see the geometric quality. (See pages 4-13 and 4-17.)



Press the DOWN ARROW to display the date and time of the fix and the currently selected datum.



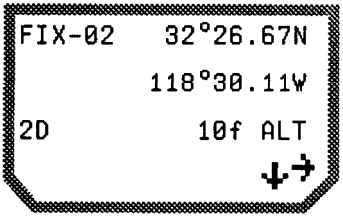
Press the DOWN ARROW again to display satellite signal information.

WARNING

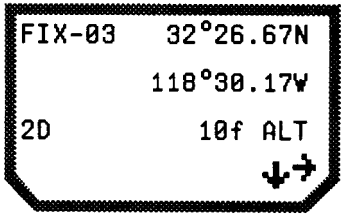
Do not use this position for navigation if GQ is 3 or less.

Last Fix Backups

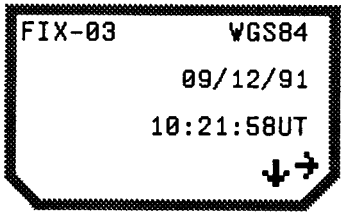
The unit also retains four previous position fixes. They are stored as FIX-02, FIX-03, FIX-04, and FIX-05.



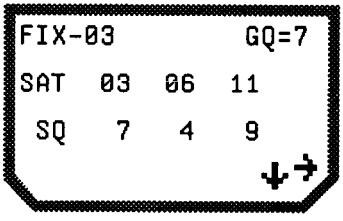
To view the backup fixes, press the RIGHT ARROW once from the LASTFX display.



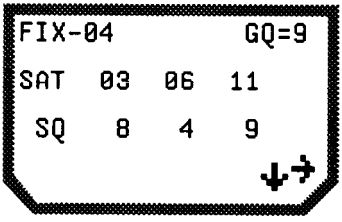
Press the RIGHT ARROW again to advance to FIX-03.



Press the DOWN ARROW once to see the second position display (date and time of fix and current datum).



Press the DOWN ARROW again to see which satellites were used for the fix, their signal qualities and the geometric quality of the fix.



Press the RIGHT ARROW to move to the third position screen of FIX-04.

NOTE

To save any of these backup Last Fixes as waypoints, press ENTER when the fix you want to save is displayed. Enter a waypoint name and ENTER, or press ENTER again to name the waypoint automatically.

LIGHT

The LIGHT key backlights the message display. Press the key to turn the light on and off.

The light turns off automatically when the unit is turned off. It also turns off when the second battery warning appears, and if external power is lost.

NOTE

The light is a significant drain on your batteries.

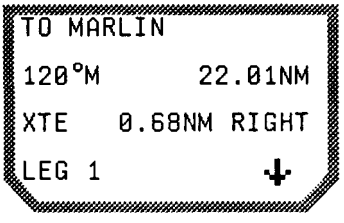
The brightness of the display when the light is on can also be modified with AUX 2. See page 5-3.

NAVIGATION

The NAVIGATION (NAV) key provides Distance, Cross Track Error, and Bearing- and Steering-related data.

Calculations are based on the most recent fix in relation to your destination waypoint. Therefore, a route must be entered with ROUTE before NAV can be used.

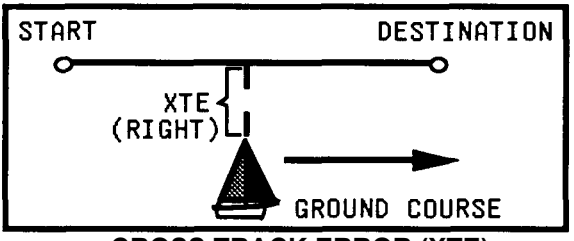
Before starting, enter your route and display the current leg.



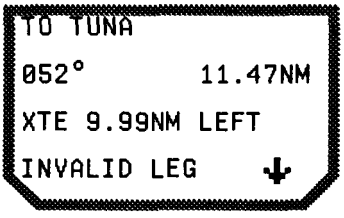
To navigate to the first destination, press NAV. The first screen displays Bearing, Distance to the destination waypoint, Cross Track Error, whether you are right or left of your route leg, and which leg you are on.

NAV

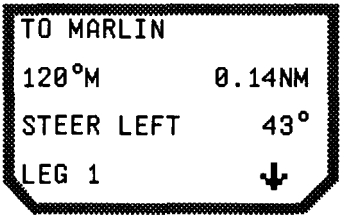
XTE (Cross Track Error), on the third line of the sample screen above, is the length of the perpendicular between your present position and the courseline. It is described as being to the right or left of the courseline, facing the destination.



CROSS TRACK ERROR (XTE)



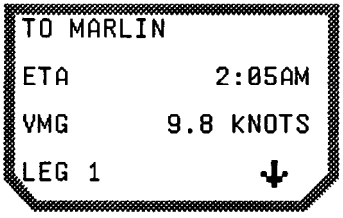
If you are 9.99 nautical miles or more from the selected route leg the NAV 5000 will not compute a Cross Track Error-(XTE). The "Invalid leg" message is displayed.



Press the DOWN ARROW once to see Steering. Steering indicates which way the vessel should be turned to head toward the leg destination, given your current ground course and bearing.

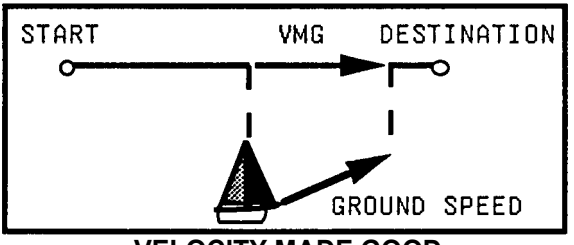
NOTE

You must be traveling at least 0.2 knots to get velocity-related data, such as Steering or Time To Go.

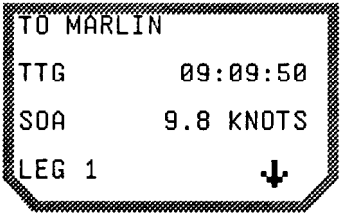


Press the DOWN ARROW again to see Estimated Time of Arrival (ETA) at your destination waypoint and Velocity Made Good (VMG).

Velocity Made Good (VMG) is the component of the total ground speed that is parallel to the course line. (Ground speed is actual ground speed, measured at a given instant.)



VELOCITY MADE GOOD

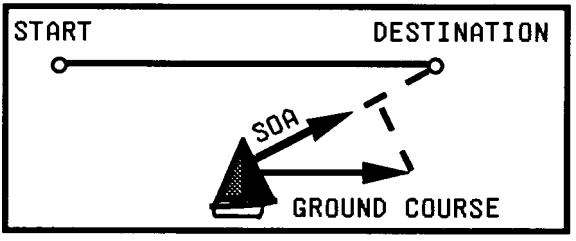


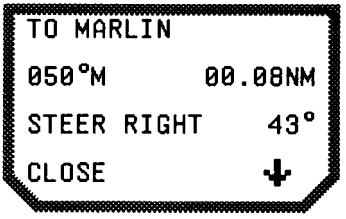
Press the DOWN ARROW to see Time To Go (TTG) and Speed Of Advance (SOA).

Time To Go (TTG), on the second line of the screen above, is the length of time required to complete the current leg, given the current speed of advance.

Speed Of Advance (SOA), on the third line, is the component of the ground speed in the direction of the destination waypoint. It is calculated using speed and ground course. When XTE = 0, SOA = VMG.

NAV





When you are within 500 feet (152.4 meters) of the destination, the NAV 5000 beeps and the fourth line of the screen reads "CLOSE."

NOTE

When you are within 60 feet (18.3 meters) of your destination, only Distance to destination is available.

ON/OFF

ON/OFF

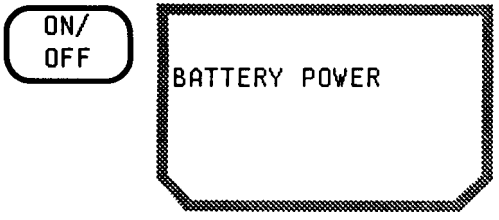
The On/Off key turns the NAV 5000 on and off.

When the Battery Saver is on, the NAV 5000 will take fixes for two minutes after POS, NAV, or VEL is pressed, and then shuts off if no other function keys are pressed. When the Battery Saver is off, the unit operates continuously until the second battery warning appears (see page 4-8). In continuous use alkaline batteries power the receiver for about 10 hours.

When operating from external power, the unit operates continuously until disconnected or until turned off with the ON/OFF key.

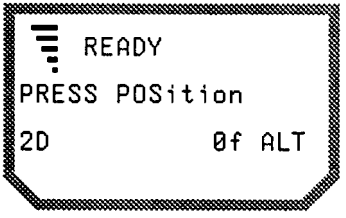
Self-Test

The NAV 5000 performs a self-test each time it is turned on.



When the unit is turned on, the first display is a temporary power status message, indicating if the unit is operating from batteries or an external power source.

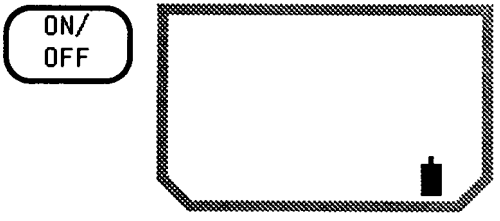
The unit then performs a brief self-test of its memory, Almanac, and power. The READY display appears when the self-test is complete.



To continue, press POS to find a position (See page 4-10).

If there is a problem, a power warning will also appear.

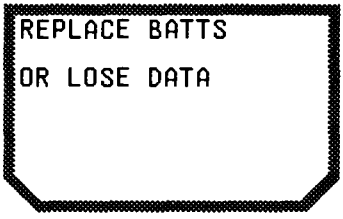
Power Warnings



The battery symbol appears on the display when the batteries are low, and remains until the batteries are replaced.

WARNING

The batteries must be replaced when you see the second battery warning.

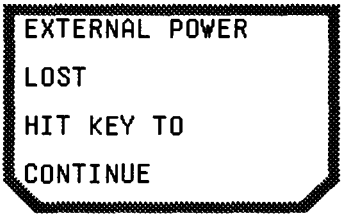


An additional power warning appears when the batteries become dangerously low. The batteries must be replaced now, or all stored information may be lost.

The unit shuts itself off two minutes after this warning appears. You may continue to operate only from external power.

NOTE

When the second power warning appears, the batteries have enough residual power to retain memory for one month.



This message appears when the level of external power being supplied to the unit is lost or is below minimum requirements. Press any function key except ON/OFF or LIGHT to continue on battery power.

POSITION (POS)

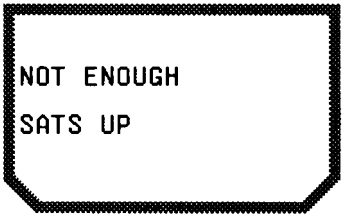
When the POS key is pressed the NAV 5000 checks its Almanac to determine which satellites are scheduled to be in view, and which of the available satellites will give the best geometry for a position fix. If satellites are scheduled to be in view, the receiver turns on and the display goes to the receiver screen.

Taking a Position Fix

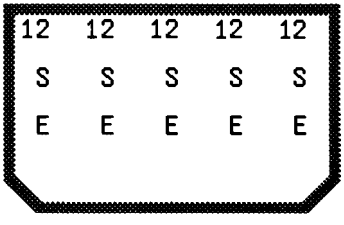
Press POS. The unit checks its Almanac to determine which satellites are available, based on your last position fix.

NOTE

If the unit does not have an Almanac or has not been operated for more than a few minutes in the past 9 months, the unit enters Sky Search to locate a satellite and collect a current Almanac before calculating a position fix. (Refer to page 2-10 and 5-8.)



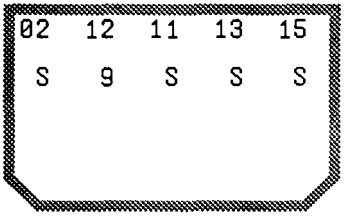
If no satellites are scheduled to be in view, the receiver does not turn on.



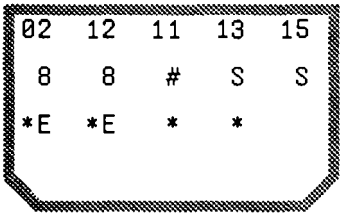
If satellites are scheduled to be in view, the unit starts the Instafix™ satellite search algorithm. Satellite receiver activity is monitored on the receiver status screen.

The Instafix™ satellite search algorithm devotes all five channels to the search for the satellite the Almanac indicates is directly overhead, given your last fix or initial position. This greatly shortens the length of time required to obtain a position fix.

The first satellite is usually located in a few seconds, but when satellite geometry is not optimum, it takes up to a minute. If the satellite cannot be located, the unit looks for the satellite with the next highest elevation.



Once the satellite has been located, the receiver searches for other satellites that are scheduled to be in view.



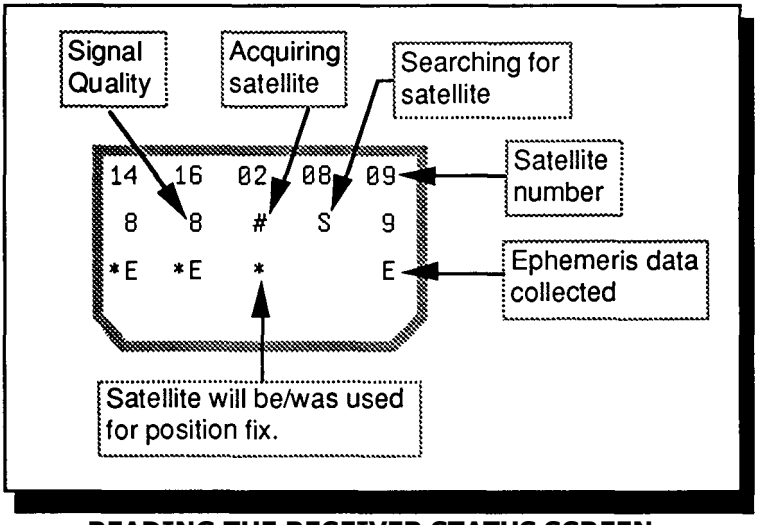
Throughout the search and acquisition of satellites the receiver status screen monitors the activity of all 5 channels. Refer to the illustration on page 4-12 to interpret this screen.

NOTE

When the unit is being operated in 2D, it uses four channels to search for and acquire satellites. When the unit is in 3D, it uses five channels to search for and acquire satellites. Therefore, the screen you see on the unit may differ from the five-channel display shown above.

When the unit is first turned on, the unit's internal clock is updated in the first 10 seconds of Ephemeris data collection. Thereafter, the clock is updated every few position fixes.

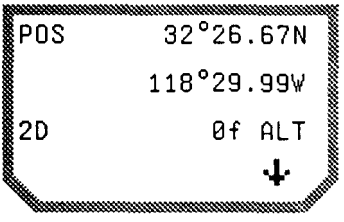
A position fix is calculated when enough satellites for the mode you have chosen have been acquired. If the unit was initialized correctly, the first position fix can be made in 55 seconds or less. Subsequent fixes can be made in about 30 seconds, if the previous fix was made in the last hour and you are using the same set of satellites.



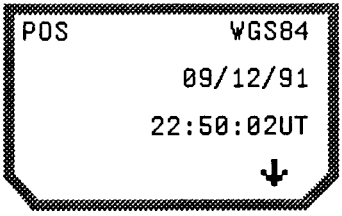
READING THE RECEIVER STATUS SCREEN

Position Display

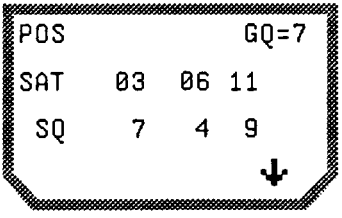
The position is automatically displayed on three screens when it has been calculated. Scroll through the screens with the DOWN ARROW.



The first position screen shows the latitude, longitude, mode, and altitude. Remember that altitude is a user-entered value in 2D; the unit computes it in 3D.



Press the DOWN ARROW to see the current datum, date, and time.



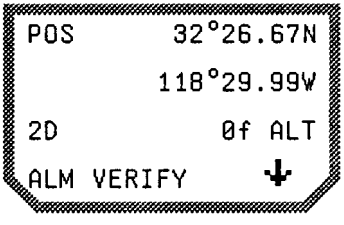
Press the DOWN ARROW again to see which satellites were used to compute the position, the satellite signal quality, and the geometric quality of the fix. (See page 3-9 for a description of SQ and GQ. Refer to the Appendix for a more detailed description.)

Press the DOWN ARROW again to return to the first screen.

NOTE

You may perform other functions, such as entering a route or checking satellite status and schedule while the receiver is on.

The unit sometimes has enough satellites to calculate a position fix before it has finished collecting or refreshing its Almanac. It may therefore verify the data in its Almanac to be certain that it is complete and error-free.



ALM VERIFY appears on the screen when the unit is checking its Almanac. Do not turn the unit off while this message is on the screen.

Continuous Operation

When the unit is in continuous operation, it updates the position fix approximately every second. As satellites set or their signals become blocked, and as other satellites rise, the unit occasionally changes which satellites are being used. This does not affect the unit's updating the position fix.

When the unit is operating from external power, it does not turn off until ON/OFF is pressed or power is lost.

Real-Time Messages

The messages below appear on the fourth line of the position screen.

ALM VERIFY	The entire Almanac was not collected; the unit is identifying the missing data and collecting it. Do not turn the unit off.
NOW IN 2D	Appears briefly the first time POS is pressed after the unit is turned on, and when the unit switches from 3D to 2D.
NOW IN 3D	Appears briefly the first time POS is pressed after the unit is turned on, and when the unit switches from 2D to 3D.
	OId Data. Satellites have set or their signals have become blocked, and there are not enough satellites to update the position fix; the position displayed is more than 10 seconds old.
	The signal quality (SQ) of one or more satellite is 3 or lower. The lock on the satellite's Signal is not strong, and may not be maintainable.
	The geometric quality (GQ) of the position fix is 3 or less. The accuracy of this fix is uncertain; do not use this fix for navigation purposes.

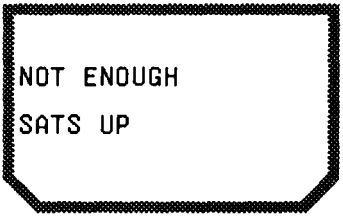
Search and Acquisition Errors

Under the following conditions, the unit may be unable to obtain a position fix:

- o Initialization was not done correctly.
- o Poor signal environment.
- o Insufficient number of satellites.
- o Unit searches constantly.

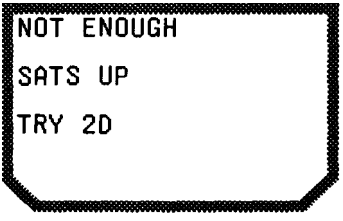
Insufficient Number of Satellites

The NAV 5000 checks its Almanac before beginning to search for satellites. The receiver will not turn on if the Almanac indicates that not enough satellites are within view to establish a position fix.



This message appears when the Almanac indicates that not enough satellites are in view to take a fix. The receiver remains off.

If you are operating with the Battery Saver on, the unit shuts itself off if it cannot locate enough satellites for a fix. Check Sat(ellite) Status with AUX 3 to be sure that no satellites have been set to "OFF."



This message appears when the unit is set to 3D operation, and not enough satellites are available for a 3D fix. Try 2D, which requires fewer satellites.

Unit Searches Constantly

If the unit has an Almanac and is unable to locate satellites, it searches continually until a satellite is found.

The unit may be unable to locate satellites under the following conditions:

- The antenna is not positioned correctly.
- The satellite signals are blocked from view by buildings, mountains, etc.
- There are signal reflections that can be corrected by moving the antenna.
- There are satellite outages.
- Satellites set to "OFF" in Sat Status.

Refer to AUX 3, Sat Status (page 5-3), to verify satellite status. Refer to "Orienting the Antenna" (page 2-9) to position your antenna.

Initialization Error

An initialization error occurs when:

- The initial position entered in SETUP or Initialization was incorrect by 300 miles (487.2 km) or more.

- The unit has been moved 300 miles (487.2 km) or more from its last position fix or initial position.

Either condition can cause the unit to be unable to find the satellites it looks for. Since the unit searches for satellites based on where it thinks it is, an incorrect initial position or a LASTFX that is 300 miles (487.2 km) or more away from the unit's current position may cause the unit to search for satellites that are not available at the unit's true location.

Either condition can also cause the unit to calculate a position fix that is 300 miles (487.2 km) or more from its initial position or LASTFX. The unit regards this position fix as an error, and tries three more times to obtain a position fix that it can accept.

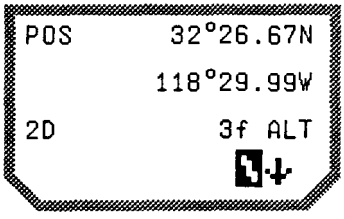
If the unit cannot locate any satellites, or after the fourth attempt to obtain an acceptable position fix, the unit discards the initial position or LASTFX and assumes that an initialization error has occurred. The unit displays the receiver status screen, and "SKY SEARCH" appears on the fourth line of the screen.

Briefly, since the unit already has an Almanac, it skips the first part of Sky Search, which collects a new Almanac. The unit simply searches the sky for satellites until it locates enough to verify its position and calculate a new position fix. This usually takes 15 minutes.

If the unit does not have a new position fix after about 20 minutes, either reinitialize the unit (page 2-5 or 4-27) or enter Sky Search with AUX 5 (page 5-8) to collect a new Almanac.

Accuracy Warning Symbol

The accuracy of a position fix is determined by the position of the satellites used relative to each other. The closer the satellites are to each other, the less accurate the fix is. This is referred to as geometric quality, and is displayed on the third screen of a fix as GQ. (GQ is described in greater detail in the Appendix.)



This symbol appears on the fourth line of all screens of a position fix when the GQ is 3 or less.

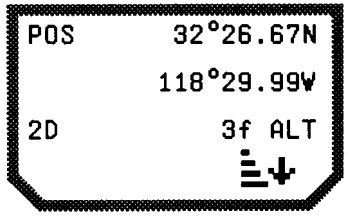
WARNING

When the accuracy warning symbol appears, DO NOT use this data to navigate. Refer to "Determining the Quality of a Fix" on page 3-9.

Signal Quality

The unit also measures the strength of the signal it receives from the satellites and displays this information on the third screen of the position fix. An SQ of 4 and above indicates a strong signal: 0 to 3 indicates a signal so weak that it may be lost.

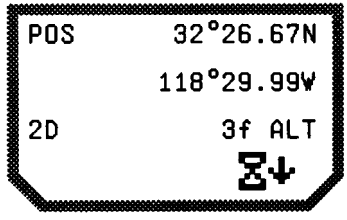
Signal Quality (SQ) does not affect the accuracy of the fix; it is intended only to alert you that a signal from one or more satellites is not as strong as it could be.



This symbol appears on all three screens of the position fix when the SQ from one or more satellites is 3 or less.

Old Data

The unit automatically updates its position every second. If a satellite signal is lost, or a satellite sets or becomes obstructed, the unit switches to other satellites to update the fix. If other satellites are not available, the unit cannot update the position fix.



The hourglass symbol appears on the position display when the unit is displaying a position fix that is at least 10 seconds old. The position displayed is not current, and should not be used for navigating.

ROUTE

The ROUTE key is used to enter a route consisting of 1 to 10 legs and to change route legs.

A route is established by setting a series of waypoints to correspond to the legs of the route.

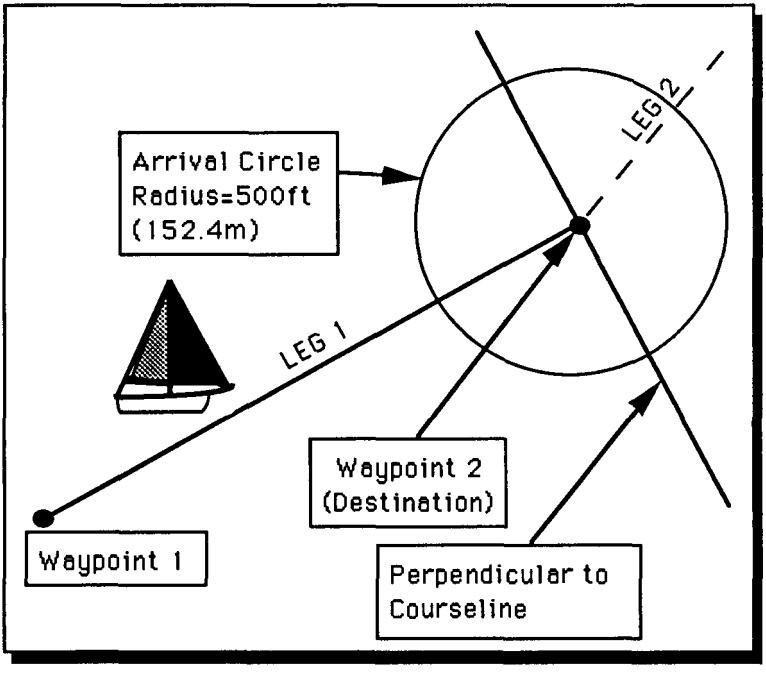
A route can be followed in either the automatic or manual mode. The route mode is selected in SETUP. (See page 4-33.)

In either mode, when following a route, the navigation screen is updated every second, and the unit displays a "CLOSE" message

when you arrive within 500 Feet (152.4 meters) of the current leg's destination.

In the automatic mode, when you cross an imaginary line that intersects your destination and is perpendicular to your courseline, the unit automatically changes to the next leg of your route (see diagram below.)

In the manual mode, when you cross the imaginary perpendicular line you must change to the next leg manually. Press ROUTE and the RIGHT ARROW to move to the next leg. (Refer to the illustration below.)



THE ROUTE LEG

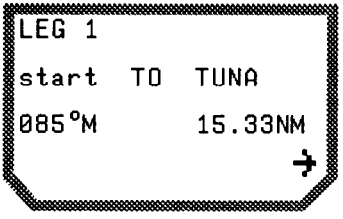
Multi-Leg Routes and NMEA

The NAV 5000 output NMEA data is based on positions related to a multi-leg route. Navigation data is sent out through the NMEA port

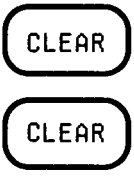
when the dataport is turned an (AUX 6); a route is entered; a leg is selected; the POS, VEL, or NAV key is pressed; and the first fix has been made.

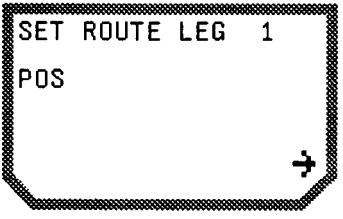
Creating a Route

Use the following key sequences to enter a route.

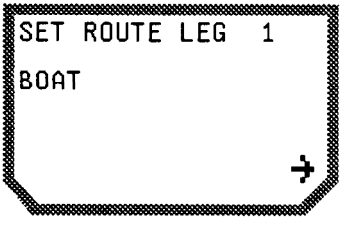


Press the ROUTE key. The current leg of an existing route will appear.





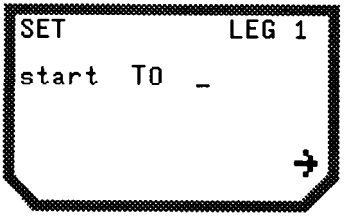
Erase the existing route by pressing CLEAR twice. The unit automatically displays the current position (POS).



Use the RIGHT ARROW to scroll through the stored waypoints in alphabetical order, and then back to POS. You can also enter the first letter of the desired waypoint and ENTER, then use the RIGHT ARROW to scroll through the rest of the waypoints.

ROUTE

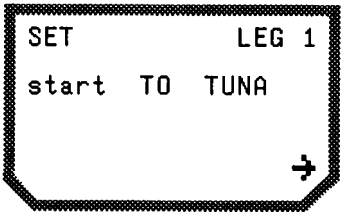
ENTER



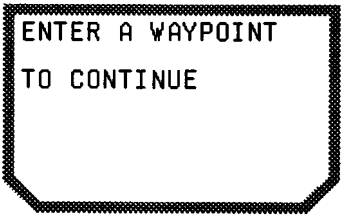
When you reach the waypoint you want to use as the course start, press ENTER.

You may choose POS as the starting point or destination of a leg. When POS is chosen, it is stored as waypoint "start." POS will no longer be available when defining a route leg; you may, however, use "start."

ENTER

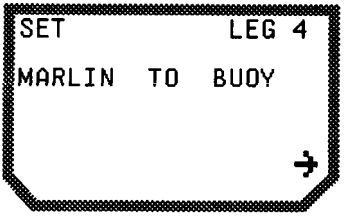


Select the leg's destination the same way. When the desired position is displayed, press ENTER. The unit automatically moves to the next leg.



This screen is displayed if there are no waypoints stored in the unit's memory. You must have waypoints to set a route.

ENTER

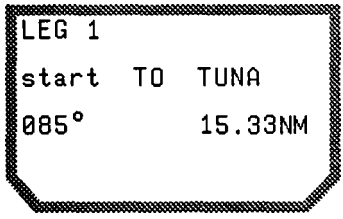


Repeat the steps above to enter route segments until you have completed your route, or until all ten legs have been set.

ROUTE

ENTER

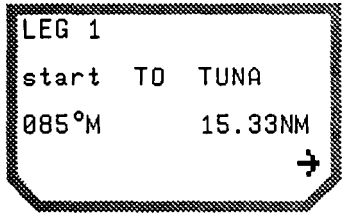
ENTER



When all of the route legs have been set, press ENTER twice. The screen goes to leg 1 of the route you just created.

Viewing an Existing Route

ROUTE



To view the route you just created, press ROUTE and use the RIGHT ARROW to scroll through the legs. Press NAV, POS, or VEL to display navigation data relative to the route leg and destination.

NOTE

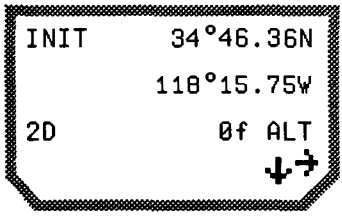
The fourth line of the NAV and VEL displays show the current leg and indicates your arrival at the leg's destination. The current leg is not displayed in POS. The NMEA port is not active if you are using the unit with the Battery Saver on.

Resetting a Route

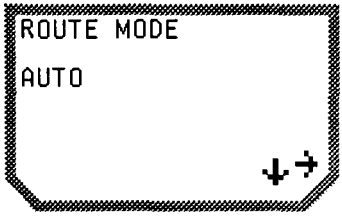
Routes can be reset by pressing the ROUTE key, selecting a new leg, then pressing POS, NAV, or VEL. You can also enter a new route, select a leg, then press POS, NAV, or VEL.

Route Modes

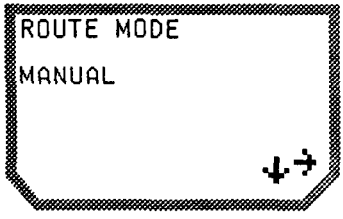
The automatic and manual modes are selected with the SETUP key.



Press the SETUP key to view this message.



Press the DOWN ARROW until you reach the Route Mode screen.



Press the RIGHT ARROW to toggle between Automatic and Manual modes.

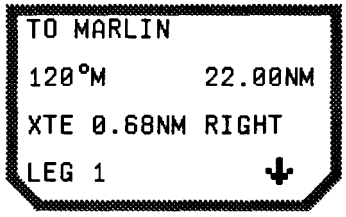
NOTE

Data is output only when the Battery Saver is off or the unit is being operated from external power; a route has been set; POS, NAV, or VEL is pressed; and the first fix has been calculated (this takes about 55 seconds). If you want to change your route, we recommend that you first turn off the device being supported with NMEA data, or place it in standby. Then reset the route, activate the dataport (POS, NAV, or VEL), and reactivate the external device.

ROUTE

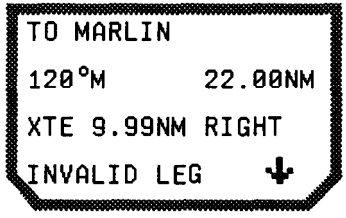
Automatic Mode

NAV

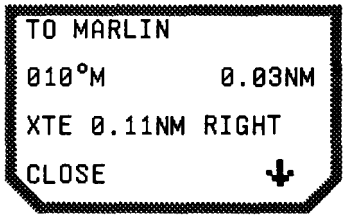


When a route is being followed in the automatic mode, press the NAV key after selecting the current leg. This displays navigation data for the current leg. (See NAV, page 4-4.)

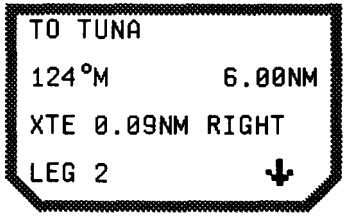
NAV



If you are 9.99 nautical miles or more from your courseline, the unit cannot compute a cross track error and the invalid leg message appears. Clear the message by choosing a more appropriate leg or by clearing the route completely.



When you are within 500 feet (152.4 meters) of your destination, "CLOSE" appears on the bottom line.

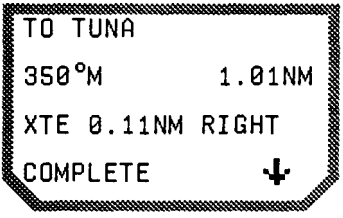


Imagine that a line intersects the destination waypoint and is perpendicular to the courseline. (See the Illustration on page 4-19.) When you cross that line, the unit automatically switches to the next leg of the route.

ROUTE

NOTE

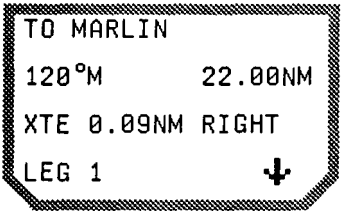
If you cross the imaginary line without entering the arrival circle (illustrated on page 4-19), the unit does not display the "CLOSE" message before switching to the next leg.



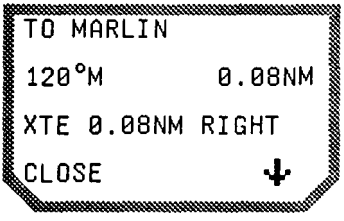
When you arrive at the final destination of the last route leg, the unit displays the "COMPLETE" message.

Manual Mode

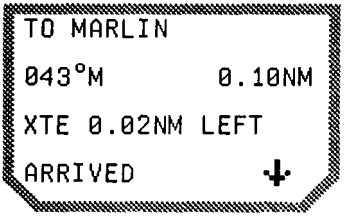
NAV



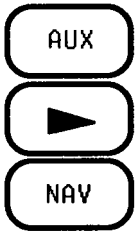
Press the NAV key after selecting the route leg.

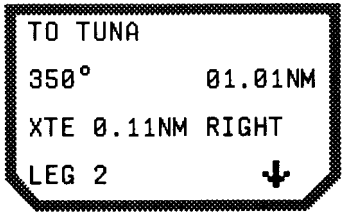


When you are within 500 feet (152.4 meters) of your destination, the display shows the "CLOSE" message.



Imagine that a line intersects the destination waypoint and is perpendicular to the courseline. (See the illustration on page 4-19.) When you cross that line, the unit displays the message "ARRIVED."

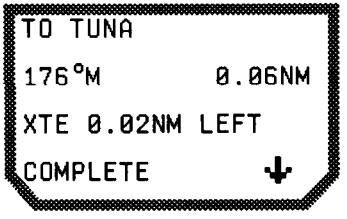




Press ROUTE, then the RIGHT ARROW to scroll to the next leg. Press NAV to return to the navigation screen.

NOTE

If you do not manually change to the next leg within one minute of your arrival at the destination, the unit sends an NMEA invalid output message. If you are supporting an autopilot with the NAV 5000 NMEA output, the invalid output message causes the autopilot to sound an alarm. You can continue to navigate if you are using a plotter or radar.



When you reach the route's final destination, the unit sounds a beeper, and the screen displays the "COMPLETE" message.

SETUP

SETUP is used to initialize the unit before it is used for the first time or when it has been moved more than 300 miles (487.2 km) from where the last fix was taken. (Although it is possible to get a position fix without an initialized position, the unit performs better when it has been initialized manually.) SETUP is also used to modify a configuration item and when the unit has suffered a memory loss.

In SETUP you can:

- Initialize a position
- Choose a position mode (2D, 3D, or Automatic)
- Choose a local clock for time display
- Set the time (local clock)
- Choose an automatic or manual Route Mode
- Select the Lat/Lon display
- Select a Map Datum
- Enter a Magnetic Variation
- Select Distance and Speed Units
- Select Altitude Units
- Select the Date Order

Before pressing SETUP, take a minute or two and fill out the worksheet on page 4-28. Keep the worksheet as a reference, so you can refer to it if the unit loses its memory and must be recustomized.

Press SETUP and then the DOWN ARROW to display the SETUP features in sequence. Use the RIGHT ARROW to toggle between the selections within each feature.

NOTE

When you change a feature in SETUP, all related displays are affected. For example, once a coordinate system is chosen, that system appears in the current position, last fix, backup fixes, waypoints, and initialization position.

Entering an Initialization Position

The initial position entered here must be correct within 300 miles (487.2 km). If you are not sure of your position, call your local marine electronics dealer or consult an atlas or chart.

The unit should be reinitialized if it is moved more than 300 miles (487.2 km) from the last fix or suffers a memory loss.

SETUP WORKSHEET

SELECT ONE OPTION FOR EACH SETUP FEATURE
(Factory defaults are shown in bold)

MODE

- ❑ **2D**
- ❑ 3D
- ❑ Automatic

TIME DISPLAY

- ❑ **UT (UNIVERSAL COORDINATE TIME)**
- ❑ LOCAL (AM/PM)

ROUTE MODE

- ❑ **Automatic**
- ❑ Manual

LAT/LON DISPLAY

- ❑ **DEGREES/MINUTES**
- ❑ DEGREES/MINUTES /SECONDS

MAP DATUMS

WGS84
USER
AUSTR
EUROP
NAD27
ALASK
MAUZ
OAHU
KAUAI
GRB36
TOKYO
WGS72

MAGNETIC VARIATION

- ❑ **(M) AUTO MAG**
- ❑ (T) TRUE
- ❑ (U) (USER SET)
  __°__ E or W (SPECIFY)

SETUP WORKSHEET (Cont'd)

DISTANCE, SPEED UNITS

- ❑ **NM (nautical miles) and KNOTS (knots)**
- ❑ Km (kilometers) and Km/HR (kilometers per hour)
- ❑ MI (statute miles) and MPH (miles per hour)

ALTITUDE UNITS

- ❑ **feet**
- ❑ meters

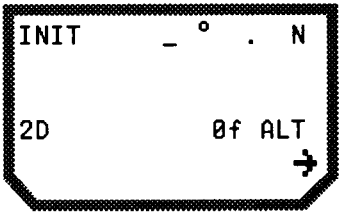
DATE ORDER

- ❑ **MONTH/DAY/YEAR**
- ❑ DAY/MONTH/YEAR

SETUP

SETUP

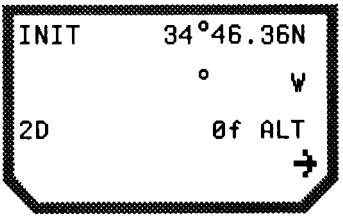
CLEAR



Press SETUP to see the initial position. If a position is displayed, erase it. You can erase a position by pressing CLEAR or by entering the first number of the new position; the old position will disappear.

344636

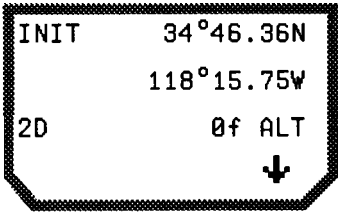
ENTER



Enter the latitude, using the RIGHT ARROW to toggle between N and S. If your latitude ends with zeroes they do not have to be entered; the unit will add them. Press ENTER.

1181575

ENTER



Enter the longitude, using the RIGHT ARROW to toggle between E and W. Press ENTER.

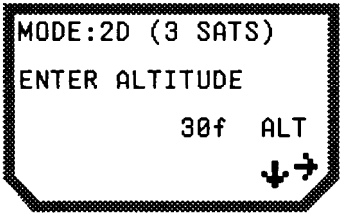
NOTE

The default hemispheres (before initialization or after memory loss) are North and West. The unit assumes that the hemispheres you choose here (or the hemispheres calculated in LASTFX, whichever is more recent) are current. These hemispheres are offered as your first choice when you enter a waypoint manually.

Selecting Mode and Altitude

The NAV 5000 has three modes of operation. The default mode is 2D; 2D requires a user-entered value for altitude and is used primarily at sea. It uses three satellites to calculate latitude and longitude. The 3D mode uses a fourth satellite to compute your altitude for you; it is used

primarily on land. Automatic selects 2D or 3D, according to how many satellites are available. If the unit is intended for maritime use, we recommend using the 2D mode for greater accuracy.

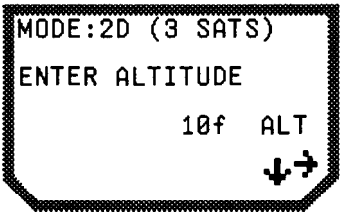


From the first SETUP display (initial position), press the DOWN ARROW.

CLEAR

10

ENTER

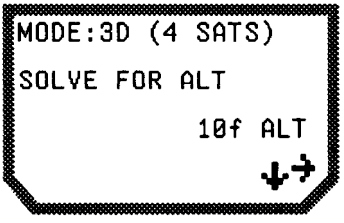


Press CLEAR to erase an existing altitude or simply enter a new value. Enter any new altitude. Use the RIGHT ARROW to toggle to a negative altitude. Press ENTER.

NOTE

The unit can accept altitudes up to 57999 feet (18000 meters).

If you prefer to use meters instead of feet, the unit of measure is defined later in SETUP (see page 4-40). The NAV 5000 recalculates the stored altitudes when the unit of measure is changed. It you know your altitude in feet, go ahead and enter it now.



Press the RIGHT ARROW to scroll to 3D. (Altitude can also be changed at this screen.)

NOTE

Regardless of the mode you choose to use, an altitude must be entered for your initial position. The mode/altitude screens in SETUP are the only place you can enter altitude for an initial position.

Press the RIGHT ARROW to go to the Automatic mode. Remember that if you use this mode, some fixes may be made in 2D. Therefore, be sure you have entered an altitude.

Setting the Time

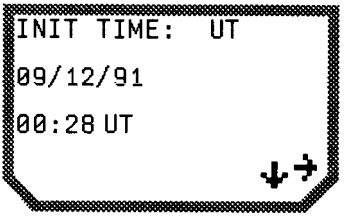
The unit can be operated on Universal Time (UT, formerly Greenwich Mean Time) or local time.

The GPS satellites operate on UT, and the unit collects the current time (in UT) from the satellites as part of the Almanac. It is therefore unnecessary to set time if you want to use UT. You must remember, however, that UT displays the time and date that is current at the Prime Meridian.

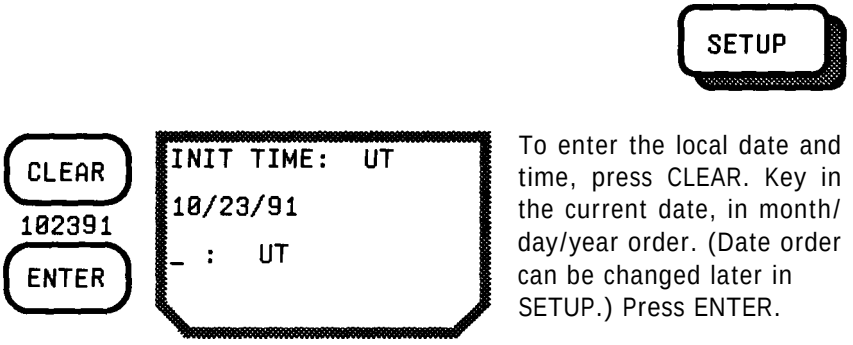
NOTE

When the unit has suffered a memory loss, time and date are reset to 01/06/80 and 00:00:00UT. Collect an Almanac to get the current date and time.

If you prefer to use a local clock, you must enter the local date and time here.



From the mode/altitude display, press the DOWN ARROW. The screen displays the current date and time on the UT clock.



To enter the local date and time, press CLEAR. Key in the current date, in month/day/year order. (Date order can be changed later in SETUP.) Press ENTER.

Press the RIGHT ARROW to change to local time. Key in the local time (hours and minutes), and use the RIGHT ARROW to toggle between AM and PM. (Local time does not use a 24-hour clock.) Press ENTER.

Choosing Automatic or Manual Route Modes

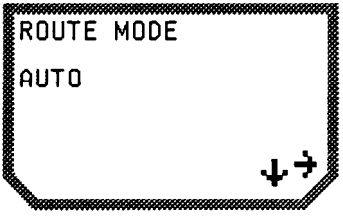
A route can be followed in either the automatic or manual modes.

In the automatic mode, the NAV 5000 continually updates the navigation screen. When you are within 500 feet (152.4 meters) of the destination of a navigation leg the screen displays a "CLOSE" message. When you cross an imaginary line that runs through your destination waypoint and is perpendicular to your courseline, the unit automatically switches to the next leg of your route.

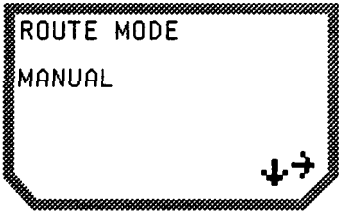
In the manual mode, the NAV 5000 continually updates the navigation screen, and displays the "CLOSE" message when you are within 500 feet (152.4 meters) of your destination waypoint. When you cross the imaginary line that runs through the waypoint and is perpendicular to the courseline, however, the unit does not advance to the next leg, but displays an "ARRIVED" message. You must press ROUTE and the RIGHT ARROW to advance to the next leg.

See page 4-18 for a more detailed description of the ROUTE function.

To select automatic or manual route mode, use the key sequences below. (Default is Automatic.)



From the initial time display, press the DOWN ARROW.



Press the RIGHT ARROW to toggle between automatic and manual modes.

Choosing Lat/Lon Display

The latitude and longitude can be displayed in degrees and minutes (DEG/MIN) or in degrees/minutes/seconds (DEG/MIN/SEC). (Default is DEG/MIN.)

From the route mode display, press the DOWN ARROW.

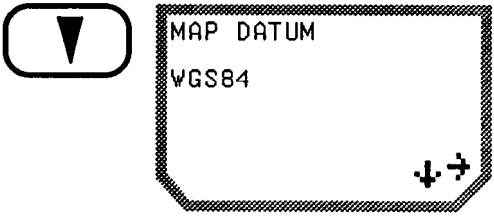
Use the RIGHT ARROW to toggle between Deg/Min and Deg/Min/Sec.

Selecting a Map Datum

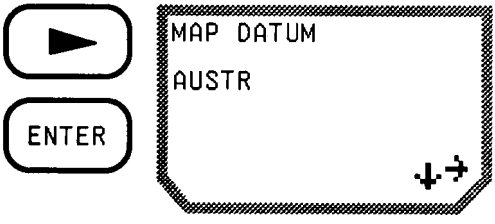
The NAV 5000 provides 12 geodetic map datums for use with charts and maps worldwide. The unit also allows you to enter manually any map datum not currently in the unit's memory.

A datum refers to a mathematical model of the earth. The latitude and longitude of a position differs from one model (datum) to another. It is therefore important to know which map datum you will be using if you want to relate your position information to a chart, since using a different datum may result in positioning errors of up to 1968.5 feet (600 meters) when compared with the chart.

The Map Datum feature allows you to operate the NAV 5000 on a datum that corresponds to the charts you are using. Which datum your chart uses can usually be found in the legend.



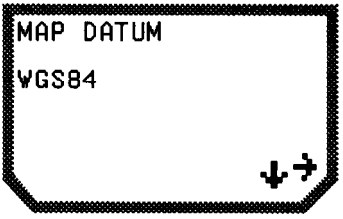
From the Lat/Lon display, press the DOWN ARROW.



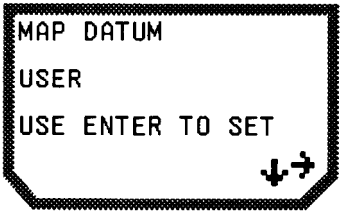
Use the RIGHT ARROW to scroll through the available datums until you find one that corresponds to your chart. Press ENTER.

Setting a User-Entered Datum

If your Chart uses a datum that is not included in the choices listed on the SETUP worksheet, you can use a user-entered datum. Refer to Appendix 2 for the constants to convert the most common local datums to WGS84.



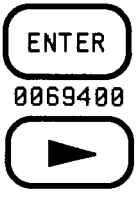
From the LAT/LON display, press the DOWN ARROW.

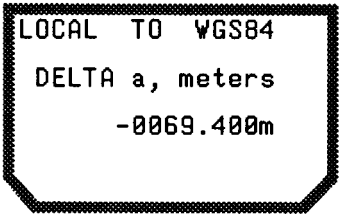


Press the RIGHT ARROW until this message appears.

NOTE

Be sure to key in all leading zeroes.





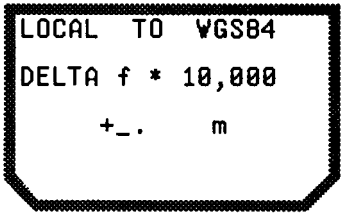
Press ENTER. If a value other than 0 is displayed, press CLEAR. Key in the value for Δa (the difference in the semi-major axis from the local datum to WGS84). On the screen this is displayed as "DELTA a".

SETUP

NOTE

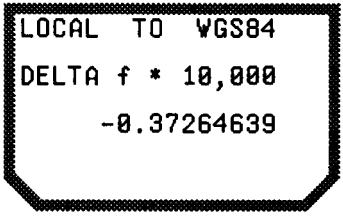
In this sample, we are using the constants for the Bahamas. To enter the constants for your local datum, refer to Appendix 2.

ENTER



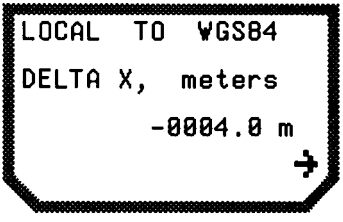
Press ENTER to go to the $\Delta f \times 10^4$ display. This is displayed as "DELTA f * 10000."

03726
4639



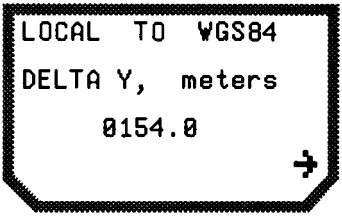
Enter Δf (the constant that represents the difference in the ellipsoid flattening between WGS84 and the local datum). Press the RIGHT ARROW to show a negative value.

ENTER
00040



Press ENTER. Add the ΔX. Press the RIGHT ARROW to show a negative value.

ENTER
01540



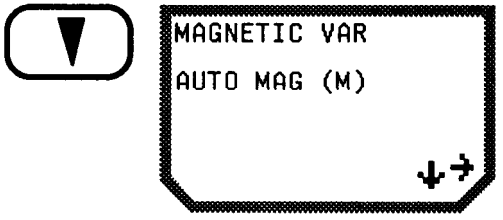
Press ENTER. Enter ΔY.

Press ENTER, then enter **ΔZ.** Press ENTER again to store the values entered.

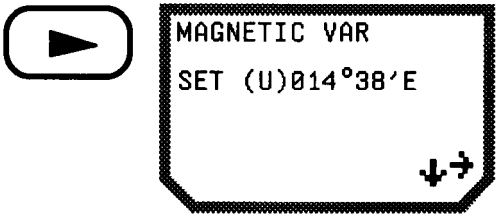
Magnetic Variation Display

Select one of the three available heading and bearing types for all displays and entries.

Auto Mag (M)	Includes an automatic adjustment for variation by the NAV 5000. (Default)
True (T)	No magnetic adjustment in readout
Set (U)	A constant user-entered adjustment



From the Map Datum display, press the DOWN ARROW to reach this display.

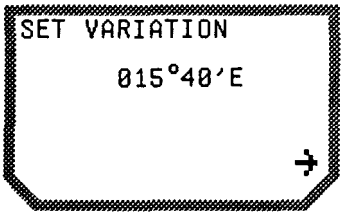


Use the RIGHT ARROW to toggle between the choices listed above. If you select User Set (U), the screen displays the last entered value.

SETUP

CLEAR

01540

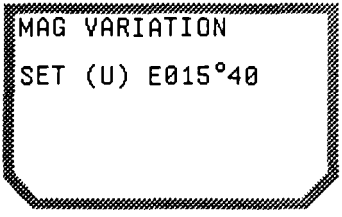


To change the value displayed, either press CLEAR or begin entering numbers to clear the display. Enter the constant compass error in degrees and minutes. Use the RIGHT ARROW to toggle between East and West.

NOTE

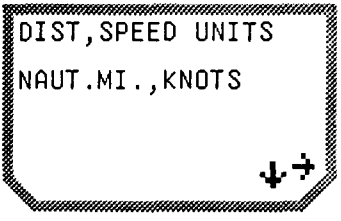
Use leading zeroes as required.

ENTER

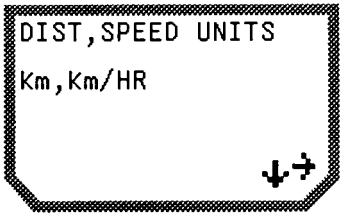


Press ENTER and the display returns to the magnetic variation display.

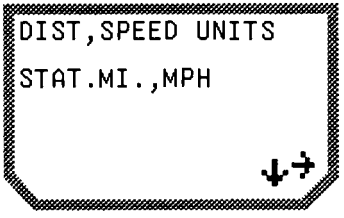
DIstance/Speed Units



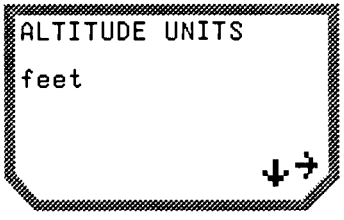
From the magnetic variation display, press the DOWN ARROW. The currently selected unit of measurement for distance and speed is displayed.



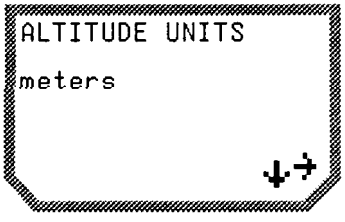
Use the RIGHT ARROW to toggle between nautical miles and knots, kilometers and kilometers per hour, and statute miles and miles per hour.



Altitude Units



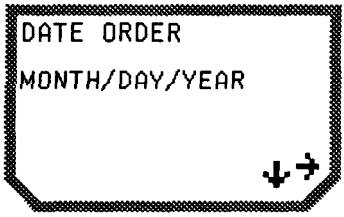
From the distance/speed display, press the DOWN ARROW to view altitude units. The default unit of measurement is feet.



Use the RIGHT ARROW to toggle between feet and meters.

Changing altitude units affects all displays where altitude is shown. The unit recalculates all altitude measurements to the new unit of measure.

Date Order



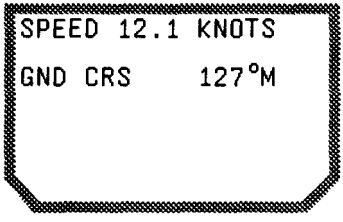
From the altitude display, press the DOWN ARROW to view the date order.

Use the RIGHT ARROW to change the date order.

Press the DOWN ARROW to return to the first SETUP display. Press any function key other than SETUP, DOWN ARROW, or RIGHT ARROW to exit SETUP.

VELOCITY

The VELOCITY key displays information about your rate and direction of travel. (Speed Over Ground and ground course). This information is available only in continuous operation and when your speed exceeds 0.2 knots. (Speeds greater than 951 mph/1529.5 kph/826.73 knots cannot be measured.)



Press VEL.

VEL

NOTE

You must be moving at least 0.2 knots to obtain velocity-related information.

WPT

WAYPOINT

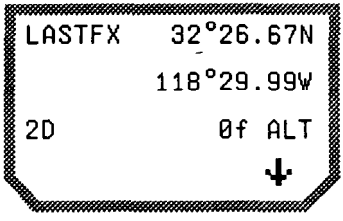
The WAYPOINT (WPT) key lets you enter up to 100 positions in the unit's memory by saving a current position, a last fix, or a fix backup, or by manually entering a position. Waypoints can also be viewed, deleted, and renamed.

Waypoints are stored in alphanumeric order.

Saving Positions as Waypoints

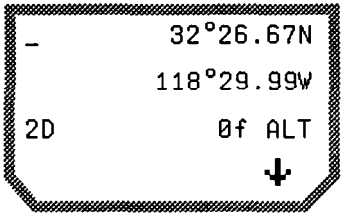
Use the following key sequence to save a position as a waypoint.

LAST FIX



Locate the position fix you want to save.

ENTER

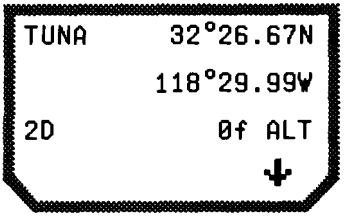


Press the ENTER key. The cursor goes to the upper left corner on the message display.

WPT

TUNA

ENTER



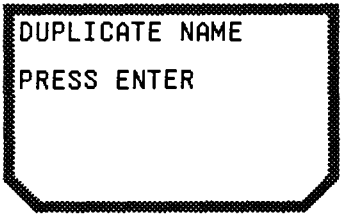
Name the waypoint. Enter one to six characters as described in "Entering Data" on page 2-14. Press ENTER.

OR

Press ENTER to name the waypoint automatically.

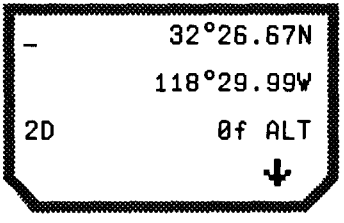
NOTE

Use waypoint names that are easy to remember, and keep a log of waypoints that you have stored as a reference. This is especially important if you use the unit-generated waypoint names. A sample logbook page is included at the back of this manual.

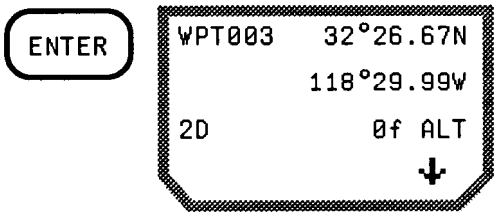


If the name you chose is already being used, this message appears. Press ENTER and key in another name.

ENTER



If you do not choose a name for the waypoint, the NAV 5000 generates one. Unit-generated names are in the format WPTxxx, where xxx represents numbers 001 through 099. Waypoints are numbered in sequence.

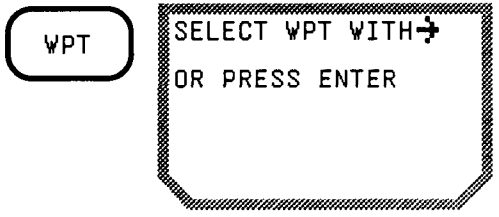


To allow the unit to name the waypoint, simply press ENTER again.

Once the position has been saved, date/time message can be accessed by pressing the DOWN ARROW. Use the RIGHT ARROW to display waypoints in alphabetical order .

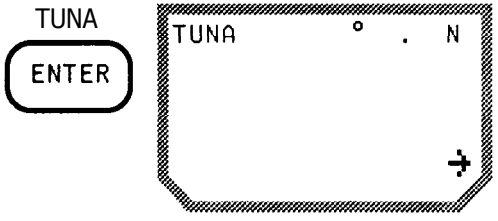
Entering Waypoints Manually

Use the following key sequence to enter a waypoint manually.



Press the WPT key.

Press the ENTER key once.

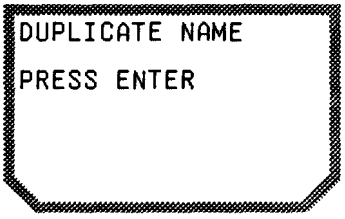


Enter a one- to six-character waypoint name from the alphanumeric keypad, or press ENTER again to name the waypoint automatically.

WPT

NOTE

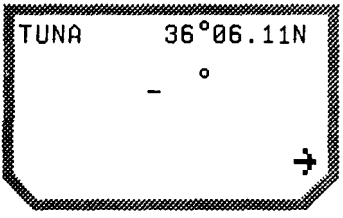
Refer to page 2-14 for instructions on entering text from the alphanumeric keypad.



This message appears if the name you chose is already being used. Press ENTER and key in.

360611

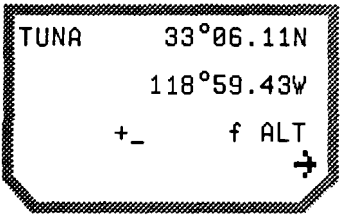
ENTER



Key in the latitude. Press ENTER. Use the RIGHT ARROW to toggle between N (north) and S (south).

1185943

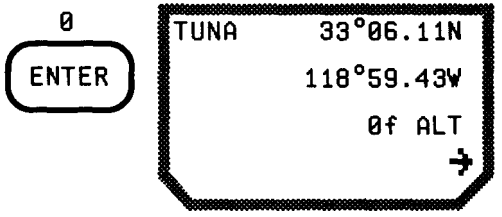
ENTER



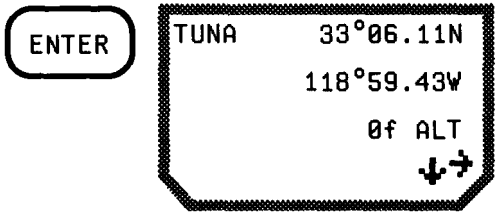
Key in the longitude. Use the RIGHT ARROW to toggle between W (west) and E (east). Press ENTER.

NOTE

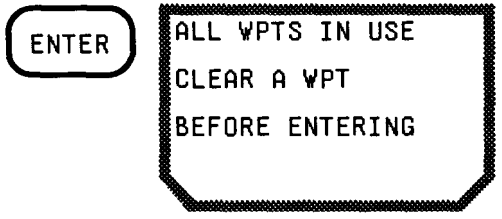
When a waypoint is entered manually, there will be no date/time of fix or SQ and GQ values displayed on the second and third position screens.



Key in the altitude. Use the RIGHT ARROW to toggle between positive and negative values (above and below sea level). Press ENTER.



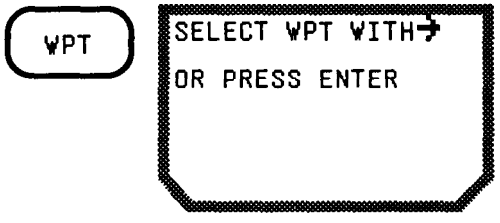
Press ENTER again to store this information. When ENTER has been pressed, the DOWN ARROW appears on the display.



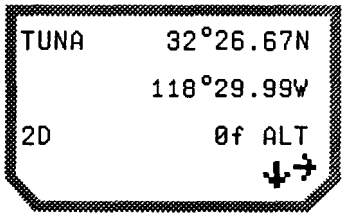
If this message appears, there is no room to store another waypoint. You must delete a waypoint before another can be stored. See "Clearing Waypoints" below.

Viewing Stored Waypoints

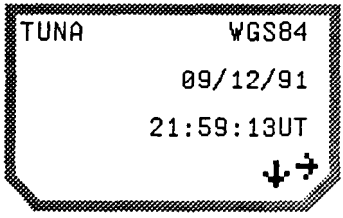
Use the following key sequence to access and view a waypoint.



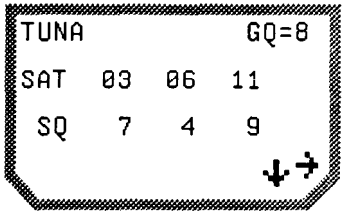
Press the WPT key.



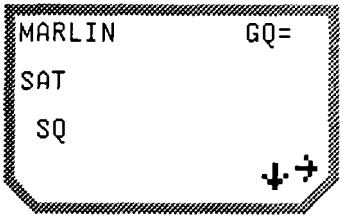
Press the RIGHT ARROW to scroll through the stored waypoints. You can also key in all or part of a waypoint name and press ENTER. Use the RIGHT ARROW to continue to scroll.



Press the DOWN ARROW to see the datum, date, and time of the position fix for TUNA.



Press the DOWN ARROW again to see the satellite signal quality and geometric quality of the fix.



If a waypoint was entered manually, no values will be displayed for satellite signal quality and geometric quality.

Renaming Waypoints

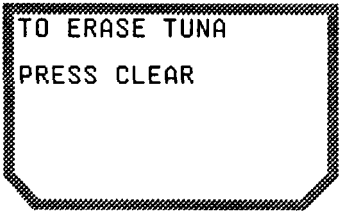
To rename a waypoint, retrieve it as described in "Viewing a Waypoint." From any of the waypoint message displays, press ENTER. Enter the new name, and press ENTER again.

Waypoints that are assigned to a route cannot be renamed. This includes the waypoint "start".

Waypoint "start" can, however, be copied. Retrieve the waypoint and rename it as described above. The unit copies the position data from "start" to the new waypoint name. "Start" is untouched until a new route is entered.

Clearing a Waypoint

Use the following key sequence to delete a waypoint from the unit's memory.



Locate and retrieve the waypoint, as described in "Viewing a Waypoint." Press CLEAR. The display shows the message illustrated.

To continue and erase the waypoint, press CLEAR again.

To abort and keep the waypoint, press any function key.

To clear all waypoints, use AUX 10.

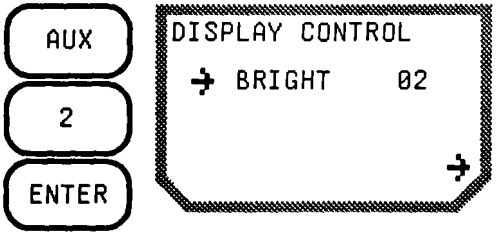
NOTE

Waypoints assigned to a route cannot be erased.

CHAPTER 5
AUXILIARY FUNCTIONS

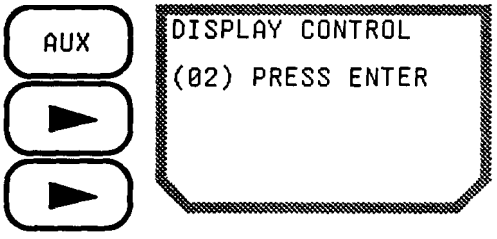
In addition to the 9 function keys described in Chapter 4, the NAV 5000 has 11 auxiliary functions. The Auxiliary Functions give you additional information and control over how the unit displays information.

The Auxiliary Functions can be accessed two ways.



Press AUX and the number of the Auxiliary Function you want to access, followed by ENTER.

OR



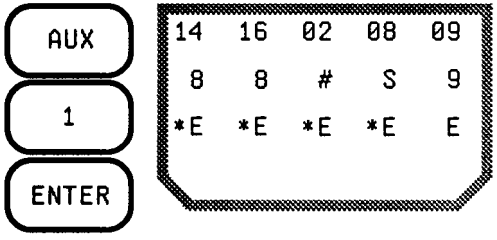
Press AUX and use the RIGHT ARROW to scroll through the Auxiliary Functions until you see the one you want. Then press ENTER.

This chapter is arranged in numerical order; for your convenience, a table at the end of the chapter arranges the functions in alphabetical order.

AUX 1- RECEIVER STATUS SCREEN

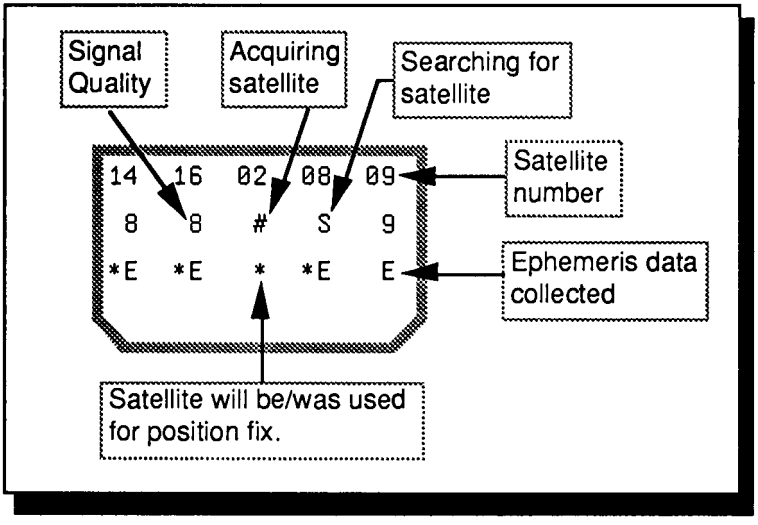
The receiver status screen allows you to monitor the search, acquisition, and ranging of satellites that are visible and may be used for a position fix.

The receiver status display appears when POS is pressed. You can also go to this display manually when you want to know which satellites are being tracked and the signal quality from each satellite. This can be helpful if you are having difficulty getting a position fix, especially if you think the signals may be blocked.



Press AUX, 1, and ENTER (or AUX and the RIGHT ARROW).

Each column on the display represents a channel; the unit searches for the five satellites identified on the first line simultaneously. The second line monitors the search and acquisition of the satellites. The third line identifies the satellites that have been or will be used for the position fix, and which satellites the unit has collected Ephemeris data from. (Refer to the Illustration below.)

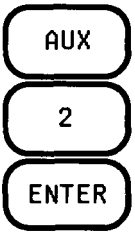


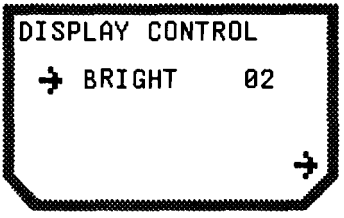
READING THE RECEIVER STATUS SCREEN

The mode of operation (2D or 3D) is indicated by the number of satellites marked with an asterisk. On the sample above, 4 satellites have asterisks, therefore, the position fix will be in 3D. If the unit were in 2D, 3 satellites would have asterisks, and only 4 channels would be displayed.

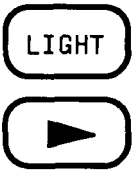
AUX 2 - DISPLAY CONTROL

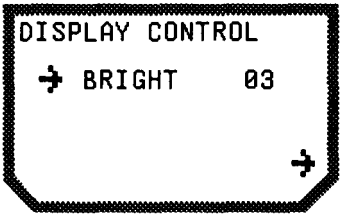
The Display Control function allows you to change the brightness of the display.





Press AUX, 2, and ENTER (or press AUX once and the RIGHT ARROW twice) to view the Display Control screen.





Press LIGHT to backlight the display. Press the RIGHT ARROW to change the display brightness.

The possible levels of brightness are 1 through 15. Each time the RIGHT ARROW is pressed, the brightness setting increases by one. At 15, the value rotates back to 1. (The default setting is 15.)

Once set, the values chosen remain unchanged until reset or the unit's memory is lost or cleared.

AUX 3 - SATELLITE STATUS

Satellite Status (referred to as "Sat Status" throughout this guide) provides specific information on the satellites used by GPS. Sat Status can give you the following information:

- which satellites are listed as being healthy by the GPS system operators.
- the elevation and azimuth of the satellites that are above the horizon.

- satellites with weak SQs or set temporarily unusable by the GPS system operators.
- the current status of every satellite in the system.

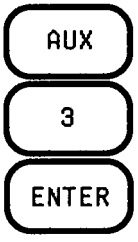
The satellite status display includes one of the following messages:

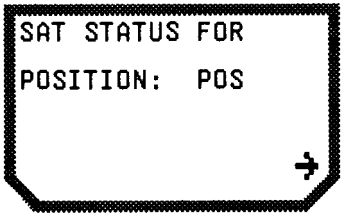
ON: the satellite is operating and is healthy.

TEMP OFF: the unit is temporarily ignoring this satellite. Usually a satellite is being ignored because, after three tries, the unit was unable to find it. This happens when a satellite is hidden from view by buildings or other large obstacles. The satellite will be temporarily off until the unit is turned off and back on, or until the satellite is located by the fifth channel.

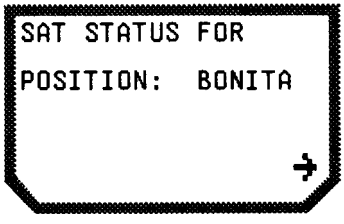
OFF: the unit has been instructed to ignore this satellite by the user, perhaps because its SQ is very low. The satellite remains off until it is reset.

Satellites that are listed in the Almanac as being unhealthy by the GPS system operators are not listed in Sat Status. Satellites are identified by a pseudorange number (PRN), which is used by the government to identity the satellites.

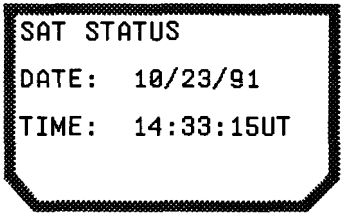




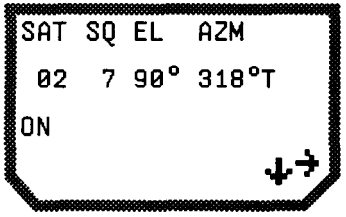
Press AUX, 3, and ENTER (or press AUX once and the RIGHT ARROW three times) to reach the Sat Status display. The first display is the message POS.



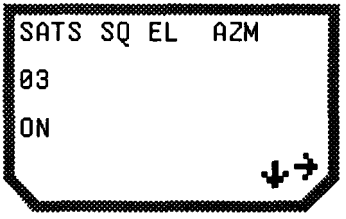
You can analyze your current position or press the RIGHT ARROW to analyze a waypoint.



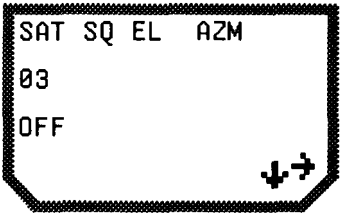
Press ENTER to accept the displayed position. The current date and time is displayed. It you want to reset the date and time, you can do this now.



Press ENTER again. The unit computes and displays the current status of all healthy satellites in numerical order. Elevation and azimuth is displayed for satellites that are above the horizon. An SQ is shown when the satellite displayed was used to recently obtain a position fix.

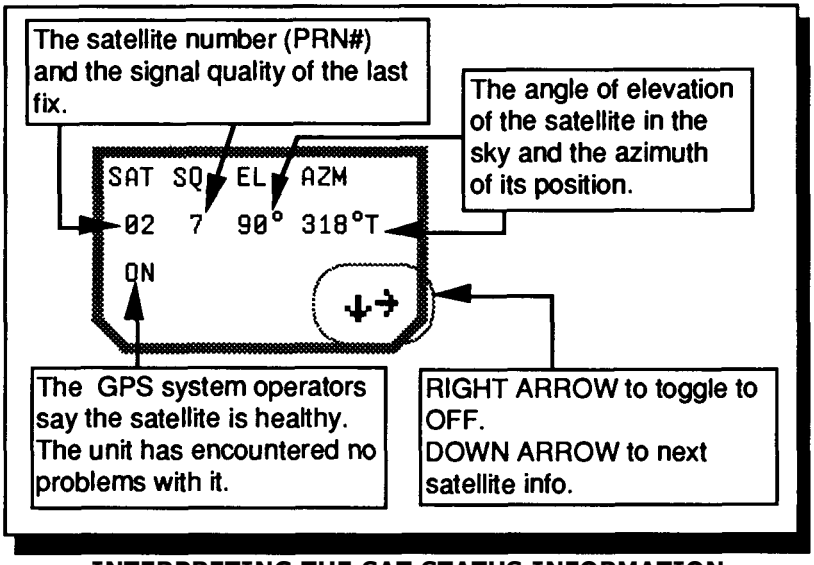


Press the DOWN ARROW to display the status of the next satellite.



Press the RIGHT ARROW to toggle between ON and OFF for this satellite. Press the DOWN ARROW to view Sat Status for the next satellite.

Refer to the illustration below as necessary to interpret the satellite status screen.

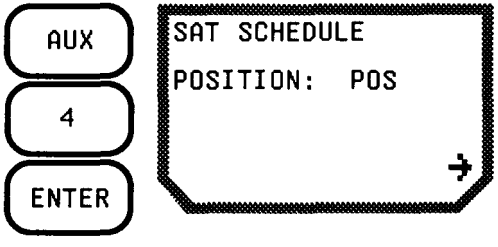


INTERPRETING THE SAT STATUS INFORMATION

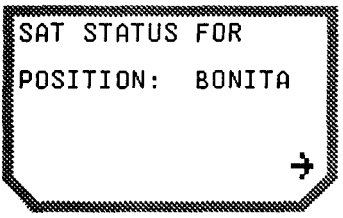
The unit does not use satellites with an elevation of 10° or less. Any satellite used to take a fix will be used for subsequent fixes until it sets or until its signal becomes blocked by an obstacle.

AUX 4 - SATELLITE SCHEDULE

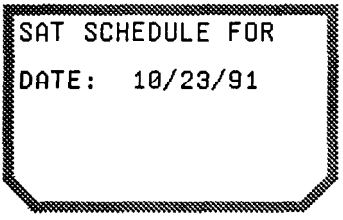
Until the full constellation of satellites is complete, satellites may not be available 24 hours a day in all parts of the world. The AUX 4 function computes a schedule for the date and position you choose in the mode (2D or 3D) the unit is currently using. The schedule computed covers midnight of the date entered to the next midnight.



Press AUX, 4, and ENTER (or press AUX once and the RIGHT ARROW four times. The first display shown is POS.



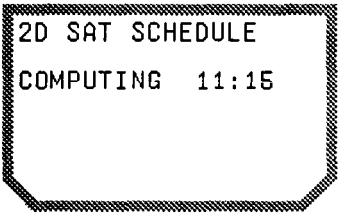
You can compute a schedule for your current position, or press the RIGHT ARROW to choose a waypoint.



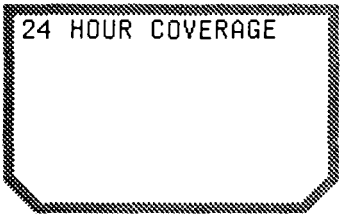
Press ENTER to accept the displayed position. The current data is displayed. Do nothing to accept the date, or key in a new one.

NOTE

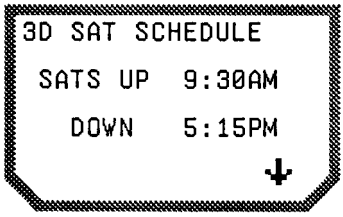
You may enter any date that is within 9 months of the date on which you last used the unit for more than a few minutes.



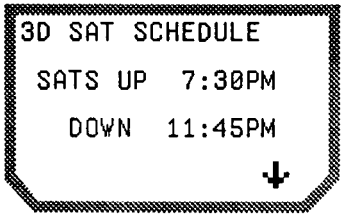
Press ENTER to begin computing. As the unit calculates the satellite schedule for a 2D or 3D solution, the time advances in 15-minute increments as the unit computes a 24-hour schedule.



When the computations are complete, the "window of availability" appears. This is when there will be enough satellites to get a position fix. In 2D, there are usually enough satellites at any given time.



In 3D, you are more likely to see a shorter window of availability, because more satellites are needed to take a fix. If there is more than one window in a 24-hour period, the DOWN ARROW appears on the display.

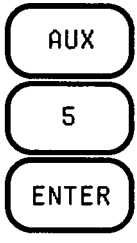


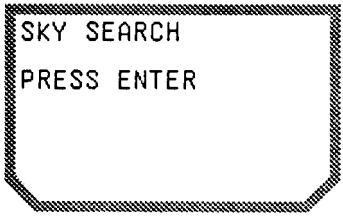
Press the DOWN ARROW to display the remaining satellite schedule.

AUX 5 - SKY SEARCH

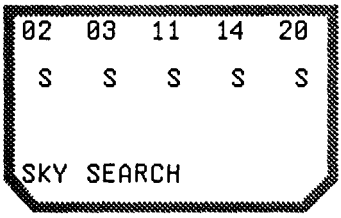
Sky Search is a random search for satellites from all channels that is conducted when the unit has lost all memory or does not have an Almanac. Sky Search is entered with AUX 5, but is also initiated automatically when POS is pressed and the unit does not have an Almanac.

In Sky Search, the unit follows a prescribed search hierarchy on all five channels to search the sky for satellites. When a satellite is located the unit collects an Almanac from it and then locates other satellites to obtain a position fix. (If you do not have initial position when you enter Sky Search, the unit calculates one and self-initializes.) From start to finish, Sky Search usually takes about 15 minutes.

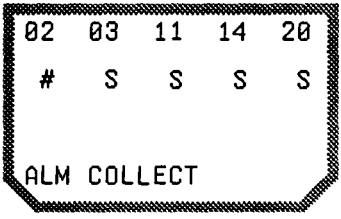




Press AUX, 5, and ENTER (or press AUX once and the RIGHT ARROW five times.



Press ENTER to initiate Sky Search. The receiver status screen appears on the screen, and "SKY SEARCH" is displayed on the fourth line. The unit searches for satellites until one is located.



The ALM COLLECT message appears on the display when a satellite has been located and acquired, and the unit is collecting an Almanac. DO NOT turn the unit off when this message is displayed.

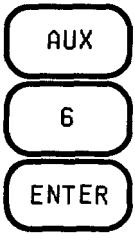
AUX 6 - NMEA SETUP

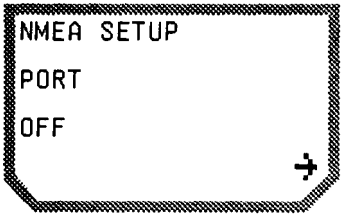
If you will be supporting an NMEA device with the NAV 5000, the unit must be set to an output message format that can be received by the device.

Consult your autopilot, plotter, or radar manual for instructions on how to connect to the NAV 5000 correctly, and to see what message format is appropriate.

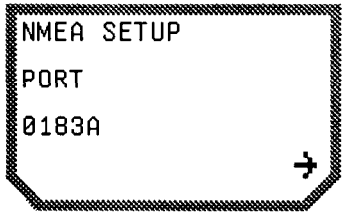
The NAV 5000 supports the following NMEA messages:

0180
0183A — BWC, APA, GLL, VTG
0183B — RMC, RMB
0183C — BWC, XTE, GLL, VTG





Press AUX, 6, and ENTER (or press AUX once and the RIGHT ARROW six times). Default is "off."



Press the RIGHT ARROW to toggle between output message Formats. Choose between, 0183A, 0183B, 0183C, 0180, or OFF.

NOTE

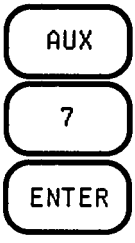
You may have to experiment to determine which message is appropriate for your equipment.

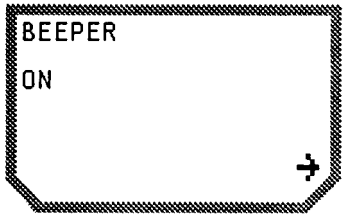
WARNING

Test these settings before actually navigating to be sure the settings you have chosen are appropriate.

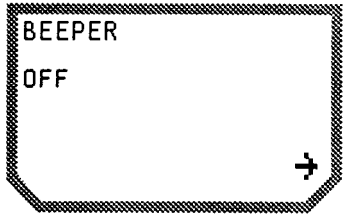
AUX 7 - BEEPER CONTROL

The unit beeps when a key on the keypad is pressed and when an SQ, GQ, or Old Data symbol appears. The beeper can be turned off and on; default is "on."





Press AUX, 7, and ENTER (or press AUX once and the RIGHT ARROW seven times).

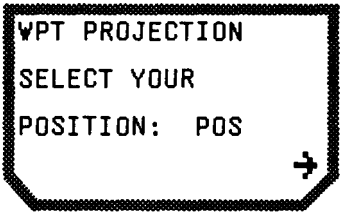


Press the RIGHT ARROW to toggle between "on" and "off."

AUX 8 - WAYPOINT PROJECTION

The NAV 5000 can calculate the latitude and longitude of a remote destination based on a relative distance and bearing that you enter.

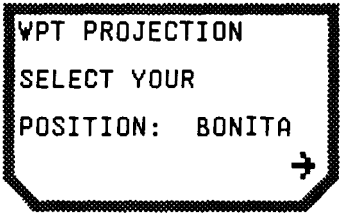
AUX
8
ENTER



Press AUX, 8, and ENTER (or press AUX once and the RIGHT ARROW eight times).

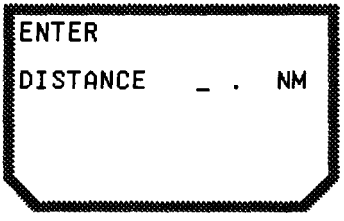
WARNING

POS is not your current position if you have moved since taking this position fix.



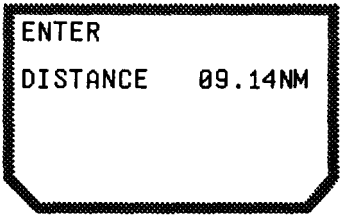
You can use POS or press the RIGHT ARROW to display a waypoint.

ENTER



Press ENTER to accept the displayed position. The display moves to the distance message.

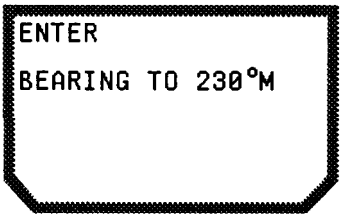
0914



Key in the estimated distance. Remember that the display is a fixed decimal; add trailing zeroes as necessary.

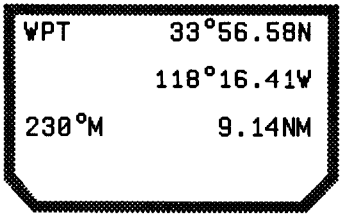
ENTER

230



Press ENTER. Key in the estimated bearing to the destination from the chosen position.

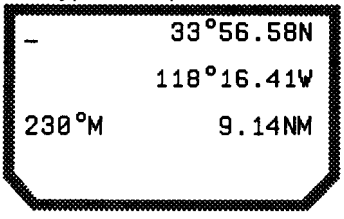
ENTER



Press ENTER. The unit calculates and displays the destination waypoint. It also displays the bearing and distance you entered above.

If you like, you can save the projected waypoint. This will allow you to use a projected waypoint as part of a route.

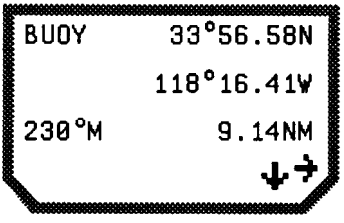
ENTER



To save a projected waypoint, press ENTER.

BUOY

ENTER



Key in a name (see page 2-14) and press ENTER.

OR

Press ENTER twice to let the unit name the waypoint.

AUX 9 - BATTERY SAVER

The NAV 5000 can operate (from battery power) either for two-minute periods or continuously. This is controlled by turning the Battery Saver on or off.

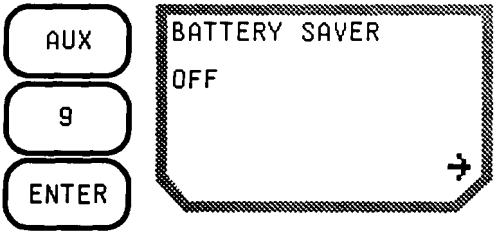
When the Battery Saver is on, the unit obtains position fixes for two minutes and turns itself off. This drains relatively little power from the batteries. (The unit will not turn itself off during Sky Search, Almanac Collect, or Almanac Verify.)

When the Battery Saver is off, the unit operates until it is turned off with the ON/OFF key or until two minutes after the second battery warning appears. Battery Saver "off" is the default setting.

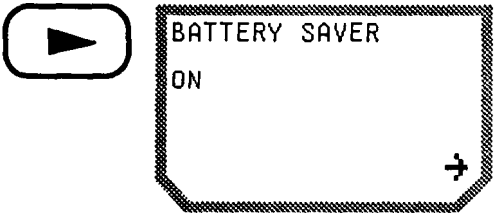
It you want to support NMEA devices while operating from battery power, you must turn the Battery Saver off.

Operating the unit with the Battery Saver off is a heavy drain on the batteries. If you plan on operating for any length of time with the Battery Saver off, consider using external power instead. (See page 2-4 to connect external power.)

Once set, Battery Saver remains unchanged until reset with AUX 9.



Press AUX, 9 and ENTER (or press AUX once and the RIGHT ARROW nine times).



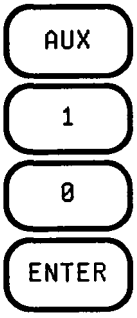
Use the RIGHT ARROW to toggle between on and off.

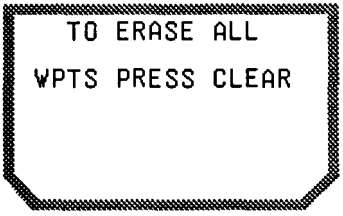
AUX 10 - ERASE WAYPOINTS

This is a fast way to clear all waypoints and routes stored in the NAV 5000's memory.

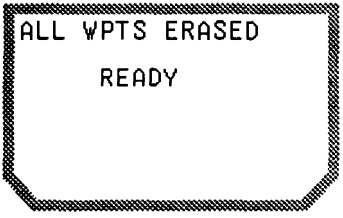
WARNING

Do not use this Auxiliary Function unless you really want to clear everything stored in Waypoint and Route.





Press AUX, 1, 0, and ENTER (or press AUX once and the RIGHT ARROW ten times).



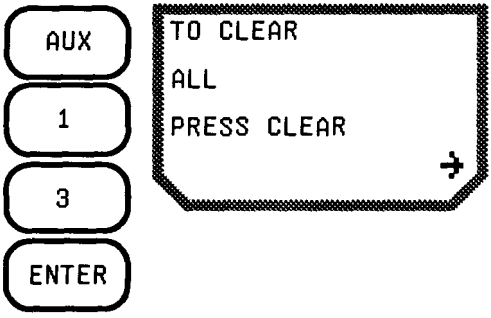
Press CLEAR.

AUX 13 - CLEAR MEMORY

Clear Memory erases all or selected portions of the unit's memory. Before using this function be very sure that this is what you really want to do.

NOTE

Clear Memory can be accessed only by pressing AUX 13. It does not appear if you scroll through the Auxiliary Functions with the RIGHT ARROW.



Press AUX, 1,3, and ENTER to view the Clear Memory display.

If you press CLEAR now, all of the unit's memory is erased. Press the RIGHT ARROW to scroll through the following options:

ALL	erases everything in the unit's memory.
USER DATUM	erases user-entered datum.
SETUP	erases all non-default SETUP parameters.
WAYPOINT/ROUTE	erases all waypoints and the route.
ALMANAC/EPHEM	erases the Almanac and any Ephemeris data the unit may have from a satellite.
LAST FIX/INIT	erases the last fix, backup fixes, and initial position.

As you press the RIGHT ARROW you will notice that the second line of the screen shown above changes, indicating what part of the memory will be cleared.

Press CLEAR when the area you want to erase is displayed on the second line. The third line then displays "CLEARED." Press the RIGHT ARROW to display another choice, or exit AUX 13 by choosing another function or auxiliary function or by turning the unit off.

This table is an alphabetical list and brief description of the Auxiliary Functions. lt is not intended to replace the descriptions earlier in this chapters, but only to provide a quick reference.

AUXILIARY	CODE (AUX +)	PAGE	DESCRIPTION FUNCTION
Battery Saver	9	5-12	Switches the unit between Battery Saver and continuous operation when the unit is being run from battery power.
Beeper Control	7	5-10	Turns the beeper on and off.
Clear Memory	13	5-14	Erases all stored information in the unit's memory.
Display Control	2	5-3	Controls the brightness of the unit's display.
Erase Waypoints	10	5-13	Deletes all waypoints and routes from the unit's memory.
NMEA Setup	6	5-9	Selects output message format to supported NMEA devices.
Receiver Status Screen	1	5-2	Displays five satellites that are in view and monitors the search, acquisition, and ranging of those satellites.

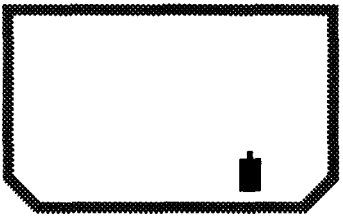
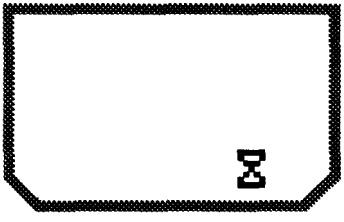
AUXILIARY	CODE (AUX +)	PAGE	DESCRIPTION FUNCTION
Sat Schedule	4	5-6	Calculates the window of availability for the location and date entered.
Sat Status	3	5-3	Displays the current status of the satellites that are listed as healthy. The angle, and elevation of satellites above the horizon are also displayed.
Sky Search	5	5-8	Searches for satellites in a prescribed hierarchy to collect an Almanac and determine position after a total memory loss. Also accessed with POS after memory loss.
Waypoint Projection	8	5-11	Estimates the latitude and longitude of a distant position, based on the estimated distance and bearing from POS or a waypoint.

CHAPTER 6
TROUBLESHOOTING AND OPERATING TIPS

This chapter contains the miscellaneous information you will require to interpret the error/warning messages, troubleshoot operating Problems, and prepare the unit for long-term storage.

ERROR AND WARNING MESSAGES

Error and warning messages are displayed to alert you to a condition you need to be aware of. Most messages require a response or action on your pari. A few are informative only.

MESSAGE	DESCRIPTION/SOLUTION
	First battery warning: The 6 AA-batteries are getting low. Typically, the unit can be operated for 30 minutes (Battery Saver off) or 15 sets of fixes (Battery Saver on) without jeopardizing the unit's memory.
Do this:	***Replace the batteries. We recommend that you always keep the spare battery clip at hand, loaded with fresh batteries.***
	Old data: The unit has lost contact with one or more of the satellites used for the previous fix and cannot find another available satellite. The position fix displayed with this symbol is 10 seconds old or older, and should not be used to navigate.

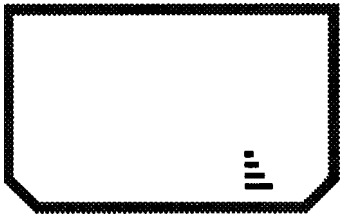
Try this:

1. ***Check Sat Status (AUX 3) to be sure all satellites are set to "ON."***
2. ***Reposition the antenna to see if you can get a clearer view of the sky.***
3. ***If using 3D, try 2D.***

GQ warning: The Geometric Quality of the position fix is 3 or less; the fix is not accurate, and it should not be used to navigate by. This symbol appears on all screens of the affected position fix.

Try this:

1. ***Scroll to the third screen of the position fix. Note which satellites were used for the fix.***
2. ***Check Sat Status (AUX 3) to be sure all satellites are "ON."***
3. ***Check the angle of elevation and azimuth of the visible satellites: are signals being blocked by your surroundings? Try changing your position or the location of the antenna and taking another fix.***
4. ***Did you turn on any satellites that are currently visible? If so, take another position fix.***



SQ warning: The Signal Quality of one or more satellites is 3 or less. This indicates that the signal is not strong and the unit may lose it. SQ does not affect GQ or accuracy. This symbol appears on all screens of the affected position fix.

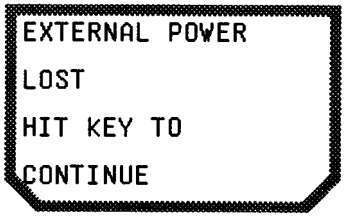
Try this:

Change your position or the position of the antenna. Even a slight change may be enough to allow the receiver to get a stronger signal.

Not enough satellites are visible to take a position fix: If operating in 2D, there are fewer than 3 satellites; If operating in 3D, there are fewer than 4 satellites.

Try this:

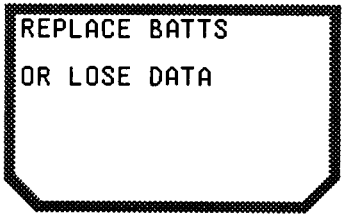
1. ***Make sure the antenna has a clear view of the sky.***
2. ***If using an exterior antenna, check the connections.***
3. ***Verify the initialization position and time (see SETUP).***
4. ***Check Sat Status (AUX 3) to be sure all satellites are set to "ON"***
5. ***Check Satellite Schedule (AUX 4) to be sure enough satellites are available at this time.***
6. ***If in 3D, try using 2D, or switch to AUTO. In AUTO the unit takes 3D fixes when 4 satellites are available and 2D fixes when only 3 satellites are available.***
7. ***If the unit has not been used for more than a few minutes in the past 9 months, press AUX 5 to initiate SkySearch and collect a new Almanac.***



External power lost or the level of external power supplied to the unit is below minimum requirements: The unit is therefore operating on battery power.

Do this:

1. ***Check the cable and/or adapter to be sure they are secure. Be sure to turn the unit off before securing loose cables.***
2. ***Check the external power source for malfunctions.***
3. ***Press any function key except ON/OFF or LIGHT to continue.***



Second battery warning: You ignored the first battery warning, and battery power is now dangerously low. The unit turns itself off two minutes after this message appears, even if the Battery Saver is off. Until fresh batteries are installed, the unit can be operated only from external power. Once this message appears, the batteries have enough residual power to protect memory for up to four weeks.

Do this: ***Turn the unit OFF immediately and insert new batteries.***

OPERATING PROBLEMS

Use the table below to identify problems that arise when operating the unit.

CONDITION	DESCRIPTION/SOLUTION
DISPLAY FROZEN:	The display is frozen and the keypad does not respond.
Do this:	***Remove the batteries and wait for the unit to turn off.***
	OR
	With the batteries in place and the unit on, short the two center connectors in the battery compartment.
	NOTE: This will clear the unit's memory.
NO POWER: battery Operation	The batteries are inserted into the clip incorrectly, or the clip is not inserted into the unit correctly.
Do this:	***Insert the batteries into the clip correctly, and Insert the clip into the unit correctly.***
	The battery compartment is not clean or dry.
Do this:	***Make sure the battery compartment is clean and dry.***
	The batteries have run down completely; memory is lost.
Do this:	***Replace the batteries, and initialize the unit as described in Initialize (page 2-6) or SETUP (page 4-27).***

external power	The power jack is not fully inserted.
Do this:	***Press the jack in firmly.***
UNIT TURNS OFF DURING USE	The unit is operating with the Battery Saver on.
Do this:	***Turn unit back on. Use AUX 9 to turn the Battery Saver off.***
	External power was interrupted, and the unit switched to battery power.
Do this:	***Turn the unit on. Watch the self-test display to verify the power source. Check the external power source for malfunctions. Also check all connections.***
POSITION FIX DOESN'T CHANGE	The Signal from one or more satellites has been lost; the position fix displayed is the most recent one available, and the hourglass is visible on the fourth line of the display.
Do thIs:	***Refer to ⧗, in "Error and Warning Messages."***
	Display may be frozen; keypad does not respond.
Do this:	***Remove the batteries and wait for the unit to turn off.***
	OR
	With the batteries in place, and the unit on, short the two center connectors in the battery compartment.
	NOTE: This will also clear the unit's memory.

FIXES VARY A LOT

The position accuracy of the NAV 5000 is affected by several variables, the most important of which is the GQ (geometric quality). Therefore, the specified accuracy of 15 meters RMS in 2D is statistical, not absolute. Also, it is assumed that GQ is greater than 7 and SQ is at least 7. Even under good conditions, then, not all fixes will be within 15 meters of the true position.

A good rule of thumb is that approximately two-thirds of the fixes will be within 15 meters of the true position and about 95% of the fixes will be within 25 meters under good conditions. This assumes that the government is not "adjusting" the satellites. (The government may periodically degrade the accuracy of the system.)

Since 20 meters is approximately 0.01 minute of latitude (and 0.01 minute of longitude at the equator), it is normal to see variations as large as +/-0.03 minutes of latitude/longitude from fix to fix when conditions are good. Under less favorable conditions, larger variations are normal.

If the unit is being operated near the poles, small changes in position may cause great variations in position and velocity-related data. Refer to Using the Unit Near the Poles in OPERATING TIPS.

EXTERNAL DEVICES NOT RESPONDING	Dataport not turned on.
Do this:	***Press AUX 6 to turn the dataport on. See page 5-9.***
	Unit not sending output messages in correct format.
Do this:	***Refer to the device's user guide to determine the correct message format. Press AUX 6 to verify the unit's setting and change it, if necessary.***
	Cables and adapters are not secure, or are not connected correctly.
Do this:	***Check all cables and adapters; refer to the illustration on page 2-4 for proper connections.***
	Unit not in continuous mode.
Do this:	***Turn the unit off, connect the unit to an external power source, then turn the unit on, or turn the Battery Saver off (AUX 9).***
	Unit is not taking fixes.
Do this:	***You must press POS, NAV, or VEL to get continuous fixes.***
AUTOPILOT DOES NOT RESPOND	Refer to "External Devices," above.
	You are not navigating on a "route."
Do this:	***Set a route as described on page 4-18. Operate from external power or with the Battery Saver off, and press POS, NAV, or VEL."***

NAV DOES NOT WORK	You must set a route to use NAV.
Do thls:	***Enter a route, or select a route leg to navigate on.***
	You must be travelling faster than 0.2 knots to get velocity-related data, such as Speed Over Ground (SOG), ground course (COG), Steering, Speed Of Advance (SOA), Estimated Time of Arrival (ETA), Time To Go (TTG), or Velocity Made Good (VMG).
Try this:	***Increase speed to 0.2 knots or greater.***
	Navigation- and velocity-related data is not available until three fixes have been made.
Do this:	***Wait until three position fixes have been taken, then try again.***
DASHES APPEAR IN NAV DISPLAYS	You are 65.6 feet (20 meters) or less from your destination. Distance to destination is no longer available, and Bearing varies considerably. This is normal.
ZEROES APPEAR IN POS, NAV, AND VEL DISPLAYS	Your speed is too slow to provide velocity-related data such as speed, ground course, and steering. You must be travelling at least 0.2 knots to obtain this data.
Do this:	***Increase your speed to at least 0.2 knots.***
SATELLITE AVAILABILITY NOT TO YOUR EXPECTATIONS	The position or health of a satellite may have been changed by the government. You may also have last collected an Almanac on a day when

one or more satellites were set to "unhealthy."

Do this: ***Check your initialized position, time, and the satellites listed in Sat Status (AUX 3). Collect a new Almanac with Sky Search, then check Sat Status again. Note If more satellites are listed now***

You may have turned some satellites off.

Do this: ***Check Sat Status with AUX 3. Scroll through the satellites. If any are set to "OFF," reset them to "ON."***

OPERATING TIPS

General

Most equipment malfunctions can be prevented by observing the following rules:

- Turn the unit off before inserting or removing a power jack.
- Do not leave the unit face up in the sun.
- Do not operate the unit in temperatures above 60°C or below -10°C.
- Do not store the unit at temperatures above 70°C or below -40°C.
- If the unit is dropped in the water, use fresh water to carefully rinse both the outside of the unit and the battery compartment. Dry the unit and battery compartment thoroughly.

Unsure of Your Initialization Position

When you have no map to refer to and you don't know your initialization, press AUX 5. (Be sure you have a clear view of the sky.) The unit searches the sky for any satellite and collects an Almanac from it. The unit then locates additional satellites to calculate a position fix and initialize itself. An initialized position entered in this way is sufficient to operate the unit, but the unit will obtain its first position fix much faster if it is initialized by manually entering the position.

You can use Waypoint Projection (AUX 8) to help project a new position, based on where you were.

CHOOSING A DATUM

All charts are created using a system that includes the scale, type of projection, and a map datum. There are hundreds of map datums in use throughout the world, but only a few are in widespread use today. The NAV 5000 has 11 map datums plus one user-entered datum. You should set the unit to use the same datum as your charts and equipment; a position in one datum can differ by 300 meters or more from one calculated using another datum.

Before setting the datum in SETUP, check the datum used by your charts (look at the legend) and the manuals for your electronic navigation equipment. If the datum you need is not available with the NAV 5000, set a user-entered datum. This is described in SETUP, Setting a User-Entered Map Datum.

The National Oceanic and Atmospheric Administration (NOAA) is currently changing its charts to NAD-83; for most purposes, this is the same as WGS 84. Most NOAA charts in use now are NAD-27 or NAD-83. USGS maps are usually in NAD-27.

USING THE UNIT NEAR THE POLES

Since all meridians of longitude converge at the North and South poles, a nautical mile can span many degrees of longitude near the poles. This means that small changes in position can cause large variations.

The inherent accuracy of the NAV 5000 does not change near the poles, but this mathematical sensitivity problem can cause position and velocity-related data to appear unstable when the unit is operated at latitudes greater than 85 degrees north or south of the equator. Use caution in interpreting displayed data in these areas.

STORING THE UNIT

Use the instructions below to store the unit.

For More Than 3 Months

To prepare the unit for long-term storage:

- Manually record all waypoints.
- Record any non-default parameters from SETUP.
- Remove the battery clip from the unit.
- Place the unit in the carrying/storage case or in its original box.

When the unit is taken out of storage, reload the battery clip with fresh batteries, and insert it into the unit. Reinitialize the unit and reconfigure SETUP, if necessary. Enter the waypoints you recorded before removing the batteries (above).

For Less Than 3 Months

To prepare the unit for short-term storage:

- Load fresh batteries into the unit to save any stored waypoints, Almanac, and non-default SETUP settings.
- Place the unit in the carrying/storage case or in its original box.
- If the unit is stored in the carrying/storage case, place the field card in the front pocket, to be sure no keys are accidentally pressed.

WHEN NOTHING ELSE WORKS

When nothing described in Operating Problems solves your problem, you can try clearing the unit's memory by pressing AUX 13. This is a last-ditch solution, since all of the unit's memory will be cleared. Be sure to record your waypoints and any non-default SETUP features before clearing the memory.

In extreme cases, such as when the display is frozen and the keypad will not work, remove the battery clip for at least 1/2 hour. This will also erase the memory.

MAGELLAN'S CUSTOMER SUPPORT

Representatives are available Monday through Friday, between 8 AM and 5 PM, Pacific Standard Time at 714 - 394-5000. Faxes can be sent to 714 - 394-7050.

If necessary, you can also return your unit to Magellan for repair. (Please call Customer Support for assistance first.) If possible, please notify us before shipping the unit by Parcel Post or UPS, and include with the unit a description of the problem and your name and address. If your return shipping address is different, please include it.

Packages should be sent to:

Magellan Systems Corporation
960 Overland Court
San Dimas, California 91773
Attention: Warranty Repair

APPENDIX 1

WAYPOINT LOG

Always keep a written record of all waypoints, especially of waypoints that are named by the unit. Copy these pages for your waypoint notebook.

WAYPOINT NAME: __ __ __ __ __ __	DATE: __ / __ / __
LAT __ __ ° __ __ . __ __ N or S	ALTITUDE:
LON __ __ __ ° __ __ . __ __ E or W	__ __ __ __ __f or m
NOTE: _____	DATUM:_____

WAYPOINT NAME: __ __ __ __ __ __	DATE: __ / __ / __
LAT __ __ ° __ __ . __ __ N or S	ALTITUDE:
LON __ __ __ ° __ __ . __ __ E or W	__ __ __ __ __f or m
NOTE: _____	DATUM:_____

WAYPOINT NAME: __ __ __ __ __ __	DATE: __ / __ / __
LAT __ __ ° __ __ . __ __ N or S	ALTITUDE:
LON __ __ __ ° __ __ . __ __ E or W	__ __ __ __ __f or m
NOTE: _____	DATUM:_____

WAYPOINT NAME: __ __ __ __ __ __	DATE: __ / __ / __
LAT __ __ ° __ __ . __ __ N or S	ALTITUDE:
LON __ __ __ ° __ __ . __ __ E or W	__ __ __ __ __f or m
NOTE: _____	DATUM:_____

WAYPOINT NAME: __ __ __ __ __ __	DATE: __ / __ / __
LAT __ __ ° __ __ . __ __ N or S	ALTITUDE:
LON __ __ __ ° __ __ . __ __ E or W	__ __ __ __ __f or m
NOTE: _____	DATUM:_____

WAYPOINT NAME: __ __ __ __ __ __	DATE: __ / __ / __
LAT __ __ ° __ __ . __ __ N or S	ALTITUDE:
LON __ __ __ ° __ __ . __ __ E or W	__ __ __ __ __f or m
NOTE: _____	DATUM:_____

WAYPOINT NAME: __ __ __ __ __ __	DATE: __ / __ / __
LAT __ __ ° __ __ . __ __ N or S	ALTITUDE:
LON __ __ __ ° __ __ . __ __ E or W	__ __ __ __ __f or m
NOTE: _____	DATUM:_____

WAYPOINT NAME: __ __ __ __ __ __	DATE: __ / __ / __
LAT __ __ ° __ __ . __ __ N or S	ALTITUDE:
LON __ __ __ ° __ __ . __ __ E or W	__ __ __ __ __f or m
NOTE: _____	DATUM:_____

WAYPOINT NAME: __ __ __ __ __ __	DATE: __ / __ / __
LAT __ __ ° __ __ . __ __ N or S	ALTITUDE:
LON __ __ __ ° __ __ . __ __ E or W	__ __ __ __ __f or m
NOTE: _____	DATUM:_____

APPENDIX 2

TABLE OF CONSTANTS

The following table contains the constants needed to convert a local datum to WGS84. This is the equivalent of entering a user-entered datum in SETUP.

When entering these constants, remember that Δa is displayed on the screens as "DELTA a", Δf x 10^4 is "DELTA f * 10000", and so on.

MOLODENSKIY TRANSFORMATION CONSTANTS
LOCAL DATUM TO WGS '84

DATUM	ELLIPSOID	Δa	Δf x 10^4	ΔX(m)	ΔY(m)	ΔZ(m
ADINDAN Mean Value (Ethiopia, Mali, Senegal, and Sudan)	Clarke 1880	-112.145	-0.54750714	-162	-12	206
AFG Somalia	Krassovsky	-108	0.00480795	-43	-163	45
AIN EL ABD 1970 Bahrain Island	International	-251	-0.14192702	-150	-251	-2
ANNA 1 ASTRO 1965 Cocos Islands	Australian National	-23	-0.00081204	-491	-22	435
ARC 1950 Mean Value (Botswana, Lesotho, Malawi, Swaziland Zaire, Zambia, and Zimbabwe)	Clarke 1880	-112.145	-0.54750714	-143	-90	-294
ARC 1960 Mean Value (Kenya, Tanzania)	Clarke 1880	-112.145	-0.54750714	-160	-8	-300
ASCENSION ISLAND 1958 Ascension Island	International	-251	-0.14192702	-207	107	52
ASTRO BEACON "E" Iwo Jima Island	International	-251	-0.14192702	145	75	-272

TABLE OF CONSTANTS (Cont'd)

DATUM	ELLIPSOID	Δa	Δf x 10⁴	ΔX(m)	ΔY(m)	ΔZ(
ASTRO B4 SOR. ATOLL						
Tern Island	International	-251	-0.14192702	114	-116	-333
ASTRO POS 71/4	International	-251	-0.14192702			
St. Helena Island				-320	550	-494
ASTRONOMIC STATION 1952						
Marcus Island	International	-251	-0.14192702	124	-234	-25
AUSTRALIAN GEODETIC 1966						
Australia and Tasmania Island	Australian National	-23	-0.00081204	-133	-48	148
AUSTRALIAN GEODETIC 1984						
Australia and Tasmania Island	Australian National	-23	-0.00081204	-134	-48	149
BELLEVUE (IGN)	International	-251	-0.14192702			
Efate and Erromango Islands				-127	-769	472
BERMUDA 1957	Clarke 1866	-69.4	-0.37264639			
Bermuda Islands				-73	213	296
BOGOTA OBSERVATORY						
Colombia	International	-251	-0.14192702	307	304	-318
CAMPO INCHAUSPE						
Argentina	International	-251	-0.14192702	-148	136	90
CANTON ISLAND 1966						
Phoenix Islands	International	-251	-0.14192702	298	-304	-375
CAPE	Clarke 1880	-112.145	-0.54750714			
South Africa				-136	-108	-292
CAPE CANAVERAL	Clarke 1866	-69.4	-0.37264639			
Mean Value (Florida and Bahama Islands)				-2	150	181
CARTHAGE	Clarke 1880	-112.145	-0.54750714			
Tunisia				-263	6	431

TABLE OF CONSTANTS (Cont'd)

DATUM	ELLIPSOID	Δa	Δf x 10⁴	ΔX(m)	ΔY(m)	ΔZ(m)
CHATHAM 1971 Chatham Island (New Zealand)	International	-251	-0.14192702	175	-38	113
CHUA ASTRO Paraguay	International	-251	-0.14192702	-134	229	-29
CORREGO ALEGRE Brazil	International	-251	-0.14192702	-206	172	-6
DJAKARTA (BATAVIA) Sumatra Island (Indonesia)	Bessel 1841	739.845	0.10037483	-377	681	-50
DOS 1968 Gizo Island (New Georgia Islands)	International	-251	-0.14192702	230	-199	-752
EASTER ISLAND 1967 Easter Island	International	-251	-0.14192702	211	147	111
EUROPEAN 1950 Mean Value [Austria, Denmark, Finland, France, FRG (Federal Republic of Germany), Gibraltar, Greece, Italy, Netherlands, Norway, Portugal, Spain, and Switzerland]	International	-251	-0.14192702	-87	-98	-121
EUROPEAN 1979 Mean Value (Austria, Finland, Netherlands, Norway, Spain, Sweden, and Switzerland)	International	-251	-0.14192702	-86	-98	-119
GANDAJIKA BASE Republic of Maldives	International	-251	-0.14192702	-133	-321	50

TABLE OF CONSTANTS (Cont'd)

DATUM	ELLIPSOID	Δa	Δf x 10⁴	ΔX(m)	ΔY(m)	ΔZ(m
GEODETIC DATUM 1949						
New Zealand	International	-251	-0.14192702	84	-22	209
GUAM 1963	Clarke 1866	-69.4	-0.37264639			
Guam Island				-100	-248	259
GUX 1 ASTRO	International	-251	-0.14192702			
Guadalcanal Island				252	-209	-751
HJORSEY 1955	International	-251	-0.14192702			
Iceland				-73	46	-86
HONG KONG 1963	International	-251	-0.14192702			
Hong Kong				-156	-271	-189
INDIAN	Everest					
Thailand and Vietnam		860.655	0.28361368	214	836	303
Bangladesh, India, and Nepal		860.655	0.28361368	289	734	257
IRELAND 1965	Modified Airy	796.811	0.11960023			
Ireland				506	-122	611
ISTS 073 ASTRO 1969						
Diego Garcia	International	-251	-0.14192702	208	-435	-229
JOHNSTON ISLAND 1961						
Johnston Island	International	-251	-0.14192702	191	-77	-204
KANDAWALA	Everest	860.655	0.28361368			
Sri Lanka				-97	787	86
KERGUELEN ISLAND						
Kerguelen Island	International	-251	-0.14192702	145	-187	103
KERTAU 1948	Modified	832.937	0.28361368			
West Malaysia and Singapore	Everest			**-11**	**851**	**5**
LA REUNION	International	-251	-0.14192702			
Mascarene Island				94	-948	-1262
L.C. 5 ASTRO	Clarke 1866	-69.4	-0.37264639			
Cayman Brac Island				42	124	147

TABLE OF CONSTANTS (Cont'd)

DATUM	ELLIPSOID	Δa	Δf x 10^4	ΔX(m)	ΔY(m)	ΔZ(m)
LIBERIA 1964	Clarke 1880	-112.145	-0.54750714			
Liberia				-90	40	88
Luzon	Clarke 1866	-69.4	-0.37264639			
Philippines (Excluding Mindanao Island)				-133	-77	-51
Mindanao Island				-133	-79	-72
MAHE 1971	Clarke 1880	-112.145	-0.54750714			
Mahe Island				41	-220	-134
MARCO ASTRO	International	-251	-0.14192702			
Salvage Islands				-289	-124	60
MASSAWA	Bessel 1841	739.845	0.10037483			
Eritrea (Ethiopia)				639	405	60
MERCHICH	Clarke 1880	-112.145	-0.54750714			
Morocco				31	146	47
MIDWAY ASTRO 1961						
Midway Island	International	-251	-0.14192702	912	-58	1227
MINNA	Clarke 1880	-112.145	-0.54750714			
Nigeria				-92	-93	122
NAHRWAN	Clarke 1880					
Masirah Island (Oman)		-112.145	-0.54750714	-247	-148	369
United Arab Emirates		-112.145	-0.54750714	-249	-156	381
Saudi Arabia		-112.145	-0.54750714	-231	-196	482
NAMIBIA	Bessel 1841	653.135***	0.10037483			
Namibia				616	97	-251
NAPARIMA, BWI	International	-251	-0.14192702			
Trinidad and Tobago				-2	374	172

TABLE OF CONSTANTS (Cont'd)

DATUM	ELLIPSOID	Δa	Δf x 10⁴	ΔX(m)	ΔY(m)	ΔZ(
NORTH AMERICAN 1927						
Mean Value (CONUS)	Clarke 1866	-69.4	-0.37264639	-8	160	176
Alaska		-69.4	-0.37264639	-5	135	172
Bahamas (Excluding San Salvador Island)		-69.4	-0.37264639	-4	154	178
San Salvador Island		-69.4	-0.37264639	1	140	165
Canada (Including Newfoundland Island)		-69.4	-0.37264639	-10	158	187
Canal Zone		-69.4	-0.37264639	0	125	201
Caribbean (Barbados, Caicos Islands, Cuba, Dominican Republic, Grand Cayman, Jamaica, Leeward Islands, and Turks Islands)		-69.4	-0.37264639	-7	152	178
Central America (Belize, Costa Rica, El Salvador, Guatemala, Honduras, and Nicaragua)		-69.4	-0.37264639	0	125	194
Cuba		-69.4	-0.37264639	-9	152	178
Greenland (Hayes Peninsula)		-69.4	-0.37264639	11	114	195
Mexico		-69.4	-0.37264639	-12	130	190
NORTH AMERICAN 1983						
Alaska, Canada, Central America, CONUS, Mexico	GRS 80	0	-0.00000016	0	0	0

TABLE OF CONSTANTS (Cont'd)

DATUM	ELLIPSOID	Δa	Δf x 10⁴	ΔX(m)	ΔY(m)	ΔZ(m)
OBSERVATORIO 1966						
Corro, Santa Cruz, and Flores Islands (Azores)	International	-251	-0.14192702	-425	-169	81
OLD EGYPTIAN 1930						
Egypt	Helmen 1906	-63	0.00480795	-130	110	-13
OLD HAWAIIAN	Clarke 1866	-69.4	-0.37264639			
Mean Value				61	-285	-181
OMAN	Clarke 1880	-112.145	-0.54750714			
Oman				-346	-1	224
ORDNANCE SURVEY OF GREAT BRITAIN 1936	Airy	573.604	0.11960023	375	-111	431
Mean Value (England, Isle of Man, Scotland, Shetland Islands, and Wales)						
PICO DE LAS NIEVES						
Canary Islands	International	-251	-0.14192702	-307	-92	127
PITCAIRN ASTRO 1967						
Pitcairn Island	International	-251	-0.14192702	185	165	42
PROVISIONAL SOUTH CHILEAN 1963	International	-251	-0.14192702	16	196	93
South Chile (near 53°S)						
PROVISIONAL SOUTH AMERICAN 1956	International	-251	-0.14192702	-288	175	-376
Mean Value (Bolivia, Chile, Colombia, Ecuador, Guyana, Peru, and Venezuela)						
PUERTO RICO	Clarke 1866	-69.4	-0.37264639			
Puerto Rico and Virgin Islands				11	72	-101

TABLE OF CONSTANTS (Cont'd)

DATUM	ELLIPSOID	Δa	Δf x 10⁴	ΔX(m)	ΔY(m)	ΔZ
QATAR NATIONAL Qatar	International	-251	-0.14192702	-128	-283	22
QORNOQ South Greenland	International	-251	-0.14192702	164	138	-189
ROME 1940 Sardinia Island	International	-251	-0.14192702	-225	-65	9
SANTA BRAZ Saint Miguel, Santa Maria Islands (Azores)	International	-251	-0.14192702	-203	141	53
SANTO (DOS) Espirito Santo Island	International	-251	-0.14192702	170	42	84
SAPPER HILL 1943 East Falkland Island	International	-251	-0.14192702	-355	16	74
SOUTH AMERICAN 1969 Mean Value (Argentina, Bolivia, Brazil, Chile, Colombia, Ecuador, Guyana, Paraguay, Peru, Venezuela, and Trinidad and Tobago)	South American 1969	-23	-0.00081204	-57	1	-41
SOUTH ASIA Singapore	Modified Fischer 1960	-18	0.00480795	7	-10	-26
SOUTHEAST BASE Porto Santo and Madeira Islands	International	-251	-0.14192702	-499	-249	314
SOUTHWEST BASE Azores (Pico and Terceira Islands)	International	-251	-0.14192702	-104	167	-38
TIMBALAI 1948 Brunei and East Malaysia (Sarawak and Sabah)	Everest	860.655	0.28361368	-689	691	-46

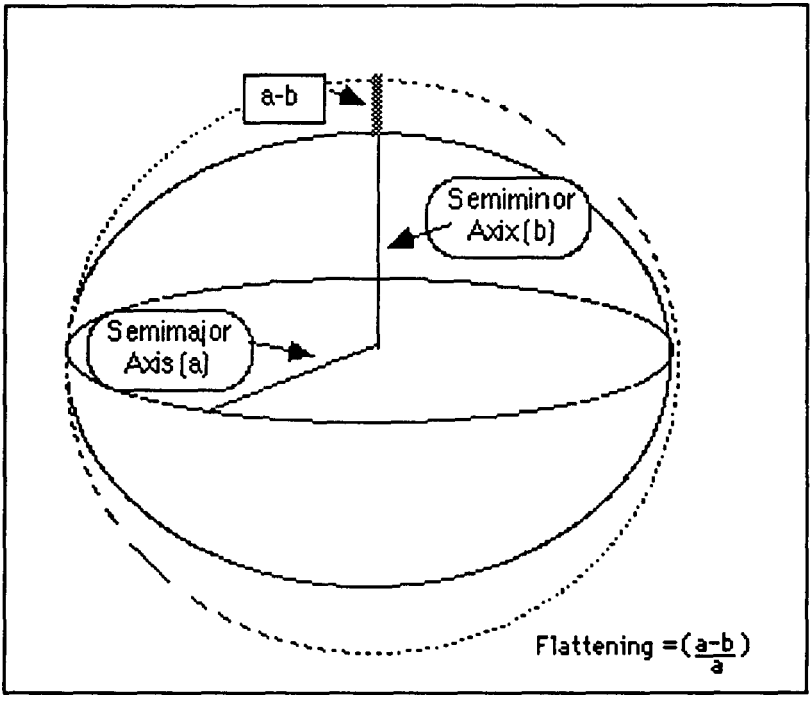
TABLE OF CONSTANTS (Cont'd)

DATUM	ELLIPSOID	Δa	Δf x 10^4	ΔX(m)	ΔY(m)	ΔZ(m
TOKYO Mean Value (Japan, Korea, and Okinawa)	Bessel 1841	739.845	0.10037483	-128	481	664
TRISTAN ASTRO 1968 Tristan da Cunha	International	-251	-0.14192702	-632	438	-609
VITI LEVU 1916 Viti Levu Island (Fiji Islands)	Clarke 1880	-112.145	-0.54750714	51	391	-36
Wake-Eniwetok 1960 Marshall Islands	Hough	-133	-0.14192702	101	52	-39
ZANDERIJ Suriname	International	-251	-0.14192702	-265	120	-358

ΔX, ΔY, ΔZ are the differences in height from the center of the earth from the WGS model of the earth's surface to the local datum's model of the earth's surface.

Δa = the difference from the WGS semi-major axis to that of the local datum.
Δf (x 10,000) = the difference in flattening from the WGS84 model to the local datum.
Flattening = (a-b)/a, where a = semi-major axis and b = semi-minor axis.

***This value reflects a difference in the definition of legal and international meters in Namibia. (The semimajor axis for the Bessel 1841 Ellipsoid in Namibia is a = 6377483.865 legal meters.)



Ellipsoid Model of the Earth

APPENDIX 3

GEOMETRIC QUALITY

Geometric quality (GO) is a measure of position accuracy. It is displayed on the third screen of any position fix and any fix saved as a waypoint.

Geometric quality (GO) is based on a measurement of the geometry of the satellites used for triangulating a position. In general, the farther apart the satellites are, the more accurate the fix is. The position fix may not be as accurate when the satellites are close together.

When geometric quality is between 4 and 9 the position fix is reliable and can safely be used to navigate. When geometric quality is from 0 to 3 the fix is unreliable, and should not be used to navigate with. Position fixes with a GO of 0 to 3 are displayed with a warning symbol () in the lower right corner of the display.

GEOMETRIC QUALITY	
7 - 9	Very good
4 - 6	Good
0 - 3	Unreliable: do not use.

APPENDIX 4

SIGNAL QUALITY

Signal quality (SQ) is an indication of the carrier-to-noise ratio (C/N_o) of the signal of each satellite being used for a position fix. SO has no affect on the accuracy of the position fix; it is only an indication of signal strength.

SQ is displayed on the third screen of a position fix, backup fix, or stored fix (waypoint), and ranges from 0 (lowest quality) to 9 (highest quality). An SQ of 4 or higher indicates a signal strong enough that the unit will not lose its lock on it.

SIGNAL QUALITY	
7 - 9	Strong
4 - 6	Good
0 - 3	Weak: may lose lock

When SQ is weak,  is displayed on all three screens for position fix, last fix, backup fixes, and saved fixes (waypoints).

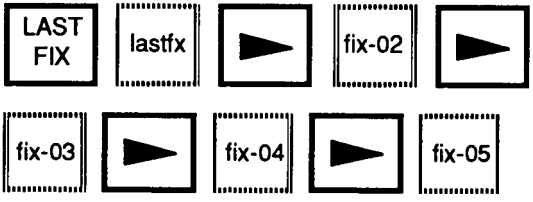
APPENDIX 5

The following are a synopsis of the most often used function key sequences.

LAST FIX KEY SEQUENCES:

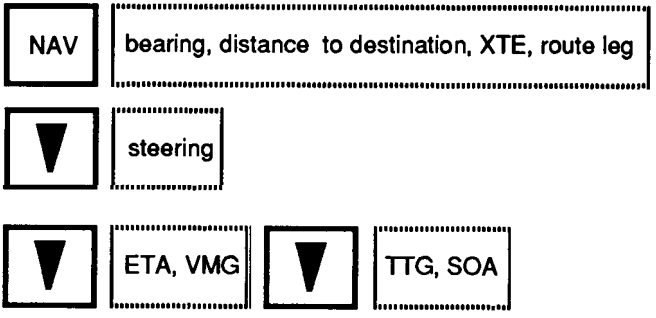
View Coordinates of most recent stored Position

View Last Fix Backups



at any time

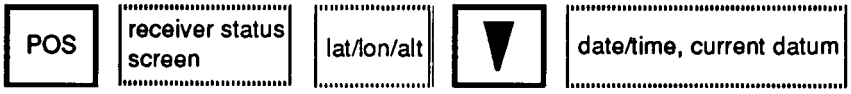
NAVIGATION KEY SEQUENCES:



POSITION KEY SEQUENCES:

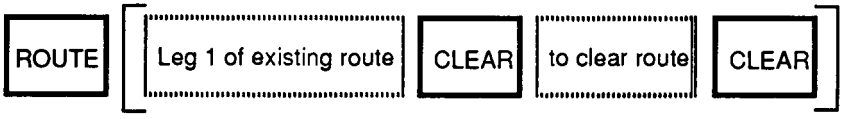
Receiver Status Screen

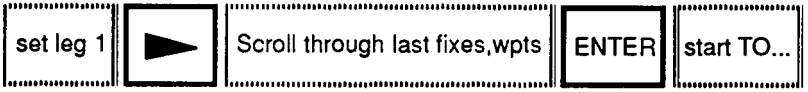
Position Display

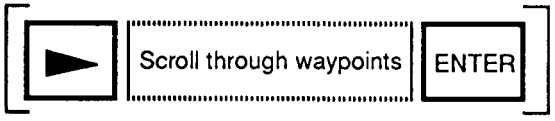


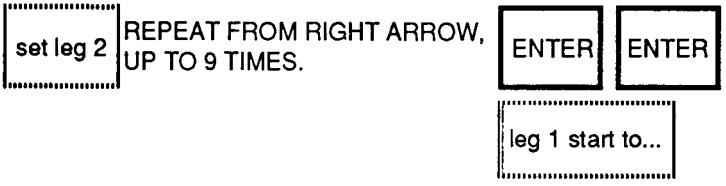
ROUTE KEY SEQUENCE:

Creating Route

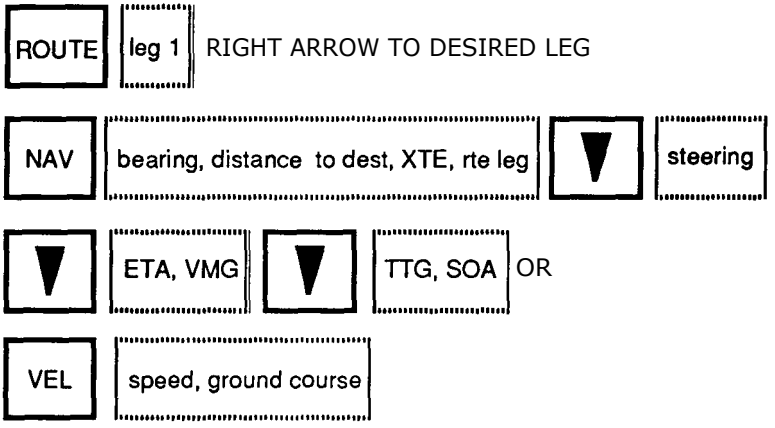






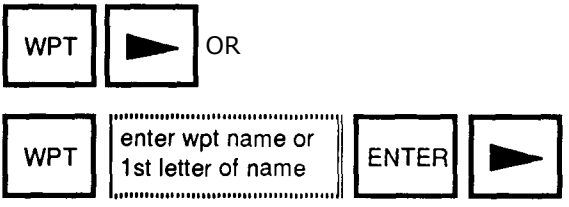


Navigate a Route

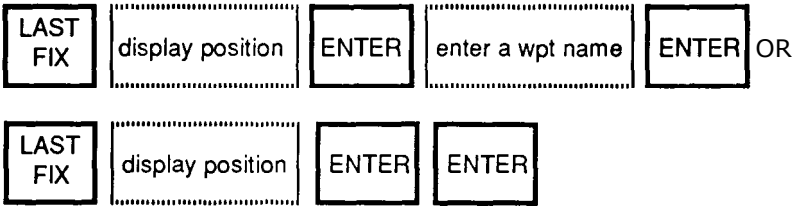


WAYPOINT KEY SEQUENCES:

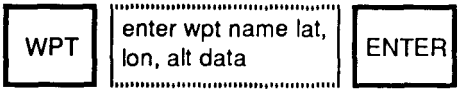
View Waypoints



Save a Position

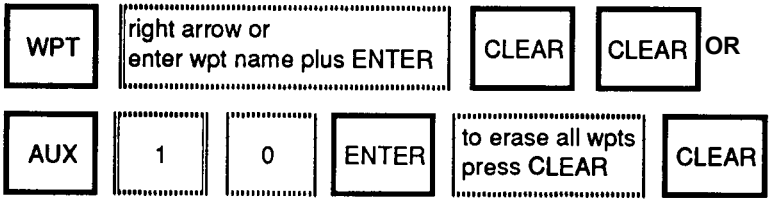


Enter Waypoints



Rename Waypoints

Erase Waypoints



APPENDIX 6

GLOSSARY

ACQUISITION	**Occurs when the unit locates a signal and collects data from a satellite.**
ALMANAC	**Data on the general location and health of all satellites in the GPS constellation. Can be collected from any available satellite.**
ANTENNA ALTITUDE	**The sum of the altitude at your location (zero at sea level) and the antenna height.**
ARRIVED	**The message displayed when navigating on a route in manual mode, indicating that you have reached the destination of the current leg.**
AUTOMATIC MODE	**The mode of operation that uses either 2D or 3D, depending on the number of available satellites. (Preference is given to 3D.)**
AUTOMATIC ROUTE MODE	**A mode of operation used when navigating on a route. In the automatic route mode, when you pass the leg's destination the unit automatically switches to the next leg of the route.**
BACKUP FIXES	**The position fixes taken before the current position and stored in the unit's memory. Accessed by pressing LAST FIX. Saved as LASTFX, FIX-02, FIX-03, FIX-04, and FIX-05.**

BEARING

The direction of a destination or target in relation to the vessel.

C/N_o

Carrier-to-noise ratio. An absolute means of specifying the signal-to-noise ratio (SNR) that is independent of band width. Indicated on the unit display by SQ.

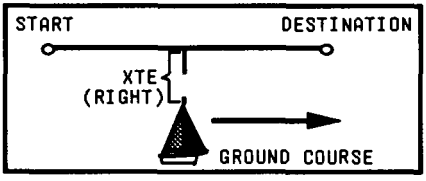
CLOSE

The message displayed when navigating on a route, indicating that you are within 500 feet of the destination of the current leg.

COURSELINE

The planned line of travel; the line between your start point and destination.

CROSS TRACK ERROR



The perpendicular distance between the present position and the courseline. Given as right or left of course when facing the destination. Displayed in NAV as XTE.

DEFAULT

The value or setting automatically chosen by the unit unless directed otherwise. Can be changed in SETUP.

ESTIMATED TIME OF ARRIVAL

The estimated time of day the leg's destination waypoint will be reached, based on the Velocity Made Good.

ETA

Estimated Time of Arrival.

FIX

A single position, defined by latitude, longitude, and altitude.

GEOMETRIC QUALITY

A measurement of the geometry of the satellites used to triangulate the position. Abbreviated as GQ. GQ ranges from 0 (lowest) to 9

	(highest). A GQ of 7 or better is preferred, but a GQ of 4 or better is navigable. A GQ of 3 or below is inaccurate, and should not be used to navigate. See Appendix 3 and Error/Warning Messages in Chapter 6.
GQ	Geometric Quality.
GROUND COURSE	The true direction of travel achieved, which may differ from courseline. Sometimes referred to as Course Over Ground.
GROUND SPEED	See Speed Over Ground.
HEADING	The direction your vessel is facing, defined as an angle from North.
LAST FIX	The position fix taken before the current position fix, stored in the unit's memory and accessed by pressing LASTFX.
LATITUDE	The distance north or south of the equator, measured in an arc with the equator being 0° and the poles being 90°. (The default latitude is north.)
LONGITUDE	The distance east or west of the prime meridian (0°), which intersects Greenwich, England. The range is 0°-180°E, moving east of 0°, and 0°-180°W, moving west of 0°. (The default longitude is west.)
MAP DATUM	A method of assigning position coordinates to real-world locations. Based on an underlying ellipsoidal model of the earth, and

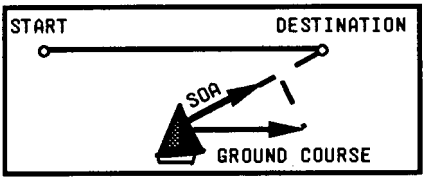
	subject to other scientific assumptions. Identified by a unique name, such as NAD-27 or NAD-83.
MANUAL ROUTE MODE	A mode of operation used when navigating on a route. In the manual route mode, when you pass the leg's destination, the screen displays "ARRIVED" on the fourth line. The unit must be switched to the next leg manually by pressing the RIGHT ARROW.
NMEA	National Marine Electronics Association. Also the standard developed by the NMEA to allow navigational devices to exchange data.
POSITION	A location that is obtained in real time and expressed in a coordinate system. Sometimes called a fix. Also a waypoint location obtained from a chart or other source.
RECEIVER	The electronic components of the NAV 5000 that receive satellite signals.
ROUTE	A planned course of travel, divided into one to ten legs, each with its own start and destination.
ROUTE LEG	A portion of a route.
SIGNAL QUALITY	An indication of the carrier-to-noise ratio of each satellite signal being used, and abbreviated as SQ. Ranges from 0 (lowest) to 9 (highest). A scale for indicating the strength of the signal, and the likelihood of the lock on the signal being lost. See Appendix 4 and

Error/Warning Messages.

SOA — Speed of Advance.

SOG — Speed Over Ground.

SPEED OF ADVANCE — A component of ground speed (SOG) towards the destination. Abbreviated as SOA. Displayed when NAV is pressed and after three position fixes have been taken.



SPEED OVER GROUND — Actual ground speed measured as instantaneous speed and direction. Abbreviated as SOG. The calculation is made by the unit instantly and displayed with VEL.

SQ — See Signal Quality.

3D — Three dimensional. The mode of operation that calculates latitude, longitude, and altitude, requiring the use of four satellites.

TIME TO GO — Time To Go. The time necessary to reach the destination of the current leg, based on Speed of Advance (SOA).

TOGGLE — To switch back and forth between two settings, or to move through settings in a continuous loop. For example, when setting latitude, use the RIGHT ARROW to toggle between North and South.

TTG — Time To Go.

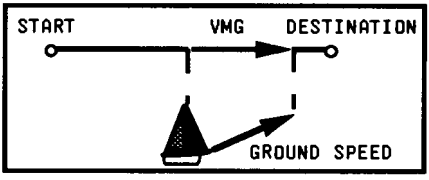
2D — Two dimensional. The mode of Operation that calculates latitude and longitude only, requiring the

use of three satellites. Altitude in 2D is user-entered.

UNIVERSAL TIME — Universal Time, formerly referred to as GMT or Greenwich Mean Time. Abbreviated as UT.

UT — Universal Time.

VELOCITY MADE GOOD — The component of total ground speed (SOG) as projected along the courseline. Abbreviated as VMG, and displayed with NAV.



VMG — Velocity Made Good.

WAYPOINT — A position stored in the unit's memory under a unique name.

XTE — Cross Track Error.

E

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L

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N

O

P

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