



MAGELLAN
SYSTEMS CORPORATION

Magellan GPS NAV 1000™
User Guide

**READ USER GUIDE COMPLETELY TO INSURE PROPER
AND SAFE USE OF THE MAGELLAN GPS NAV 1000™.**



**THIS SYMBOL IS USED FOR IMPORTANT SAFETY
INFORMATION. WHEN YOU SEE THIS SAFETY SYMBOL,
CAREFULLY READ AND FOLLOW THE MESSAGE.**

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Part No. 22-10005

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PREFACE

Our goal is to bring the Global Positioning System (GPS) down to earth! The **Magellan GPS NAV 1000™** makes navigation with GPS easy to understand, easy to use, and affordable. To accomplish these goals...

WE'VE KEPT THE UNIT SIMPLE: We know that a sensibly featured product is easier to understand than a unit cluttered with marginally useful features.

WE'VE KEPT THE OPERATION CONSISTENT: Each key does what it indicates; there are no double or hidden functions on the main function keys.

WE'VE MADE GPS INTUITIVE TO USE: The display prompts you to the next step. We hope our design enables you to use our unit without the use of this user guide. For those who want help or more information, we've written the guide in clear language with illustrations.

WE'VE SEGREGATED THE ADVANCED FEATURES: You do not need to customize the unit or use advanced features to obtain satisfactory use of the NAV 1000.

WE LISTEN: All comments are carefully considered for future products and written materials. We'd like to hear from you.

Randy Hoffman
President & Chief Executive Officer
Magellan Systems Corporation

▲ WARNINGS

A measure of knowledge by the user is required for proper and safe use of the **Magellan GPS NAV 1000™**. **READ THE USER GUIDE & WARRANTY COMPLETELY.** Heed this safety warning symbol.

Use Good Judgment

This product is a navigation aid and does not replace the need for careful position charting and good judgment. 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 inaccurate, such as changes in the position or health of a satellite.

Accuracy can also be affected by poor geometry with respect to the satellites. **WHEN THE ACCURACY WARNING APPEARS ON THE SCREEN, DO NOT USE THE DATA.**

THE GLOBAL POSITIONING SYSTEM IS STILL DEVELOPMENTAL. The government can make changes to the system which affect the performance of GPS receivers. Such a change could require a modification to your NAV 1000. If you have properly registered your unit, Magellan Systems can notify you of the opportunity to upgrade your NAV 1000 to accommodate these changes.

Set the Correct Mode

AMONG THE MOST IMPORTANT THINGS YOU MUST KNOW IS WHETHER YOUR UNIT IS SET FOR TWO DIMENSION (2D) OR THREE DIMENSION (3D) MODE OF OPERATION.

Using only three satellites for obtaining a position, 2D mode gives a latitude and longitude position. **HOWEVER, 2D REQUIRES THAT YOU**

ENTER A CORRECT (± 15 feet) ANTENNA ALTITUDE (YOUR ALTITUDE ABOVE SEA LEVEL PLUS THE HEIGHT OF THE ANTENNA). IF YOU ENTER THE WRONG ANTENNA ALTITUDE, YOUR POSITION FIX WILL BE INACCURATE.

THE UNIT SHOULD BE INITIALIZED TO WITHIN 300 MILES OF ITS TRUE LOCATION. IN 2D MODE, IF YOU FAIL TO DO THIS, YOUR POSITION FIXES COULD BE WRONG.

IF YOU USE THE NAV 1000 ON LAND, WE RECOMMEND THAT YOU ONLY USE 3D MODE UNLESS, OF COURSE, YOU KNOW YOUR ALTITUDE ± 15 FEET. That means the unit will use four satellites for obtaining a position fix; thereby obtaining altitude as well as latitude and longitude. (This insures the accuracy of the fix where exact altitude is not available.)

INTRODUCTION TO THE GUIDE

Two breakthroughs in technology make the **Magellan GPS NAV 1000™** the leading navigation product in the world.

First, the NAV 1000 takes advantage of the NavStar Global Positioning System (GPS) currently being put in place by the United States government. GPS will be the world's first truly global, 24-hour, continuous, precise, three-dimensional navigation system.

Second, the NAV 1000 makes use of the latest developments in electronics. Using custom chips and technologies at the cutting edge, like gallium arsenide, we have brought a revolutionary product in size, weight, flexibility and price, to the boating industry.

This user guide is divided into six sections for easy reference. The sections contain the following information:

Section 1: General Information, overviews the NAV 1000 unit and its available accessories.

Section 2: The Basics, covers basic information related to hand-held battery operation and external power operation of the unit, the keypad, and how to enter data.

Section 3: Getting Started, teaches you how to collect an Almanac and initialize the unit. In addition, a tutorial helps you become familiar with the unit's various functions.

Section 4: Function Keys, provides procedures for using the unit's function keys. Reference this section whenever you have questions on how to perform a function.

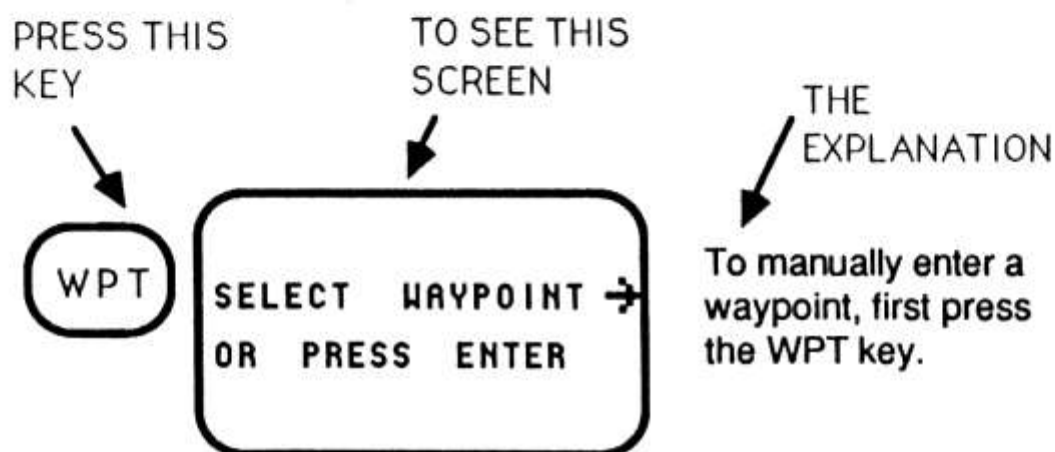
Section 5: Auxiliary Functions, covers the auxiliary functions available under the AUX key.

Section 6: Trouble Shooting and Tips, includes information for trouble shooting, instructions for maintaining your unit and tips.

We have written **All About GPS**, which appears in the Appendix, to give you an overview of the Global Positioning System.

Editorial Approaches

The following editorial approaches have been used in this guide to make it easy to understand:



Reading the Guide

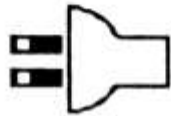


THIS SYMBOL IS USED FOR IMPORTANT SAFETY INFORMATION. WHEN YOU SEE THIS SAFETY SYMBOL, CAREFULLY READ AND FOLLOW THE MESSAGE.

Safety Symbols and Warning Messages

The NAV 1000 is designed to conserve power while operating on its six AA alkaline batteries and will turn off after two minutes if no keys are pressed. This battery-conserving operation is referred to as "push-to-fix."

The unit may be operated continuously by using external AC power (Adapter supplied with the NAV1000), external DC power (with quick-release bracket mounting accessory kit), or its six internal AA alkaline batteries. Use AUX 4 to select continuous operation when the unit is powered by its internal batteries.



The NAV 1000 sometimes works differently in continuous operation. This power plug is used to describe those differences.

Instructions for Continuous Operation

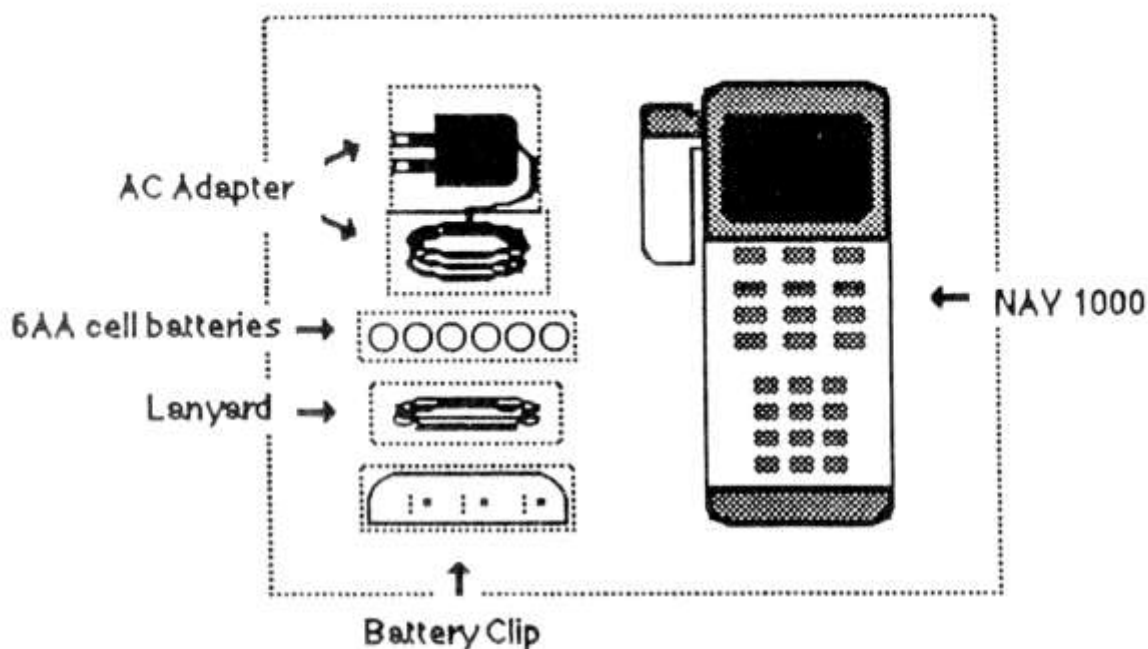
SECTION 1

GENERAL INFORMATION

PACKING LIST

The contents of your **Magellan GPS NAV 1000™** basic package includes

- Magellan GPS NAV 1000 unit
- AC Adapter
- Lanyard
- 6 AA Alkaline Batteries
- Battery Clips (2)
- User Guide
- Field Card
- Warranty
- Registration



Magellan GPS NAV 1000™
Basic Package
PN 00-11000

ACCESSORIES

The NAV 1000 has several optional accessories.

Carrying Case

A durable woven Cordura™ carrying case is available for transporting your NAV 1000 from vessel to shore. The case can be worn over the shoulder or on a belt. It can be used for storing the unit safely. The field card and an extra battery clip fit into a specially designed pocket.

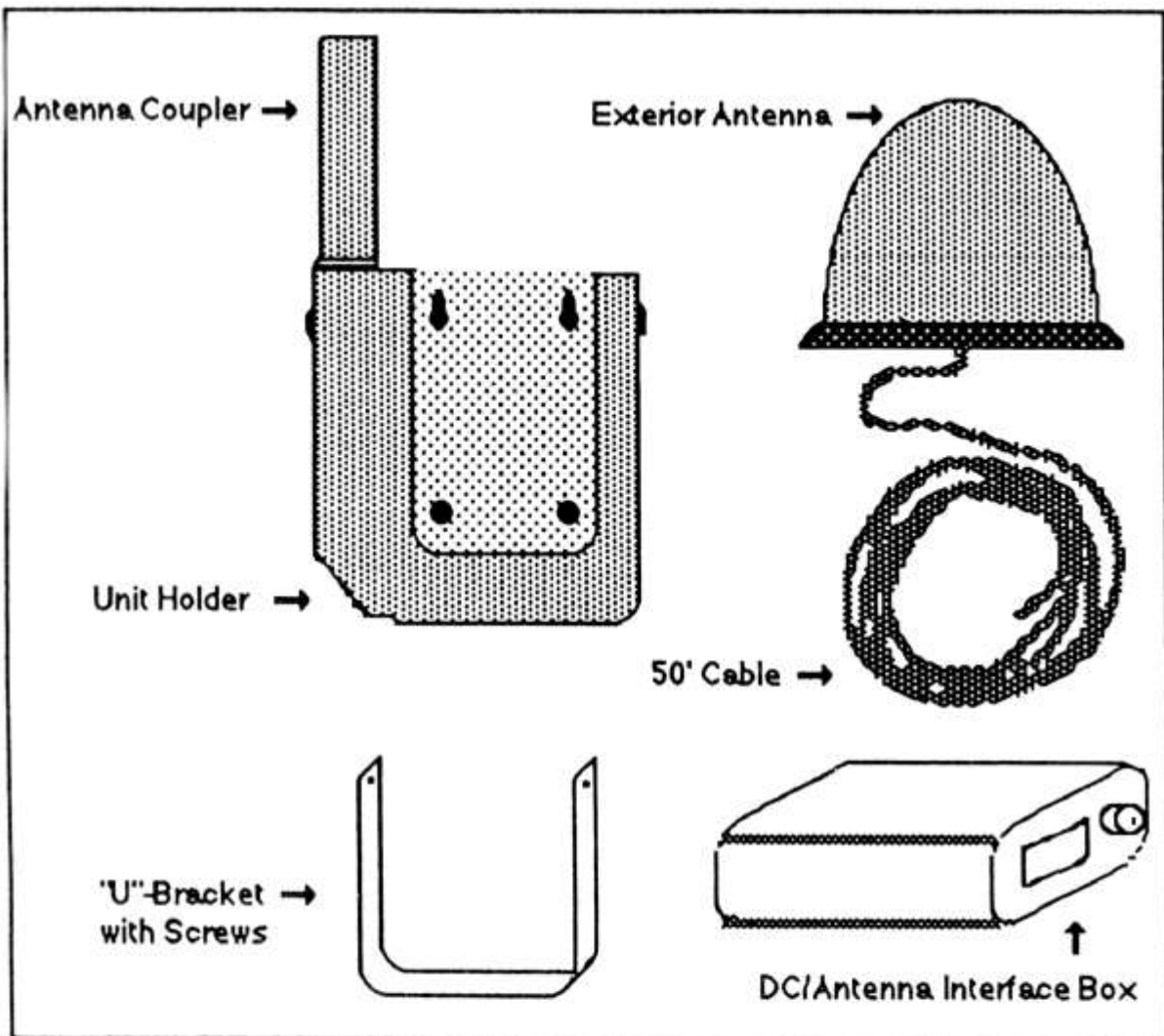


NAV 1000 Carrying Case
PN 00-19005

Quick-Release Bracket Mounting Kit

The quick-release bracket mounting kit allows you to operate your NAV 1000 inside the wheel house or cabin. It consists of

- Unit Holder
- "U"-Bracket with Screws
- Exterior Antenna
- Cable (50 feet)
- DC/Antenna Interface Box
- GPS Antenna Coupler

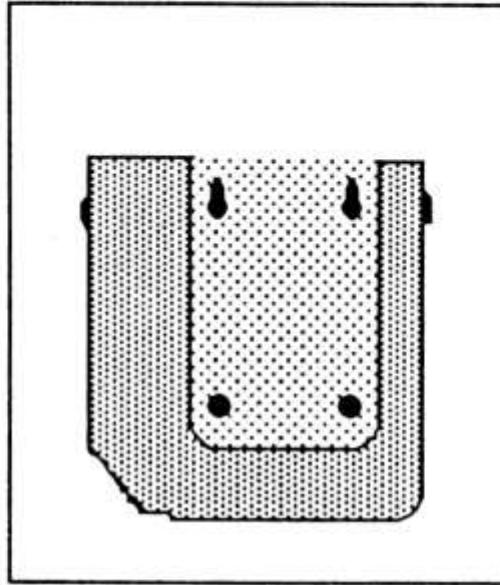


Quick-Release Bracket Mounting Kit
PN 00-19001

The GPS Antenna Coupler fits within the unit holder. Connection of the coupler to the exterior antenna is made through the interface box.

Unit Holder

Unit Holders are available to provide several snug berths for the NAV 1000 on deck, in a skiff, or in a lifeboat.



Unit Holder
PN 00-19002

Other Accessories

Also available are Replacement Battery Clips (PN 00-19004). U-Brackets (PN 00-19003) can also be purchased individually.

SPECIFICATIONS

Physical Characteristics

Unit Size:	8.75" x 3.5" x 2.13" (excluding antenna); 9.0" x 5.0" x 2.5" (bracket mounted)
Weight:	30 ounces with batteries
Display:	2 line, 16 character, alphanumeric, backlit LCD
LCD Dimension:	2.5" x 1.75"; .232" high digits (with cursor)
LCD Operating Temperature:	-10° C. to 60° C.
Waterproof.	
Buoyancy:	Specific gravity compared to seawater = 0.8 (it floats)
Safe Storage Temperature:	-40°C. to 70°C.
GPS Exterior Antenna:	3.5" diameter x 3.5" height, 50 feet of cable (See Instructions for the Quick Release Bracket Mounting Kit.)

Data Characteristics

Accuracy:	(HDOP < 2, C/N ₀ ≥ 47 dB-Hz, 2D) POS - 25 meters RMS in 2D* VELOCITY - ±0.2 Knots
Speed:	0 to 200 MPH (statute or nautical)
Time to First Fix:	2.5 minutes (2D) typical, in continuous operation
Time to Subsequent Fix:	11 seconds (2D) typical
Memory:	50 user-stored waypoints 9 automatic waypoints

Electrical Characteristics

Receiver:	One channel
Power Requirements:	6 AA alkaline batteries (internal) 10 to 15 volts DC with adapter 115 volts AC ±10% with adapter
Power Consumption:	260 MA without light 310 MA with light
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, altitude, and time using best 4 satellites)



*Accuracy of position fixes can be affected by the periodic adjustments to GPS satellites by the U.S. Government.

SECTION 2

THE BASICS

▲ MESSAGE DISPLAY SYMBOLS

The following symbols appear in various message displays:



Accuracy Warning - Appears in all position messages if either the Signal Quality (SQ) or Geometric Quality (GQ) falls below four. Do not use this data for navigating.



Satellite - Appears as each satellite is located during search and data collection.



Bell - Appears on the latitude/longitude displays when the unit's internal alarm has been set to "Wake-Up for Position Fix."



Battery Warning - Appears when the batteries are low and need to be replaced.



Right Arrow - Appears when the RIGHT ARROW key can be pressed to toggle another selection. It also appears when the RIGHT ARROW key will bring you another item, like another waypoint.



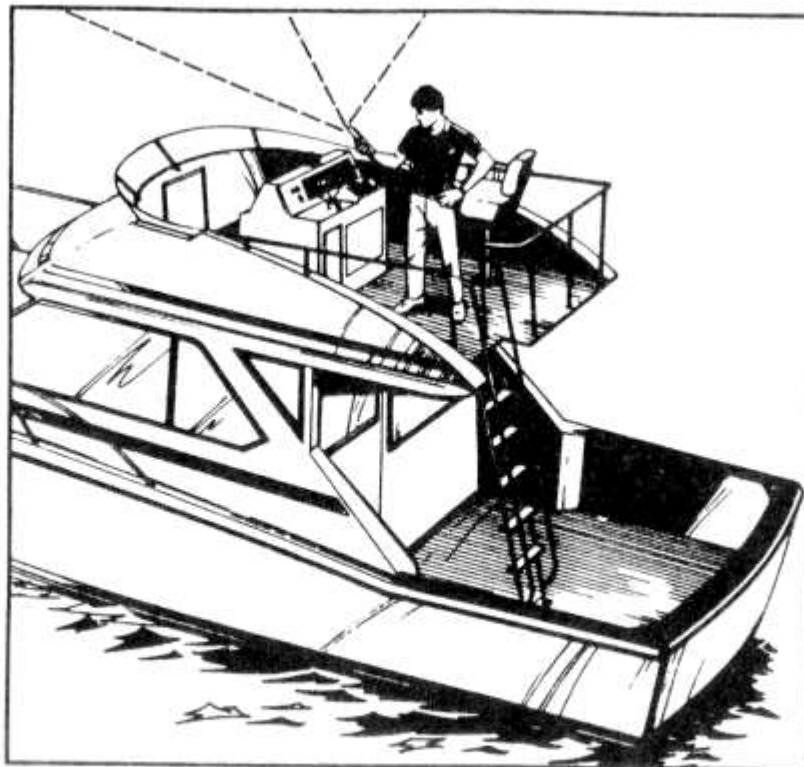
Down Arrow - Appears when the DOWN ARROW key can be pressed to scroll down, to view additional information about that item, like the time/date screen of a particular waypoint.

HAND-HELD BATTERY OPERATION

In hand-held battery operation, the **Magellan GPS NAV 1000™** is powered by six AA alkaline batteries. The operation and electrical design of the unit are intended to extend the life of the batteries. This is part of the unique PowerSaveR™ design. For example, when you press POS key, the receiver turns on, takes one position fix and turns itself off. If no keys are pressed for two minutes, the NAV 1000 stores the position as the last fix and turns itself OFF.

Although it is not recommended, the receiver can be set up to remain on continuously while the unit is in hand-held battery operation. The function is available under AUX 4. The unit will automatically revert to full PowerSaveR™ operation when the batteries get low.

The satellite signals are not like radio and TV waves. To obtain signals in hand-held operation, the unit must be held or placed in direct view of the satellites with antenna pointing directly upward as shown in the figure below.

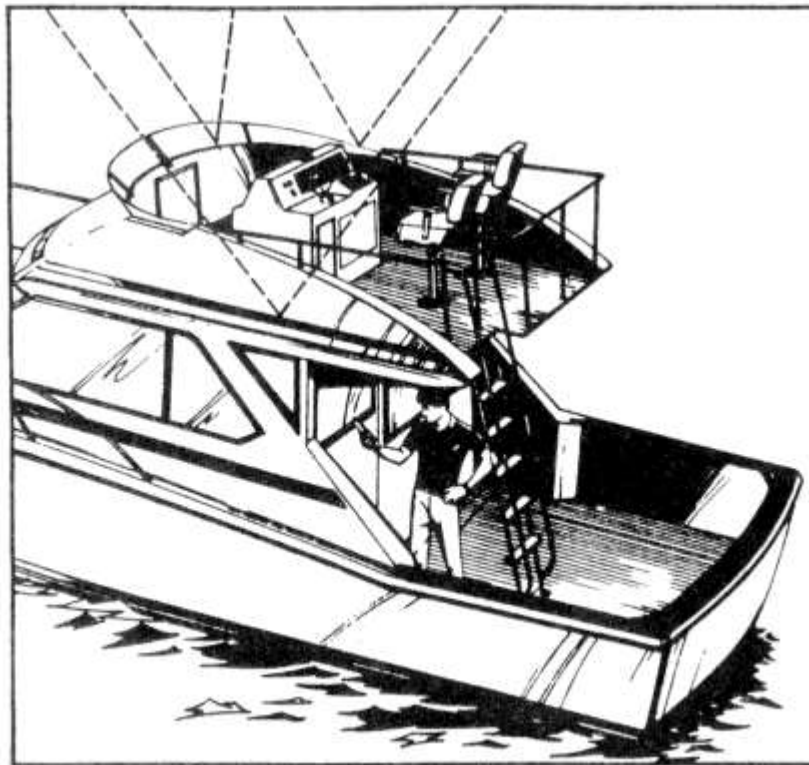


Give Antenna Direct View of Satellites

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 exterior antenna. A sail will not block the signal.

When obtaining the satellite signal, hold the unit still. For ease and comfort of operation, place it in a holder whenever possible.

You can expect to obtain approximately 60 position fixes from a fresh set of alkaline batteries or 6 hours of continuous operation.



Obstructions Will Block Signal

NOTE: The NAV 1000 can be operated continuously on its six AA cell batteries. Use AUX 4 to select this feature.

Battery Warning Symbol



The battery warning symbol appears on each display when the batteries are low. You can continue operating with the battery warning symbol, but be prepared to change batteries by having a loaded battery clip handy. You can obtain approximately 10 more fixes after the first warning appears or operate continuously for another 40 minutes.

When the second low warning level is reached, you will see the message: "Replace batteries or lose data." Replace the batteries now.

When the second low battery symbol appears, there is generally enough power to save your memory for another four weeks. We permit you to override the memory protection barrier because there may be circumstances when one or two more position fixes may be more important to you than protecting your waypoints.

Rechargeable batteries are not recommended for two reasons. First, their life expectancy is considerably shorter than that of fresh alkaline batteries. Second, the sharp drop in power near the end of their charge cycle can jeopardize the unit's memory without warning. In hand-held operation, the alkaline batteries serve to both power the unit and protect critical memory, like stored waypoints.

Loading the Alkaline Batteries

Follow these steps to load the six AA alkaline batteries into your unit.

1. Load the extra battery clip with six AA alkaline batteries following the placement instructions in the clip. We recommend Eveready Energizer® batteries.
2. Turn the unit off.
3. If the unit is being operated on external power, turn off the unit, remove the connector from the power jack.

4. Grip the battery compartment door on each side as shown. Remove door by pulling the door very firmly toward the bottom of the unit.

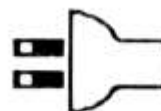


Opening the Battery Door

▲ **WARNING:** The open side of the clip must face outward. You have two minutes to exchange battery clips before the unit will lose its memory.

5. Replace old battery clip with a fresh battery clip making certain that the open side of the clip, with batteries exposed, faces outward. Failure to follow this instruction will cause damage to the unit.
6. Remove any dirt, sand, or other foreign matter from the battery compartment seal.
7. Replace the battery compartment door by pushing up until it is firmly in place.

EXTERNAL POWER OPERATION

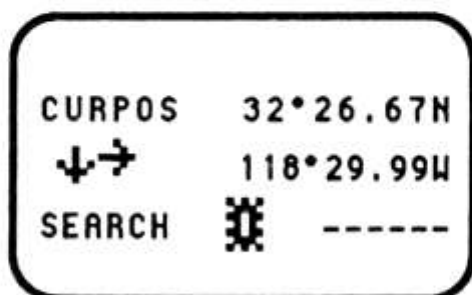


The **Magellan GPS NAV 1000™** can be operated using an external power supply. When the unit uses external power, the receiver remains on continuously after you press the Position (POS) or Navigation (NAV) keys. It "knows" when the power jack is supplying current and switches to continuous operation automatically.

You must attain a speed of 1 knot before the unit displays speed over ground (speed). Other velocity related navigation data, ground course, velocity made good and estimated time of arrival can be obtained only when the unit is in continuous operation and is going at least 1 knot. Until threshold speed is attained, dashes will appear. Velocity related information is available after the second position fix.

After the second fix, navigation data is calculated using Magellan's exclusive filter with exponential weighting. This means that velocity data actually takes into consideration nearly all of your fixes since you began your trip; however, only the last 4 or 5 positions make a significant difference when it comes to the display of information. This is different from Lorans where many fixes are averaged to provide reliable readings. The NAV 1000 updates twice each minute.

This update rate may lag by a few seconds when the unit switches to a new satellite. Every 10 minutes the NAV 1000 evaluates the signal quality and geometric quality of the satellites overhead. You will know if the unit switches to one or more new satellites because a message will appear beneath the main display that says SEARCH, followed by DATA. During this time, your position does not update.



A symbol appears on the screen for each new satellite being acquired.

Your NAV 1000 will operate using AC or DC power. Use only Magellan equipment for connecting to external power because all adapters and interfaces have been designed to supply the unit with the correct level of direct current. Any other equipment may cause harm to the NAV 1000.

For AC
(115 volts AC \pm 10%,
50/60 Hz)

Use the Magellan AC Adapter
(PN 00-19006) furnished with
the basic NAV 1000 unit.

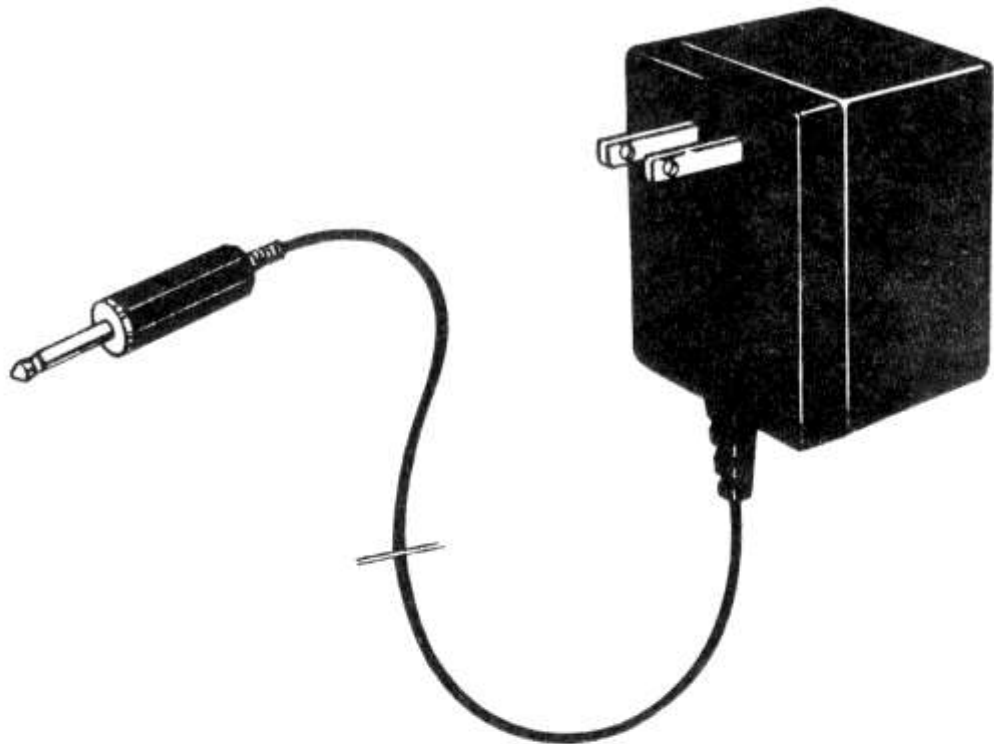
For DC
(12 volts DC,
negative ground)

Use the Magellan DC/Antenna
Interface Box available in the
Magellan Quick-Release Bracket
Mounting Kit (PN 00-19001).

Connecting to an External Power Supply

▲ WARNING: Use only the Magellan power adapters to connect your unit to an external power supply. Other adapters may severely damage the unit. To avoid the possibility of losing your memory or freezing up the NAV 1000 make sure the unit is always turned off before connecting or disconnecting the external power supply.

The NAV 1000 external power jack is located on the side of the unit opposite the antenna. Remove the rubber tab and insert the connector.



AC Power Jack and Adapter

AC ADAPTER:

Designed to be used with 115 AC volt electrical ($\pm 10\%$) outlets.

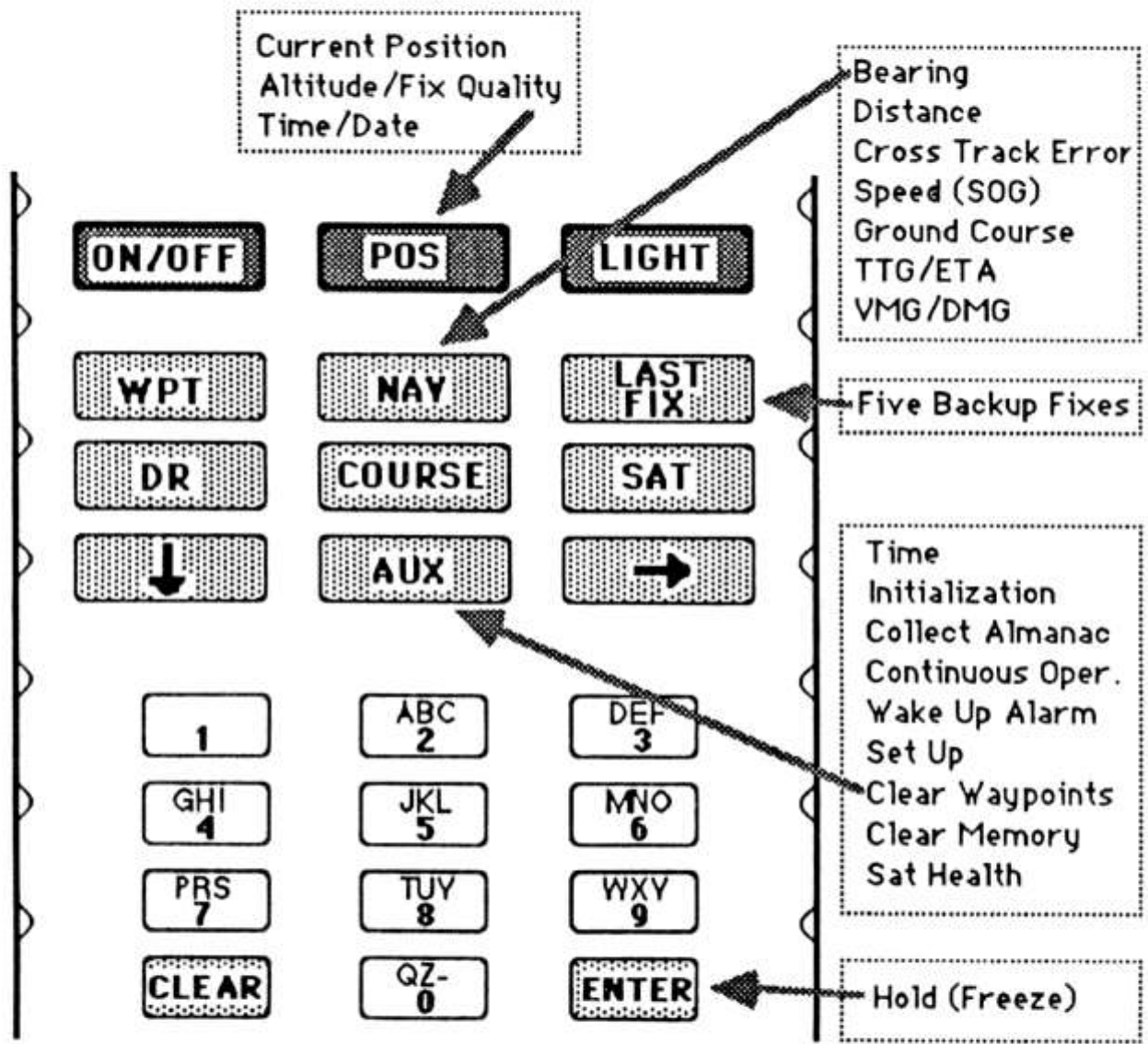
For electrical systems not conforming to U.S. standards, purchase a converter (approved for use in your specific location) to interface with the Magellan AC Adapter. For further information, consult your marine electronics dealer.

**DC/ANTENNA
INTERFACE BOX:**

Designed to be used with a 12-volt power supply (10-15 VDC). (To use a DC power source, you will need the Magellan Quick-Release Bracket Mounting Kit (PN 00-19001.)

THE KEYPAD

The unit's keyboard has 12 function keys and an alphanumeric keypad.



The Keypad

<u>Key</u>	<u>Key Function</u>
AUX	AUXILIARY — Access various miscellaneous functions (such as Collect Almanac).
CLEAR	CLEAR — Clear the display, backspace, or erase stored information.
COURSE	COURSE — Establish your route - start and destination - against which the current position is evaluated.
DR	DEAD RECKONING — Estimate your current position when the satellites are unavailable.
↓	DOWN ARROW — Use as a scroll key to display additional information.
ENTER	ENTER — Accept information for storage or freeze a position to be saved as a waypoint.
LAST FIX	LAST FIX — Display the last five position fixes.
LIGHT	LIGHT — Turn the display light on and off.

Key

Key Function



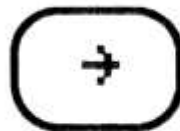
NAVIGATION — Display the bearing and distance to destination, cross track error, [estimated time to go, estimated time of arrival, current speed, ground course, velocity made good, and distance made good, if on continuous power].



ON/OFF — Turn the unit on and off.



POSITION — Display your current position, antenna altitude, accuracy indicators, current date, and current time.



RIGHT ARROW — Use as a toggle switch and to scroll to the right for the next item of information.



SATELLITE SCHEDULE — Display the time schedule(s) of satellite availability.



WAYPOINT — Enter and retrieve waypoint positions.



ALPHANUMERIC — Ten alphanumeric keys laid out in an easy-to-use telephone keypad style.

ENTERING DATA

To enter or change data, like a waypoint, use the alphanumeric keypad. This is on the lower half of the keyboard; it looks like a telephone keypad. Data entries are always completed by pressing the ENTER key which saves the information. Until then corrections can be made by pressing the CLEAR key.

Entering Waypoint Labels

Some field entries, such as waypoint labels, let you enter alphabetic or numeric characters. To make alphanumeric entries:

1. Press the key that displays the letter or number you want to enter.
2. Press the RIGHT ARROW key to toggle to the desired letter.
3. To move the cursor one space to the right, press the key that has the next letter or number to be entered.
4. When you have completed your entry, press the ENTER key.

NOTE: If you make a mistake, you can erase one letter or number at a time by pressing the CLEAR key. If you cannot correct your error with the CLEAR key, start the entry from the beginning by pressing the function key again.

Entering Numbers Only

When a field requires a numeric entry, the data entry keys automatically input numbers only. The RIGHT ARROW does not toggle to alphas.

A number must be entered in each available space. For example, if you want to enter a speed of 9.8 Knots, you would press 0-9-8.

INTERPRETING YOUR POSITION FIX

To use the NAV 1000 safely, interpret the data wisely by evaluating your position fixes.

- Determine if you are in **2D** (two dimensional or LAT/LON), or a **3D** (three dimensional or LAT/LON/ALT) mode.
- In 2D mode, enter your altitude correctly.
- Be aware of the factors affecting fix accuracy.



Read *Interpreting Your Position Fix* for safe operation of the NAV 1000.

2D vs. 3D Mode

Two Dimension — Three Satellite — Mode

Two dimension (2D) mode is normally used to navigate on bodies of water, such as a lake or the ocean, where the elevation is known. In 2D mode, a minimum of three satellites must be in direct view of the unit's antenna.

In 2D mode, the unit solves only for latitude and longitude and bases its solution on the antenna altitude you have entered. The altitude must be entered accurately to within 15 feet. It is the sum of your elevation plus the antenna height.

If you are on a lake with an elevation of 1000 feet and have an exterior antenna placed 20 feet above the water, your antenna altitude would be 1020 feet (1000+20). If you are on the ocean, the antenna altitude of this same boat would be 20 feet (0+20), since the elevation at sea level is zero.

- ▲ **WARNING:** A 2D solution with an incorrect antenna altitude entry will give you an incorrect latitude/longitude solution. Errors of fifteen feet or less in estimating the antenna altitude can be ignored. Ordinary tidal fluctuations are within this limit.

Three Dimension — Four Satellite — Mode

On land where altitude is not known precisely, the unit needs four satellites in direct view. This is a 3D solution: it solves for latitude, longitude *and altitude*.

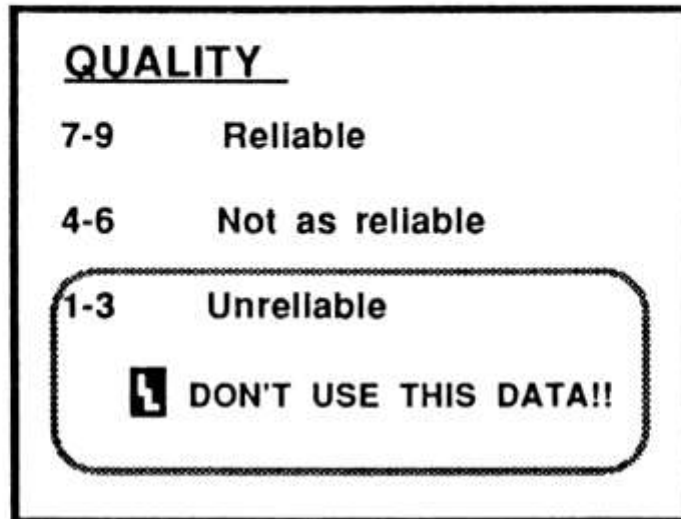
3D mode *must* be used when the unit is used on land, unless you are absolutely certain of your altitude.

The greatest amount of error in a position fix lies in the altitude part of the position fix. By entering in a known altitude, you can increase accuracy. This is why 2D is the recommended mode for the marine environment where, apart from the action of the seas, elevation remains relatively constant.

- ▲ **WARNING:** Use 3D if you are uncertain of your altitude.

Quality of the Fix

There are two factors that affect the position accuracy—signal quality and geometric quality. Quality information appears on the second message displays of the current position, last fixes, and waypoints (that represent saved fixes).



Signal Quality

Signal Quality (SQ) gives an indication of the carrier-to-noise ratio (C/N₀) of the weakest satellite signal being used. The SQ level ranges from 1 (lowest quality) to 9 (highest quality). An SQ of 4 or better on a position fix indicates the weakest C/N₀ is high enough that it will not cause reliability problems.

NOTE: You can often improve the SQ by moving the antenna into an open area. (See *Hand-Held Battery Operation* in Section 2.)

<u>SQ Level</u>	<u>C/N₀ of Weakest Signal (dB-Hz)*</u>	<u>How to Evaluate</u>
9	≥ 45	Reliable
8	44	
7	43	
6	42	Reliable, but weaker
5	41	
4	40	
3	39	Unreliable, weak
2	38	
1	37	
0	<37	

*C/N₀ at antenna terminal.

The signal quality of each satellite signal for the last fix is available in AUX 21.

Geometric Quality

Geometric Quality (GQ) is reported in a similar fashion, but is based on the Position Dilution of Precision (PDOP). This is a measurement of the geometry of the satellites used for triangulating the position. Roughly speaking, the more "spread out" the satellites are, the better the accuracy of the fix. When the satellites are bunched together in the sky, the position solution may not be as accurate as normal.

The NAV 1000 converts PDOP into easy-to-interpret ratings. Like the SQ levels, the GQ ranges from 1 (lowest quality) to 9 (highest quality). A GQ of 7 or better indicates the PDOP is good enough that geometry should not be a cause of reliability problems.

<u>GQ Level</u>	<u>~PDOP</u>	<u>How to Evaluate</u>
9	1-2.9	Reliable
8	3-3.9	
7	4-4.9	
6	5-5.9	Not as reliable
5	6-7.9	
4	8-9.9	
3	10-14.9	Unreliable
2	15-24.9	
1	25-75	

The unit will not report a position which has a PDOP > 75. A message will display, indicating that not enough satellites are available.

Time

The **Magellan GPS NAV 1000™** provides time in both universal time (UT) and local time (AM/PM time). Universal time is essentially the same as Greenwich Mean Time (GMT). Universal time is the same where ever you are in the world. It is the time at the prime meridian or longitude 0° which passes through the city of Greenwich, England, UK.

Each of the GPS satellites has the exact time in UT. When you take a position fix, your NAV 1000 corrects any error in its oscillator or "clock". If you made an incorrect entry when you initialized the unit (INIT), UT time will be corrected. Local time in minutes and seconds is also corrected.

When the unit saves position information, waypoints, and other time related data, it always saves the information in universal time, even if you have the unit set to display in local time.

Upon memory loss, the NAV 1000 must first be initialized in UT. Once this is done, you can then set it to display in local time. When you set the local time, the NAV 1000 simply remembers the offset (difference) between UT and local time in days and half hours. It adds or subtracts this offset before displaying the time data.

If you travel into another time zone, it's up to you to reset the local time. Even if you forget to do so, it's not a problem because your NAV 1000 always works using UT. If you are confused about time zone or the local offset, simply change the timeback to UT.

The time on the position fix is actually the mid point of data collection, roughly 6 - 9 seconds before the data appears on the display. It is the exact time of the fix and is rounded to the nearest minute.

SECTION 3

GETTING STARTED

USING YOUR UNIT FOR THE FIRST TIME

- ▲ Before using your **Magellan GPS NAV 1000™** for the first time, read your User Guide thoroughly paying particular attention to Section 2. You will also find it helpful to read *All About GPS* in the Appendices.

Before operating the unit, follow the steps on the following pages. These are:

- STEP ONE: Initialize the Unit.
- STEP TWO: Collect an Almanac.
- STEP THREE: Run through the tutorial program.

INITIALIZING YOUR UNIT

The first time you use your NAV 1000, you must enter an initial position, time and antenna altitude (if in 2D mode). Read *Interpreting Your Position Fix* in Section 2 for help in understanding this process.

Time as well as position is set in the Initialization. Time must first be set in universal time (UT). See *Time* in Section 2. As soon as you collect an Almanac, the unit will correct the time based on accurate information from the satellites. The purpose of entering time before collecting the Almanac is to enable you to enter waypoints and experiment with features of the NAV 1000.

Once time is set in UT, you can initialize local time and set it to display local time (AM/PM).

To initialize your unit and to set the time, turn to *AUX 2* in Section 5 NOW.

COLLECTING AN ALMANAC

Before using your NAV 1000 for the first time, you must collect an Almanac from a satellite.

An Almanac contains information about the position and status of all satellites in the GPS constellation. Each of the satellites broadcasts this information. It takes about 12.5 minutes for your unit to "collect" an entire Almanac from a satellite.

Every time the unit attempts a position fix, it consults the Almanac stored in memory before beginning its satellite search. The more recent an Almanac, the less time it is likely to take to obtain a position solution and the more accurate the satellite schedule will be.

When the unit is used frequently, it automatically updates portions of the Almanac as it "listens" to the satellites. However, if the unit is stored or used infrequently for a period of six months, the message "NEED ALMANAC" appears and you must collect a new Almanac from a satellite.

Use the following procedures to collect your initial Almanac. Use an external power supply whenever possible for collecting an Almanac.

NOTE: Use external power when collecting an Almanac to conserve the 6 AA batteries.

On a Vessel With a DC External Power Supply and an Exterior Antenna

1. Make sure the unit is turned off. Using the **Magellan DC/Antenna Interface Box**, connect the unit to an external power supply and to a Magellan exterior antenna. Turn the unit on.
2. Press AUX 3 (refer to *AUX 3* in Section 5, for instructions on collecting an Almanac).

The unit can collect an Almanac only when at least one satellite is overhead. A schedule of when satellites are available in your area can be obtained from your marine electronics dealer.

If a satellite is currently unavailable, leave the unit unattended in a window for a period of up to 24 hours. When an Almanac has been collected, the display will indicate the current date for the Almanac's Age. The date given the Almanac is set by the GPS system itself, and is typically a couple of days in the future.

On Land Using AC Power

1. Using the Magellan AC Power Adapter, connect the unit to a standard (115 volt AC) electrical outlet.
2. Position the unit outside or in a window to have as much of an unobstructed view of the sky as possible.
3. Turn the unit on. Press AUX 3 (refer to *AUX 3* in Section 5, for instructions on collecting an Almanac).

If satellites are currently unavailable, leave the unit unattended in a window for a period of up to 24 hours. When an Almanac has been collected, the display indicates the current date for the Almanac's Age.

In Hand-Held Battery Operation

We do not recommend collecting an Almanac when the unit is in hand-held battery operation, because of the length of time it could take to collect an Almanac and the possibility of depleting the internal AA batteries before completing the task. However, we recognize that certain situations may require this.

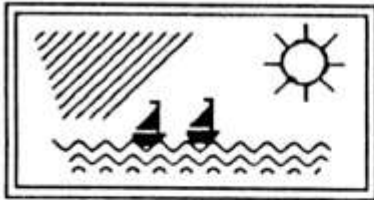
Make sure you have placed fresh batteries in the unit. If the second low battery warning is reached (refer to *ON/OFF Key* in Section 4) before the Almanac has been collected, the unit will abort data collection to protect the acquired information.

1. Ask your dealer to assist you in determining when the satellites will be available in your area.
2. Point the unit's antenna straight up to the sky.

3. Turn the unit on. Press AUX 3 (refer to *AUX 3* in Section 5, for instructions on collecting an Almanac).

NOTE: If a satellite is not found within about two hours, the unit will automatically turn off.

4. If the unit cycles off, repeat steps 2 and 3 until the Almanac is collected.



TUTORIAL

We have developed this Tutorial to show you how to use the **Magellan GPS NAV 1000™**. It is designed to be run on the unit's internal AA alkaline batteries inside a building without direct access to the satellites in the sky. The Tutorial will not work properly if the unit is in continuous operation.

The Tutorial will teach you how to —

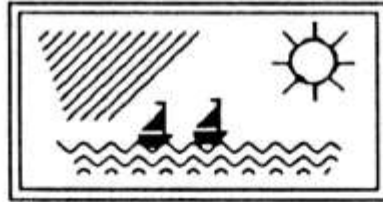
- enter and recall waypoints,
- set a course,
- navigate,
- use dead reckoning,
- check the satellite schedule, and
- locate auxiliary features.

The Tutorial assumes you are on a cruise in the Gulf of California roughly half way on a trip from Cabo San Lucas to Mazatlan. (See the chart on the next page.) To do this, we give you a last fix through a function key (AUX 20).

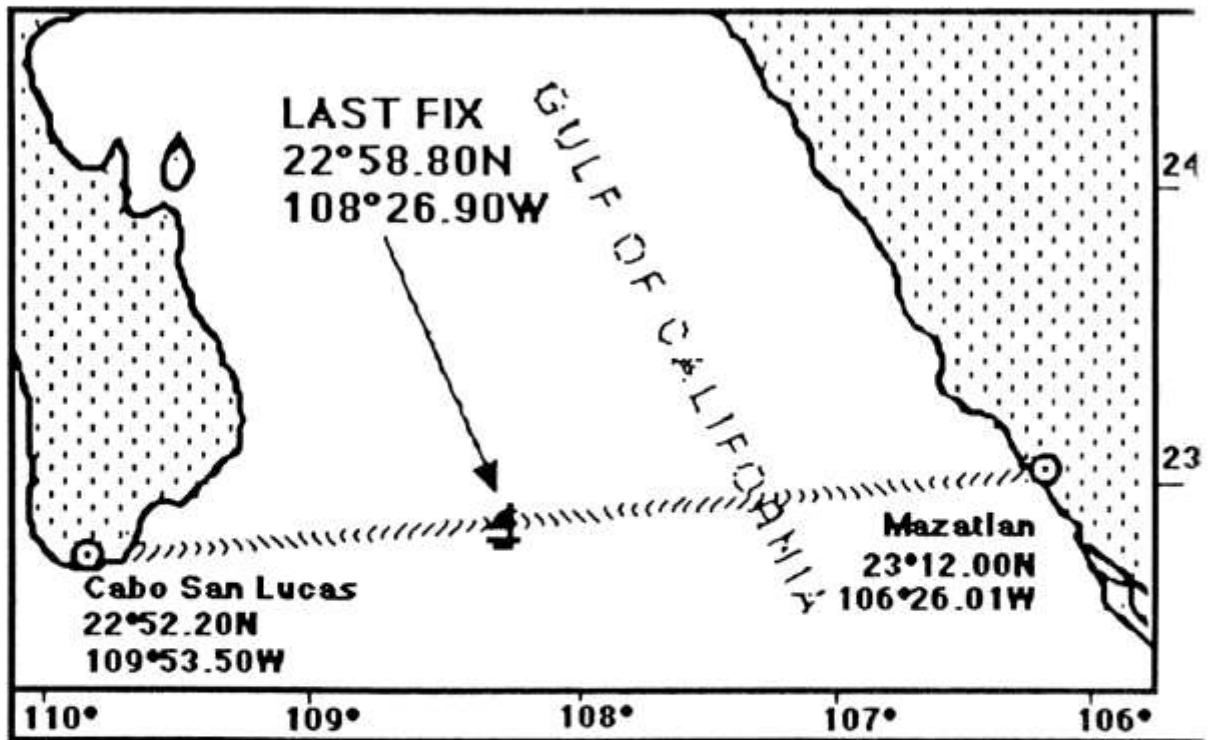
Before Using the Tutorial

The Tutorial requires that you first follow this checklist of instructions:

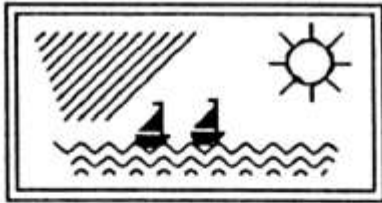
- **Turning the NAV 1000 on** by pressing the ON/OFF key.
- **Initialize the unit** (AUX 2), if you have not already done so. (See *AUX 2* in Section 5.)
- **Reset the set up defaults** so your displays will match the Tutorial. Press AUX 6 and continue to press ENTER until you reach the RESET DEFAULTS display. Press RIGHT ARROW so that "YES" appears, then press ENTER, then CLEAR.



- **Now have the unit create a last fix.** Press AUX 20 and ENTER. This last fix the unit creates is depicted as the boat on the chart below.

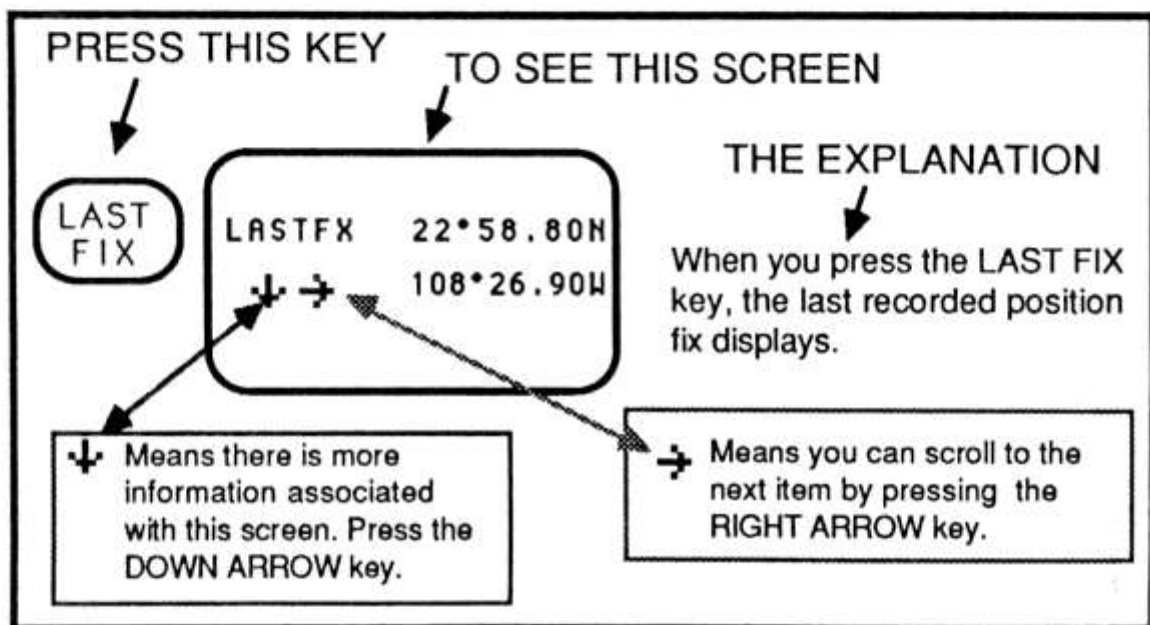


Tutorial "Cruise"



To Work the Tutorial

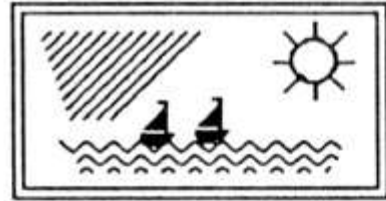
To use the Tutorial, all you must remember is to press the key shown at the left of the page to obtain the display next to it. The explanation is on the right of the page.



Tutorial Instructions

The down and right arrows indicate that you can obtain additional information.

NOTE: In hand-held (internal battery) operation, the NAV 1000 is designed to cycle off if you press no key for two minutes. Press ON and the appropriate function key to reactivate operation.



Entering Waypoints

Your first task will be to enter two waypoints: Cabo San Lucas and Mazatlan. The NAV 1000 stores waypoints by the names you give them. These names can be up to six characters long.

WPT **SELECT WAYPOINT →
OR PRESS ENTER**

To manually enter a waypoint, begin by pressing the WPT key.

ENTER **-
ENTER WPT NAME**

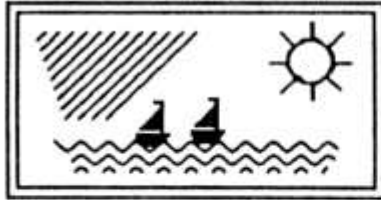
First, you will enter the waypoint CABO. Press the ENTER key to get the first entry message.

**ABC
2** **A_
ENTER WPT NAME**

Using the alphanumeric telephone-style keypad, press the 2 key. Note that the letter "A" appears on the screen.

→
→ **C_
ENTER WPT NAME**

Press the RIGHT ARROW twice to change the "A" to "C". (Continued toggling with RIGHT ARROW would reveal an endless loop of "ABC2ABC2...")



ABC
2

CA_
ENTER WPT NAME

Press the 2 key again. The first two letters of "CABO" are now entered. If you make a mistake, press CLEAR to erase the letter.

ABC
2

→

CAB_
ENTER WPT NAME

Pressing the 2 key and the RIGHT ARROW once creates the "B".

MNO
6

→

→

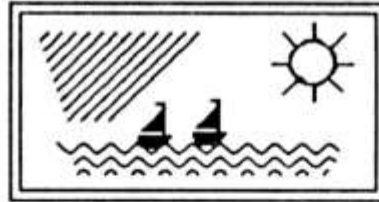
CABO_
ENTER WPT NAME

"O" is created by pressing "6", followed by two RIGHT ARROWS.

ENTER

CABO - . . N
 . . W

Press ENTER and you can begin entering the latitude.



225220

ENTER

```
CABO  22°52.20N
      -  .  .  W
```

Press the number keys 2 2 5 2 2 0 in that order. (If you press RIGHT ARROW, you can toggle between "N" (northern hemisphere) and "S" (southern hemisphere).) Press ENTER and you will see where to enter the longitude.

1095350

```
CABO  22°52.20N
      109°53.50W
```

Press the keys 1 0 9 5 3 5 0. (The RIGHT ARROW key will toggle between "W" west and "E" east.)

ENTER

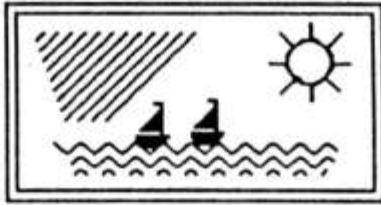
```
CABO
      00000 FT ALT
```

Press ENTER. The Antenna Altitude entered in Initialization will appear automatically. (You can enter another altitude here, if you choose.)

You must press ENTER again to save this waypoint. Repeat this process entering the waypoint for Mazatlan. Remember, first press WPT, then ENTER to begin the entry procedure.

NOW ENTER MAZATLAN ==>

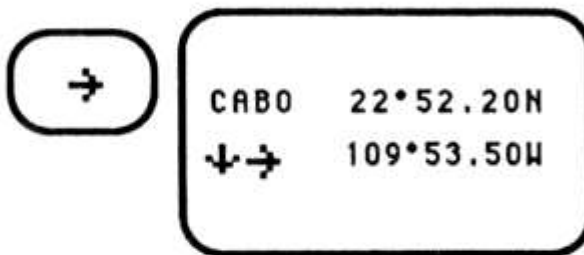
```
MAZTLN  23°12.00N
         106°26.01W
         00000 FT ALT
```



Viewing Waypoints



To begin viewing waypoints, press the WPT key.

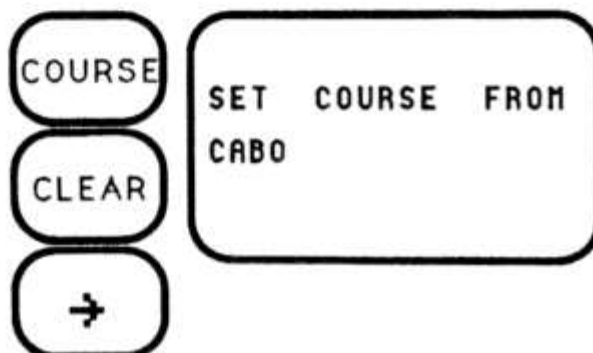


To view the waypoints just entered, press the RIGHT ARROW until CABO appears.

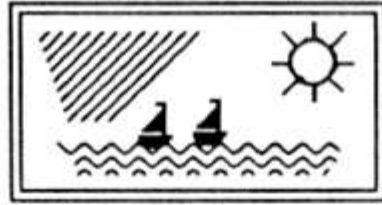
Waypoints are stored in alphabetic order. You can retrieve a waypoint by entering a letter, followed by ENTER. By pressing the RIGHT ARROW key you can view all waypoints beginning with that letter through the end of the alphabet.

Setting Your Course

Now you will set a course from CABO (Cabo San Lucas) to MAZTLN (Mazatlan) using the two waypoints you have just created.



To set the course, press the COURSE key, the CLEAR key, then press RIGHT ARROW until the waypoint "CABO" appears.



ENTER SET COURSE FROM
CABO TO -

Press ENTER. Though a destination waypoint may appear, another can now be selected using the RIGHT ARROW or...

MNO
6
ENTER SET COURSE FROM
CABO TO MAZTLN

By entering the first letter of the waypoint name, M, and ENTER, the first waypoint starting with M will appear. Use the RIGHT ARROW key, if necessary, to scroll to the desired waypoint.

ENTER CABO TO MAZTLN
73°M 191.96NM

Press the ENTER key and the unit calculates and displays the bearing and great circle distance from your course start to destination.

Last Fix

The LAST FIX key provides temporary access to previous position fixes. These fixes will update each time you take a new fix.

LAST
FIX LASTFIX 22°58.80N
↓ → 108°26.90W

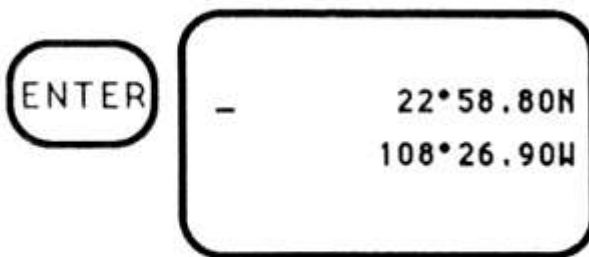
When you press the LAST FIX key, the last recorded position's latitude/longitude displays. This particular position was created when you pressed AUX 20.



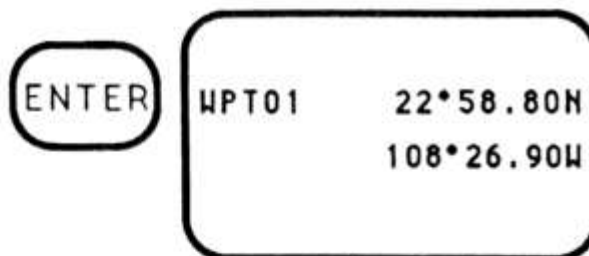
Press the DOWN ARROW key to display the antenna altitude, the signal and geometric quality, and the time/date messages for this fix. Please note that the time and date corresponds directly to the moment at which you pressed AUX 20.

Saving Positions as Waypoints

You may save any position fix—a current position, a last fix, or its related backups—as a waypoint. You save the position by pressing the ENTER key while viewing that position. The ENTER key acts like a "HOLD" key, freezing the position while you name it.

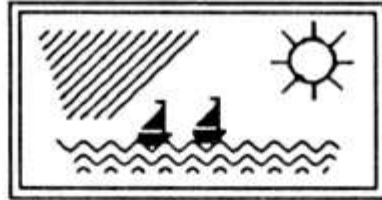


When you press the ENTER key while viewing a current position, a last fix, or its related backups, latitude/longitude information continues to display. The cursor is now in the upper-left corner of the message display. You can give the waypoint a name using the alphanumeric keypad...



Or simply press ENTER again and the NAV 1000 will automatically generate a name using the format WPT01, WPT02, etc.

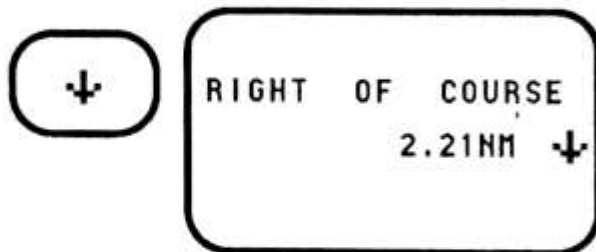
NOTE: Waypoints cannot be saved from the NAV function. Press POS or LAST FIX before trying to save waypoints.



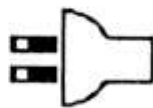
Navigating



When you press the NAV key, your bearing and distance from your last fix to the destination waypoint (MAZTLN as set in the Course function) displays. There is no bearing display when you are within 60 meters of your destination.



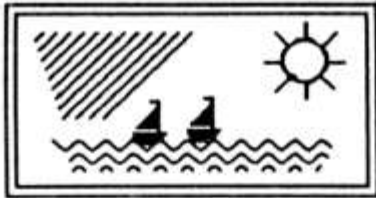
Press the DOWN ARROW key to display the cross track error message. The message will indicate if you are to the left or right of your established course.



NOTE: When the unit is working with live satellites and is operating on external power or set for continuous battery operation (AUX 4), all navigation screens will update continuously by pressing the DOWN ARROW key as follows:



Speed or speed over ground (SOG) and ground course appear next.



TIME TO GO 11:25
ETA 07:43PM ↓

Time to go or the time left to travel based on the current speed, as well as the estimated time of arrival (ETA) appear next.



VMG 9.2 KNOTS
DMG 79.98 NM ↓

Velocity made good (VMG) and distance made good (DMG) are the last navigation displays.



SPEED .4 KNOTS
GND COURSE ---°M ↓

Your boat must be moving at least .2 knots to obtain speed (SOG) and 1 knot to obtain ground course (COG), VMG, ETA, and TTG. Dashes appear when data is unavailable.

Dead Reckoning

Let's say that the satellites have just set (gone down) and you want to set up a Dead Reckoning (DR) track toward Mazatlan. You are now travelling at 9.8 Knots with a new heading of 072°M. Once you set the DR track, each time you press the DR key the NAV 1000 will give you an approximate position based on the heading and course you have given it and the time that has passed since you set the DR track. If you change speed and/or direction, the track can be easily updated.



DR

DR TRACK FROM →
LASTFX

You will set the DR track from the point of your last fix. To set a DR track, press the DR key, CLEAR and the RIGHT ARROW key, if necessary until LAST FX appears.

ENTER

ENTER

098

DRBASE
SPEED 09.8KNOTS

Press the ENTER key once and you will see the date and time of the position fix. Press the ENTER key again and you can tell the unit speed. Enter 9.8 KNOTS as your current speed.

ENTER

072

DRBASE
HEADING 072°M

Press ENTER and key in a heading of 072°M.

ENTER

DR-POS 22°59.00N
↓ 108°25.60W

Press the ENTER key, and within a few seconds you will see your calculated DR position.* Each time you now press the DR key, the DR position is recalculated. You can see the position used as the start of the DR track by pressing the DOWN ARROW key.

Because it depends on the time that has passed since the last fix was obtained (or created using AUX 20), the position shown here may not match what is on your display.



If you change your speed and/or your heading, you can quickly update your DR track by using the current DR position to set a new track. For more information consult *Dead Reckoning (DR) Key* in Section 4.

Checking the Satellite Schedule

Pressing SAT you can find out when the satellites will be available again. To use this function, you must first collect an Almanac. Refer to *AUX 3* in Section 5.



The unit will assume you want a schedule of satellite availability at the position of your last fix.

Press ENTER once and you will get the date/time of this position. Press ENTER to check the next satellite availability at the place and time of your last fix.

Using the last fix from the Tutorial, you will get a satellite schedule for that position between Cabo San Lucas and Mazatlan. See *Satellite Schedule (SAT) Key* in Section 4 for more information.

Reviewing the Auxiliary Functions

The AUXILIARY (AUX) key is a feature that contains a series of supplementary functions. Apart from loading an Almanac and initializing the unit, satisfactory use of the product does not require knowledge of these auxiliary functions. Requested by advanced users, these options can be quickly viewed using the RIGHT ARROW key.



AUX

ENTER AUX NO.
OR PRESS →

When you press the AUX key, this message displays. To access functions ...

→

TIME 11/29/89
(1) 06:01AM

Press the RIGHT ARROW key to scroll to the desired functions.

You can see the full list of Auxiliary functions by continuing to press RIGHT ARROW. AUX 13, AUX 20, and AUX 21 are only accessed by pressing the AUX key, the code number and ENTER.

- (1) TIME
- (2) INITIALIZATION
- (3) COLLECT ALMANAC
- (4) CONTINUOUS OPER
- (5) WAKE-UP FOR POS
- (6) SET UP
- (7) CLEAR WAYPOINTS
- (13) CLEAR MEMORY
- (20) TUTORIAL POSITION
- (21) SAT STATUS

SECTION 4

FUNCTION KEYS



ON/OFF KEY

Press the ON/OFF key to turn the **Magellan GPS NAV 1000™** on. Press it again to turn the unit off.



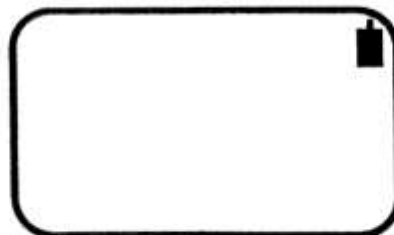
When you turn on the NAV 1000, the mode temporarily displays on the screen. It will say whether the NAV 1000 mode is set for two dimension (2D) or three dimension (3D) operation and gives the antenna altitude.

▲ WARNING: Read *2D vs. 3D Position Fixes* in Section 2 before selecting mode.

Self-Test

After displaying the mode, the unit performs a self-test, checking the mode, the power status, the memory, and the age of the Almanac. Messages will appear if problems are encountered.

Power Warning

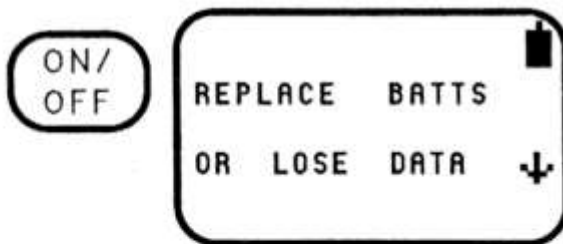


If the batteries are low, the unit emits 3 short beeps and the battery symbol displays. It will stay up continuously on the top right of all screens until the batteries are replaced.

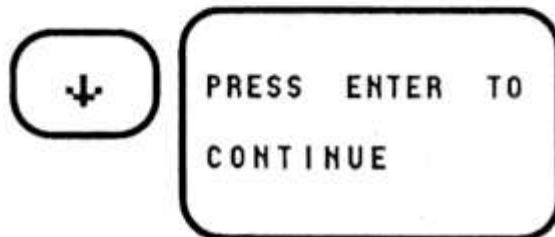


A second power warning will appear before the batteries become dangerously low. Information stored in memory may be lost if you ignore this second warning.

WARNING: Replace the batteries when you see the message below.



This second warning screen (and three beeps) should be heeded, except in the case of an emergency.



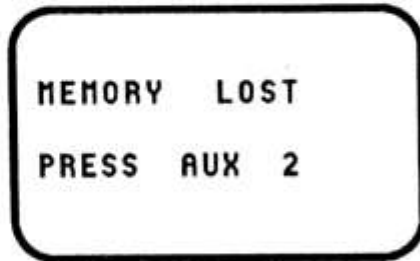
If you press the ENTER key to continue, the NAV 1000 may exhaust its power after as few as one or two additional fixes.

If you ignore this warning and completely run down the AA batteries, you erase all memory. This means that after you load new batteries into the unit, you must initialize the unit, collect an Almanac, and re-enter your waypoints.

If you are operating in hand-held continuously (see *AUX 4* in Section 5), the unit will revert to push-to-fix when this second power warning appears.



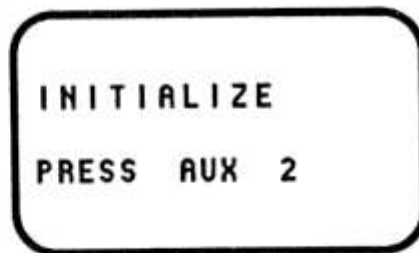
Memory Warning



If the unit's memory has been lost, you must reinitialize and collect an Almanac.

- ▲ **WARNING:** Read *Initializing Your Unit* in Section 3, *AUX 2* in Auxiliary Functions, and *Trouble Shooting* in Section 6 before initializing your NAV 1000.

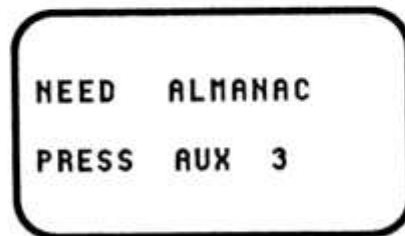
Initialization Warning



If the initialization time and/or position is absent or the unit finds it unusable, this warning will appear. See *Memory Warning* above.



Almanac Warning



If the Almanac has not been updated in over six months, this message displays. **You must collect an Almanac.**

NOTE: If the date and time have been entered incorrectly, the unit may say it needs an Almanac though one is present. Check the date and time in Initialization in AUX 2 before recollecting an Almanac.

Ready Indicator



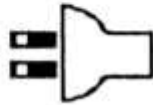
When the NAV 1000 is ready to use, this message displays.



LIGHT KEY

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

The unit (including the display light) will automatically turn itself off if a key is not pressed within two minutes.



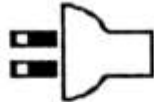
The light will remain on until you turn the unit or light off.



POSITION (POS) KEY

The POSITION (POS) key activates the unit's receiver.

Press the POS key each time you want to obtain a position fix. Under normal conditions, it will take less than four minutes to obtain a position. If you have taken a position fix within the hour, it will take approximately three minutes.




When operating on an external power supply, press the POS key to turn the receiver on. After obtaining the initial position, the unit generally will update your current position, the current time, and the navigation solutions twice a minute. (See *External Power Operation* in Section 2 for more information about update rate.)

Search and Acquisition



The NAV 1000 will begin its search for satellite signals. The initial message will indicate whether you have set the unit for a 2D or 3D search. (See *Interpreting Your Position Fix* in Section 2.)

POS

SATELLITES
FOUND 

When the first satellite is located, this message displays. As each subsequent satellite is located, additional satellite symbols are displayed.

COLLECTING
DATA

When the appropriate number of satellites have been located (three for 2D, four for 3D), this message displays.

COLLECTING
DATA 

As the data is being collected, symbols appear after data from each satellite are obtained.

COMPUTING

After all satellite data has been collected, this message displays. The position solution will display next. (See *Position Solution* in this section.)



Search and Acquisition Errors

Certain conditions can interfere with successfully obtaining your position. The following error messages will indicate these conditions just prior to or during the search and acquisition of signals:

- Insufficient number of satellites.
- Inability to acquire satellites.

Insufficient Number of Satellites

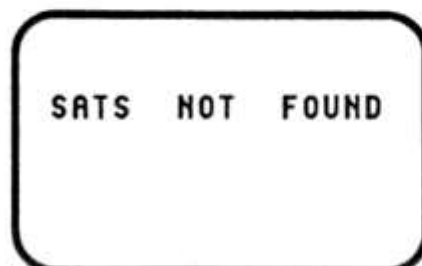
The NAV 1000 consults its Almanac before beginning its search for satellites overhead. The receiver will not turn on when the unit knows that according to its schedule, determined from the Almanac information, not enough satellites are available.



When an insufficient number of satellites are available, a message display indicates the number of satellites currently available.

Press the SAT (Satellite Schedule) key to display the satellite schedule for the next 24 hours.

Inability to Acquire Satellites



When the NAV 1000 begins its search for satellites, but is unable to locate them, this message displays.



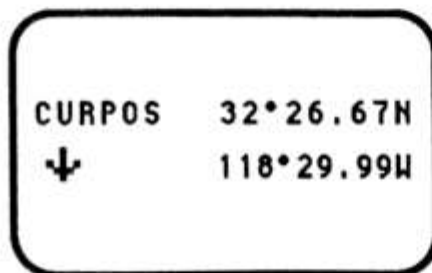
Difficulty in locating satellites may be due to the following conditions:

- The NAV 1000 has been moved more than 300 miles from the last fix or the wrong date or time was entered when the unit was initialized.
- The antenna is not in place or not properly positioned.
- The satellites are blocked from view by buildings, mountains, or other vessels.
- There are satellite outages.
- There are signal reflections that can be corrected by moving the antenna.

For more information, consult the checklist of possible problems provided in *Trouble Shooting* in Section 6. See *Hand-Held Battery Operation* in Section 2.

Position Solution

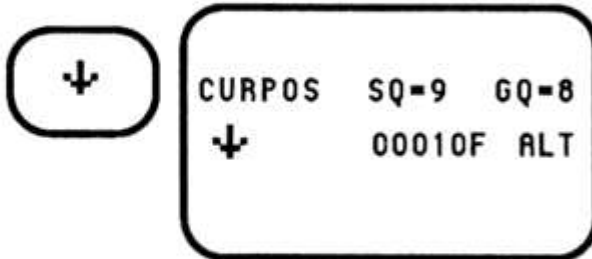
The NAV 1000 will emit a short beep to indicate that the position solution has been calculated.



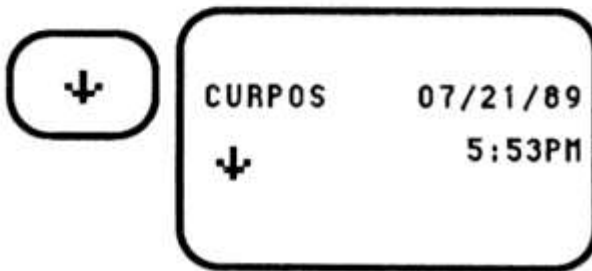
The latitude and longitude of your current position (CURPOS) displays. The accuracy warning symbol will display on all fix messages if either the Signal Quality (SQ) or the Geometric Quality (GQ) falls below four.



WARNING: Do not use the position fix if the accuracy warning appears. Read *Quality of the Fix* in Section 2.



Press the DOWN ARROW key to display the Signal Quality (SQ), the Geometric Quality (GQ) and the altitude.



Press the DOWN ARROW key again to display the date and time of the fix.

If the down arrow is pressed again, the display will return to the first CURPOS screen.



LAST FIX KEY

The LAST FIX key provides temporary access to the last five position fixes. These fixes will update each time you take a new fix. The reason for automatically saving the fixes is to provide you with reliable positions from which to set a DR track should the satellites go down or if the satellite geometry begins causing poor accuracy.

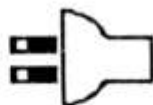


When you press the LAST FIX key, the last recorded position's latitude, longitude will display. Press the DOWN ARROW key to display the altitude, signal and geometric quality. Press The DOWN ARROW key again to display the time/date screen for this fix.

NOTE: The accuracy warning symbol displays on the first message and the unit beeps when the LAST FIX key is pressed if the (SQ) or (GQ) is less than four. See *Interpreting Your Position Fix* in Section 2.



WARNING: Do not use the position fix if the accuracy warning appears. Read *Quality of the Fix* in Section 2.



When the receiver is on (the POS key or the NAV has been pressed), the last fix and its related backups are updated every 10 minutes. Speed and ground course information is also saved, but can only be accessed when the last fix or one of the backups are used to set a DR track.

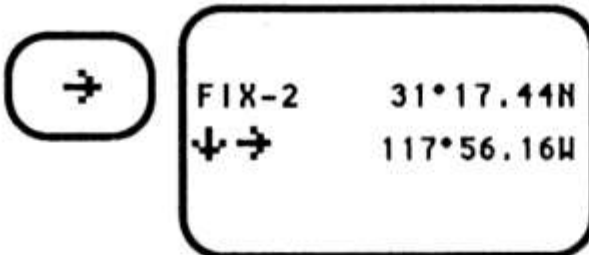


Backups to the Last Fix

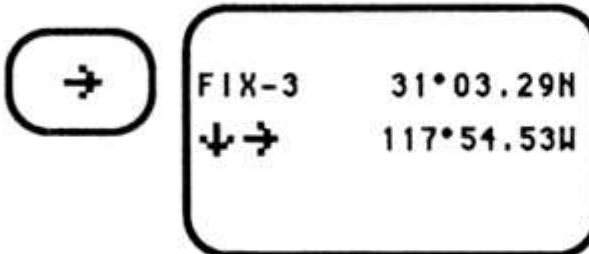
In addition to the last fix, the unit will store the four previous fixes. These are identified as FIX -2, FIX -3, FIX -4, and FIX -5, with FIX -5 being the oldest. When a new fix is taken, it becomes the last fix (LASTFX), the previous last fix becomes FIX -2, the remaining backup fixes advance sequentially, and the old FIX -5 is eliminated.



To view the backup fixes, press the RIGHT ARROW key at the last fix message display.



The latitude/longitude for FIX -2 displays. Press the DOWN ARROW key to display GQ/SQ, altitude, and time/date information.



Press the RIGHT ARROW key to scroll through the same displayed information for the remaining backup fixes.

NOTE: To save any of these fixes as waypoints, press the ENTER key when the appropriate fix is displayed.



WAYPOINT (WPT) KEY

The WAYPOINT key lets you view, save, or enter waypoints (positions that have been saved in the unit's memory). If desired, you can also rename or erase these positions with this function. The unit provides you with nine "protected" waypoints and lets you store up to 50 additional waypoints. This is done by saving a position (your current position, a DR position, a last fix, or the fix backups) or by manually entering one.

Protected Waypoints

You can access the protected waypoints, but you cannot change them. These waypoints are:

START	The course beginning (as set in COURSE).
CURPOS	The current position.
LAST FIX	A record of your last current position.
FIX -2	The most recent backup to the last fix.
FIX -3	The second backup to the last fix.
FIX -4	The third backup to the last fix.
FIX -5	The oldest backup to the last fix.
DRBASE	The start position for the Dead Reckoning (DR) track.
DR-POS	A calculated position, based on the established DR track.

See *Last Fix* in Section 4 for more information about LAST FIX and the backup fixes. In continuous operation, each ten minutes the current position is saved as a last fix. In hand-held PowerSaveR™ operation, each fix is saved as a last fix.

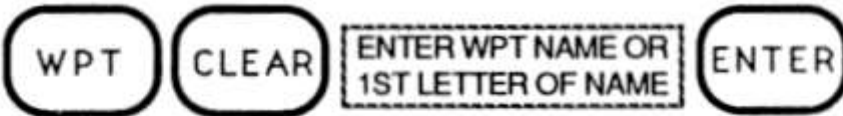


Key Sequences for Working with Waypoints Are:

To View Waypoints:



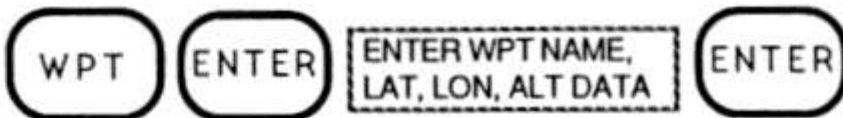
OR



To Save a Position as a Waypoint:



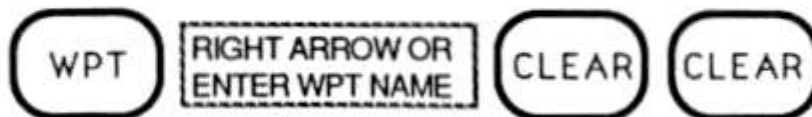
To Enter Waypoints:



To Rename Waypoints:



To Erase Waypoints:





Viewing Waypoints



To select the waypoint you want to view, you may press WPT key and then:

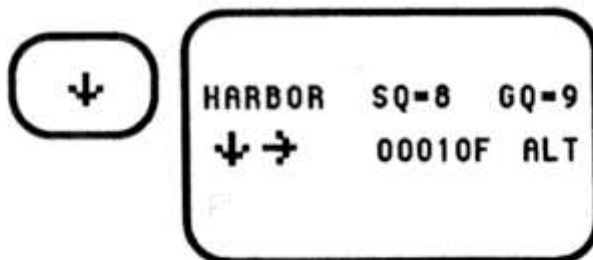
Press the RIGHT ARROW key to display waypoints in alphanumeric order.

OR

Enter the waypoint name, then press the ENTER key.

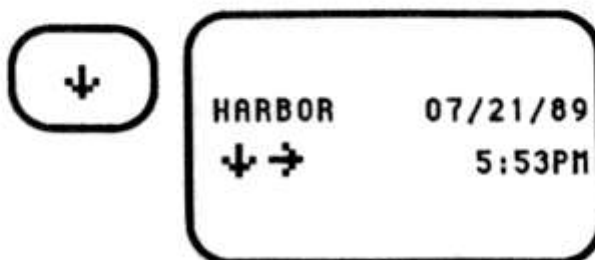
OR

Enter a portion of the waypoint name, then press the ENTER key (the unit will scan to the first waypoint that matches your entry).



After you select the waypoint, press the DOWN ARROW key to view the accuracy and altitude screen.

NOTE: The SQ and GQ of a saved position are stored in the waypoint information. If you enter this waypoint manually, this part of the display will be blank.



Press the DOWN ARROW key again to display the date/time screen.



Following this message display, you may:

Press the DOWN ARROW key to return to the latitude/longitude display.

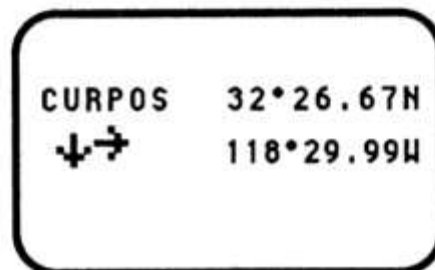
OR

Press the RIGHT ARROW key to move to the same information for the next waypoint.

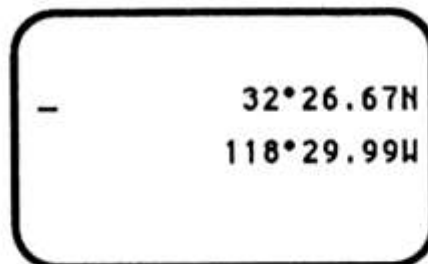
OR

Press any function key.

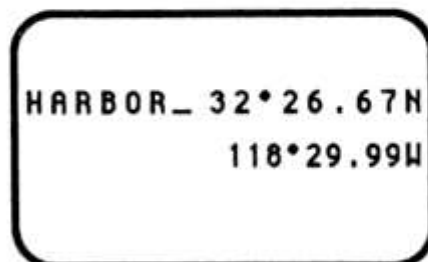
Saving Positions as Waypoints



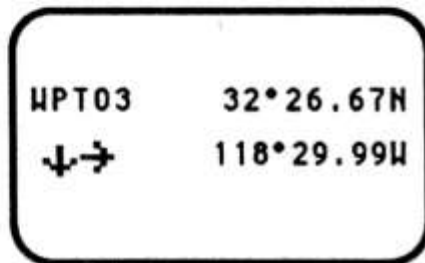
To save a position as a waypoint, first locate the current position, a last fix, or its related backups by pressing the POS key or the LAST FIX key.



Then press the ENTER key. The cursor is in the upper-left corner of the message display.



Enter the waypoint name. Then, press the ENTER key.



If you decide not to name the waypoint, the NAV 1000 will automatically generate a name using the format WPTXX, like WPT01, WPT02, WPT03.

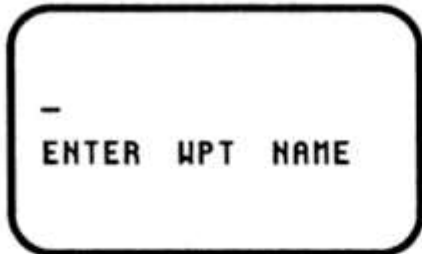
- TIPS:**
- Maintain a log book of waypoints. This provides a quick reference for waypoints that you may want to use again. A sample log book page is located in the Appendices.
 - Give waypoints names that make them easy to use. For example, waypoints for a trip to Ensenada, Mexico, could be named MEX01 through MEX07.

Once the position has been saved, you can access the altitude and date/time messages by pressing the DOWN ARROW key. Also, the RIGHT ARROW key will display the next sequential waypoint.

Entering Waypoints

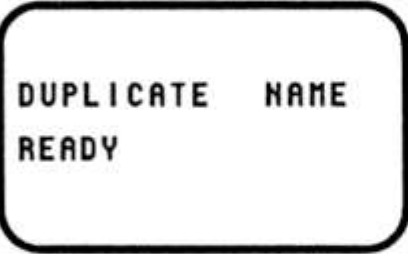


To manually enter a waypoint, press the WPT key.



Press the ENTER key. Enter a one- to six-character waypoint name or press the ENTER key again to automatically name this waypoint.

For information on data entry, see *Tutorial* in Section 3 and *Entering Data* in Section 2.



If a waypoint with the same name already exists, this message will display.



Press the ENTER key to put in the latitude. Press the RIGHT ARROW key to toggle to N (northern hemisphere) or S (southern hemisphere).

NOTE: Remember to enter numbers in each of the six numeric spaces, using leading zeros if required. For example, to enter a latitude of 9°18.00, you must enter 0 9 1 8 0 0, then press the ENTER key.

WPT

ENTER

HARBOR 37°59.70N
- . . W

Press the ENTER key to put in the longitude. Press the RIGHT ARROW key to toggle to W (west) or E (east).

ENTER

HARBOR
+ _ F ALT

Press the ENTER key again to put in the altitude. (00000F at sea level.) The altitude set in AUX 2, Initialization, will appear as the default. Use the RIGHT ARROW key to toggle a negative altitude, if appropriate. Press the ENTER key again.

CLEAR

CLEAR WAYPOINT
TO CONTINUE

If all 50 waypoints have been used, this message will display. You must clear a waypoint (see *Clearing Waypoints* on the next page) from the memory prior to making any more waypoint entries.

Renaming Waypoints

To rename a waypoint, locate the appropriate waypoint and press the ENTER key at any of the three message displays. Enter the new waypoint name. Then, press the ENTER key.



Clearing Waypoints



To clear a waypoint, locate the appropriate waypoint and press the CLEAR key. This message will display.

NOTE: If you want to escape this function, press any function key.



If you want to continue erasing the waypoint, press the CLEAR key again.



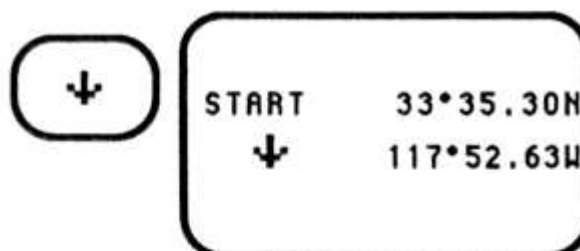
COURSE KEY

The COURSE key displays the great circle bearing and distance of the course starting point to destination.



When you press the COURSE key, the last course set displays unless it has been cleared.

Reviewing Your Course Settings



To review the position you selected as the course start, press the DOWN ARROW key.

NOTE: If a waypoint had been used as the course start, the waypoint name, rather than "start", would appear on the display. There would be no DOWN ARROW.



Setting Your Course



To reset the course, press the **COURSE** key and then the **CLEAR** key.

To accept the **LASTFX** (last fix) as the course start, press the **ENTER** key. Your selection is renamed **START**.

OR

Use the **RIGHT ARROW** key to select a saved position as the course starting point.

The selection of positions from which to start the course appear in this sequence:

- Last fix (**LASTFX**)
- The backup fixes (**FIX -2**, **FIX -3**, **FIX -4**, **FIX -5**)
- Waypoints (in alphabetical order).

Remember, if a waypoint is used to set the course start, it will not be renamed start. To view the Lat/Lon of the beginning of the course in that case, you must view it in the Waypoint function.



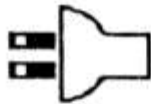
The destination waypoint is selected from waypoints. Press the **RIGHT ARROW** key to select your destination.



Press the ENTER key to display your course, which is the great circle bearing and distance from the start to the destination waypoint.

HINT: To reset your course from your current position to the previously set destination, simply press these keys:

[COURSE] [CLEAR] [ENTER] [ENTER].



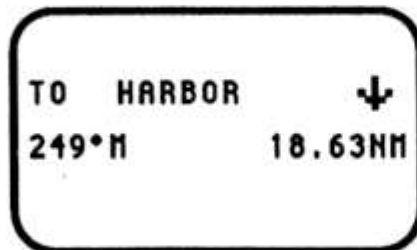
In external power operation, the "Set Course From" defaults to CURPOS, the current position.



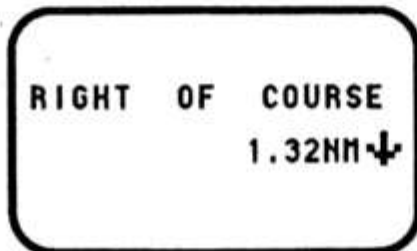
NAVIGATION (NAV) KEY

The NAVIGATION (NAV) key provides bearing and distance to destination, as well as cross track error information. Navigation calculations are based on the current position or the last fix (if a current position is not available). Bearing is not available when you are within 60 meters of your destination. When you are within 200 meters of your destination you will see variation in the bearing which increases as you approach.

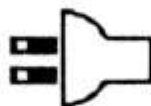
NOTE: Before you can use this function, you must enter a course (using the COURSE key). No data is entered using the NAVIGATION key.



When you press the NAV key, your bearing and distance to the destination waypoint (set in COURSE) displays.



Press the DOWN ARROW key to display the cross track error message. The message will indicate if you are to the left or right of your established course.



In continuous operation, the NAV message displays are automatically updated. Additional information displays using the DOWN ARROW key.



Navigation Displays Using External Power

The NAV 1000 will provide this additional information when the unit is using an external power source or set to continuous operation using AUX 4:

- SPEED,
- GND COURSE (ground course),
- TTG (time to go),
- ETA (estimated time of arrival),
- VMG (velocity made good), and
- DMG (distance made good).



SPEED 11.4 KNOTS
GND COURSE 334° N ↓

After the Cross Track Error display, press the DOWN ARROW key to display your speed and ground course.

NOTE: Speed is sometimes referred to as speed over ground and ground course is also referred to as course over ground. See *External Power Operation* in Section 2 for a discussion of the minimum speed for velocity displays.



TIME TO GO 19:57
ETA 2:05AM ↓

Press the DOWN ARROW key again to display the time to go (to destination) and the ETA (estimated time of arrival).



VMG 13.9 KNOTS
DMG 342.89 NM ↓

Press the DOWN ARROW key to display the velocity made good (VMG) and distance made good (DMG).



SATELLITE SCHEDULE (SAT) KEY

Until the full constellation of satellites is complete, the GPS receiver will not work 24 hours a day in all areas of the world. The SATELLITE SCHEDULE (SAT) key computes the windows of time in which you will be able to use the unit (based on 2D or 3D set up). The **Magellan GPS NAV 1000™** provides you with a schedule for the entire 24 hours of the date entered. The unit computes and displays the satellite schedule beginning at midnight of the date indicated.

The reason for automatically saving the fixes is to provide you with reliable positions from which to set a DR track should the satellites go down or if the satellite geometry begins causing poor accuracy.



Press the RIGHT ARROW key to select a saved position.

The selection of positions from which to run the satellite schedule appear in this sequence:

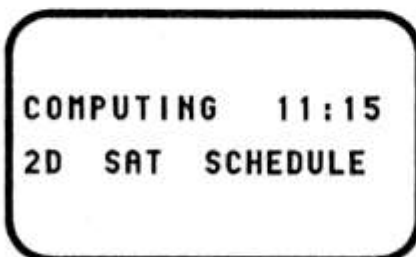
- Last fix (LASTFX)
- The backup fixes (FIX -2, FIX -3, FIX -4, FIX -5)
- Waypoints (in alphabetical order).



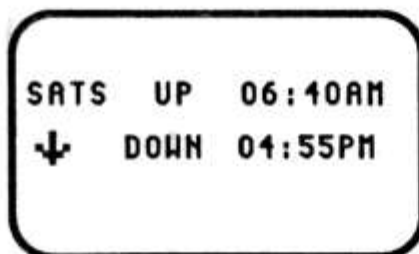
Enter the date that you require the schedule, then press the ENTER key.
OR
Press the ENTER key to accept the current date.



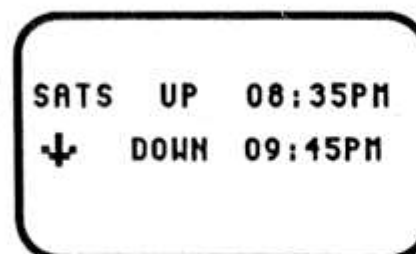
NOTE: You can enter any date that is within 9 months of the date of your current Almanac.



As the unit calculates the satellite schedule for a 2D or 3D solution, time ticks off in 15 minute intervals at the top right of the display as the unit computes a 24-hour schedule. (See *2D vs. 3D Solutions* in Section 2.)



After completing its computation, the "window of availability appears." If there is more than one "window" when the satellites will be available, a Down Arrow will appear on the screen.



To display the remaining satellite schedule messages, press the DOWN ARROW key.

NOTE: The more recent your Almanac, the more accurate your satellite schedules. Please read *AUX 3* in Section 5.

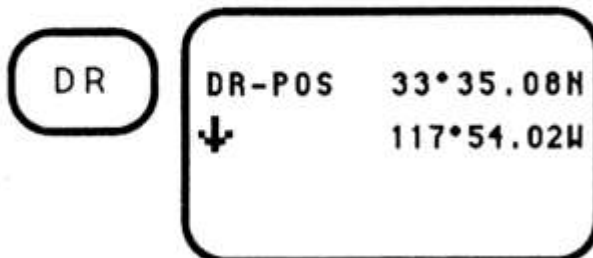


DEAD RECKONING (DR) KEY

The DEAD RECKONING (DR) key extends the unit's usefulness when the satellites are temporarily unavailable. If the satellites go down while you are operating the unit, you can select a last fix or backup fix, enter the speed and the ground course, and calculate an approximate position.

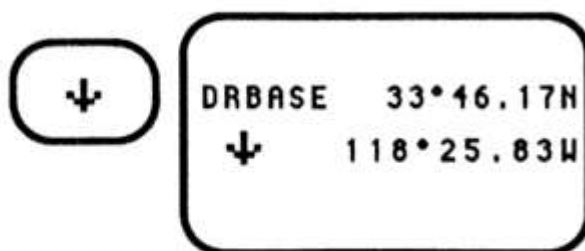
If you start your trip before the satellites are up, you may set a DR track using a waypoint (for example, a buoy) by entering the time you pass that waypoint.

You can also set a DR track to run while satellites are available. The DR position can be compared with your actual position to establish set and drift.

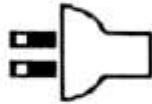


Once the DR track is set, the unit will give you an approximate DR position each time you press the DR key.

NOTE: The unit will save your DR-POS for one week. Unless you update it during that time, the unit will automatically clear it from its memory.



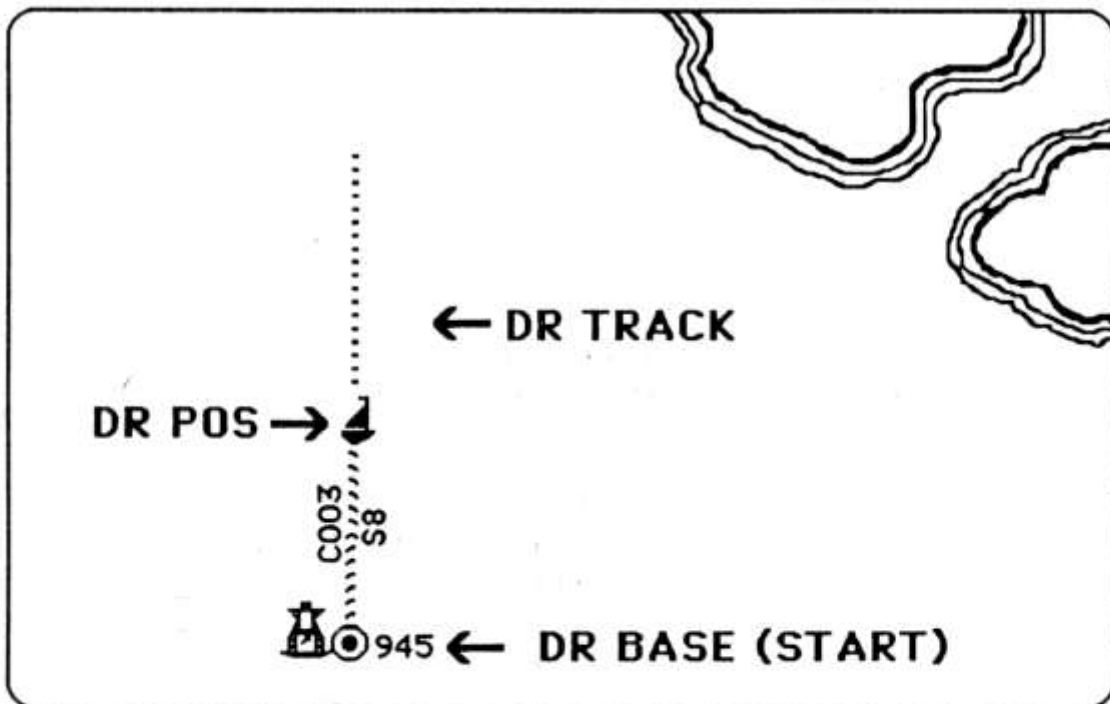
The point used as the start of the DR track, the DRBASE, displays when you press the DOWN ARROW key.



When the unit is on external power, press the DR key each time you want an updated DR track.

Setting a DR Track

The start of a DR track is called a DRBASE. It can be set from a known position which is either a last fix (or its related backups) or a waypoint. In addition to the time you were at the DRBASE, your approximate speed and ground course is required to calculate your approximate current location, referred to as your DR position (DR-POS).



A Dead Reckoning (DR) Track with
Magellan GPS NAV 1000™



To clear the existing DR track, press the DR key and then the CLEAR key.

NOTE: If it has been more than one week since you last set a DR track, the previous track will have been automatically cleared.



The starting point for a new DR track can be selected from the waypoints and last fixes stored in the unit's memory. Use the RIGHT ARROW key to select the DR starting position.

The selection of positions from which to start a DR track appear in this sequence:

- Current estimated position (DR-POS)
- Last fix (LASTFX)
- The backup fixes (FIX -2, FIX -3, FIX -4, FIX -5)
- Waypoints (in alphabetical order).

A waypoint can be used to set a DR track when you are departing at a time when the satellites are not available.

DR

ENTER DRBASE 07/08/89
TIME 16:25UT

If you set your DR track using a position fix or a backup fix, the time and date when the fix was taken displays.

Press the ENTER key to accept the displayed time and date.

NOTE: If you set your DR track using a waypoint, enter the date and time you were at the waypoint.

ENTER DRBASE
SPEED _ . KNOTS

Enter your current speed.

ENTER DRBASE
GND COURSE _ °M

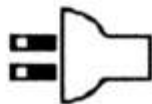
Enter your current ground course.

ENTER DR-POS 33°46.54N
↓ 118°26.40W

The estimated DR position (DR-POS) is calculated.



NOTE: Each time you return to DR, your current calculated position (based on the time of the fix, the speed, and ground course you entered) is automatically calculated.



In continuous operation, the unit uses the speed and ground course of the last fix as the default when the DR track is set. You can change this information.

Just as in hand-held battery operation, DR-POS is updated only when you press the DR key.

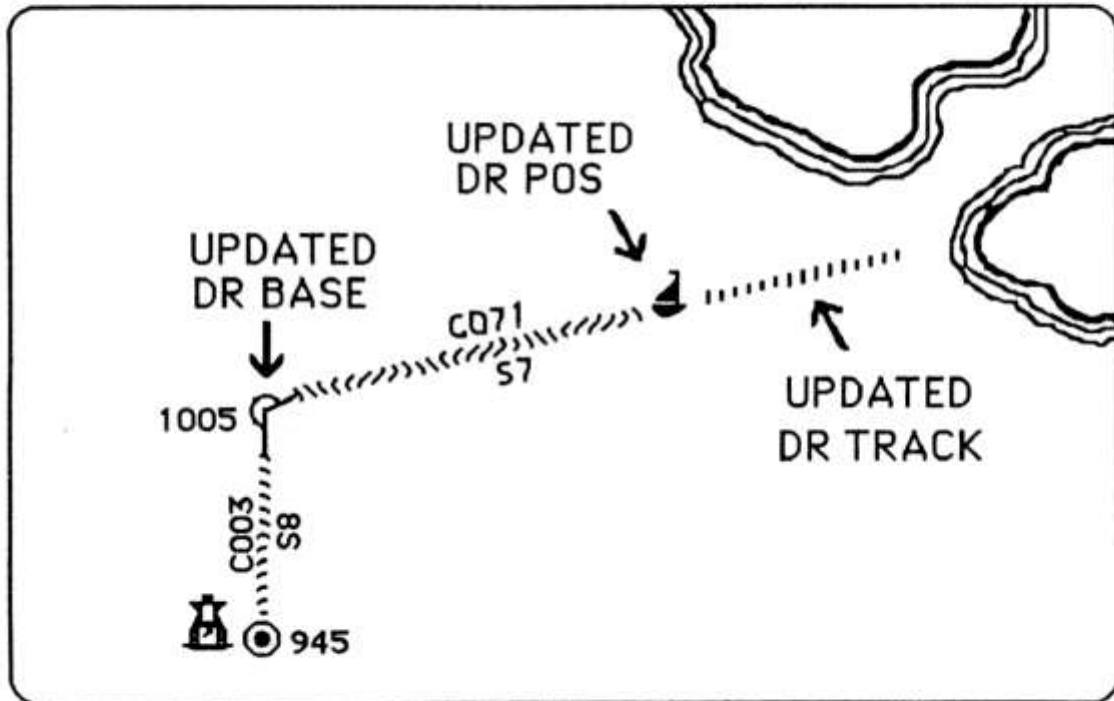
Updating the DR Track

If your boat's speed and/or your ground course changes, you can update your DR track easily. You will do this by (1) taking your DR-POS (your current estimated position), (2) making it your new DRBASE, and (3) updating the ground course and/or speed information. Doing this you set a new DR track, and use time to estimate your progress along that track.



Press the DR key. Then press the CLEAR key once to display DR-POS.

DR



Updating the DR Track

ENTER

DRBASE	07/08/89
TIME	10:05 AM

Press the ENTER key to display the current date and time.

ENTER

DRBASE	
SPEED	7.0KNOTS

070

Press the ENTER key. Change the speed, if appropriate.



```
DRBASE  
GND  COURSE  071°M
```

Press ENTER. Update the ground course, if required.



```
DR-POS  33°34.97N  
↓       117°59.51W
```

Press ENTER to see the updated DR position based on the new speed and/or ground course information.

NOTE: Each time you press the DR key, the estimated (DR) position (based on the current time and information) displays. Press the DOWN ARROW key to display the DRBASE (the position used to set (or reset) the current DR track).

SECTION 5

AUXILIARY FUNCTIONS



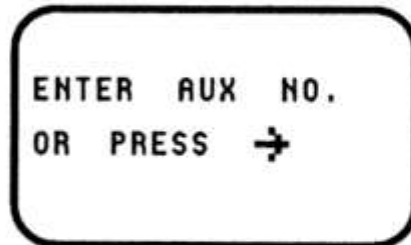
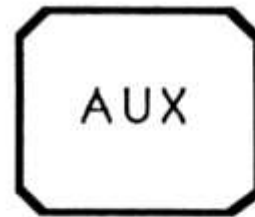
AUXILIARY (AUX) KEY

The AUXILIARY (AUX) key is a feature that contains a series of supplementary functions. To access the first seven functions, press the RIGHT ARROW key to scroll through the options or enter the related number code. Then, press the ENTER key. The auxiliary code number appears in the lower left of the display.

The AUXILIARY functions are:

Code	Display Name	Auxiliary Function
1	TIME	Current time.
2	INITIALIZATION	Initialize unit and reset time.
3	COLLECT ALMANAC	Collect an Almanac.
4	CONTINUOUS OPER	Activate continuous operation using the internal batteries.
5	WAKE-UP FOR POS	Wake-up for position fix.
6	SET UP	Set up (customization).
7	CLEAR WAYPOINTS	Automatically erases all waypoints, the course, and the DR track.
13	CLEAR MEMORY	
20	TUTORIAL POSITION	Automatically creates a last fix position for use with the Tutorial.
21	SAT STATUS	The list of satellites in the Almanac, their status and the SQ of those used in the last fix.

NOTE: AUX 13, AUX 20, and AUX 21 can be accessed only by entering their code numbers.



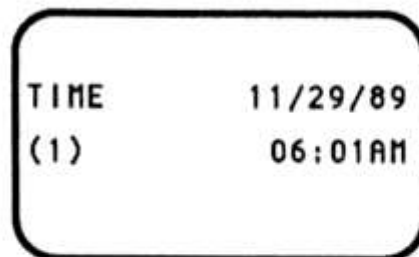
When you press the AUX key, this message displays. Press the RIGHT ARROW key to scroll to the desired functions.

OR

Enter the auxiliary code number. Then press the ENTER key.

AUX 1 - Time

The Time function displays the current time in hours and minutes. The display will be in Universal Time Coordinates, indicated by UT, or local time, indicated by AM/PM. Time and the display option is set during initialization (AUX 2). Refer to *Time* in Section 2 for an explanation of universal time. The auxiliary code is displayed in the lower left of the display.



When you select AUX 1, the current date and time displays. It will update only if AUX 1 is pressed again.



On external power, the unit works just as above.



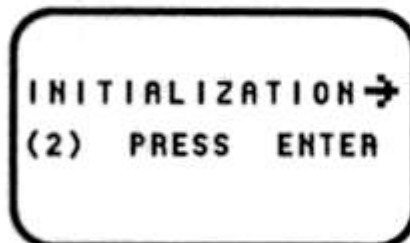
AUX 2 - Initialization/Time Reset

Initialization gives the NAV 1000 a position that it uses to locate satellites within direct view of the unit's antenna. Knowing where it is, the unit consults information in the Almanac (which it keeps in memory) to begin its search for satellites overhead.

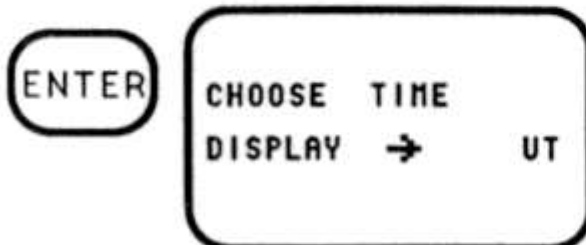
The AUX 2 - Initialization function reinitializes the unit. See *Initializing Your Unit* in Section 3 for a thorough explanation of this process. Read Section 2 carefully before using the unit for the first time.

Refer to the *Tutorial* in Section 3 or *Entering Data* in Section 2, if you need help with entering position, date and time information.

Initializing



When you select AUX 2, this message displays.



If your NAV 1000 has lost its memory, the unit must be initialized first in universal time (UT).

NOTE: The NAV 1000 always stores waypoints and other position information using the universal time and date. (See *Time* in Section 2 for an explanation of UT.) Once UT is set, you can then set the display to read in local time (AM/PM). If for any reason you reset universal time, make certain the time is correct ± 15 minutes.



ENTER

UT 09/29/89
 07:45UT

The current date and time in universal time (UT) display, if they have been previously set.

CLEAR

ENTER THE TIME
 - : UT

Press the CLEAR key to reset time and date. (If you are initializing the NAV 1000 for the first time, or if memory has been lost, this display will appear. Enter the current time in UT in hours and minutes.

ENTER

ENTER THE DATE
 - / /

Enter the corresponding UT date in Month/Day/Year. If you wish to read the date in Day/Month/Year format use AUX 6 to change the order.

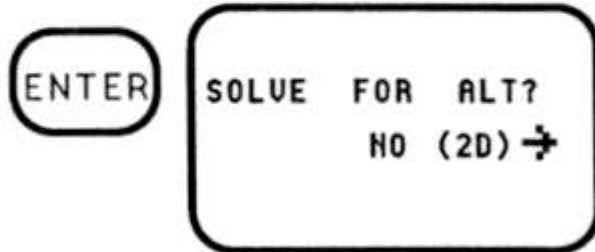
ENTER

APPROX 34°00.00N
POS 118°00.00W

Press the ENTER key. The initialization position (last fix) will appear unless memory has been lost. If you want to reset the position, press CLEAR. Enter the new position.

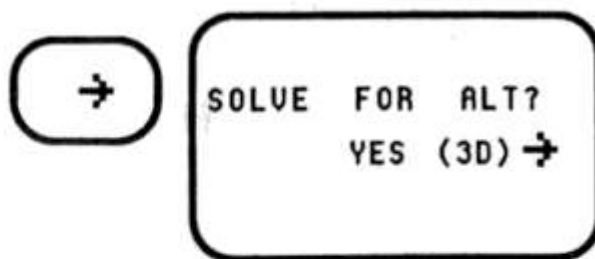


▲ **WARNING:** If you do not know your altitude within 15 feet, use 3D mode.



Press the ENTER key to select mode.

NOTE: 2D means two dimensions. In 2D mode, the NAV 1000 uses three satellites and does not solve for altitude. The antenna altitude must be entered correctly (± 15 feet) to obtain an accurate position. Antenna altitude is the vessel's elevation plus the antenna height. 3D means three dimensions. In 3D mode, the NAV 1000 uses four satellites and solves for altitude as well as latitude and longitude. For further information, see *2D vs. 3D Fixes* in Section 2. 2D (two dimensions) is the recommended mode for marine use because better accuracies can be achieved in 2D, assuming altitude is known.



Press the RIGHT ARROW key to select YES, if you want a 3D solution. By selecting this option, you need not know your antenna altitude to obtain accurate position fixes.



If 2D mode is selected, you will be asked to enter the antenna altitude. Sea level is the default.



▲ WARNING: Enter antenna altitude correctly or your position fixes will be wrong.

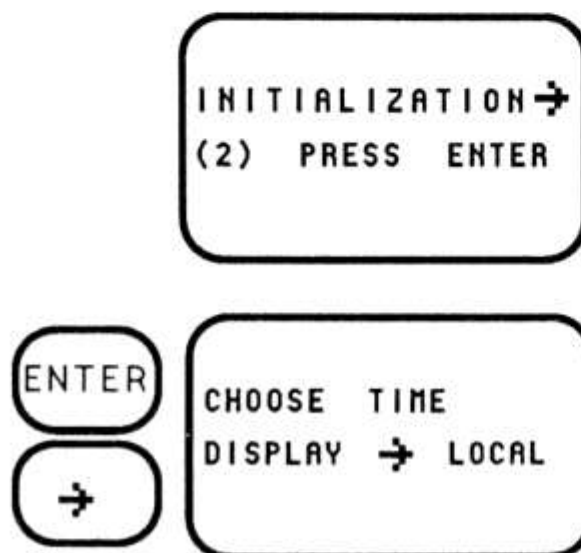
Note whether your display is set for meters or feet when you make this entry. Change antenna altitude display from feet to meters in AUX 6 - Set Up.

Multiply meters by 3.281 to convert to feet.
Multiply feet by 0.305 to convert to meters.

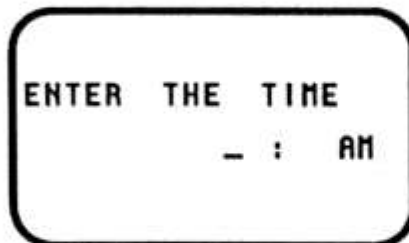
Working in Local Time

Once UT (universal time) is set, you can then set the time display to read in local time (AM/PM). The NAV 1000 remembers the difference between UT and local time and simply adds (or subtracts) that amount to give you the local time.

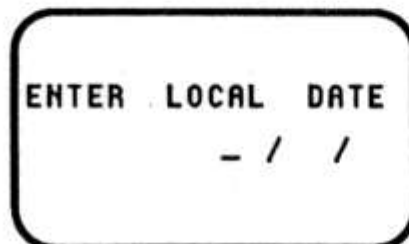
NOTE: Set time in UT before changing display to local time (LT).



Press the ENTER key to see the time display option. Using the RIGHT ARROW key, select LOCAL.



Enter the correct local time for your time zone. Select AM or PM by pressing the RIGHT ARROW key. (See *Time* in Section 2 for more information.)



Enter the correct local date in the order month/day/year unless you have changed the date order in AUX 6, Set Up. Press the ENTER key or any other function to end the initialization process.

WARNING: When you pass into a new time zone, you must remember to reset the local time.

AUX 3 - Collect Almanac

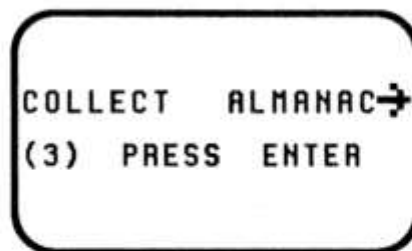
An Almanac is like a bus schedule which the NAV 1000 stores in its memory. It must be collected from one of the GPS satellites if your unit has lost its memory. Since each of the satellites in the constellation transmits the entire Almanac, only one satellite must be available to perform this function.

The AUX 3 - Collect Almanac function collects the most recent information from the satellites. If you have not been using your NAV 1000 regularly, you may be required to collect an Almanac when you attempt to use the unit. Normally, the unit updates portions of the Almanac in between fixes. If you know a new satellite has been launched or if you suspect one has been moved, it is a good idea to collect a fresh Almanac to improve the unit's performance.

For complete information on the purpose and use of the Almanac, see *Collecting an Almanac* in Section 3, and *All About GPS* in the Appendix.



NOTE: Since it takes approximately 12.5 minutes to collect the Almanac, we strongly recommend that you connect the unit to external power for this function. There is the possibility that the search for satellites when no Almanac is in memory could take several hours, draining your 6 AA batteries needlessly.



When you select AUX 3 - Collect Almanac, this message displays.

NOTE: Use external power when collecting an Almanac.



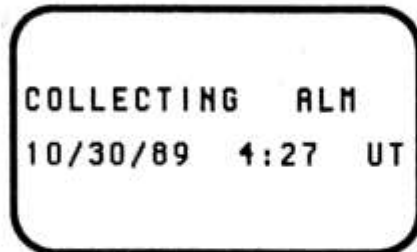
Press the ENTER key to display the date you last collected an Almanac.



Press the DOWN ARROW key for these instructions. (If no Almanac is present, this will be the first display.)



As the NAV 1000 searches for satellites, the search message will display.

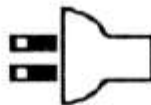


When the unit locates and locks onto a satellite, this message displays. The time displayed is when the collecting began. Add 12.5 minutes to predict completion of the task.

The date on the new Almanac will be a couple of days in the future. This is the way the GPS system date stamps the Almanac information.

The unit will take one fix before cycling off if enough satellites are visible.

If no satellites are found from which to collect an Almanac, the unit will cycle off after completing its two hour search.

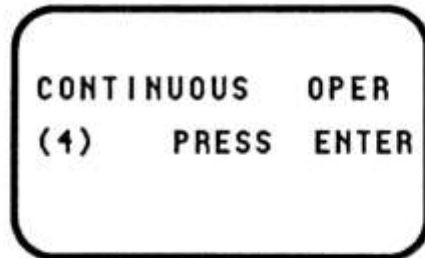


The unit will continue its search until a satellite has been found. After collecting an Almanac, the unit will take continuous position readings until satellites become unavailable.

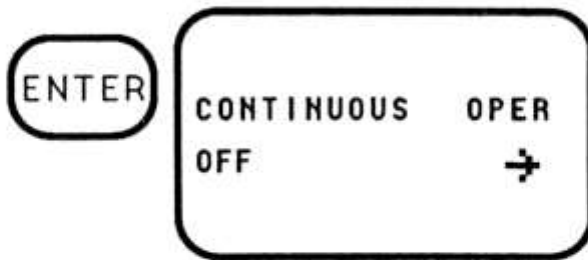
AUX 4 - Continuous Operation

The AUX 4 - Continuous Operation function lets you temporarily set the unit for continuous operation when powered with its six internal AA cell alkaline batteries. The power plug symbol in the User Guide indicates how the unit works in continuous operation.

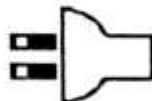
When the unit is turned off or when the batteries get low (reach the first warning level), the unit will restore all of the PowerSaveR™ design options. So, when you press the POS key you will get a single fix and none of the velocity related navigation data will be available.



When you select AUX 4 - Continuous Operation, this message displays.



Press the RIGHT ARROW key to switch the unit to continuous operation. When the unit is in battery operation, the default is OFF.



Using external power continuous operation is standard.

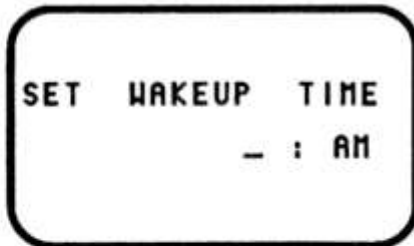
AUX 5 - Wake-Up for Position Fix

The Wake-Up for Position Fix function lets you set the unit's internal alarm. This will turn on the unit's receiver to take a single fix even if you are not on watch. The alarm can be set up to 24 hours in advance. This fix will be stored as the protected waypoint, "WAKEUP." This feature can also be used to take a fix during a short window of coverage.

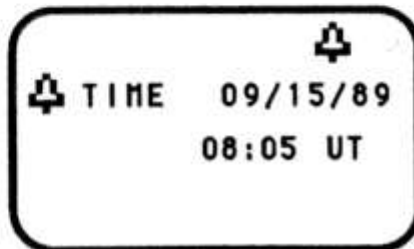
If a wake-up time has been set, the bell symbol will display on the upper most right of the display. Once the position fix is taken or after a 24 hour period, the alarm will automatically turn itself off.



When you select AUX 5 - Wake-Up for Position Fix, this message displays.



When you press the ENTER key, this message displays if the alarm has not already been set. Enter the wake-up time (in hours and minutes). Press the RIGHT ARROW key to toggle to AM or PM, if you are working in local time.



The time and date for the wake-up setting will display. The wake-up bell will be displayed on all screens. Press any key to continue.

NOTE: The time must be set at least ten minutes in the future.

Press the CLEAR key to reset or turn off the wake-up feature.

AUX 6 - Set Up

The AUX 6 - Set Up function guides you through a number of customizing features.

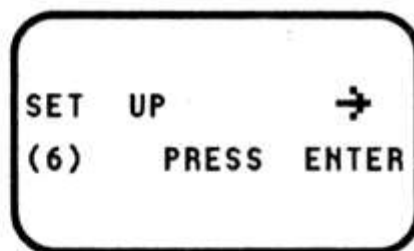


The following features are available in the set up:

- Altitude Units
- Magnetic Variation
- Latitude/Longitude Display
- Set Hemisphere
- Distance and Speed Units
- Beeper
- Date Order
- Map Datum
- Reset Factory Defaults

To see all the set up options, refer to the Worksheets on the following pages.

Displaying the Set Up Features



When you select AUX 6 - Set Up, this message displays.

- Press the ENTER key to sequentially display the features.
- Use the RIGHT ARROW key to toggle the selections within each feature.

Customizing Your NAV 1000

Before using the set up option, take a moment to fill out the following worksheet and keep it as a record. In the event that your unit loses memory, you can simply refer to it when you set up your unit again.



CUSTOMIZING YOUR NAV 1000 WORKSHEET

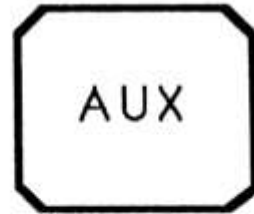
SELECT ONE OPTION FOR EACH SET UP FEATURE
(Factory defaults are shown in bold)

ALTITUDE UNITS	<input type="checkbox"/> F (FEET)
	<input type="checkbox"/> M (METERS)

MAGNETIC VARIATION	<input type="checkbox"/> M (AUTO MAGNETIC)
	<input type="checkbox"/> U (USER SET ___° ___'E or W (SPECIFY))
	<input type="checkbox"/> T (TRUE)

LAT/LON DISPLAY	<input type="checkbox"/> DEGREES/MINUTES (e.g., 33°43.67N)
	<input type="checkbox"/> DEGREES/MINUTES/SECONDS (e.g., 33°43'40N)

SET HEMISPHERE	<input type="checkbox"/> N/W
LAT/LON	<input type="checkbox"/> N/E
	<input type="checkbox"/> S/W
	<input type="checkbox"/> S/E



CUSTOMIZING YOUR NAV 1000 WORKSHEET

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

**DISTANCE/SPEED
DISPLAY**

- NM (nautical miles) and
KNOTS**
- KM (kilometers) and KM/HR
(kilometers per hour)
- STAT. MI (statute miles) and MPH
(miles per hour)

BEEPER

- ON**
- OFF

DATE ORDER

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

MAP DATUM

- WGS-84 (NAD-83)**
 - WGS-72
 - NAD-27
 - Alaska/Canada
 - European
 - Tokyo
 - Australia
-
-



Using the Set Up Features

When you change a setting, all related displays will be affected.

If you press any function key while you are in the set up feature, the selection currently displayed on the set up display will implement.

Altitude Units

The altitude units are set independently from distance units.

Magnetic Variation Display

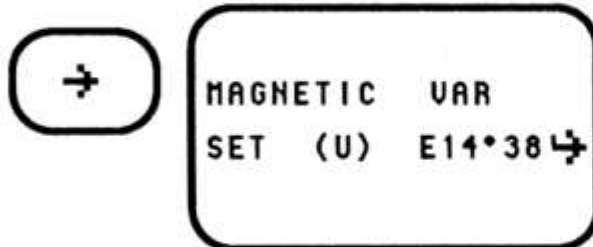
You can select one of the three available heading and bearing types for all displays and entries.

The magnetic variation selections are:

Auto Mag (M)	Includes an automatic adjustment for variation by the NAV 1000. (The default.)
User Set (U)	A constant user-entered adjustment.
True (T)	No magnetic adjustment in readouts.



To select your magnetic offset display, press the RIGHT ARROW key to toggle to the magnetic variation choice. Press the ENTER key.



If you select User Set (U), this message will display with the last entered value.



Begin entering numbers or press the CLEAR key to see this display. Enter the constant compass error in degrees and minutes. To change the east/west setting, press the RIGHT ARROW to toggle to east (E) or west (W).

Press ENTER when the entry is complete.

Latitude/Longitude Display

At sea, the most commonly used display format is degrees and minutes (using hundredths of minutes). However, for chart inserts, for use with some land maps, you may want to use the degrees, minutes, and seconds format.

Set Hemisphere

When you enter a waypoint, you can set the default hemisphere reading to one of the following:

- NW Latitude North, Longitude West.
- N/E Latitude North, Longitude East.
- S/W Latitude South, Longitude West.
- S/E Latitude South, Longitude East.



Hemisphere settings can also be changed by using the RIGHT ARROW key to toggle when entering the latitude/longitude data as a waypoint or during initialization.

Distance/Speed Display

The distance display also sets the speed display. The three options available for the distance/speed display are:

- NAUTICAL MILES - For marine use, distance is displayed in nautical miles (NM) and speed is displayed in knots.
- STATUTE MILES - For land use, distance is displayed in statute miles (Mi) and speed is displayed in miles per hour (MPH).
- KILOMETERS - Distance is displayed in kilometers (KM) and speed is displayed in kilometers per hour (KPH).

Beeper

The NAV 1000 will give you two types of beeper noises.

A Short Beep: Indicates key touch feedback or a completed fix.

A Long Beep: Indicates that you are locked out of the keyboard or that your fix has an accuracy warning.

Three Short Beeps: Indicate you have reached the first low battery level.

The audio may be silenced, by turning the beeper to "OFF," but we recommend you leave it on so you can be warned if the position accuracy is poor.

Date Order

Using Set Up in AUX 6 is the only means of verifying the date order as M/D/Y or D/M/Y.



Map Datum

The Map Datum option lets you select the datum that corresponds to the chart you are using. In the legend of your chart, you will find reference to the datum upon which the chart is based. A given position can be accurately placed on a chart only when you have the unit's datum setting matched to that of the chart. See *Tips, Choosing the Right Datum* in Section 6.

Resetting Factory Defaults

In the event you want the AUX 6 settings the way they came shipped from the factory, use this feature. The factory settings are those recommended for marine use in North America.

NOTE: No memory will be lost by performing this function. Only the format of the data will change.

AUX 7 - Clear Waypoints

AUX 7, the Clear Waypoints function, automatically erases all waypoints, your course, and the DR track.

AUX 13 - Clear Memory

There may be occasions when you think your NAV 1000 is behaving in a peculiar way, as indicated by an unusual symbol appearing in the display. (See *Trouble Shooting* in Section 6.)

Clearing memory is the best way to correct malfunctions related to the data. The AUX 13 function will delete the Almanac, erase the time and initialization position, remove all waypoints, clear the last fixes, the course and DR track, and reset the factory settings.

AUX

AUX

13

ENTER

CLEAR MEMORY
(13) PRESS CLEAR

To locate the clear memory function press AUX 13 and ENTER. (RIGHT ARROW will not access this function.)

CLEAR

TO ERASE MEMORY
PRESS CLEAR

This intermediate display will appear.



WARNING: Record all waypoints before continuing.

CLEAR

MEMORY ERASED
TURN UNIT OFF

To complete the Clear Memory task you must now turn the unit off.

AUX 20 - Position for Tutorial

AUX 20, the Tutorial Position function, creates a last fix position for the tutorial. After performing this function, the last fix of 22°58.80N, 108°26.90W, with a GQ=7 and SQ=8, and an antenna altitude at sea level will appear when you press last fix. The time and date on that position will be the time and date when you press AUX 20.



AUX 21 - Satellite Status

AUX 21 is important for trouble shooting. It can be used to determine which satellites were used to calculate the last fix, the status of satellites, and the signal qualities of each.

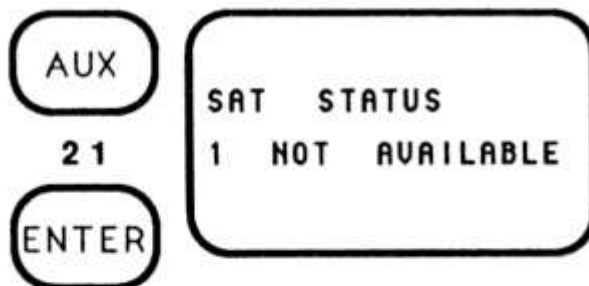
The satellite's status will have one of three messages:

ON which indicates the satellite is operating and that it is healthy.

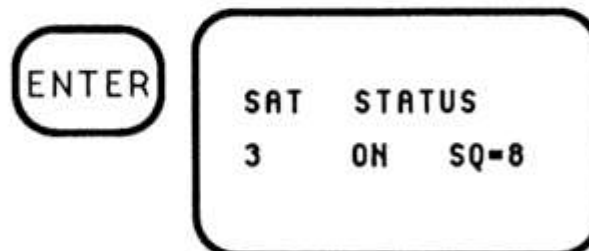
NOT AVAILABLE which means the satellite does not exist or it is temporarily set not active by the unit.

OFF is an option selected by the user when he does not wish to use a particular satellite. A satellite deemed NOT AVAILABLE cannot be turned to OFF.

Occasionally, the unit itself rather than the GPS system will declare a satellite NOT AVAILABLE. Turning the unit OFF and ON again will reset these to ON.



The display shows the satellite number and its status.



Enter brings you to the next satellite. This one was used to determine the last fix as indicated by the signal quality for that satellite.

AUX



SAT STATUS
3 OFF SQ=8 →

The RIGHT ARROW key lets you change the status from ON to OFF or vice versa.

SECTION 6

TROUBLE SHOOTING AND TIPS

ERROR MESSAGES

The **Magellan GPS NAV 1000™** has many helpful prompts to assist you in trouble shooting. These are a few:

- "SATS NOT FOUND"** The Almanac has determined that enough satellites are available for taking a position fix, but it cannot locate the signals.
- Try this: Turn the unit OFF and ON again. Make sure the antenna is straight up. Remove obstruction or move the unit. (The antenna needs a clear view of the sky.) Check the initialization position and time. If using an exterior antenna, check connections. Press POS again. If these fail, collect a new Almanac.
- "NOT ENOUGH SATS AVAIL"** There are insufficient satellites up to take a position fix, that is less than 3 satellites in 2D mode and 4 satellites in 3D mode.
- Try this: Check the satellite schedule (SAT) to determine when satellites will be available to you, making certain the unit has been initialized properly.
- "MEMORY LOSS"** The unit has lost all of its memory. Several conditions can cause the NAV 1000 to display the memory warning message: (1) before first use, (2) if you fail to replace batteries at the second low battery warning, (3) if you have cleared all memory by pressing AUX 13, or (4) if you have purposely caused the unit to lose its memory by removing batteries.
- Do this: Replace the 6 AA cell batteries. Reinitialize the unit (AUX 2). Collect a new Almanac (AUX 3).

**"INITIALIZE -
PRESS AUX 2"**

The unit has detected something unexpected in the initialization position and time. Use AUX 2 to reenter the correct information.

**"NEED ALMANAC
PRESS AUX 3"**

The Almanac is either erased or too old. If the Almanac is more than 6 months old, this message will appear.



When the 6 AA cell alkaline batteries are getting low, this symbol displays. The unit will run up to another hour continuously or take about 10 more single fixes with no danger of losing memory. We recommend that you load the spare battery clip with fresh batteries.

**"REPLACE BATTS
OR LOSE DATA"**

Turn the unit OFF. As long as you do not operate the unit, the memory will be protected up to four weeks with the power remaining in the battery. Change the batteries by inserting a fresh battery clip. In emergency situations, you may want to override this battery warning to obtain one or two more fixes. Proceed if you must, but you will lose memory.

PROBLEMS

The Position Fix Is Not Changing

The satellites may temporarily be low on the horizon or the antenna may have become obscured. The search status will appear on the lowest line of the display during these outages. Check the time message on the position key. If the unit beeps, informing you that you are locked out of the keypad, it is because the unit is busy searching or collecting data from the satellite.

Follow the same instructions for the "SATS NOT FOUND" error message.

Unit Will Not Stay On When You Have It Connected to an External Power Source

The unit will automatically switch to push-to-fix operation when the external power is interrupted. You are probably operating on the unit's internal batteries.

The Fixes Seem to Vary a Great Deal

The position accuracy of the NAV 1000 is affected by many variables, the most important of which is the GQ (geometric quality) and to some extent, the SQ (signal quality). Because of this variability, the specified accuracy of 30 meters r.m.s. is a statistical rather than an absolute accuracy, and further assumes that GQ and SQ are both at least 7. This means that even under good conditions, not all fixes will be within 30 meters of the true position. However, a good rule of thumb is that approximately two-thirds of the fixes will be within 30 meters of the true position and about 95% of the fixes will be within 60 meters under good conditions.

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 under good conditions, and more under less favorable conditions.

Receiver Is Turning Off

Entering certain of the following functions, like SATS and AUXILIARY turn the receiver off. To reactivate it you must press POS or NAV. Between 2 to 3-1/2 minutes will elapse before your first position. Unless you are in continuous operation, the receiver will turn itself off after obtaining a single fix.

NAV Will Not Work

There are several things you must know about the NAV function in addition to what is covered within *Navigation (NAV) Key* in Section 4.

1. Navigation requires that you enter a course with a start and destination. (You can select your present position as the course start.)
2. If you are not in continuous operation, only distance, bearing and cross track error are available to you.
3. Bearings are not displayed when you are within 60 meters of your destination.
4. You must be travelling at least 0.2 knots to get speed (SOG) and 1.0 knots to get ground course (COG).
5. VMG (velocity made good), ETA (estimated time of arrival) and TTG (time to go) cannot be calculated until ground course is available.
6. Despite the speed of your vessel, velocity related data is not available until the unit has taken two fixes.

The Unit Beeps When You Press a Key

You are locked out of the keypad. Be patient a moment and try again. The unit was receiving important information from the satellite and did not want to be interrupted. To turn the receiver off, thereby freeing the keypad, simply turn the unit off.

Dashes Appear in the Position and Navigation Displays

If the unit, upon checking the data, determines that there is something inconsistent with the information, it will give you dashes while it recalculates. It will also display dashes when your speed is too slow for providing velocity related information. When you are 60 meters or less from your destination, bearing is not displayed.

The Satellites' Availability Does Not Match with the Unit's Satellite Schedule

There is a very good chance that the U.S. Government may have changed the position or health of a satellite, or even launched a new satellite. If you suspect your satellite schedule is inaccurate, collect a new Almanac.

EQUIPMENT MALFUNCTION

Most malfunctions can be avoided by remembering these rules:

- Turn the unit off before inserting or removing the power jack.
- Do not leave the unit face up in the direct sun.
- Do not try to operate the unit above 50° C. or below 0° C.
- Do not store the unit at temperature above 60° C. or below -20° C.
- If the unit gets dropped in the sea, rinse the unit, including the battery compartment, with fresh water and dry it carefully.

Maintain a waypoint log—always "backing up" your favorite waypoints—just in case.

If the equipment malfunctions, try this procedure:

First, turn the unit ON and OFF. This will "cure" a great number of errors. If the unit will not turn on, skip to *Power* in this Section.

Second, if the problem persists, clear the unit's memory using AUX 13. Before you do that, write down all your waypoints. Refer to *AUX 13* in Section 5.

Or, if the display is "frozen" and keypad will not work, remove the battery clip for at least 1/2 hour. This too will erase the memory, just like AUX 13.

POWER

Always turn the unit off before inserting or removing power jacks.

If the unit fails to power on, make certain the battery clip is in place and that it has fresh batteries. The battery compartment should be clean and dry. Check that the clip is touching the contacts on the unit.

If you are using external power, make certain that the power jack is fully inserted and power is being supplied to the unit. Test this by removing the power jack to determine if the unit will work without external power.

TIPS

Using the Unit Near the Poles

All meridians of longitude converge at the North and South poles. Near the poles, a nautical mile can span many degrees of longitude, so small changes in position can cause large variations in longitude. While the inherent measurement accuracy of the NAV 1000 does not change near the poles, this basic mathematical sensitivity problem can cause position and velocity related data to appear unstable when the unit is operated at latitudes exceeding approximately 85 degrees North or South. In these regions, caution must be exercised in interpreting displayed data.

When the Almanac Is More Than 6 Months Old

If your Almanac is a few days too old, you can trick the unit into giving you a fix by reinitializing the unit to a few days back in time.

Choosing the Right Datum

All charts are created using a system that includes the scale, type of projection, and a map datum. There are hundreds of map data throughout the world, but fortunately most charts in common use employ a select number of datums.

The GPS satellites provide positions in the WGS-84 datum. If your chart or other marine electronic navigation equipment is created using another datum, you must take this into account before comparing positions. A position in WGS-84 could differ by 300 meters or more from one calculated using another datum. Check the datum in the legend of your chart and the manuals of your other navigation equipment. Use AUX 6 in your NAV 1000 to select the matching datum.

The National Oceanic and Atmospheric Administration (NOAA) is presently changing its charts to NAD-83 which is the same as WGS-84 for all practical purposes. The bulk of NOAA charts remain in NAD-27.

STORING YOUR UNIT

On occasion, you may need to store your unit for a long period of time. These precautions should be taken to ensure that you will continue to get the very best performance from your unit.

If you are storing the unit for more than three months:

1. Manually record all waypoints.
2. Remove the battery clip from the unit.
3. Place the unit in a NAV 1000 carrying case or in the original box.

When you take the unit out of storage, reload the battery clip and collect a new Almanac.

If you are storing the unit for less than three months:

1. Load new batteries (see *Loading Batteries* in this section) in the unit. This will preserve the stored waypoints, Almanac, and custom settings.
2. Place the unit in a NAV 1000 carrying case or the original box.
3. If you store it in the carrying case, place the field card in the front pocket to prevent accidental pressing of the keys.

APPENDICES

ALL ABOUT THE GLOBAL POSITIONING SYSTEM

GPS — Worldwide Navigation from a New Perspective

The concept of a highly accurate, worldwide navigation and positioning system that could be used continuously at any time of the day began with the U.S. government. It envisioned radio signals transmitted from a satellite constellation, a system that would not be fraught with the limitations of existing navigation technologies.

Their vision was realized with the Global Positioning System made possible by rapid advancements in aerospace technology, a firm financial commitment from the U.S. government, and the intense participation of individuals and corporations with communications expertise.

The heart of the Global Positioning System is a constellation which will eventually consist of 21 satellites and 3 spares. Circling the Earth twice daily, each satellite is in a fixed orbit, approximately 10,900 nautical miles above the surface of the earth, inclined at 55 degrees from the equator.

This new navigation infrastructure is available to a variety of worldwide users including recreational boaters, fishing and shipping fleets, general and commercial aviation aircraft, and military forces. Recent technological innovations have made GPS worldwide navigation an affordable reality for everyone.

Information provided is precise and transmitted in real time. The most accurate, on-demand worldwide navigation system, GPS is extremely resistant to interference from weather, earth-based radio signals, and electronic equipment.

All of these advantages make GPS superior to any other navigation system.

Satellite Navigation Made Simple

Navigation by Satellite on Demand

Each GPS satellite continuously transmits two types of orbit data used to calculate a position: Almanac and ephemeris. Listening to only one satellite, a GPS receiver can gather the Almanac information, which contains the approximate location of every satellite in the system. From the Almanac, the receiver determines which satellites will give the best geometries. The better the geometry, the more accurate the position fix. The ephemeris data is more precise and is used in obtaining the actual navigation information.

In addition to this information, two codes are transmitted: a protected code (P-Code) and an unprotected code (C/A Code). The P-Code is reserved for military use; the C/A Code is intended for public access.

The C/A code has two purposes. It provides immunity of the signal to interference from undesired signals. Secondly, the C/A code is used in determining the precise range of the user from each satellite—the first stage in calculating a position fix.

"Reading" Satellite Information

While the Global Positioning System may appear complex, navigation with GPS can be amazingly simple. A well-designed GPS receiver uses the signal information in a fundamental geometric equation. It solves the equation and presents it in easy-to-use navigation displays.

To obtain a position fix, a minimum of three satellites are "read". First the receiver determines the time of transmission and reception of the signal from each satellite. It then multiplies the difference in these times by the speed of light (186,000 miles per second) to arrive at an estimate of the satellite's distance from the receiver.

Using the calculated distance and the calculated orbital position of each satellite, the receiver determines and displays a position fix in degrees of latitude and longitude. Exact time of that fix, accurate to one ten-millionth of a second can also be determined. Although accuracy varies somewhat with satellite constellation geometry, a position fix accuracy of 30 meters or better is typical.

Monitoring and Controlling GPS

A master control station on Earth serves to gather pertinent navigation data from the satellite constellation. This dedicated facility is especially equipped for satellite monitoring, telemetry, tracking, command and control, data uploading, and navigation message generation.

Monitor stations and ground antennas strategically located around the world passively track the GPS satellites, relaying data to the master control station. Through the monitor stations, exact satellite position and signal-data accuracy are constantly updated and maintained.

The master control station routinely adjusts minor discrepancies between where the satellite "thinks" it is and where the monitor stations "know" it is. The compensations are relayed to a ground antenna which then transmits the correction to the appropriate satellite.

If for any reason a satellite emits erroneous data or is otherwise not operating properly, a ground station will mark it "unhealthy" and the satellite will broadcast this fact to the user. Receivers are programmed to ignore the unhealthy ones, "reading" instead the next best satellite for determining the user's position.

GPS Brings New Navigation Horizons

GPS is the technology of the future. Based on ingenuity and vanguard capabilities, GPS will replace systems based on technologies developed decades ago. Unlike other systems, GPS is superior in its accuracy, coverage, and resistance to interference.

Accuracy

The most remarkable feature of the Global Positioning System is its accuracy. Position accuracies of 30 meters or better are commonly obtained from GPS receivers. Repeatable accuracy, that is being able to return to the same spot, will also be experienced by GPS users.

Coverage

The completed GPS constellation of 21 satellites will provide 24-hour continuous coverage world-wide. Unlike all other electronic navigation systems, the signal never weakens because of distance from the broadcast source.

Interference

Another remarkable feature of GPS is its resistance to interference from conditions which disturb other electronic navigation systems: thunder, lightning, heavy weather, radio signals, on-board electronics, passing ships, on-shore electronic installations, ignition of the boat engines, portable radio receivers, and so forth.

The high frequencies used by GPS means that it operates in a wave environment where there is less interfering radiation. More important, GPS uses spread spectrum technology which greatly reduces any possible interference in the frequencies where it operates.

Other Navigation Systems

Most of the current means of electronic navigation are land based, like Omega, Decca, radio direction finders, and Loran C. These systems have inherent limitations in coverage area, accuracy, and susceptibility to interference.

Transit (Sat/Nav), the only other satellite-based system, does not provide continuous navigation information, only periodic position fixes once every one to three hours. In addition, the user must already have a close approximation of his position and velocity to make use of the system. SatNav requires about 15 minutes even under good conditions to take a fix.

Omega, Loran C and Transit are all destined to be replaced by GPS.

TRANSIT

- Sometimes hours between fixes.
- Requires user knows rough position, velocity.
- 15 minutes for a fix.
- Coverage = 100% of earth.

**LORAN C
& DECCA**

- Accuracy highly dependent on geometry, where vessel is in relation to the transmitters.
- Highly susceptible to interference.
- May require user input.
- Coverage = 10% of earth.

OMEGA

- Disrupted by storms.
- Requires user knows time, date.
- Requires pre-voyage initialization.
- Intolerant of power failures.
- Coverage = 90% of earth.

CELESTIAL

- Accuracy 1 to 5 miles.
- Requires complex and recurrent training.
- Clear weather only.
- Error prone.

WAYPOINT LOG

KEEP A WRITTEN RECORD OF ALL WAYPOINTS. COPY THESE PAGES FOR THE NOTEBOOK YOU KEEP.

WAYPOINT NAME: _____	DATE: ___ / ___ / ___
LAT ___ ° ___ . ___ N or S	ANTENNA ALTITUDE
LON ___ ° ___ . ___ E or W	_____ F or M
NOTES: _____	

WAYPOINT NAME: _____	DATE: ___ / ___ / ___
LAT ___ ° ___ . ___ N or S	ANTENNA ALTITUDE
LON ___ ° ___ . ___ E or W	_____ F or M
NOTES: _____	

WAYPOINT NAME: _____	DATE: ___ / ___ / ___
LAT ___ ° ___ . ___ N or S	ANTENNA ALTITUDE
LON ___ ° ___ . ___ E or W	_____ F or M
NOTES: _____	

WAYPOINT NAME: _____	DATE: ___ / ___ / ___
LAT ___ ° ___ . ___ N or S	ANTENNA ALTITUDE
LON ___ ° ___ . ___ E or W	_____ F or M
NOTES: _____	

WAYPOINT NAME: _____ DATE: __ / __ / __
LAT ____ ° ____ . ____ N or S | ANTENNA ALTITUDE
LON ____ ° ____ . ____ E or W | _____ F or M
NOTES: _____

WAYPOINT NAME: _____ DATE: __ / __ / __
LAT ____ ° ____ . ____ N or S | ANTENNA ALTITUDE
LON ____ ° ____ . ____ E or W | _____ F or M
NOTES: _____

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LON ____ ° ____ . ____ E or W | _____ F or M
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LON ____ ° ____ . ____ E or W | _____ F or M
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LON ____ ° ____ . ____ E or W | _____ F or M
NOTES: _____

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LAT ____ ° ____ . ____ N or S | ANTENNA ALTITUDE
LON ____ ° ____ . ____ E or W | _____ F or M
NOTES: _____

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LAT ____ ° ____ . ____ N or S | ANTENNA ALTITUDE
LON ____ ° ____ . ____ E or W | _____ F or M
NOTES: _____

WAYPOINT NAME: _____ DATE: ___ / ___ / ___
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LON ____ ° ____ . ____ E or W | _____ F or M
NOTES: _____

WAYPOINT NAME: _____ DATE: ___ / ___ / ___
LAT ____ ° ____ . ____ N or S | ANTENNA ALTITUDE
LON ____ ° ____ . ____ E or W | _____ F or M
NOTES: _____

GLOSSARY

ACQUISITION

Referring to signal acquisition, when the NAV 1000 locates and receives data from the GPS satellites.

ALMANAC

Information the NAV 1000 obtains from a single satellite, containing data on the general location and health of all satellites in the GPS constellation.

ANTENNA ALTITUDE

The sum of the elevation (zero at sea level) and the antenna height.

BEARING

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

C/N₀

Carrier-to-noise ratio is an absolute means of specifying signal-to-noise ratio (SNR) that is independent of band width.

COURSE

The great circle line connecting the two points between which the vessel intends to travel.

CROSS TRACK ERROR

The perpendicular distance between the present position and the course line, given as right or left of course.

CURRENT POSITION

The present position obtained in real time.

DEAD RECKONING

The task of calculating an approximate position based on speed, ground course, time, and last position fix.

DEFAULT

The displayed or system selected choice. If you do not want to use the default (automatic) value, you can erase it and enter your own choice.

DISTANCE MADE GOOD

DMG is a very simple calculation aimed to give you a measure of the effective distance you have travelled towards your goal. It is the original distance at your course start less the distance you have to travel from your current position.

ELLIPSOID

The idealized mathematical model of the earth's surface used in developing charts.

FIX

A single position with latitude, longitude, altitude, time, and date. When recorded on a chart, it may include speed and ground course.

GEOID

A model of the distortions of the earth's surface due to global gravity variation. Primarily used to establish sea level at specific locations.

GREAT CIRCLE

The shortest distance between any two points at sea. Can be viewed as a circle on the earth's surface that is described by a plane cutting through the earth's center.

GROUND COURSE	The direction your vessel is actually moving. Also called course over ground (COG).
HDOP	Horizontal Dilution of Precision is a measurement of possible error related to the geometry of the satellites; it includes only the horizontal (Lat/Lon) aspect of the error.
HEADING	The direction your vessel is oriented.
LAST FIX	A fix stored in temporary memory, a record of an earlier position fix.
LATITUDE	The distance north or south of the equator, measured in an arc with the equator being 0° and the poles being 90°.
LONGITUDE	The distance east and west, measured in an arc from the prime meridian (0°) which intersects with Greenwich England. The range is 0°-180°E moving east and 0°-180°W moving west of the Prime Meridian.
MAP DATUM	A coordinate system with an associated ellipsoid upon which a given chart is based (as noted on each individual chart).

PDOP	Position Dilution of Precision is a measurement of possible error related to the geometry of the satellites; it includes both the horizontal (Lat/Lon) and the vertical (altitude) aspect of the error.
RECEIVER	The electronic components of the NAV 1000 that receive the satellite signals.
SEARCH	The task of the NAV 1000 that locates the GPS satellite signals in the sky overhead.
SPEED	The speed over ground (SOG) is the distance you have moved over the ocean floor divided by the time required to move that distance. This is a more accurate measure than speed through the water which does not take into account tidal currents.
3 D	Three dimensional, referring to a latitude, longitude, and altitude position, requiring four GPS satellites in view.
TOGGLE	To switch back and forth between two settings (for example, north and south). Information is toggled with the RIGHT ARROW key.
2D	Two dimensional, referring to a latitude, longitude position, requiring a user entered antenna altitude and three GPS satellites in view.

VELOCITY MADE GOOD

Using the speed and ground course, the unit calculates the speed of advance along the course line, that is the component of the velocity vector which is parallel to the course line.

WAKE-UP

The auxiliary function that automatically turns the unit on to take a single position fix, then turns the unit off.

WAYPOINT

A position stored in the unit's memory.

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