User Manual

GPS 310 Satellite Navigator

MAGELLAN

WARNINGS

A measure of knowledge by the user is required for proper and safe use of the **Magellan GPS 310™**. READ THE USER MANUAL & WARRANTY COMPLETELY.

Use Good Judgment

This product is an excellent navigation aid, but it does not replace the need for careful orientation 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 less accurate.

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Introduction

Welcome to the Magellan GPS 310

Congratulations on your purchase of the Magellan GPS 310 satellite navigator. The GPS 310 is an easy-to-use GPS receiver designed to get you out in the "Great Outdoors" rather than spending hours reading a User's Manual. There are, however, a few items that you need to be familiar with so it is suggested that you follow along at least through the chapter on *Basic Operation*.

Before you begin, make sure that your package includes the items listed on the GPS 310 box. If any items are missing or damaged, contact your Magellan dealer or retailer.

GPS 310 Description

The GPS 310 is a self-contained hand-held GPS receiver designed for general purpose position locating and navigation. It has a built-in antenna located at the top of the receiver, a backlit display, and keypad. Using two AA batteries, inserted from the battery door found at the back of the receiver, the GPS 310 will operate for up to 20 hours.

Magellan GPS 310 Key Functions

GPS Antenna

GPS 310

MAGELLAN

The **ENTER** key confirms data entries or menu selections.

The **NAV** key accesses the Position and Navigation screens.

The **MARK** key is used to create landmarks and store the current position.

The **GOTO** key is used to create a direct route to any landmark stored in memory.

The **MENU** key is used to access the route, landmark and setup functions.

The **PWR** key turns the receiver on and off.

The **LIGHT** key turns the light on and off.

The **ARROW** pad is used to enter landmark names, and scroll through the series of screens and menu selections.

Getting Started

Installing the Batteries

The GPS 310 uses two AA alkaline batteries that are installed at the back of the receiver. To remove the battery cover, turn the ring of the battery door screw counterclockwise until the battery cover can be removed.

Insert the new batteries as shown, being sure to respect the polarities, and replace the battery cover.

Replace the screw and turn the ring clockwise until the battery door is held in place securely. While the battery door does provide the waterproofing seal to the batteries, you should avoid overtightening the battery door screw.
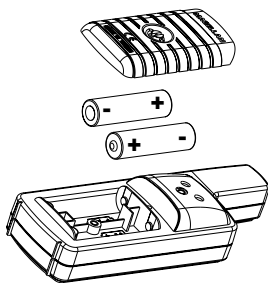
Getting Signals from Satellites

Since the GPS 310 receives information from satellites orbiting the earth, the antenna needs to have a relatively unobstructed view of the sky. Large obstructions such as buildings, cliffs, and overhangs may interfere with signal reception causing your GPS 310 to take additional time to compute your location.

The GPS 310 is designed to fit comfortably in your hand. Hold the receiver with the antenna towards the sky.

Initializing the Receiver - EZStart

Before using your GPS 310 for the first time, the receiver needs to know its approximate location. Using Magellan's EZStart procedure, the GPS 310 will prompt you for the information it requires when you turn it on for the first time.

You do not need to initialize your receiver each time you use it. Follow these steps to initialize the GPS 310 if this is the first time you are using it.

❶ Press /**PWR** to turn the GPS 310 on.

❷ **SELECT REGION.** Use the ARROW pad to change the flashing text to select the appropriate region for your present location. Press **ENTER**

❸ **SELECT COUNTRY or STATE.** Use the ARROW pad to change the flashing text to select the country or state for your present location.
Press **ENTER**

④ **ENTER ELEVATION.** Use the ARROW pad to enter the approximate elevation for your position. If unknown, leave the elevation at 0. Press **ENTER**

⑤ **ENTER TIME.** Use the ARROW pad to enter your present time. Press **ENTER**

⑥ **ENTER DATE.** Use the ARROW pad to enter the date. Press **ENTER**

The GPS 310 then displays the *POSITION* screen and automatically begins searching for satellites that it knows are in this area for the date and time you entered.

The display shown here may differ from yours depending upon the information you selected in steps 2 and 3. As the GPS 310 scans the sky, the arrow in the circle will swing around pointing to a satellite and displays, in the center of the circle, that satellite's elevation above the horizon.
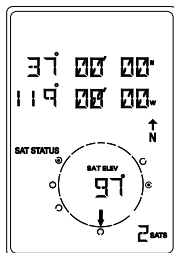
Computing a Position

The GPS 310 will begin to acquire information from the satellites and use this information to compute your current position (called a position fix). Whether you have just

completed the initialization process or have just turned your GPS 310 on, the GPS 310 will display the following screens in the order shown.
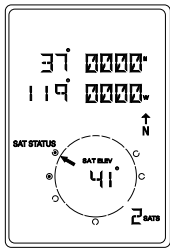
As the GPS 310 searches for satellites, some of the small circles around the large circle will become black indicating that the GPS 310 is tracking that satellite and receiving information. The number at the bottom right of the screen displays how many satellites are being tracked.

After the GPS receiver has received positioning data from at least three satellites (approximately 2-3 minutes), it will begin computing a position fix based upon the information it is receiving. As soon as a position fix is computed, the receiver switches to the navigation screen displaying the moving compass. The word "TRACKING" is displayed in the lower right corner indicating that the receiver is computing position fixes.
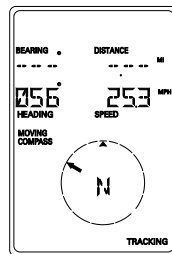
Note: If the receiver has not acquired a position fix in approximately 10 minutes, refer to the troubleshooting section of this manual.

More information on these screens and the information they display can be found in the next chapter.

Basic Operation

Saving a Position Fix

Position fixes can be saved in memory for use later when you want to return to that position. Saved position fixes are referred to as <u>landmarks</u> or LMK.

To save (*mark*) your current position press **MARK**.

Receiver-Generated Name: The GPS 310 prompts you to enter a name or accept the receiver-generated name for this landmark. To accept the receiver-generated name (LM01 - LM99), press **ENTER**

```
LM01
34 0664'
117 4961.
                 TRACKING
```
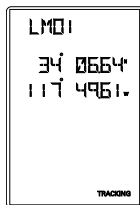
To quickly save a position fix, press **MARK** **MARK**.

User-Created Name: To create a name (up to four characters), use the UP/DOWN arrows to change the character and the LEFT/RIGHT arrows to move the cursor to the left or right respectively. After you have input the desired landmark name press **ENTER**.

Press **ENTER** to accept the current latitude and press **ENTER** again to accept the current longitude.

Shortcut: Press **MARK** at anytime while viewing this screen to quickly save the position.

Creating a Landmark

To create a landmark at a location which is not your current position, use the same procedure as saving a position with the additional step of inputting different latitude/longitude coordinates.

To create a landmark press **MARK**.

The GPS 310 prompts you to enter a name or accept the receiver-generated name for this landmark. When the desired name is displayed at the top of the screen press **ENTER**.

```
CAMP
 34 0664'
117 4961.

          TRACKING
```

Use the ARROW pad to change the latitude and press **ENTER** to accept.

Use the ARROW pad to change the longitude and press **ENTER** to accept.

The newly created landmark is stored in memory and you are returned to the screen that was displayed when you pressed the MARK key.

Shortcut: Press **MARK** at anytime while viewing this screen to quickly save the position.
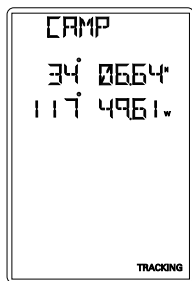
Viewing the *POSITION* Screen

The *POSITION* screen displays the coordinates for your last computed position and information about any satellites that are visible. It can be accessed by pressing the $\boxed{\text{NAV}}$ key.

Latitude and **Longitude**

North Indicator

Satellite Elevation
Degrees above the horizon of the satellite indicated by the satellite pointer.

Satellite Pointer

Number of satellites being used.

Satellite Icons

O Visible but not tracked.

⊙ Satellite is being tracked.

Tracking Indicator
Appears when the receiver has acquired enough information from the satellites to compute a position fix.

You may sometimes notice that the number of satellites being tracked differs from the number of satellites being displayed graphically. This is due to more than one satellite being tracked in the same general area.

Viewing the *Navigation Screens*

Without an Active Route. Without an active route the
navigation screen displays your heading and the speed at
which you are traveling. The lower portion of the screen
displays a moving compass. The triangle at the top of the
compass points in the direction you are traveling and the
arrow points to north.

**Navigation Screen without an Active Route
(Moving Compass)**

BEARING   DISTANCE

**Current
Speed**

**Current
Heading**

HEADING   SPEED

**Direction of
Travel**

MOVING
COMPASS

**North
Indicator**

N

Tracking Indicator
Appears when enough
satellites have provided
information to compute
position fixes.

TRACKING
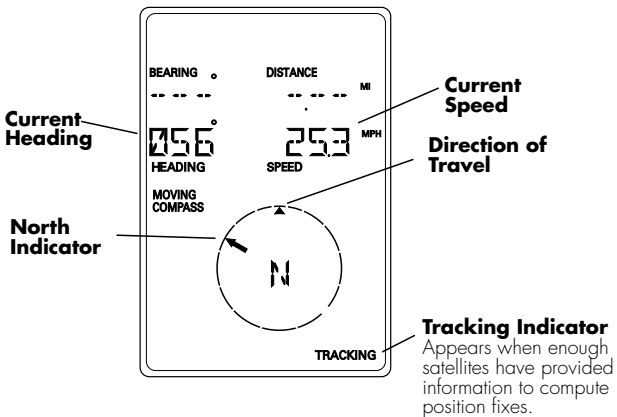
The navigation screens display your speed of travel. In order
for the North Indicator to be valid and the speed to be
displayed, *you must be moving at a speed greater than 2 miles
per hour.*

With an Active Route. When you have an active route the navigation screen still displays your heading and speed but also includes the bearing and distance to your destination. The moving compass is then replaced with steering information. You can use the graphical representation or the steering indicator to assist in directing you towards your final destination.

Navigation Screen with an Active Route (Steering)
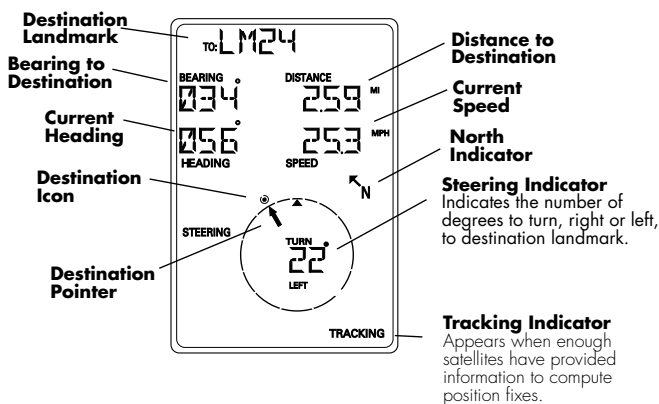
In the screen above you are traveling with a heading of 56° while your destination bearing is 34°. This would indicate that you need to turn left 22° to be on a straight line to your destination. The circle and arrow display the same information but in a visual manner. The triangle points in the direction you are traveling and the arrow points towards your destination.
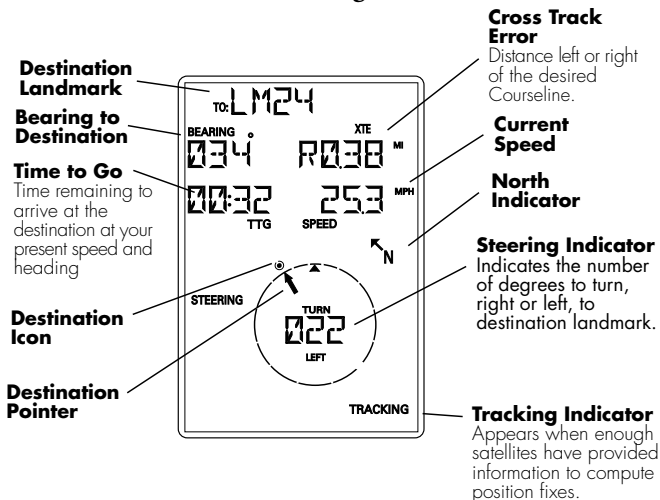
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A second navigational screen is also provided while you have an active route. This screen is very similar to the first screen except that the distance to the destination has been replaced with XTE (cross track error, the distance left or right that you are off course) and heading has been replaced with TTG (time to go). This screen provides you additional information to aid you in navigating to your destination.

Second Navigation Screen with an Active Route (Steering)

Destination Landmark

Bearing to Destination

Time to Go
Time remaining to arrive at the destination at your present speed and heading

Destination Icon

Destination Pointer

Cross Track Error
Distance left or right of the desired Courseline.

Current Speed

North Indicator

Steering Indicator
Indicates the number of degrees to turn, right or left, to destination landmark.

Tracking Indicator
Appears when enough satellites have provided information to compute position fixes.

The navigation screens and the position screen are connected to one another in a circular loop. Pressing the $\boxed{\text{NAV}}$ key or using the ARROW pad while viewing one of the position or navigation screens moves you to the next screen in the loop.

Creating a GOTO Route

The simplest form of a route is a one-leg route called a
GOTO route (you are GOing TO a destination). This is
routing you from your current position to a landmark stored
in memory All that is required to create a GOTO route is
that you have saved a landmark indicating the location of your
destination.

To create (activate) a GOTO Route:

From any screen, press $\boxed{\text{GOTO}}$. The
GOTO screen appears.

To select a different landmark, use the
LEFT/RIGHT ARROWS until the
desired destination landmark is displayed.
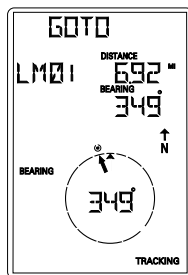
Press $\boxed{\text{ENTER}}$ or $\boxed{\text{GOTO}}$. The display
returns to the Navigation screen showing
the name of the GOTO destination at
the top of the screen.

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If the receiver is not tracking sufficient satellites to compute a position fix, the start of the newly created GOTO route will be the last position computed, which may not be the current position.

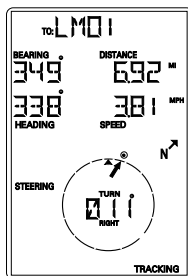This GOTO route will remain the active route until a new GOTO route is created, a multileg route is activated, or the receiver is turned off. **Turning off the receiver deactivates any GOTO route.**

Summary

This completes the basic operation of the GPS 310. At this time it would be a good idea to put what you know to practice. Pick a location that you would want to come back to, your home for example. Take a position fix of the location and save it to memory, giving it a name that you will later associate with this location. Then travel a few miles away with your receiver, stop and take another position fix. Now use the `GOTO` key to set a GOTO route and highlight the landmark you created before and press `ENTER`.

Your GPS 310 is ready to navigate you back to where you started. The navigation screens are now showing you the distance and bearing back to the original landmark. As you begin moving, the GPS 310 will begin using your speed and direction to compute the shortest distance back to your original starting point as well as how long it will take you to get there.

The following chapters provide you with more information on using your GPS 310 that build upon what you've learned.

Working with Landmarks

Viewing a Landmark

To view a stored landmark press MENU until LMKS appears at the top of the screen.

```
  LMKS

PRESS ENT
TO VIEW
```
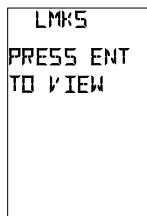
Press ENTER. The *BEARING/DISTANCE* screen for the first landmark in the receiver's memory is displayed with the bearing and distance from the last computed position fix to that landmark. To select a different landmark, use the LEFT/RIGHT arrows until the name of the landmark you wish to view is at the top of the screen.

```
      LM01
BEARING    DISTANCE
349        12"
                  ↑N
BEARING
    349
         TRACKING
```
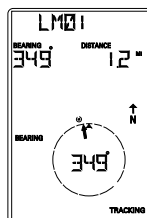
To view the *POSITION* screen of the selected landmark, press the UP ARROW.

```
    LM01
 34 0654°
117 4951"
BEARING
   349
      TRACKING
```
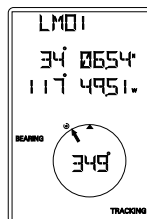
Editing a Landmark

Following the instructions under *Viewing a Landmark*, use the LEFT/RIGHT arrows to select the landmark you wish to edit.

Press the UP ARROW until the screen displays PRESS ENT TO EDIT, then press **ENTER**.

You can modify the landmark name and/or the coordinates for the landmark by using the UP/DOWN arrows to change the information and press **ENTER** to move to the next line. If the landmark you are editing is used in a route, the route will be modified to reflect the changes you made to the landmark.

Deleting a Landmark

Following the instructions under *Viewing a Landmark*, use the LEFT/RIGHT arrows to select the landmark you wish to delete.

Press the UP ARROW until the screen displays PRESS ENT TO DELETE, then press **ENTER**. Use the LEFT/RIGHT ARROWs to confirm (YES or NO) and press **ENTER**.

If the landmark is used in a route or is the destination landmark in a GOTO route, the GPS 310 alerts you that the landmark cannot be deleted. Remove the landmark from the route and repeat.

Working with Routes

The route function allows you to link a series of landmarks and travel, point by point, to a final destination.
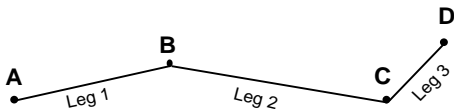
The route depicted here is a three-leg route. Leg 1 extends from landmark A to landmark B, leg 2 from landmark B to landmark C, and leg 3 from C to D. The GPS 310 gives you information on the NAV screens that directs you to the destination of each leg sequentially.

Creating a Route

A route can contain up to 10 legs using any of the landmarks stored in memory. If there is a route already in memory you must delete the existing route before you can create a new one.

Access the Route Menu by pressing **MENU** until ROUTE appears at the top of the screen. The display should say "PRESS ENT TO CREATE."

NOTE: If the display says PRESS ENT TO VIEW there is an existing route and you must delete the existing route before creating a new one. (See *Deleting a Route* for details.)

Press **ENTER**.

The receiver prompts you for a starting landmark for the route. The first landmark, *POS, is your present position. Use the ARROW pad to scroll through the list of landmarks. When the desired landmark is displayed (and flashing) press **ENTER**.

The display changes to allow the selection of the landmark to be used as the end of the first leg in the route. Use the ARROW pad to scroll through the list of landmarks. When the desired landmark is displayed (and flashing) press **ENTER**. Note that as you scroll through the list of landmarks, the display updates showing you the bearing and distance from the start of this leg to the displayed landmark.

If the distance from the start of the leg to the end of the leg is below 0.10 miles, the message INVALID is displayed and you are prompted to select a different landmark.

The screen changes to the next leg in the route with the destination landmark of the previous leg inserted as the start of the next leg. The message END ROUTE is displayed in the TO field. You may continue this route by using the ARROW
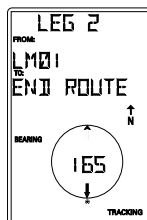
pad to select a landmark as the destination for this leg or press ENTER to signal the GPS 310 that this was the last leg in the route and you are finished creating a route.

Continue this process for each leg in the route remembering to press ENTER with END ROUTE displayed in the TO field to finish up the route. If you accidently pressed the ARROW pad but you meant to end the route, you can still end the route by continuing to press the ARROW pad until END ROUTE is displayed again.

> A route may contain no more than ten legs and the GPS 310 automatically saves the route and returns to the Route Menu as soon as Leg 10 is entered.

After the route has been created, the GPS 310 automatically activates the route and begins providing navigation information for the route.
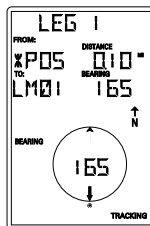
Viewing a Route

You can view a summary of the route in memory as well as viewing the individual legs of the route. All editing commands are accessed from the View Route function as well.

With a route in memory, press MENU until ROUTE appears at the top of the display. Press ENTER.

The first screen displayed is the *ROUTE SUMMARY* screen. This screen displays the start and end landmark for the entire route as well as the total distance of the route.

Use the LEFT/RIGHT ARROWs to view the legs in the route. The leg screen displays the FROM and TO landmark for the leg as well as the distance and bearing for the leg. The circle graphically displays the bearing for the leg. Continue pressing the LEFT/RIGHT ARROWs to step through the other legs in the route, eventually returning to the *ROUTE SUMMARY* screen.

Activating/Deactivating a Route

With a route in memory, press MENU until ROUTE appears at the top of the display. Press ENTER. Press the UP ARROW. If the route is currently active, the display indicates: ENT TO DEACTVATE. If the route is currently deactivated, the display indicates: ENT TO ACTIVATE. Pressing ENTER will activate or deactivate the route depending upon its present status. After a route is deactivated, the route summary is displayed. If a route is activated, the NAV screen is displayed.

Deleting a Route

With a route in memory, press **MENU** until ROUTE appears at the top of the display. Press **ENTER**. While still viewing the Route Summary screen, press the UP ARROW three times until the display indicates PRESS ENT TO DELETE. Press **ENTER**. You will be prompted to confirm the deletion. Use the ARROWs to select YES or NO and press **ENTER**.

Adding Legs to a Route

With a route in memory, press **MENU** until ROUTE appears at the top of the display. Press **ENTER**. While still viewing the Route Summary screen, press the UP ARROW until the display indicates PRESS ENT TO ADDLEG. Press **ENTER**. The display changes to the Add Leg screen with END ROUTE flashing. As in creating a route, use the ARROW pad to select the new landmark for this leg. With the new TO landmark flashing, press **ENTER**. The newly created leg is added to the route. The process of adding a leg continues until you select END ROUTE or the route is full.
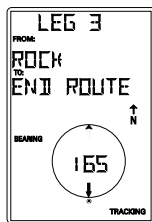
Activating a Leg in a Route

As you are navigating you may decide that you no longer wish to continue on the leg that you are now using. Instead you wish to use another leg of the route. You will need to activate the leg of the route with the desired destination (TO landmark).

Press **MENU** until ROUTE appears at the top of the display. Press **ENTER**. Use the LEFT/RIGHT ARROWs until the leg you wish to activate is displayed. Press the UP ARROW. If the leg is not active, the display indicates ENT TO ACTIVATE. Press **ENTER**. The leg has become activated, the NAV screen is displayed, and the receiver begins to compute the necessary information to continue you on the route using the leg you selected.

If the display indicates ENT TO DEACTVATE, it means that the receiver is using this leg to compute the navigational information. Pressing ENTER at this screen not only deactivates the leg and returns to the leg summary screen, but deactivates the route as well.

Editing a Leg in a Route

Press **MENU** until ROUTE appears at the top of the display. Press **ENTER**. Use the LEFT/RIGHT ARROWs until the leg you wish to edit is displayed. Press the UP ARROW until PRESS ENT TO EDIT is displayed and press **ENTER**.

The Edit Leg screen is displayed with the FROM landmark flashing. Use the LEFT/RIGHT ARROWs to select a new FROM landmark and press **ENTER**.

The TO landmark begins flashing alerting you that the GPS 310 is ready for you to select a new TO landmark. Press **ENTER** to accept the TO landmark as it is or use the LEFT/RIGHT ARROWs to select a new TO landmark and press **ENTER**.
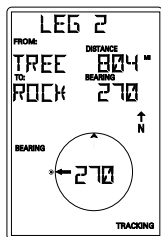
The leg before and after the one you just edited will be automatically changed to reflect the changes that were made to this leg.

Deleting a Leg From a Route

Press MENU until ROUTE appears at the top of the display.
Press ENTER. Use the LEFT/RIGHT ARROWs to find the
leg of the route that you want to delete. Press the UP
ARROW until PRESS ENT TO DELETE is displayed and
press ENTER.

The GPS 310 prompts you to confirm the deletion of the leg.
Use the LEFT/RIGHT ARROW to select (flashing) YES to
delete or NO to cancel.

If you attempt to delete a leg that causes the route to
contain a leg that is under the 0.1 mile leg distance
limitation, the receiver will display the message
INVALID DELETE.

Reversing a Route

Press MENU until ROUTE appears at the top of the display.
Press ENTER. Press the DOWN ARROW until PRESS
ENT TO REVERSE is displayed and press ENTER.

The GPS 310 prompts you to confirm the action. Use the
LEFT/RIGHT ARROW to select (flashing) YES to reverse or
NO to cancel and press ENTER.

Additional Features

Viewing the Time and Date

You can view the current time and date (obtained from the satellites) by repeatedly pressing the `MENU` key until TIME is displayed at the top of the screen.

Viewing Elevation

You can view the last computed elevation for your GPS 310 by repeatedly pressing the `MENU` key until ELEVATION is displayed at the top of the screen.

Viewing Battery Life

You can view the estimated battery life remaining by repeatedly pressing the `MENU` key until POWER is displayed at the top of the screen.
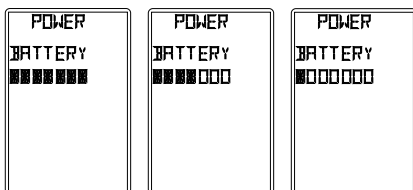
POWER BATTERY ▉▉▉▉▉▉▉	POWER BATTERY ▉▉▉▉□□□	POWER BATTERY ▉□□□□□□
Full Battery Life	40-60% Battery Life	Low Batteries

Changing Coordinate Systems

You may wish to change the coordinate system that your GPS 310 uses to display the position and landmarks coordinates.

You have the following options: LAT/LON using degree/ minutes (DEGMIN), LAT/LON using degree/minutes/ seconds (DEGMINSEC),Universal Transverse Mercator (UTM), OSGB, Irish, Swiss, Swedish, Finnish, French, or German. The choice you make will depend upon the maps or charts you may be using. You want your GPS 310 to be displaying the coordinates in the same mode that your map or chart uses.

The following example shows the same position in three different modes.

```
34 0657'      34 06 34'      3774603'
117 4957.      117 49 34.      11 423806'
```
| LAT/LON | LAT/LON | UTM |
| (DEGMIN) | (DEGMINSEC) | |

Press the **MENU** key until SETUP is displayed at the top of the screen and press **ENTER**. Press **ENTER** again and the currently used coordinate system begins to flash. Use the RIGHT/LEFT ARROWs to scroll through the list of coordinate systems and press **ENTER** when the desired system is displayed. Some coordinate systems require additional zone or format information. Use the arrow pad and **ENTER** to select the proper zone or format.

Changing Map Datums

If you are using a map (or chart) in conjunction with your GPS 310 you need to insure that the datum used by the GPS 310 matches the one used in creating the map. The map datum can usually be found in the legend box of the map or chart. The GPS 310 offers the choices of WGS84 (default), NAD27, AUST 84, EUROPE 50, GRB 36, IRELAND, KKJ, RT90, S AMERICA 69, SWISS, FRENCH, GERMAN, and TOKYO.

Press the MENU key until SETUP is displayed at the top of the screen and press ENTER. Use the RIGHT ARROW until SETUP MAP DATUM is displayed. Press ENTER again, the currently used map datum begins to flash. Use the RIGHT/ LEFT ARROWS to scroll through the list of map datums and press ENTER when the desired datum is displayed.

Some coordinate systems can be used only with a specific datum (i.e., OSGB coordinate system can be used only with the GRB 36 datum). Your GPS 310 automatically selects the proper datum when you select that coordinate system and will not allow you to change the datum until you select a different coordinate system.

Changing Distance Units

Your distance units can be in miles and miles per hour (MI-MPH), nautical miles and knots (NM-KTS), or kilometers and kilometers per hour (KM-KPH). To change the units, press **MENU** until SETUP is displayed at the top of the screen and press **ENTER**. Use the RIGHT ARROW until SETUP UNITS is displayed. Press **ENTER** again and, the distance unit of measure begins to flash. Use the RIGHT/LEFT ARROWs to scroll through the list of units and press **ENTER** when the desired unit of measure is displayed.

Changing Time Display and Time

To change the way that time is displayed (12 HOUR- default, 24 HOUR, or UT), repeatedly press **MENU** until SETUP is displayed at the top of the screen and press **ENTER**. Use the RIGHT ARROW until SETUP TIME is displayed. Press **ENTER** again and the time display begins to flash. Use the RIGHT/LEFT ARROWs to scroll through the list and press **ENTER** to select. The screen changes to TIME SET. Use the ARROW pad to set the time and press **ENTER** when done. (You are not prompted to set the time if you selected UT as the time format.)

When you change your clocks because of daylight savings time, remember to change the time in your GPS 310.

Changing North Reference

The GPS 310 uses *magnetic north* as a default reference for all navigation computations. You can change this to *true north* (good if you are also using a map) or back to *magnetic north* (default, good to use if you are using a compass) under the SETUP menu. Press the [MENU] key until SETUP is displayed at the top of the screen and press [ENTER]. Use the RIGHT ARROW until SETUP NORTH REF is displayed. Press [ENTER] again, the north reference begins to flash. Use the RIGHT/LEFT ARROWs to scroll between MAGNETIC and TRUE and press [ENTER] to select.

Initializing the Receiver (EZSTART)

If you desire to re-initialize the receiver, (for example, you have moved more than 300 miles since the last time the receiver was turned on) you can do so in the SETUP menu. Press [MENU] until SETUP is displayed at the top of the screen and press [ENTER]. Use the RIGHT ARROW until SETUP PRESS ENT TO EZSTRT is displayed. Press [ENTER] again and the receiver prompts you to enter the necessary data.

SELECT REGION. Use the ARROW pad to change the flashing text to select the appropriate region for your present location. Press [ENTER].

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SELECT COUNTRY or STATE. Use the ARROW pad to change the flashing text to select the country or state for your present location.

Press **ENTER**.

ENTER ELEVATION. Use the ARROW pad to enter the approximate elevation for your position. If unknown, leave the elevation at 0. Press **ENTER**.

ENTER TIME. Use the ARROW pad to enter your present time. Press **ENTER**.

ENTER DATE. Use the ARROW pad to enter the date. Press **ENTER**.

Note: The prompts to enter time and date will not appear if your receiver has already collected this information from the satellites.

Activating the Demo Mode

To turn on the Demo Mode, press **MENU** until SETUP is displayed at the top of the screen and press **ENTER**. Use the RIGHT ARROW until SETUP DEMO is displayed. To toggle between ON or OFF, press **ENTER**. The present status, on or off, will flash. Use the LEFT/RIGHT ARROWs to switch between on and off and press **ENTER**.

While in the Demo Mode, the receiver displays sample information on the *POSITION* and both *NAVIGATION* screens.

Setting Display Contrast

To adjust the contrast of the display, press
MENU until SETUP is displayed at the
top of the screen and press **ENTER**. Use
the LEFT/RIGHT ARROW until SETUP
CONTRAST is displayed and press
ENTER. Use the LEFT/RIGHT AR-
ROW keys to change the contrast to the
desired level and press **ENTER**.

```
 SETUP
CONTRAST
█████□□
```

Using the Trip Odometer

Press **MENU** until the ODOMETER is
displayed. The odometer will keep track
of the distance you have traveled while
using your GPS 310. To reset the
odometer press **ENTER**. You will be asked
to confirm that you really want to reset the
odometer to zero. Use the LEFT/RIGHT
ARROWs to highlight (blinking) YES and
press **ENTER**.

```
 000250"
ODOMETER
```
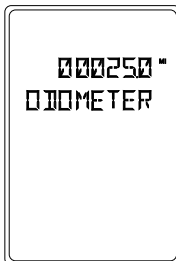
Connecting to External Devices

The GPS 310 is designed to interface to a PC or other devices using a data cable. The GPS 310 continuously outputs NMEA messages through the data port at a rate of every 1 second. The GSV message is output all the time including when the receiver is not computing fixes. After the first fix is computed, GSA, GLL, GGA and RMC messages are also output. These messages contain position, time, date, satellite position as well as other status information. These messages can be used by a variety of navigation software packages available for the personal computer.

If the receiver is computing fixes and has a route set (either a GOTO or a multi-leg route) the RMB and APB messages are also output. The RMB and APB contain information (steering, distance to destination, etc.) used to navigate to the route destination. These messages are used by autopilots and marine navigation software.

Connecting the GPS 310 to a Personal Computer (PC)
Connect one end of the data cable to the back of the GPS 310 and connect the other end of the data cable (the end with the DB9 connector) to the serial port on the personal computer. Now any application that you run on your PC that accepts NMEA messages will be able to receive that information from your GPS 310.

NOTE: Be sure that your PC software is set to the COM port that you connected your data cable to and that the baud rate is set to 4800 baud.

Connecting the GPS 310 to an Autopilot Device
To connect the GPS 310 to an autopilot or other external
device you may need to cut off the DB9 connector and "hard
wire" the cable to the device. The cable configuration is as
follows:

Orange: Data Out
Yellow: Data In
Black: Ground
Red: Power (DO NOT USE)

Refer to the manual on the external device and connect the
wires to their proper place. Be careful and double check your
connections before applying power to the external device as an
improper connection could damage the GPS 310 and void its
warranty.

Connecting the GPS 310 to a DGPS Receiver
The GPS 310 is capable of receiving differential corrections
from a differential receiver for improved accuracy. By
connecting a differential beacon receiver (DBR), such as the
Magellan DBR IV, to the GPS 310, corrections are automati-
cally applied to the position and velocity computed by the
receiver. If corrections are being applied to the GPS 310,
"DGPS" will appear on the top of the position screen.

The GPS 310 accepts standard RTCM v2.1 messages at 4800
baud rate. You can use either the Data Cable, Power/Data
Cable or PC Cable with Cigarette Lighter to connect the GPS
310 to the DBR.

NMEA Data Messages

NMEA DATA MESSAGES. NMEA data is output at 4800 baud, 8, N, 1, checksum off. These settings are acceptable to most equipment and software applications.

Your GPS receiver outputs the following NMEA 0183 version 2.1 messages.

GSA, GSV, GLL, GGA, RMB, RMC and APB.

Vers. 2.1 NMEA is recommended for navigation data, satellite data and autopilots.

NMEA Message Definitions

APB   Revised autopilot message contains all of the above plus: heading to steer toward destination, bearing from the present position to the destination (magnetic or true).

GGA   GPS position, time, fix quality, number of satellites used, HDOP (Horizontal Dilution of Precision), differential reference information, and age.

GLL   GPS-derived latitude, longitude, and time of fix.

GSA   GPS receiver operating mode, satellites used in the navigation solution reported by the $-GGA sentence and DOP (Dilution of Precision) values.

GSV   Number of satellites in view, satellite numbers, elevation, azimuth, and SNR value.

RMB   Data status, cross track error, direction to steer, origin, destination landmark, landmark location, bearing to destination, and velocity toward the destination.

RMC   Time, latitude, longitude, speed, heading, and date.

APB   Autopilot Sentence "B"

```
   1 2 3    4 5 6 7 8   9 10  11 12 13  14
APB,A,A,x.x,a,N,A,A,x.x,a,c—c,x.x,a,x.x,a*hh
```

1   Status: *A = Data valid*

V = Loran-C Blink or SNR warning

V = general warning flag for other

navigation systems when a

reliable fix is not available.

2   Status: V = Loran-C cycle lock warning flag

A = OK or not used

3   Magnitude of XTE

4   Direction to steer (L, R)

5   XTE units, nautical miles

6   Status: A = arrival circle entered

7   Status: A = perpendicular passed at waypoint

8-9 Bearing origin to destination, M/T

10   Destination waypoint ID

11-12 Bearing, present position to destination,
     Magnetic or True

13-14 Heading to steer to destination waypoint,
     Magnetic or True

GGA   Global Positioning System Fix Data

```
   1        2     3 4         5 6 7  8   9  10 11
GGA,hhmmss.ss,1111.11,a,yyyyy.yy,a,x,xx,x.x,x.x,M,x.x,

    12 13   14
    M,x.x,xxxx*hh
```

   1   UTC of Position
   2-3 Latitude - N/S
   4-5 Longitude - E/W
   6   GPS Quality Indicator
        0 = fix not available or invalid
        1 = GPS SPS Mode, Fix valid
        2 = Differential GPS, SPS Mode, fix valid
        3 = GPS PPS Mode, fix valid
   7   Number of satellites in use (00-12, may be
        different from the number in view)
   8   Horizontal dilution of precision
   9   Antenna altitude above/below mean sea level
   10   Units of antenna altitude, meters
   11   Geoidal separation - difference between the WGS-
        84 earth ellipsoid and mean sea level (geoid), "-
        " = mean sea level below ellipsoid
   12   Units of geoidal separation, meters.
   13   Age of Differential GPS data - Time in seconds
        since last SC104 Type 1 or 9 update, null field
        when DGPS is not used
   14   Differential reference station ID, 0000-1023

GLL   Geographic Position — Latitude/Longitude

```
   1        2 3        4 5          6
GLL,1111.11,a,yyyyy.yy,a,hhmmss.ss,A*hh
```

```
   1-2    Latitude, N/S
   2-3    Longitude, E/W
   4      UTC of position
   6      Status  A = Data valid
                  V = Data not valid
```

GSA   GPS DOP and Active Satellites

GPS receiver operating mode, satelites used in the navigation solution reported by the $--GGA sentence, and DOP values.

```
   1 2 3                                        4
GSA,a,x,xx,xx,xx,xx,xx,xx,xx,xx,xx,xx,xx,xx,
```

```
5  6  7
x.x,x.x,x.x*hh<CR><LF>,
```

```
   1    Mode: M=Manual, forced to operate in 2D or
        3D mode,
             A=Automatic, allowed to automatically
        switch 2D/3D
   2    Mode: 1= Fix not available, 2=2D, 3=3D
   3-4  PRN numbers of satellites used in solution
        (null for unused fields)
   5    PDOP
   6    HDOP
   7    VDOP
```

GSV   GPS Satellites in View

Number of satellites (SV) in view, PRN numbers,
elevation, azimuth and SNR value. Four satel-
lites maximum per transmission, additional
satellite data sent in second or their message.
Total number of messages being transmitted and
the number of messages being transmitted is
indicated in the first two fields.

```
 1 2 3  4  5  6  7           8  9  10  11
GSV,x,x,xx,xx,xx,xxx,xx..........xx,xx,xxx,xx*hh<CR><LF>
```

1   Total number of messages, 1 to 3

2   Message number, 1 to 3

3   Total numer of satellites in view

4   Satellite PRN number

5   Elevation, degrees, 90° maximum

6   Azimuth, degrees True, 000 to 359

7   SNR (C/No) 00-99 dB, null when not tracking

8-9 2nd-3rd SV

10-11 4th SV

Notes: 1) Satellite information may require the
transmission of multiple messages. The first
field specifies the total number of messages,
minimum value 1. The second field identifies
the order of this message (message number),
minimum value 1.

2) A variable number of "PRN-Elevation-Azimuth-
SNR" sets are allowed up to a maximum of four
sets per message. Null fields are not required
for unused sets when less than four sets are
transmitted.

RMB   Generic Navigation Information (immediately follows RMC)

```
   1 2    3 4    5    6        7 8        9 10
RMB,A,X.XX,a,c--c,c--c,1111.11,a,yyyyy.yy,a,x.x,

 11  12 13 14

 x.x,x.x,A *hh
```

   1   Data Status (A = valid, V = invalid)

   2-3 XTE, naut. miles and direction to steer (L
        or R) [If XTE exceeds 9.99 NM, display 9.99
        in field 2.]

   4   Origin waypoint ID

   5   Destination waypoint ID

   6-7 Destination Waypoint Latitude (N or S)

   8-9 Destination Waypoint Longitude (E or W)

   10   Range naut. miles, present fix to destina-
        tion waypoint Great Circle. [If range exceeds
        999.9 nm, display 999.9.]

   11   Bearing, True, Great Circle, Present fix to
        dest. waypoint

   12   Closing velocity to destination, knots

   13   Arrival (OR'ed arrival circle and crossing
        of line which is perpendicular to the course
        line and which passes through the destination
        waypoint.)

   14   CHECKSUM (Mandatory in this sentence.)

RMC   Transit Specific (to be followed by RMB)

```
   1      2 3       4 5      6 7   8 9       10
RMC,hhmmss.ss,A,1111.11,a,yyyyy.yy,a,x.x,x.x,xxxxxx,x.x,a
*hh
```

    1   Time, UTC of position fix
    2   Status (A = valid, V = Navigation receiver
         warning)
    3-4 Latitude at UTC time, N or S
    5-6 Longitude at UTC time, E or W

    7   Speed over ground, knots
    8   Course over ground, degrees
    9   Date (DDMMYY)

    10   Magnetic variation, degrees
    11   Magnetic variation, sense (E or W)
    12   CHECKSUM (Mandatory in this sentence)

The formats listed are NMEA formats and Magellan receivers may not output all of the information listed for a particular format.

> A complete copy of the NMEA specifications can be obtained from:
>
> NMEA, PO Box 3435 New Bern, NC 28564-3435

Troubleshooting

Does not turn on:

1. Check to insure that the batteries are installed correctly and that the battery terminals are clean.

2. Replace the batteries.

Takes more than 10 minutes to get a position fix:

1. If there are large obstacles nearby or overhead, move to a new location with a clear view of the sky and turn the receiver back on.

2. Make sure that the antenna is pointing up and that it is a reasonable distance from your body.

3. Check that the time is correct. If not, reset the time following the instructions for "Changing Time Display and Time" on page 28.

4. If the receiver still does not get a position fix within 10 minutes, you may wish to repeat the EZSTART initialization procedure found on page 29.

Cannot view the second navigation screen:

1. The second navigation screen is displayed **only** if you have an active route or GOTO. Activate a route or GOTO and use the NAV key to scroll to the second navigation screen.

Destination Pointer does not point to the destination:

1. Note that much of the navigation information is based upon your movement. If you are standing still the

navigation information (destination pointer, etc.) is not updated until you are moving. (The receiver is unable to detect which way you are facing while you are stationary.)

Position coordinates on your receiver do not match the location on your map.

1. Make sure that your receiver is set up to use the same datum as your map. The map datum is generally shown in the map legend. See Map Datum under Setup for instructions on selecting the map datum in your receiver.

2. Check your LAT/LON format. Make sure that the format selected in COORDINATE SYSTEM (DEG/MIN/SEC or DEG/MIN.MM) is in the same format as the map you are using.

Receiver turns off unexpectedly.

1. This most commonly is caused by excessive static electricity. Turn the receiver back on and it should operate normally. Move the receiver to a different location to aviod a similar occurance.

Frequently Asked Questions

Does the receiver adjust itself for daylight savings time?

No. You need to reset the time for changes in your area. (See "Changing Time Display and Time" on page 28.)

Will my receiver function correctly in the year 2000?

Absolutely. Even though only the last two digits of the year are displayed, the full year designator is stored in memory.

Why won't the receiver accept the coordinates higher than 59 seconds when I am inputting coordinates?

The most common cause of this is you are trying to enter coordinates that are in degrees/minutes while your receiver is set to degrees/minutes/seconds. Since the last two digits in degrees/minutes is in hundredths (00 - 99) and degrees/minutes/seconds can be no higher than 59 (00 - 59), inputting a number higher than 59 while in deg/min/sec results in an error and the receiver does not accept the entry.

Can I use NiCad Batteries in my GPS 310?

Yes. However, the battery life of your GPS 310 will be diminished with the use of NiCad batteries.

Can I attach my GPS 310 to external power?

Yes. However, this requires the optional external power cable available from your dealer or Magellan Corporation.

Will I lose all my landmarks when my batteries die?

No. As long as you leave the batteries inside the GPS 310, memory will be retained for up to one month, even with dead batteries. (With good batteries installed, you can store your GPS 310 for six months without losing any memory.) When you remove batteries, you have 30 minutes to install new batteries before memory is lost.

**Why does my speed and elevation sometimes jump around?**

For security reasons, the U.S. Government introduces small errors (selective availability) which can affect positioning information. These errors are most noticeable while viewing speed, heading, and elevation.

Icons

TRACKING Provides a visual indication of whether the receiver is "locked" or "unlocked" on satellite signals. While the tracking icon is displayed, the receiver is updating its position and can be used to save landmarks and as a navigation tool. If the tracking icon is not displayed, you may need to reposition the GPS receiver to get a better view of the sky.

▭▬ **Battery Warning.** When this icon first appears, the receiver will operate for about an additional hour before automatically turning off.

The Magellan GPS 310 will retain its memory (route, landmarks, last fixes, etc.) for 30 minutes with the batteries removed. **Memory will be retained even with low batteries for approximately one month if the unit is turned off.**

☼ **Light.** Displayed when the LCD backlight has been turned on with the [☼] key. The backlight will cause the batteries to run down much quicker and should be turned off when not needed.

EXT POWER **External Power.** Displayed when the GPS 310 is operating from external power using the GPS External Power Cable.

Contacting Magellan

If after using the troubleshooting section, you are still unable to solve your operation problem, please call Magellan's Technical Service at 800-707-9971. Representatives are available Monday through Friday, from 7 a.m. to 5 p.m., Pacific Standard Time. Faxes can be sent to 909-394-7070.

If necessary, you can also return your unit to Magellan for repair. (Please call for assistance first.) Ship the unit to Magellan Corporation by Parcel Post or UPS and include a description of the problem, your name, address, phone number and a copy of your sales receipt. If your return shipping address is different, please include it.

With all correspondence, please be sure to state the model of the receiver you have and if calling, please be sure to have your unit with you.

To return your receiver for repair, please call Magellan Service at 1-800-669-4477 or 1-909-394-5000 to obtain return authorization.

Accessories

Accessories for your Magellan GPS 310 are available from your Magellan dealer or you can order directly from Magellan using the order card supplied with your receiver.

Carrying Case: Protects your GPS 310 from the elements and allows you to carry your GPS 310 on your belt, keeping it handy for when you need it.

Mounting Bracket: Mounts on a dashboard or other surface allowing you hands-free operation of your GPS 310. Allows the use of the External Power Cable while the receiver is resting in the bracket putting your GPS 310 where you want it and always ready to use.

External Power Cable: Connects your GPS 310 to a cigarette lighter allowing uninterrupted use without any drain on your batteries. (Do **not** connect the GPS 310 to external power without the External Power Cable.)

Instructional Video: A 30-minute instruction video in VHS format that provides you with instructions on how to use and operate your GPS 310.

Data Cable: Connects the GPS 310 to a PC using a DB-9 connector.

PC Cable with Cigarette Lighter Adapter: Allows you to connect the GPS 310 to a cigarette lighter for external power.

Power/Data Cable: Connects the GPS 310 to external power and/or external devices. (Bare wires).

Attaching the Wrist Lanyard

The lanyard for your GPS 310 can be easily attached by inserting the small loop of the lanyard through the ring provided on the battery door locking screw and then looping the other end of the lanyard strap through the small loop.
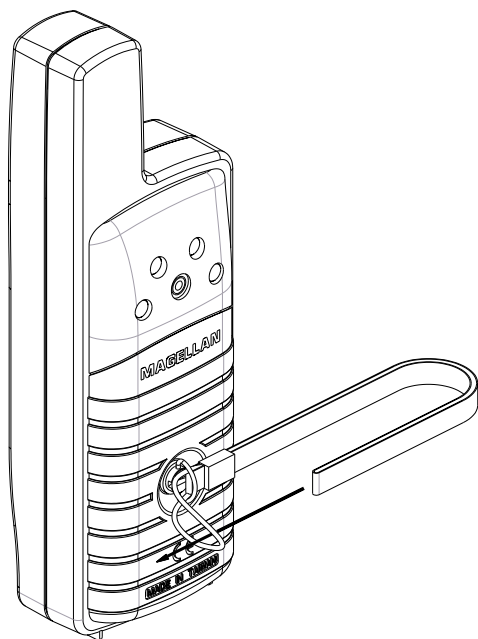
Shipping / Transporting

If you ship or transport your GPS 310 more than 100 miles, you may need to reinitialize the GPS 310 again at your new location. This will speed up the time it takes to get your first fix after shipment.

Also, prior to shipping, you should loosen the battery door screw if you feel that your GPS 310 may be placed in an unpressurized area of an aircraft. Loosening the battery door will allow the GPS 310 to equalize to the pressure of the cargo area. Changes in pressure without the battery door loosened can cause damage to the water seals of your receiver.

Glossary

Active Leg   The segment of a route currently being used to compute navigational information.

Bearing   The compass direction from your position to a destination, measured to the nearest degree.

Coordinates   A unique numeric or alphanumeric description of position.

Datum   Refers to the theoretical mathematical model of the earth's sea level surface. Map makers may use a different model from which to chart their maps, so position coordinates will differ from one datum to another. The datum for the map you are using can be found in the legend of the map. If you are unsure as to which datum to use, use WGS84.

Elevation   Distance above mean sea level.

GOTO   A single leg route with the present position being the start of the route and a defined landmark as the destination. (If the unit has been moved while turned off and has not yet acquired a new position fix, the start of the GOTO will be the position fix last recorded.)

Heading   The compass direction in which the Magellan GPS 310 is moving.

Landmark	A location saved in the unit's memory which is obtained by entering data, editing data, calculating data or saving a current position. Used to create routes.
Latitude	The angular distance north or south of the equator measured by lines encircling the earth parallel to the equator in degrees from 0° to 90°.
LAT/LON	Coordinate system using latitude and longitude coordinates to define a position on the earth.
Leg (**Route**)	A segment of a route that has a starting (FROM) landmark and a destination (TO) landmark. A route may consist of 1 or more legs. A route that is from landmark A to landmark B to landmark C to landmark D has three legs with the first being from landmark A to landmark B.
Longitude	The angular distance east or west of the prime meridian (Greenwich meridian) as measured by lines perpendicular to the parallels and converging at the poles from 0° to 180°.
Magnetic North	The direction toward the north magnetic pole from the observer's position.
Position Fix	Position coordinates as computed by the Magellan GPS 310.

TTG	Time To Go (TTG) is the measurement of how long it will take you to arrive at your destination. TTG is based on how fast you are moving towards the destination and the distance remaining.
True North	The direction to the geographical North Pole from an observer's position. The north direction on any geographical meridian.
UT	Universal Time, formerly referred to as Greenwich Mean Time (GMT).
UTM	Universal Transverse Mercator (UTM) is the metric grid system used on most large and intermediate scale land topographic charts and maps.
XTE	Cross Track Error (XTE) is the distance, left or right, of the desired courseline. The courseline is a straight line from your present position to your destination.

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Specifications

Performance:

Receiver:	12 parallel-channel receiver with quadrifilar antenna, tracks up to 12 satellites to compute and update position information.
Acquisition Times:	Warm (within 1 hour of last use) - Approx. 25 seconds Cold (immediately after initialization) - Approx 1.0 minute
Update Rate:	1 second continuous
Accuracy:	Position - 49 feet (15 meters) RMS (without Selective Availability)
	Velocity - 0.12 mph RMS steady state (without Selective Availability)

Physical:

Weight:	6.8 ounces
Housing:	Waterproof Construction
Temperature:	0°C to 50°C (operating) -10°C to 60°C (storage)

Features:

No. of Landmarks:	100 stored landmarks
No. of Routes:	1
Legs per route:	10 maximum

Power:

Source:	2 AA alkaline batteries or 3.3 VDC (±2%) 110 mA at receiver or 9-16 VDC with Magellan External Power Cable
Battery Life:	Approximately 20 hours operation

MAGELLAN

SATELLITE ACCESS TECHNOLOGY

960 Overland Court, San Dimas, CA 91773