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15

Instruction Manual

Introduction

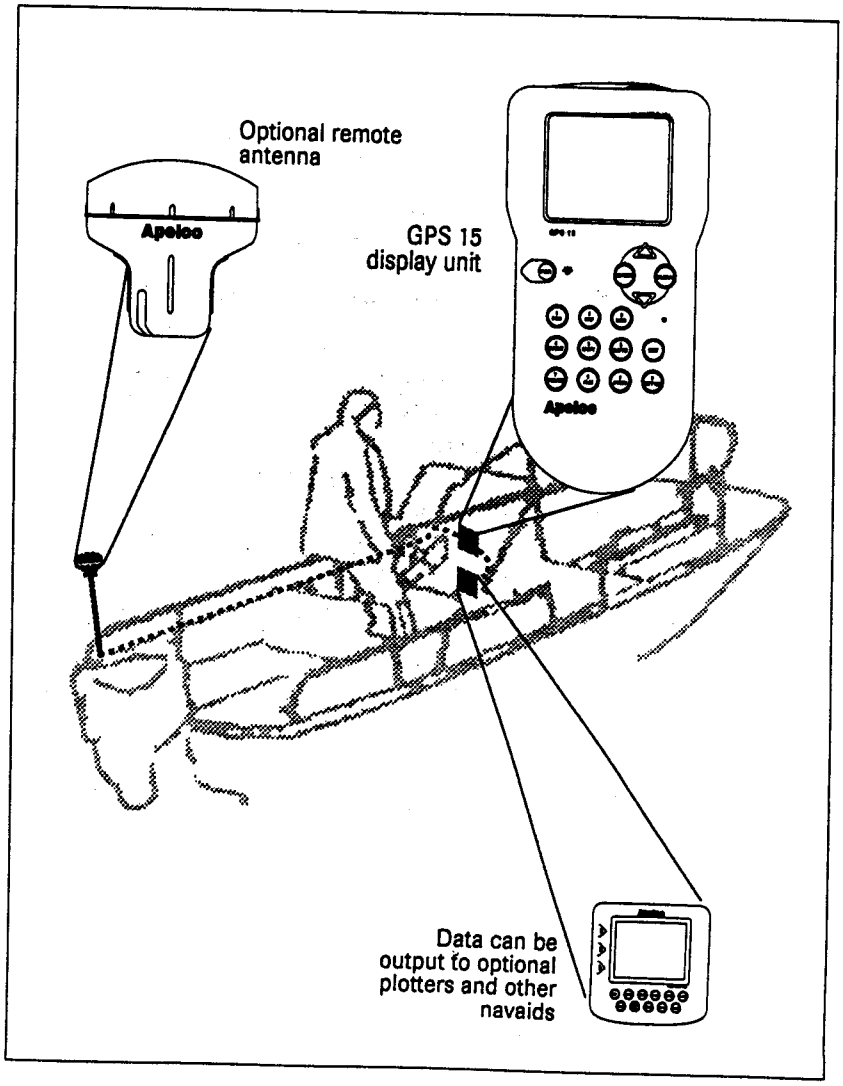
About the GPS 15

The GPS 15 incorporates the latest in GPS technology and has DGPS capabilities (with the optionally available receivers) to make your navigation as simple and accurate as it can be. The automatic features and on-screen prompts make operation a breeze. Simply press one key and the most useful navigational information is displayed in large clear characters on the high contrast display.

System Components
The standard GPS 15 consists of a compact handheld display unit with built-in GPS capabilities.

Additional GPS capabilities are available with the optional Remote GPS Antenna.

Use of the DGPS capabilities requires the optional Remote GPS Antenna and the Apelco BR 101 Differential Beacon Receiver.



We know you will appreciate the GPS 15's space saving compact size, totally waterproof cabinet, and attractive design with a common sense approach to operation. A great deal of care and effort has been put into providing you with a quality product that will give you trouble-free operation aboard your vessel for many boating seasons.

Unpacking and Inspection

When unpacking your unit, the following standard equipment should be found in the carton. If any items are missing, please notify your APELCO dealer immediately.

Standard Equipment

Description	Part No.
GPS 15 Main Unit (1)	M93503
Instruction Manual (1)	DC52-JLR-4410R
Spare Fuse (1)	5ZFAD00015
Screws, tapping	BRTG03052
Alkaline Battery (4)	~~CMB-8631~~

Optional Accessories

Description	Part No.
Remote GPS Antenna	M93517
BR101 Beacon Receiver	M93516
Soft Storage/Carrying Case	M99-119

Optional accessories and parts can be purchased directly from Apelco Marine. For prices and ordering information, please call our Parts Dept. at (603) 881-9605.

2 Installation

Installing the Display Unit

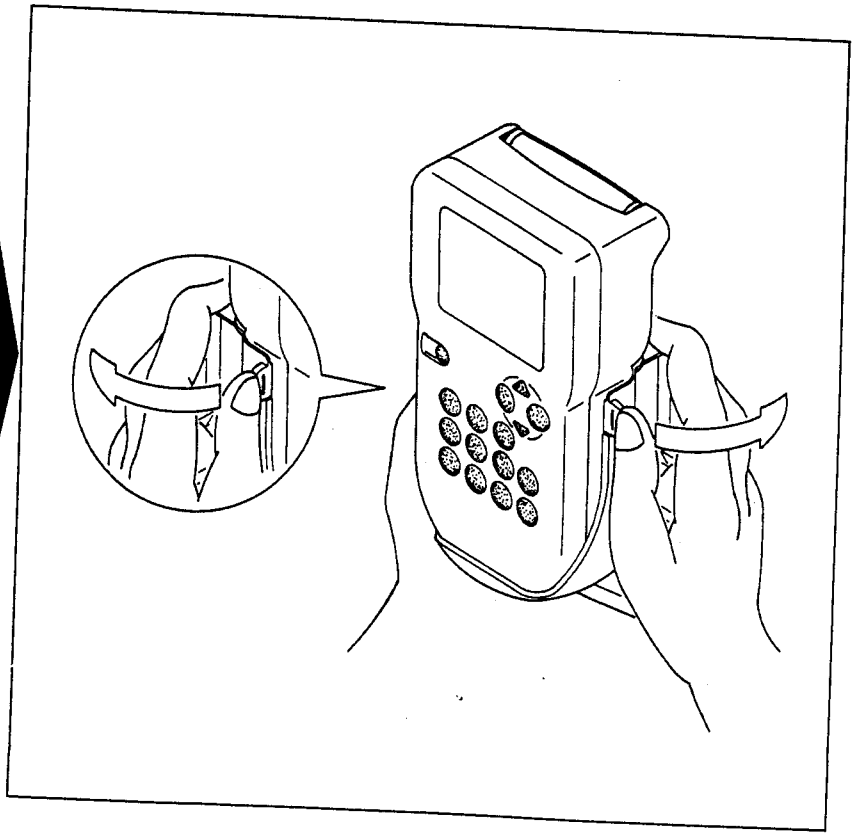
Mount the display unit on any flat surface using the mounting kit supplied.

LCD displays have a specific viewing angle so, before selecting a permanent mounting location, you may wish to apply power to the unit and test the visibility of the display from a few different angles.

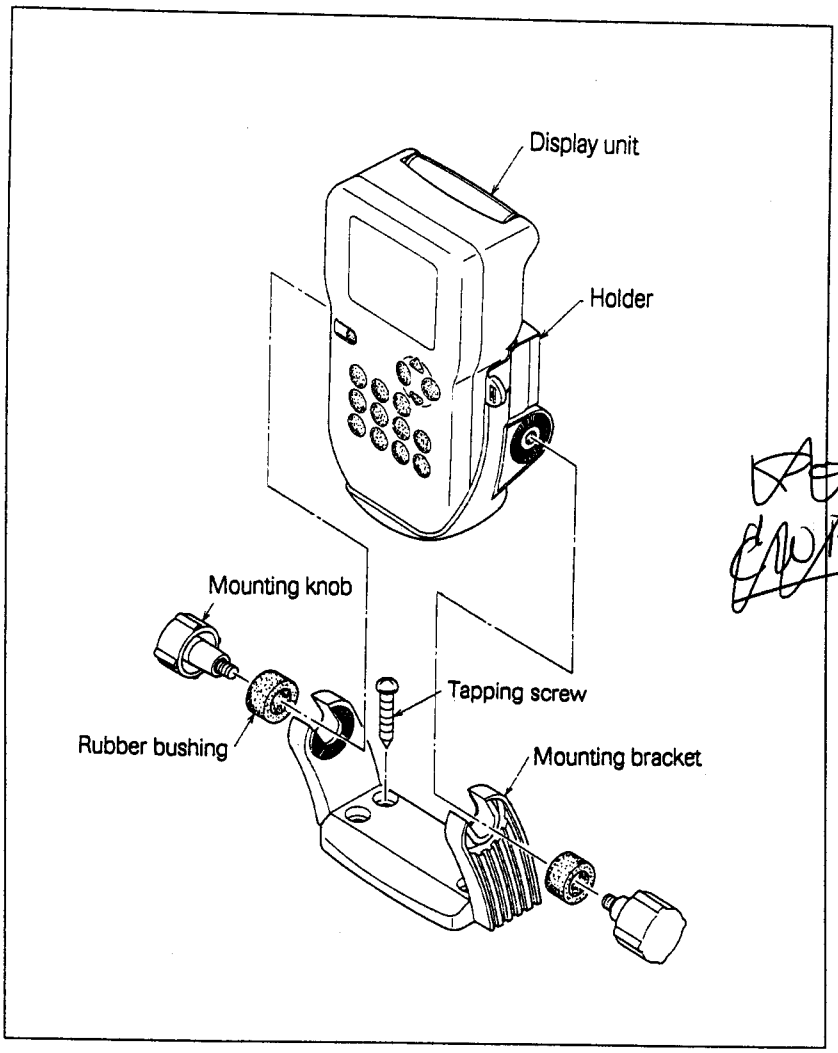
To mount the display:

1 Loosen the knobs on each side of the display unit.
2 Remove the bracket from the holder and display unit.
3 Remove the display unit from the holder:
   - ➲ Push back the thumb tabs with both hands.
   - ➲ The unit will release. DO NOT remove the unit before releasing the thumb tabs. If you do so, the holder will be permanently damaged.
   - ➲ Remove the unit.

CAUTION
Make sure to push back both thumb tabs to release the display unit from the holder. Forcing may permanently damage the holder or display unit.



4 Mount the bracket with the supplied screws.
5 Attach the holder to the bracket.
6 Hand tighten the knob loosely to fix the holder in place.
7 Slide the display unit into the holder until it clicks and the thumb tabs grasp the display unit.
8 Adjust for the optimum viewing angle and tighten the knob.



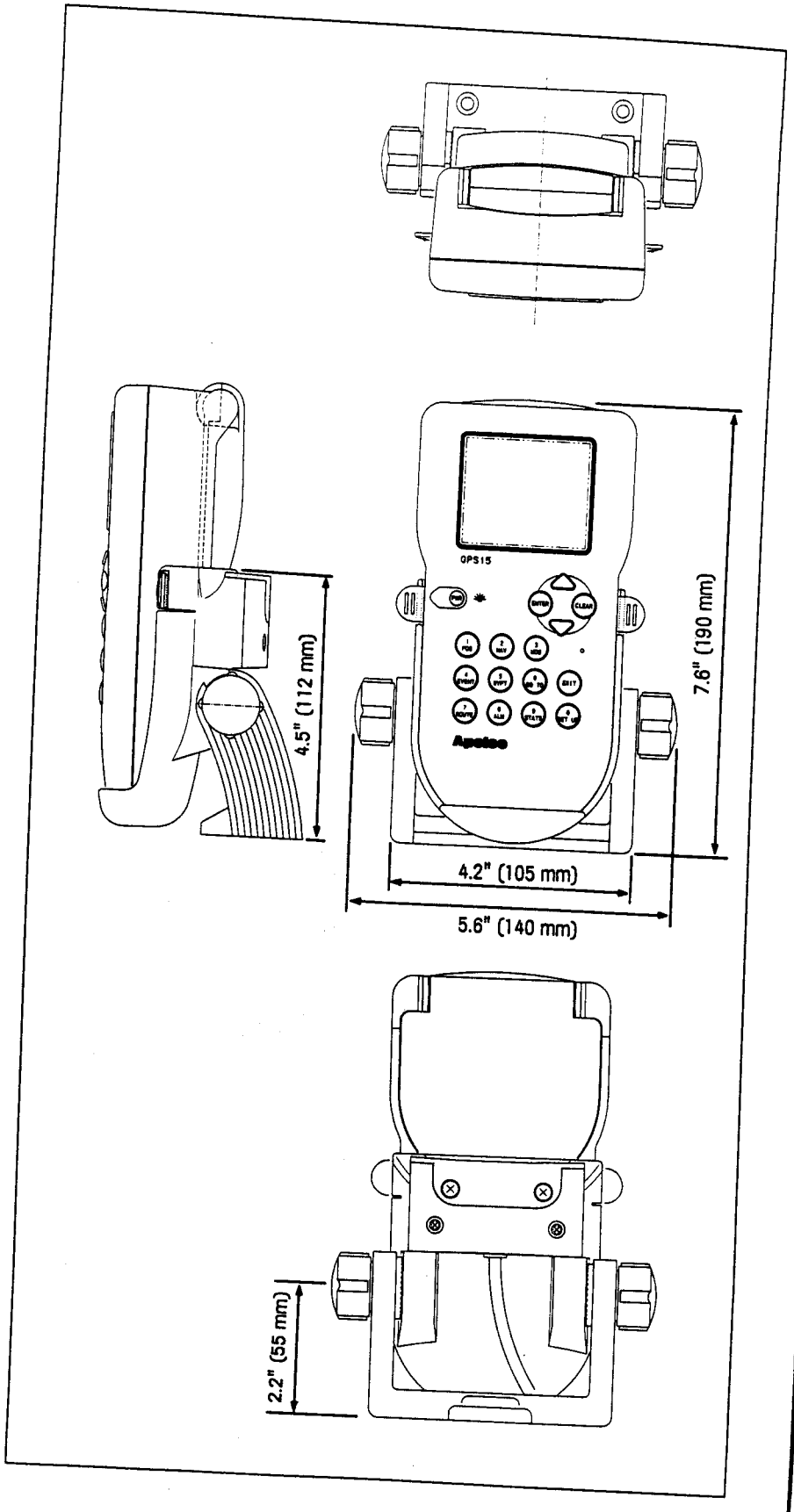
Before final installation of the display unit, make sure that the optimum viewing angle is achieved on the LCD from the navigation station.

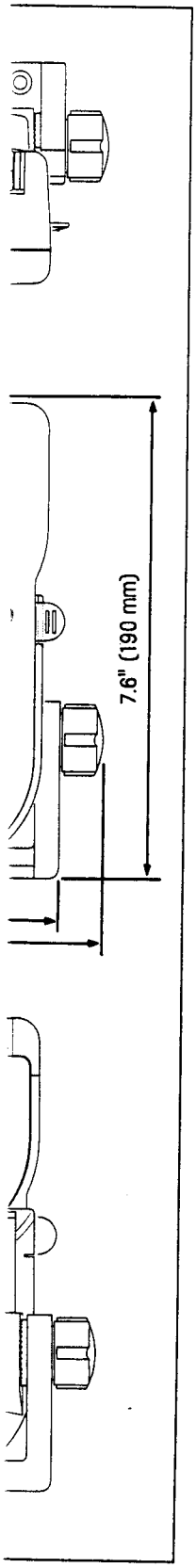
Handheld Operation

To maximize battery life, in the Set-up Mode, set Sleep Mode to on and Data Out to off to save power. See Set-up Mode for details.

See above for instructions on removing and replacing the unit in the holder. The holder connects the unit to your vessel's power, conserving battery life.

When carrying the unit, the optional soft storage/carrying case (part # M99-199) comes in handy.


4.5" (112 mm)
7.6" (190 mm)
4.2" (105 mm)
5.6" (140 mm)
2.2" (55 mm)

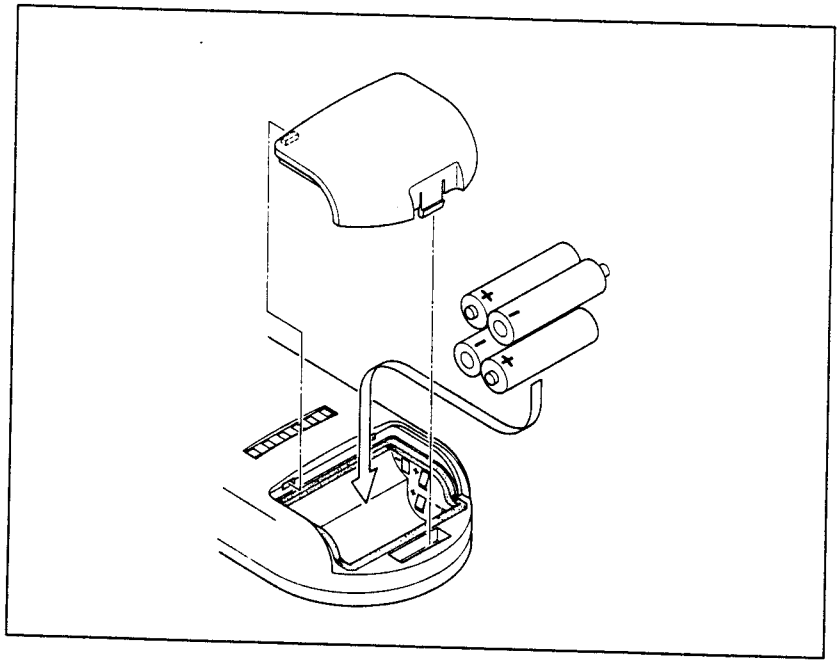


Making the Electrical Connections

The unit has several electrical connections. The GPS data output is only necessary when interfacing to another product.

Installing the Batteries

Insert the four batteries as shown below. Installation is the same for ni-cad and alkaline batteries. To open the battery compartment, press on the place marked PUSH on the bottom of the display unit. The battery cover may then be removed.



Connecting DC Power

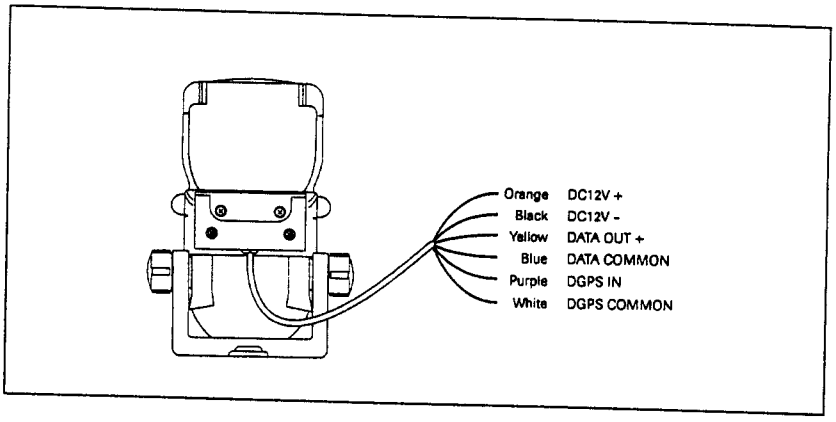
The unit requires 13.5 volts DC negative ground. The source must be capable of supplying 1.5 amps. The power cable has a 2 amp in-line fuse for protection.

Observe proper polarity, red is positive (+) and black is negative (–). The power cable is connected to the holder of the unit and should reach the source of DC power. The unit and the holder have identical six-pin square connectors. The unit obtains power through this connection when it is properly inserted into the holder. The unit's power consumption is less than 3 watts. However, if the power cable leads need to be extended more than 10 feet, the wire size of the leads should be increased accordingly to minimize line losses. For runs of 20–35 feet, use #12 AWG.

Separate the wiring as much as possible from other devices to prevent electrical noise interference. Avoid grouping the unit's power connections with radar, steering, or other power leads on the same circuit breaker.

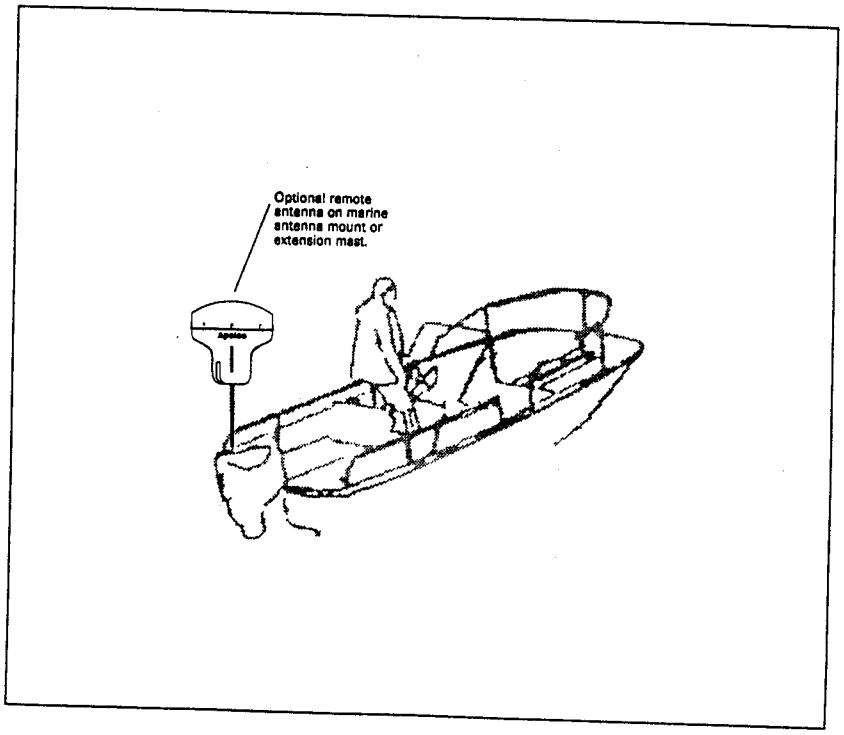
Connecting for Data Output (DATA Connector)

You can interface your unit with Auto-Pilots, etc. The type of data output is NMEA 0183. See Input and Output Data in the Reference section of this manual for more information.



Installing the Optional Remote Antenna

The optional remote antenna consists of a receiving antenna that receives GPS signals, and a broadcasting antenna that broadcasts GPS signals to the GPS 15 itself. The broadcast antenna is mounted on the holder, and the receiving antenna is mounted on the outside of your boat where is has a panoramic view of the horizon.



Mounting the Receiving Antenna

The antenna is designed to receive signals from orbiting satellites in a direct path. Mount the antenna unit vertically in a location that is open and clear of any masts, search lights, or other structures that could block the path of signals.

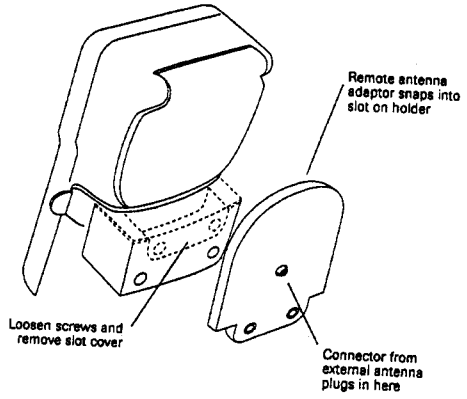
For ideal signal reception, the GPS sensor's ability to receive across the horizon is of more importance than its height.

The lower the antenna can be mounted and still maintain a clear view of the horizon, the more accurate your position will be. See GPS Basics in the Reference section for details.

Avoid mounting to the tops of masts on sailboats as excessive pitch and roll may cause instability in position calculations. Separate the GPS antenna at least 3 feet from other communication antennas and do not locate in the direct path of a radar antenna beam.

Mounting the Remote Antenna Adaptor

1. Loosen the screws on the cover on the holder and remove the cover.
2. Slide the remote antenna adaptor into the slot until it clicks.
3. Replace the screws.
4. Insert the cable from the receiving antenna into the plug on the remote antenna adaptor.



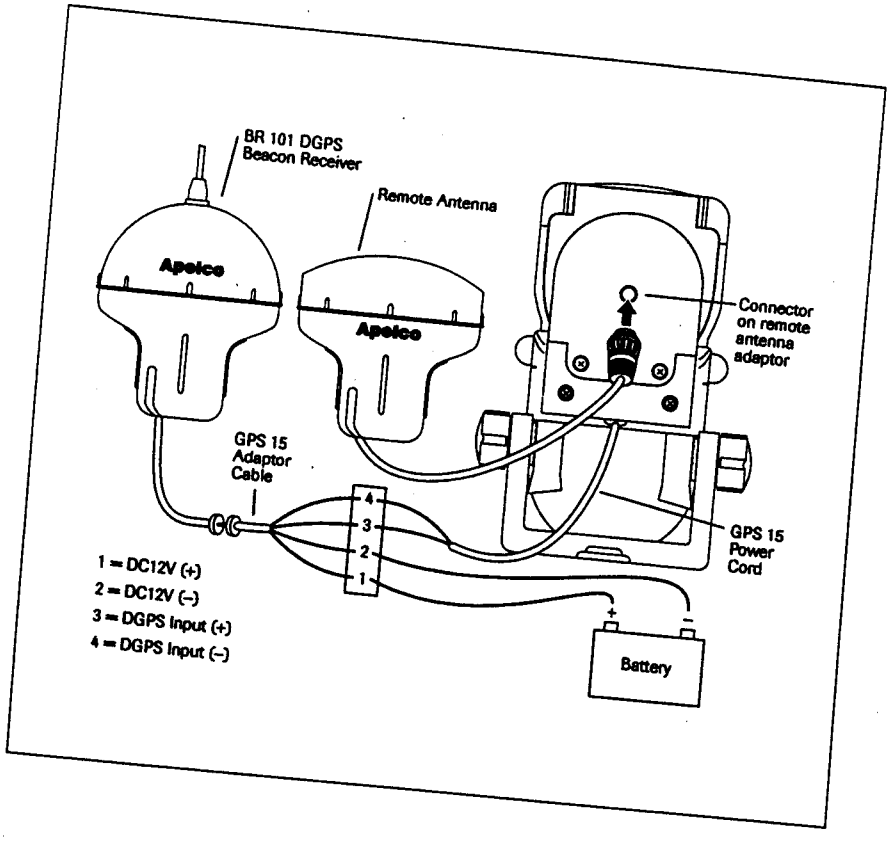
INSTALLATION

Installing the Optional Differential Beacon Receiver

The optional beacon receiver works together with, and compliments, the optional remote antenna by helping to improve data accuracy. To select the best location and mount the beacon receiver, follow the instructions in Installing the Optional Remote Antenna.

Connecting the Beacon Receiver

Using the 5-pin GPS 15 Adaptor Cable (part# G622982), connect the BR 101 to the GPS 15 as shown below.



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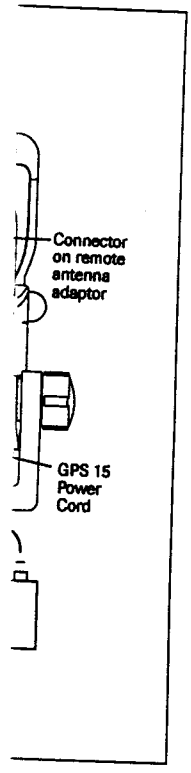
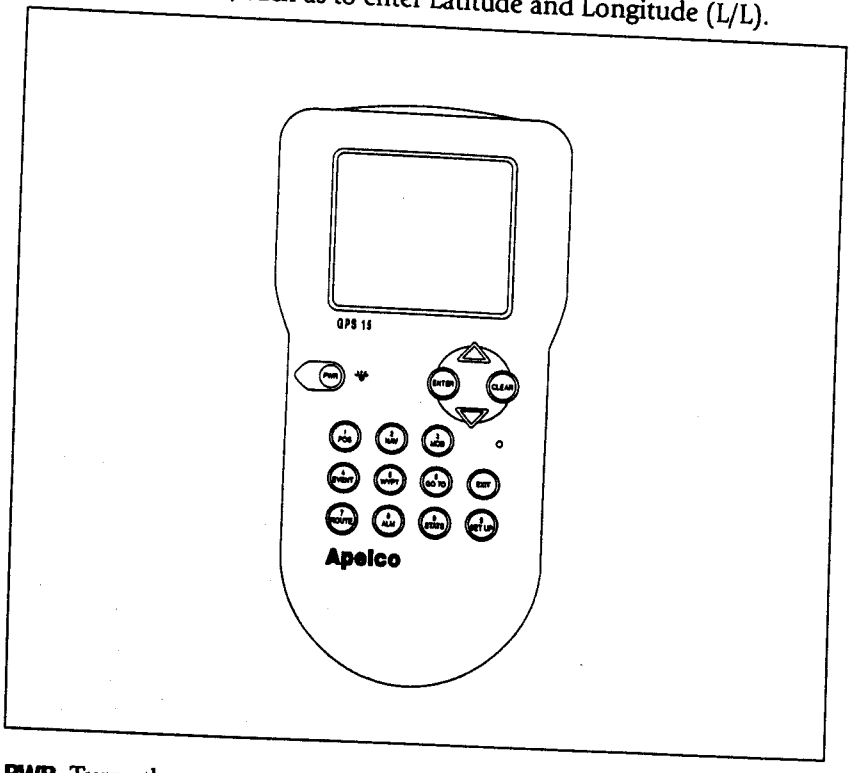


3 Basic Operation

Using the Keys

Functions of keys are described as follows. Keys also represent digits for entering numbers, such as to enter Latitude and Longitude (L/L).



PWR Turns the power on and off. Operates the backlight.
1/POS Selects present position displays. 1 key.
2/NAV Selects navigation displays. 2 key.
3/MOB Activates Man-overboard mode. 3 key.
4/EVENT Instantly stores vessel's present position. 4 key.
5/WYPT Activates Waypoint mode. 5 key.
6/GO TO Selects destination waypoints. 6 key.
7/ROUTE Activates Route mode. 7 key.
8/ALM Activates Alarm mode. 8 key.
9/STATS Activates Signal status mode. 9 key.
0/SET UP Activates initial Set-up mode. 0 key.
ENTER Confirms entered data. Advances to the next display.
CLEAR Clears data entry. Resets numeric values to 0. Silences audible alarms.
EXIT Fast escape key. Returns to the Position display.
Arrow keys Scroll through displays in a mode. Selects +/–, N/S and E/W.

Initializing Your Unit

When you turn on your unit for the first time, or anytime after a Soft or Hard Reset, you only need to initialize the unit with your estimated L/L (Latitude/Longitude) of your position to the nearest degree.

After you initialize the unit for your boating area, the unit automatically locks onto the signals and determines your position. You may immediately begin to read through the operations section and become familiar with how your unit functions.

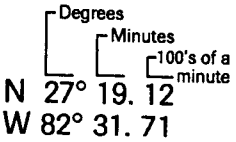
You can customize or preset various functions, for your particular needs or application, from the GPS Set-up modes.

Let's press the power key and get going!

Correcting mistakes

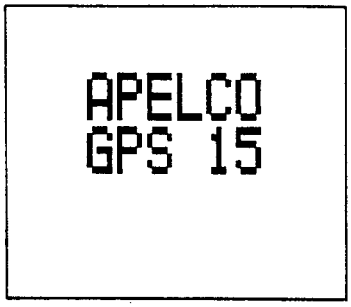
If you make a mistake keying in digits, just press **CLEAR**. This clears your last entry and you can start over.

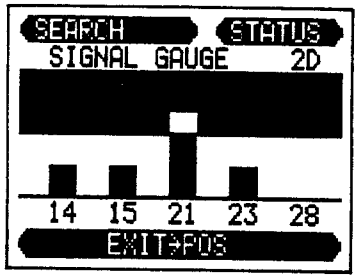
How to read Latitude and Longitude



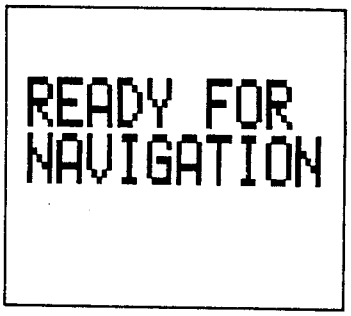
Power ON/OFF

1 Press PWR to turn the unit ON.
The following display appears briefly, then the SIGNAL GAUGE display appears.
To turn the unit OFF, hold down the **PWR** key for more than 3 seconds.





When the GPS signals are locked on, the following display appears, then the POS display appears.



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display appears
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LCO
15

STATUS
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POS

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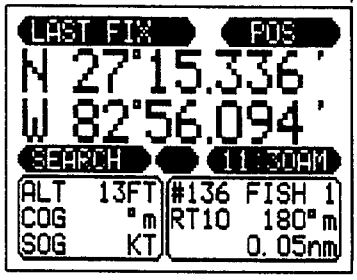
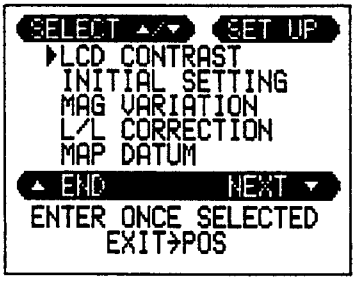
Keying in L/L

2 Press POS to show the POS (Position) display.
Press SETUP to show the SETUP display.



Press ▲ or ▼ to select Initial Setting, then press ENTER.

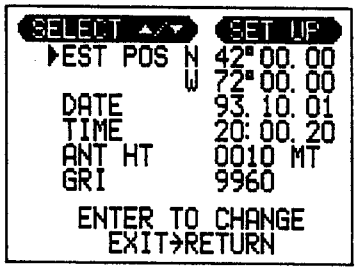


3 Key in your estimated latitude, press ▲ or ▼ to select N (North) or S (South), then press ENTER.

Example:
To key in a latitude of N 42.00.00, key in 4,2,0,0,0,0, press ▲ or ▼ to select North, then **ENTER**.

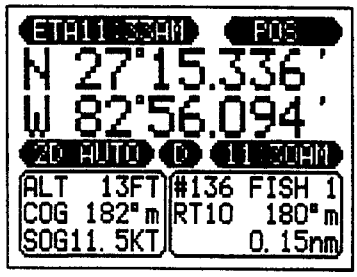
Key in your estimated longitude, press ▲ or ▼ to select W (West) or E (East).
Then press ENTER.

Example:
To key in a longitude of W 72.00.00, key in 0,7,2,0,0,0,0, press ▲ or ▼ to select West, then **ENTER**.



4 Key in the date (year, month, day) and time (in 24-hour military time), then press ENTER.
Key in your antenna height, then press ENTER.
You may key in a GRI if you wish to store waypoints as TD's, but this is optional. Press ENTER.

5 Press EXIT 2 times to return to the POS (Position) display.



BASIC OPERATION

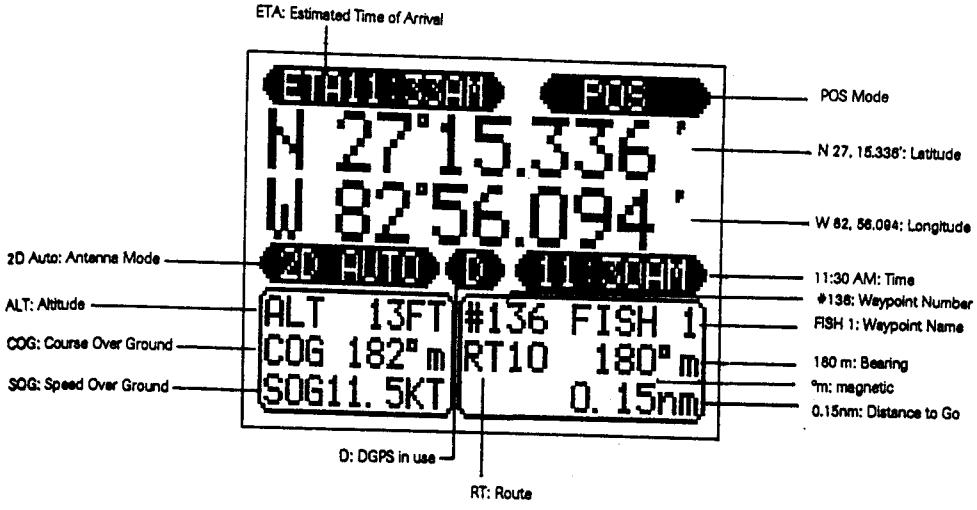
Main Mode Displays

The two main navigation displays that are used most often in normal operations are the POS (Position) and the NAV (Navigation) displays. To select the POS mode, press the **POS** key. To select the NAV mode, press the **NAV** key.

POS (Position) Mode Display

The POS (position) mode display shows you a large, clear readout of your present position in L/L as well as waypoint information, altitude, course, speed, and more.

Press POS to show the POS mode display.



NAV (Navigation) Mode Displays

In the NAV mode there are 2 displays, NAV 1 and NAV 2. The navigation mode displays give you a digital map of your vessel and its position relative to the programmed destination.

The NAV 1 display shows you how close you are following the track line to your destination.

The NAV2 mode gives you a bird's-eye view of your boat's position relative to your destination and, if you are following a route, it shows the other waypoints in the route as well. If you have named a waypoint, the first character of the waypoint's name appears on the display. If you have not named a waypoint, it appears as a dot on the display.

NAV 1 Mode D

Press NAV to sho

RT: Route

XTE: Cross Trac

CMG: Course

NAV 2 Mode Di

Press NAV from the

Press ▲ to increase

COG: Course Over G

SOG: Speed Over Gr

#36: Waypoint Numb

FISH 1: Waypoint Na

220°m: bearing to d

12.4 NM: range to d

Naming a Waypc

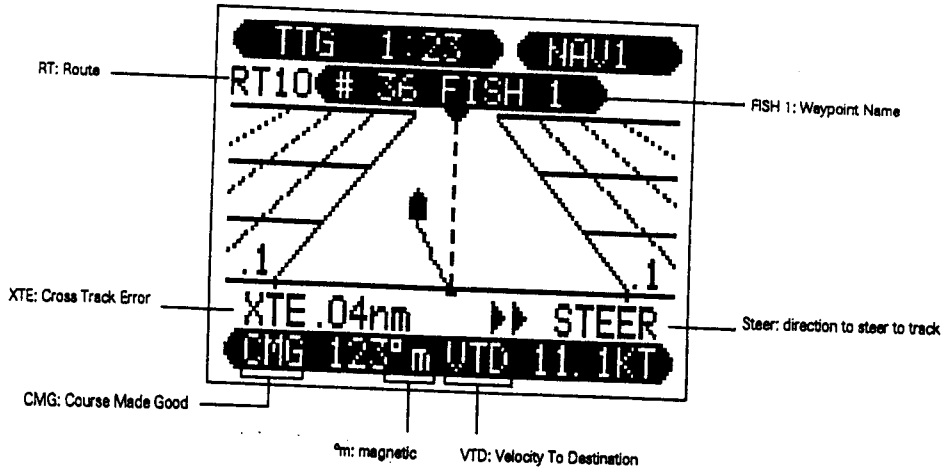
If you name a wayp

waypoint when it a

name a waypoint, it

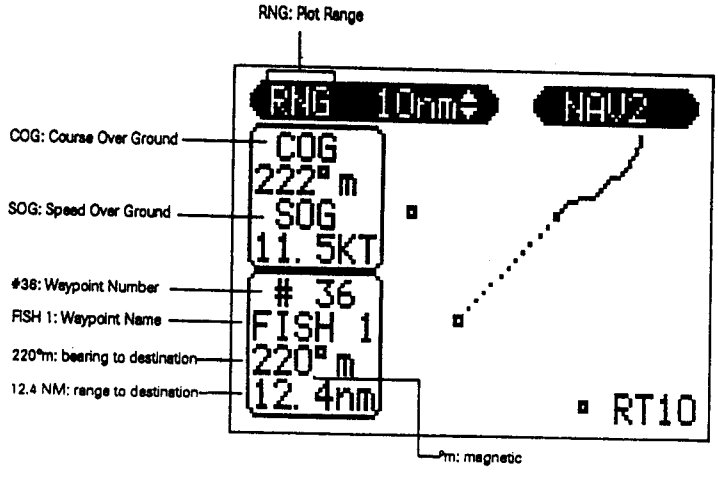
NAV 1 Mode Display

Press NAV to show the NAV 1 display.



NAV 2 Mode Display

Press NAV from the NAV 1 display to select the NAV 2 display.
Press ▲ to increase, ▼ to decrease plot range.



Naming a Waypoint

If you name a waypoint, the first character of the name indicates the waypoint when it appears on the plot (Nav 2) display. If you do not name a waypoint, it appears as a dot on the plot display.

Waypoint Mode

Keying in waypoints with L/L

A waypoint is a position such as a buoy, harbor entrance, or your favorite fishing spot that you wish to store in memory. The unit's memory is backed up by a lithium battery so that your waypoints are retained even if power is removed.

To store a new waypoint, you must first select a waypoint memory location. Your unit has 199 memory locations (001 to 199 –Waypoint number 000 is reserved for your present position). Because there are so many memory locations, you should always maintain a paper log of your stored waypoint data. A sample log sheet is provided in the Reference section.

In Waypoint mode, you can store waypoints in three ways:

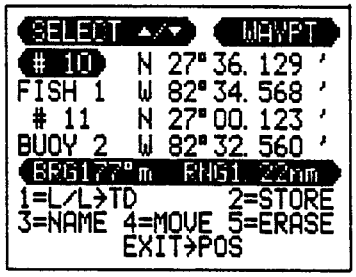
- Directly key in L/L or B/R data taken from a chart or NAV list.
- Key in TD readings from a chart or numbers given to you by someone else.
- Press **EVENT**, while in the POS or NAV mode, to store your present position in the next available or selected memory location.

Remember:

Press **CLEAR** to start over, or press **EXIT** to return to the POS display.

Keying in L/L

1 Press WYPT to show the LIST WAYPOINT display. Press ▲ or ▼ to select a waypoint OR key in the waypoint number, then press ENTER.



Correcting mistakes

If you make a mistake keying in digits, just press **CLEAR**. This clears your last entry and you can start over.

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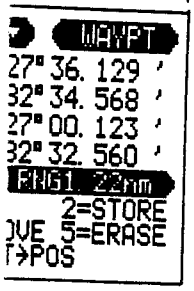
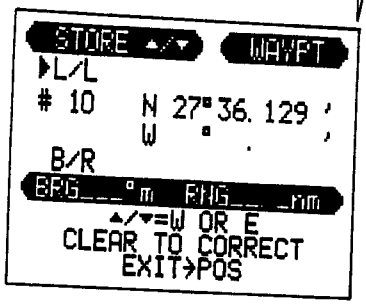
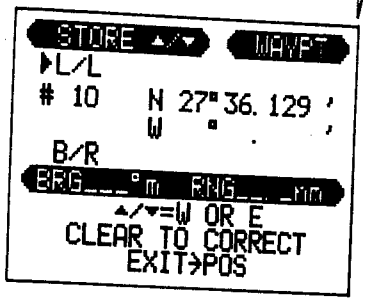


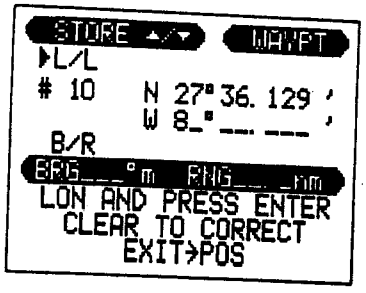
2 Press the 2 key to select the STORE WAYPOINT display. Press ▲ or ▼ to select L/L or Bearing and Range, then press ENTER.



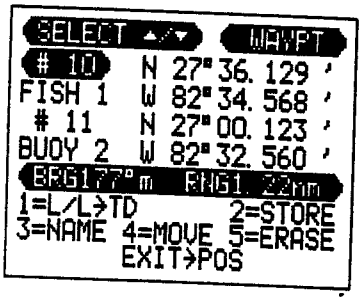
3 Key in the latitude, press ▲ or ▼ to select N (North) or S (South), then press ENTER, or key in Bearing, then press ENTER.



4 Key in the longitude, press ▲ or ▼ to select W (West) or E (East), then press ENTER, or key in Range, then press ENTER.



The display showing the waypoint appears briefly, then the LIST WAYPOINT display returns.



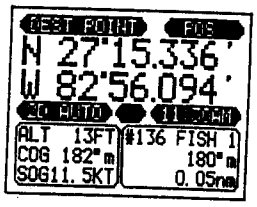
How to read Latitude and Longitude

Degrees
Minutes
100's of a minute

N 27° 19. 12
W 82° 31. 71

Protected Waypoint

A protected waypoint is one that is selected as your destination or as part of a selected route. If you try to write over a protected waypoint, "DEST POINT" (destination point) appears at the top left corner of the display.



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Waypoint Mode

Keying in waypoints with TD's

Storing Waypoints

When you key in data for a new waypoint, always allow the unit enough time to complete calculations (until "Calculating Waypoint" disappears) before you press another key. This ensures your waypoints are computed correctly.

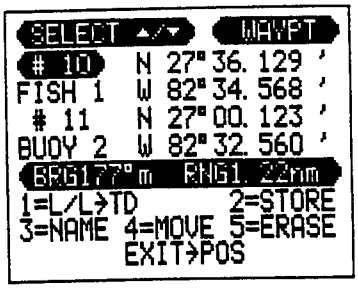
Before you key in a waypoint in TD's, you have to key in a GRI in the Set-up mode. See Set-up Mode for details.

Remember:

Press **CLEAR** to start over, or press **EXIT** to return to the POS display.

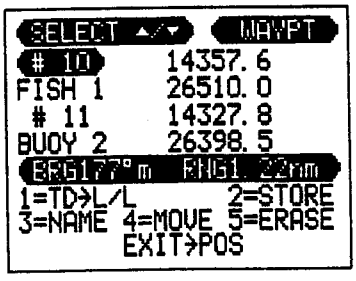
Keying in TD's

1 Press WYPT to show the LIST WAYPOINT display.



Press the 1 key to show waypoints in TD's.

Press ▲ or ▼ to select an empty memory location.



Correcting mistakes

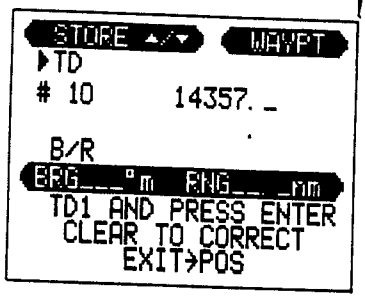
If you make a mistake keying in digits, just press **CLEAR**. This clears your last entry and you can start over.

'D's

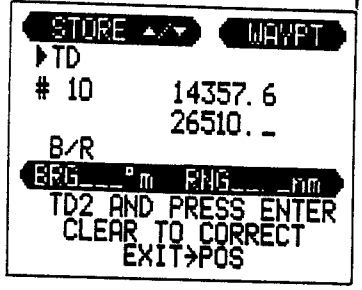
T to show the IT display.

2 Press the 2 key to select the STORE WAYPOINT display. Press ▲ or ▼ to select TD or Bearing and Range, then press ENTER.

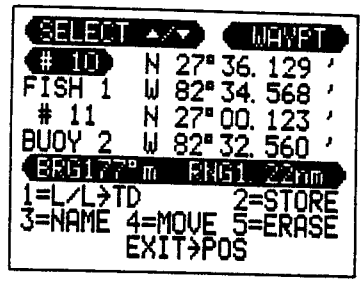
Key in the coordinates for TD1 (6 digits), then press **ENTER**, or key in Bearing, then press **ENTER**.



3 Key in the coordinates for TD2 (6 digits), then press ENTER, or key in Range, then press ENTER.



4 The display showing the new waypoint appears briefly, then the LIST WAYPOINT display returns.



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mistakes

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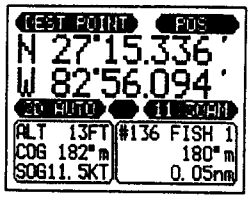
s **CLEAR**. This clears
and you can start

Protected Waypoint

A protected waypoint is one that is selected as your destination or as part of a selected route. If you try to write over a protected waypoint, "DEST POINT" (destination point) appears at the top left corner of the display.



Waypoint Mode

Keying in B/R (Bearing and Range)

Storing Waypoints

When you key in data for a new waypoint, always allow the unit enough time to complete calculations (until "Calculating Waypoint" disappears) before you press another key. This ensures your waypoints are computed correctly.

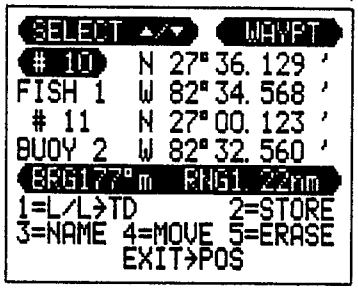
Before you key in a waypoint in TD's, you have to key in a GRI in the Set-up mode. See Set-up Mode for details.

Remember:

Press **CLEAR** to start over, or press **EXIT** to return to the POS display.

Keying in B/R

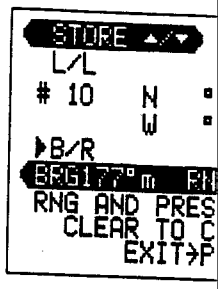
1 Press WYPT to show the LIST WAYPOINT display. Press ▲ or ▼ to select an empty memory location.



Correcting mistakes

If you make a mistake keying in digits, just press **CLEAR**. This clears your last entry and you can start over.

2 Press the 2 ke the STORE WAYP Press ▲ or ▼ to s then press ENTER. Key in the bearing ENTER.



Protected Waypoi

A protected waypoint is a selected route. If you (destination point) appe

B/R

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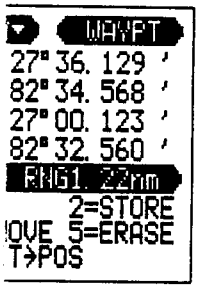
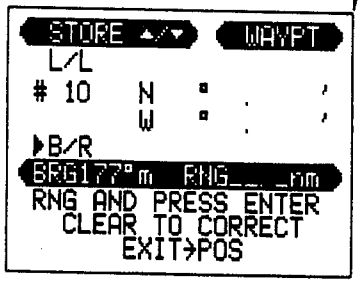
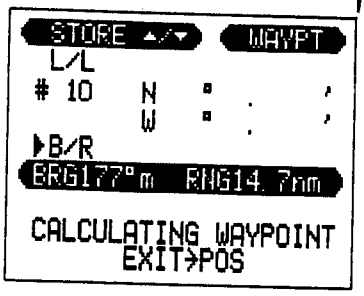
o select an
/ location.



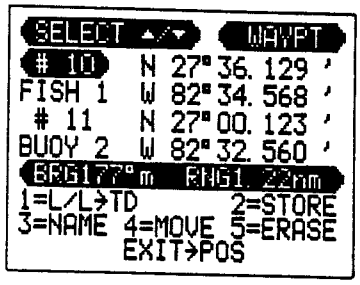
2 Press the 2 key to select the STORE WAYPOINT display. Press ▲ or ▼ to select B/R, then press ENTER.
Key in the bearing, then press ENTER.



3 Key in the range, then press ENTER.



4 The display showing the waypoint appears briefly, then the LIST WAYPOINT display returns.



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CLEAR. This clears
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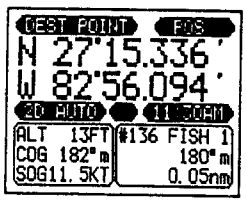
Protected Waypoint

A protected waypoint is one that is selected as your destination or as part of a selected route. If you try to write over a protected waypoint, "DEST POINT" (destination point) appears at the top left corner of the display.



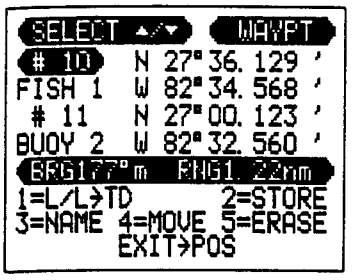
Waypoint Mode

Naming a Waypoint

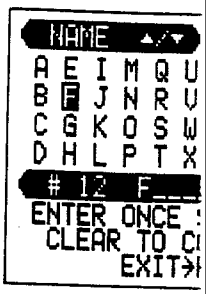
If you name a waypoint, the first symbol or character of the name indicates the waypoint when it appears on the PLOT display. If you do not name the waypoint, it appears as a dot on the PLOT display.

Naming a Waypoint

1 Press WYPT to show the LIST WAYPOINT display. Press ▲ or ▼ to select the waypoint you wish to name.



2 Press the 3 k
the NAME WAYP
Press ▲ or ▼ to
individual charac
characters, inclu
numbers, and sy
press ENTER. Pre
any time to store
return to the prev



Correcting mistakes

If you make a mistake keying in digits, just press **CLEAR**. This clears your last entry and you can start over.

Protected Waypc

A protected waypoint
a selected route. If yo
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PT to show the
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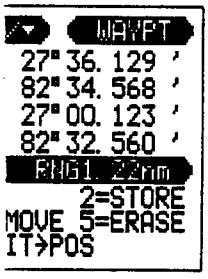
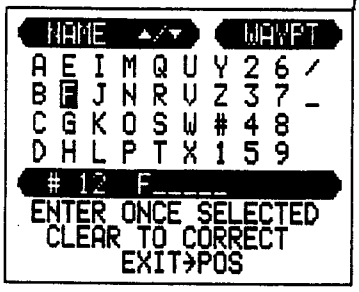
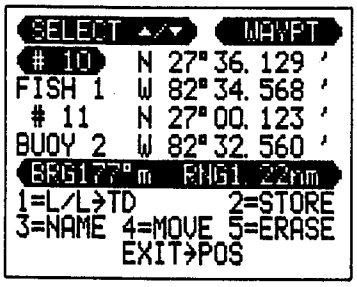
to select the
wish to name.



2 Press the 3 key to select the NAME WAYPOINT display. Press ▲ or ▼ to select each individual character, up to six characters, including letters, numbers, and symbols, then press ENTER. Press EXIT at any time to store the name and return to the previous display.



3 The LIST WAYPOINT display returns.



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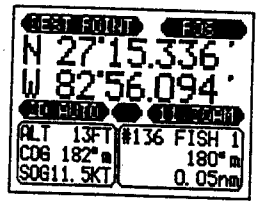
CLEAR. This clears
nd you can start

Protected Waypoint

A protected waypoint is one that is selected as your destination or as part of a selected route. If you try to write over a protected waypoint, "DEST POINT" (destination point) appears at the top left corner of the display.



Waypoint Mode

Storing an Event

Event Operation

A waypoint is a position you wish to return to, for example a good fishing spot or channel marker. When your vessel is at a spot you want to return to, press the **EVENT** key to store the spot as a waypoint. Each waypoint is identified by the memory location (001-199) it is stored into. Storing an Event is the most accurate method to enter a waypoint.

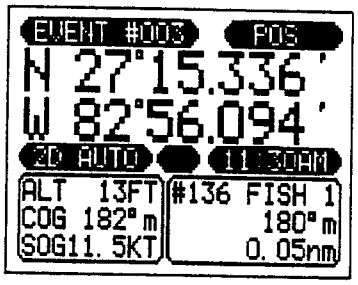
Remember:

When you want to use the Event function to enter a waypoint, always allow the unit enough time to settle on your position before you press **EVENT**.

Storing an Event

Press EVENT to store the coordinates of your present position as a waypoint.

The event is automatically stored in the next empty memory location as a waypoint.



To select an alternate memory location, key in the new waypoint number, then press **ENTER**.

If you have accidentally selected a protected waypoint, press **CLEAR** to return to the default memory location, or press **EXIT** to cancel the event operation.

Correcting mistakes

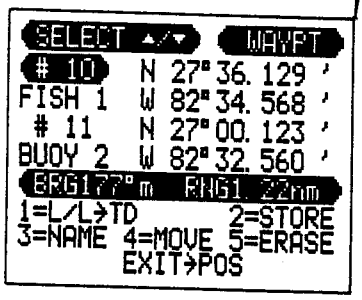
If you make a mistake keying in digits, just press **CLEAR**. This clears your last entry and you can start over.

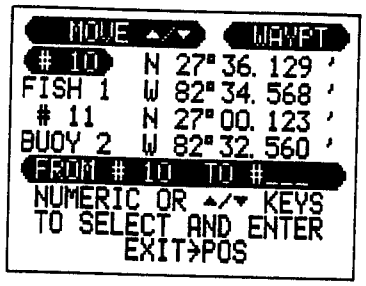
Moving a Waypoint

1 Press WYPT to show the LIST WAYPOINT display or choose the waypoint you wish to move by keying in its waypoint number.

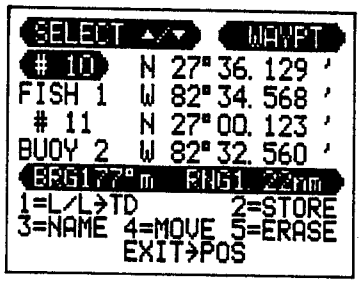
2 Press the 4 key to select the MOVE WAYPOINT display.

Key in the waypoint number you wish to move the waypoint to, then press **ENTER**.





The waypoint moves to its new memory location. After the waypoint has moved to its new memory location, the waypoint is erased from its old memory location. Then the LIST WAYPOINT display returns.



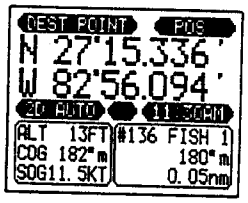
How to read Latitude and Longitude

Degrees
Minutes
100's of a minute

N 27° 19. 12
W 82° 31. 71

Protected Waypoint

A protected waypoint is one that is selected as your destination or as part of a selected route. If you try to write over a protected waypoint, "DEST POINT" (destination point) appears at the top left corner of the display.



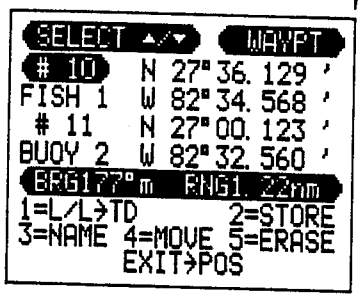
Waypoint Mode

Erasing a Waypoint

Please be careful! Erasing a waypoint is an easy operation. Because a waypoint you erase is irretrievable, you should look up the waypoint, using the LIST WAYPOINT display, to make sure you want to erase it.

Erasing a Waypoint

1 Press WYPT to show the LIST WAYPOINT display.



2 Press the 5 k
ERASE WAYPOI
Key in the waypo
you wish to eras
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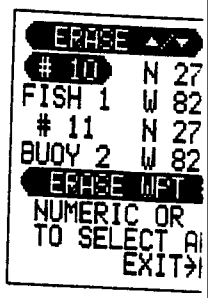

Protected Waypoi

A protected waypoint is
a selected route. If you
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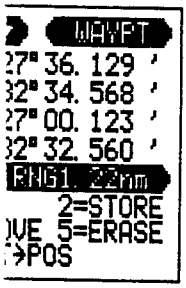
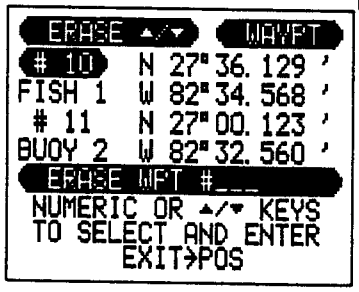
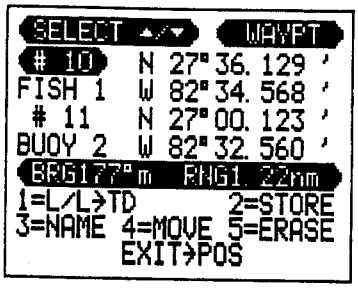
to show the
r display.



2 Press the 5 key to show the ERASE WAYPOINT display. Key in the waypoint number you wish to erase, then press ENTER.

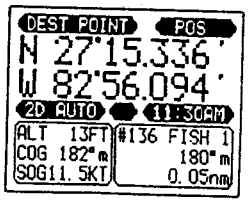


3 The waypoint is erased and the LIST WAYPOINT display returns.



Protected Waypoint

A protected waypoint is one that is selected as your destination or as part of a selected route. If you try to write over a protected waypoint, "DEST POINT" (destination point) appears at the top left corner of the display.



Waypoint Mode

MOB Mode

Press MOB to activate the Man-overboard mode.

GO TO C

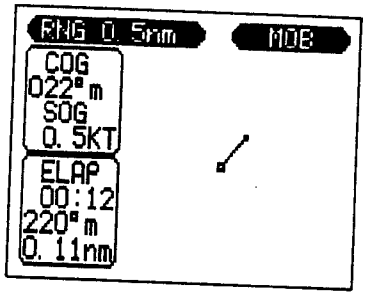
Press GOTO mode to sele use as a des Key in the m number of th wish to navig ENTER.

Man-Overboard Mode

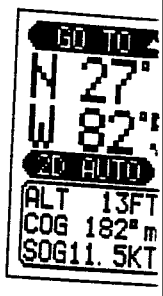
MOB mode is useful if something (or someone) falls overboard and you need to return to the point where it fell overboard. Just press **MOB** immediately.

When you activate the MOB mode:
When you press **MOB** to turn on the MOB mode, your present position is automatically stored into a memory location and selected as your current destination. Bearing and range data appear and your arrival alarm is automatically set at 0.1 NM, to alert you when you near the position your vessel was at when you pressed the **MOB** key. The MOB mode display is a plotter display, like the NAV 2 display.

When you turn off the MOB mode:
When you press **MOB** to turn off the MOB mode, the unit returns to your last used display, and your previous Arrival alarm setting is restored.



To cancel Man-overboard mode, press and hold **MOB** for 3 seconds. The unit then returns to your last used display.



Protected Way
A protected waypo
a selected route. If
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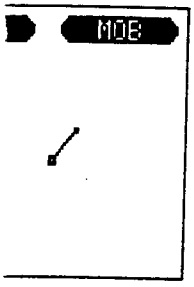
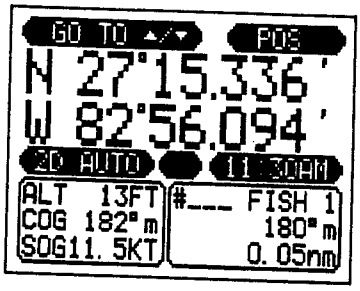
activate the
d mode.



-overboard
ıd hold **MOB**
The unit then
last used

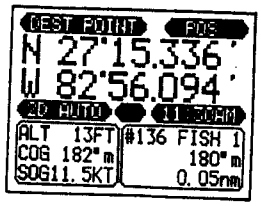
GO TO Operation

Press GOTO in the POS or NAV mode to select a waypoint to use as a destination.
Key in the memory location number of the waypoint you wish to navigate to, the press ENTER.



Protected Waypoint

A protected waypoint is one that is selected as your destination or as part of a selected route. If you try to write over a protected waypoint, "DEST POINT" (destination point) appears at the top left corner of the display.



Route Mode

Route Planning

When planning routes, remember that you can use a total of 200 waypoints in up to 10 routes.

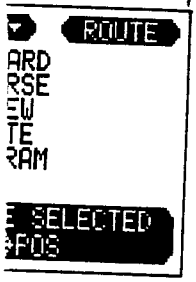
Route Mode

Note that most functions in Route Mode begin and end with the LIST ROUTE display.

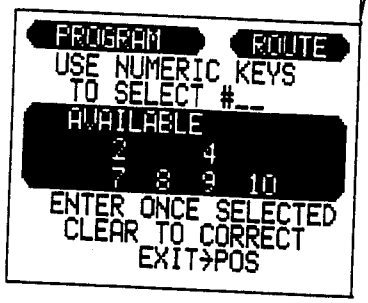
Programming a Route

1 Press ROUTE to show the LIST ROUTE display. Press ▲ or ▼ to select PROGRAM, then press ENTER.

TE to show the
splay.
o select
en press ENTER.

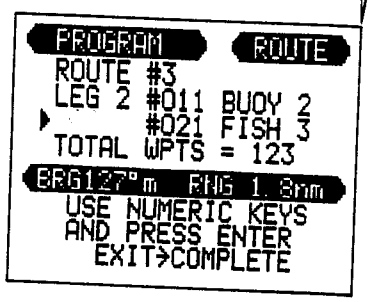


2 Key in the route number, then press ENTER.
The route number you are programming appears at the top of the display.



Only routes that are available (not programmed) appear in the box.

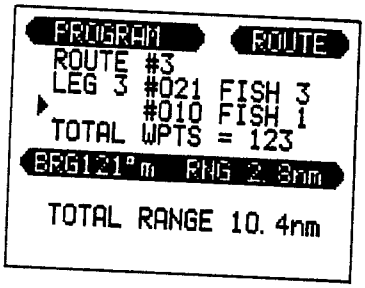
3 Key in the memory location of the first waypoint in the route, then press ENTER.
Key in the memory location of the second waypoint in the route, then press **ENTER**.



To complete programming your route, continue to add waypoints in this manner.

TOTAL WPTS tells you how many waypoints you have stored in memory.

4 Press EXIT after you have keyed in the last waypoint of your route.
The following display appears to show the total distance of your route.



Route Mode

Route Planning

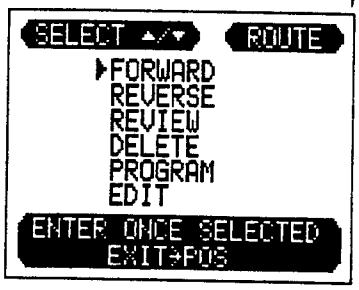
When planning routes, remember that you can use a total of 200 waypoints in up to 10 routes.

Route Mode

Note that most functions in Route Mode begin and end with the SELECT ROUTE display.

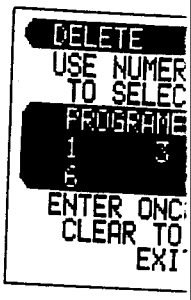
Erasing a Route

1 Press ROUTE to show the ROUTE MENU display. Make sure it is the route you want to erase.

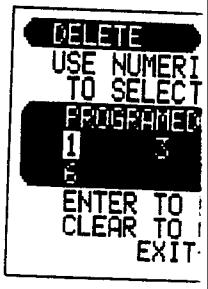


2 Key in the n route you wish

Only programr appear in the b



Press ENTER to e
The ROUTE MEI returns.



Correcting mistakes

If you make a mistake keying in digits, just press **CLEAR**. This clears your last entry and you can start over.

Erasing a Route

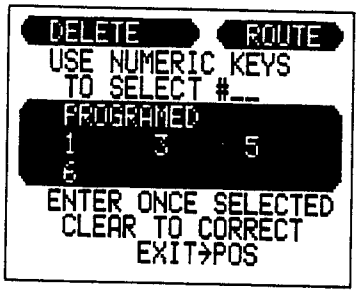
Please be careful! Era irretrievable.

oute

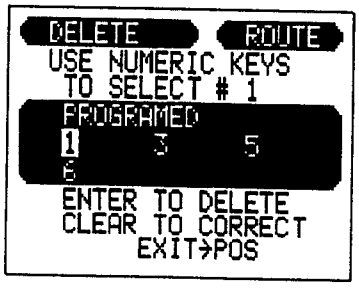
'E to show the
display. Make
ute you want to

2 Key in the number of the route you wish to erase.

Only programmed routes appear in the box.

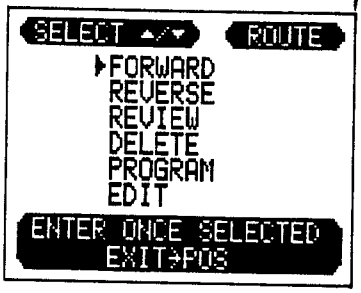


Press ENTER to erase.
The ROUTE MENU display returns.



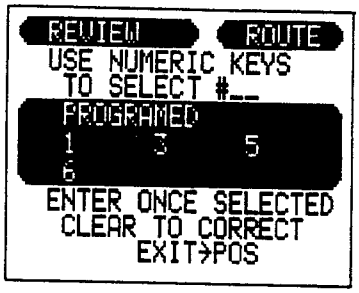
Reviewing a Route

1 Press ROUTE to show the ROUTE MENU display. Press ▲ or ▼ to select REVIEW, then press ENTER.



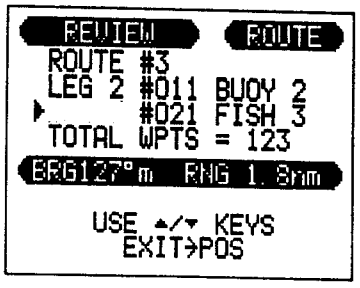
2 Key in the route number you wish to review, then press ENTER.

The first and second legs of the selected route appear.



3 Use ▲ and ▼ to scroll.

The display shows waypoint name and number for each of two waypoints, and the BRG (bearing) and RNG (range) between them.



Press **EXIT** to return to the POS mode.

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CLEAR. This clears
d you can start

Erasing a Route

Please be careful! Erasing a route is an easy operation. A route you erase is irretrievable.

Route Mode

Route Planning

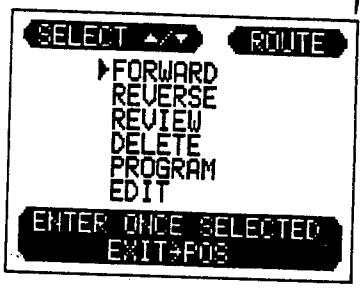
When planning routes, remember that you can use a total of 200 waypoints in up to 10 routes.

Route Mode

Note that most functions in Route Mode begin and end with the SELECT ROUTE display.

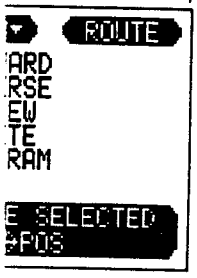
Editing a Route

1 Press ROUTE to show the ROUTE MENU display.



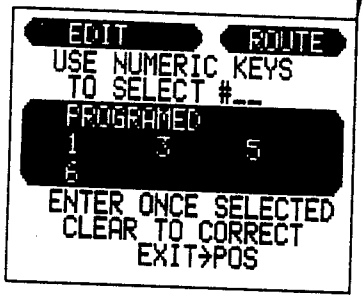
Insert, Delete, or Change a Waypoint Within a Route

TE to show the display.

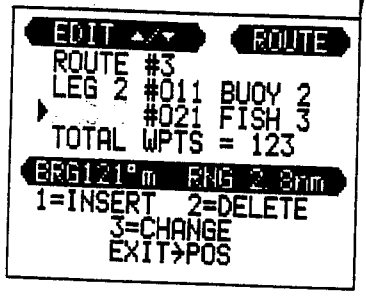


2 Press ▲ or ▼ to select EDIT, then press ENTER.

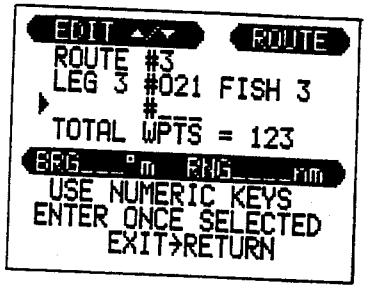
Only programmed routes appear in the box.



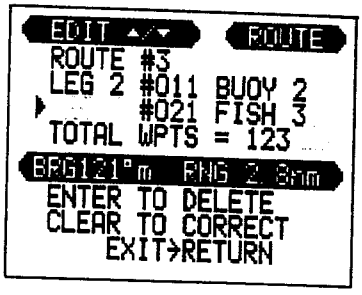
3 Press ▲ or ▼ to select the leg in which you wish to insert a waypoint, or which you wish to delete or change. Press the 1 key to insert a leg, the 2 key to delete a leg, and the 3 key to change a leg.



4a To insert or change a leg, key in the waypoint number, then select ENTER.



4b To delete a leg, select the waypoint to delete, then press ENTER.



Route Mode

Route Planning

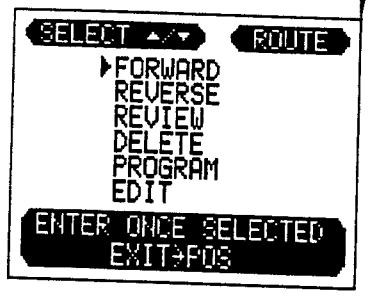
When planning routes, remember that you can use a total of 200 waypoints in up to 10 routes.

Route Mode

Note that most functions in Route Mode begin and end with the ROUTE MENU display.

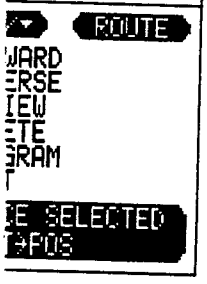
Turning On a Route Sequence

1 Press ROUTE to show the ROUTE MENU display. Press ▲ or ▼ to select FORWARD or REVERSE, then press ENTER.



a Route Sequence

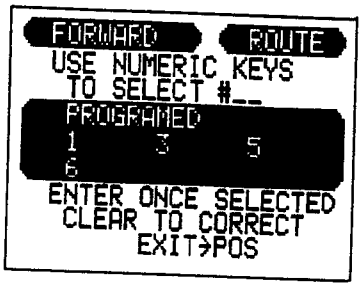
TE to show the display.
to select FOR-ERSE, then press

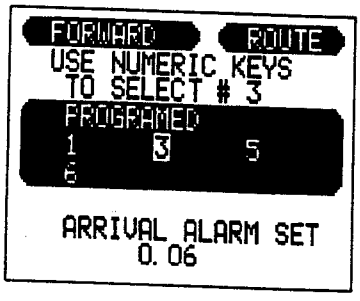


2 Key in the route number that you wish to turn on.

Only programmed routes appear in the box.

FORWARD ROUTE (or REVERSE ROUTE) appears at the top of the display.



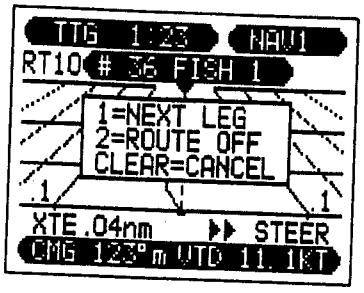


After you turn on a route, the arrival alarm appears at the bottom of the display. The arrival alarm setting determines the point at which the unit will automatically switch to the next leg of the route.

If you have not set an arrival alarm for this route, do so now. See Alarm Mode (next page) for details.

Turning Off a Route Sequence

While a route is on, if you press GOTO in the Nav or Pos modes, the following message box appears. Press the 1 key to advance to the next leg of the route, press the 2 key to turn off the route, or press CLEAR to cancel.



BASIC OPERATION

Alarm Mode

Setting Alarms

There are three types of alarms:

- Arrival alarm (ARV): Alerts you when your vessel is within a specified distance to your waypoint.
- Off Course alarm (XTE): Alerts you when your vessel strays too far from the intended track.
- Anchor Watch alarm (ANC): Alerts you when your vessel drifts beyond the specified distance from the anchor point.

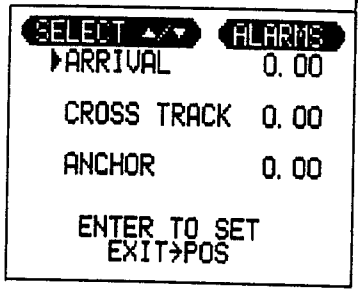
Whenever an alarm is set and activated, a beeper sounds and a message appears on the display showing the type of alarm. Press **CLEAR** to silence the alarm.

Alarm Mode

Press **ALM** to show the first alarm setting (Arrival alarm). Press ▼ or ▲ to switch between the three alarm displays (in the order of ARV, XTE, ANC).
Press **ENTER** to return to the POS mode. If you make a mistake entering data, press **CLEAR** to start over.

Alarm Mode

1 Press ALM to select the ALARM display. Press ▲ or ▼ to select the alarm you wish to set, then press ENTER.



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2 Key in the alarm distance, to the nearest hundredth of a nautical mile and up to a maximum of 9.99 nautical miles, then press ENTER.

Before you set an Anchor Watch alarm

To set and activate an Anchor Watch alarm, you must first key in your present position as a waypoint and select it as your destination as follows:

- Anchor, then select the POS mode.
- When your present position settles, press **EVENT**. The memory location, in which your present position is stored, appears on the display.
- Press **GO TO**, key in the memory location of the event you just stored, then press **ENTER**.

Your unit now has a reference with which to monitor the drift from your anchor position (stored event).

Now all you have to do is simply go to the Anchor Watch alarm display, key in an alarm distance and press **ENTER**. The unit automatically activates your Anchor Watch alarm and switches to the POS mode.

CAUTION
We do not recommend setting an Anchor Watch alarm distance of less than .05 nautical miles. Remember, 0.01 nautical mile is approximately 60 feet.

4 GPS Status/ Set-up Mode

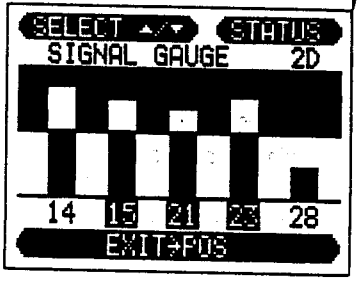
GPS Signal Status Mode

The GPS Signal Status mode is provided so that at any time during operation, you can switch to this mode and determine whether your unit is receiving and tracking the satellites properly.

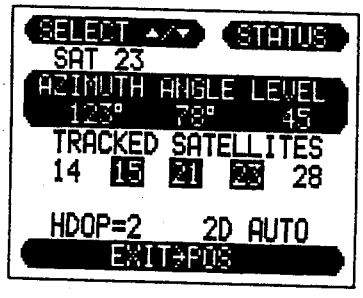
For more information about GPS, see GPS Basics in the Reference section of this manual.

Press ▲ or ▼ to toggle between displays or press **EXIT** to return to the POS mode.

1 Press STATS. The following display appears.



2 Press ▲ or ▼ to review the status of each satellite.



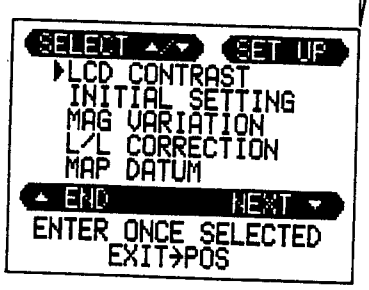
Set-up Mode

You can set various functions of your unit by entering the Set-up mode. Functions are set at factory default settings for use in most boating areas and conditions. You can also manually set some of the automatic features if desired.

If you set functions after initial installation, they will not require attention under normal daily operation, as all the settings you make are stored in memory.

To return to the default settings:
To return all of your manual settings in Set-up mode to the factory default settings, simply carry out a Soft or Hard Reset. See Soft/Hard Reset in the Maintenance section of this manual.

1 Press SET UP to select the Set-up mode.
The first 5 items appear on the display.



2 To select an item, press ▲ or ▼ to highlight the item, then press ENTER.

There are 16 items in the list. They are:

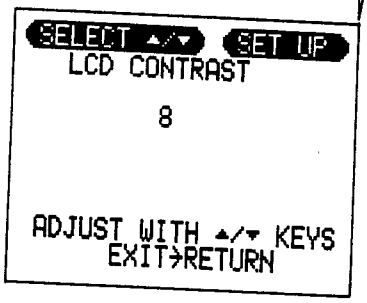
LCD Contrast	Antenna Height
Initial Setting	Time
Magnetic Variation	GPS Mode
L/L Correction	PLOT
Geodetic Datum	Waypoint Sorting
Averaging	Sleep Mode
Data Out	Language
System Unit	Simulator

Set-up mode
Press **ENTER** to advance the set-up displays. To check your settings without changing anything, press **ENTER** to bypass each set-up display. If you make a mistake entering data, press **CLEAR** to start over.

1. LCD Contrast

Press ▲ or ▼ to adjust the LCD contrast.

There are 16 contrast levels (0 to 15)



2. Initial Setting

When you turn on your unit for the first time, or any time after a Soft or Hard Reset, you must initialize your unit. Key in the estimated position, date, time, antenna height and GRI.

Press ▲ or ▼ to select an item, then press ENTER.

Estimated Position

1 Key in the estimated latitude, press ▲ or ▼ to select N (North) or S (South), then press ENTER.

2 Key in the estimated longitude, press ▲ or ▼ to select W (West) or E (East), then press ENTER.

Date

3 Key in year, month, and day, then press ENTER.

Time

4 Key in the local time (hour, minute, second) in military (24 hour) time, then press ENTER.

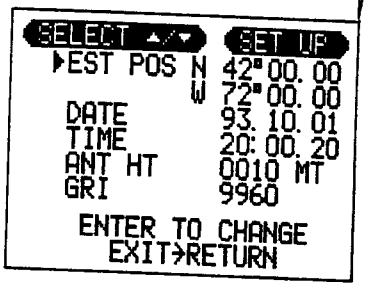
Antenna Height

5 Key in your vessel's antenna height, then press ENTER.

GRI (Group Repetition Interval)

You need to set a GRI so that you can key in waypoints in TD's.

Key in the GRI, then press ENTER.



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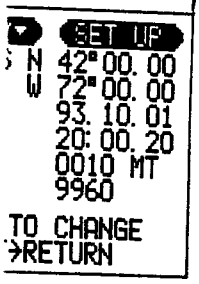
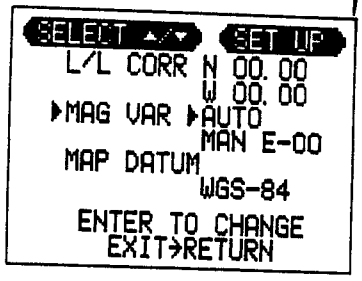
, then press



3. Magnetic Variation

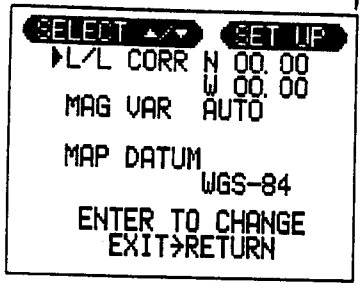
Press ENTER to select AUTO or MAN (manual).
If you select MAN, key in the magnetic variation, then press ENTER.



4. L/L Correction

1 Key in latitude correction, use ▲ or ▼ to select N (North) or S (South), then press ENTER.

2 Key in longitude correction, use ▲ or ▼ to select W (West) or E (East), then press ENTER.



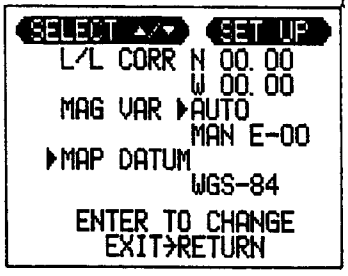
Magnetic Variation
When you apply magnetic variation either manually or automatically, M appears in the lower, left corner of POS or NAV displays after the degree readings.

L/L Offset
This is a method to adjust your L/L position readings. To determine an offset value, go to a charted point and read your current L/L position from the POS display. Calculate the difference between your POS (Position) reading and the charted position, then apply the correction as in the following example:

POS reading:	N 25°31.62'	W 83°41.29'
Charted point:	N 25°31.21'	W 83°41.76'
Difference:	– 0.41'	+ 0.47'
Correction:	S 0.41'	W 0.47' = Offset value

5. Geodetic Datum

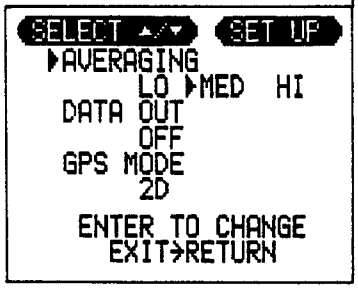
Press ENTER to select a geodetic datum.



6. Averaging

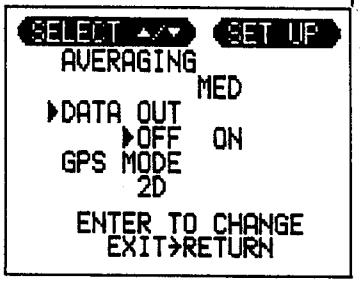
Press ENTER to select the averaging rate for L/L reading.

Recommended Setting:
LO: 10 knots or slower
MED: 10 to 25 knots
HI: 25 knots or faster



7. DATA OUT

Press ENTER to turn on or off.



8.

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Geodetic Datum

In preparing charts or maps, cartographers use a particular geodetic datum or "scaling system" to calibrate the Latitude/Longitude coordinate structure onto their charts. The type of datum used is normally listed in the margins of the chart. Mariners may find considerable errors (up to 200 meters) in plotting their vessel's position if their charts were created using one type of geodetic datum while the GPS navigator is busy calculating positions using another datum. Although the default geodetic datum used by the GPS 15 is NAD 83, you can program the unit to provide position calculations utilizing one of 47 different datums including:

1 WGS-84
2 NAD 83
3 WGS-72 (Loran-C)
4 JAPAN (BESSEL)
5 NAD-27 (older NOAA charts)
6 CANADA (Canada/Alaska)
7 EURO 50 (Europe)
8 AUST 66 (Australia)
9 OSGB 36 (British Admiralty)

For more information regarding geodetic datum's, refer to Geodetic Datum's in the Reference section.

Because the GPS 15 uses more power when DATA OUT is on, we recommend turning it off unless the unit is in the holder, and therefore connected to your vessel's power. DATA OUT means Data Output.

turn on or off.

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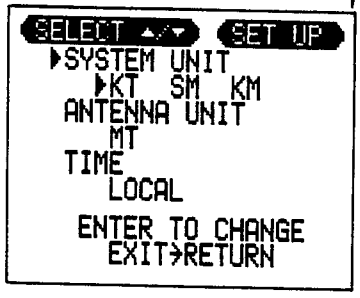
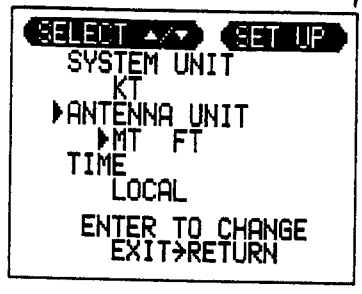
8. System Unit

Press ENTER to show your readings in NM (nautical miles), SM (statute miles) or KM (kilometers).



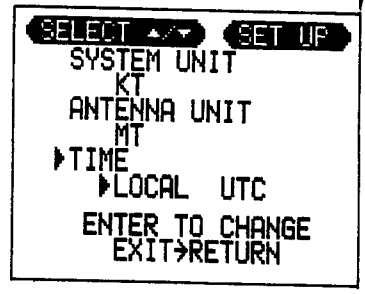
9. Antenna Height

Press ENTER to select MT (meters) or FT (feet).



10. Time

Press ENTER to select local or UTC time.



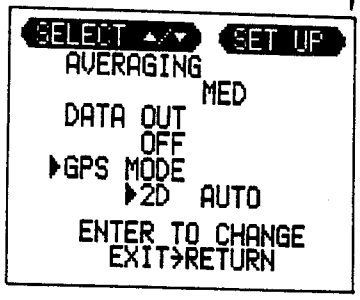
Local/UTC Time

Although the GPS satellites use UTC time (Universal Time Coordinate or Greenwich Mean Time) as a basic reference for operation, you only need to key in your local time and date (accurate to within 15 minutes). When your GPS calculates a fix, the satellites update your local time entry automatically.

11. GPS Mode

Press ENTER to select 2D or AUTO.

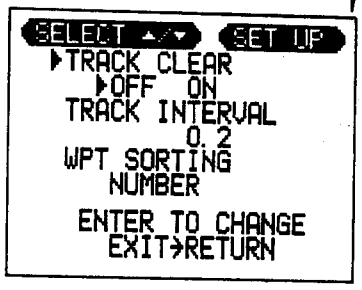
In 2D, the unit uses a 2D fix, and in AUTO the unit will select 2D or 3D according to how many satellites are in view. See GPS Basics in the Reference section for more information.



12. Plot

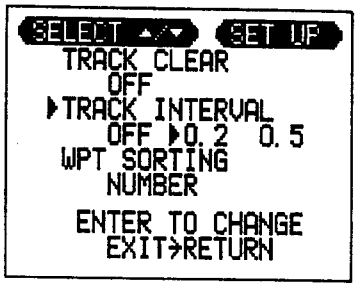
Track Clear

1 Press ENTER to turn on or off.



Track Interval

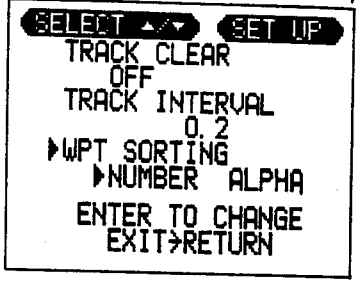
2 Press ▲ or ▼ to select OFF, 0.2, or 0.5, then press ENTER.



13. Waypoint Sorting

You can choose to sort waypoints by waypoint number or waypoint name.

Press ENTER to select method.



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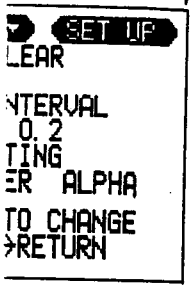
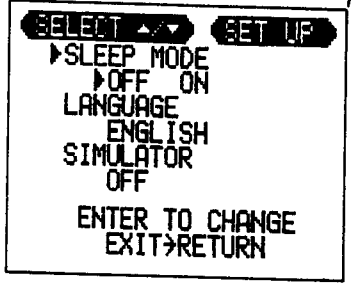


14. Sleep Mode

Press ENTER to select OFF, 2, 5, or 10.

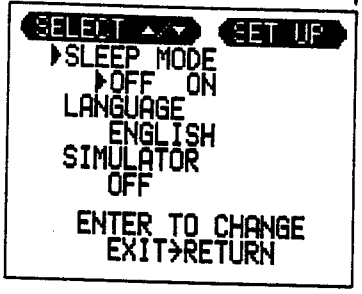


If you turn sleep mode on, the unit automatically turns off when no keys are pressed for the selected number of minutes. Sleep mode conserves power and is therefore useful when running on battery power.

15. Language

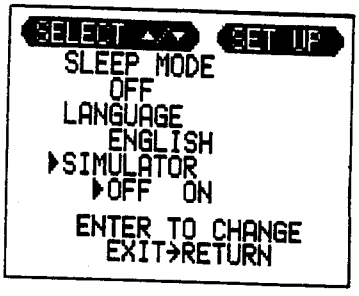
Press ENTER to select a language.

Each time you press ▲, the language changes as follows: English German Norwegian French Spanish Italian English



16. Simulator

Press ENTER to turn the simulator on or off.



Become familiar with your unit, without actually being underway, by simulating real conditions in the POS or NAV mode. Run through all of the functions, until you are comfortable with the operations.

Set-up Mode

5 Reference

Maintenance

You can maintain satisfactory operation of your unit depending on how well you care for the equipment. The simple maintenance tips that follow can save you time and money, as well as prevent unnecessary, premature failures.

➲ Always keep the equipment as clean as possible.
Use a soft clean cloth for cleaning the surface filter, control panel, etc. Do not use abrasive cleansers, chemical cleaners or solvents. Use glass cleaners or a suitable general purpose detergent.

➲ Periodically check system hardware.
Inspect the antenna and mounts making sure all components are free of corrosion and are securely mounted. Examine all cables for evidence of chafing or abrasions. Make sure connections to the vessel's DC power are clean and tight.

Product and Customer Service

In the event that your unit is in need of service, contact the dealer where you purchased the unit, or an authorized Apelco dealer for assistance. The authorized Apelco dealer is best equipped to handle your inquiries. If, after contacting your dealer, you have further questions and require further assistance, you may directly contact Apelco Marine Company at the following numbers:

Customer Service: (603) 881-9605 ext. 2120
This department deals primarily with questions regarding: purchasing parts and accessory items, authorized Apelco dealer locations, basic product information, and brochure/literature requests.

Product support: (603) 881-9605 ext. 2444
This department deals primarily with operation and technical aspects of Apelco Marine equipment. Please contact your dealer in advance.

When you call the above numbers, your call is placed in a queue and answered in the order which it was received. Normal operating hours for this system are from 8:30 am - 5:00 pm Eastern Standard Time.

REFERENCE

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Soft/Hard Reset

There are two methods to restore your unit to the factory defaults.

Soft Reset: restores all factory defaults but saves your waypoints and routes.

Hard Reset: restores all factory defaults and clears all waypoints and routes.

Soft Reset

When the unit is turned OFF, press PWR and the 2 key simultaneously.
Apelco GPS 15 appears briefly to indicate a reset has been performed. All factory defaults are restored and your waypoints and routes are saved.

Hard Reset

When the unit is turned OFF, press PWR and the 1 key simultaneously.
Apelco GPS 15 appears briefly to indicate a reset has been performed. All factory defaults are restored and all of your waypoints and routes are cleared.

Soft Reset Defaults:

Magnetic variation	auto
Units	NM, KT
L/L offset	none
Averaging	Med
Alarms	0.00 NM (off)
Antenna mode	2d
Geodetic datum	WSG-84
Sleep mode	off
Language	English
Data Output	off

Soft Reset Memory:

Waypoint memory	saved
Programmed routes	saved

Hard Reset Defaults:

Same as Soft Reset

Hard Reset Memory:

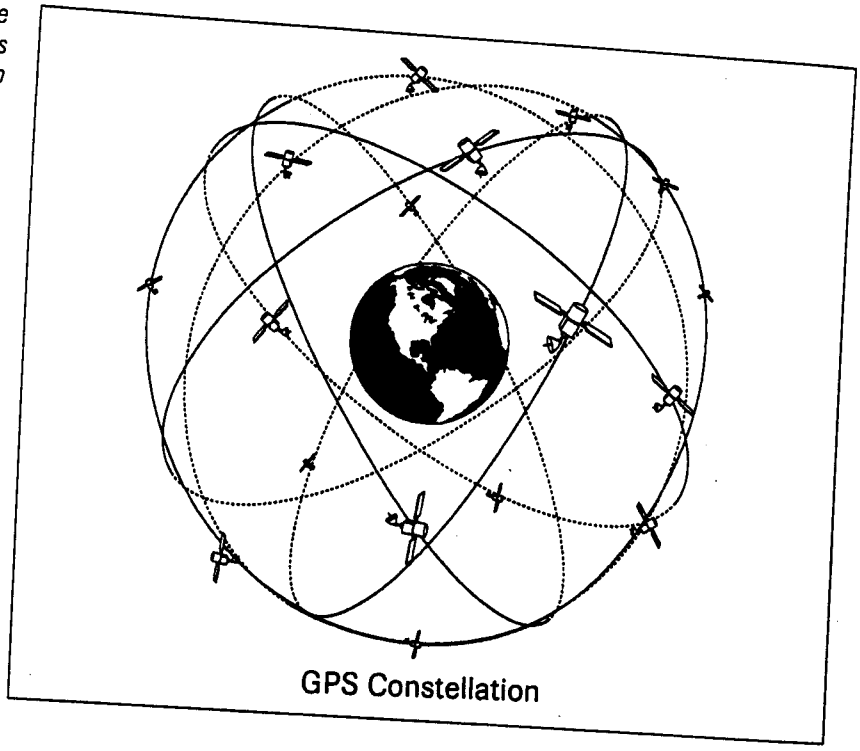
Waypoint memory	cleared
Programmed routes	cleared

GPS Basics

The Navstar/GPS system is a satellite based radio navigation system designed to provide global, 24 hour, all weather, accurate position data for navigators worldwide.

The GPS (Global Positioning System) is based on a GPS receiver's ability to accurately measure the propagation time of signals transmitted from orbiting satellites.

The GPS satellite constellation provides coverage to any point on the globe.



GPS Constellation

These satellites transmit accurately timed signals along with a navigation message containing the satellite's position, precise time correction signals, as well as almanac data for all of the satellites in the constellation.

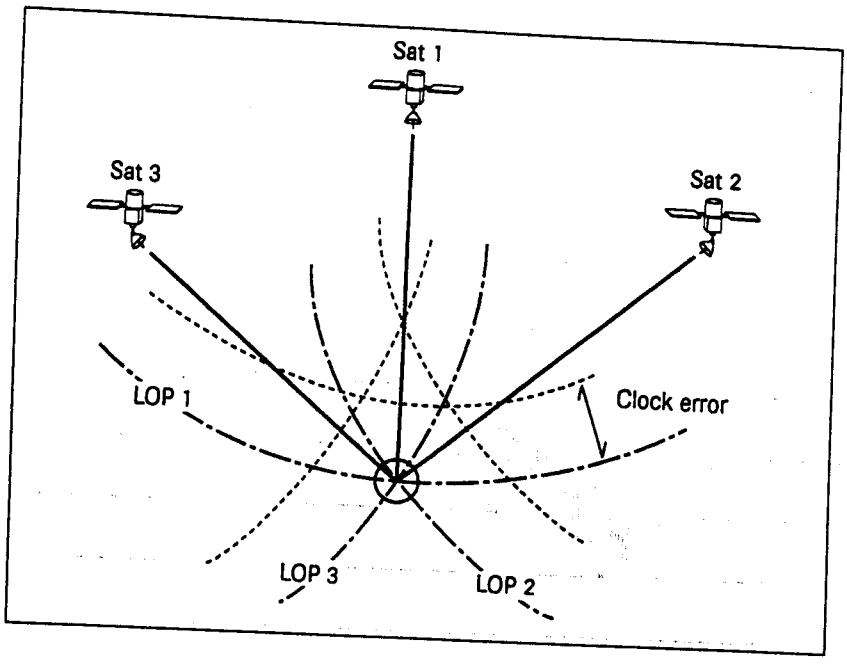
The GPS sensor measures the arrival time of each satellite signal and calculates the range to each tracked satellite. If the range to the satellites is known, then the position of your vessel can be determined by triangulation of the range data of the satellites in view, and presented in Latitude and Longitude.

The satellites continuously broadcast their navigation messages at a frequency of 1575.42 MHz (for civilian use). Superimposed on the navigation message is a high rate C/A (Coarse Acquisition) code used for accurate positioning measurements and positive satellite identification. The C/A ID code permits the user to determine and select the most appropriate satellites to use in position calculations.

If it were possible to measure true satellite ranges directly, it would only be necessary to track data from any two satellites to obtain a vessel's Latitude/Longitude.

For marine navigation, the receiver tracks a minimum of three satellites in order to resolve timing errors, including the receiver's own internal clock timing bias error which must be factored into the various range calculations.

Normally, your unit tracks up to five satellites (if visible) and uses the best four out of the five for calculating position fixes. By using four satellites, the processor can determine the amount of clock error in each range calculation. The receiver subtracts the error bias equally from each range solution until the LOPs intersect. Theoretically, this process can produce highly accurate position fixes for navigation (±15 M rms.).



The GPS 15's receiver tracks a minimum of three satellites to resolve timing errors, including its own internal clock timing bias error.

Continuous tracking of each satellite signal allows the receiver to perform this timing adjustment process and to calculate accurate measurements to the satellites. The unit uses an five-channel parallel receiver providing fast efficient acquisition and accurate position updating, while saving overall unit size, weight, cost and power consumption.

Unfortunately, the Department of Defense has included a special mode into the GPS satellite system design which introduces variable timing errors into the satellite signals. This mode is known as "Selective Availability" (SA) and when it is enabled, it is designed to degrade accurate fixes for all users (except authorized military users). Accuracy in the order of ±100 meters rms. 95% of the time is obtained when SA is ON. This means that 95% of the time the actual position is within a radius of 100 meters; 5% of the time the actual position is out of this 100 meter circle. Selective Availability has been enabled almost continuously since early 1991.

Glossary of Terms

Azimuth	The horizontal direction expressed as the angular distance between the position of your vessel and the position of a satellite.
Bearing	The direction of an object from the observer. Can be stated in terms of TRUE, magnetic and compass values.
Channel	A channel of a GPS receiver consisting of the circuitry necessary to tune the signal from a single GPS satellite.
Clock bias	The difference between the clock's indicated time and true universal time.
CMG	Course-Made-Good—The bearing that you see from the starting point of your course to your current position.
COG	Course-Over-Ground—The actual direction of your vessel's movement over ground calculated by the Loran.
Course	The direction in which a vessel is to be steered or is being steered. The direction of travel through the water.
Deviation	The amount by which a vessel's magnetic compass needle points (deviates) either side of magnetic North.
Geodetic datum	A scaling system used to calculate the L/L coordinate structure onto a chart for navigation. There are many datum's available, and it is important that you use the same datum as the navigation chart you are using.
GRI	Group-Repetition-Interval—The assigned precise timing interval in which the Loran chain must perform its sequential transmissions. These transmissions are measured in microseconds. The GRI timing is used to identify the Loran chains worldwide. (99,600 µs = 9960 GRI).
HDOP	Horizontal Dilution Of Precision—The multiplicative factor that modifies ranging error. It is caused solely by the geometry between the user and their set of satellites.
Ionosphere	The band of charged particles found 80 to 120 miles above the Earth's surface.

Latitude	Angular measure 0° -90° North and South from the equator. On a chart these lines are drawn from right to left.
L/L	Latitude and Longitude
Longitude	Angular measure 0° -180° East and West of the prime meridian (0°) at Greenwich, England. On a chart these lines are drawn from top to bottom.
LOP	Line-Of-Position—The hyperbolic lines formed by points where the time measured between the receipt of the signals from several satellites are always the same. LOP's are frequently overlaid onto marine charts and are otherwise known as Time Lines or Time Delays.
Microsecond	One microsecond (1 μs) = .000001 second.
Repeatable Accuracy	A measure of your ability, through using a navigation system such as GPS, to return to a position that you have been to before and stored as a waypoint.
Rhumb line	A straight line showing the direct course from the starting position to a waypoint.
Satellite constellation	The arrangement in space of a set of satellites.
SOG	Speed-Over-Ground—A calculation of the rate of movement of the vessel over ground.
TD	Time Difference—The difference in time of arrival (measured in microseconds) of the two Loran signals, one from the master transmitting station and the other from a secondary.
Variation	The difference in degrees between "True North" and "Magnetic North."
VAR	Velocity-Along-Route—The component along the planned route of your vessel's current speed.
VTD	Velocity-Towards-Destination—The component toward your destination based on your vessel's current speed.
Waypoint	Any location which has been stored in memory using L/L or TD as the coordinates.

Specifications

General

Digital outputs	NMEA0183
GPS:	GLL, RMB, RMC, VTG, BWC, APA, APB, GGA
Routes	10 routes (200 waypoints)
Keyboard	16 keys
Position memory	200 memory locations (for L/L, TD, Event)
Event input	Stored into next empty location or selectable memory location
Man-overboard	Built-in
Display structure	56 x 48 mm
Backlight	ON/OFF (LCD: Lamp; Panel: Lamp)
Memory back-up	lithium battery (3–5 year life)
Power source	DC. 10.8–16 V (negative ground)
Power consumption	approx. 3 W with backlight ON 1 W with backlight OFF

Data display

L/L	N/S + 6 digits, E/W + 7 digits, 0.01 min. resolution
Waypoint	L/L, TD position
Bearing and Range	bearing and range to selected waypoint
Time To Go	time to go to the waypoint
Speed and Course	average speed and course over ground
Signal Status	GPS signal and satellite information.
Cross Track Error	Cross Track Error from current route
Off-line CC	off-line conversion 2 way between L/L and TD
Warnings	Error, Arrival, Anchor, XTE
Receiving indicator	NNN-4410R
Operating temperature	−15 °C to +55 °C
Weight	0.55 kg
Dimensions	183 (H) x 94 (W) x 56 (D)
Waterproofing	U.S.C.G., CFR 46 standard
EMI	IEC 945, EMI standard

Troubleshooting

Not receiving a signal

- Make sure your antenna has an unobstructed view of the horizon.
- Check your estimated L/L. Correct as necessary.
- Check time, date, and year. Correct as necessary.
- Do a Hard Reset.

Does not retain memory

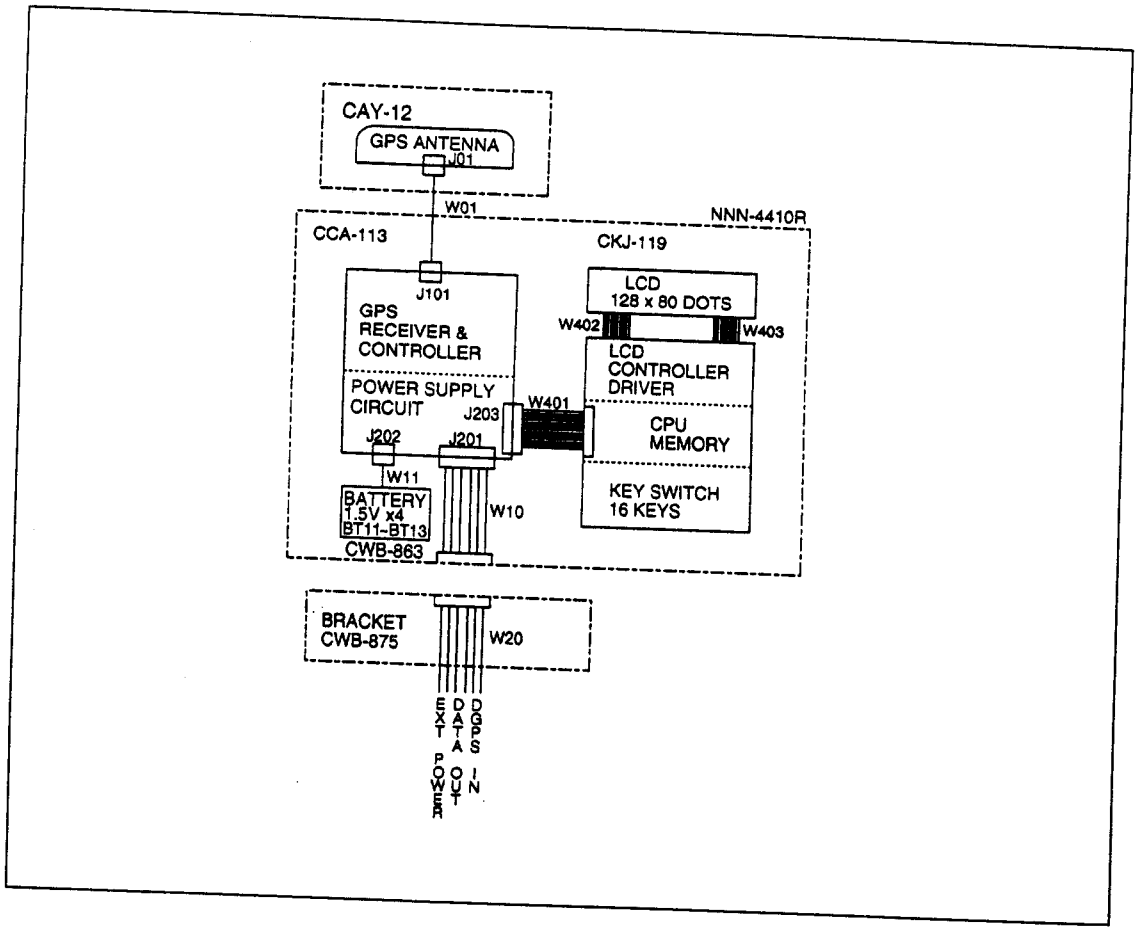
- Do a Hard Reset.
- Check power supply for power surges (transient spikes). If present, install filtering on input DC power connections.

No power input

- Check that the unit is seated properly in the holder.
- Check batteries.
- Check vessel's power (battery) for proper voltage readings of 11–16 V DC.

REFERENCE

Interconnection Diagram



Parts List

Adjustable Patch Antenna	CAY-12
Receiver PCB	CCA-113
Data Processor PCB	CKJ-119
Front Panel Assembly	MPBX 31895
Rear Panel Assembly	MPBX 32379
Keypad Contact Rubber	MTV 30077
Mounting Knob	MPTG 30116
Mounting Bracket	MPBX 32005
Holder	CWB-875 874

REFERENCE

Input and Output Data

Output Data

GLL	Vessel's present position in L/L
VTG	Track Made Good and Ground Speed
APA	Auto-pilot sentence A
APB	Auto-pilot sentence B
BWC	Bearing and distance to waypoint
RMB	Minimum navigational information (waypoint)
RMC	Minimum specific data GPS/Transit

Data Output Format

The following briefly describes the data output format of the GPS 15. When interfacing units of different manufacturers we recommend checking with each manufacturer to confirm compatibility.

NMEA0183

Normally used to provide position and waypoint information to fishfinder or radar units. Also provides steering information for auto-pilots.

Contains the following data:

- Vessel's position in L/L's.
- Own ship's course over ground and speed over ground.
- Bearing & distance to waypoint
- Auto-pilot cross-track-eror information
- Recommended minimum implementation for Generic Navigation Information