NAVADD5000

and

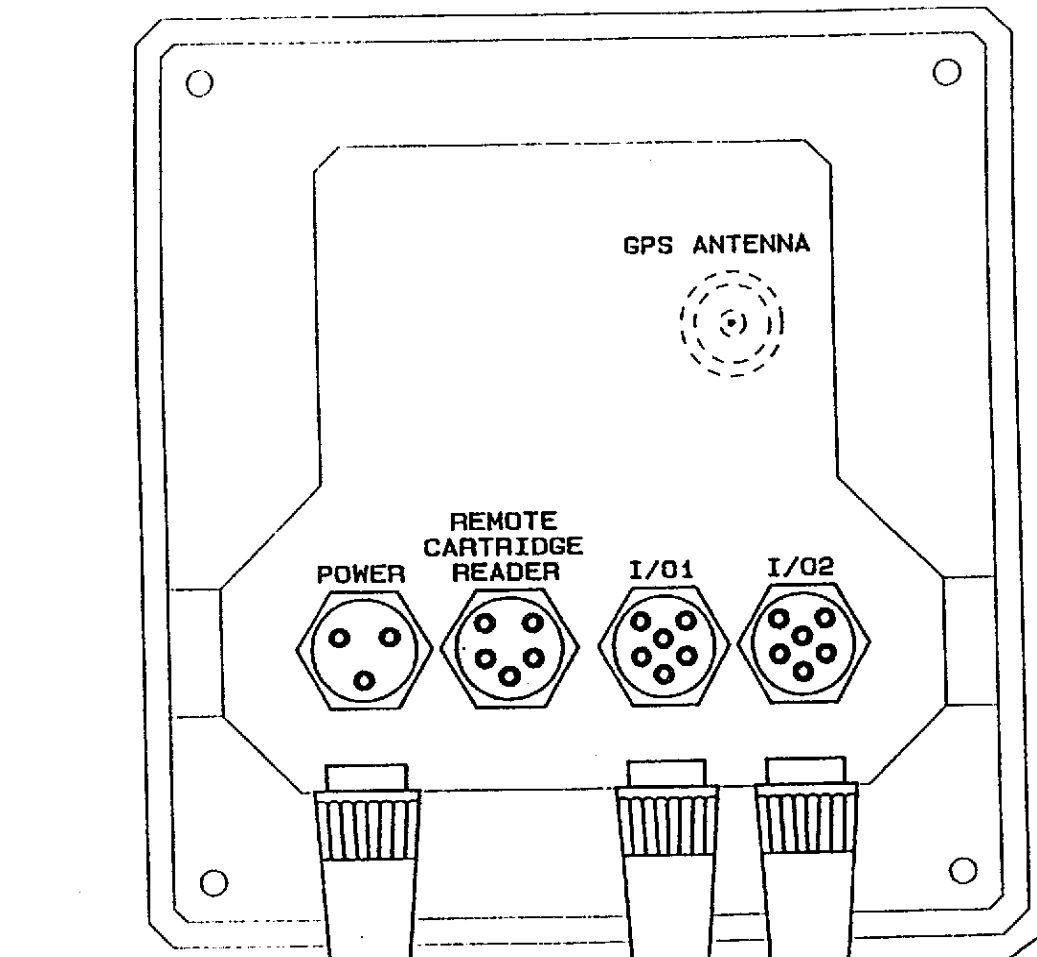
NAVADD5000G

User Manual

Software Name : SWLCD

SI-TEX

REAR VIEW



APPLIES TO VERSIONS:

UM0LCD00SW
UM0LCG00SW
UM0LCD00SX
UM0LCG00SX
UM0LCU00NS
UM0LC600NS
UM0LC600XX
UM0LCU00XX

POWER

1)	IN+	RED
2)	IN-	BLACK
3)	CASE	WHITE

I/02

1)	+AUX (12)	BLACK
2)	$\overline{TXB}$	ORANGE
3)	RXB+	WHITE
4)	RXB-	GREEN
5)	RDY+2	YELLOW
6)	GND	GREY

I/01

1)	$\overline{ATX0}$	BLACK
2)	$\overline{TXA}$	ORANGE
3)	RXA+	WHITE
4)	RXA-	GREEN
5)	RDY+1	YELLOW
6)	GND	GREY

WARNING

Every effort has been made to assure that the unit C-MAP charts are accurate and reliable. However, they are not intended nor should they be used as a substitute for official charts.

You are required to carry and use the officially published and approved nautical charts for your area of operation.

IMPORTANT SAFEGUARDS

Please read this manual before installing and operating this unit. If you have any questions, please contact your dealer or SI-TEX Customer Service.

Do not remove the case and attempt to service this product yourself. This unit should be serviced only by trained personnel.

The unit can be severely damaged by reversed DC power polarity. Such damage may not be covered under the warranty.

This unit is not waterproof. Please ensure that it is installed in a dry area, free from spray and rain. Water damage is not covered by the warranty.

Like all electronics gear, the unit can be damaged by exposure to excessive heat.

Please, remember you cannot change cartridge without following the exact procedure, as software may get damaged.

TABLE OF CONTENTS

chapter 4 - USING THE UNIT

chapter 1
INTRODUCTION

The SI-TEX unit is an electronic chart and navigation system. It uses computer technology to provide extensive navigational information in simple graphic form.
The unit interconnects the vessel's navigation receiver and autopilot into an integrated system with a single user interface.

1.1) FEATURES

New hi-speed processor provides quick keyboard response.

Simple operation features menu selection.

Built-in basic charts supply world-wide route planning & tracking ability.

The unit's small footprint saves helm station space.

Zooming allows display scales from .03 to 1000 NM per inch.

Large memory capacity permits the simultaneous storage of up to 800 positions. This can be any combination of waypoints, marks and events.

Memory is divided into 2 selectable pages. This helps to avoid screen clutter by keeping unused routes stored in the undisplayed page.

The unit keeps information in its memory even when turned off. This lets the user power the unit on and off without having to re-enter information and re-select options.

All information can be stored on a user cartridge and can be recalled at any time.

Selectable screen options including: depth contours, coastlines, names, navigation aids, etc. provide flexibility.

The data window can be expanded to cover the full screen to allow easy viewing of navigational fix and course data.

The minimum scale displayable for a C-MAP cartridge depends on the scale of the charts it holds.
For example, the scale for NOAA/11413A, (Tampa Bay) contains detail at a scale of approx .5 NM per inch, and NOAA/11426A (Ft Myers) can scale down to approximately 1 NM per inch. The unit can zoom-in to .03 NM per inch when mapping is turned off.

1.2) USING THIS MANUAL

This manual is structured as follows:
CHAPTER 1 - Introduction
CHAPTER 2 - Unit Product Description
CHAPTER 3 - Getting Started
CHAPTER 4 - Using the unit
CHAPTER 5 - Installation and Reference
CHAPTER 6 - Commands Quick Reference
CHAPTER 7 - Unit model with GPS

1.3) CHAPTER OBJECTIVES

CHAPTERS	1 and 2	Acquaints a new owner/user with the product and its features.
CHAPTER	3	Guides the first time user through basic set up and chart display functions.
CHAPTER	4	Guides the first time user through using the unit's charting and navigation capabilities.
CHAPTER	5	Provides one time or low usage information such as: installation procedures (unit), reference information, and problem resolution.
CHAPTER	6	Provides quick reference "how to" information for unit commands. This chapter is intended to be used by persons familiar with the unit, and lists the cross-hair and keyboard

actions necessary to perform a desired task or command.

CHAPTER 7 — This chapter contains all information unique to the Unit + GPS. If you have a model with GPS, please refer to this section for installation instructions and information concerning differences between the unit and the unit with GPS models.

Note

This manual applies to unit at software release level 1.03. Units not at this level may differ in functions and features. SI-TEX Marine Electronics, Inc. reserves the right to modify and update unit software at any time.

1.4) KEYBOARD SEQUENCES

Unit operations are performed by the following key sequences. Key sequences can select menus, turn options on or off (toggle), select one item of a group, etc.

A sample of what happens during a keyboard sequence is included in the next page. It shows the results of the key sequence for changing the language from English to Italian.

1. Press '***MENU***' (brings up the AUXILIARY FUNCTIONS display)

AUXILIARY FUNCTIONS

0) CHANGE CARTRIDGE
1) CLEAR USER POINTS
2) SCREEN SETTINGS
3) FIX/COMPASS FUNCTIONS
4) TRACKING MENU
5) AUTOPILOT MENU
6) DEPTH CONTOURS
7) DISTANCE TABLE
8) SCREEN MODE: NORMAL

'CLR' TO EXIT

2. Press '***2***' (display the SCREEN SETTINGS menu)

SCREEN SETTINGS

0)	FILL	ON
1)	NAMES	ON
2)	NAV AIDS	OFF
3)	COSTAL FEATURES	OFF
4)	RESTRICTIONS	ON
5)	COORDINATES	OFF
6)	USER POINT IDENTIFIER	ON
7)	EXTERNAL WAYPOINT	ON
8)	TEXT AREA: POSITION	
9)	LANGUAGE ENGLISH	

PREVOIUS MENU: 'CLR'

3. The '***9***' key will select the desired language.

4. Depressing '***CLR***' key two times will return to the starting point.

The remainder of this manual will use a simplified method to describe key sequences.

Screens that are brought up won't be shown unless there is something unusual requiring further explanation.

Required keystrokes will be shown as follows:
- Depress '***MENU***' + '***2***' + '***9***' (This means press 'MENU', then press '2', then '9')

The use of the 'CLR' key to back out of a menu or screen won't be mentioned every time.

1.5) SCREEN BRIGHTNESS

When cartography is displayed, the '***CONTR***' key controls the screen contrast. Pressing the 'CONTR' and up or down arrow key.
Pressing the 'LIGHT' key, the user can select one among four brightness levels.
It is also possible to select the video screen mode, normal or inverse, pressing the 'MENU' and '8' keys.

chapter 2
UNIT PRODUCT DESCRIPTION

The unit uses and displays several types of information.

2.1) EXTERNAL INFORMATION INPUTS

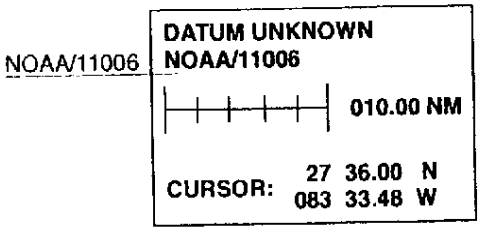
The unit uses information from three sources. They are:

2.1.1) C-MAP CARTRIDGES

The unit has built-in world wide basic zone charts. Basic zone charts contain enough data to provide navigation capabilities and low detail display for the entire world. C-MAP cartridges are used to add detail to the basic zone charts.

There are thousands of C-MAP data cartridges available for use with your unit. Each cartridge contains multiple digitized nautical charts for a specific geographic area. They contain coast lines, landmark names, depth contour lines, navigation aids, etc.
The coverage area for each mini C-MAP cartridge is printed on the notched side of the cartridge.

When cartridge data is displayed, the data window shows the chart the data was taken from. The referenced chart should be carried on board and used for reference and backup. The chart referenced for cartridge J 0130.03 is NOAA/11006.



Common chart abbreviations used are:
- AA British Admiralty
- ISTIDR Istituto Idrogralico Italiano

- NOAA National Oceanic Atmospheric Administration
- SHF Service Hidrographique Francaise
- DMA Defense Mapping Agency

2.1.2) NAVIGATION RECEIVERS

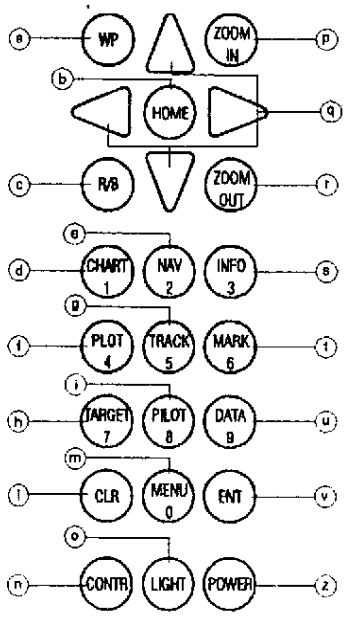
The unit accepts navigational fix data from most LORAN and GPS receivers. Ten types of receiver interfaces are supported and can be selected by the user (See Chapter 5 for a list of SI-TEX products useable with the unit and the supported interfaces).

2.1.2.1) Special navigation receiver functions

Special navigator functions add the ability to display satellite, signal quality, time, and other data that GPS receivers can send to the unit. It also supports sending of unit data to certain types of navigational receivers that require it.

2.1.3) KEYBOARD

The keyboard controls unit operations as well as providing a means for number entry. Numeric (0-9) keys provide this function. The other keys' definitions and uses are shown below.



a) SELECTS ROUTE PAD MENU

b) CENTERS CROSS-HAIR POSITION ON THE SCREEN

c) DISPLAYS DISTANCE AND BEARING BETWEEN TWO POINTS

d) SELECTS CHART PAD MENU

e) SELECTS NAVIGATION OR CHARTING MODE

f) DISPLAYS PATH TRAVELED

g) TURNS TRACK RECORDING ON/OFF

h) SELECTS TARGET PAD MENU

i) SELECTS AUTOPILOT PAD MENU

l) CANCELS MENUS, DELETES MARKS AND WAYPOINTS

m) SELECTS AUXILIARY FUNCTION MENU

n) CONTROLS SCREEN CONTRAST

o) CONTROLS SCREEN BRIGHTNESS

p) ZOOM-IN: - DISPLAYS SMALLER AREA WITH MORE DETAILS

q) ARROW KEYS MOVE CROSS-HAIR

r) ZOOM-OUT: - DISPLAYS LARGER AREA WITH LESS DETAILS

s) SELECTS NAVIGATION DATA PAGE

t) SELECTS MARK PAD MENU

u) SELECTS USER DATA-GROUP SELECTION MENU

v) ENTERS NUMERIC KEYPAD INFO AND RESETS CONDITIONS

z) TURNS POWER ON/OFF

The keyboard is locked out while the processor is performing heavy computing functions such as redrawing the chart window. No function takes more than a few seconds.

HINTS: 1. When repeating an operation such as stepping ZOOM-OUT several steps, hold the ZOOM key down instead of pressing it for each step. This will take less time.

2. The cross-hair is the last item re-written when the screen is being changed.

2.2) UNIT OUTPUTS

Many types of information can be sent to the vessel's autopilot. The

outputs are described on the following pages.

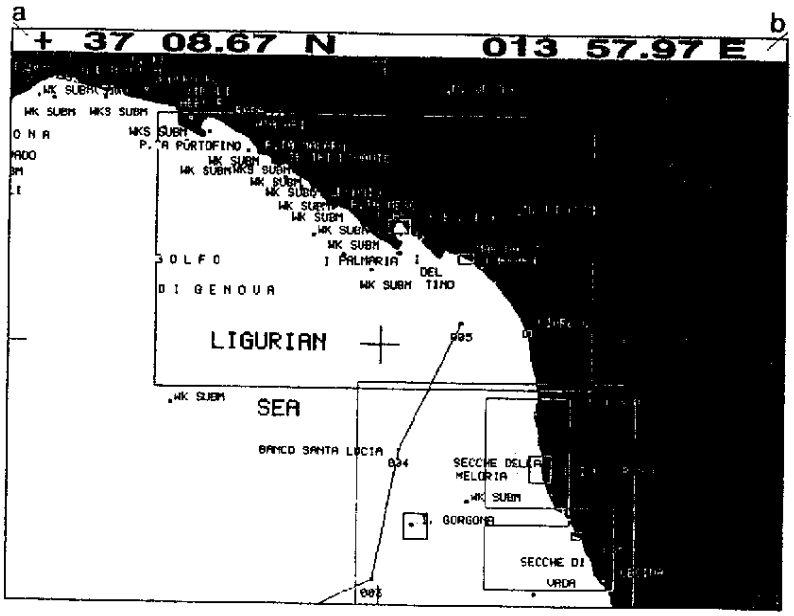
2.2.1) CHARTING WINDOW

All but the topmost section is used to represent electronic charts. Charts are always displayed with the top of the screen representing north. This display method is referred to as North up.
The C-MAP charts contain navigational information, courses, selection menus, and other types of information.

2.2.2) DATA WINDOW

The top portion of the screen displays text information showing unit status and key navigational information.
Information can be displayed on the screen in four different configurations, depending on the option selected: press 'MENU' to select the AUXILIARY FUNCTIONS Menu and then press '2' to select the SCREEN SETTINGS submenu. Now by pressing the '8' key it is possible to select one of the four possible choices: POSITION, FIX + CHART INFO, FIX + TARGET INFO, CHART + TARGET INFO.

1. POSITION has been selected:

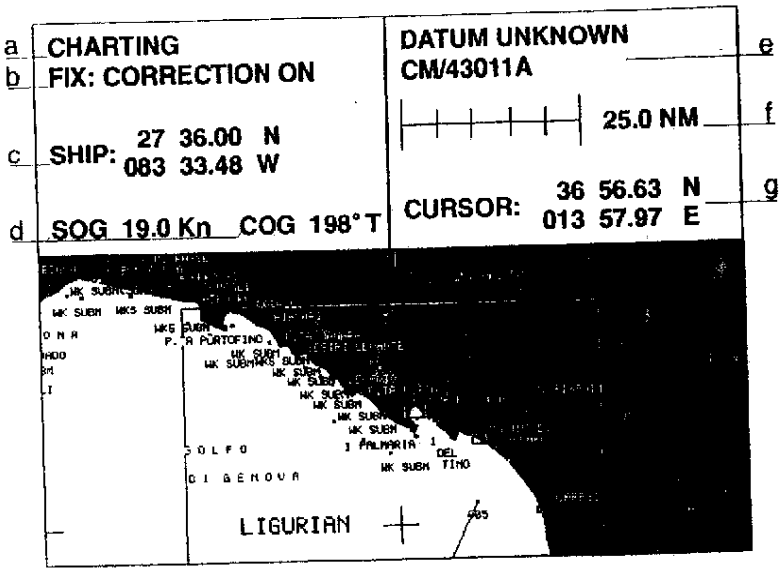


Note

*a) Indicates CHARTING (+) or NAVIGATION ((+)) mode. (See note *).*

b) If in Charting mode, current cross-hair location; if in Navigation mode, current or last fix from navigation receiver.

2. FIX + CHART INFO has been selected:



Note

*a) Indicates Charting or Navigation mode. (See note *).*

*b) Status of navigation receiver fix. (See note **).*

c) Current or last fix from navigator receiver.

d) Course and speed over ground.

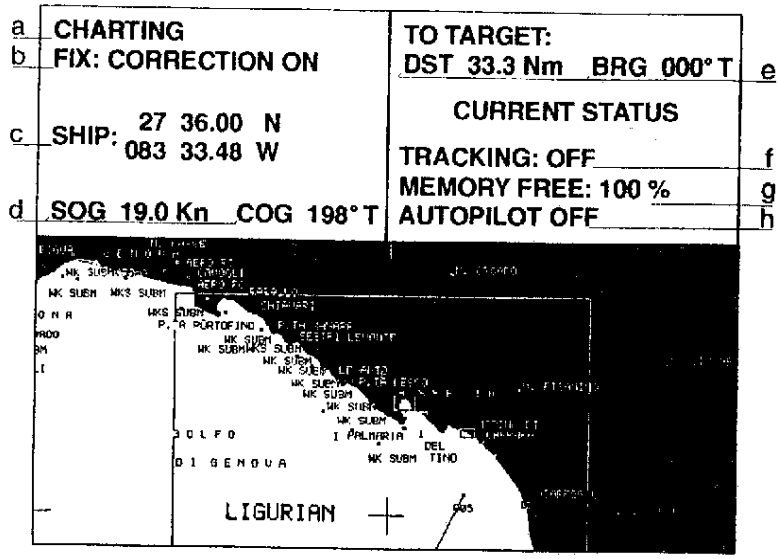
*e) Chart to be used as reference and chart datum description. (See note ***).*

f) Scale of current chart displayed.

g) Current cross-hair location.

3. FIX + TARGET INFO has been selected:

See the following figure.

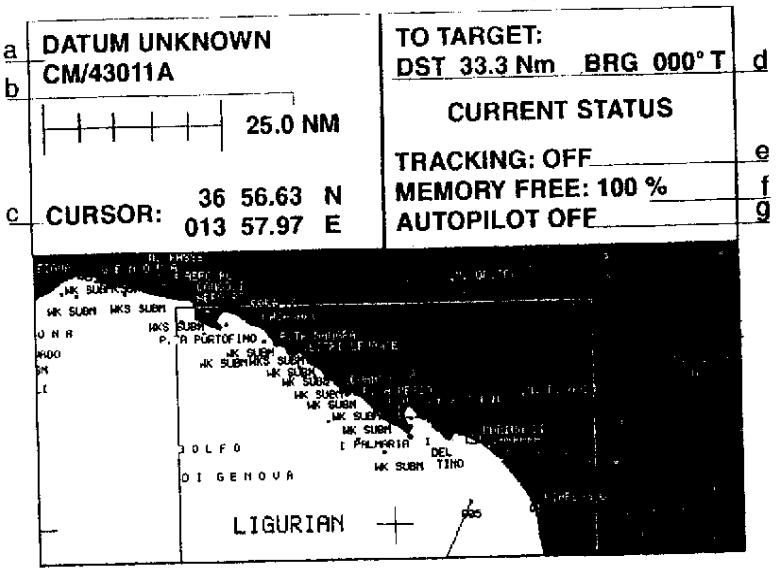


Note

*a) Indicates Charting or Navigation mode. (See note *).*
*b) Status of navigation receiver fix. (See note **).*
c) Current or last fix from navigator receiver.
d) Course and speed over ground.
e) Bearing and distance to target.
f) Shows the tracking status ON/OFF.
g) Percentage of memory free.
h) Autopilot status.

4. CHART + TARGET INFO has been selected:

See the following figure.



Note

a) *Chart to be used as reference and chart datum description. (See note ***).*
b) *Scale of current chart displayed.*
c) *Current cross-hair location.*
d) *Bearing and distance to target.*
e) *Shows the tracking status ON/OFF.*
f) *Percentage of memory free.*
g) *Autopilot status.*

Note

(*) *Many commands function differently in CHARTING or NAVIGATION mode*

(**) *One of six messages will appear for FIX:*

- *"NOT RECEIVED" - No data is received.*
- *"NOT GOOD" - The receiver format is correct but the information is declared "invalid" by the positioning instrument.*
- *"WRONG FORMAT" - The receiver format does not correspond to the selected format or the receiver data do not have information on ship's position.*
- *"CORRECTION ON" - The format is correct and understood and the fix correction is active.*
- *"CORRECTION OFF" - The format is correct and understood, but the fix correction is not active. This message appears only in cartography off. In car-*

tography on the unit substitues the message "CORRECTION OFF" with one of the following:
"FIX: CHART DATUM"
"FIX: WGS 84"
"FIX: <Datum Name>"

The "WRONG FORMAT" and "NOT RECEIVED" messages appear 15 seconds after the condition persist, instead in the "NOT GOOD" message appears after 30 seconds. The received correct fix condition appears immediately. The specific alarm is activated after a good fix is not received for 1 minute.

(***) Here the following message might appear:
"CHART DATUM UNKNOWN"
"WGS 84 NOT AVAILABLE"
"WGS 84 DATUM SELECTED"
"DATUM: <Datum Name>"

The right top part of the screen is also used as a note pad area by some functions.
The following example results when the '**WP**' key is pressed.
This note pad and others are explained later in this manual.

```
ROUTE:

1) ADD A POINT
2) CLEAR LAST WP
3) CHANGE ROUTE
4) REVERSE ROUTE
5) CLEAR ROUTE
6) DATA REPORT

 # TO SELECT
'CLR' TO EXIT
```

The user can obtain information about lights, harbours, platform and user points automatically, placing the Cross-Hair on the symbol that identifies light or user point.

2.2.3) AUDIBLE ALARM

An internal beeper is used to signal valid key depression (single beep), wrong key pressed (three short beeps), and alarms. Alarms are addressed in chapter 4.

2.2.4) AUTOPILOT

Targets can be set on the screen. The unit will calculate heading and distance from the vessel's present position to the target. This information is sent to the autopilot to direct the vessel to the target. Even if you do NOT have an autopilot, you may use this function to provide course and distance data to allow you to steer to the target.
Autopilot mode allows course following. This causes the unit to target the next waypoint when the current one is reached. This function works well when steering without an autopilot.

2.2.5) DATA RETENTION

The following types of data are retained when the unit is powered off.

- Autopilot Alarm Range Settings
- Cartographic Display
- Compass Calibration
- Distance Table Entries
- Fix Alarm Settings
- Fix Error and Auto-correction Status
- Last Good Fix received from Nav Receiver
- Selected Input and Output Interface Formats
- Stored Events, Marks, Waypoints, and Routes
- Target Points

Note

The unit uses an internal NiCad battery to retain storage data when power is turned off. The battery should last approximately 3 years. If your unit loses data when turned off, return the unit to your point of service for battery replacement.

chapter 3
GETTING STARTED

Chapters 3 and 4 contain instructional material. The aim is to teach the user enough to be able to perform most functions by using the COMMANDS QUICK REFERENCE in Chapter 6. Once familiar with the unit, you should only have to use these chapters for seldom-used procedures such as performing compass calibration.

This chapter is intended to help you become familiar with the unit and understand how the unit is set up and prepared for use.

3.1) CARTRIDGE INSERTION

The cartridge goes in the slot of the remote cartridge reader. Push the cartridge into the slot until it stops, then push gently until the male connector is engaged within the socket.

If you need to change cartridge, it can be removed and inserted with power on.
To change cartridge:
- Remove the present cartridge
- Press ***'MENU'***
- Press ***'0'***
- Insert the new cartridge
- Press any key

You may lock the unit up if the correct procedure isn't followed. To reset lockup, power the unit off and back on.

3.2) POWER ON AND SELF TEST

The unit is turned on by pressing the **'POWER'** key. A short beep will sound and the internal system unit test will start. After approximately three seconds, the internal memory is verified.

The C-MAP cartridge is tested next. A successful test will cause both

the Data cartridge and Code cartridge IDs to be displayed. See the sample screen in the next page. POWER OFF by pressing and holding the **'POWER'** key for 5 seconds. This delay is built in to prevent accidental powering off.

```
SYSTEM UNIT TEST V. 3.42 (*)

- SYSTEM WORD : 0001  9DE0
- EPROM  TEST  : PASSED
- RAM  TEST    : PASSED
- DATA         : MAP CARTRIDGE  N. J 101.00
- CODE         : SWLCD/W7  V. 104
```

Note

(*) Kernel and code cartridge versions subject to change without notice.

Other possible test results and messages are:

"NOT PRESENT OR FAULTY" - No cartridge is inserted
- The cartridge is not completely inserted
- The cartridge is faulty

"FAULTY" The test has read bad cartridge data

"ILLEGAL SOFTWARE" The inserted cartridge is not unit compatible

The final auto test verifies the internal unit code.

After successful testing, the caution screen is displayed. Pressing the ***'ENT'*** key puts the unit into normal operating mode.

3.2.1) EXTENDED SYSTEM UNIT TESTS

Extended tests are available for service personnel and clearing storage.
Operating procedures for extended tests may be found in Chapter 5 (INSTALLATION AND REFERENCE).

3.2.2) WHEN ALL ELSE FAILS

The unit performs many operations. If you ever experience problems or a lock-up due to "finger checks" or possible equipment failures, you might try a memory reset before seeking help. RAM memory verification and reset is performed by the extended system unit test (See Chapter 5).

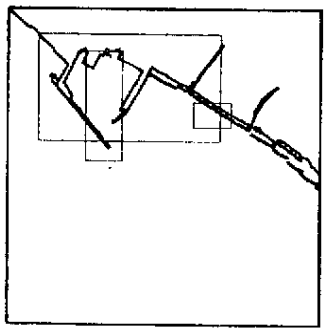
3.3) MAPPING

We will first concentrate on exploring unit mapping functions. They are explained in this section.

3.3.1) CHART BOUNDARIES: *'CHART' + '1'*

After powering on, the screen will display the entire area covered by the inserted C-MAP cartridge. All the boundaries of the individual charts contained in the cartridge will be displayed.

The boundaries will be erased the first time the map is redrawn (caused by ZOOM-IN or OUT or moving the cross-hair off the screen). They can be turned on or off by depressing the ***'CHART'*** + ***'1'*** Keys.



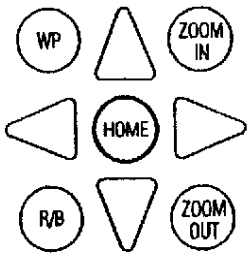
3.3.2) MAPPING (CARTOGRAPHY) ON/OFF: *'CHART' + '2'*

Land and sea outlines are deleted by turning cartography off. In addition, turning cartography (mapping) off permits the screen scale to be zoomed in to approximately .03 NM per inch (reads .02 in metric). This allows precise placement of the cross-hair down to the hundredths of a minute level.
All other functions may be used with or without the outlines and chart details.

"CARTOGRAPHY OFF" message appears when function is off.

3.3.3) CROSS-HAIR

The four arrow keys are used to move the cross-hair on the chart window. Pressing the ***'HOME'*** key will center it on the chart window. This is an easy way to find the cross-hair if you lose track of it.



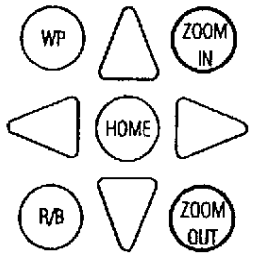
Moving the cross-hair off the screen while in CHARTING mode will cause the screen to be shifted in the direction the cross-hair is moving. In NAVIGATION mode, the cross-hair will stop at the edge of the screen and no image shifting will occur.

You will notice that the cross-hair speeds up after it moves a short distance. This allows you to make short precise positioning adjustments or move the cross-hair rapidly for a long span.

3.3.4) ZOOM-IN and OUT

The **'ZOOM-IN'** key causes the size of the area represented on the chart window to decrease. It also causes the amount of details shown to increase. The **'ZOOM-IN'** key is the top right key of the keyboard. The **'ZOOM-OUT'** key causes the represented area to increase and

the amount of details to decrease.



With the cross-hair in the cartridge mapped area the **'ZOOM-IN'** function can display down to .03 NM per inch (with cartography off) and out to 1000 NM per inch.
The unit has a built-in world-wide chart. That chart is used for display outside the cartridge area. It provides zooming from 20 NM to 1000 NM outside the cartridge mapped area.

3.3.5) SCREEN SETTINGS SUB-MENU: *'MENU' + '2'*

Sub-menus are merely menus that are accessed from other menus. Two sub-menus control most of the screen settings. They are the SCREEN SETTINGS and the DEPTH CONTOURS sub-menus.

Most items on the SCREEN SETTINGS menu are toggles These items are turned on and off by pressing the numeric key specified. Toggles are used throughout the unit menu structure.

The settings accessed via the SCREEN SETTINGS MENU are:

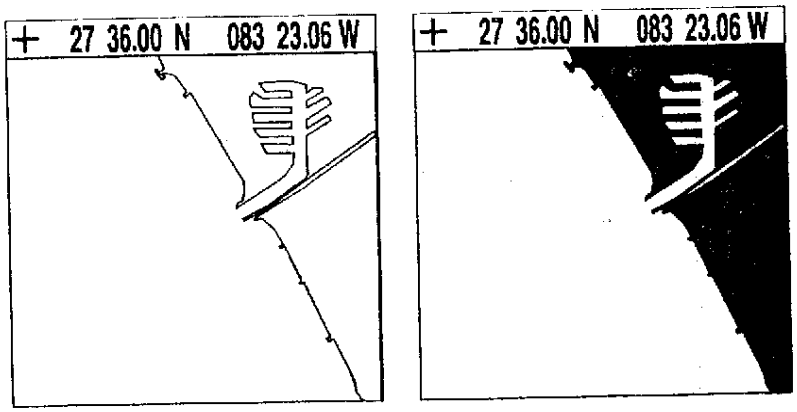
3.3.5.1) Language selection: *'MENU' + '2' + '9'*

The unit can display data window and menu text in five languages. Chart text originating from a cartridge stays in the language in which the cartridge was written.
The unit is set on English at the factory. You can select French, Italian, Spanish or German at any time, by pressing the 'MENU' and '2' keys, and then the '9' key repeadly.

3.3.5.2) Fill: *'MENU' + '2' + '0'*

Turning FILL on fills in all land masses. This is especially helpful when

you are displaying complex areas with islands, bays, harbors, etc.



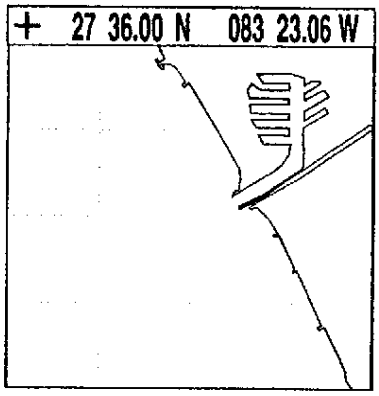
LANDFILL OFF LANDFILL ON

3.3.5.3) Names display: *'MENU'* + '2' + *'1'*

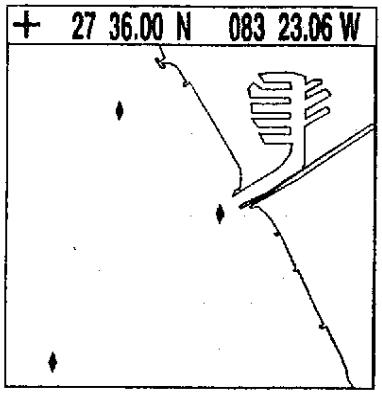
Location and object names can be removed or added to the screen. Most names, navigation aids, depth contours, contour lines, coastal features and restrictions are only displayed in the smaller ranges (1 NM per inch and lower).

3.3.5.4) Navigational aids display: *'MENU'* + '2' + '2'

Navigation aids include items such as lighthouses, platforms, range lights, day markers, and numbered buoys. The navigation aids flash when displayed.
See the following figure.



NAVIGATION AIDS OFF



NAVIGATION AIDS ON

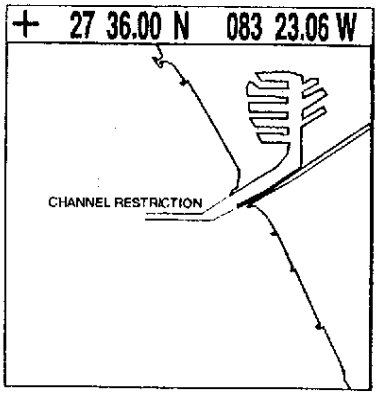
To obtain the international code of a lighthouse or other nav aids and their characteristics, the Cross-Hair must be placed on the diamond symbol. The information will be displayed in the data window note pad area.

3.3.5.5) Coastal feature display: *'MENU' + '2' + '3'*

The display of coastal features can also be turned on and off. Coastal features are items such as: rocks, wrecks, marshes, etc.

3.3.5.6) Navigation restriction display: *'MENU' + '2' + '4'*

This item is identified as "restrictions" on the screen setting menu. Navigation restrictions include spoil areas, intercoastal waterways, etc.



COMMON SYMBOLS

- PLATFORM
- LIGHTHOUSE/BUOY
- PORT
- LOCATION
- CONTOUR LINE
- SHORELINE

3.3.5.7) Coordinate display: *'MENU' + '2' + '5'*

The latitude and longitude grid display can be turned on or off. It consists of dashed lines with LAT and LON reference. The grid is especially usefull when cartography mode is off.

The latitude and longitude grid display can be turned on or off. It consists of dashed lines with LAT and LON reference. The grid is especially useful when route planning or when, cartography mode are off.

3.3.6) DEPTH CONTOURS SUB-MENU: *'MENU' + '6'*

The depth contours menu controls display of depth contour lines, spot soundings, and the unit of measurement used for the display. The depth contours sub-menu operations are:

3.3.6.1) Depth unit selection: *'MENU' + '6' + '3'*

The unit of measurement will toggle each time the '3' key is pressed. The three units are: Meter (MT), Fathom (FM), and Feet (FT). The unit, at the factory, is set to the MT scale.

As you alter the measurement unit, notice that the unit of measurement and numeric values, for each contour line, changes appropriately.

3.3.6.2) Depth contour line: *'MENU' + '6' + '0'/'1'/'2'*

'MENU', ***'6'***, and either ***'0'*** or ***'1'*** or ***'2'*** will turn on or off one of the contour lines.

3.3.6.3) Spot soundings: *'MENU' + '6' + '4'*

Some spot soundings (data available used only on special cartridges) from the original charts are stored in the cartridge. Their display can be turned on and off from the Depth Contours Sub-Menu.

3.4) COMPASS FUNCTIONS

There are two compass functions that you may wish to perform before

moving on to the next chapter.

3.4.1) COMPASS CALIBRATION: *'MENU' + '3' + '7' +'1'*

The unit can be matched to the deviation of a vessel's compass by using this function. It allows data from your compass's deviation card to be entered into the unit.
For example: if your compass has a deviation of -1 degree at a heading of 0 degrees, you can cause the unit's magnetic bearing to agree with the compass's bearing.

To perform this function:
- Depress ***'MENU' + '3' + '7' +'1'*** to get to the compass calibration screen
- Enter the values

Note

This command uses the left and right arrow key s to move from N, to N/E, to E, etc
· Values are increased with up arrow key
· Values are decreased with down arrow key

3.4.2) DISPLAY HEADING SELECTION: *'MENU' + '3' + '7' + '0'*

This command allows you to cause unit displayed headings to be either true or magnetic. Selecting true heading automatically adjusts for the magnetic variation in your area. This information is stored in each C-MAP cartridge.

chapter 4
USING THE UNIT

This chapter will help you to set up and use the power of your unit. To simplify matters, this chapter is divided into two sections. The sections are CHARTING and NAVIGATION. As you may remember:

CHARTING mode relates all operations to the cross-hair.
All charting functions can be performed without attaching an autopilot or navigation receiver. One good use for CHARTING mode is course layout and planning.

Many charting functions can also be performed in NAVIGATION mode. For example: you can always place marks on the displayed screens.
NAVIGATION mode relates all operations to the current or last known vessel position fix.
NAVIGATION mode will not allow you to shift the screen by moving the cross-hair to the screen edge. Instead, it will shift the screen when the vessel's position nears the edge of the displayed screen.

Navigation receiver and autopilot usage are also addressed in the navigation section.

Note

It is easy to accidentally change modes by bumping the 'NAV' key. This can cause problems since many commands perform differently in CHARTING and NAVIGATION modes. Please verify the mode when a command doesn't act as expected.

4.1) CHARTING MODE *'NAV'*

Pressing the ***'NAV'*** key switches the unit between NAVIGATION and CHARTING modes. You must have a navigation fix stored to enter NAVIGATION mode.

4.1.1) DISTANCE MEASURING

There are several ways to measure the distance and bearing

between two points with the unit. One of the easiest is to use the '***R/B***' (Range and Bearing) key. In CHARTING mode the '**R/B**' key measures distance between two cross-hair positions. In NAVIGATION mode it measures distances between a cross-hair position and the vessel position.

To use the key in CHARTING mode:
1. Place the cross-hair on the first point
2. Press the '***R/B***' key ("A" will appear)
3. Move the cross-hair to the second point
4. Press '***R/B***' again ("B" will appear)

A straight line will connect the points. The distance and bearing will be displayed on the screen.

5. To clear the line, press '***CLR***' and '***3***' after the sub menu appears.

4.1.2) TARGETING

Any screen position can be set as a target. The range and bearing to the target can then be displayed: in CHARTING mode the range and bearing are between the target and the cross-hair; in NAVIGATION mode the vessel position is used as the reference.

4.1.2.1) Designating target: *'TARGET' + '1'*

Place the cross-hair at the desired location. The target is assigned with the '***TARGET***' and '***1***' keys. The unit assigns and displays a waypoint number to the target.

WAYPOINTS CANNOT BE ADDED IN THE ROUTE WITH THE TARGET

4.1.2.2) Display Bearing and Distance/Time to target: *'TARGET' + '3'*

DISTANCE and BEARING or DISTANCE and TIME are displayed on the screen the Target Information are shown. Pressing the '***3***' key switches between the two functions.

4.1.2.3) Clear target: *'TARGET' + '2'*

The '***2***' key clears the target. A waypoint will remain in the target

location. This can be cleared by using the waypoint sub menu. This is discussed later in the manual (See par. 4.2).

4.1.3) DISTANCE TABLE FUNCTIONS

The unit features a built-in distance table. This feature allows you to store up to five locations. The locations can be user points or navigation aids. You can display the distance and bearing to these points from the cross-hair while in CHARTING mode (In NAVIGATION mode, the distance and bearing are from the vessel position instead of the cross-hair).

4.1.3.1) Display distance table: *'MENU'* + *'7'*

Pressing ***'MENU'*** + **'7'** keys will bring up the DISTANCE TABLE display.

DISTANCE TABLE

Pt **Place**	**Latitude** **Longitude**	**Dist (NM)** **Brg (M)**
1 Viareggio	43 52.72 N 010 16.47 E	104.2 110
2 User point	43 52.72 N 010 06.02 E	97.2 111
3 Not used		
4 Not used		
5 Not used		

4.1.3.2) Clear all distance table positions: *'MENU'* + *'1'* + *'4'* + *'ENT'*

This command resets all five distance table entries.

4.1.3.3) Distance table entry: *'ENT' + '1'/'2'/'3'/'4'/'5' + 'ENT'*

Depressing the ***'ENT'*** key displays distance table entry 1 in the note pad area. The other four entries may be displayed one at a time by pressing ***'2'/'3'/'4'/'5'***. As each entry is displayed, it will indicate either 'NOT USED' or it will contain a previous entry.

To make a new entry:
1. Display the position to be changed.
2. Put the cross-hair on the desired point/navigation aid and press ***'ENT'***.

The new entry will be stored and the note pad will be cleared.

4.1.4) CHART INDICATORS

In addition to distance table user points, charting and navigation activities, the unit provides marks, events, and waypoints as chart symbols.

The unit can store as many as 350 chart indicators at one time on each of the 2 memory pages. These can be any combination of events, marks and waypoints.

Marks: Marks can be entered at any cross-hair location or specified coordinates. This allows accuracy to the 1/100th of a minute if required.

Events: Events are placed on the vessel position marker instead of the cross-hair position. Their position cannot be changed.

Waypoints: A route consists of one or more waypoints. A navigational receiver provides position data to the unit. The unit performs waypoint calculations to help in route planning. They provide information such as the bearing the vessel must steer to intercept a waypoint, time and distance between segments, etc. Waypoint operations are explained later in the Route Planning section (see par. 4.2).

4.1.5) MARK COMMANDS

4.1.5.1) Entering Marks

MARK and **WAYPOINT** positions can be established in three ways. Selection among the three is based upon the amount of precision required and personal preference.
Two of the methods require that you position the cross-hair before entering the mark.
The other method allows you to key-in the coordinates from the keyboard.

The three methods are:

- **CROSS-HAIR POSITIONING WITH CARTOGRAPHY (MAPPING) ON**

While displaying a chart you are limited as to how far you can ZOOM-IN. The smallest area you can typically display is from .4 to 1 NM per inch depending upon the chart displayed. Scales in this range make it difficult to position the cross-hair to the degree of precision offered by the unit.
(The unit displays positions to hundredths of a minute.)

However, you often do not need that degree of accuracy. It is a simple process to mark an object or general location that is displayed on the chart window.

For example, placing the cross-hair on or near a sea buoy you wish to mark is simple and often adequate.

To enter a mark, position the cross-hair and press '*MARK + 1*'.
You have two options available if you need accuracy greater than being within a few hundredths of a minute. (1/100 of a minute = 60 feet or 20 meter less).

- **CROSS-HAIR POSITIONING WITH CARTOGRAPHY (MAPPING) OFF**

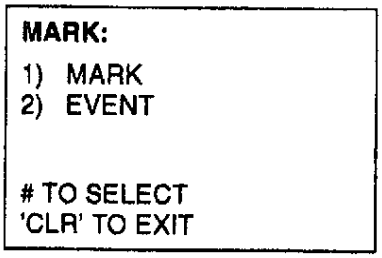
You can get better accuracy by turning mapping off and zooming in to the .03 NM per inch range (reads .02 in metric). This range makes it easy to position the cross-hair at the exact desired position.

- Turn Mapping off '***CHART***' + '*1*'
- ZOOM-IN to the .02 scale.
- Place the cross-hair where you prefere
- Press '***MARK***' + '*1*'
- Turn Mapping back on '***CHART***' + '*1*'

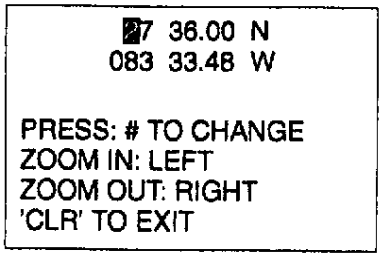
- **KEYBOARD ENTRY**

An alternate method allows keyboard entry of the coordinates. To do this perform the following 5 steps.

1. Press the '***MARK***' key. This will cause the MARK MENU to display on the screen.



2. Press and hold '*1*' key for 1 second (the second beep) until the note pad contains the mark's coordinates.



3. You can alter or fine tune the mark's coordinates from the keyboard. The highlighted cursor can be moved from number to number by using the 'ZOOM-IN' and 'ZOOM-OUT' keys. Change the highlighted number by pressing the desired keyboard number. The cursor automatically advances when you enter a number.

You may find it easier to key in the entire coordinates than to use the

ZOOM keys to move the cursor.

4. Press '***ENT***' to confirm your entry and changes if any. The mark will move to its new position if you change the coordinate values from the keyboard.

5. Mark entry is now complete.

4.1.5.2) User point identifier On/Off: *'MENU' + '2' + '6'*

With user point identifier on, each user point (MARKS, EVENTS, and WAYPOINTS) will be automatically numbered in sequence, starting at 000, up to 350.

4.1.5.3) Delete single Mark: *'CLR' + '1'*

A single mark can be deleted by placing the cross-hair on it and pressing '***CLR***' + '***1***'

4.1.5.4) Delete all Marks: *'MENU' + '1' + '0' + 'ENT'*

Entering '***MENU***' brings up the "AUXILIARY FUNCTIONS" menu; press '1' to select the "CLEAR USER POINTS" menu and '0' to clear all navigational entries. It verifies all operations by making the user press '***ENT***' before it acts.

4.1.6) EVENT COMMANDS

4.1.6.1) Enter Event: *'MARK' + '2' + 'CLR'*

This command is similar to mark entry. The differences are:
- Events are marked on the vessel position instead of the cross-hair.
- The coordinates cannot be altered from the keyboard.
- Events cannot be entered if there is no vessel position indicator on the screen.

4.1.6.2) Clear single Event mark: *'CLR' + '2' + 'CLR'*

Place the cross-hair on the event to be erased and press '***CLR***' + '***2***'.

4.1.6.3) Clear all Events: *'MENU' + '1' + '1' + ENT'*

This command makes you confirm your intention by pressing '***ENT***'.

4.2) ROUTE PLANNING

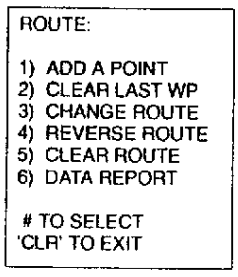
The unit simplifies route planning and layout. It allows you to build routes containing one or more waypoints. It can store up to a maximum of 350 waypoints. You can keep building routes until all 350 waypoints (per page) are used.
Routes and waypoints will remain in memory even while the unit is powered off.

A route data report is generated for each stored route. The route data report contains:
- Waypoint latitude and longitude
- True and magnetic heading
- Distance of each leg
- Total distance
- Time en route
- Fuel consumption

This section contains a route planning exercise to help the new user become familiar with route planning functions.
It is not necessary that you have the C-MAP cartridge for the West Florida coast to perform this operation. The built-in world-wide basic charts provide all details necessary to perform this exercise.

EXERCISE
A fishing trip from Egmont key (27 36.01 N, 082 46.00 W)
to:
A favorite off shore location (27 36.01 N, 083 33.49 W)
and:
An alternate Amberjack spot (27 12.03 N, 083 41.90 W)

1. Enter '***WP***', this will bring up the ROUTE menu in the note pad area.



2. Press and hold '*1*' until a beep sounds and the waypoint coordinates are displayed on the screen.

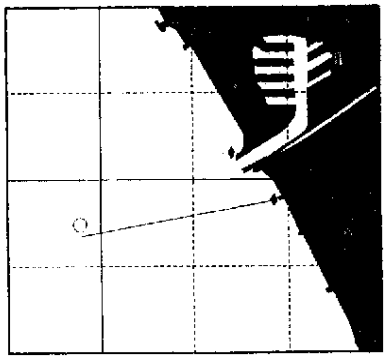
   Use the ZOOM-IN and OUT, and '0' thru '9' keys to enter the exact coordinates. Press '***ENT***' to confirm the coordinates.

3. Press and hold '*1*' until the coordinates are displayed and enter the coordinates as before.

   The waypoint symbol will appear on the second location and the two waypoints will be connected by a dotted line.

4. Repeat step 3 and enter the coordinates for the last waypoint.

Your screen should contain the dashed line route shown on the drawing below. The solid line is included to show how multiple routes can be displayed.



OBSERVE THAT:

- There is another route on the screen. This route was added to show how the unit can store and display multiple routes.
- The active or selected route is a dashed line.
- The starting end of active route is marked with an "O".

Also be aware that waypoint locations can be established with the cross-hair. The two methods of cross-hair positioning described on chapter 4 can be used for waypoints the same way they are used for marks.

Note

Waypoints cannot be added when a target is set in that route.

The next page continues with the other route and WP commands. If you prefer, go directly to route following. Please see ROUTE FOLLOWING AND AUTOPILOT on chapter 4.

4.2.1) ROUTE MENU COMMANDS

The "ADD A POINT" command is uses to build the sample route. The sample route can be used to try the other Route commands. Leave the route just entered alone and stay in the route menu to try the following commands.

4.2.1.1) Change route: *'WP' + '3*

Move the cross-hair off the last waypoint. Then enter '***3***', this will cause the route to change from a dotted to a solid line. Then press, but don't hold '***1***' to add a waypoint and start a new route. Move the cross-hair and add another waypoint. You now have two routes displayed.

Note

The '1' key only needs to be held down if you want to see/alter the coordinates.

4.2.1.2) Clear last Waypoint: *'WP' + '2'*

Press '2' to delete the last waypoint entered. Then press '***1***' to put it back.

4.2.1.3) Reverse Route: *'WP' + '4'*

Pressing '***4***' will cause the "O" to go to the other end. This is a handy feature for using the same route in two directions.

4.2.1.4) Clear Route: *'WP' + '5'*

Press this key with the second route still selected. It will be erased.

4.2.1.5) Clear all Routes: *'MENU'* + *'1'* + *'2'* + *'ENT'*

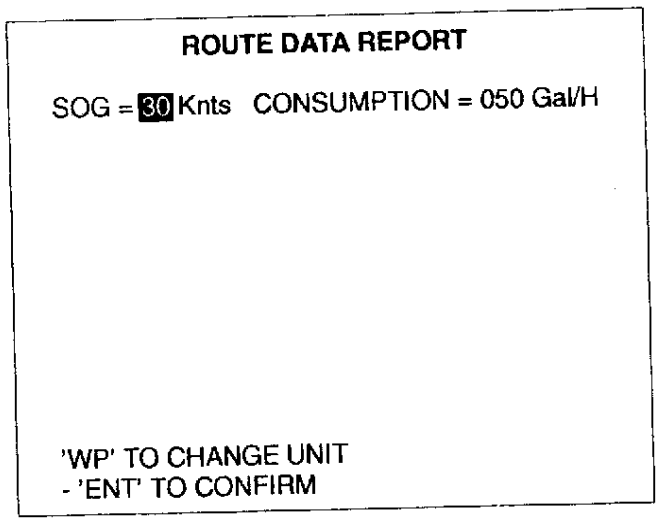
Also it is possible to delete all routes planned by the user. Entering 'MENU' brings up the "AUXILIARY FUNCTIONS" menu; press '1' to select the "CLEAR USER POINTS" menu and '2' to clear all routes. It verifies all operations by making the user press 'ENT' before it acts.

4.2.1.6) Re-select first Route (change Route to edit): *'WP'* + *'3'*

Position the cross-hair on any of the first routes waypoints and press ***'3'***. You can now use all ROUTE menu commands on the first route.

4.2.1.7) Data report: *'WP'* + *'6'*

This command will display the data report for the selected route. If you do not have the first route selected, you will need to select it now. Then press ***'6'***. This will bring up the first DATA REPORT screen. The first screen lets you enter the planned speed and the fuel consumed per hour at that speed.



The speed field will be highlighted first:

- Press ***'WP'*** to select speed unit (Knots).
- Use numeric keys (***'0'***-***'9'***) to specify planned speed.

- Press '***ENT***' to accept value and unit.

Repeat the procedure (select Gal/Hr) and enter 20 for fuel burned per hour at the planned speed (20 Gal/Hr).

After the 2nd 'ENT' key, the next ROUTE DATA screen will display.

ROUTE DATA REPORT

SOG = 30 Knts CONSUMPTION = 050 Gal/H

WP NO	LATITUDE LONGITUDE	TRUE MAG	LEG TOTAL	TIME CONS.
001	55 02. 02 N	346.7	010.3	000H 20M
	005 30. 19 E	346.7	010.3	0017L
002	55 12. 08 N	112.2	030.3	013H 33M
	005 26. 06 E	112.2	030.3	011L
003	55 18. 28 N	068.6	017.0	000H 54M
	005 53. 93 E	068.6	017.0	001L

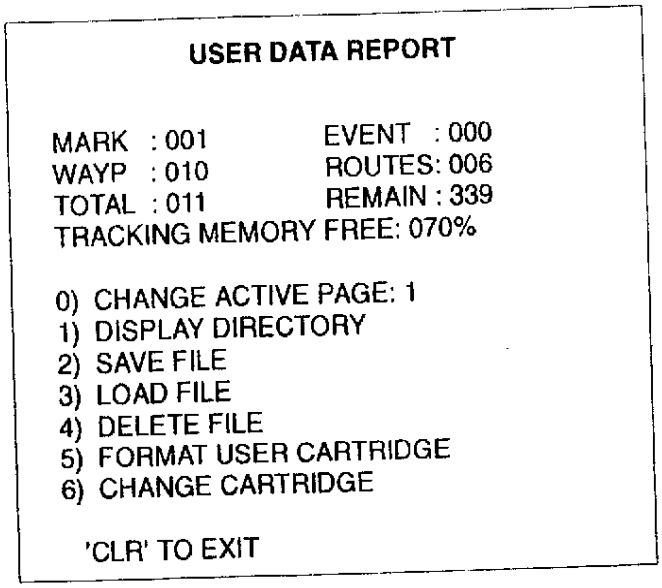
'CLR' TO EXIT

If a route has more than 15 waypoints, another page will be created. The unit can build a report for up to 350 waypoints.

Now exit the ROUTE menu with the '***CLR***' key.

4.2.2) USER DATA-GROUP SELECTION

By pressing the 'DATA' key, a special menu (User Data Menu) is activated. Besides displaying all used marks, events, routes and tracks (User Data Report), the list of the available functions are displayed in the lower part of the screen: the change active page option, the display directory option, the Save File submenu, the Load option and the change of the user cartridge.
Most of these options refer to the management of the user cartridge.



4.2.2.1) Change active page: *'DATA' + '0'*

2 different pages are available.
After pressing the '0' key, on the screen will be displayed the message "ENTER ACTIVE PAGE # [1-2]": press the desired number (or 'CLR' to abort).

Note

After pressing the number of the desired page the information in the User Data Report will be adjust with the correct data.

4.2.3) USER CARTRIDGE

The user cartridge is used by the unit to save user data: it is a convenient medium for storing and retrieving your information.

Before a new user cartridge can be used, you must format it, by selecting the "Format User Cartridge" option provided by the unit. This function initializes the user cartridge and prepares it for storing information.
Remember that if an user cartridge is not blank, formatting it destroys any data already stored on the user cartridge.

Warning

The cartridges must be formatted in order to be reused, considering though that with this operation all data memorized on the cartridge will be lost.

4.2.3.1) Display directory: *'DATA' + '1'*

Data stored on user cartridge are grouped in files.
A file is a collection of information (of the same type) stored on user cartridge. Each file must have a unique name, ideally one that describes its contents. For example, "MARK1".

The names of your files are kept in a directory on each user cartridge. If you want to know which files are on your user cartridge, you can use the "Display Directory" option. This function is accessed by pressing (after inserting the user cartridge into the slot) the 'DATA'+'1' keys. After pressing the '1' key, the directory will appear:

DISPLAY DIRECTORY	
MARK	**EVENT**
POINT345 CORALLO FORM	FISH5 M1M1
ROUTES	**TRACKS**
SYMBOL FEATURE NOT	TRK1
'CLR' TO EXIT	

The files are grouped on screen by symbols: for example in the

column labeled "MARK" are grouped all files contain Marks.
For each type, 10 files are available.

Before pressing the '1' key to display directory, check to see if the user cartridge is inserted into the slot. If the user cartridge is not present, the message "USER CARTRIDGE NOT PRESENT, PRESS ANY KEY TO CONTINUE" will be shown.

4.2.3.2) Save a file: *'DATA' + '2'*

The Save File submenu stores on user cartridge the desired group (file) of user points, for example a file of routes, present on screen.

To access this function press the 'DATA'+'2' keys and then '0'/'1'/'2'/'3' to select the group that you want to save on user cartridge.
After selecting a group and pressing the 'ENT' key to confirm the choice, the user can choose the filename.
The name of the file is displayed: moving the up or down arrow key changes the character identified by the cursor and pressing the right or left arrow keys to advance cursor to previous or next letter.
Once finished, press 'ENT' to confirm: on the screen will be displayed the message "SAVING DATA ..." followed by the number of saved points (For example, saving a file of Events, it is shown the number of stored Events points).

Note

When naming a file, you may have trouble finding a name that uniquely identifies the file's contents. Dates, for example, are often used in filenames; however, they take up several characters, leaving you with little flexibility. The secret is to find a compromise, a point where you can combine a date with a word, creating a unique filename.

The maximum length of the filename is 8 characters. The characters may be numbers (0,...,9), letters (A,...,Z) and spaces (For example legal identifiers are "ABC", "AA", "12121212", "A B A", "1 A 1", and so on).

If there are 10 files of the same type, another file cannot be saved, and a warning message will be displayed.

4.2.3.3) Load a file: *'DATA' + '3'*

The Load File submenu loads from user cartridge the desired group of user points, for example a file of routes.

To access this function press the 'DATA'+'3' keys and then '0'/'1'/'2'/'3' to select the group that you want to load from user cartridge.
After doing so, the first filename will be displayed. By pressing the up or down arrow key the name of the file changes; if there is no file of that type, it is shown a message "NO FILES ON USER CARTRIDGE".
When you have found the desired filename, press 'ENT' to confirm: on the screen will be displayed the message "LOADING DATA ..." followed by the number of stored points (For example, loading a file of Events, it is shown the number of Events points present into the file).

Note

If there is no filename of that type, the "NO FILES ON USER CARTRIDGE" message will appear.

4.2.3.4) Delete a file: *'DATA' + '4'*

Just as you may need to save files, you may also need to remove old or unnecessary files to clean up your user cartridge. When you want to erase a file from the user cartridge, you can use the "Delete File" option.
Remember, though, that this option permanently erases the file.

To access this function press 'DATA' + '4' and then '0'/'1'/'2'/'3' to select the group that you want to delete from user cartridge.
After doing so, the first filename will be displayed. By pressing the up or down arrow key the name of the file changes; if there is no file of that type, it is shown a message "NO FILES ON USER CARTRIDGE".
When you have found the desired filename, press 'ENT' to confirm: on the screen will be displayed the message "ARE YOU SURE ?", press 'ENT' key to confirm or any key to abort function.

Note

If there is no filename of that type, the "NO FILES ON USER CARTRIDGE" message will appear.

4.2.3.5) Format user cartridge: *'DATA' + '5'*

Formatting user cartridge must be done before using a new user cartridge: this operation prepares the user cartridge to receive and store information.

Before you start the formatting procedure, insert a new user cartridge into the slot and press the 'DATA'+'5' keys and then 'ENT' to confirm formatting (any other key aborts the function)
During formatting, the message "FORMATTING CARTRIDGE ...PLEASE WAIT" is displayed on the screen.
Once finished, your user cartridge is formatted and ready to use. Be sure to label it; the label will remind you that you have formatted the user cartridge, and will help you identify its contents.
Used user cartridge can also be formatted; if an used user cartridge is formatted, however, all previously stored data on the user cartridge will be lost completely.

Warning

Formatting an user cartridge destroys all information on it. Before you format an used user cartridge, use the "Display Directory" option to see what's on it. That way you won't lose any needed files.

4.2.3.6) Change user cartridge: *'DATA' + '6'*

To change the user cartridge press the 'DATA'+'6': insert the desired user cartridge and then press any key when ready.

4.2.3.7) Error messages

This paragraph contains an alphabetical listing of the messages that might appear in the handling of user cartridge:

USER CARTRIDGE FULL
The user cartridge the unit is writing to is full. Delete any unnecessary files and retry, or use another user cartridge.

USER CARTRIDGE NOT FORMATTED
The user cartridge into the slot is not formatted. Before using it, you must format it to prepare the user cartridge to receive and store information.

USER CARTRIDGE NOT PRESENT
The user cartridge is not present into the slot. Insert the user cartridge into the slot and retrive.

USER CARTRIDGE TYPE FULL
The user cartridge the unit is writing to is full for files of that type. Delete any unnecessary files of that type and retry, or use another user cartridge.

FILE ALREADY EXISTS
The filename you specified in the command is the same as a filename present on the user cartridge.

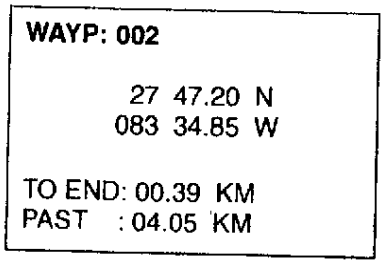
FILE NOT FOUND
The file named in a function does not exist on the user cartridge in the slot. Check to see that you entered the filename correctly and try again.

There are other types of messages that you could see on your screen:

INTERNAL ERROR: <N° system error>
A specific error number is associated with each type of system error. Write down the error number and report it to your dealer.

4.2.4) MEASURING BETWEEN WAYPOINTS

The user can obtain the information on a desired waypoint.
When the Cross-Hair is placed on the symbol that identifies the waypoint. The waypoint, its number and location will be displayed. In addition, the distance to the route end as well as the distance from the preceding or past waypoint are also displayed.



You should now be able to plan and enter routes in the unit.
The navigation section will cover navigation receivers, how to follow routes, route tracking, autopilots and alarms.

4.2.5) EXTERNAL WAYPOINT

The coordinates of a waypoint, received from a GPS or a Loran connected to the plotter, if the GPS or the Loran are NMEA/0183 protocol compatible and support the $BWC sentence (this symbol remains on the screen for 30 seconds). The user may save it by placing a waypoint or a Mark onto that symbol. As soon as the unit receives another $BWC sentence with the coordinates of a new waypoint, the symbol moves to the new point.
This feature is available only if the option External Waypoint is set On.

The waypoint storing feature can be selected by pressing: 'MENU' + '2' + '7'.

4.3) NAVIGATION MODE

This section describes functions that use the vessel's position. They use navigation fix information provided by a LORAN, GPS receivers, or Satnav.
The fix location (vessel's position) is marked by a blinking symbol.

4.3.1) NAVIGATION RECEIVER OPERATIONS

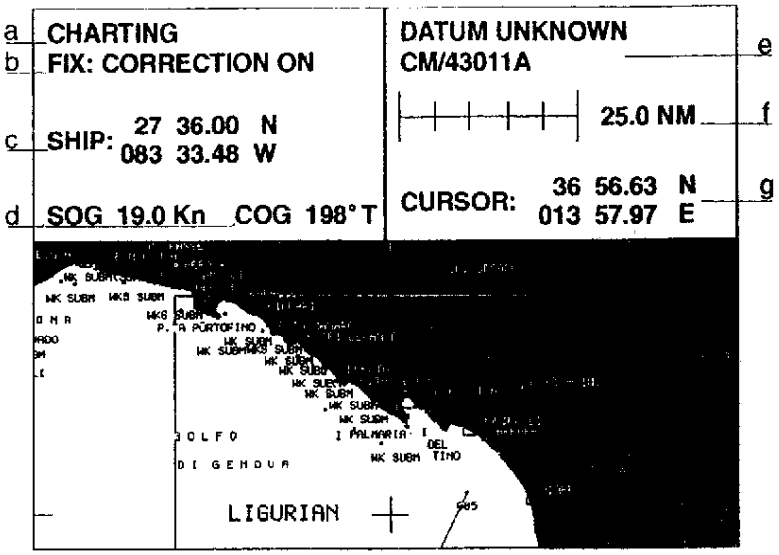
4.3.1.1) Input signal status

The unit shows the status of the incoming signal from the navigation receiver.

If the receiver is connected and receiving a valid signal, the vessel coordinates will show in the screen data window. The vessel position indicator also will blink when the unit is receiving a valid signal.

There are 3 messages that can be displayed in the second line of the data window (in the configuration 2 and 3, see par. 2.2.2) when a good signal is received.

They are:



"CHART DATUM" - The signal received from the nav receiver is in the correct format and fix correction is off or inactive.

"CORRECTION ON" - The signal received from the nav receiver is in the correct format and the fix correction function is on or active.

"CORRECTION OFF"- Cartography (mapping) is off, and FIX CORRECTION IS OFF.

Two messages may appear when the unit does not receive a good fix:

"NOT RECEIVED' - Indicates that no signal is detected (The receiver may be off or disconnected)

"WRONG FORMAT" - The signal received from the nav receiver is not the correct format (Wrong input format probably specified)

See also note (**) on par. 2.2.2.

4.3.1.2) Input format selection (Nav receiver): *'MENU' + '3' + '1'*

The unit is compatible with ten formats used as nav receiver outputs by various manufacturers. They are listed in the Technical Specifications (Chapter 5). These interfaces allow 18 existing nav receivers to be used with the unit.
Also see SPECIAL NAVIGATOR FUNCTION on chapter 4.

4.3.1.3) Port selection: *'MENU' + '3' + '2'*

The unit has two input ports. To select the desired port, press the 'MENU' and the '3' keys: then by pressing the '2' key repetedly,you can switch between port 1 and port 2.

4.3.2) FIX CORRECTION

The unit can correct erroneous navigation fixes. The amount of correction can be determined in 2 ways. The automatic method is done by:

1. Be in NAVIGATION mode with vessel position indicator shown.
2. Mark your position on the displayed chart with the cross-hair.
3. Select COMPUTE FIX ERROR ***'MENU' + '3' + '0' + '1'***

The unit will calculate the correction needed to move the position indicator to the cross-hair. This correction will continue to be applied whenever FIX CORRECTION is on.

The manual method is to:

1. Select CHANGE FIX ERROR ***'MENU' + '3' + '0' + '2'***
2. Use the up and down arrow keys to alter Latitude and left and right arrow keys to alter Longitude

4.3.2.1) Fix correction On/Off: *'MENU' + '3' + '0' + '0'*

Fix correction will be applied to the vessel position indicator whenever the function is turned on.

4.3.2.2) DATUM WGS 84: *'MENU' + '3' + '5'/'6'*

All charts are generated to compensate for the earth's curvature.

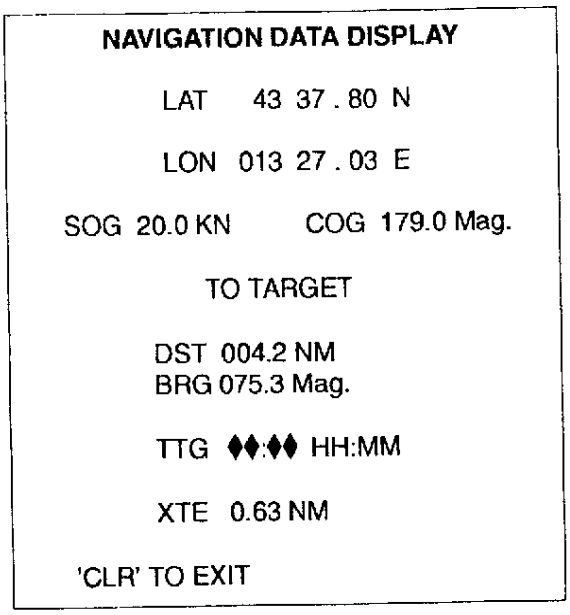
There are several math models to accomplish this. DATUM WGS 84 is an evolving model to ensure greater accuracy in charts (the earth really isn't perfectly round). All North American C-MAP charts are now manufactured using Datum WGS 84.
When you have a DATUM WGS 84 capable cartridge, you can apply its correction to the chart and cross-hair with the CHART DATUM WGS 84 ON/OFF command. (***'MENU'*** + ***'3'*** + ***'6'***)
The FIX DATUM WGS 84 command ***'MENU'*** + ***'3'*** + ***'5'*** turns correction on and off for the navigation receiver fix. It is switched separately as the receiver may already be applying the DATUM WGS 84 correction to the fix before it is sent to the unit. (The SI-TEX GPS receiver utilizes DATUM WGS 84).

4.3.3) ROUTE FOLLOWING AND AUTOPILOT

4.3.3.1) Overview

To follow a route, you must set the first waypoint you want to intercept as a target. You can then steer to the target manually. The data window will always show the bearing and distance or time to the target.

The Navigational Data Display feature can be especially handy when you need to reference navigation fix and tracking information. It expands the data window to cover the entire screen. It is performed by pressing 'INFO'.
The following screen will be displayed.



Upon arrival at the waypoint, simply set the next waypoint as a target and continue.
Engaging the autopilot function allows automatic route following. Set the first waypoint as the target, start the autopilot and assign the route following forward or backward function. Route following will cause the target to automatically shift to the next waypoint when you reach the one now targeted.
This function will work even if your vessel is not autopilot equipped.

4.3.3.2) Select Target display: *'TARGET' + '3'*

The "TO TARGET" display can show Bearing and Distance, or Bearing and Time. The *'3'* option toggles between the two. The time to target is calculated by the unit based upon the vessel's speed.

4.3.3.3) Insert Target: *'TARGET' + '1'*

To set a target for manual or autopilot following, position the cross-hair on the first waypoint you intend to steer to. Press ***'TARGET'*** and ***'1'***.

4.3.3.4) Autopilot On (Target already selected): *'PILOT' + '1'/'2'/ 'CLR'*

Use this procedure if you already have a waypoint or cross-hair location selected as a target. The ***'1'*** or ***'2'*** option will cause the autopilot to automatically change to the next waypoint if the first target is in a multi waypoint route. If you try to engage the autopilot without a current good fix, (blinking vessel position indicator) the message "FIX NOT VALID AUTOPILOT NOT ALLOWED" will appear at the bottom of the note pad. If the fix is valid, a sub-menu will appear. It lets you select forward, backward, or stop at target.

Note

1. *This function can be used with no autopilot to enable route following.*
2. *The unit will not auto advance to the next waypoint until the vessel position indicator actually touches the present target.*

4.3.3.5) Autopilot On with no Target selected: *'TARGET' + '1' + '4' + '1'/'2'/'CLR'*

Position the cross-hair on the desired location or waypoint. Set the target ***'TARGET + 1'*** the autopilot option then appears on the target menu.

4.3.3.6) Autopilot Off: *'PILOT'*

4.3.3.7) Route follow Forward or Backward: *'TARGET' + '4' + '1'/ '2'* OR *'PILOT' + '1'/'2'*

Forward tracking will cause automatic shifting to the next waypoint away from the route end marked with an "O" symbol when the current waypoint is reached.

Reverse tracking moves toward the "O" symbol.

4.3.3.8) Stop at Target: *'PILOT' + 'CLR'* OR *'TARGET' + '4' + 'CLR'*

The stop at target command will guide you to the selected waypoint, but will not advance to the following one.

4.3.3.9) Clear Target: *'TARGET' + '2'*

This command clears the present target.

4.4) TRACKING

The unit can store multiple positions. These fixes can then be displayed to plot the vessel's course.

The Data window always shows the tracking status (ON/OFF) and the percentage of tracking memory that is unused. The tracking memory can store up to 800 positions per page. Each of the 2 memory pages can store 800 positions.

4.4.1) TURNING TRACKING ON/OFF: *'TRACK'*

Tracking is turned on/off by pressing the ***'TRACK'*** key.

4.4.2) SELECTING TRACKING METHOD: *'MENU' + '4' + '1'*

Tracking points can be recorded on a time or distance basis.

In time mode, points will be recorded at a pre-selected time interval.
Time increments range from 30 sec. to 5 Minutes.
800 storage positions can supply from 6.66 to 66.6 hours depending the time unit selected.
When distance tracking, the track is updated each time the vessel travels the selected distance. The change in location is derived from navigation receiver fix information.
Available distance increments range from .05 to 1 mile.
800 storage positions will allow a plot of 40 miles length at .05 miles, and 800 miles at the 1 mile setting.

4.4.3) SETTING TRACKING DISTANCE INTERVAL: *'MENU' + '4' + '2'*

Tracking intervals can be selected for distance settings.

The available values are:

DISTANCE

1 Mile
.5 Mile
.1 Mile
.05 Mile

4.4.4)SETTING TRACKING TIME INTERVAL: *'MENU' + '4' + '3'*

Tracking intervals can be selected for time settings.
The available values are:

TIME

5 Minutes
3 Minutes
1 Minute
30 Seconds

4.4.5) PLOT DISPLAY: *'PLOT'*

The vessel track can be displayed by pressing the ***'PLOT'*** key. The plot will be erased each time the screen is redrawn (ZOOMING-IN/OUT or screen shifting) unless the Automatic Replot function is on. Press the ***'PLOT'*** key to re-display the plot.

4.4.6) AUTOMATIC REPLOT: *'MENU' + '4' + '0'*

When Automatic Replot is on, the plot will be displayed on the screen at all times. It will automatically replot when the screen scale is changed or the screen position is changed by vessel or cross-hair movement.

4.4.7) RESET TRACKING COUNTER: *'MENU' + '4' + '4' + 'ENT'*

This erases the stored track. The command only resets the current page. It frees up all 800 positions in the current page for use.

4.5) SPECIAL NAVIGATOR FUNCTION

The unit offers a special navigator feature. It allows display of GPS RECEIVERS data from your GPS nav receiver and enables the unit

to send information to seleced nav receiver types.

4.5.1) GPS RECEIVERS

To enable GPS receiver data to be displayed on the unit, turn on the GPS special navigator option. Enter '***MENU***' + '***3***' +'1' to set up a GPS receiver for special navigation functions (GPS NORMAL or INVERSE).

Press 'MENU' + '3' + '3' to select the GPS Data Page:

Date [ddmmyy] : 15-07-91
UTC Time [hhmm:ss]: 1357:58

SAT NO.	ELEVATION	AZIMUTH	SNR
2	23°	143°	42
6	63°	48°	48
13	Not tracking		
14	17°	273°	39
19	48°	189°	49

Satellites In Use: 5

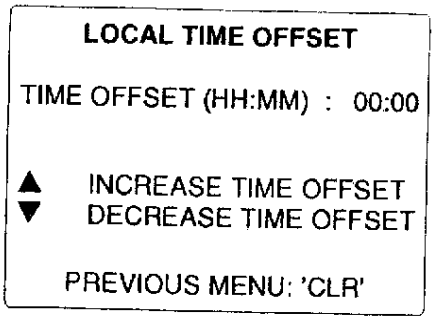
LAT-LON: 42°41.36 N 070°36.37 W
FIX RELIABLE
SOG: 13.2 Kts COG: 047° T
Altitude: 10.2 meters
HDOP: 4.6 VDOP: 6.3

1) TIME OFFSET MENU
PREVIOUS MENU: 'CLR'

4.5.1.1) Local time offset

Local time offset '***MENU***' + '***3***' + '***3***' + '***1***' provides the ability to change the Greenwich mean time broadcast by the GPS system to your local time zone. The offset will have to be changed when your area goes from or to daylight savings time.

Once the menu is selected, the time can be advanced with the up arrow key and set back with the down arrow key.



4.5.2) OTHER SPECIAL NAVIGATION FUNCTIONS

Special navigator functions also allow information to be sent to two types of navigation receivers. They use the MICROLOGIC-ML 8000T and AP NAV.-MK4 formats. Special navigators are selected by entering '***MENU***' + '***3***' +'***1***'
Then press 'MENU' + '3' + '3' to enable the SPECIAL NAVIGATOR MENU.

The menus allow the unit cross-hair position to be sent to both receiver types. In addition, the CHAIN number can be sent to the MICROLOGIC ML 8000T.

4.5.3) ALARMS

The unit has an audible alarm. It is used when there is a problem with the incoming nav fix signal or the vessel reaches a pre-set arrival point.

Unless disabled, the signal condition alarm will sound after the detected problem has existed for 2 minutes. The audible alarm is accompanied by a note pad message. The alarmed signal conditions and messages are:

- "NOT RECEIVED" No data is received.
- "NOT GOOD" The nav receiver says the fix is not good.
- "WRONG FORMAT" The data is not in the format expected by the unit

When the audible alarm is triggered by the arrival condition, the following message will be displayed in the note pad area:

- "AUTOPILOT ARRIVAL RANGE" The craft has reached a preset distance from a target.

4.5.3.1) Fix alarm On/Off: *'MENU' + '3' + '4' + '0'*

This command will toggle the audible alarm on or off.

4.5.3.2) Auto alarm clear On/Off: *'MENU' + '3' + '4' + '1'*

The auto alarm clear function is especially handy if you are in an area where you occasionally lose your navigation signal. Auto alarm clear will cause the alarm to reset itself after the signal is regained.

4.5.3.3) Autopilot alarm range selection: *'MENU' + '5' + '1'*

The alarm can be set to sound when the vessel has come within a preselected distance from the current target. This command selects ranges from .5 to 5 Miles.

chapter 5
INSTALLATION AND REFERENCE

5.1) INSTALLATION

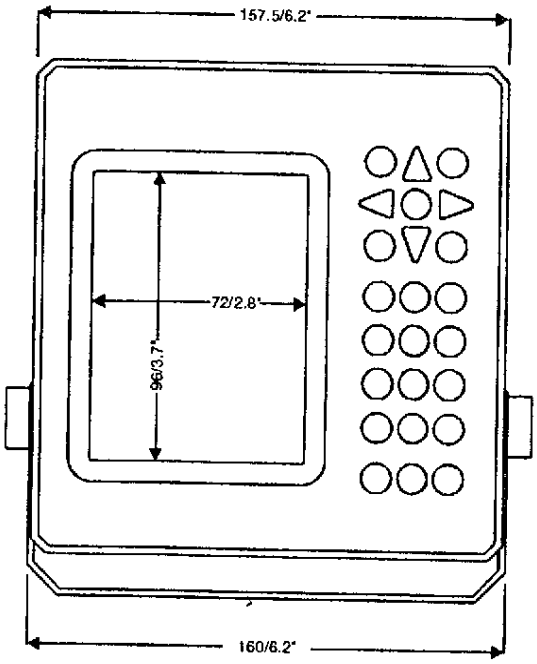
5.1.1) LOCATION

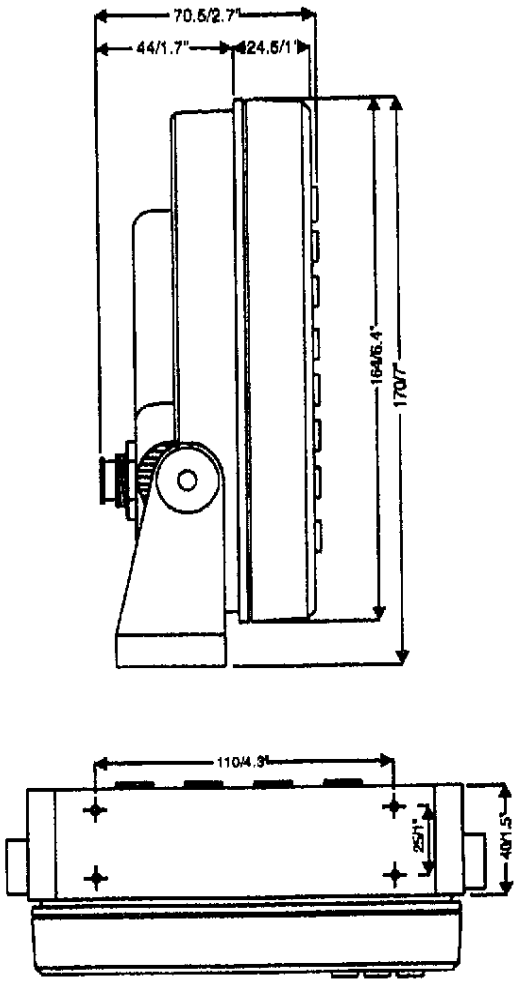
The unit is easily installed in most vessels. It can be mounted above or below the trunnion mounting bracket, or flush mounted. Two brackets are included for flush mounting.

5.1.2) MOUNTING

Attach the trunnion mounting bracket with 4 screws once the location has been determined.

5.1.2.1) Phisical dimensions (mm/")



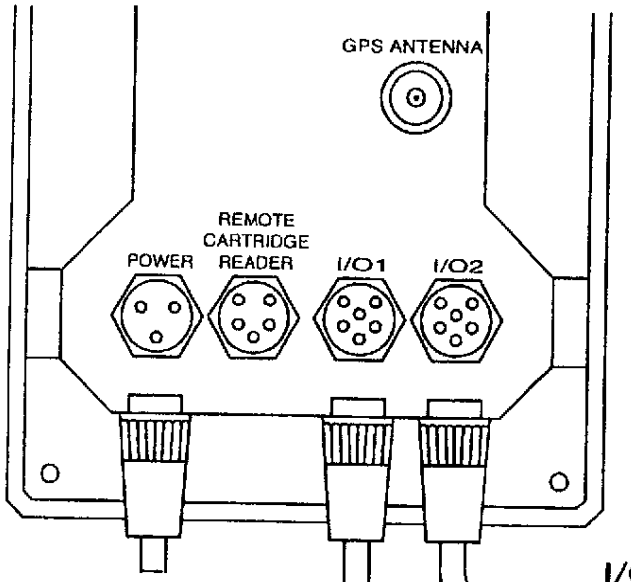


Note

Please allow at least 63.5mm/2.5" behind the unit for cable connectors.

5.1.3) UNIT CONNECTIONS

5.1.3.1) Cabling



POWER

1) IN+	(RED)
2) IN-	(BLACK)
3) CASE	(WHITE)

I/O1

1) ATX0	(BLACK)
2) TXA	(ORANGE)
3) RXA+	(WHITE)
4) RXA-	(GREEN)
5) RDY+1	(YELLOW)
6) GND	(GREY)

I/O2

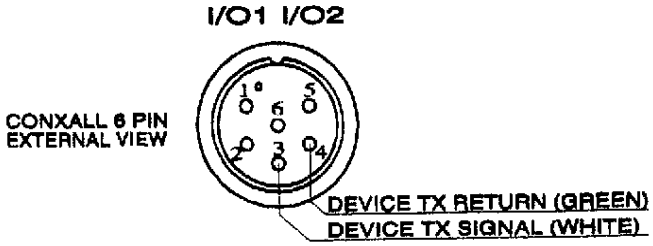
1) +AUX(12)	(BLACK)
2) TXB	(ORANGE)
3) RXB+	(WHITE)
4) RXB-	(GREEN)
5) RDY+2	(YELLOW)
6) GND	(GREY)

Warning

The unit contains no fuses. It must be externally fused with a 1 AMP fuse. Failure to fuse the unit may result in severe internal damage.

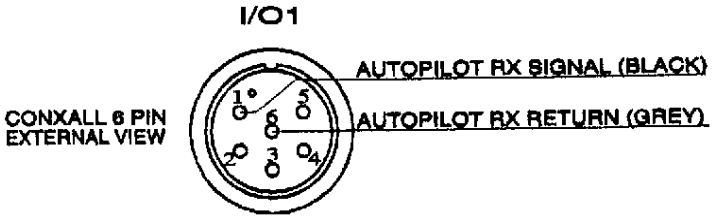
5.1.3.2) External wiring

POSITIONING DEVICE

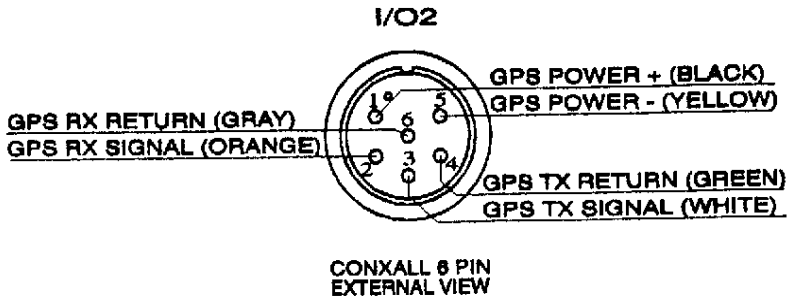


NOTE: POSITIONING DEVICE = GPS, LORAN ECC.

AUTOPILOT



GPS SENSOR



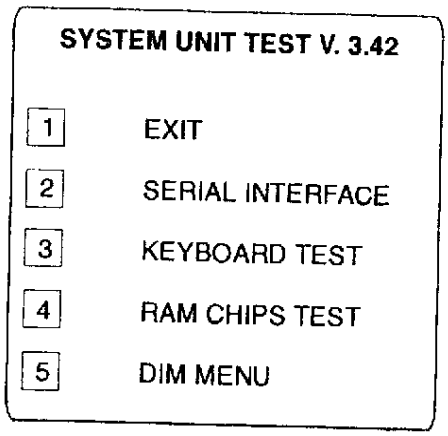
Note

1. *SI-TEX provides a 118.1 or 3 mt. video cable, a 78.7" or 2 mt. power supply cable and a 39.3 or 1 mt. I/O interface cable with the unit. Any other cable required for special navigator connection must be fabricated locally by your dealer or other marine electronics servicer.*
2. *The maximum configuration that can be attached to the unit at the same time is a navigation or special navigation receiver, and an autopilot.*

5.2) EXTENDED SYSTEM UNIT TEST

Extended system tests can be started immediately after turning the unit on.
To run the tests:

1. Turn the unit on by pressing '***POWER***'
2. As soon as the '***POWER***' key beep sounds, press and hold any other key until the unit beeps again.
3. You should now see the following menu



Any test, or exit is selected by placing the cross-hair on one of the numbered squares or entering the number from the keyboard.

EXIT = Return to normal operation

SERIAL INTERFACE = This is a service personnel procedure. It

cannot be run without a special test wrap adapter.

KEYBOARD TEST = The keyboard image will display on the screen. Pressing any key will cause a cross to appear in the keys position and the unit will beep. End the test by putting the cross-hair in the exit block.

RAM CHIPS TEST = This test verifies and erases all memory. Running the test erases all user waypoints, marks, tracks, and options. The unit is reset to the factory default conditions listed on the next page. When 4 is selected, the following message appears:

PRESS <CLR> TO CLEAR RAM
ANOTHER KEY TO EXIT

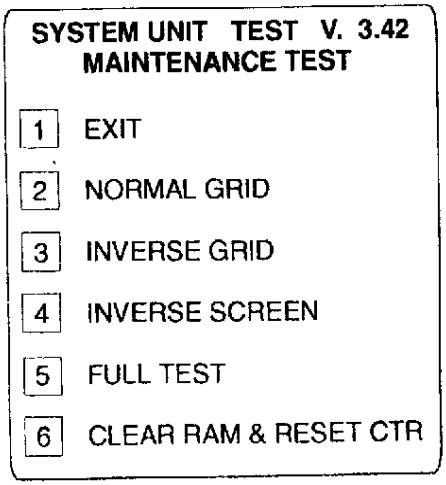
After pressing '***CLR***' the following message will then appear:

ARE YOU SURE (YES='***ENT***')

After '***ENT***' is pressed, all storage is erased.

DIM MENU = This function changes the brightness of the screen.

Another layer of testing can be accessed by pressing '***CLR***' + '***ENT***' + '***0***' while in the EXTENDED SYSTEM unit TEST SCREEN.



5.3) INITIAL FACTORY SETTINGS

A new unit just out of the box will be set to the following conditions. Running the EXTENDED SYSTEM unit RAM CHIPS TEST will also reset the unit to this same condition.

SCREEN SETTINGS	:	Land Fill	ON
		Nav Aids	OFF
		Names	ON
		Restrictions	OFF
		Coastal Features	ON
		Depth Unit	MT
		Depth Lines 0-5MT	ON
		Depth Lines 6-50MT	OFF
		Depth Lines >50MT	OFF
		Lat/Lon Grid	OFF
		User Point Identifier	OFF
LANGUAGE	:	English	
TRACKING	:	Track Recording	OFF
		Time/Distance	Distance
		Track Step	1 Mile
		Auto Replot	ON
COURSE & BEARING	:	Magnetic	
FIX CORRECTION	:	OFF	
FIX ALARM SETTING	:	Audible Alarm	ON
		Audible Alarm Clear	OFF
MEMORY PAGE	:	Page 1	

5.4) UNIT ACCESSORIES

The following items are shipped with the unit:

1 - Trunnion mounting bracket
2 - Mounting knobs
1 - 2 mt./78.7" Power cable

1 - 1 mt./39.3" Interface cable
1 - 3 mt/118.1" Video cable
1 - Unit Users Manual
1 - KODEN MD-3400/SI-TEX T-170 SERIES modification kit
or
1 - KODEN MD-3600 SERIES modification kit
or
1 - FURUNO 1900 SERIES modification kit

5.5) REFERENCE INFORMATION

5.5.1) TECHNICAL SPECIFICATIONS

AUTOPILOT INTERFACE NMEA-0180
NMEA-0180/CDX
NMEA-0183(*)

TO SELECT AUTOPILOT INTERFACE PRESS: *'MENU'* + '5' + '0'

CARTOGRAPHY ..... High definition mini C-MAP cartridges
DIMENSIONS ..... W 157/6.1" x H 164/6.4" x D 62/2.4"
DISPLAY ..... Transflective backlighted LCD 320 x 240 pixel resolution
FUSE TYPE ..... 1 AMP 250V
KEYBOARD ..... Silicon rubber keyboard
NAVIGATION INTERFACE ..... From Loran, Satnav, GPS, Decca, Omega via NMEA 0182/0183(*) and others
MEMORY ..... Non volatile (NiCad internal battery backup, appx. 3 yr life, dealer/SI-TEX replaceable)
POWER CONSUMPTION..... 5 Watt, 10-35 Volt dc
OPERATIONAL TEMP. RANGE..... 0/50 degrees Celsius
WEIGHT ..... 1,250 Kg.
ZOOM ..... From 1 meter to 40 Km per pixel

5.5.2) ADVANCED FEATURES

- Low power consumption
- Small, low cost cartridge

- Die-cast aluminum case

5.5.3) USER POINTS

GROUPS(*):		2
RECORDABLE INDIVIDUAL POINTS(**):	Waypoints + Marks + Events	350
ROUTES(**):	Routes	350(***)
	Waypoints per Route	350
TRACKING(**):	Track	1
	Points per Track	800
	Steps by Distance (NM)	1, .5, .1, .05
	Steps by Time (MIN)	5, 3, 1, .5

FUNCTIONS

CARTOGRAPHIC FUNCTIONS:
Worldwide chart coverage
Lat/Lon grid
Cartography off
Mark numeric identifier
Depth unit selection (MT, FT, FM)
Names
Nav aids
Coastal features
Restrictions
Chart boundaries
Land mass filling
Automatic replot of past course
WGS84 coordinate system
Spot soundings

FIX FUNCTIONS:
Fix correction
Display headings True or Magnetic
Keypad entry to modify fix correction
Fix Datum WGS84

REPORT FUNCTIONS:
Route data report with selectable units
Distance table
GPS data page
Navigation data display (LAT, LON, COG, SOG,

BRG, XTE, TTG)

Automatic info

AUXILIARY MEMORY: User Cartridge

INTERFACE

I/O SUPPORT: Two serial connector

INPUT FORMATS: NMEA-0183 (#) (GLL, SBK, SCY, SNU, XTE, GXP, GDP, GOP, GLP, VTG, RMA, RMC, GGA, BWC, PKMLC, PKMAP)
NMEA-0182/TAIYO
KODEN 717
KODEN 757
FURUNO CIF
TRIMBLE-200
DECCA MK3
IIMORROW AVENGER
MICROLOGIC VOYAGER
TEXAS TI9900 I/II

SPECIAL NAVIGATORS: MICROLOGIC ML 8000T
AP NAV-MK4
GPS NMEA-0183 (#) NORMAL/INVERSE

OUTPUT FORMATS: NMEA-0180
NMEA-0180/CDX
NMEA-0183 (#)(****): GLL, VTG, BWC (void)
(with Autopilot on: XTE, BOD, BWC, APA, GLL, VTG, APB, WCV, RMC, RMA)

Note

(*) Groups: number of memory pages.
(**) For each page. The total number of points is this number times the number of pages.
(***) The number of routes is limited by the maximum number of waypoints available. Theoretically you can have 350 routes each one made of one point only.
(****) These sentences are continuosly sent only if a fix is received.
(#) In accordance with standard NMEA 0183 v. 2.00

5.5.4) COMPATIBLE SI-TEX NAVIGATION RECEIVERS

The following receivers are fully compatible with the unit via one or more of the nav receiver interfaces listed below.

GPS	GPS receiver
LORAN	XJ-1, XJ-2, XJ-3, 717, 757C, 767C, 787C, 760, 768, 770, 790, 797, EZ-7, EZ-97
SATNAV	A-310-SH
NAV RECEIVER INTERFACES	MICROLOGIC-VOYAGER DECCA-MK3 FURUNO-CIF IIMORROW-AVENGER KODEN 717 KODEN 757 NMEA-0182 NMEA-0183 TEXAS-TI9900 I/II TRIMBLE-200

TO SELECT NAVIGATION RECEIVER AUTOPILOT INTERFACE
PRESS: *'MENU' +'3' +'1' + 'CLR'*

SPECIAL NAV RECEIVERS	AP NAV-MK4 MICROLOGIC-ML 8000T NMEA-0183 NORMAL/INVERSE GPS
POWER REQUIREMENTS	10 - 35 VDC, 13W
WEIGHT	1.250 gr./2.75 lbs.

5.6) SERVICE INFORMATION

THIS INFORMATION IS INCLUDED FOR USE BY SERVICE PERSONNEL.

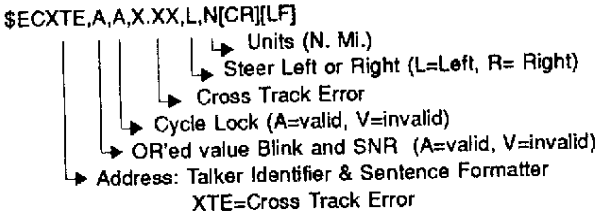
5.6.1) INPUT NMEA 0183 SENTENCES

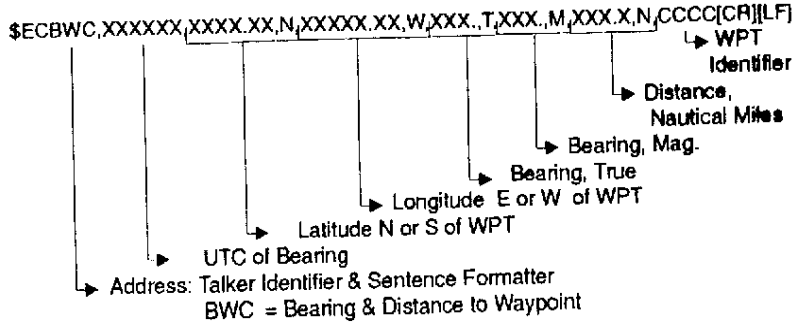
BWC	: Bearing And Distance To Selected Waypoint
GDP	: Dead Reckoning Positions
GGA	: Global Positioning System Fix Data
GLL	: Geographical Position, Lat/Lon
GLP	: LORAN-C Positions
GOP	: OMEGA Positions
GXP	: TRANSIT Positions
PKMAP/PKMLC	: Proprietary Of King Marine
RMA	: Recommended Minimum Specific LORAN-C Data
RMC	: Recommended Minimum Specific GPS/TRANSIT Data
SBK	: LORAN-C Blink Status
SCY	: LORAN-C Cycle Lock Status
SNU	: LORAN-C SNR Status
VTG	: Track Made Good & Ground Speed
XTE	: Cross-Track Error, Measured

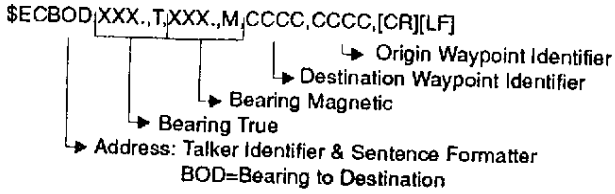
5.6.2) OUTPUT NMEA 0183 SENTENCES

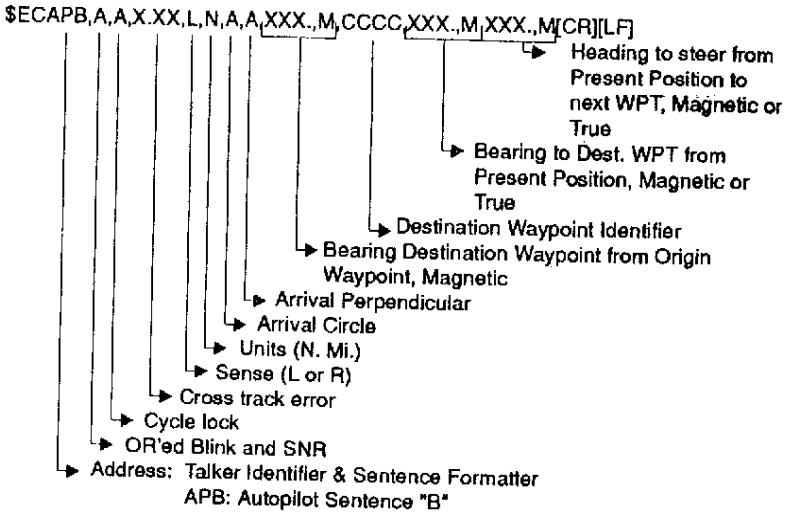
COMMON INFORMATION:

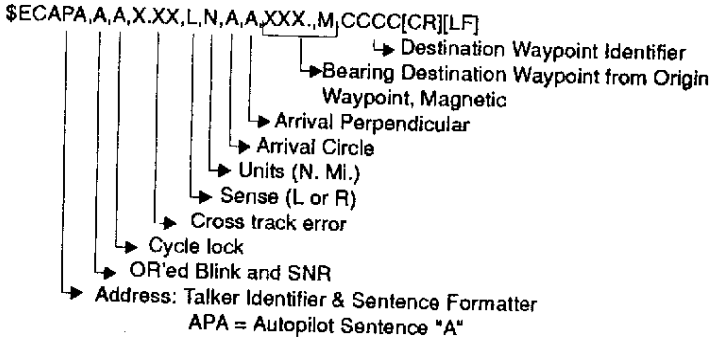
$	=	Start of Sentence
EC	=	Electronic chart display & information system
[CR][LF]	=	Sentence Terminator

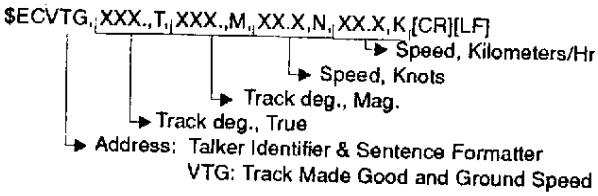


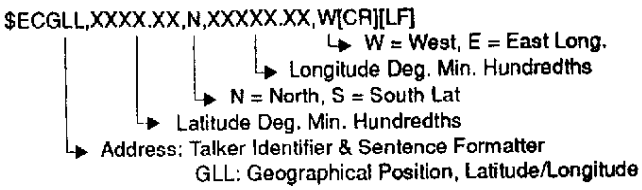


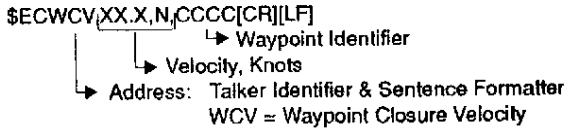

$ECBOD,XXX.,T,XXX.,M,CCCC,CCCC,[CR][LF]
Origin Waypoint Identifier
Destination Waypoint Identifier
Bearing Magnetic
Bearing True
Address: Talker Identifier & Sentence Formatter
BOD=Bearing to Destination


$ECAPB,A,A,X.XX,L,N,A,A,XXX.,M,CCCC,XXX.,M,XXX.,M[CR][LF]
Heading to steer from Present Position to next WPT, Magnetic or True
Bearing to Dest. WPT from Present Position, Magnetic or True
Destination Waypoint Identifier
Bearing Destination Waypoint from Origin Waypoint, Magnetic
Arrival Perpendicular
Arrival Circle
Units (N. Mi.)
Sense (L or R)
Cross track error
Cycle lock
OR'ed Blink and SNR
Address: Talker Identifier & Sentence Formatter
APB: Autopilot Sentence "B"


$ECAPA,A,A,X.XX,L,N,A,A,XXX.,M,CCCC[CR][LF]
Destination Waypoint Identifier
Bearing Destination Waypoint from Origin Waypoint, Magnetic
Arrival Perpendicular
Arrival Circle
Units (N. Mi.)
Sense (L or R)
Cross track error
Cycle lock
OR'ed Blink and SNR
Address: Talker Identifier & Sentence Formatter
APA = Autopilot Sentence "A"


$ECVTG,XXX.,T,XXX.,M,XX.X,N,XX.X,K,[CR][LF]
Speed, Kilometers/Hr
Speed, Knots
Track deg., Mag.
Track deg., True
Address: Talker Identifier & Sentence Formatter
VTG: Track Made Good and Ground Speed


$ECGLL,XXXX.XX,N,XXXXX.XX,W[CR][LF]
W = West, E = East Long.
Longitude Deg. Min. Hundredths
N = North, S = South Lat
Latitude Deg. Min. Hundredths
Address: Talker Identifier & Sentence Formatter
GLL: Geographical Position, Latitude/Longitude


$ECWCV,XX.X,N,CCCC[CR][LF]
Waypoint Identifier
Velocity, Knots
Address: Talker Identifier & Sentence Formatter
WCV = Waypoint Closure Velocity

chapter 6
COMMAND QUICK REFERENCE

This chapter is intended to provide a quick reference for persons familiar with the unit. It lists keyboard operations and the steps necessary to perform them. If you require additional details, please refer to chapter 4.

6.1) GROUND RULES

Menu operations are listed by key sequence.
The reason for the key depression is not listed, nor is the instruction to depress the keys. (Refer to chapter 4 if more information is required)
It is assumed that the user knows to depress the 'CLR' key to back out of the menu and return to the navigational display.
Commands that require cross-hair placement will indicate this with an *.
Basic operations such as power on/off, dim, and zoom are not included.

QUICK REFERENCE

AUTOPILOT

ALARM RANGE SELECT ..... *'MENU' + '5' + '1'*
chapter 4

AUTOPILOT OFF ..... *'PILOT'*
chapter 4

AUTOPILOT ON (WITH TARGET SELECTED) [1] ..... *'PILOT' + '1'/'2'/'CLR'*
chapter 4

*AUTOPILOT ON (NO TARGET SELECTED) [1] ..... *'TARGET' + '1' + '4' + '1'/'2'/'CLR'*
chapter 4

OUTPUT FORMAT SELECT ..... *'MENU' + '5' + '0'*
chapter 5

ALARM

ALARM ON/OFF ..... *'MENU' + '3' + '4' + '0'*
chapter 4

ALARM CLEAR ON/OFF ..... *'MENU' + '3' + '4' + '1'*
chapter 4

CARTRIDGE

CHANGING CARTRIDGE ..... *'MENU' + '0' + ANY KEY*
chapter 3

CHART

CARTOGRAPHY ON/OFF ..... *'CHART' + '2'*
chapter 3

BOUNDARIES ON/OFF ..... *'CHART' + '1'*
chapter 3

COMPASS FUNCTIONS

CALIBRATING[2] ..... *'MENU' + '3' + '7' + '1'*
chapter 3

DISPLAY HEADING SELECTION ..... *'MENU' + '3' + '7' + '0'*
chapter 3

CONTOUR LINES

CHANGE MEASUREMENT UNITS ..... *'MENU' + '6' + '3'*
chapter 3

SPOT SOUNDINGS ON/OFF ..... *'MENU' + '6' + '4'*
chapter 3

TURN CONTOUR LINE DISPLAY ON/OFF ..... *'MENU' + '6' + '0'/'1'/'2'*
chapter 3

DATUM WGS 84

CHART ..... *'MENU' + '3' + '6'*
chapter 4

FIX ..... *'MENU' + '3' + '5'*
chapter 4

DISTANCE TABLE

CLEAR TABLE ..... *'MENU' + '1' + '4' + 'ENT'*
chapter 4

DISPLAY TABLE ..... *'MENU' + '7'*
chapter 4

*ENTER DISTANCE TABLE ENTRIES ..... *'ENT' + '1'/'2'/'3'/'4'/'5' + 'ENT'*
chapter 4

EVENTS

ENTERING EVENT ..... *'MARK' + '2' + 'CLR'*
chapter 4

CLEAR ALL EVENTS ..... *'MENU' + '1' + '1' + 'ENT'*
chapter 4

*DELETE SINGLE EVENT ..... *'CLR' + '2' + 'CLR'*
chapter 4

FIX

FIX CORRECTION ON/OFF ..... *'MENU' + '3' + '0' + '0'*
chapter 4

COMPUTE FIX ERROR ..... *'MENU' + '3' + '0' + '1'*
chapter 4

CHANGE FIX ERROR ..... *'MENU' + '3' + '0' + '2'*
chapter 4

INPUT FORMAT SELECT ..... *'MENU' + '3' + '1'*
chapter 5

LANGUAGE

LANGUAGE SELECTION ..... *'MENU' + '2' + '9'*
chapter 3

DELETING ALL MARKS ..... *'MENU' + '1' + '0' + 'ENT'*
chapter 4

*DELETE SINGLE ENTRY ..... *'CLR' + '1'*
chapter 4

*ENTERING MARKS ..... *'MARK' + '1'*
chapter 4

MARK NUMERIC IDENTIFIER ON/OFF ..... *'MENU' + '2' + '6'*
chapter 4

NAVIGATION DATA DISPLAY

DISPLAY ..... 'INFO'
chapter 4

PLOT

AUTO REPLOT ..... *'MENU' + '4' + '0'*
chapter 4

ON/OFF ..... *'PLOT'*
chapter 4

RANGE & BEARING

CLEAR R/B DISPLAY ..... *'CLR' + '3'*
chapter 4

*DISPLAY (NAVIGATION MODE) ..... *'R/B'*
chapter 4

*DISPLAY (CHARTING MODE) ..... *'R/B'* + CROSS-HAIR + *'R/B'*
chapter 4

ROUTE

*ADD WAYPOINT ..... *'WP' + '1'*
chapter 4

*CHANGE EDITING END [3] ..... *'WP' + '4'*
chapter 4

*CHANGE ROUTE TO EDIT ..... *'WP' + '3'*
chapter 4

CLEAR LAST WAYPOINT ..... *'WP' + '2'*
chapter 4

*CREATE NEW ROUTE ..... *'WP' + '3'*
chapter 4

DATA REPORT [3] ..... *'WP' + '6'*
chapter 4

DELETE ROUTE [3] ..... *'WP' + '5'*
chapter 4

DELETE ALL ROUTES ..... *'MENU' + '1' + '2' + 'ENT'*
chapter 4

ROUTE FOLLOWING ..... *'TARGET' + '1' + '4' + '1'/'2'/'CLR'*
chapter 4

SCREEN SETTINGS

COASTAL FEATURE DISPLAY ..... *'MENU' + '2' + '3'*
chapter 3

COORDINATE DISPLAY ..... *'MENU' + '2' + '5'*
chapter 3

LAND MASS FILLING ..... *'MENU' + '2' + '0'*
chapter 3

LANGUAGE SELECTION ..... *'MENU' + '2' + '9'*
chapter 3

LOCATION NAMES DISPLAY ..... *'MENU' + '2' + '1'*
chapter 3

NAVIGATION AIDS DISPLAY [4] ..... *'MENU' + '2' + '2'*
chapter 3

NAVIGATION RESTRICTION DISPLAY ..... *'MENU' + '2' + '4'*
chapter 3

SPECIAL NAVIGATORS

SELECTION ..... *'MENU' + '3' + '1'*
chapter 4

SPECIAL NAVIGATOR DISPLAY ..... *'MENU' + '3' + '3'*
chapter 4

TARGETING

*CLEAR TARGET ..... *'TARGET' + '2'*
chapter 4

*DESIGNATE (INSERT) TARGET ..... *'TARGET + 1'*
chapter 4

DISPLAY BEARING & DISTANCE OR TIME ..... *'TARGET' + '3'*
chapter 4

TRACKING

AUTO REPLOT ON/OFF ..... *'MENU' + '4' + '0'*
chapter 4

DISTANCE INTERVAL SELECTION ..... *'MENU' + '4' + '2'*
chapter 4

TIME INTERVAL SELECTION ..... *'MENU' + '4' + '3'*
chapter 4

METHOD (TIME or DISTANCE) ..... *'MENU' + '4' + '1'*
chapter 4

ON/OFF ..... *'TRACK'*
chapter 4

RESET TRACKING COUNTER ..... *'MENU' + '4' + '4' + 'ENT'*
chapter 4

TEXT AREA

SELECT DISPLAY ..... *'MENU'* + '2' + '8'
chapter 2

USER DATA-GROUP SELECTIONS

CHANGE ACTIVE PAGE ..... *'DATA'* + '0'
chapter 4

CHANGE USER CARTRIDGE ..... *'DATA' + '6'*
chapter 4

DELETE FILE ..... *'DATA'* + '4'
chapter 4

DISPLAY DIRECTORY ..... *'DATA'* + '1'
chapter 4

DISPLAY USER DATA REPORT ..... *'DATA'*
chapter 4

FORMAT USER CARTRIDGE ..... *'DATA'* + '5'
chapter 4

LOAD FILE ..... *'DATA'* + '3'
chapter 4

SAVE FILE ..... '***DATA***' + '2'
chapter 4

WAYPOINTS (ALSO SEE ROUTES)

CLEAR LAST WAYPOINT ..... '***WP***' + '2'
chapter 4

*ADD A WAYPOINT ..... '***WP***' + '1'
chapter 4

EXTERNAL WAYPOINT ..... '***MENU***' + '2' + '7'
chapter 4

Note

(1) The autopilot cannot be engaged without a good fix indication
(2) - Use left and right arrow key to select angle group
- Use up arrow key to increase value
- Use down arrow key to decrease value
(3) You must have a route selected to perform these commands
(4) Display Nav aid and waypoint info by placing the cross-hair on the object.

chapter 7
UNIT + GPS

7.1) DESCRIPTION

The UNIT + GPS consists of a unit Electronic Charting System and a GPS navigation receiver.
The GPS receiver is a 5 channel, fully automatic unit. It requires no attention once it is installed and the UNIT + GPS has been properly set up.
The GPS receiver requires no external power connections. It is powered from the unit. It is equipped with an internal Lithium battery. This allows it to retain the last known position when power was turned off. This permits the unit to quickly align itself when it is turned on. The battery will last approximately 3 years and should then be replaced. When the battery is dead, the unit will take up to 15 minutes to realign itself when power is applied.

7.2) UNIT + GPS ACCESSORIES

The following items are shipped with the unit:

1 - Trunnion mounting bracket
2 - Mounting knobs
1 - 2 mt./78.7" Power cable
1 - 1 mt./39.3" Interface cable
1 - 3 mt/118.1" Video cable
1 - GPS receiver Antenna and 393"/10 mt. Cable assembly
1 - Unit Users Manual
1 - KODEN MD-3400/SI-TEX T-170 SERIES modification kit
or
1 - KODEN MD-3600 SERIES modification kit
or
1 - FURUNO 1900 SERIES modification kit

7.3) INSTALLATION

Perform the following steps to install and configure your unit + GPS.

7.3.1) DETERMINE UNIT + GPS LOCATION

The unit + GPS is easily installed in most vessels. It can be mounted above or below the mounting bracket.
Bright sunlight on the screen can impair viewing. It is recommended that the unit be located so that the screen is shaded as much as possible.

Please make sure the GPS receiver on/off switch is on prior to positioning the unit if the switch will be difficult to access. The unit front panel on/off switch also turns the GPS receiver on and off.

Remember, this unit is not water proof. Please ensure that it is installed in a dry area free from spray and rain. Water damage is not covered by the warranty.

7.3.2) DETERMINE GPS RECEIVER ANTENNA LOCATION

The unit + GPS antenna should be mounted as high as possible. It should have the clearest line of sight to the horizon possible.

Adjacent antennas or other metallic objects can cause a degradation in GPS receiver performance.

Some general rules that should be followed for GPS positioning are:
- Mount the antenna at least 13 feet from VHF/HF/MF transmitter antennas
- Keep the antenna out of the vessels RADAR beam
- Mount at least 10 feet from loop antennas, and 16.5 feet from Inmarsat antennas
- Position the antenna as far from large metal objects as possible
- The antenna cable is 33 feet in length. An optional antennal assembly is available with a 49 FT. cable.

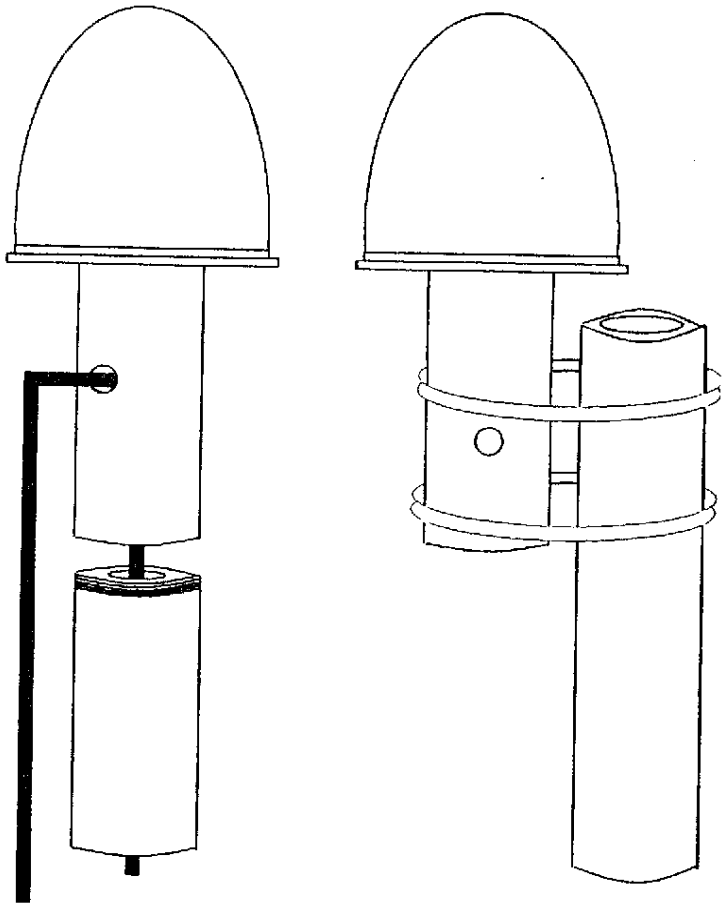
Note

GPS receiver performance may be degraded if the preceding location recommendations cannot be met.

7.3.3) MOUNT GPS RECEIVER ANTENNA

The antenna may be physically mounted either by clamping the antenna base to a vertical mast or threading the base to the end of a

vertical mast. The thread type is W1 - 14.
If threading to a mast end, the cable may be passed through the mast or routed externally by passing it through the opening in the base.



7.3.4) CABLING

POWER CONNECTION

Connect the supplied power cable to the vessels DC distribution

system (10 to 35 VDC) as follows:

RED	TO	+ or Positive
BLACK	TO	- or Negative
WHITE	TO	Ground

UNIT I/O CONNECTOR - A factory installed cable connects the unit and GPS receiver. The cable also has a "pigtail". The pigtail is used for an autopilot connection.
- Special modifications will be required to connect the unit + GPS to a printer. Please consult your dealer if a printer is to be connected.

UNIT VIDEO OUT - This port can be used to drive an external video display.

GPS RECEIVER ANTENNA - Connect the GPS receiver antenna coaxial cable to the top connector on the end of the GPS receiver.

7.3.5) CONFIGURATION

Turn on the unit + GPS by pressing the front panel '*POWER*' key

After the warning screen appears on the unit, press the '*ENT*' key.

Set the unit to the correct data format GPS (Inverse or Normal) by pressing '*MENU + 3 + 1*' keys.

Setting the special navigator function to the proper interface will allow you to display GPS receiver output data. This allows the unit to function as a GPS receiver operator panel by displaying information such as number of satellites acquired, antenna altitude, etc.

Refer to chapter 4 for additional information regarding data format command if necessary.
The GPS receiver will take up to 15 minutes to acquire satellites and determine its position the first time. After the first time this process will take less time.

In the 2 and 3 configuration (see par. 2.2.2) the unit will display "FIX: NOT RECEIVED" at the top of the data window until the GPS receiver passes a navigation fix to the unit.
Refer chapter 4 for sample data window display.

If connecting to an autopilot, perform the following procedure to select the proper output format:

PRESS *'MENU + 5 + 0'* to select the proper output format.

At this point, the installation of your unit + GPS is complete. You may need to perform additional steps such as setting fix correction and compass calibration.
However, at this point it is recommended that you turn to chapter 3-1 (GETTING STARTED) and familiarize yourself with unit/unit + GPS operations.

7.4) GPS RECEIVER SPECIFICATIONS

Receiver	: Digital 5-channel parallel
Receiver frequency	: 1575.42 MHZ ± 1 MHz (C/A code)
Sensivity	: Less than - 130 dBm (for elevations over 5 degrees)
Accuracy (demonstrated)	
a) Position	: 2D RMS (PDOP≤3 with SA), 100 m with SA Spherical probability: 95% 15 m without SA Unit: 1/1000 min (1.8 m)
b) Speed	: 1 m/s or less (PDOP <3 with SA) Unit: 0.1 m/s
c) Bearing	: Approx. 1 degree with SA Unit: 0.1 degree
Dynamics	
a) Velocity	: Less than 300 Km/h (500 km/h: optional)
b) Acceleration	: Less than 1G

Position update time	: Every 1 second
Time to position fix (hot start)	: Within 60 seconds
Positioning mode	: 2-D positioning (with 3 satellites under the condition of HDOP 15 or less) 3-D positioning (with 4 satellites under the condition of PDOP 8 or less)
Backup memory	: Supported by internal lithium battery
Initial position data	: Not necessary
Almanac and time data	: Not necessary
Antenna	
a) Microstrip antenna	: Right-hand circular polalized antenna
b) Directivity	: Zenith: 4 dB or more Elevation: -4 dB or more
c) Pre-amplifier	: Gain: 26 dBi ± 3 dB Noise figure: 2 dB or less
d) Antenna cable	3 meters (9.9 ft)
Temperature range	
a) Operation	: Antenna unit: - 30° to + 70° C (- 22° to 158° F) Sensor unit: - 10° to + 60° C (- 14° to 140° F) Wider range: optional
b) Storage	: Antenna unit: - 40° to + 85° C (- 40° to 185° F) Sensor unit: - 40° to + 85° C (- 14° to 185° F) Wider range: optional
Communication	: Asynchronous data output Bidirectional channel
Data contents	
Latitude and Longitude	: Increments of 0.001 minute

Time	: UTC (hour, minute and seconds)
Altitude	: In increments of 1 meter
Speed	: In increments of 0.1 meter/ sec.
Heading	: In increments of 0.1 degree
Others	: HDOP, positioning mode

Note

Accuracy subject to change in accordance with DOD civil GPS user policy.

7.5) UNIT + GPS COMMAND NOTES

Several unit commands are used differently when the unit is connected to an external navigation receiver or an integrated GPS receiver.
Those commands are:

INPUT FORMAT SELECT (CHAPTER 5)

The unit supports 10 types of nav receiver inputs plus 4 special navigator.

DATUM WGS 84 COMMANDS (CHAPTER 4)

Turn the FIX DATUM WGS 84 and CHART DATUM WGS 84 commands off for GPS receiver operation. The GPS receiver receiver already supplies DATUM WGS 84 and all North American C-MAP charts include DATUM WGS 84.

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