numerical values with the up or down arrows.
3. Press ENTER to confirm the Lat/Lon position or CLEAR to abort operation.
4. Press MENU to select another function.

Target deletion is possible by following this procedure:

Selection of DELETE TARGET function

1. Press MENU until "GOTO" appears in the status window.
2. Press CLEAR to select the delete Target function.
3. Press ENTER to confirm the deleting of the Target. After pressing the 'ENTER' key, the symbol that identifies Target disappears from the screen.
   If autopilot is activated, pressing the 'ENTER' key confirms deletion, the autopilot is disabled but the Target symbol remains. The dotted line connecting the Target with the ship disappears from the screen, but not the symbol that identifies the Target. To delete the Target you must press the 'CLEAR' key again and the 'ENTER' key to confirm deletion.
   Pressing the 'ENTER' key when a Target has not been inserted will cause the chart plotter to emit three beeps to indicate an error condition.
4. Press MENU to select another function.

The chart plotter can display the Distance (Distance To Go = DTG), the Time to the Target (Time To Go = TTG) or the Cross Track Error (XTE) follow the procedure described in the par. 2.6.5.

❖ 4.7 - DISTANCE AND BEARING BETWEEN SHIP'S POSITION AND ANY GIVEN POINT

In Navigation mode, Navigation Area Amplifier and in Auto Zoom on Target this function allows fast and easy measurements of distances and bearings between ship's position and any point on the chart.
To activate this option follow this procedure:

Selection of FR-TO function

1. Press MENU until "FR-TO" appears in the status window.
2. Press ENTER to place the "FR" point on the ship's position and the "TO" point on the place identified by the Cross-Hair: the two points are connected by a straight line. A cross will identify the beginning and the end of the "FR-TO" line.
3. Press MENU to select another function.

To clear the "FR-TO" segment press the following keys:

Selection of CLEAR FR-TO function

1. Press MENU until "FR-TO" appears in the status window.
2. Press CLEAR to delete the point "FR", -"TO" and the line connecting these points.
3. Press MENU to select another function.

Note

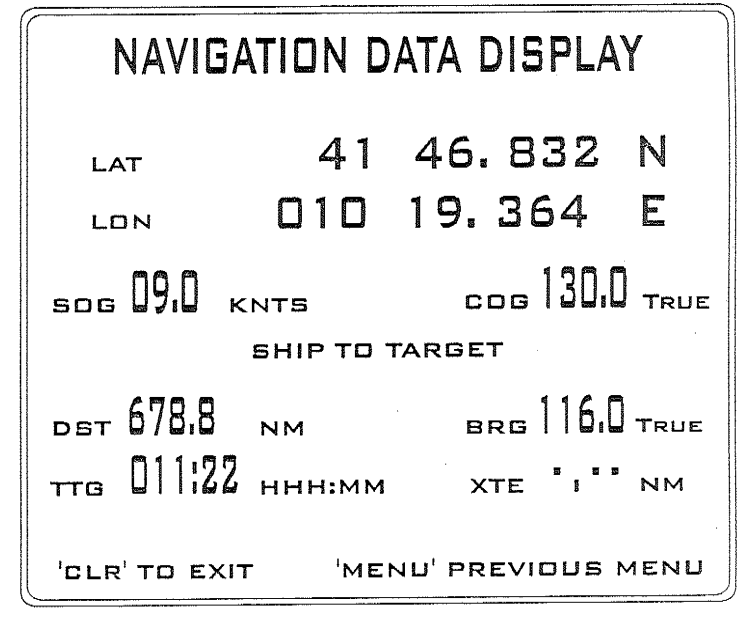
In Navigation mode, in Navigation Area Amplifier and in Auto Zoom on Target the "FR-TO distance is between the ship's position and any given point. In the Charting mode, it is between the Cross-Hair and any given point (See also par. 3.3).

❖ 4.8 - NAVIGATION DATA DISPLAY

Navigation Data Display can be selected by following the procedure:

Selection of NAVIGATION DATA page

1. Select: Main Menu/Navigation Data Page (n. 3).
2. When you have highlighted that option, press ENTER: the Navigation Data Page will appear on the screen.



4.9 - MAN OVERBOARD FUNCTION (M.O.B)

The Man Overboard function is an important function should someone or something fall overboard. To activate this function you have to be in split screen or full screen mode and it is receiving a valid fix, follow this procedure:

Selection of M.O.B. function

1. Press MENU for about 2 seconds: the symbol that identifies the MOB is placed at ship's coordinates and a screen window that contains the MOB coordinates is open.

To activate navigation to MOB, you must place the Target on the position identified by the MOB symbol (see par. 4.6) and then activate the navigation to Target (see par. 6.2).

To delete the MOB symbol follow the procedure:

Selection of DELETE M.O.B. function

1. Press MENU for about 2 seconds: the symbol that identifies the MOB is deleted from the screen.

If navigation to MOB is activated, the MOB is deleted but the Target remains (so the navigation remains activated to Target). To delete the Target and to disable the navigation see par. 4.6.

4.10 - SIMULATE MODE

For practicing operation, it is possible to simulate navigation without receiving a fix. To set this mode of operation follow this procedure:

Selection of SIMULATE MODE

1. Select: MAIN MENU/AUXILIARY FUNCTION MENU (N. 2)/FIX AND COMPASS FUNCTIONS (N. 4)/SIMULATE MODE (N. 10).
2. When you have highlighted that option, press ENTER to select the Simulate Mode On or Off (*).
3. Press ENTER to confirm. After pressing the 'ENTER' key the simulated ship's position is placed on the Cross-Hair position. If in Split screen in the top line of the text area the message "SIMULATION" is shown instead of "CHART DATUM"; if in Full screen in the top right corner of the screen the message "SIMULAT." is shown.

To exit from Simulate Mode follow the above procedure setting the Simulate Mode to Off at the 8 step (*).

chapter 5
USER POINTS

5.1 - INTRODUCTION

A user point is a place on the chart stored by its coordinates and displayed on the screen with a reference symbol.
The chart plotter gives two types of user points, Mark and Event.
Marks are reference points, that can be set either in Charting mode or in Navigation mode, related to Cross-Hair position.
Events are markers directly related to the ship's position. It is simply a way of marking where the boat is.

5.2 - PLACING MARKS ON THE CHART

To place a Mark on the chart the Cross-Hair must follows this procedure:

Selection of INSERT MARK function

1. Press MENU until "MARKS" appears in the status window.
2. Press ENTER to place the Mark on the screen. Three types of Marks are available. Press the ENTER key to select Mark style.
3. Press MENU to select another function.

The user may also create Marks at specific points of latitude and longitude:

Selection of MARK AT L/L COORDINATES function

1. Press MENU until "MARKS" appears in the status window.
2. Press ENTER for more than one second and then release: the point coordinates identified by the Cross-Hair will appear on the screen. Latitude and Longitude of the point are shown on the screen, and the user can change them by moving the cursor by the left and right arrows and setting the numerical values by the up or down arrows.
3. Press ENTER to confirm the insert value or CLEAR to abort operation.
4. If the 'ENTER' key is pressed, it is possible to insert a name on the Mark. The left and right arrows move the cursor, and by the up and down arrows you can insert the

desired character (the label may have 8 characters max).
5. Press ENTER to confirm the name. It is possible to select the desired Mark type by pressing the ENTER key.
6. Press MENU to select another function.

Note

The previous procedure allows the user to store a Mark on coordinates and also to name that Mark.

It is not possible to set another Mark over an existing Mark (see par. 5.7).

5.3 - PLACING EVENTS ON THE CHART

As previously pointed out, a Mark is simply a reference point on the map. It can be set in either Charting or Navigation mode.
An Event, is a marker directly related to the ship's position. It is simply a way of marking where the boat is.

To create Events, in the two modes, simply follow this procedure:

Selection of INSERT EVENT function

1. Press MENU until "EVENT" appears in the status window.
2. Press ENTER to place the Event. Instantly, a symbol will appear on the screen, marking the boat's position.
3. Press MENU to select another function.

It is possible to name the Event following this procedure:

Selection of INSERT LABEL ON EVENT function

1. Press MENU until "EVENT" appears in the status window.
2. Press ENTER for more than one second and then release it to name the Event. The left and right arrows move the cursor, and by the up and down arrows you can insert the desired character (the label may have 8 characters to max).
3. Press ENTER to confirm the name.
4. Press MENU to select another function.

5.4 - DELETING MARKS/EVENTS OFF THE CHART

A single Mark can be deleted following this procedure:

Selection of DELETE A SINGLE MARK function

1. Press MENU until "MARKS" appears in the status window.
2. Press CLEAR to delete the Mark indicated by the Cross-Hair.

To erase an Event the procedure is quite similar:

Selection of DELETE A SINGLE EVENT function

1. Press MENU until "EVENT" appears in the status window.
2. Press CLEAR to delete the Event indicated by the Cross-Hair.

If all the Marks or Events placed on the electronic chart have to be cancelled:

Selection of DELETING ALL MARKS/EVENTS function

1. Select: MAIN MENU/AUXILIARY FUNCTION MENU (N. 2)/CLEAR USER POINTS (N. 1).
2. Use up or down arrow keys to highlight the deleting of desired user points option (to delete all the Mark ⧖; to delete all the Mark ⋈; to delete all the Mark ✳; to delete all the Event ⟆).
3. When you have highlighted that option, press ENTER to select the desired deletion.
4. Press the ENTER key again to confirm the choice. On the screen the message "Please waiting ..." is shown until the deleting is ended.

5.5 - INFORMATION ABOUT AN USER POINT

To obtain the coordinates of a Mark or Event, simply place the Cross-Hair on the desired Mark or Event. On the screen the user point identifier and its coordinates are displayed.

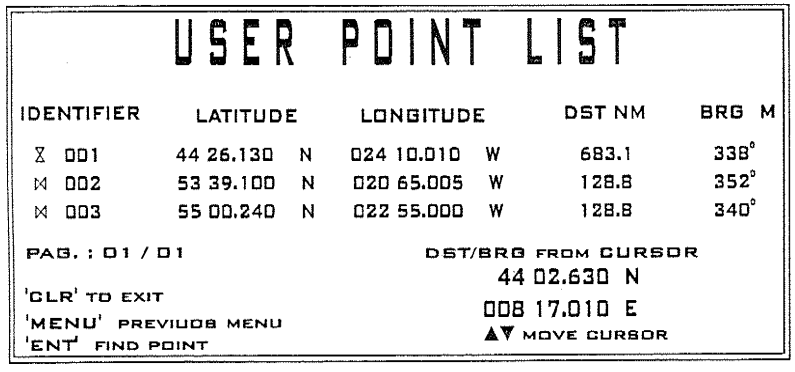
5.6 - USER POINT LIST PAGE

The User Points List Page gives information about all stored user points: latitude and longitude, distance and bearing from the cursor (if the system is in Charting mode) or the ship's position (if the system is in Navigation mode, in Navigation Area Amplifier or in Auto Zoom on Target) are displayed for each point. In the bottom right side of the screen the cursor coordinates (if in Charting) or the coordinates of the ship (if in Navigation,

in Navigation Area Amplifier or in Auto Zoom on Target) are shown. To display the User Points List follow this procedure:

Selection of USER POINTS LIST PAGE display

1. Select: MAIN MENU/USER POINTS LIST (N. 4).
2. When you have highlighted that option, press ENTER: the User Points List Page will appear.



3. Press the up and down arrow key to select the desired user point in the list, and then press the ENTER key if you want to display the selected user point. After pressing the 'ENTER' key, the chart plotter exits from the User Points List Page and the chart redraws, shown the selected point with the Cross-Hair placed on it: a window containing the coordinates and the identifier of the user point is opened on the screen. If the Page contains more than 16 user points, the list follows in the next page(s): press the ZOOM OUT key to display the next page(s) and the ZOOM IN key to return to the previous page(s).

❖ 5.7 - MOVING USER POINT

The chart plotter allows the user to move on the screen already existed Marks to place them in new positions. To move user point follow this procedure:

Selection of MOVING MARKS

1. Press MENU until "MARKS" appears in the status window.
2. Placing the Cross-Hair on an existing Mark and pressing the ENTER key, it is possible to move Mark and its identifier on the screen, to place it in the desired position. After pressing the 'ENTER' key, the Mark indicated by the Cross-Hair changes its icon: moving the Cross-Hair on the screen by the arrow keys, a dotted line connecting the Mark to the new position is shown on the screen.
3. When the desired position is obtained, press the ENTER key again: the Mark is placed in the new position.

Note

If the Mark has been placed, pressing the 'ENTER' key (as indicated in 2.) it is possible to change the Mark icon without changing its position. To move a Mark , move the Cross-Hair and replace it on the Mark : pressing 'ENTER' makes it possible to modify the position.

To move a Mark on the screen changing its identifier follow this procedure:

Selection of MOVING MARKS CHANGING IDENTIFIER

1. Press MENU until "MARKS" appears in the status window.
2. Placing the Cross-Hair on an existing Mark and pressing the ENTER key for more than 1 second, it is possible to modify Mark position and its identifier.
3. A window showing the Mark coordinates on the screen is displayed: using the left or right arrow keys it is possible to move the cursor to the left or to the right, and by using the up or down arrow key it is possible to change the coordinates displayed in reverse video. Press the ENTER key to confirm or the CLEAR key to abort operation.
4. Pressing the 'ENTER' key, again a window containing the Mark identifier is shown: using the left or right arrow keys it is possible to move the cursor the left or to the right, and using the up or down arrow keys it is possible to modify the character displayed in reverse video. Press the ENTER key to confirm or the CLEAR key to abort operation.
5. Press the MENU key to select another function.

chapter 6
AUTOPILOT MODE

6.1 - INTRODUCTION

The chart plotter can be connected to an autopilot through a standard interface NMEA-0180, NMEA-0180/CDX or NMEA-0183.
The autopilot function can only be used when the chart plotter is correctly receiving the ship's position from the positioning instrument, the Navigation mode is selected and the Target Point is properly inserted. Once the Target Point is set (see par. 4.6) and the autopilot function is activated (see par. 6.2), the chart plotter computes the course between the current position and the Target to be sent to the Autopilot, and starts to transmit the Cross Track Error to the Autopilot.
After arriving at a certain distance (which can be selected among 0.1, 0.25, 0.5, 1, 2, 3, 5 nm/km/sm) from the Target Point, the chart plotter gives an audible alarm.

Note

If the Target destination has changed, a new course from which the Cross Track Error is calculated, is set.

6.2 - TURNING THE AUTOPILOT ON/OFF

To enable the Autopilot function follow this procedure:

Selection of AUTOPILOT ON FUNCTION

1. Press MENU until "GOTO" appears in the status window.
2. Press ENTER. There are two possible cases:
   2.1. if the Target is placed on a single Waypoint, when you press the 'ENTER' key, the screen message is "ACTIVE NAVIGATION, 'ENTER' TO CONFIRM". Pressing the ENTER key again the autopilot will activate.
   2.2. if the Target was placed on a Waypoint in a route, when you press the 'ENTER' key it is possible to choice the route direction: the ZOOM IN key activates to sail the Waypoints forward, the ZOOM OUT key activates to sail the

Waypoints in reverse, the ENTER key enables stop at Target.

3. Press MENU to select another function.

The autopilot on is shown on the screen with a dotted line connecting the Target to the ship.

To disable the autopilot follow this procedure:

Selection of AUTOPILOT OFF FUNCTION

1. Press MENU until "GOTO" appears in the status window.
2. Press CLEAR to disable autopilot.
3. Press ENTER to confirm "disable of autopilot": the autopilot is turned Off and the dotted line is deleted from the screen.
4. Press MENU to select another function.

Note

If the ship's position is not correctly received or if the Target point is disabled, the Autopilot function is automatically turned Off.

❖ 6.3 - SETTING AN AUTOPILOT ALARM RANGE

To select the Autopilot alarm range, (0.1, 0.25, 0.5, 1, 2, 3, 5 nm/km/sm - releted to the unit selected, see par. 2.7.2) press the following keys:

Selection of AUTOPILOT ALARM RANGE

1. Select: MAIN MENU/AUXILIARY FUNCTIONS MENU (N. 2)/AUTOPILOT MENU (N. 6)/ AUTOPILOT ALARM RANGE (N. 2).
2. When you have highlighted that option, press ENTER to select the desired range. Every time the 'ENTER' key is pressed, one of the possible ranges is selected.

❖ 6.4 - AUTOPILOT INTERFACE SELECTION

The chart plotter can be connected to an autopilot throught a standard interface NMEA-0180, NMEA-0180/CDX or NMEA-0183.

To select the desired interface follow this procedure:

Selection of AUTOPILOT INTERFACE

1. Select: MAIN MENU/AUXILIARY FUNCTIONS MENU (N. 2)/AUTOPILOT MENU (N. 6)/ AUTOPILOT OUTPUT (N. 1).
2. When you have highlighted that option, press ENTER to select the desired output format. Every time the 'ENTER' key is pressed, one of the three possible output formats is selected.

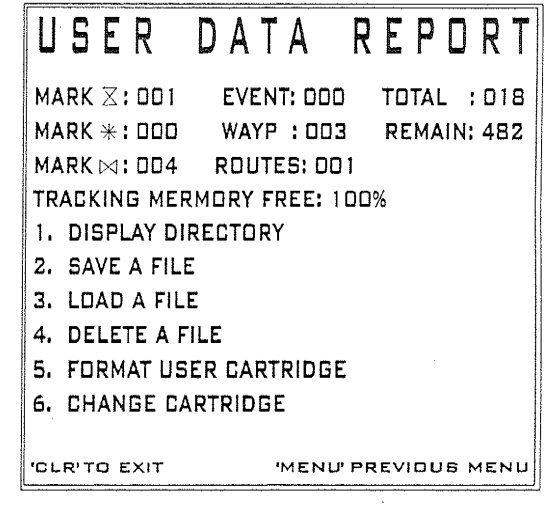
chapter 7
USER DATA MENU

7.1 - USER DATA REPORT

Selecting this menu all used marks, events, routes and tracks (User Data Report) are displayed on the screen. To select the User Data Report follow this procedure:

Selection of USER DATA REPORT

1. Select: MAIN MENU/AUXILIARY FUNCTION MENU (N. 2)/USER DATA-GROUP SELECTION MENU (N. 7).
2. Press ENTER to select the User Data Report. The following page is shown on the screen:



7.2 - USER CARTRIDGE

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

The user cartridge may be inserted in one of the two available slots.
Before a new user cartridge can be used, you must format it, by selecting the "Format User Cartridge" option provided by the chart plotter. This function initializes the user cartridge and prepares it for storing information.
Remember that if an user cartridge is not blank, by formatting it you will destroy any data already on the user cartridge (See par. 7.2.5 for more details).

Warning!

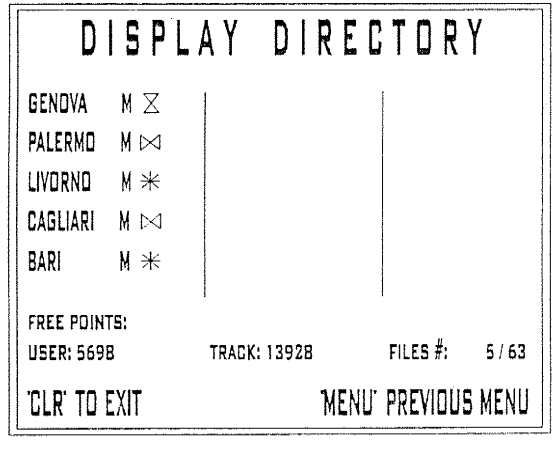
The cartridges must be formatted in order to be reused, this operation means that all old data memorized on the cartridge will be lost.

7.2.1) DISPLAY USER CARTRIDGE DIRECTORY

Data stored on user cartridge are grouped in files. A file is a collection of information (of the same type) stored on a user cartridge. Each file must have a unique name, ideally one that describes its contents. 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 following commands (after inserting the user cartridge into the slot):

Selection of DISPLAY DIRECTORY

1. Select: MAIN MENU/AUXILIARY FUNCTION MENU (N. 2)/USER DATA-GROUP SELECTION MENU (N. 7)/DISPLAY DIRECTORY (N. 1).
2. Press ENTER to select the directory display. After pressing the 'ENTER' key, the directory will appear on the screen (see the following figure).



By pressing the ZOOM IN and ZOOM OUT keys it is possible to select the previous or next page (if existing).

63 files are available, which are grouped on screen organized in six columns each of 11 files. The file name consisting of an "extension" to indicate the contents of the file (*). At the bottom of the screen the user number, the track free points and the number of created files, are shown.

Note (*)

The available extensions are M⧖, M⋈, M✳ for the three types of Marks, EVT for Events, RTE for routes and TRK for tracks.

If no user cartridge is present in the slot, the warning message "USER CARTRIDGE NOT PRESENT" will appear.

7.2.2) SAVE A FILE

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 accede this function:

Selection of SAVE FILE

1. Select: MAIN MENU/AUXILIARY FUNCTION MENU (N. 2)/USER DATA-GROUP SELECTION MENU (N. 7)/SAVE FILE MENU (N. 2).
2. Use up or down arrow keys to highlight the type of data to save.
3. Press ENTER to select the type of data to save on user cartridge.
4. Press ENTER again to confirm the type of data to save. After selecting the group, the user can choose the filename.
   At first the default name ("NONAME") or the name of the last stored file is shown. Use the up and down arrows keys to change the highlighted character and use the left and right arrow keys to move cursor to the previous or next letter. Once finished, press ENTER to confirm: the message "SAVING DATA ..." followed by the number of saved points (i.e.: saving a file of Events, displayed is the number of stored Events points) will be displayed on the screen.

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 (i.e.: legal identifiers are "ABC", "AA", "12121212", "A B A", "1 A 1", and so on).

7.2.3) LOAD A FILE

The Load File submenu loads from user cartridge a desired group of user points, for example a file of routes. To accede this function:

Selection of LOAD FILE

1. Select: MAIN MENU/AUXILIARY FUNCTION MENU (N. 2)/USER DATA-GROUP SELECTION MENU (N. 7)/LOAD FILE MENU (N. 3).
2. Use up or down arrow keys to highlight the type of data to load.
3. Press ENTER to select the type of data to load from user cartridge. After pressing the 'ENTER' key, the first filename of this group is shown on the screen. When you have found the desired filename, press ENTER to confirm: the message "LOADING FILE: <file name>" and soon after "LOADING DATA ..." followed by the number of stored points (i.e.: loading a file of Events, displayed are the number of Events points present into the file) will be displayed on the screen.

Note

Loading a file of Marks of a different type from the three available types, the chart plotter shows this file as a file of Mark of type I. Loading a file of user points of unknown type, the plotter displays this file with extension ".???".

7.2.4) DELETE A FILE

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 user cartridge, you can use the "Delete File" option. Remember, though, that this option permanently erases the file. To accede this function:

Selection of DELETE FILE

1. Select: MAIN MENU/AUXILIARY FUNCTION MENU (N. 2)/USER DATA-GROUP SELECTION MENU (N. 7)/DELETE FILE MENU (N. 4).
2. Use up or down arrow keys to highlight the type of data to delete.
3. Press ENTER to select the type of data to delete from user cartridge. After pressing the 'ENTER' key, the first filename of this group is shown on the screen. When you have found the desired filename, press ENTER to confirm: on the screen will be displayed the message "ARE YOU SURE ?", press the ENTER key again or another key to abort the deletion. After pressing the 'ENTER' key, the message "DELETING FILE: <file name>" is shown on the screen.

7.2.5) FORMAT USER CARTRIDGE

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 following keys:

Selection of FORMAT USER CARTRIDGE

1. Select: MAIN MENU/AUXILIARY FUNCTION MENU (N. 2)/USER DATA-GROUP SELECTION MENU (N. 7)/FORMAT USER CARTRIDGE (N. 5).
2. When you have highlighted that option, press ENTER to select the format operation.
3. Press ENTER again to confirm the formatting (any other key aborts the operation). During formatting, the message "FORMATTING CARTRIDGE PLEASE WAIT" is displayed on the screen. Once finished, your user cartridge is formatted and ready to use: the message "USER CARTRIDGE FORMATTED" is shown.
4. Press any key to return to the previous menu.

Be sure to label it; the label will remind you that you have formatted the user cartridge, and will help you to identify its contents. A used user cartridge can also be formatted; if a used user cartridge is formatted, however, all previously stored data on the user cartridge will be lost completely.

Warning!

Formatting a user cartridge destroys all information on it. Before formatting a used user cartridge, use the "Display Directory" option (See par. 7.2.1) to see what's on it. That way you won't loose any needed files.

7.2.6) CHANGE USER CARTRIDGE

To change the user cartridge follow this procedure:

Selection of CHANGE USER CARTRIDGE

1. Select: MAIN MENU/AUXILIARY FUNCTION MENU (N. 2)/USER DATA-GROUP SELECTION MENU (N. 7)/CHANGE CARTRIDGE (N. 6).
2. When you have highlighted that option, press ENTER to select the change operation. Insert the desired user cartridge and then press any key when ready to return to the previous menu.

7.2.7) ERROR MESSAGES

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

CARTRIDGE FULL
The user cartridge in use is full. Delete any unnecessary file (See par. 7.2.4) and retry, or use another user cartridge.

CARTRIDGE NOT FORMATTED
The inserted user cartridge is not formatted. Before using it, you must format it to prepare the user cartridge to receive and store information (See par. 7.2.5).

DIRECTORY FULL
The number of files is the maximum available (see par. 7.1.1). Delete any unnecessary file (see par. 7.1.4) and retry, or use another user cartridge.

FILE ALREADY EXISTS
The filename you specified by the command is already present on the user cartridge.

FILE NOT FOUND
The file named typed does not exist on the current user cartridge. Verify that you entered the filename correctly and try again.

USER CARTRIDGE NOT PRESENT
The user cartridge is not in, or not correctly inserted, in the slot. Insert the user cartridge into the slot (See par. 1.1) and try again.

Other types of messages can be displayed on your screen:

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

chapter 8
ALARMS

8.1 - CLEARING ALARMS

When an alarm sounding is on, the CLEAR key resets it. The reason for the alarm is displayed on the screen (See par. 8.3).

8.2 - FIX ALARM SETTING

The user can enable or disable the fix alarm, in case of no fix from GPS, and the auto alarm clear. To select these options, press the following keys:

Selection of AUDIBLE ALARM

1. Select: Main Menu/Auxiliary Function Menu (n. 2)/Fix and Compass Functions Menu (n. 4)/Fix Alarm Setting Menu (n. 5)/Audible Alarm (n. 1).
2. When you have highlighted that option, press ENTER to set the audible alarm On or Off. Every time the 'ENTER' key is pressed, the audible alarm is enabled or disabled.

Selection of AUTO ALARM CLEAR

1. Select: Main Menu/Auxiliary Function Menu (n. 2)/Fix and Compass Functions Menu (n. 4)/Fix Alarm Setting Menu (n. 5)/Auto Alarm Clear (n. 2).
2. When you have highlighted that option, press ENTER to set the auto alarm clear On or Off. Every time the 'ENTER' key is pressed, the auto alarm clear is enabled or disabled.

8.3 - ALARM MESSAGES

There are five different alarm messages.
Three of them are related to the receiving data from the positioning instrument (see also par.1.4):
"NOT RECEIVED" : no data is received.

"NOT GOOD" : the received format is correct, but the information is declared "not good" by the positioning instrument.

"WRONG FORMAT" : the received format does not correspond to the selected format, or the received data do not have information on the ship's position.

The fourth alarm message is related to the autopilot alarm range.

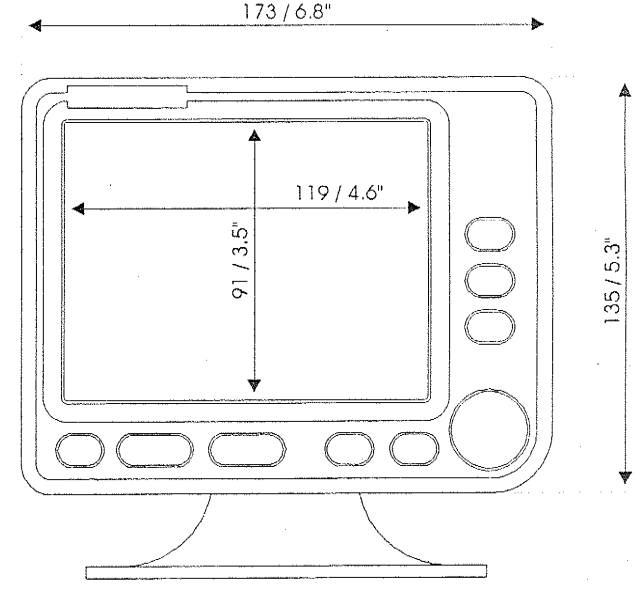
"AUTOPILOT ARRIVAL RANGE": the boat position is within the radius that the user has set.

The fifth alarm message is the following:

"WAYPOINT REACHED": the actual position of a Waypoint is reached and the plotter sets the course to the next Waypoint.

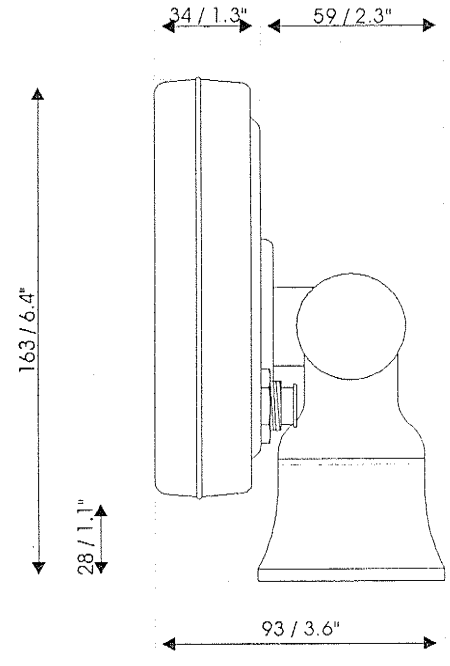
appendix A - TECHNICAL SPECIFICATIONS

Power consumption	7 Watt, 10 - 35 Volt dc
Navigation interface	From Loran, Satnav, GPS, Decca, omega via NMEA 0182/0183 and others
Autopilot interface	NMEA-0180 NMEA-0180/CDX NMEA-0183 (#)
Display	LCD 7"
Display resolution	320 x 240 pixels
Cartography	C-MAP NT C-CARD
Operational temperature range	-10/ +65 degrees Celsius
Memory	Non volatile with battery back-up
Keyboard	Silicon rubber backlighted
Weight	560 gr.
Dimensions: (mm/inch)	



Note

#) In accordance with Standard NMEA 0183 v. 2.00.



appendix B - SOFTWARE SPECIFICATIONS

USER POINTS

GROUPS(*):		1
RECORDABLE INDIVIDUAL POINTS(**):	Waypoints + Marks + Events	500
ROUTES:	Routes	10
	Waypoints per Route	500
	Target	1
TRACKING:	Track	1
	Points per Track	500
	Steps by Distance	1, .5, .1, .05 (NM)
	Steps by Time	5, 3, 1 (min)
		5, 10, 30 (sec)
MARK/EVENT:	User point alphanumeric identifier	
	Type of Marks	3
	Type of Events	1

FUNCTIONS

CARTOGRAPHIC FUNCTIONS:

- Worldwide Chart Coverage
- Lat/Lon Grid
- Depth unit selection (MT, FT, FM)
- Natural Features, Rivers & Lakes, Cultural Features, Landmarks, Water turbolence, Depth Areas, Spot Soundings, Bottom type, Ports & Services, Attention Areas, Tracks & Routes, Lights, Buoys & Beacons, Signals, Cartographic Objects, Names, Compass, Chart Generation, New objects, Info Level.
- WGS84 Coordinates System
- Full Screen Cartography
- Thousand Handling Coordinates

FIX FUNCTIONS:

- Fix Correction
- Display Headings True or Magnetic
- Keypad Entry to Modify Fix Correction
- COG Vector
- Magnetic variation user selections

REPORT FUNCTIONS:
- Route Data Report with selectable units, fuel consumption and estimated time arrival
- Navigation Data Display (LAT, LON, COG, SOG, BRG, XTE, TTG)
- User points list page
- GPS Data display

SPECIAL FUNCTIONS:
- External waypoint
- M.O.B.
- Simulate mode
- Automatic info on Nav aids and User points

AUXILIARY MEMORY:
- User cartridge 128K

INTERFACE

I/O SUPPORT:
- Two serial in/out port
- Autopilot output

INPUT FORMATS:
- NMEA-0183 (#) [Strings: BWC, GLL, SBK, SCY, SNU, XTE, GXP, GDP, GOP, GLP, VTG, RMA, RMC, GGA, PKMLC, PKMAP]
- NMEA-0182/TAIYO, KODEN 717, KODEN 757, FURUNO CIF, TRIMBLE-200, DECCA MK3, IIMORROW AVENGER, MICROLOGIC VOYAGER, NAVSTAR 2000D, TEXAS TI9900 I/II

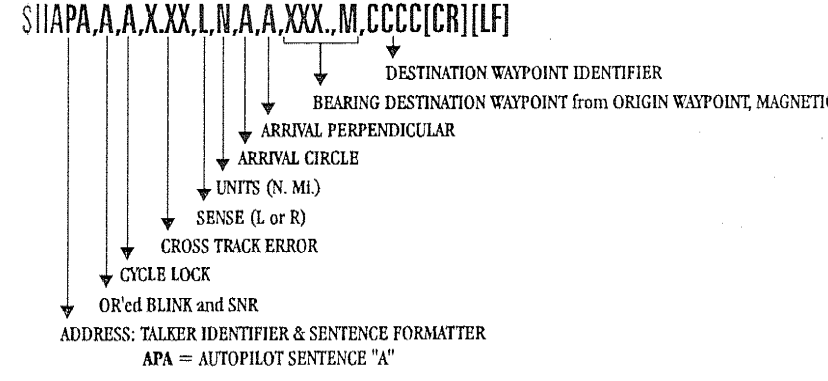
SPECIAL NAVIGATORS:
- MICROLOGIC ML 8000T
- AP NAV-MK4
- GPS NMEA-0183
- GPS ROCKWELL

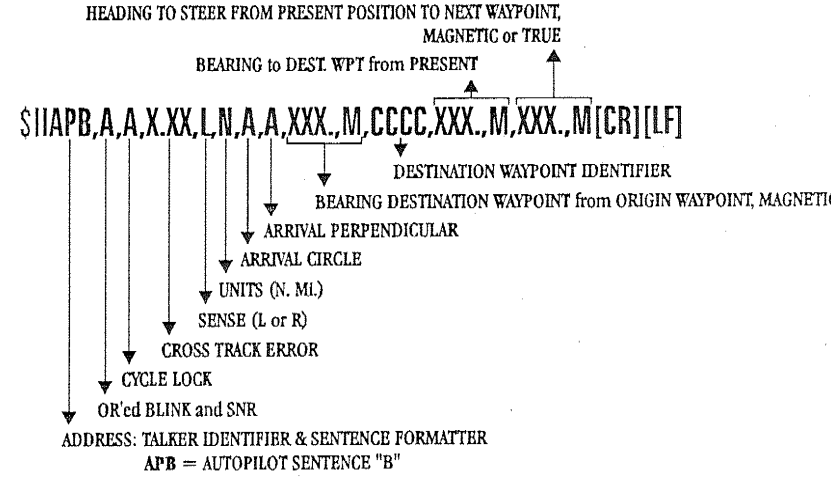
OUTPUT FORMATS:
- NMEA-0180
- NMEA-0180/CDX
- NMEA-0183 (#) (***) GLL, VTG, BWC (void)
  with Autopilot On: APB, XTE, GLL, VTG, WCV, APA, BWC, BOD, RMC, RMA

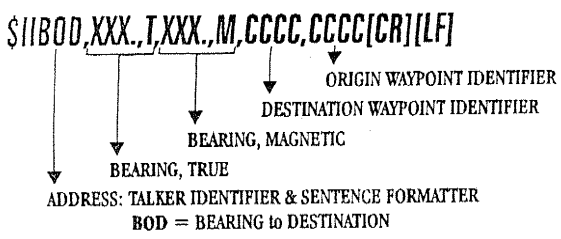
Note

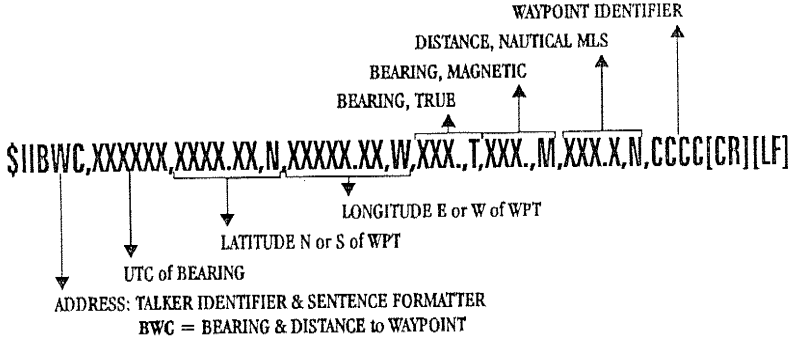
(*) Groups: number of memory pages.
(**) For each page. The total number of points is this number times the number of pages.
(***) These sentences are continuously sent only if a fix is received.
(#) In accordance with NMEA 0183 standard v. 2.00.

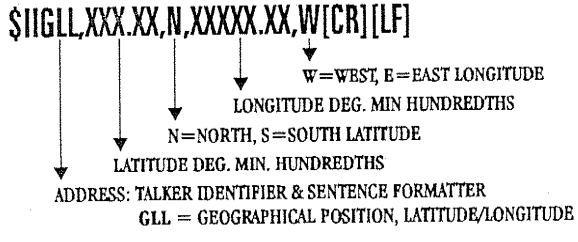
Common information:
- $ = Start of Sentence
- II = Integrated Instrument
- [CR][LF] = Sentence Terminator

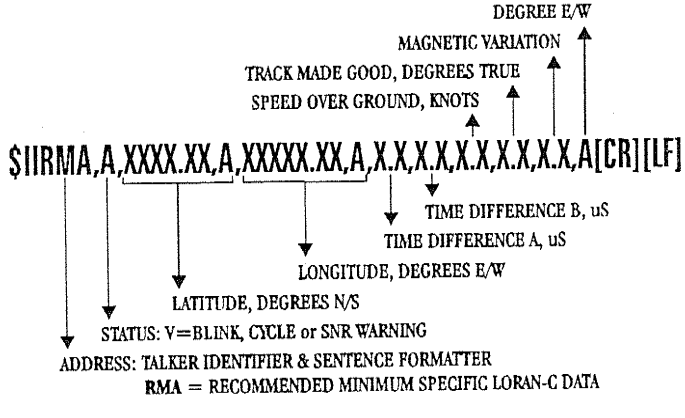


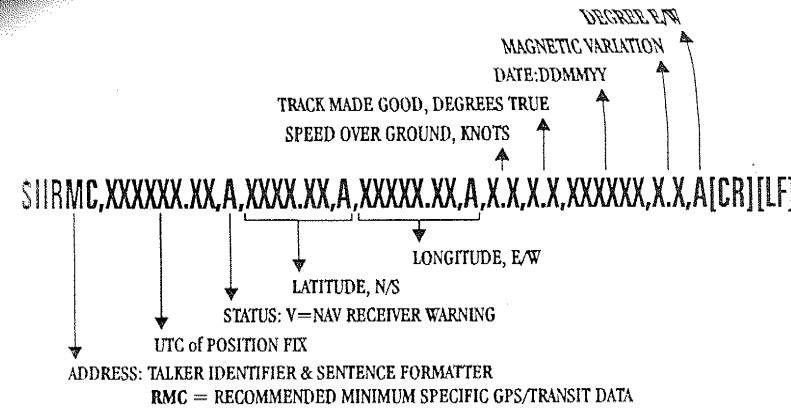


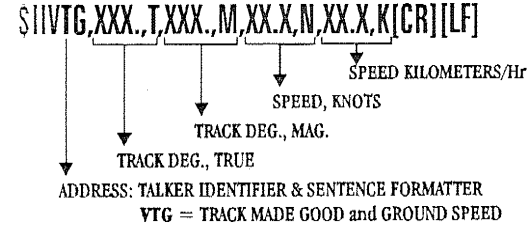

$IIBOD,XXX.,T,XXX.,M,CCCC,CCCC[CR][LF]
ORIGIN WAYPOINT IDENTIFIER
DESTINATION WAYPOINT IDENTIFIER
BEARING, MAGNETIC
BEARING, TRUE
ADDRESS: TALKER IDENTIFIER & SENTENCE FORMATTER
BOD = BEARING to DESTINATION

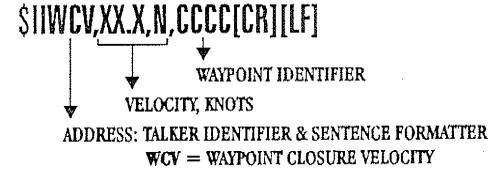

WAYPOINT IDENTIFIER
DISTANCE, NAUTICAL MLS
BEARING, MAGNETIC
BEARING, TRUE
$IIBWC,XXXXXX,XXXX.XX,N,XXXXX.XX,W,XXX.,T,XXX.,M,XXX.X,N,CCCC[CR][LF]
LONGITUDE E or W of WPT
LATITUDE N or S of WPT
UTC of BEARING
ADDRESS: TALKER IDENTIFIER & SENTENCE FORMATTER
BWC = BEARING & DISTANCE to WAYPOINT

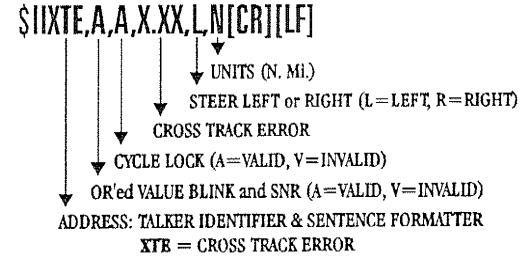

$IIGLL,XXX.XX,N,XXXXX.XX,W[CR][LF]
W=WEST, E=EAST LONGITUDE
LONGITUDE DEG. MIN HUNDREDTHS
N=NORTH, S=SOUTH LATITUDE
LATITUDE DEG. MIN. HUNDREDTHS
ADDRESS: TALKER IDENTIFIER & SENTENCE FORMATTER
GLL = GEOGRAPHICAL POSITION, LATITUDE/LONGITUDE


DEGREE E/W
MAGNETIC VARIATION
TRACK MADE GOOD, DEGREES TRUE
SPEED OVER GROUND, KNOTS
$IIRMA,A,XXXX.XX,A,XXXXX.XX,A,X.X,X.X,X.X,X.X,X.X,A[CR][LF]
TIME DIFFERENCE B, uS
TIME DIFFERENCE A, uS
LONGITUDE, DEGREES E/W
LATITUDE, DEGREES N/S
STATUS: V=BLINK, CYCLE or SNR WARNING
ADDRESS: TALKER IDENTIFIER & SENTENCE FORMATTER
RMA = RECOMMENDED MINIMUM SPECIFIC LORAN-C DATA


DEGREE E/W
MAGNETIC VARIATION
DATE:DDMMYY
TRACK MADE GOOD, DEGREES TRUE
SPEED OVER GROUND, KNOTS
$IIRMC,XXXXXX.XX,A,XXXX.XX,A,XXXXX.XX,A,X.X,X.X,XXXXXX,X.X,A[CR][LF]
LONGITUDE, E/W
LATITUDE, N/S
STATUS: V=NAV RECEIVER WARNING
UTC of POSITION FIX
ADDRESS: TALKER IDENTIFIER & SENTENCE FORMATTER
RMC = RECOMMENDED MINIMUM SPECIFIC GPS/TRANSIT DATA


$IIVTG,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


$IIWCV,XX.X,N,CCCC[CR][LF]
WAYPOINT IDENTIFIER
VELOCITY, KNOTS
ADDRESS: TALKER IDENTIFIER & SENTENCE FORMATTER
WCV = WAYPOINT CLOSURE VELOCITY

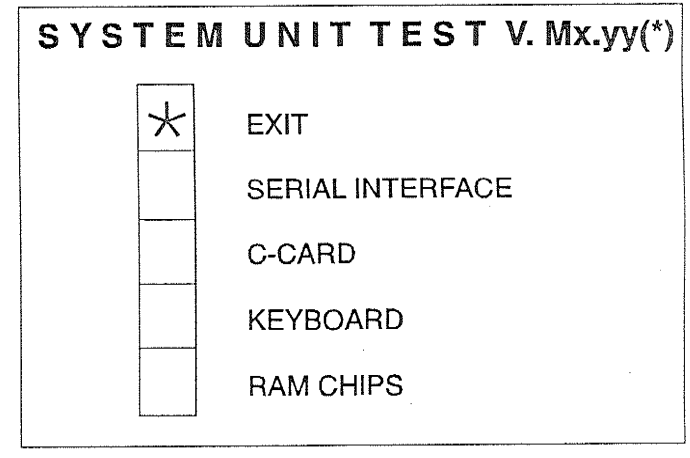

$IIXTE,A,A,X.XX,L,N[CR][LF]
UNITS (N. Mi.)
STEER LEFT or RIGHT (L=LEFT, R=RIGHT)
CROSS TRACK ERROR
CYCLE LOCK (A=VALID, V=INVALID)
OR'ed VALUE BLINK and SNR (A=VALID, V=INVALID)
ADDRESS: TALKER IDENTIFIER & SENTENCE FORMATTER
XTE = CROSS TRACK ERROR

Components of accepted sentences:

BWC	:	Bearing and Distance to selected Waypoint
GDP	:	Dead Reckoning Positions
GGA	:	Global positioning System fix data
GLL	:	Geographical Position, Latitude/Longitude
GLP	:	Loran-C Positions
GOP	:	OMEGA Positions
GXP	:	TRANSIT Positions
PKMAP	:	Property of King Marine
PKMLC	:	Property 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 and Ground Speed
XTE	:	Cross-Track Error, Measured

If you have connected your position-finding according to the instructions, and chosen the proper menu selection for your device, and are still having problems with your chart plotter, the extended auto-test should help determine the problem.

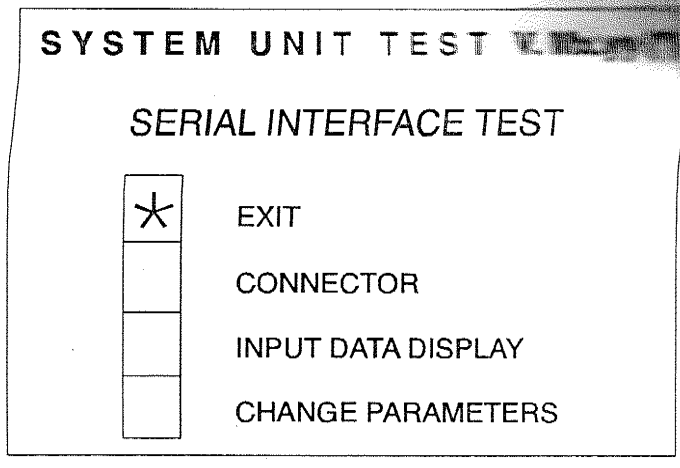
Make sure the chart plotter is turned off. While pressing and holding any other key, press the POWER key to turn the chart plotter on until you hear two beeps. A new menu will appear on the display:



Use the arrow keys to make your selection: as you position the cursor on the box of your choice, the chart plotter will select the item. Also you may use the ZOOM IN and ZOOM OUT keys to move the cursor up and down and the ENTER key to make the selection.

E.1) SERIAL INTERFACE TEST

If you are having problems receiving data from the position-finding instrument, the first test in the menu, the "Serial Interface Test", should help determine the problem. When you select this test a new menu will appear:

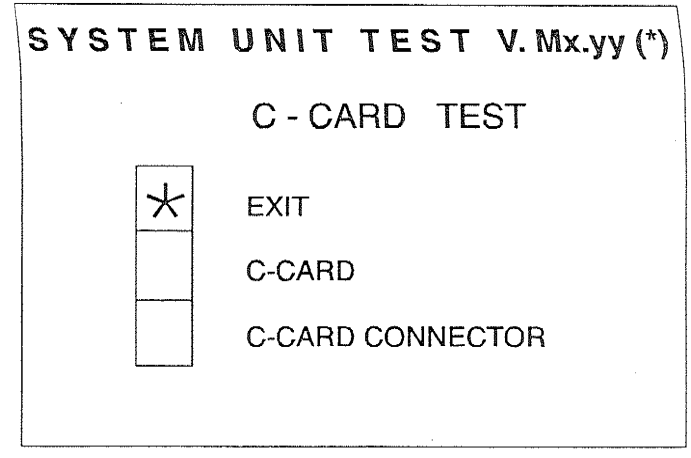


E.1.1) Connector Test
The first test in this new menu is the "Connector Test". This test will indicate if there is a malfunction in the transmitting or receiving circuitry. In order to run the "Connector Test", you need a special test output connector: contact your dealer with more information.

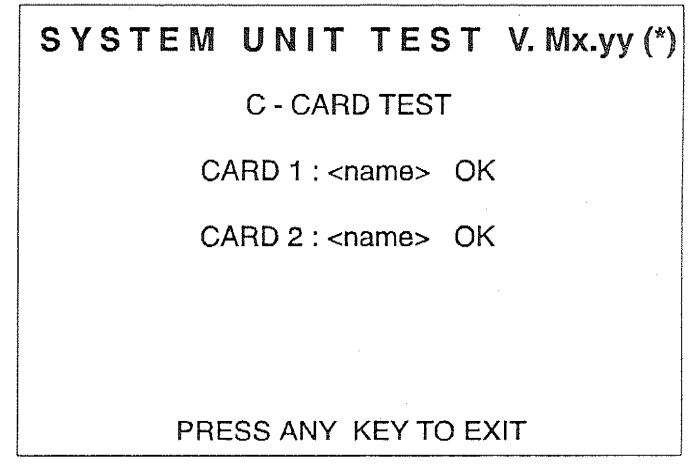
E.1.2) Input Data Display Test
The next test "Input Data Display" allows your chart plotter act as a computer terminal and display the incoming data exactly as it received.
If the data displayed on the screen is unrecognizable, you may have selected the wrong input parameters for your particular receiver, for example, NMEA-0182 instead of NMEA-0183. Check your receiver manual to be sure that you have selected the proper interface format. If the screen is blank, you may have a broken connection, and no data is being received.
Use the MENU key to stop (or continue after pause) data displaying, the ENTER key to show data in hex or ASCII mode (normal or small) and the CLEAR key to exit from "Input Data Display" page.

E.1.3) Change Parameter Test
You can check to make sure that the chart plotter is receiving properly, by exiting back to the "Serial Interface" Menu and selecting "Change Parameters", which allows you change the parameters of the serial interface. You will receive a new menu, which allows you to change the Baud Rate (300, 1200, 2400, 4800 or 9600), the Word Length (7, 8), Parity (EVEN, ODD or NONE), Signal Polarity (NORMAL, INVERSE) and Signal Source (UART0, UART1). Set the parameters to those that match the navigation receiver and return to the input "Data Display Test" to confirm that the data is correct. These settings are only used in the "Input Data Display Test", and are ignored by the chart plotter when in its normal operation mode. It may be necessary to experiment with the input parameters to determine exactly what format your receiver is providing.

...lows you to check the C-Card and its connector.
...this test, the following menu page appears on the screen:



E.2.1) C-Card Test
The first test in this new menu is the "C-Card Test". This test will indicate if there is a C-Card inserted or not in the slot and the integrity of the C-Card. When selecting this test the following page is shown on the screen:



There are four possible situations:

1. If there is a data cartridge inserted in the slot and there is not a malfunction, the name of the cartridge zone (<name>) and the message "OK" are shown.
2. If there is a data cartridge inserted in the slot, but it is a dameged cartridge, the name of the cartridge zone (<name>) and the message "ERROR 1" are shown.
3. If there is not any cartridge inserted in the slot, the message "ERROR 01" is shown.
4. If there is an user cartridge in the slot, the message "USER CARTRIDGE" is shown.

E.2.2) Connector Test

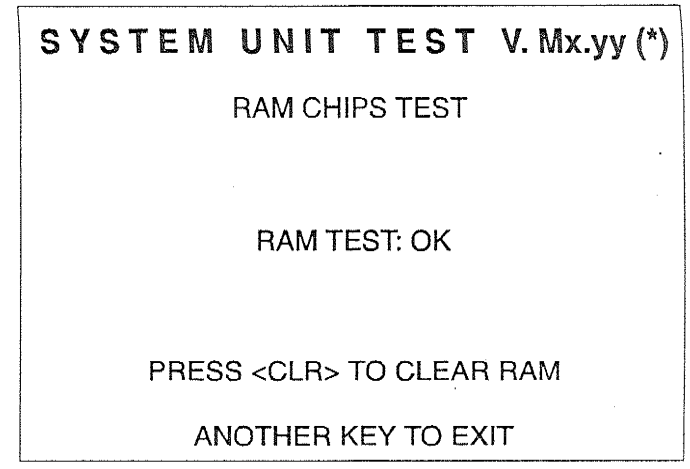
This test will indicate if there is a malfunction in the connector(s). It is used only in production.

E.3) KEYBOARD TEST

The "Keyboard Test" allows you check your keyboard for malfunctions. As you press the keys, an "X" will appear on the keyboard diagram and the chart plotter will beep. Contact your dealer if there seems to be a faulty keyboard. As soon as you position the cursor on the box with label "EXIT", the chart plotter returns to "System Unit Test" page.

E.4) RAM CHIP TEST

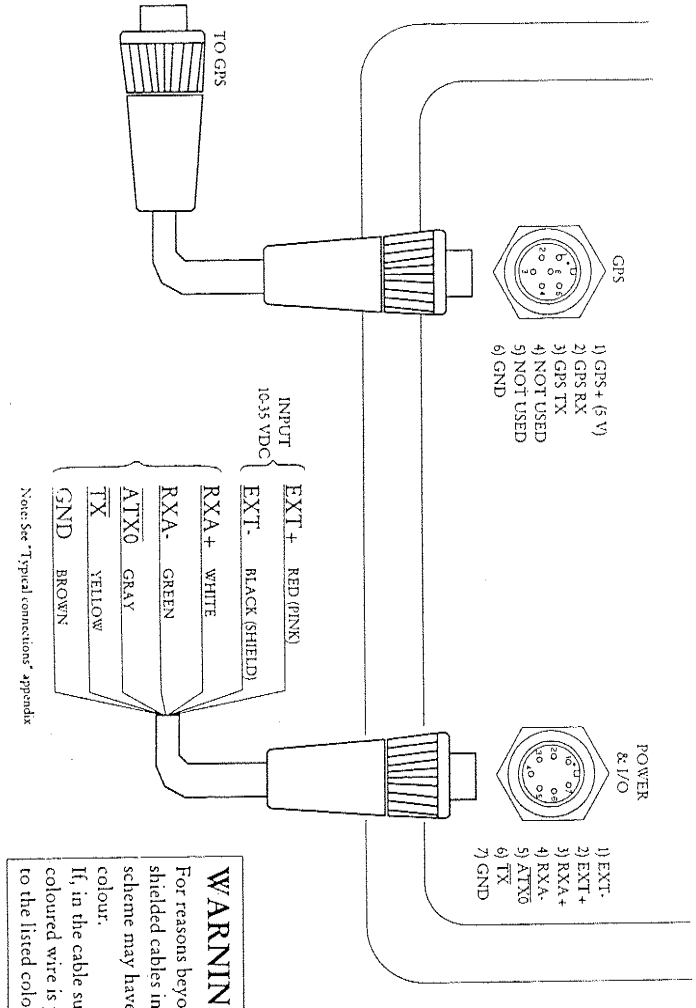
This test verifies the integrity of the memories and if desired during this test all the internal memory can be erased and the default setting restored.
If the chart plotter exhibits unusual behavior, or appears to be malfunctioning, it may be possible to correct the problem by clearing RAM.
This operation will erase all Marks, Events, Routes, stored track plots and destinations. It will also return all selections (Input Data Format, Autopilot selection, etc.) to original default values.
To clear system RAM, select the "RAM Chip Test" option from the "System Unit Test" menu. The chart plotter will run an automatic test; on the screen the following menu will appear:



When the automatic test is finished, press the CLEAR key to clear RAM. The chart plotter will ask you to confirm your decision to clear RAM by pressing the ENTER key. If at this time you do not wish to clear RAM, press any other key.

Note (*)

The number version displayed in the top right corner indicates the system program version.



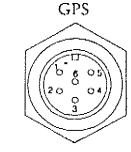
WARNING

For reasons beyond our control, the shielded cables indicated in this scheme may have different wires colour.
If, in the cable supplied, the pink coloured wire is present, please, refer to the listed colours in parenthesis.

Warning!!!

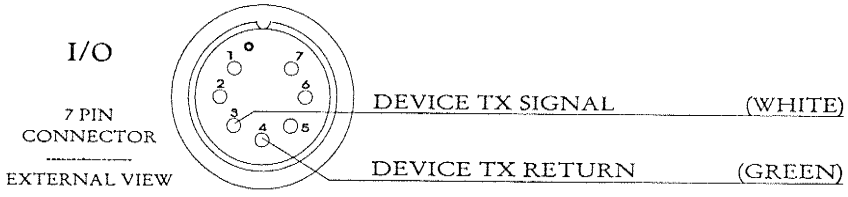
In this unit the "GPS Port" supplies (on Pin No. 1) a 5Vdc voltage for "GPS Sensor" power supply, using dedicated supplied cable.

If you use a "10-35V sensor", connect it to a proper power supply.



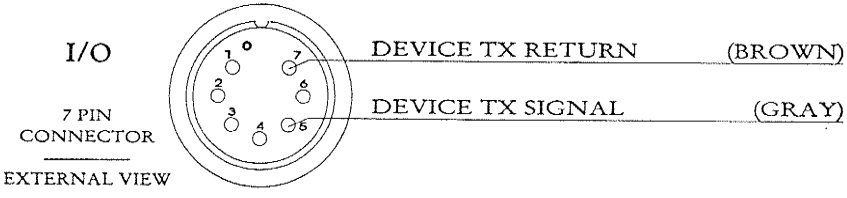
1) GPS+ (5 V)
2) GPS RX
3) GPS TX
4) NOT USED
5) NOT USED
6) GND

POSITIONING DEVICE

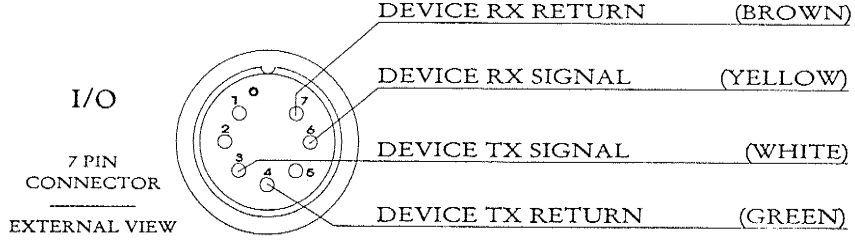


NOTE: POSITIONING DEVICE = GPS, LORAN, ECC.

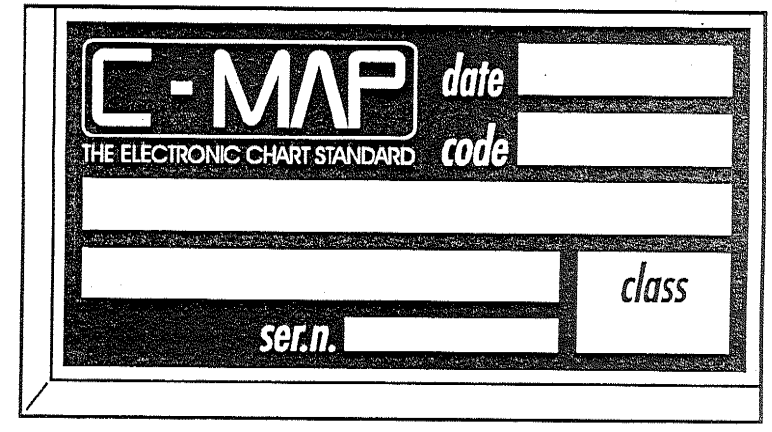
AUTOPILOT



BIDIRECTIONAL COMMUNICATION



NOTE:
Wire colors are referred to the supplied 7-wires cable.



Where:

date : appears on the cartridge and in the plot catalog. It identifies the release date of the cartridge.

code : indicates the geographic area and product code of the cartridge (see cartridge code details below).

class : identifies the quantity of cartographic data present in a cartridge. This varies according to the area covered by the charts and in particular on the complexity of the cartography itself. This size identifies the price class of the cartridge.

ser.n.: indicates the cartridge serial number.

C-MAP cartridges contain a number of charts and subcharts to cover a wide geographical area with a variety of scales (from 2 up to 90 charts, with an average of 40).
Coast lines, landmark names, lighthouses, depth lines, restrictions and other data normally available on nautical maps are all stored in the cartridge.
Chart selection is completely automatic and is performed by pointing the Cross-Hair and selecting the zoom level of the charts and subcharts.

C-CARDs are identified as follows:

XX-Yxxx.yy

Where: XX: identifies the geographical area;

Y : identifies the C-CARD generation (incremental letterinng indicates new data types, compression, etc... Current generation is "B" - as of October 1996);
xxx: identifies the specific product code;
yy : identifies the revision number (in case cartography is modified - for updates and/or corrections - and released).

For example, the chart with the code EM-A002.01 indicates:

EM: Mediterranean Europe;
A : First generation C-CARD.
002: Product code 2;
01 : First revision.

If you are in Split screen mode, reference to the official HO (Hydrographic Offices) chart code is always displayed in the data window just below the screen scale.

"See chart: AA2345" means refer to the British Admirality (AA) chart # 2345.

Examples of abbreviations you may find include:

AA	:	British Admiralty
ISTIDR	:	Istituto Idrografico Italiano
NOAA	:	National Oceanic Atmospheric Administration (USA)
SHF	:	Service Hidrographique Francaise
DMA	:	Defense Mapping Agency

Appendix I - GLOBAL POSITIONING SYSTEM

I.1) GLOBAL POSITIONING SYSTEM (GPS)

The Global Positioning System (GPS) is a space-based radio positioning system which provides suitably equipped users with accurate position, velocity and time data.
Originally the GPS was conceived for military purpouses, but now it is used in civilian applications as surveying, marine, aviation, ...

The GPS constellation consists of 24 orbiting satellites, four equally spaced around each of six different orbital plane. These satellites provide anywhere on earth, 24 hour a day, under all weather conditions, three dimensional (3D) coverage.
The GPS receiver can compute an accurate position calculating the distance to the GPS satellites that orbite the earth. This is called Satellites Ranging. So a 2D position calculation requires three Satellites Ranges, a 3D position calculation requires four Satellites Ranges.

I.2) DIFFERENTIAL GPS (DGPS)

Differential GPS (DGPS) is an accurate form of GPS navigation which may be used to correct certain errors in the GPS signals (errors in GPS measurements are due to the atmosphere, the ionosphere and the SA -*Selective Availability*) enabling a highly accurate position calculation.

DGPS uses pseudorange errors recorded at known location to improve the measurements made by other standard GPS receivers within the same general geographic area.

DGPS relies on error corrections transmitted from a GPS receiver placed at known location. This receiver, called reference station, measures ranges from all visible satellites to its surveyed position. The differences between the measured and estimated ranges are computed, comparated and transmitted via radio or other signals to differential equipped receivers in a local area. The DGPS receiver applies the corrections received to achieve accurate position and velocity measurements.

GLOSSARY

BEARING (BRG): *the horizontal direction of one terrestrial point from another, expressed as the angular distance from a reference direction, usually measured from 000° at the reference direction clockwise through 360°.*

CHARTING: *mode of operation in which all operation refer to the position of the Cross-Hair.*

COURSE OVER GROUND (COG): *iterm used to refer to the direction of the path over ground actually followed by a vessel.*

CROSS TRACK ERROR (XTE): *the distance from the vessel's present position to the closest point on a line between the origin and destination waypoints of the navigation leg being travelled.*

DEFAULT: *indicates a value when the user has not defined a particular value.*

DEPTH LINES: *lines that connect points at the same depth.*

DEVIATION: *the angle between the magnetic meridian and the axis of a compass card, expressed in degrees east or west to indicate direction in which the northern end of the compass card is offset from magnetic north.*

DIRECTORY: *list of file names on the user cartridge.*

EVENT: *user point refers to the ship's position.*

FILE: *collection of information (of the same type) stored on user cartridge.*

FORMATTING: *function to initializes user cartridge and prepares it for storing information. Remember that if an user cartridge is not blank, formatting it destroys any data already on the user cartridge.*

FULL SCREEN: *screen mode that displays maps at full screen.*

GEOMETRIC DILUITION OF PRECISION (GDOP): *a value representing all geometric factors that degrade the accuracy of a position fix which has been derived from a navigation system.*

GPS: *Global Positioning System.*

HEADING: *the horizontal direction in which a ship actually points or heads at any istant, expressed in angular units from a reference direction, usually from 000° at the reference direction clockwise through 360°.*

HORIZONTAL DILUTION OF PRECISION (HDOP): *similar to GDOP, expect elevetion factors are ignored.*

MAGNETIC BEARING: *bearing relative to magnetic north; compass bearing corrected for devia-*

MAGNETIC HEADING: *heading relative to magnetic north.*

MARK: *user point refers to the Cross-Hair position.*

NAVIGATION: *mode of operation in which all operation refer to the ship's position.*

PAN: *function that automatically shifts screen to desired Cross-Hair position (if in Charting Mode) or ship's position location (if in navigation Mode).*

ROUTE: *sequence of waypoints connected by segments.*

SIGNAL TO NOISE RATIO (SNR): *the ratio of the magnitude of a signal to that of the noise (interference).*

SPEED OVER GROUND (SOG): *the speed of a vessel along the actual path of travel over the ground.*

TARGET: *special Mark point that indicates the position to the ship goes.*

TRACKING: *past course represented by a line that connects the stored positions.*

TRUE BEARING: *bearing relative to true north; compass bearing corrected for compass error.*

TRUE HEADING: *heading relative to true north*

USER CARTRIDGE: *convenient medium for storing and retriving your information.*

USER POINT: *point placed permanently on the chart with a graphic symbol (Mark, Event, Waypoint).*

UNIVERSAL TIME COORDINATED (UTC): *a time scale based on the rotation of the earth which is disseminated by most broadcast time services.*

VARIATION: *the angle between the magnetic and geographic meridians at any place, expressed in degrees and minutes east or west to indicate the direction of magnetic north from true north.*

WAYPOINT: *any point on earth to which one intends to navigate at some time.*

ANALITYCAL INDEX

A

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