M A N U A L

SIMRAD CA42/50/52
ChartRadar with Echosounder

183-0500-202 English

02244.30

Note!
Insert or remove C-MAP cartridges ONLY through CHART menu or when unit is off.
All electronic navigation equipment is subject to external factors beyond the control of the
manufacturer. Therefore such equipment must be regarded as an aid to navigation. The
prudent navigator will, for that reason, never rely on a single source for position fixing and
navigation.

1830500202

MOB 'MAN OVERBOARD' function

MOB In case someone falls overboard, press the [MOB] key and hold for two seconds, or activate an external MOB switch – hold for five seconds.

CLR Press [CLR] to confirm and reset the alarm if activated by mistake.

ENT Pressing [ENT] will provide all relevant data for an efficient rescue operation.

Display 3	**Display 1**
	Display 2
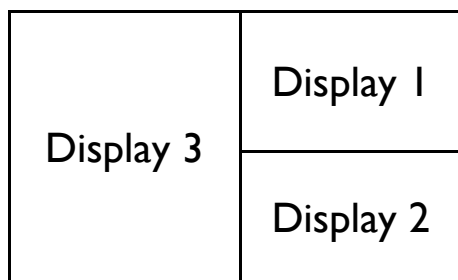
Screen layout default after activating MOB.

Display 1: The MOB display will provide the position where the man fell overboard, together with present course (C), bearing (B), and distance (DIST) to the MOB position.
Elapsed time - first in seconds and then in minutes. If "*" is shown instead of number of minutes, means that the elapsed time has exceeded 9999 minutes.

Display 2: Data display will provide information of: Date, time and position of MOB incident.

Display 3: The CHART display will provide a graphical impression of the MOB position – a man waving his arms in relation to the ship.

To turn MOB navigation off (two ways):
Either press [GOTO], [3] or... press [MENU], [4], [2].

To recall last MOB position, see section 9.2.

1.1 Introduction and system familiarization

Congratulations on your purchase of **SIMRAD CA42/50/52 DGPS ChartRadar with Echosounder** - a combination of the latest GPS receiver technology with built-in differential receiver for accurate positioning and prepared for SDGPS, plus: detailed cartography and high performance radar and echosounder technology; all in a unique slim-line design with a 10" ATFT (CA42), 14" TFT (CA50), or 15" TFT (CA52) large LCD display in color.

The CA42/50/52 chart system includes a built-in world chart for rough planning and overview. The choice of chart system best suitable for the CA42/50/52 was carefully singled out to be the **C-MAP NT+ mini cards.** The optional C-MAP cards are available world-wide at your local Simrad dealer.

The echosounder system with selectable frequencies will provide an impression of Bottom expansion, VRM expansion, A-scope and white line.

The radar system with dual EBL and VRM markers, direct Quick-range keys, off-center mode, etc. together with Dual radar feature … two radar displays in one screen, one for short range and one for long distance observations.

The Global Positioning System is at this time and age the most common system used for navigation and positioning all over the world. Not only for maritime use, but also for land-based applications and aviation. The satellite-based system has been developed and is operated by the US Department of Defense in order to provide an accurate and reliable service, which include a 24-hour global coverage. The GPS system consists of approx. 24 satellites which orbit around the Earth at an altitude of approx. 20,200 km. The satellites transmit perfectly synchronized data. However, depending on the position, the signals will reach the receiver at a slightly different time. By adding the measured time difference to the known position of the satellites it is possible to calculate the ship's position to within a few meters.

DS42/50/52 Dual Station for the CA42/50/52 is available in 10" ATFT color, 14" TFT color and 15" TFT color.

How to use this manual? The manual is written for the products: CA42, CA50 and CA52, which all share the same type of software. From hereon, these models are referred to as: **CAXX**.
It is a good idea if you make yourself familiar with the key functions, menu structure and rotation of pages (screens) described in chapter 2 before you start out, and then proceed with section 2.7 Initial start-up. For quick location of a certain term, please check the "Glossary of terms" and the "Index" at the back of the manual.
How to interpret special marked key symbols, etc. in the manual:

+/-   Either the + (plus) or – (minus) key may be applied.

0-9   Alpha-numeric keys for insertion of figures.

A-Z   Alpha-numeric keys for insertion of letters.

☞   Emphasizes important points.

I,3   Indicates that you should press the keys **[I]** and **[3]** to obtain what is written in *italic* next to the keys.

1.2 Safety summary

Precaution The operating unit should not be exposed to direct sunlight, as "boiling" the display may cause too high temperatures internally and subsequently damage parts of the unit beyond repair.

Power source, fuse and power cable Check that the DC power supplied to the unit is within the range of 10 to 32 volts. Note that the appropriate fuse must be employed (F6.3A). Ensure that the power cord is firmly attached.

Grounding To reduce electrical interference and risk of electrical shock, properly ground the unit to the ship's ground using the ground screw on the back of the unit. Good grounding should also be exercised for connected equipment, refer to separate Installation manual.

2.1 Fundamentals of the PAGE and WINdow system

The CAXX DGPS ChartRadar with Echosounder has a multi-function screen data presentation system. You can choose to have a full screen, or a screen divided into e.g. a chart display and two data/chart displays, etc.

The current active display is indicated by a highlighted frame around the active window. There are five screen combinations to choose from:
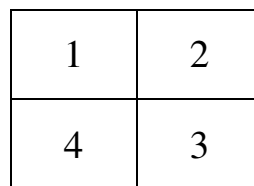
1. Full (1/1) screen.   2. Four ¼ displays.   3. Two ½ displays.
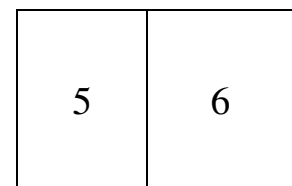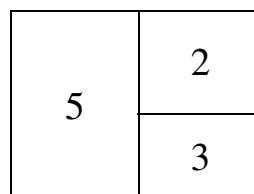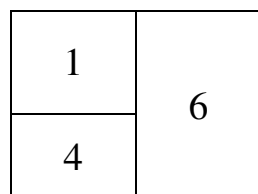
4. & 5. Combination displays of one ½ and two ¼ displays shown together in the same screen.

☞ Not all displays are available in any size windows.

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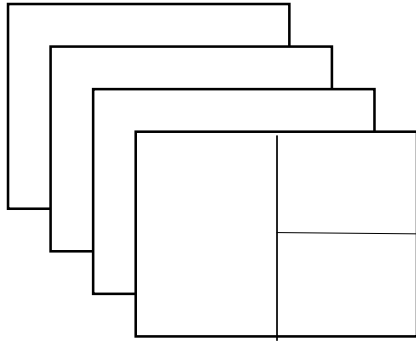
As many as 4 screen combinations or full screens can be saved in 4 pages (layers).

Press the [PAGE] key to toggle between the 4 pages, or hold the [PAGE] key depressed for two seconds to start a rotation of the 4 pages. Press [PAGE] again to return to manual operation.

To mix and match the various chart and data displays you wish to have in the PAGE and WINdows presentation, you will first need to know what is pre-set from the factory:

`PAGE` *Scroll through the four pre-set pages* to see if you wish to exchange any of the displays with a different one.

Example of how to edit a pre-set page:

We pretend that in this page, window 2 contains the navigation display (highway), window 3 a chart display in a large scale for overview, and window 5 a chart display in a smaller scale to enlarge a certain area.

You now wish to insert the Position display in window 3 instead of the chart display. This is the procedure:

`WIN` *Press the* [WIN] *key until the frame around window 3 is highlighted*

`MENU` *Call up the menu bar, and…*
`2,1` *then call up the POS menu and select "Position"*
- you will now have the Position display in window 3 instead of the chart display.

Example of how to edit a full screen to four ¼ displays:
We pretend that you are looking at a full screen which you wish to divide into four ¼ displays. This is the procedure:

`MENU` *First call up the menu bar, and…*
`2` *then call up the POS menu* - see example next page.

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POSITION	WIN	�(grey box)

                    2
                    POS

   I Position
   2 Dual speed
   3 Speed, course & depth
         etc.

What you do now will determine which WINdow the display you are about to select will appear in.

Press the [WIN] key repeatedly to scroll through the window system.

WIN   *Press the* [WIN] *key once to select WINdow 1*
-which is the left top quarter of the screen.

I   *Select the Position display*
- you will now have the position display presented in window 1.
The rest of the windows in this page i.e. window 2, 3 and 4 will contain the displays which were pre-set from the factory. They can all be exchanged with new displays at your choice.

☞ However, the same display can not appear twice on the same page, so in case you are trying to select the same display in a second window, this is what will happen:

As per above example, you have selected the Position display in window 1, but it may just happen that the Position display was pre-set to window 2 – therefore window 2 will now show the legend: " Select display via MENU."

You may select the same display to appear on different pages, but not on the same page.

☞ An exception is the radar display, which only can appear in ½ window or full screen, and you can only have the radar display appear in one page at a time. You can not toggle from page to page and see different radar displays.

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2.2 Key functions

A description of the key functions is available at the start-up display in the Quick guide. Some of the key functions are general and can be applied at any time, other key functions are related to a certain menu(s) and can only be applied when in the appropriate menu.

WIN   Toggles between windows. The active window will have a highlighted frame. Only activated windows are operable.

PAGE   Toggles between four pre-selected pages (screens). Hold two seconds for automatic rotation of pre-selected pages. A new, single press on [PAGE] will return to normal operation.

MENU   Turns the menu bar on/off. Exits any data display without taking any action (except the radar function).

ENT   Opens for/confirms insertion and editing of data (except the radar function). Calls up information on marks, waypoints, etc. on chart together with several INFO windows from a chart display. Gives access to setup displays. Exits radar control and setup menus.

●   Moves cursor in data displays and charts + activates cursor on chart. Moves left and right in the menu bar. Moves VRM up/down in echo display.

MOB   Hold two seconds to activate the MOB – "Man overboard" function, which starts a track and provides guidance back to the MOB position.

ZOOM + IN / **ZOOM - OUT**   Zooms in for greater chart details (smaller scale) / zooms out for better overview (larger scale). Increases/decreases range in radar function. + and – toggles between available values.

GAIN+ / **GAIN-**   GAIN+ (plus) and GAIN- (minus) will adjust presentation of received echoes and radar targets.

ECHO A-SCP   Hotkey to Echo 1 i.e. jumps to window on the screen with Echo 1 display; if none: inserts Echo 1 in active window. Toggles A-SCOPE on/off.

RADAR TX Hotkey to radar display. Hold two seconds to start transmission, go in Standby or Power off.

CHART GOTO Hotkey to Chart 1 i.e. jumps to window on the screen with Chart 1 display; if none: inserts Chart 1 in active window.
Activates INFO window with choice of navigation modes.

PLOT Plots down the actual ship/cursor position on chart. Activates INFO window with the possibility of plotting a waypoint, route, line, etc.

ADJ Activates radar control menu + toggles between 1st and 2nd half of the control menu in half screen displays.

0-9 A-Z The alpha-numeric keys inserts and selects data in data displays.
Keys 1-9 are also Quick scales – selects fixed scales for charts or fixed ranges for radar. The 0 key will center the cursor/ship on the chart and activate/deactivate 'off-center to cursor' on the radar display.

CLR Turns cursor off in chart display. Deletes data in enter or edit mode. From radar control menu: Returns Tune, Gain or Sea to AUTOmatic mode, and clears the EBL and VRM markers.

PWR☀ Calls up a window where you can adjust the lighting in the screen, background light in keypad, and select Daylight displays, Night display or custom made display. Hold two seconds to turn the power off.

2.3 Menu bar

MENU   *Toggles the menu bar on/off*

To fit in the complete menu bar across the screen, some of the menus have been abbreviated. However, the last selected menu will be highlighted, and if it's an abbreviation of the menu, then the complete menu title is written above the menu bar e.g.:

```
NAVIGATION                                              WIN  ■
  1        2         3         4        5        6       7       8
CHART    POS      WP/RTE     NAV     ECHO    RADAR    MISC    SETUP
                            1  Highway
                            2  Waypoint navigation,  etc.
```

Having selected e.g. 4:NAVIGATION from the menu bar, its associated menus will drop down. Key in the number next to the function you wish to call forward, or use the cursor key to highlight the function and press [ENT].

If you want to switch to a different menu, use the cursor key to move to the adjacent menu.

Most functions in the menus are general, and can be called forward at any time, but a few are related to a certain menu(s) and can only be called forward or activated in the appropriate menu. Inactive functions in the menu will have a different color from the rest of the functions. Which window is active (see top line of the menu to the right) can also have something to do with what functions are available. Use the [WIN] key to toggle between active windows and keep an eye on the functions in the menu to see how they may change color.

The menu bar will disappear from the screen at the selection of a function, or by pressing the [MENU] key. Besides, if not used, it automatically turns off after 30 seconds.

2.4 Menu layout

1 CHART	**2** POS	**3** WP/RTE
1 Chart 1 1:26400000	**1** Position	**1** WP list
2 Chart 2 1:6600000	**2** Dual speed	**2** Routes
3 C-MAP cartridges	**3** Speed, course & depth	**3** Route calculation
	4 Speed diagram	**4** Lines
	5 Satellites	**5** Start track
	6 DGPS	**6** Stop track
	7 SDGPS	**7** Tracks
		8 Targets

4 NAV (OFF)	**5** ECHO	**6** RADAR
1 Highway	**1** Echo 50kHz	**1** Radar
2 Waypoint navigation	**2** Echo 200kHz	**2** Dual radar
3 Route navigation	**3** Bottom expansion 50kHz	**3** Radar setup
4 Track navigation	**4** Bottom expansion 200kHz	
5 Anchor guard	**5** VRM expansion 50kHz	
6 Trim & highway	**6** VRM expansion 200kHz	
7 Set & drift	**7** Depth & temperature diagram	
	8 Echosounder setup	

4 NAV (ON)
1 Highway
2 Turn NAV off
3 WP advance
4 Restart to approaching point
5 ETA & AVN
6 Trim & highway
7 Set & drift

The NAV menu is dynamic and will adapt to the function which is currently active.

← When this menu appears, then one of the Navigation modes is active.

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```
        ┌──────────────────┐
        │       ▇7▇        │
        │       MISC       │
        ├──────────────────┤
        │  ▇1▇  Wind        │
        │  ▇2▇  MOB position │
        │  ▇3▇  DSC alarm   │
        │  ▇4▇  Data transfer│
        └──────────────────┘
```

```
        ┌──────────────────────────────┐
        │            ▇8▇               │
        │           SETUP              │
        ├──────────────────────────────┤
        │ ▇1▇ Speed alarm, units & language│
        │ ▇2▇ NMEA interface           │
        │ ▇3▇ Alarm/log output         │
        │ ▇4▇ Decca lanes              │
        │ ▇5▇ Loran-C                  │
        │ ▇6▇ Display color            │
        │ ▇7▇ Factory settings         │
        └──────────────────────────────┘
```

When selecting a sub-menu in the SETUP menu, the display will always appear in a pop-up window. Which means that it will not take the place of another display, and it will not mess up the pre-set displays on the screen.

And once you have confirmed the changes, or just want to exit the display, the display will disappear from the screen, as you have no further use for it.

2.5 Choice of symbols

Waypoints and other points appearing on the screen can be marked by one of 18 symbols + 8 EVENT marks in small or large symbols.

✕	Waypoint	✝	Beacon	⊙	Marker	▲	Starboard
	Red buoy		Fish		North	■	Port
	Green buoy	⊡	Platform		South		MOB
	Wreck	✳	Rock awash		East	◆	EVENT 4
✚	Danger	⚓	Harbour		West		(1 of 8 types in diamond shape)

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2.6 Naming of routes, points, etc.

First select the key with the desired letter, then you can either repeat the keystrokes, which will toggle between e.g. A,B,C,1, or once you have selected one letter you can go back and forth in the alphabet by means of the +/- keys. Use the cursor key to go to next space or to go back one space if you make a mistake.

Depending on the selected language the 0 (zero) key will hold special characters e.g. Æ Ø Å Ä Ö Ü Ñ, and the 9 (nine) key will hold: (empty space) . -

Press the [CLR] key to delete everything from cursor position and to the right of cursor on that row.

2.7 Initial start-up of the CA42/52 MKII unit

PWR☀   *To turn on the power, press and hold the* [PWR] *key till a picture appears on the screen*

PAGE   *Press* [PAGE] *to scroll through a quick guide which informs of the use of the keys and where you can enter owner's setup*

ENT   *Press* [ENT] *when ready to assume normal operation*

PWR☀   *Press* [PWR] *again to adjust the lighting in the screen and select day or night display, etc., move around in display by means of the cursor key and change settings with +/- keys, and…*

ENT   *Confirm with* [ENT]

The unit will now perform a fully automatic start-up and find the correct position without further data entries. The start-up phase is completed when a position appears in the position display – see section 4.1.

The radar function should not start transmission before the antenna is properly warmed up - refer to section 8.2.3 Start transmission.

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The echosounder function has a demo program, which can be activated in the Echosounder setup display, refer to section 7.8.
☞ When a transducer has been installed and selected, and the Echosounder function is set up and ready to perform, please make sure that the demo mode is switched OFF.

Select display language:

MENU   *Call up the menu bar, and…*
8,1   *press* [8] *and* [1] *to call up the language display*

⬤   *Go to the bottom line in the display*

+/-   *Select language*

ENT   *Confirm entry*

2.8 Turn power off

PWR☀   *Call up INFO window, and…*

PWR☀   *Press and hold until screen turns black*

The CAXX is now turned off. All data and setups are saved and stored in the internal memory and, of course, will be available next time the unit is turned on.

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3.1 Chart menu

┃
CHART
1 Chart 1 1:26400000
2 Chart 2 1:6600000
3 C-MAP cartridges

- see section 3.1.1.
- see section 3.1.1.
- see section 3.2.

☞ For safety reasons, navigation with electronic charts should always be combined with authorized paper charts.

3.1.1 Charts

It is possible to have two charts in different scales on the screen at the same time. Each chart can be operated individually, and each will have it's own cursor and individual chart setup.

MENU   *Call up the menu bar, and…*
WIN   *select the WINdow in which the large-scale chart should appear, and…*
1,1   *press* [1] *and* [1] *to call up Chart 1in scale 1:26400000*

MENU   *Call up the menu bar, and…*
WIN   *select the WINdow in which the detailed chart should appear, and…*
1,2   *press* [1] *and* [2] *to call up Chart 2 in scale 1:6600000*

The chart display opens for the built-in world chart, as well as the optional, detailed C-MAP electronic charts (C-MAP cart must be inserted in the drawers below the CA42/50/52 MKII's keypad).

☞ Shortcut feature:
CHART GOTO   Hotkey to Chart 1 i.e. jumps to window on the screen with Chart 1 display; if none: inserts Chart 1 in active window.

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Chart range indicator (5.1 nm) can be set ON/OFF in "Chart setup".
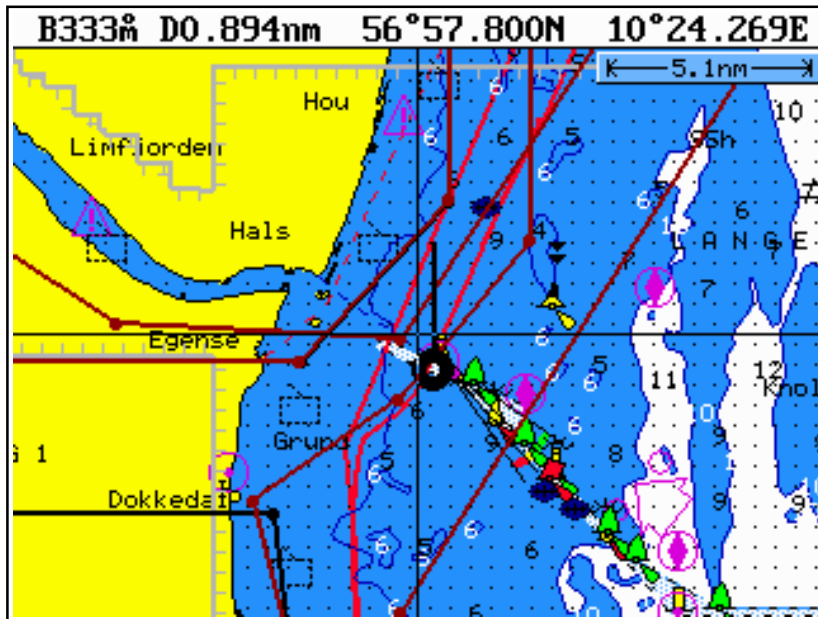
The top line of the chart display (with cursor off) will give you ship's position, speed, course and status of differential data – refer to section 4.1 Status indicator and accuracy.

With cursor on, the top line will show the cursor position in lat/long, bearing and distance from actual position to cursor position.

The ship symbol indicates the present position on the chart and the pointer informs of the actual true course (course over ground). There is a built-in autohome function which automatically moves the chart to maintain the ship symbol in the display (with cursor off).

☞ Press **[ENT]**, **[0]** to center the ship on the chart.

Cursor function

With chart display active, press the cursor key to activate the cursor and…

CLR   Press **[CLR]** to turn the cursor off.

☞ The chart cursor will automatically switch off if not used in the last five minutes. The chart will update and bring the ship's position to the center of the screen.

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● Use the cursor key to move cursor in any direction on the screen – the chart will automatically adjust when cursor reaches the edge of the screen.

☞ Press [0] to center the cursor on the chart.

☞ In data displays the cursor will be shown in form of either a ruling box around the active field, or the active field will be highlighted.

Zoom function – with *cursor on*, the zoom function will zoom around the cursor. With *cursor off*, the zoom function will zoom around the ship´s position.

ZOOM
+ IN   *Zoom in for details (smaller scale)*

ZOOM
- OUT   *Zoom out for overview (greater scale)*

1-9   ☞ Use one of the shortcut keys to quickly change the chart scale:

Press [1] = 1:6.600.000,   [2] = 1:2.000.000,   [3] = 1:600.000,
      [4] = 1:200.000,   [5] = 1:60.000,   [6] = 1:20.000,
      [7] = 1:6.000,   [8] = 1:2.000,   [9] = 1:600

Chart details may not be available in all scales in all areas. Non-covered areas will be marked as hatched or all blue with coordinate grid (with grid set to AUTO in chart setup), depending on the actual scale. See section 3.4 Chart setup for more details on what you might want to see in the chart and not see.

The **built-in world chart** can be zoomed up/down in six steps from a scale of approx. 1:33,000,000 to 1:2,000,000.

An **over-zoom function** enables you to zoom beyond the chart, which automatically is switched off and replaced by a lat/long coordinate grid. In this mode the scale can go down to 1:600.

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3.2 C-MAP cartridges

On the front of the CAXX below the keypad are two small watertight drawers wherein you place the C-MAP cartridge(s) you wish to load.

☞ Do not attempt to insert or remove cartridges unless the CAXX is turned off, or chart reading is in stand-by (see below):

`MENU` *Call up the menu bar, and…*
`1,3` *load the pop-up window for C-MAP cartridge(s)*

Example:

```
C-MAP   cartridges


UPPER
  Name: P&T: MELBOURNE BEACH TO LAKE WORTH INL
  Code: NA-B502.02
  Date: 13/11/1998

LOWER
  Name: DENMARK NORTH COAST & LIMFJORDEN
  Code: EN-B102.03
  Date: 01/03/1999


 MENU   Exit                              Test   ENT
```

Chart reading is now in stand-by, and you may insert/ remove cartridges.

To open the drawer below the keypad, press the eject key next to the drawer. Place the cartridge in the tray with the terminals pointing towards the unit, and push the drawer back in place – it has to make a "click" sound to be closed tight and remain watertight.

`ENT` *Press* [ENT] *to test the data on the C-MAP cartridge which you have just placed in one of the drawers*

The CAXX will now test the data on the cartridge(s) to see if its valid and free from faults.

☞ If a cartridge is defect, it must be removed before you can exit the display.

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MENU   *Return to chart display*

In addition to the larger boundaries of the world chart there will be
separate boundary lines for the individual charts stored on the same
cartridge. However, the boundary lines for the C-MAP chart areas can
be turned off, so they will not be visible on the chart – refer to Chart
setup.
Other chart areas can quickly be reached by means of the zoom keys:

ZOOM - OUT   *Zoom out until desired area becomes visible*

●   *Move cursor to approximate area, and…*

ZOOM + IN   *Zoom in*

The chart will automatically start to move when cursor reaches the
edge of the screen. When cursor is switched off [CLR], the chart will
return to ship's position.

☞ See also section 3.4 Chart setup.

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3.3 INFO windows

A number of pop-up INFO windows are available mainly from active chart display. Only a few of the functions in the INFO windows can be accessed from data displays and other displays. Refer to sections 3.3.x.

3.3.1 Cursor inactive

ENT   With chart in active window, and with cursor off, press [ENT] to *call up an info window* with the following to choose from:

`Scale: 1:6600000`	-Actual chart scale.
`No user data` `at ship's position`	
1 `Edit user data`	-Inactive function.
2 `Chart info`	-Refer to Appendix C.
3 `Find nearest port services`	-Refer to Appendix C.
4 `Bearing & dist. from A to B`	-Inactive function.
5 `Lock cursors`	-Inactive function.
9 `Chart setup`	-Refer to section 3.4.
0 `Ship to center`	
GOTO `Select NAV mode`	
PLOT `Plot new data`	
PAGE `More user data`	
MENU `Exit`	-Exit info window.

0   *Ship to center* will adjust the chart to place the ship's position in the center of the chart display.

GOTO   *Select NAV mode* will activate Navigation mode.

PLOT   *Plot new data* will give you the choice of entering the ship's position as Eventmark, waypoint or target.

PAGE   *More user data* will toggle between available data on the ship's position.

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3.3.2 Cursor active but not placed on any object or data

| ENT | With chart in active window, and cursor not placed on any object or user data, press [ENT] to *call up an info window* with the following to choose from: |

Scale: 1:6600000	-Actual chart scale.
No user data at cursor position	
1 Edit user data	-Inactive function.
2 Chart info	-Refer to Appendix C.
3 Find nearest port services	-Refer to Appendix C.
4 Bearing & dist. from A to B	
5 Lock cursors	
9 Chart setup	-Refer to section 3.4.
0 Cursor to center	
GOTO Select NAV mode	-Refer to section 3.3.8.
PLOT Plot new data	-Refer to section 3.3.9.
PAGE More user data	-Inactive function.
MENU Exit	-Exit info window.

4   *Bearing & dist. from A to B* will quickly provide the bearing and distance from your current cursor position (A) to an arbitrary point (B). Move cursor to point B and see the calculation in the small info window. Press [MENU] to exit the function.

5   *Lock cursors* will lock the cursors in two chart displays on the same screen and thus make the cursor movements synchronized. To return to individual cursor control in each chart display, press [ENT] and [5] to "Release cursors" again.
☞ See also "Lock cursors" in Appendix A.

0   *Cursor to center* will adjust the chart to place the cursor position in the center of the chart display.

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3.3.3 Cursor placed on waypoint

ENT   With chart in active window, and cursor placed on a waypoint, press [ENT] to *call up an info window* with the following to choose from:

WP found	
Name: WP 1 LAT 51°49.107N LON 5°16.007W	-Example.
1 Edit user data	
2 Chart info	-Refer to Appendix C.
3 Find nearest port services	-Refer to Appendix C.
4 Bearing & dist. from A to B	-Refer to section 3.3.2.
5 Lock cursors	-Refer to section 3.3.2.
9 Chart setup	-Refer to section 3.4.
0 Cursor to center	-Refer to section 3.3.2.
GOTO Select NAV mode	-Refer to section 3.3.8.
PLOT Plot new data	-Refer to section 3.3.9.
PAGE More user data	
MENU Exit	-Exit info window.

1   *Edit user data*   opens for a new info window:

Waypoint	
1 Edit	Change the name, symbol, color, etc.
2 Move	Move waypoint with cursor, and press [ENT].
CLR Delete	Delete waypoint ? "YES" / "NO".
MENU Exit	Exit info window.

PAGE   *More user data* will be available if more than one point is plotted on the same position, where the [PAGE] key then will toggle between data for each point.

3.3.4 Cursor placed on route leg or line section

ENT   With chart in active display and cursor placed on a route leg or line leg, press [ENT] to *call up an info window* with the following to choose from:

```
┌────────────────────────────────────┐
│ Route leg found                    │
├────────────────────────────────────┤
│ Name:   RTE 1                      │
│ Leg:    B336°      77.16nm         │
│ Total:   4 legs     215.6nm        │
├──────┬─────────────────────────────┤
│  1   │ Edit user data             │
│  2   │ Chart info                 │
│  3   │ Find nearest port services │
│  4   │ Bearing & dist. from A to B│
│  5   │ Lock cursors               │
│  9   │ Chart setup                │
│  0   │ Cursor to center           │
│ GOTO │ Select NAV mode            │
│ PLOT │ Plot new data              │
│ PAGE │ More user data             │
│ MENU │ Exit                       │
└──────┴─────────────────────────────┘
```

-Example.

-Refer to Appendix C.
-Refer to Appendix C.
-Refer to section 3.3.2.
-Refer to section 3.3.2.
-Refer to section 3.4.
-Refer to section 3.3.2.
-Refer to section 3.3.8.
-Refer to section 3.3.9.
-Inactive function.
-Exit info window.

1   *Edit user data*   opens for a new info window:

```
┌──────┬─────────────────┐
│      │  Route leg      │
├──────┼─────────────────┤
│  1   │ Edit leg        │
│  2   │ Insert point    │
│  3   │ Edit            │
│ CLR  │ Delete          │
│ MENU │ Exit            │
└──────┴─────────────────┘
```

New info window to edit route leg.
Move cursor and press **[ENT]** to insert point.
New info window to edit route.
Delete whole route ? "YES" / "NO".
Exit info window.

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3.3.5 Cursor placed on routepoint or linepoint

ENT With chart in active display and cursor placed on a routepoint or linepoint, press [ENT] to *call up an info window* with the following to choose from:

Routepoint found: 2	
Name: RTE 1 From start: To end:	-Example.
l Edit user data	
2 Chart info	-Refer to Appendix C.
3 Find nearest port services	-Refer to Appendix C.
4 Bearing & dist. from A to B	-Refer to section 3.3.2.
5 Lock cursors	-Refer to section 3.3.2.
9 Chart setup	-Refer to section 3.4.
0 Cursor to center	-Refer to section 3.3.2.
GOTO Select NAV mode	-Refer to section 3.3.8.
PLOT Plot new data	-Refer to section 3.3.9.
PAGE More user data	
MENU Exit	-Exit info window.

l *Edit user data* opens for a new info window:

Routepoint	
l Edit point	New info window to edit routepoint's position.
2 Move point	Move cursor and press [ENT] to move point.
CLR Delete point	Delete routepoint ? "YES" / "NO".
3 Add point	Only from first or last point in route.
4 Edit	New info window to edit route.
5 Delete	Delete whole route ? "YES" / "NO".
MENU Exit	Exit info window.

PAGE *More user data* will toggle between data on routepoint and route leg.

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3.3.6 Cursor placed on trackpoint

Trackpoints are not as easily recognized as Routepoints, you may have to move the cursor along on the track to locate a trackpoint.

ENT   With chart in active display and cursor placed on a trackpoint, press [ENT] to *call up an info window* with the following to choose from:

Trackpoint found:	3	
Name: TRACK 1 Total: 836 points – 83.6nm		-Example.
1	Edit user data	
2	Chart info	-Refer to Appendix C.
3	Find nearest port services	-Refer to Appendix C.
4	Bearing & dist. from A to B	-Refer to section 3.3.2.
5	Lock cursors	-Refer to section 3.3.2.
9	Chart setup	-Refer to section 3.4.
0	Cursor to center	-Refer to section 3.3.2.
GOTO	Select NAV mode	-Refer to section 3.3.8.
PLOT	Plot new data	-Refer to section 3.3.9.
PAGE	More user data	
MENU	Exit	-Exit info window.

1   *Edit user data*   opens for a new info window:

	Trackpoint	
CLR	Delete point	Delete trackpoint ? "YES" / "NO"
1	Delete points from A to B	*) see below.
2	Edit	New info window to edit track.
3	Delete	Delete whole track ? "YES"/"NO"
MENU	Exit	Exit info window.

*) Move cursor to point B and press [ENT] to delete all trackpoints between cursor position on chart and point B.

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PAGE   *More user data* if cursor is placed on a MOB track you can toggle
between data on MOB symbol and data on MOB track.
☞ The symbol and track are edited separately.

3.3.7 Cursor placed on target

ENT   With chart in active display and cursor placed on a marked target, press
[ENT] to *call up an info window* with the following to choose from:

Target found		
Name:	**TARGET 1**	
	LAT 57°40.636N	-Example.
	LON 10°34.767W	
1	**Edit user data**	
2	**Chart info**	-Refer to Appendix C.
3	**Find nearest port services**	-Refer to Appendix C.
4	**Bearing & dist. from A to B**	-Refer to section 3.3.2.
5	**Lock cursors**	-Refer to section 3.3.2.
9	**Chart setup**	-Refer to section 3.4.
0	**Cursor to center**	-Refer to section 3.3.2.
GOTO	**Select NAV mode**	-Refer to section 3.3.8.
PLOT	**Plot new data**	-Refer to section 3.3.9.
PAGE	**More user data**	-Inactive function.
MENU	**Exit**	-Exit info window.

1   *Edit user data* opens for a new info window:

	Target	
1	**Edit**	Change the name, color, position, etc.
2	**Move**	Move target with cursor, and press [ENT].
CLR	**Delete**	Delete target ? "YES" / "NO".
MENU	**Exit**	Exit info window.

3.3.8 GOTO function

CHART
GOTO

Shortcut to Chart 1, press again *to call up INFO window* with available navigation modes:

Select NAV mode	
1	Cursor
2	Waypoint
3	Route
4	Track
5	Anchor guard
MENU	Exit

To select "Cursor" navigation will require that the cursor is active.
"Waypoint", "Route" and "Track" navigation will require there is one stored in the memory before it can be activated. The NAV mode can also be activated from the NAV menu.

For further details on the different NAV modes, refer to chapter 4. Waypoints and navigation.

Anchor guard – When setting anchor, check/change the preset alarm distance etc., so you will be warned in case you drift too far from the anchored position. The alarm distance can be set anywhere from 0.01 to 9.99 nm in Navigation setup display. See also section 6.3 Anchor guard.

If pressing the [GOTO] key while one of the NAV modes is active, this pop-up window will appear on the screen:

Navigation is ON	
1	Advance
2	Restart to approaching point
3	Turn NAV off
MENU	Exit

Press [1] to advance to next waypoint in the route (Route navigation). Press [2] if you for some reason have drifted off course and wish to restart navigation from your actual position to the approaching point.

3.3.9 PLOT function

The CAXX is designed to make navigation easy and safe. Making routes, drawing lines and plotting waypoints, etc. can all be done directly on the chart. Very straightforward and uncomplicated.

The PLOT function is available from various displays as indicated below.

PLOT With any other display than chart or echo display in active window, press [PLOT] to *insert ship's / cursor's position as waypoint*

PLOT With chart in active display, press [PLOT] to *call up an INFO window* with the following to choose from:

	PLOT new data
PLOT	**Plot eventmark - ship**
1	**Plot waypoint - cursor**
2	**Insert waypoint - ship**
3	**Insert waypoint - cursor**
4	**Plot waypoint from echogram**
5	**Make route**
6	**Draw line**
7	**Plot target - cursor**
8	**Set vertical mark**
MENU	**Exit**

PLOT From any display:
Plot and save ship's position as a waypoint including actual depth.

1 From active chart display with cursor ON:
Plot and save cursor position as a waypoint.

2 From active chart display:
Plot and save ship's position as a waypoint including actual depth; insert a location name (cf.section 2.6), adjust the position by keying in new figures, change the symbol (cf.section 2.5).

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3   From active chart display with cursor ON:
Plot and save cursor position as a waypoint; insert a location name (cf.section 2.6), adjust the position by keying in new figures, change the symbol (cf.section 2.5).

4   From active echo display:
Plot and save waypoint including actual depth from echogram, move cursor and press [ENT] to save spot as waypoint. Add a name, symbol, color, etc.

5   From active chart display with cursor ON:
You can quickly make a route by plotting cursor's position, one after another i.e. the present cursor position will be the first position of the route you are about to make. Move cursor to next position, and press [PLOT]. Continue in this manner till the route is completed. In case you make a wrong plot, press [CLR] to erase the last plotted position.
Save the route with [ENT] or exit the function with [MENU] to abandon the route.

6   From active chart display with cursor ON:
To draw lines or to make a route is the same procedure, please refer to point 5.

7   From active chart display with cursor ON:
Plot target at cursor position with preset target name, etc.

From chart display with cursor OFF:
The ship's position will be plotted as target.

After plotting the target it will be saved in the memory, and you can edit the target later on, either via the menu or directly from the chart: Place cursor on the target symbol and press **[ENT]** to open an info window with the heading "Target found". Press **[I]** Edit user data to open for new options of editing i.e. move target, delete target, alter the position, insert a location name (cf.section 2.6) or select a new color for the target number and symbol (cf.section 2.5).

8   From active echo display:
This function will set a vertical marker (line) at the current ping in the echo display.

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3.4 Chart setup

ENT
9

With chart 1 or chart 2 in active window, press [ENT], [9], to *load the chart setup* for the selected chart (1 or 2)

```
                        Chart setup
Land settings                   │Simplified draw mode          OFF
 Features                   ON  │Quick chart info               ON
 Landmarks                  ON  │Chart area                   SMALL
Marine settings                 │Orientation        NORTH UP    TRUE
 Tides, currents           ON   │Rotation resolution           15°
 Depths                    ON   │Depth
 Underwater objects        ON   │ Level 1          0 - 002m    ████
 Soundings                 ON   │ Level 2          2 - 006m    ████
 Nature of seabed          ON   │ Level 3          6 -  MAX    ____
Naval aids settings             │Grid                  AUTO    ____
 Ports                     ON   │Show range        WITH BACKGROUND
 Caution areas             ON   │Auto chart select              ON
 Tracks, routes            ON   │Extended level range           ON
 Lights                    ON   │Non active waypoints           ON
 Buoys                     ON   │Waypoint names                 ON
 Signals                   ON   │Waypoint depths                ON
Paper chart settings            │Non active routes     AS SELECTED
 Names                     ON   │Route names                    ON
 Compass distance          ON   │Non active tracks     AS SELECTED
Chart settings                  │Track names                    ON
 Chart                 NORMAL   │Lines                 AS SELECTED
 Boundary lines            ON   │Line names                     ON
 Mixing levels            OFF   │Targets               AS SELECTED
 Marine presentation  INTERNATIONAL│Target names               ON
```

The settings are dedicated to the chart in the active window and does not affect the second chart. This enables simultaneous viewing of a very detailed chart and a less detailed chart.

ENT *Confirm changes and return to chart, or…*

MENU *abandon Chart setup and return to chart without making any changes*

All C-MAP feature groups i.e. Land settings, Marine settings, Naval aids settings and Paper chart settings are described in Appendix C. To obtain a "cleaner" view of the chart details, you can turn some of the settings OFF if they do not contribute to the clarity of the chart area you wish to explore. All the listed objects that can be turned on and off speaks for themselves – they are either "shown on the chart" or "not shown on the chart".

All user data in the chart system are listed under 'Chart settings' in the display example and are described below:

Chart can be set to NORMAL, COMPRESSED and CHART OFF:
NORMAL - will automatically select the chart level appropriate for the selected range/scale.
COMPRESSED - will change the range (scale) / chart level ratio one step, which, depending on the actual chart, will select a more detailed level.
CHART OFF - will only show all the user-made data such as waypoints, routes, lines and tracks, etc.

Boundary lines will indicate available C-MAP chart areas.

Mixing levels – when set to ON you will no longer see any blank chart areas, as the C-MAP library will find the missing area in a different level to cover the blank area otherwise left on the screen. However, when using this feature, chart re-draw time will be increased a little.

Marine presentation can be set to INTERNATIONAL or AMERICAN:
INTERNATIONAL – will present NavAids in 'real life' shapes and colors for quick visual recognition (as per official INT1 standard paper chart presentation).
AMERICAN – will present NavAids in simplified shapes and real colors (as generally found on NOAA paper charts).

Simplified draw mode – when set to ON the NavAids will be shown in generic symbols for minimum visual clutter on-screen.

Quick chart info – placing the chart cursor on a C-MAP object will activate a small info window with details on the object. Info window will automatically close after 10 seconds or when cursor is moved away.

Chart area can be set to SMALL, MEDIUM or LARGE.
SMALL – Opens a small chart area big enough to just fill the size of the screen. When panning and scrolling, the chart will automatically be redrawn.
MEDIUM – Opens a medium-size chart area for pan and scroll which goes beyond the size of the screen. The chart redraw time increases equally.
LARGE – Opens a large chart area for pan and scroll in a size which goes well beyond the size of the screen. The chart redraw time increases equally.

Orientation can be set to NORTH UP, HEAD UP or NAV UP, and the mode can be RELATIVE or TRUE motion.
NORTH UP – The chart will always be presented as north up.
HEAD UP – The chart will automatically turn, so your actual course (COG) is up. If a compass is connected, the reference will automatically change to heading (compass).
NAV UP – The chart will automatically turn, so your bearing to destination is up.
☞ To enable chart rotation the chart cursor must be turned off [CLR].

TRUE motion – The 'ship' will move across the chart.
RELATIVE motion – ('Chart area' will default to MEDIUM). The 'ship' is locked to the center of the screen and the chart will move.

Rotation resolution can be set to adjust the chart for each 5, 10, 15, 20 or 25° changes in present course or heading.

Depth – Level 1, 2 and 3 are identified by different colors. The number of meters in the levels can be changed. The colors are preset, see section 10.6.

Grid the LAT/LON grid can be set AUTO/ON/OFF. The color of the grid is preset in Palette setup, section 10.6.

Show range ON will add a small line to the chart display indicating that the length of the line equals a certain number of nautical miles/km.

Auto chart select When sailing with "Auto chart select" ON and cursor turned OFF, the scale will automatically change to the chart which is available. But when set to OFF, then the selected scale will remain, also when sailing "out of the chart".

Extended level range ON will enable changing range 3-4 steps within the same chart level after having selected the range via a numeric key.

The remainder of the objects from 'Non active waypoints' can all be set to:
ON = shown on chart; **OFF** = not shown on chart; **AS SELECTED** = the choices made for a particular route etc. via the menu e.g. MENU, 3, 2, ENT, ENT Edit route, where 'Course line' can be set ON or OFF.

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4. Position menu

2 POS	
1 Position	- see section 4.1.
2 Dual speed	- see section 4.2.
3 Speed, course & depth	- see section 4.3.
4 Speed diagram	- see section 4.4.
5 Satellites	- see section 4.5.
6 DGPS	- see section 4.6.
7 SDGPS	- see section 4.7.

4.1 Position display

MENU *Call up the menu bar, and…*
2,1   *load the Position display*

Indicates the datum currently selected.

Datum 000 WGS 1984	Log 1 1.1nm	Log 2 1.1nm

Trip log 1 and 2.

LAT	56°52.500N
LON	9°50.700E

Position with three deci-mals in minutes.

Speed **0.4kn**	Course **17°**	Compass **°**

Status DGPS a	UTC time 8:02:43	UTC date 12-02-2001

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Speed indicates Speed over ground.

Course, magnetic or true.

Depth or *Compass* from external sensor, or actual antenna altitude.

UTC or local time and date
Time and date in UTC – Universal Time Coordinates – is equal to standard time in London (GMT). UTC is not affected by the local summertime adjustments.

Status indicator for reception of satellites:
a(A)= good, b(B)= acceptable, c(C)= fair, or *= no update - see also "Status indicator and accuracy" below.

With built-in or connected DGPS receiver:
dGPS= differential data received.
DGPS= differential data received and used for corrections.
SDGPS= satellite differential data received and used for corrections.

Status indicator and accuracy
Small letters (a,b,c,) indicate that SA is active, and the position accuracy is expected to be better than 100 meters in 95% of the time. Capital letters indicate that SA is OFF, and the position accuracy is then expected to be 15 meters or better in 95% of the time.
dGPS indicates that differential data is received, either via built-in differential receiver or from external receiver.
DGPS or SDGPS indicates that the position is corrected by the differential data. The accuracy will typically be 1-3 meters for DGPS and 2-6 meters for SDGPS.

In order to utilize the high accuracy of the GPS system, it is necessary to align the lat/long calculations to the paper charts you are using. Refer to Position setup display on next page.
☞ When using C-MAP electronic charts, the datum will be aligned automatically.

Position setup

ENT   From position display, press [ENT] *to load Position setup*

```
Datum  000:                 World Geodetic System 1984
Log 1:                                         00001.1nm
Log 2:                                         00001.1nm

Display position as:                              LAT/LON
Delta position:           0°00.000N         0°00.000E
Start position:           Lat 56°52N       Lon 009°50E


Speed and course filter level:                          3
Display speed as:                                     SOG
Course and bearing as:                           MAGNETIC
Additional data:                                  COMPASS



Time:                                                 UTC
Time:    08:06:01                      Date:  12-02-2002
```

⬤   *Go to the function you wish to change*

CLR   *Reset log*

0-9   *Key in new values, or…*

+/-   *Toggle between available values*

ENT   *Confirm editing and return to Position display*

Datum – is preset to WGS 1984 (World Geodetic System 1984), but can be changed to any of the 118 datums listed in Appendix B e.g. to match old paper charts or trackplotter data from RS2500/RS4000 (datum #002 European 1950).
The position in the position display and NMEA output will refer to the selected datum. To select a new datum: Place the cursor next to "Datum" and leaf through the datum list with +/-, or key in the number.
☞ The datum in the chart display is fixed i.e. WGS84.

Log – reset log or insert alternative start figure by altering the value in the "log 1" and/or "log 2" line. Press [CLR] to reset the figure, and press the numeric keys 0-9 to alter the figure.

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Display position as – the position can be shown in latitude/longitude, Loran C or decca coordinates (after selecting chain). Toggle with +/-.

Delta position – some paper charts do not indicate a datum, but instead they have a notation to an offset or delta position to WGS84.
Use numeric keys to key in the position correction.

Start position – can be inserted if exact start position is known.

Speed and course filter level – there is a filter of 10 steps available (0= fast response, 9= stable reading).

Display speed as – SOG Speed Over Ground or STW Speed Through Water. Toggle with +/-.
☞ to receive STW information from external instrument (via NMEA port) will require that NMEA sentence VHW and "Log speed sensor" are set to ON. Refer to section 10.1 and 10.2.

Course and bearing – readings of course and bearing can be made in either MAGNETIC or TRUE. Toggle with +/-.

Additional data – can be set to COMPASS, DEPTH or ANT. HEIGHT.
COMPASS will show heading from connected sensor.
DEPTH will be shown when NMEA depth data is received from connected depth instrument.
ANT. HEIGHT will indicate the actual antenna altitude (height above sea level).

Time – can be set to UTC or local. Toggle with +/-.
Correct actual time and date by means of the numeric keys.

4.2 Dual speed display (trawling speed display)

The analogue differential speed indicator will show how much the
present speed varies from the average speed.
If the difference exceeds +/- 3 knots (or km/h or miles/h), an arrow
will appear which will be pointing out of the scale.

| MENU | *Call up the menu bar, and…* |
| 2,2 | *load dual speed display* |

Status GPS a	UTC time 10:02:43	Water speed *.*kn
	LAT 56°52.500N **LON 9°50.700E**	
-3 -2 -1 1 2 3		
Speed/kn 0.8	Average Spd 0.6	Course 17°

Water speed
readout from
connected
log trans-
ducer.

Position with three decimals in minutes.
Analogue differential speed indicator (scale).
Dynamic speed with short filtering time is reacting quickly to changes,
but is also more unsteady.
Average speed with long filtering time gives a very stable reading.
Course over ground, magnetic (m) or true (°).

How to reset dual speed:

| ENT | *Open for change* |

| ENT | *Press* [ENT] *to reset dual speed, or…* |

| MENU | *Press* [MENU] *to exit function without making any changes* |

4.3 Speed, course & depth

MENU
2,3

Call up the menu bar, and…
load Speed, course & depth display

```
Speed over ground


                                 *.*kn

Course


                                  *m̊

Depth below keel


                                 *.*m
```
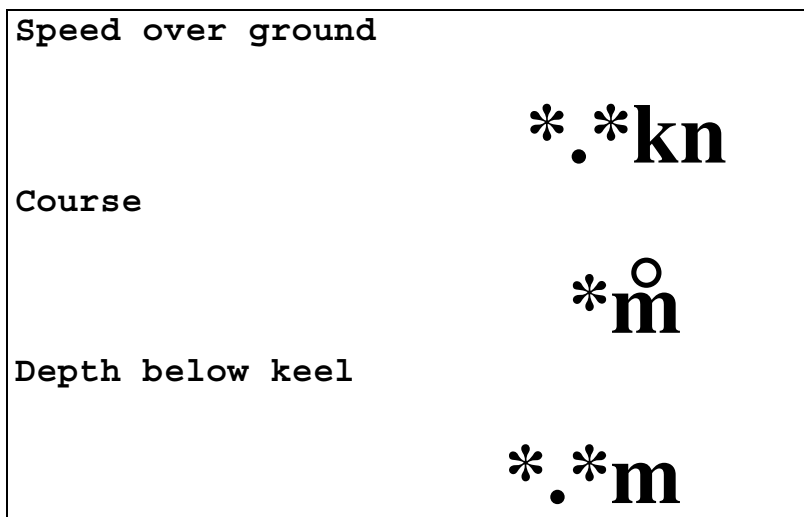
This display is preset to show: Speed over ground in knots, Magnetic course and Depth below keel in meters.

To change the settings for this display:

• Speed over ground can be changed from the Position display settings to show Speed through water: Press [MENU], [2], [1], [ENT], go to the line "Display speed as: SOG", press the [+] key to toggle to STW, press [ENT] to accept the change. The top line in above display will now show Speed through water.

• Course can be shown as magnetic or true. Toggle between the two settings from the Position display: Press [MENU], [2], [1], [ENT], go to the line "Course and bearing as: MAGNETIC", press the [+] key to toggle to TRUE, press [ENT] to accept the change. The middle part in above display will now show True course e.g. 17°.

• Depth below keel can be changed from the Echosounder setup to show Depth below surface or Depth below transducer. Press [MENU], [5], [8], go to the line "Display: DEPTH BELOW KEEL", press the [+] key to toggle to DEPTH BELOW SURFACE or DEPTH BELOW TRANSDUCER, press [ENT] to accept the change. The new setting will be shown in the lower part of the display.

4.4 Speed diagram

MENU
2,4

Call up the menu bar, and…
load "Speed diagram"

```
┌─────────────┬─────────────┬─────────────┐
│ S  6.2kn    │ V  4.8kn    │ W  2.2kn    │
├─────────────┴─────────────┴─────────────┤
│ [kn] 22:03                       22:08   │
│  10                                       │
│   8                                       │
│   6                                       │
│   4                                       │
│   2                                       │
│   0                                       │
│ SD:S *.*kn  T  *°  R  *° │WIND: *.*ms  *°R│
└──────────────────────────────────────────┘
```
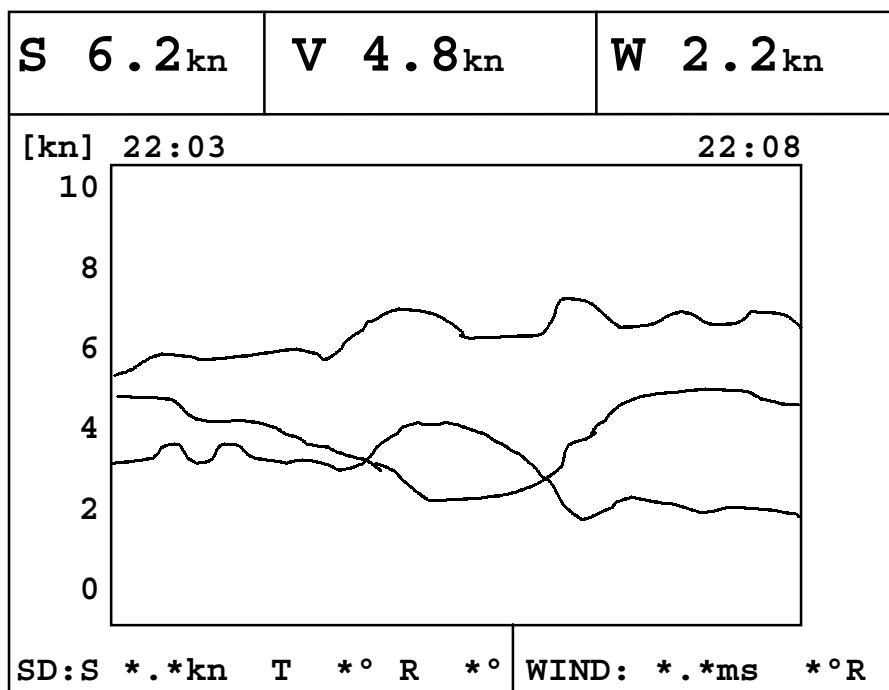
S= Speed over ground.

V= Velocity towards waypoint.

W*= Speed through water.

SD (Set and drift)*= Speed and direction, true or relative.

WIND*= Speed and direction.

* Connection to external sensors is required.

ENT

Call "Speed diagram setup"
- see next page

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```
Speed diagram setup:

  Scale for speed, max:                            +005kn
  Scale for speed, min:                            -000kn

  Speed over ground (SOG):         [black]            ON

  Velocity made good (V):          [blue]             ON

  Water speed (W):                 [red]              ON


  Time interval:                                   5 MIN.
```

The scale for the speed diagram can be adjusted in this display.

Time interval can be set in 8 intervals from 1 minute to 3 hours and freeze.

●   *Go to the function you wish to change*

+/-   *Key in new figure or change setting*

ENT   *Confirm entry and return to Speed diagram*

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4.5 Satellite status

MENU
2,5

Call up the menu bar, and…
load satellite status display

SAT	SNR		
nr	0 50 100		

2		
4		
7		
8		
9		
11		
13		
15		
16		
21		

N
0°
30°
60°
W   E
S   Alarm: OFF
GPS: D   HDOP: 1.6   DOP limit: 8

>++++++++	++ - - ++++	+++++ - ++	+ +++-+++-<

The display will show which satellites are currently being used for computation of data. It will show their position together with SNR – Signal to Noise Ratio. The bottom line shows the status of all the satellites in the GPS system, starting from left to right with the numbers 1 to 32, or the legend: No almanac.

Satellite status (bottom line):
+   indicates the satellite is healthy
-    excluded or non-existing satellite
0   satellite data is faulty
*   satellite is manually excluded

You may want to exclude a satellite manually in case a particular satellite is disturbing the navigation.

ENT   *Open for change, and…*

⬤   *Place the cursor on the satellite in the bottom line you wish to exclude*

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- | *The minus key will exclude the satellite, and…*
+ | *the plus key will reinstate it*
- these two plus and minus keys are also the ZOOM keys!

ENT | *Confirm entry*

HDOP, PDOP and DOP limits:

MENU | *Call up the menu bar, and…*
2,5 | *load satellite status display*

HDOP: Low

HDOP: High
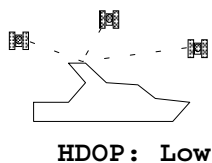
The value of HDOP (horizontal dilution of precision) expresses "the quality" of the satellite geometry in relation to 2D positioning and a fixed antenna altitude.
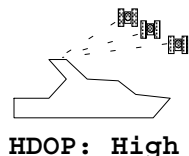
PDOP (position dilution of precision) is equivalent to 3D positioning. The values will typically stay between 1.3 and 8. The lower the value the higher the "quality". A poor geometry might produce a value of more than 20.

If the preset DOP limit is exceeded (indicated by * in the position display) it will cause the position updating to stop until it once again is within the limit.

The DOP limit can be changed manually, but should not be set higher than 8 (factory setup), as this may result in poor accuracy – false position.

Position update alarm - go to "Alarm" in the display and set it to "ON" if you wish to be alerted when there is no position update.

ENT | *Open for change*

● | *Go to DOP limit (6-99), and…*

0-9 | *Insert new limit*

ENT | *Confirm entry*

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4.6 DGPS information

The DGPS – differential position corrections – can be provided from a built-in module, which is preset to full automatic operation, or from connected DGPS receiver – see 'Status indicator' in position display.
☞ List of beacon stations is available in addendum, part no. 183.0122.501.

MENU
2,6

Call up the menu bar, and…
load DGPS setup display (with built-in module)

```
DGPS setup:

  Beacon:         SKAGEN          B312°          D87.3nm
  Status:                                         LOCKED
  Beacon is monitored:                               YES

  Frequency:              298.5kHz              MANUAL
  Bit rate:               100bps                  AUTO

  Signal strength:                                   17
  Signal to noise ratio (SNR):                     23dB

  Message:


```

To receive valid differential data will require that the navigator is locked in on a beacon station.

ENT *Open for change, and…*

● *Go to the function you wish to alter*

+/- *Toggle the function, or…*
0-9 *insert new figures*

ENT *Confirm entry*

Beacon – informs the name of the beacon the navigator is locked on to (if any), together with indication of bearing and distance.

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Status – can either be:
LOCKED = locked on a beacon and receiving differential data.
NOT LOCKED = not locked on a beacon and receiving no differential data.
NOT INSTALLED = there is no built-in DGPS module in unit.
NOT IN USE = external DGPS receiver applied.

Beacon is monitored – YES or NO.
If YES it should be safe to rely on the received differential data, because the beacon station's performance is under observation.
If NO, then you have to use the received differential data with caution, as there is no guarantee it is not faulty.

Frequency – the frequency of the beacon station can be set manually if known. However, when left in AUTO the navigator will always search for the nearest station with a good signal strength.

Bit rate – indicates *bits per second,* and can be set manually to 25, 50, 100 or 200 bps.

Signal strength – a good signal strength is 20 and up.

Signal to noise ratio (SNR) – should be 8dB and up.

Message – type 16 message will be displayed when received from the DGPS system. The contents of this message could be something to do with the performance of the system. Temporarily out of service, etc.

4.7 SDGPS information

The SDGPS – satellite differential GPS - is preset to full automatic operation, which means that the system will utilize the position corrections from either differential GPS stations (refer to section 4.6) or satellite differential GPS signals from WAAS, EGNOS or MSAS (refer to section 4.7.1).

MENU
2,7

Call up the menu bar, and…
load SDGPS setup display

```
SDGPS setup:

 SDGPS select mode:              AUTO
 Uses corrections from:         *****
CHANNEL 1: sat.no.:    ****    ****
 Corrections:                   NONE
 Integrity messages ok:           NO
 Range used for position fix:     NO
 Type 0 warning received:         NO
CHANNEL 2: sat.no.:    ****    ****
 Corrections:                   NONE
 Integrity messages ok:           NO
 Range used for position fix:     NO
 Type 0 warning received:         NO
 Ignore type 0 warnings:          NO
```

ENT   *Open for change*

⬤   *Go to the function you wish to alter (see below)*

+/-   *Toggle the function*

ENT   *Confirm entry*

SDGPS select mode determines which differential corrections can be used in the position determination:
AUTO is default mode. Local area DGPS corrections are used when available. If not available, then SDGPS corrections are used (if these are available).
MANUAL mode: SDGPS corrections are used (if available). Local area DGPS corrections are not used.
PASSIVE mode: SDGPS corrections are never used.

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Uses corrections from - indicates which differential corrections (DGPS or SDGPS) are currently used for position determination.

CHANNEL 1: sat.no. - indicates which satellite number and name is currently tracked/searched by channel 1, and what is the tracking state - see also section 4.7.1.

Corrections - indicates if corrections are being received on this channel. If YES: is the quality of the reception sufficiently high for the corrections to be usable.
NONE: no corrections are received.
RECEIVED: corrections are received, but of insufficient quality.
USABLE: corrections are received and of sufficient quality.
USED: corrections received on this channel are used in the position determination.

Integrity messages ok - the SDGPS system will transmit messages concerning the integrity of the GPS satellites. This line will indicate whether such messages are received and reliable.

Range used for position fix - if the receiver is tracking a particular SDGPS satellite, it "knows" the distance to that satellite. This line will indicate whether the distance is used in the position determination.

Type 0 warning received - if an SDGPS satellite is not operating according to specifications it will transmit a so-called "Type 0 warning". In this situation, the receiver will not use any information that it might receive from that satellite. Until the SDGPS system is declared operational, the SDGPS satellites will always transmit Type 0 warnings.
☞ It is possible (but not recommendable) to override the Type 0 warnings - refer to last line in SDGPS setup.

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4.7.1 Satellites in SDGPS system

The SDGPS system consist of eight orbiting geostationary satellites. It is, however, not expected to become fully employed till sometime in 2003. In the meantime, the system will have limited usage but will be available to all users with e.g. Simrad XX42/50/52 MKII software, version 4.20 and up.

Number	Name	System	Area
120	AOR-E	EGNOS - EU	Atlantic ocean region east
122	AOR-W	WAAS - US	Atlantic ocean region west
124	ARTEMIS	EGNOS - EU	
126	INMARSAT	EGNOS - EU	
129	MTSAT-1	MSAS - JAPAN	
131	IOR	EGNOS - EU	Indian ocean region
134	POR	WAAS - US	Pacific ocean region
137	MTSAT-2	MSAS - JAPAN	

Tracking state
The letter indicating the tracking state will appear immediately after the satellite number in the display.

Letter indication: *- means that the receiver is:*
S   searching for satellite.
D   trying to synchronize to data stream.
C   code locked to signal.
P   phase locked to signal.

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5. Waypoint / route menus

```
        ┌──────────────────────┐
        │         ▇3▇           │
        │        WP/RTE         │
        ├──────────────────────┤
        │  ▇1▇  WP list         │     - see section 5.1.
        │  ▇2▇  Routes          │     - see section 5.2.
        │  ▇3▇  Route calculation│    - see section 5.3.
        │  ▇4▇  Lines           │     - see section 5.4.
        │  ▇5▇  Start track     │     - see section 5.5.
        │  ▇6▇  Stop track      │     - see section 5.5.
        │  ▇7▇  Tracks          │     - see section 5.6.
        │  ▇8▇  Targets         │     - see section 5.7.
        └──────────────────────┘
```

5.1 WP list (waypoints stored in the memory)

The waypoint list will appear in alphabetical order and will include the waypoint's position in lat/long. To edit one of the stored waypoints:

MENU   *Call up the menu bar, and…*
3,1   *load WP list*

A-Z   *Insert name of waypoint you wish to edit, or…*

+/-   *Leaf through waypoints with +/- keys or up/down cursor*

ENT   *Open for editing*

●   *Place the cursor on the function you wish to change*

0-9   *Key in new figures, or…*
+/-   *toggle between available values*

PLOT   *Move the position to ship's position, or…*

ENT   *Confirm entry and return to WP list*

☞ Plot new waypoints with the [PLOT] key. Refer to section 3.3.9.

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5.1.1 Delete waypoints via menu

MENU	*Call up the menu bar, and…*
3,1	*load WP list*

+/-   *Select waypoint you wish to delete*

ENT   *Press* [ENT] *to open for editing*

WIN   *Press* [WIN] *to delete waypoint*

CLR   *Confirm entry and return to WP list*

☞ Edit waypoints directly on the chart via info windows. Refer to section 3.3.3.

5.2 Routes stored in the memory

The route list will keep a record of all the saved routes in the system. It will provide information on number of waypoints in the route, etc. Existing routes can be altered via the route list – see further on in this chapter, or directly on the chart via info windows – refer to sections 3.3.4 and 3.3.5. To delete a route – refer to section 5.2.1.

☞ Making new routes can be done directly on the chart with the PLOT function – refer to section 3.3.9, or from the WP list using existing waypoints – refer to section 5.2.2.

MENU	*Call up the menu bar, and…*
3,2	*load route list*

+/-   *Toggle through the stored routes with the +/- keys, or…*

A-Z   *Select route by entering its name (existing route)*

●   *Move cursor up/down to select a specific route*

ENT   *Call up the route details on highlighted route* – see next page.

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```
Route:  DENMARK                              0001
Course line:                    ─────  ████    ON
XTE line:                       ··········  ████   OFF



       1:      RHUMBLINE    70°    5.4nm    5.4nm
       2:      RHUMBLINE    90°    7.6nm   13.0nm
       3:      RHUMBLINE    42°    5.4nm   18.4nm
       4:      RHUMBLINE     0°    5.4nm   23.8nm
       5:      RHUMBLINE    50°    6.7nm   30.5nm
       6:      RHUMBLINE   349°    5.5nm   36.0nm
Number of points in route:                    219
MENU Exit                              Edit ENT
```

This display provides information on course line, XTE line, route legs, routepoints, etc.

ENT *Call up the Edit route display* – if you wish to make any changes.

```
Edit route:
─────────────────────────────────────────────
Settings for total route:
  Name:           DENMARK
  Course line:                    ─────  ████    ON
  XTE:            00.11nm          ··········  ████   OFF
  Navigation mode:                RHUMBLINE
─────────────────────────────────────────────
Settings for route leg:                 1 - 2
  XTE:                               00.11nm
  Navigation mode:                RHUMBLINE
─────────────────────────────────────────────
Direction in route:                  FORWARD
Show route as:                     NAVIGATION
─────────────────────────────────────────────
PLOT Routepoints               Delete GOTO
MENU Exit                       Accept ENT
```

Turning "Course line" OFF in the Route display will make the route invisible on the screen. Put it back on the screen by turning it ON again. The course line and XTE line can be changed in color – there are a total of 14 colors to choose from, and 9 different line types.

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If the XTE distance is not the same in all legs, the value will be *.* instead of the 0.10nm. Navigation mode can be either Rhumbline or Great circle, or … if not set to the same in all legs in a route, the mode will be: COMPOSITE.

Direction in route: can be set to either FORWARD or REVERSE direction.

Show route as: NAVIGATION for navigational data in the route display (example on the previous page), or POINTS for a list of route points together with the points' position in lat/lon and the XTE limit.

⬤ *Place the cursor on the function you wish to change*

0-9 *Key in new figures, and…*
+/- *toggle between available values*
- if no more alterations are required, go to [ENT], or you can insert/remove routepoints from the route by entering a new display:

PLOT *Open for the function: Remove/insert routepoints*

+/- *Existing routepoints can be removed, by using the +/- keys to highlight*
CLR *the routepoint you wish to remove, and press* [CLR]

⬤ *New routepoints can be added to the route by using the cursor to go up/down in the WP list to select the position you wish to add to the route, then…*

+/- *By means of the +/- keys highlight the routepoint where you wish the*
PLOT *new position should be placed in the route, and press* [PLOT]
- the last point in the RtePt panel is empty, and as such will allow you to enter a new final routepoint.

ENT *Confirm modification of route and return to the Edit display*
- or abandon modification by pressing [MENU]

ENT *Confirm editing*

MENU *Return to route list*

5.2.1 Delete route via menu

MENU	*Call up the menu bar, and…*
3,2	*load route list*
+/-	*Select the route you wish to delete*
ENT	*Press* [ENT] *to open for editing*
WIN	*Press* [WIN] *to delete route*
CLR	*Confirm*

☞ Edit routes directly on the chart via info windows. Refer to section 3.3.4 and 3.3.5.

5.2.2 Make new route from WP list

When you have a number of waypoints stored in the WP list which would be convenient to link together as a route it is easily done via the route list.

MENU	*Call up the menu bar, and…*
3,2	*load route list*
CLR	*Make new route from WP list*
●	*Use the cursor to go up/down in the WP list to select the position you wish to add to the route, then…*
+/-	*By means of the +/- keys you can control where the highlighted posi-*
PLOT	*tion is placed in the route, press* [PLOT]

- the last point in the RtePt panel is empty, and as such will allow you to enter a new final routepoint. Once a WP position is transferred to the routepoint section, there is no longer any connection between the position and the waypoint in the WP list.

Select the next position and press [PLOT]. Continue in this manner until the route is completed. In case you make a wrong plot, you can

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delete the routepoint by highlighting the RtePt number by means of the +/- keys and then press [CLR] to remove the point from the route.

Display example:

```
Route:  RTE 1                           0000
Waypoint:        WP 1
    Waypoint / position              RtePt


  ↑ WP 1                                    –
        56°57.000N   10°25.000E     ▶    1
  ↓ WP 10                                   +
    WP 2
    WP 3
    WP 4
  PLOT Insert pos.      Delete RtePt CLR
  MENU Abandon                  Accept ENT
```

ENT *Save the route with* [ENT] *and go to the Edit display*
- or leave the function with [MENU] to abandon the route.

In the Edit route display you can set up the route preferences you need and also change the name of the route.

● *Place the cursor on the function you wish to change*

0-9 *Key in new figures, and…*
+/- *toggle between available values*

ENT *Confirm editing*

MENU *Return to route list*

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5.3 Route calculation

To stay well informed during navigation, the Route calculation display will provide information on how long it takes to go from one point to another, total distance, arrival time, etc.

MENU   *Call up the menu bar, and…*
3,3   *load route calculation display*

```
Route calculation:

Route:         RTE 37
Course line:                    ─────      ████    ON
XTE:                            ------     ████    ON

Routepoint A:                                      0001
Routepoint B:                                      0003

ETA speed:                      10.0kn            AUTO
─────────────────────────────────────────────────────
 Total distance from A to B:                    110.5nm
 Time to go from A to B:                          2h35m
 Arrival time:                                    11:41
 Date:                                       12-02-2001
```

+/-   *Toggle between available routes in the memory*

●   *Go to Routepoint A, and*

0-9   *Select the first route point (A) from where you wish to start the calculation in the route, and then select the second point (B)*

Present speed is automatically used for calculating the arrival time, but if required, an alternative speed can be inserted:

ENT   *Open for change*
0-9   *and insert new speed value*

+/-   *Toggle between AUTO and MANUAL*

ENT   *Confirm entry*

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5.4 Lines stored in the memory

The line list will keep a record of all the saved lines in the system.
It will provide information on number of line sections in line, etc.

"Lines" are used for defining a certain area on the chart, e.g. a fishing ground, a shipwreck, large rocks, restricted areas, etc., or defining a channel to sail through narrow passages, making your own coast line or for whatever reason you could use a drawing on the chart.

☞ To draw new lines you need a chart in the active window, place the cursor where you wish to start the line, and press [PLOT]. Then follow the instructions in the info windows. Refer to section 3.3.9.
Lines can also be edited directly on the chart via info windows. Refer to section 3.3.4 and 3.3.5.

MENU
3,4

Call up the menu bar, and…

load line display

☞ Only plotted lines saved in the memory can be called forward.

```
Line:      FISHING BORDER                        0005
Line:                            ———  ██████      ON


   1:                    56°52.700N    009°50.230E
   2:                    56°52.712N    009°50.431E
   3:                    56°52.723N    009°50.654E
   4:                    56°52.756N    009°50.760E
   5:                    56°52.856N    009°50.899E
   6:                    56°52.901N    009°51.232E
   7:                    56°53.230N    009°51.400E
   8:                    56°53.650N    009°51.432E
   9:                    56°53.897N    009°51.230E
  10:                    56°54.220N    009°52.110E


Number of sections in line:                        16
```

This display indicates how many line sections are used for the drawing.

+/-   *Toggle through the stored lines with the +/- keys, or…*

●   *Leaf through the line points by moving cursor up/down*

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ENT   *Call up the Edit line display - if you wish to make any changes.*

```
Edit line:
Name:           FISHING BORDER
Line:                          _____   █████     ON
```

                                                      WIN   Delete
                         MENU Exit   ENT   Accept

Turning "Line" OFF will make the line drawing invisible on the screen. Put it back on the screen by turning it ON again.

●   *Place the cursor on the function you wish to change i.e. name, line type or color*

+/-   *Toggle between available values*

ENT   *Confirm entry*

5.4.1 Delete lines via menu

MENU   *Call up the menu bar, and…*
3,4   *load line display*

+/-   *Select the line you wish to delete*

ENT   *Press* [ENT] *to open for editing*

WIN   *Press* [WIN] *to delete the line*

CLR   *Confirm*

☞ Edit lines directly on the chart via info windows. Refer to section 3.3.4 and 3.3.5.

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5.5 Start / stop track

The track function will provide a track trailing the movement of your ship. With a Simrad TL50 Turbo Loader + ARPA radar connected, you will also be able to track ARPA targets on the CAXX chart display - refer to the TL50 manual for further details.

To start track function from own ship:

| MENU | *Call up the menu bar, and…* |
| 3,5 | *load Start track pop-up window* |

```
┌────────────────────────────────────────────┐
│ Start track:                                 │
├──────────────────────────────────────────────┤
│                                              │
│   Name:    TRACK 1                           │
│   Display track:                        ON   │
│   Update:                         DISTANCE   │
│   Interval:                       0.100nm    │
│   Trackpoints:                           0   │
│   Type:                    ────    ████      │
│                                              │
├──────────────────────────────────────────────┤
│ MENU Exit                        Start  ENT  │
└────────────────────────────────────────────┘
```

As default from the factory: The first track is stored as TRACK1, the next as TRACK2, etc.

If you wish to change the default values:
Move cursor to where you wish to make a change

| +/- | *Toggle between available values, or…* |
| 0-9 | *key in new values* |

| ENT | *Start track by pressing* [ENT] |

Name of track can be altered (max. 25 characters).

Display track can be set ON and OFF, where OFF will make it invisible on the screen. Turn ON to put it back on the screen.

Update of the track can be performed by distance in nautical miles, or by time interval.

Type of track line i.e. full, dotted, etc. has 9 different types to choose from in 15 different colors.

To stop track:

| MENU | *Call up the menu bar, and…* |
| 3,6 | *load Stop track pop-up window* |

| ENT | *Press* [ENT] *to stop the highlighted track* |

5.6 Tracks stored in the memory

All tracks (of more than 1 trackpoint) will automatically be stored in the memory. To see which tracks are registered, you can scroll through the list by:

| MENU | *Call up the menu bar, and…* |
| 3,7 | *load "Tracks" in active window* |

```
Track:     TRACK 1

Tracking:              OFF

Display track:          ON

Trackpoints:            25

Type:           ____  ████
```

As default from the factory: The first track is stored as TRACK1, the next as TRACK2, etc.

| A-Z | *Select name of track* |

- or if a number is included in the track name, place cursor on the number, and …

| +/- | *Toggle up/down in the track numbers* |

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ENT   *Open for change*

"Display track" can be set ON/OFF, where OFF will make it invisible on the screen. Turn ON to put it back on the screen.

+/-   *Toggle between available values*

ENT   *Confirm changes*

5.6.1 Delete tracks via menu

MENU   *Call up the menu bar, and…*
3,7   *load track display*

+/-   *Select the track you wish to delete*

ENT   *Press* [ENT] *to open for editing*

WIN   *Press* [WIN] *to delete the track*

CLR   *Confirm*

☞ Edit tracks directly on the chart via info windows. Refer to section 3.3.6.

5.7 Targets stored in the memory

The CAXX can display the bearing and distance of up to three targets at a time in relation to the vessel e.g. harbors or important navigational points. A target is a fixed point on the chart which can be plotted by the cursor or from the ship's position, or keyed in via the keypad.

Set up targets
The plotted target position is automatically preset to actual position of ship, or to cursor position when the chart display is active and the cursor is on – see INFO windows, section 3.3.7.

MENU   *Call up the menu bar, and…*
3,8   *load target display*

```
Targets:

Name: TARGET 1                          ██████ ON
Position:           56°52.700N          9°50.500E
   B 213°              D 195.7nm

Name: TARGET 2                          ██████ ON
Position:           54°51.500N          9°52.135E
   B 130°              D 215.7nm

Name: TARGET 3                          ██████ ON
Position:           56°52.700N          9°50.500E
   B 345°              D 295.7nm
```

Make the target invisible on the screen by turning it OFF.

Put it back on the screen by turning it ON again.

●   *Select the target you wish to change or replace with a different target by moving the cursor up/down*

+/-   *Leaf through the targets in the memory*

ENT   *Open for change, and…*

●   *Place cursor where you wish to make a change i.e. name, color, etc.*

A-Z	*Key in new values, alphabetical or*
0-9	*numerical*

+/-	*Toggle between available values*

ENT	*Confirm entry*

5.7.1 Delete target via menu

MENU	*Call up the menu bar, and…*
3,8	*load target display*

+/-	*Select the target you wish to delete*

ENT	*Press* [ENT] *to open for editing*

WIN	*Press* [WIN] *to delete the target*

CLR	*Confirm*

☞ Edit targets directly on the chart via info windows. Refer to section 3.3.7.

6.1 NAV menu – (NAV inactive)

```
            4
          NAV
  1   Highway              - see section 6.1.1
  2   Waypoint navigation  - see section 6.5.2
  3   Route navigation     - see section 6.5.3
  4   Track navigation     - see section 6.5.4
  5   Anchor guard         - see section 6.3
  6   Trim & highway       - see section 6.2.7
  7   Set & drift          - see section 6.2.8
```

This NAV menu will appear when there is no navigation mode active.

See also section **6.2** – when navigation mode is active, section **6.3** Anchor guard, **6.4** MOB navigation, and **6.5** Navigation examples.

6.1.1 Highway display

MENU   *Call up the menu bar, and…*
4,1   *load Highway display*

Since there is no navigation mode active, you will receive the legend: NAVIGATION IS OFF. To enter the basic Navigation setup display:

ENT   *Press* [ENT] *to call up Navigation setup*
- *see display example next page.*

Before starting out in one of the navigation modes, it may be a good idea to check out the Navigation setup display and see if the default settings will suit your need.

```
Navigation setup:

 Anchor alarm distance:                        00.50nm
 WP circle alarm:                       00.10nm   OFF
 WP and cursor navigation:
  XTE alarm:                            00.10nm   OFF
  Navigation mode:                            RHUMBLINE
 Route navigation:
  XTE alarm:                                        OFF
  Auto waypoint shift:                        WP-circle
 Track navigation:
  XTE alarm:                            00.10nm   OFF
  Auto trackpoint shift:                        WP-line
  Navigation mode:                            RHUMBLINE
```

+/-   *Toggle between available values, or…*
0-9   *key in a new alarm limit*

ENT   *Confirm entry*

Anchor alarm distance – When setting anchor, check/change the preset alarm distance, etc., so you will be warned in case you drift too far from the anchored position. The alarm distance can be set to anywhere from 0.01 to 9.99nm. See also section 6.3 Anchor guard. The alarm will automatically reset once you are inside the limits again.

WP circle alarm – forms a circle around each waypoint, and the alarm distance can be set to anywhere between 0.01 and 9.99nm.
The waypoint alarm will be activated when you reach the circle or the perpendicular line – **WP line alarm** – crossing through the waypoint. When "Auto waypoint shift" is set to "WP-circle" it will override the "WP circle alarm" function.

XTE alarm – forms a corridor along the ideal track. When crossing one of the boundaries the XTE alarm will be activated.

The **alarm** will automatically reset once you are inside the limits again. The alarm distance can be set to anywhere between 0.01 and 9.99nm.

☞ In Route navigation the XTE alarm value can be specified for each route leg – see section 5.2.

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Navigation mode – RHUMBLINE navigation is used for shorter distances, and GREAT CIRCLE for long trips, especially when crossing at high latitudes. COMPOSITE navigation is used when not all legs in a route are set to the same navigation mode.

Auto waypoint shift – can be set to "WP-circle", "WP-line" or "OFF". When set to WP-circle, the system will change to the next waypoint in the route after passing the circle line (border).
When set to WP-line, the system will change to next waypoint in the route after passing the waypoint line (border).
When "Auto waypoint shift" is set to "WP-circle", then the alarm function at the waypoint's circle will not be activated.

6.2 NAV menu – (NAV active)

	4
	NAV
1 Highway	- see section 6.2.1
2 Turn NAV off	- see section 6.2.3
3 WP advance	- see section 6.2.4
4 Restart to approaching point	- see section 6.2.5
5 ETA & AVN	- see section 6.2.6
6 Trim & highway	- see section 6.2.7
7 Set & drift	- see section 6.2.8

This NAV menu will appear when navigation mode is active.
If the selected navigation mode is Waypoint navigation, then point 3:WP advance will not be available and therefore the color of the text will differ from the rest of the menu text.

See also section **6.1** NAV menu – (NAV inactive), section **6.3** Anchor guard, **6.4** MOB navigation, and **6.5** Navigation examples.

6.2.1 Highway display

`MENU`
`4,1`

Call up the menu bar, and…
load Highway display

With navigation mode active, the highway display will provide a graphical steering display:
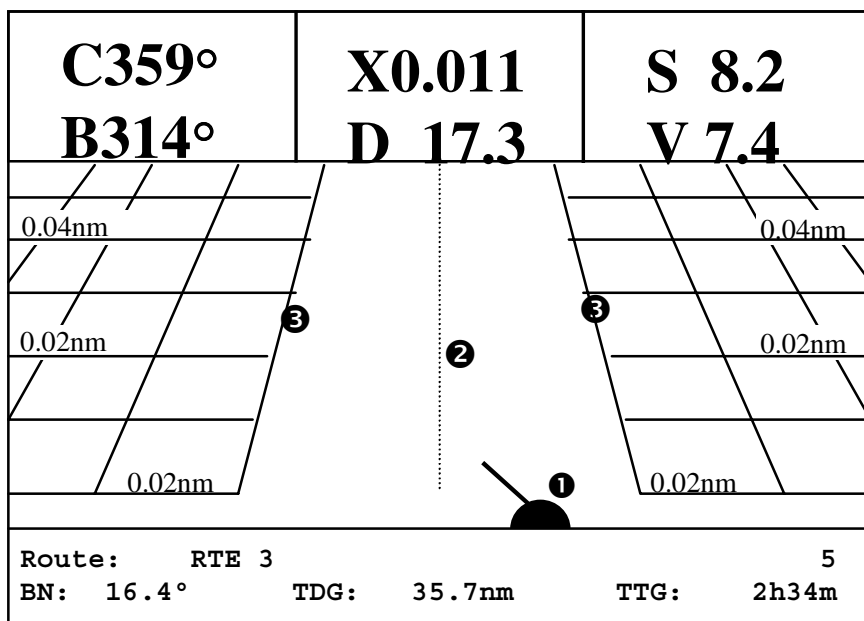
C: Course over ground
X: XTE – Cross-track-error
S: Speed over ground
B: Bearing to approaching point
D: Distance to approaching point
V: Speed towards point
Route: Name of active route
Point: No. of approaching point
TDG: Total distance to go
BN: Bearing to next point
TTG: Time to go (only for waypoint navigation).

❶   Ship's position and course in relation to intended track.

❷   Intended track between two waypoints or from ship's position when NAV is activated.

❸   XTE alarm lines – an alarm will be activated if the ship moves across the lines (if the alarm is enabled).

Refer to section 6.1.1 for alarm setup.

6.2.2 Navigation setup

If you wish to make any changes in the navigation setup, you can quickly enter the navigation setup display by pressing [ENT] from the highway display (graphical steering display).

ENT   *Quick access to navigation setup from active highway display, or…*
-refer to display example and description of functions in section 6.1.1.

6.2.3 NAV mode – Turn NAV off

MENU   *Call up the menu bar, and…*
4,2   *turn off navigation mode*

6.2.4 NAV mode – Waypoint advance

MENU   *Call up the menu bar, and…*
4,3   *activate shift to next waypoint*
- it will require that navigation mode is active and that "a next waypoint" exists.

6.2.5 NAV mode – Restart to approaching point

MENU   *Call up the menu bar, and…*
4,4   *activate restart to approaching point*
- if you for some reason have drifted off course and wish to restart navigation from your actual position to the approaching point.

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6.2.6 NAV mode – ETA & AVN

☞ Navigation mode must be active to call up the ETA & AVN display.

`MENU`
`4,5`

Call up the menu bar, and…
load the ETA & AVN display

```
ETA:

  Arrival time:                    12:46
  Date:                       12-02-2001
  ETA mode:   AUTO        ETA speed:    10.0kn

AVN:

  Velocity:                        12.5kn
  Planned arrival time:              09:24
  Date:                         12-02-2001


Route:  RTE 3                            1
```

ETA – Estimated Time of Arrival - refers to the inserted local time, and can be calculated to any point used for navigation.

AVN – Approximate Velocity Necessary – is automatically calculated in knots after you key in the planned arrival time and date.

In route navigation the approaching point and present speed over ground (AUTO) is automatically used for the calculation.

You can change to any waypoint in the route and also insert an alternative ETA speed (MANUAL).

`ENT` *Open for change* – in route navigation the approaching point is automatically suggested and present speed is used for calculation.

● *If required – go to, and…*

`0-9` *Insert alternative routepoint* – only in Route navigation.

⬤   *Go to ETA mode, and…*

+/-   *Select* AUTO *or* MANUAL

⬤   *Go to AVN, and…*

0-9   *Insert time and date*

ENT   *Confirm entry*

6.2.7 NAV mode – Trim & highway display

☞ The readings rely on data from external log and compass, and navigation mode must be active.

The Set & drift trim display will provide information on actual and mean speed, velocity and wind.
- see also section 6.2.8 Set & drift display.

MENU   *Call up the menu bar, and…*
4,6   *load the Trim & highway display*

S/kn	Av. S		
7.4	**6.3**		
V/kn	Av. V		
7.2	**7.4**		
W/kn	Av. W		
7.6	**7.2**		

B: 258°   X: 0.011nm   D: 1.18nm

0.02nm   0.02nm

Route: RTE 3   5
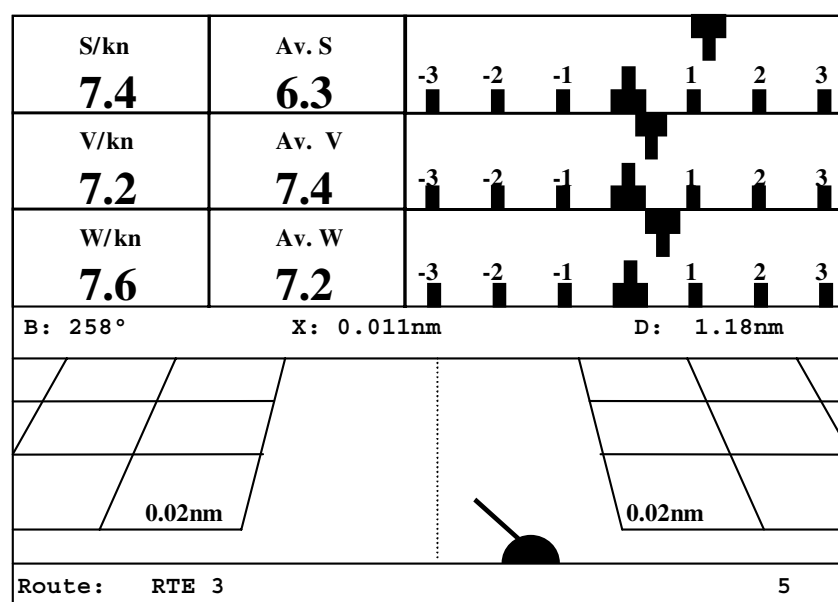
B: Bearing.

X: XTE Cross-track-error.

D: Distance to point.

ENT   *Open for change*

ENT   *Reset mean speed indication in display*

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6.2.8 Set & drift

☞ The readings rely on data from external log and compass.

MENU *Load menu bar, and…*
4,7 *load display for "Set & drift"*

```
Set & drift
```


Relative
direction.

Speed.
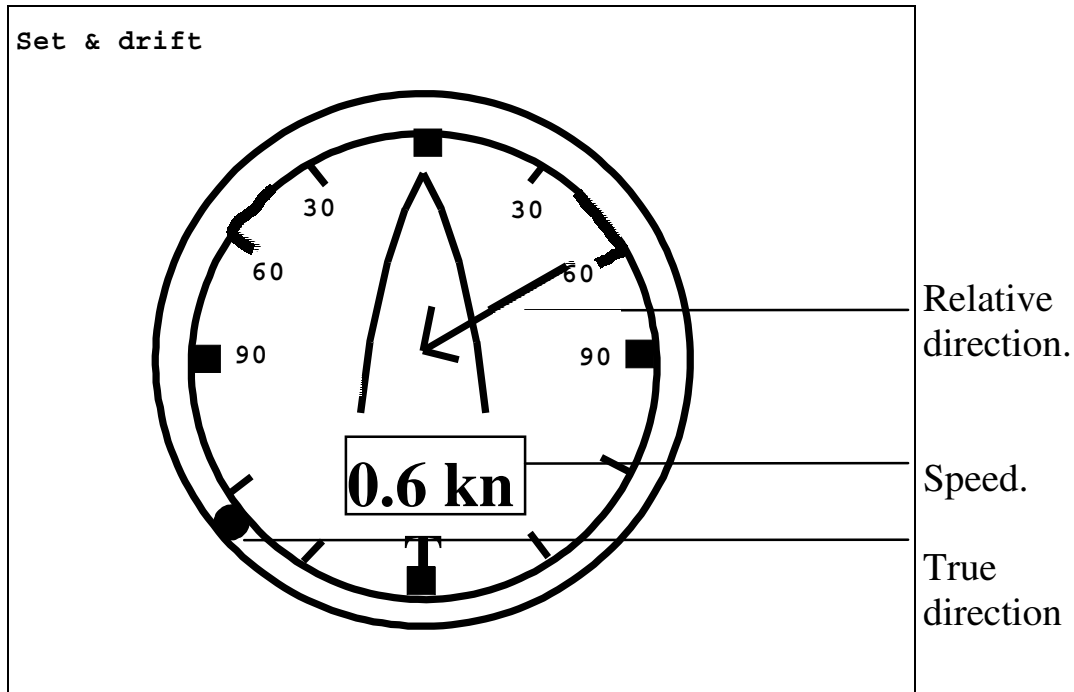
True
direction

The set & drift display will show how fast the current is moving in knots; in what direction (true) it is moving and what direction in relation to the vessel (relative).

☞ To obtain information on actual and mean speed, velocity and water speed – see the "Trim & highway display" in section 6.2.7.

6.3 Anchor guard

MENU
4,5
Call up the menu bar, and…

activate the anchor guard function
- the chart display will provide an impression of the vessel's position in relation to the alarm circle.

To check/change the preset alarm distance:

MENU
4,1
Call up the menu bar, and…

load the highway display

ENT
Press [ENT] *to call up the navigation setup display*

⬤
Move cursor to the Anchor alarm distance

0-9
Enter new value with numeric keys

ENT
Confirm the change

To turn Anchor guard off again:

MENU
4,2
Call up the menu bar, and…

turn anchor guard off

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6.4 MOB navigation

The MOB – Man overboard – display will be activated if you press the blue [MOB] key on the CAXX keypad and hold it depressed for two seconds, or activate an external MOB switch. The MOB display will provide all relevant data for an efficient rescue operation – see display examples on the rear of the first page of the manual.

To turn the MOB function off again:

MENU
4,2

Call up the menu bar, and…
turn the MOB function off

To check the last activated MOB position:

MENU
7,2

Call up the menu bar, and…
select MOB position

6.5 Navigation examples

Relevant for all navigation modes are:
- the navigation display with graphical steering – section 6.2.1.
- the ETA & AVN display with Estimated Time of Arrival and Approximate Velocity Necessary to reach a given point at a specific time – section 6.2.6.
- the *Set & drift display with indication of how fast the current is moving in knots, in what direction (true) it is moving and what direction in relation to the vessel (relative) – section 6.2.8.
- the *Trim & highway display with information on actual and mean speed over ground, velocity (VMG) and water speed – section 6.2.7.
* These readings rely on data from external log and compass.

6.5.1 Chart/cursor navigation.   6.5.2 Waypoint navigation.
6.5.3 Route navigation.   6.5.4 Track navigation.

6.5.1 Chart/cursor navigation

Cursor navigation is the easiest and most straightforward way of navigation – *point and go.*

CHART
●

Shortcut to chart 1 display
Press the cursor key to activate the cursor, then move the cursor to your destination

GOTO
1

Call up "Select NAV mode" window, and…
select "Cursor"

A course line will now be drawn from actual position (ship's position) to destination point (cursor's position).

●

Next destination: While on the way, you can easily *move the cursor to the next destination*, and when ready to change navigation leg…

GOTO
2

Press [GOTO] *and* [2] *to…*
"Restart to approaching point"
- A new course line will be drawn from ship's position to destination.

It is possible to mix and match the data you require to have on the screen e.g. ½ window for the chart display, ¼ window for the navigation display, and ¼ window for the Trim & highway display, maybe. The choice is yours. Refer to section 2.1 Fundamentals of the PAGE and WINdow system.

To turn NAV mode off again:

GOTO
3

Press [GOTO] *and* [3] *to…*
"Turn NAV off" from active chart display
or…

MENU
4,2

Press [MENU] *and* [4], [2] *to…*
"Turn NAV off" via the menu

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6.5.2 Waypoint navigation

There are two ways of activating Waypoint navigation:
From the chart or from the menu.

From the chart:

`CHART` *Shortcut to chart 1 display*

⬤ *Press the cursor key to activate the cursor, then move the chart cursor to your destination waypoint* (or select from WPlist - see below)

`GOTO` *Select NAV mode, and…*

`2` *Select Waypoint from WPlist* (if chart cursor is placed on a WP, this WP will be highlighted in the WPlist)

This will activate the pop-up window 'Navigate to WP' - now follow the procedures from the ☞ a few lines down.

From the menu:

`MENU` *Call up the menu bar, and…*
`4,2` *select Waypoint navigation*

☞ This will activate the pop-up window "Navigate to WP" from where you can choose which waypoint you wish to sail to:

⬤ *Use the cursor to scroll up/down in the waypoint list, or place cursor on the WP number, and…*

`+/-` *Scroll up/down with +/- keys, or…*

`0-9` *Key in the number of the waypoint you wish to sail to*

`ENT` *Start navigation*

A course line will now be drawn from ship's position to destination waypoint.

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It is possible to mix and match the data you require to have on the screen e.g. ½ window for the chart display, ¼ window for the navigation display, and ¼ window for the Trim & highway display, maybe. The choice is yours. Refer to section 2.1 Fundamentals of the PAGE and WINdow system.

To turn NAV mode off again:

GOTO
3
Press [GOTO] *and* [3] *to…*
"Turn NAV off" from active chart display with cursor on
or…

MENU
4,2
Press [MENU] *and* [4], [2] *to…*
"Turn NAV off" via the menu

6.5.3 Route navigation

To start Route navigation will require that at least one route is stored in the memory. Refer to section 3.3.9 PLOT function.

When navigating in a route, you will have a graphical steering display to navigate by, see section 6.2.1. Know your ETA – Estimated Time of Arrival, and your AVN – Average Velocity Necessary, see section 6.2.6. Call up the Set & drift display, see section 6.2.8.

There are two ways of activating Route navigation:
From the chart or from the menu

From the chart:

CHART
Shortcut to chart 1 display

●
Press the cursor key to activate the cursor

GOTO
Select NAV mode

3
Select Route (if chart cursor is placed on a route, this route will be

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suggested).

This will activate the pop-up window 'Navigate in route' - now follow the procedures from the ☞ a few lines further ahead.

From the menu:

`MENU`   *Call up the menu bar, and…*

`4,3`   *select Route navigation*

☞ This will activate the pop-up window "Navigate in route" from where you can choose which route you wish to select for navigation:

`+/-`   *Scroll up/down in the route list until the correct route number / name appears*

⬤   *Use the cursor to move around in the window if anything needs to be changed* – such as Direction in route, etc.

`0-9`   *Key in the number of the waypoint you wish to sail to*

`ENT`   *Start navigation*

A course line will now be drawn from ship's position to the first waypoint in the route.

It is possible to mix and match the data you require to have on the screen e.g. ½ window for the chart display, ¼ window for the navigation display, and ¼ window for the Trim & highway display or ETA & AVN display, maybe. The choice is yours. Refer to section 2.1 Fundamentals of the PAGE and WINdow system.

`GOTO`   Pressing [GOTO] from chart display during navigation will *activate an INFO window* with the following functions to choose from:
1. Advance (to next waypoint in route)
2. Restart to approaching point (in case you have drifted off course)
3. **Turn NAV OFF.**

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`MENU` `4` Pressing [MENU] and [4], from an active data display during navigation will give access to the following displays / feature:

1. Highway display
2. **Turn NAV off**
3. WP advance (to next waypoint in route)
4. Restart to approaching point (in case you have drifted off course)
5. ETA & AVN
6. Set & drift trim
7. Set & drift

6.5.4 Track navigation

A track is created by a series of trackpoints connected by track lines. Using a track for navigation is somewhat like navigating in a route with many waypoints.

☞ To start Track navigation will require that at least one track is stored in the memory. Tracks which are not yet completed can not be used for navigation. Refer to section 5.5 Start / Stop track.

When navigating in a track, you will have a graphical steering display to navigate by, see section 6.2.1. Know your ETA – Estimated Time of Arrival, and your AVN – Average Velocity Necessary, see section 6.2.6. Call up the Set & drift display, see section 6.2.8.

There are two ways of activating Track navigation:
From the chart or from the menu.

From the chart:

`CHART` *Load chart display in active window, and…*

⬤ *press cursor key to activate the cursor*

`GOTO` *Select NAV mode*

`4` *Select Track (if chart cursor is placed on a track, this track will be*

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suggested).

This will activate the pop-up window 'Navigate in track' - now follow the procedures from the ☞ a few lines further ahead.

From the menu:

MENU   *Call up the menu bar, and…*
4,4   *select Track navigation*

☞ This will activate the pop-up window 'Navigate in track' from where you can choose which track you wish to select for navigation:

+/-   *Scroll up/down in the track list until the correct track number / name appears*

●   *Use the cursor to move around in the window if anything needs to be changed* – such as Direction in track, etc.

0-9   *Key in the number of the first trackpoint you wish to sail to*

```
Navigate in track:
Track:   TRACK 1                  0001
Trackpoint:                      00001
Bearing:   224°      Distance:    0.000nm
Direction in track:            FORWARD
XTE alarm:                  00.10  OFF
Auto trackpoint shift:       WP-circle
Navigation mode:             RHUMBLINE
Beep at trackpoint shift:          OFF
```

ENT   *Start navigation*

A course line will now be drawn from ship's position to the first point of destination.

It is possible to mix and match the data you require to have on the screen e.g. ½ window for the chart display, ¼ window for the navigation display, and ¼ window for the Trim & highway display or ETA & AVN display, maybe. The choice is yours. Refer to section 2.1 Fundamentals of the PAGE and WINdow system.

GOTO   Pressing [GOTO] from chart display during navigation will *activate an INFO window* with the following functions to choose from:
1. Advance (to next trackpoint)
2. Restart to approaching point (in case you have drifted off course)
3. **Turn NAV OFF.**

MENU   Pressing [MENU] and [4], from an active data display during navigation
4   will give access to the following displays / feature:
1. Highway display
2. **Turn NAV off**
3. WP advance (to next trackpoint)
4. Restart to approaching point (in case you have drifted off course)
5. ETA & AVN
6. Set & drift trim
7. Set & drift

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7. Echosounder operation

The echosounder function of the CAXX determines the distance between its transducer and underwater objects such as fish, lake bottom or seabed. It does this by utilizing the fact that an ultrasonic wave transmitted through water travels at a nearly constant speed of 4800 feet (1500 meters) per second. When a sound wave strikes an underwater object such as fish or sea bottom, part of the sound wave is reflected back toward the source. Thus by calculating the time difference between the transmission of a sound wave and the reception of the reflected sound wave, the depth to the object can be determined.

The entire process begins in the display unit. Transmitter power is sent to the transducer as a short pulse of electrical energy. The electrical signal produced by the transmitter is converted into an ultrasonic signal by the transducer and transmitted into the water. Any reflected signals from intervening objects (such as a fish school) are received by the transducer and converted back into an electrical signal. It is then amplified in the amplifier section, and finally, displayed on the screen.

The picture displayed is made up of a series of vertical scan lines (pings), one for each transmission. Each line represents a 'snapshot' of what has occurred beneath the boat. The series of snapshots are accumulated side by side across the screen, and the resulting contours of the bottom and fish between the bottom and surface are displayed.

Selecting echosounder displays
The CAXX provides four types of echosounder displays: standard, bottom zoom, marker zoom and A-scope. Each display has its advantages and disadvantages. Select the appropriate setup for the echosounder display in the presentation 'Setup' and 'Echosounder setup' displays, considering current sea area and target fish.

☞ To view the echo display while plotting ship's route, select a CHART display in one window and an ECHO display in the adjacent window.

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7.1 ECHOSOUNDER MENU

	5	
	ECHO	
1	Echo 50kHz	- see section 7.2.
2	Echo 200kHz	- see section 7.2.
3	Bottom expansion 50kHz	- see section 7.3
4	Bottom expansion 200kHz	- see section 7.3.
5	VRM expansion 50kHz	- see section 7.4.
6	VRM expansion 200kHz	- see section 7.4.
7	Depth & temperature diagram	- see section 7.7.
8	Echosounder setup	- see section 7.8.

7.2 Echosounder display

Low and high frequency echosounder display can be set up separately
and be shown simultaneously in the same screen, but in separate
WINdows. The low frequency display will show deep water bottom
contours, and the high frequency display will show the mid-water
section with trawl targets or bait fish in a higher resolution.

As an example:

MENU   *Press* [MENU], *to call up the menu bar, and…*

5,2   *press* [5] *and* [2] *to call up the Echo display for 200kHz*
- see display example on next page.

The top line in the display informs of: Actual temperature **T** in Celcius
or Fahrenheit (in half degrees), current speed **S** in knots or kilometers/
hour or miles/hour – current settings can be changed in Setup for units
(MENU, 6,1). Actual depth **DK** i.e. **D**epth below **K**eel/Surface/Trans-
ducer – settings can be changed in echosounder setup (MENU, 5,8).

FREQUENCY indicates the selected frequency.
PULSE (not in ¼ size displays) indicates the transmission pulse length.
POWER (not in ¼ size displays) indicates the transmission power.
(A = AUTO)

This is the basic presentation mode (standard display) for observing fish schools and seabed. Some surface noise may appear just below the transmission line.

FREQUENCY:	50kHz		
PULSE:	A-	SHORT	**T *.*°C S 0.0kn DK 5.0 m**
POWER:	A-	1000W	

Transmission line

VRM

Depth range is adjustable with +/- keys or the Quick-range keys 1-9. Press key 0 to return to Auto range.
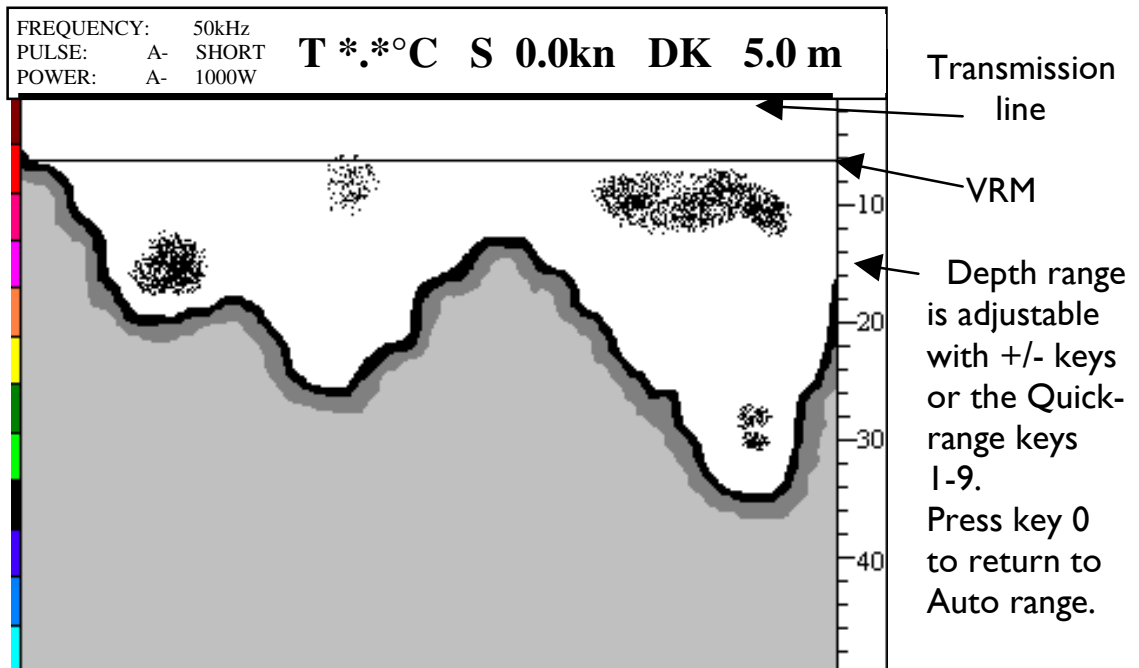
☞ Refer to Appendix A for further description of the various functions.

ENT *Direct access to Setup display related to active echo display – 38kHz, 50kHz or 200 kHz – (see section 7.9)*

● *Use the cursor to go to the function you wish to change the value for*

+/- *Toggle between available values, and...*
ENT *Confirm with* [ENT]

ECHO A-SCP *Hotkey to Echo 1 display* (from [MENU],[5],[!]) i.e. jumps to window on the screen with Echo 1 display; if none: inserts Echo 1 in active window.

7.3 Bottom expansion

The advanced bottom lock and expansion feature ensures a reliable depth readout and provides a compressed standard display in the upper 1/2 of the display. The bottom area can be magnified for better separation of echoes. The actual size of the expansion window can be adjusted in the Setup display for 38kHz/50kHz/200kHz.

As an example, from active echo display, 50kHz:

MENU   *Press* [MENU], *to call up the menu bar, and…*

5,3   *press* [5] *and* [3] *to activate bottom expansion of the 50kHz sounder*
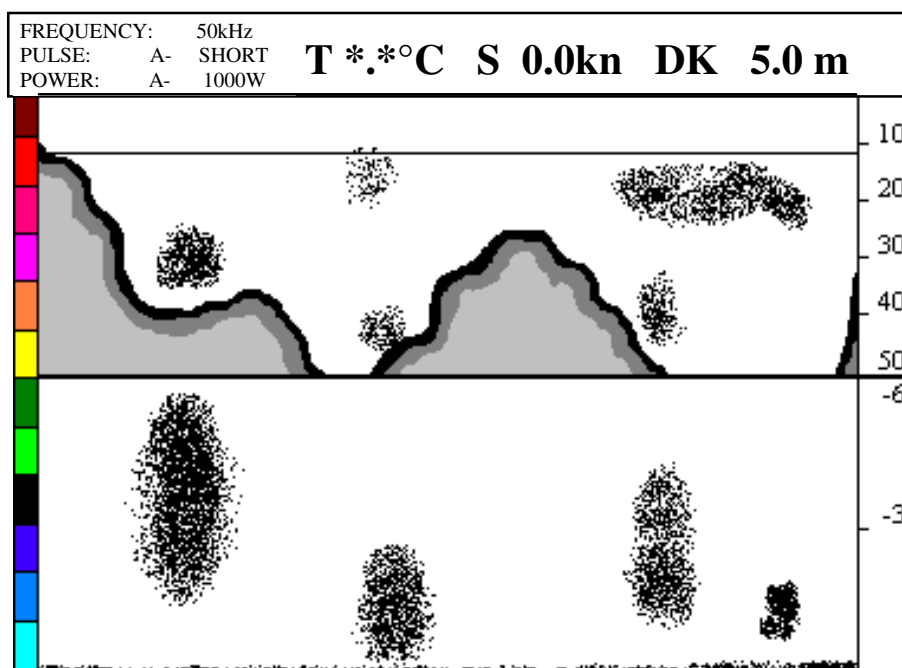
+/-   *The depth range at the right of the screen can be adjusted by means of the + and – keys*

ENT   *Open Setup display* (see section 7.9), *if any changes are required*

ENT   *and confirm changes with* [ENT]

MENU   *Return to standard echo display 1 or 2 via Echo menu*

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7.4 VRM expansion

This feature will provide an expanded view of the area near the Variable Range Marker which will give a better separation of echoes. The actual size of the expansion window can be adjusted in the Setup display for 38kHz/50kHz/200kHz. As an example, from active echo display, 50kHz:

MENU   *Press* [MENU]*, to call up the menu bar, and…*

5,5   *press* [5] *and* [5] *to activate VRM expansion of the 50kHz sounder*
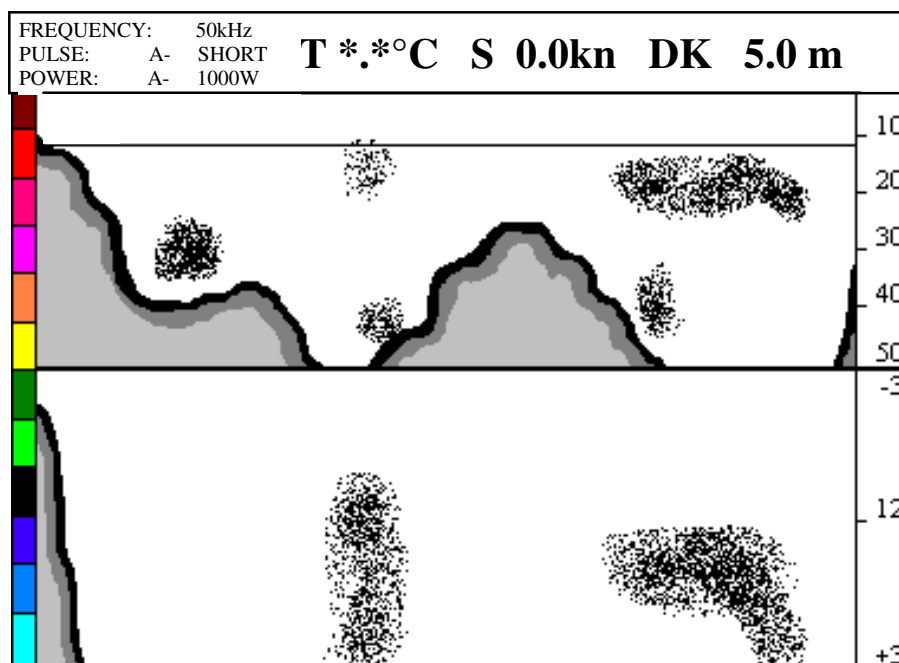
The zoom level can be selected in seven steps ranging from 3 to 50 meters, or converting to feet or fathoms (refer to Setup for units, section 10.1). The VRM horizontal line can be moved up/down by means of the cursor.

+/-   *Adjust range with the + and - keys*

ENT   *Open Setup display* (see section 7.9)*, if any changes are required*
ENT   *and confirm changes with* [ENT]

MENU   *Return to standard echo display 1 or 2 via Echo menu*

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7.5 A-scope

The amplitude scope which appears in the right side of the echo display, can be turned on and off.

The readout indicates the precise amplitude or strength of the last received ping (sounding), which often can be used for determining individual species of fish or hardness of the bottom.

From active echo display:

A-SCP   *Gain direct access to the A-scope function*
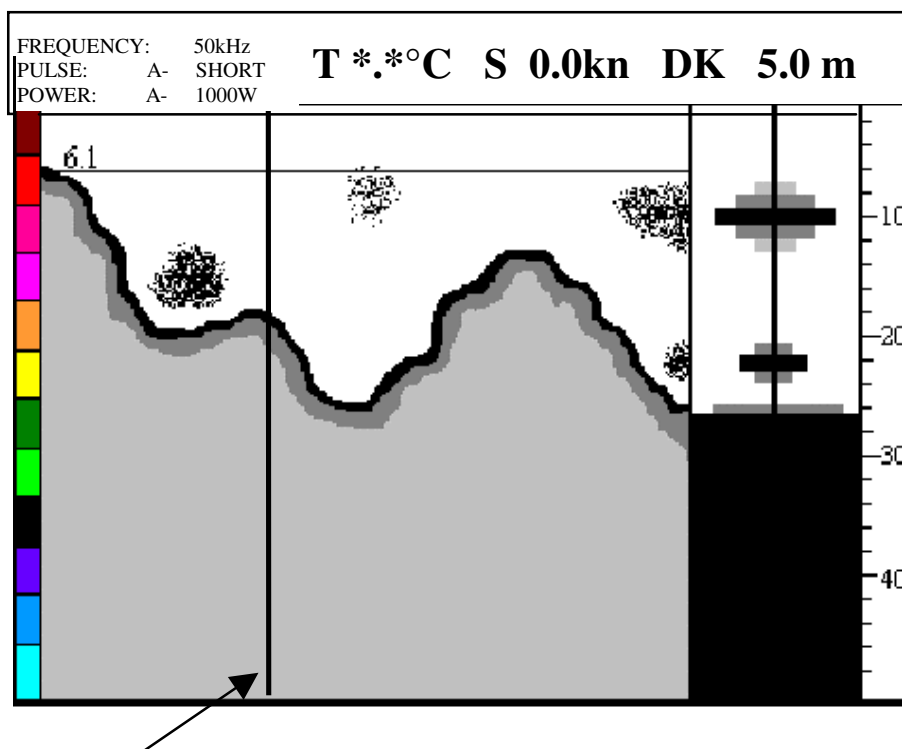
The vertical marker in this display is activated by the [PLOT] key + select 'Set vertical marker'.

+/-   *Adjust range with the + and - keys*

ENT   *Open Setup display* (see section 7.9), if any changes are required
ENT   *and confirm changes with* [ENT]

A-SCP   *Turn A-scope OFF again*

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7.6 Variable range marker

From active echo display:
Turn on the Variable Range Marker function, and…

Move the variable range marker up/down

+/-   *Adjust the range by means of the +/- keys*

CLR   *Turn VRM marker off again*

7.7 Depth & temperature diagram

MENU   *Press* [MENU], *to call up the menu bar, and…*
5,7   *press* [5] *and* [7] *to activate Depth & temperature diagram*

Present water temperature.

8.3°C	12:05	27.2m

Present depth.

```
[°C]  7:00                    7:05 [m]
 30 -                              0


 20 -


                                   25

 10 -                              50


                                   75
  0 -                             100
```
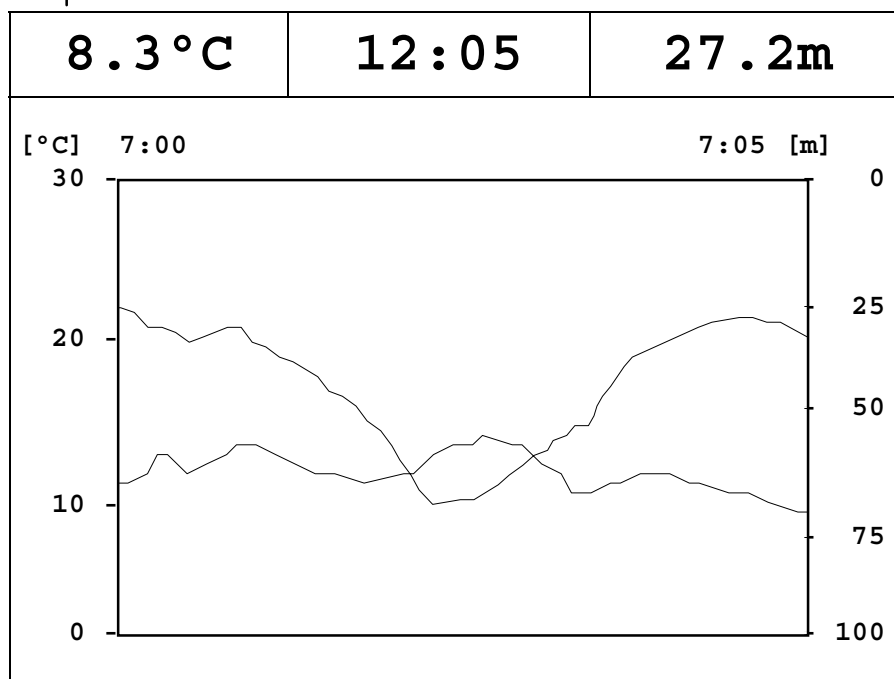
Depth over time or distance.

Temperature over time or distance.

ENT   *Call Setup for Depth display*

```
Setup for Depth:

 Scale for depth:                    0 →  100 m



 Color for depth:


 Scale for temperature:              0 → 20 °C
 Color for temperature:

 Interval of screen:                      TIME
  Time interval:                       5 MIN.
```

⬤   *Go to the function you wish to change*

0-9   *Key in new figure, or…*
+/-   *change setting*

ENT   *Confirm entry*

Scale for depth – there are six depth scales to choose from, ranging from 0-10m to 0-3000m. Toggle with +/- keys.

Color – for depth and temperature can be changed. Toggle between available colors by means of the +/- keys.

Scale for temperature – can be set to 0 - 10°, 0 - 20°, 0 - 30°, 10 - 20° and –10 - 10°.

Interval of screen – Interval for updating of screen can be related to TIME or DISTANCE.
TIME interval can be set in 6 intervals from 5 minutes to 3 hours (+ freeze) for refreshing of the screen.
DISTANCE can be set in 7 intervals ranging from 0.05nm to 90nm in order to adjust to the boat's speed, and you can freeze the reading.

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7.8 Echosounder setup

The 'Echosounder setup' display mainly consist of general settings, but also applies to a specific frequency where stated. The type of transducer selected (and installed) in the first two lines will also determine the frequencies.

The CAXX features two transceivers, a 50/200kHz (ECHO1) and a 38/200kHz (ECHO2), which gives the following dual frequency combinations: 38+50, 38+200 and 50+200 kHz.

One combi transducer <u>or</u> two single transducers can be connected.

☞ Do <u>not</u> connect both a combi + a second transducer at the same time – see the Installation manual for selection of transducer.

MENU   *Call up the menu bar, and…*
5,8   *press* [5] *and* [8] *to call up the* 'Echosounder setup' *display*

```
Echosounder setup:
Select transducers:
                         TYPE              PORT
 Transducer 1:     Simrad Combi C50/200    ECHO2


                      BEAM ANGLE          DEPTH
 Transducer 1:          12/07°          00.0 m

Keel depth below surface:               00.0 m
Display:                        DEPTH BELOW KEEL
Data on NMEA-out from:                    50kHz
Alarm for fish:          Strength: 30dB     OFF
Depth DS fish:          min: 0010m    max: 0100 m
Depth DK alarm min.:                  0005.0 m  OFF
Depth DK alarm max.:                  0100.0 m  OFF
Water profile:                            SALT
Velocity of sound in water:            1470m/s
Time/distance scale:                       OFF
Echo sampling:                          BOTTOM
Demo mode:                                 OFF
MENU Exit                       Accept   ENT
```

Use the cursor key to move cursor around in the display, and select new values by means of the +/- keys.

The ECHO1 port is for single transducers of 50/200kHz, including speed and temperature.

The ECHO2 port is for combi transducers as well as single transducers of 38, 50 and 200kHz, also with temperature.

Choose from the listed transducers where frequencies and other parameters are preset from the factory.

⚠ **Do not** connect transducers containing speed log sensor e.g. Airmar triducer B744V to ECHO2 port, as this will cause the 1kW pulses to be connected directly to the speed sensor and thereby damage the electronics beyond repair!

"Display" can show: DEPTH BELOW SURFACE, DEPTH BELOW TRANSDUCER, DEPTH BELOW KEEL.

"Data on NMEA-out from" - select the frequency you wish to use for transfer of data to connected navigator, plotter, etc.

"Alarm for fish" - set the strength from min. 00 (weak echo) to max. 99dB (strong echo), and you can set it ON or OFF.

"Depth DS fish" – define a specific area below the water surface of minimum and maximum depth for concentrated viewing.

"Depth DK alarm min. and max." – set up a depth limit alarm for depth below keel.

"Water profile" - choose between SALT and FRESH water. The setting will reflect on the:

"Velocity of sound in water" i.e. SALT = 1470 meters per second and FRESH = 1430 meters per second as standard. The standard settings can be even more accurate by slightly increasing the number of meters in warm waters and decreasing in cold waters.

"Time/distance scale" – will indicate the elapsed time or distance for the echo picture. The readout will appear in the upper part of the echo display. Toggle between time and distance in "Scroll synchronisation", section 7.9.

"Echo sampling" – is normally left at BOTTOM for total viewing all the way to the bottom, but can be changed to RANGE for a more defined search. In RANGE a new transmit pulse will be send out when the selected range has been reached. This will give a fast ping rate when searching for fish in mid water. AUTO range will switch to manual range setting. The depth alarm function has higher priority than the selected range.

"Demo mode" - the echosounder will function as though a transducer was connected, but all data presented in the displays will be simulated.

ENT   *Confirm entry with* [ENT]

☞ The system will not accept an illegal combination of transducers and will block from confirming changes to the setup display before the combination is right.

7.9 Presentation setup

The most common settings for adjusting the presentation of the high or low frequency echo picture are accessed by a single keystroke.

ENT   *Press* [ENT] *from active echo display*

```
Setup 50kHz:

 Range start:                          000 m
 Range:                                AUTO
 Gain:                                 +30dB
 White line:                           OFF
 Expansion window:                     6 m
 TVG:                    Normal (20 log  R)
 Ping to ping filter:                  ON
 Signal threshold:                     OFF
_Color threshold:                      OFF
 Depth grid:                           OFF
 Transmit pulse length:               AUTO

 Transmit power:                      AUTO
 Scroll synchronization:              TIME
 Scroll speed:                        HIGH
```

Use the cursor key to move around in the display and select new values by means of the +/- keys.

⬤   *Go to the function you wish to change*

0-9   *Key in new figure, or…*
+/-   *toggle between available values*

☞ Refer to Appendix A, for details on the functions.

ENT   *Confirm entry with* [ENT] *and return to the echo display*

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7.10 How the echosounder works

When the CAXX is turned on, the processor begins to send electrical pulses to the transducer. The ceramic resonators in the transducer has a special property which enables it to change dimensions slightly when a varying voltage is applied.
The voltage is thus converted to mechanical vibrations (sound waves) which are then transmitted down through the water.
See Fig. 1.

Fig. 1 – Transmitted 'ping' from the receiver/transmitter.

The sound waves move through the water until they encounter a change in density, such as a fish or the bottom. This causes the sound waves to "echo" back up through the water. When the reflected sound waves (echoes) hit the transducer, the ceramic disk vibrates at the same frequency.
This generates a varying voltage between the disk surfaces. This voltage goes back up through the cable to the receiver.
The CAXX processes the signals and presents them on the display screen.
See Fig. 2.

Echo from fish

Transmitted pulse

Fig. 2 – Echo returning to the receiver.

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7.11 Transducer beamwidth

The transducer mounted to the hull of your vessel serves as both a "speaker" when transmitting, and as a "microphone" when the echo-sounder is receiving. Similar to the way a flashlight focuses light, most of the sound from your transducer is focused downwards with a smaller amount going out to the sides. The amount of focusing of the sound beam is expressed as a "beamwidth".

Transducer

Approximation of the sound pattern below the transducer

This angle is the transducers beamwidth

½ maximum intensity

Maximum intensity
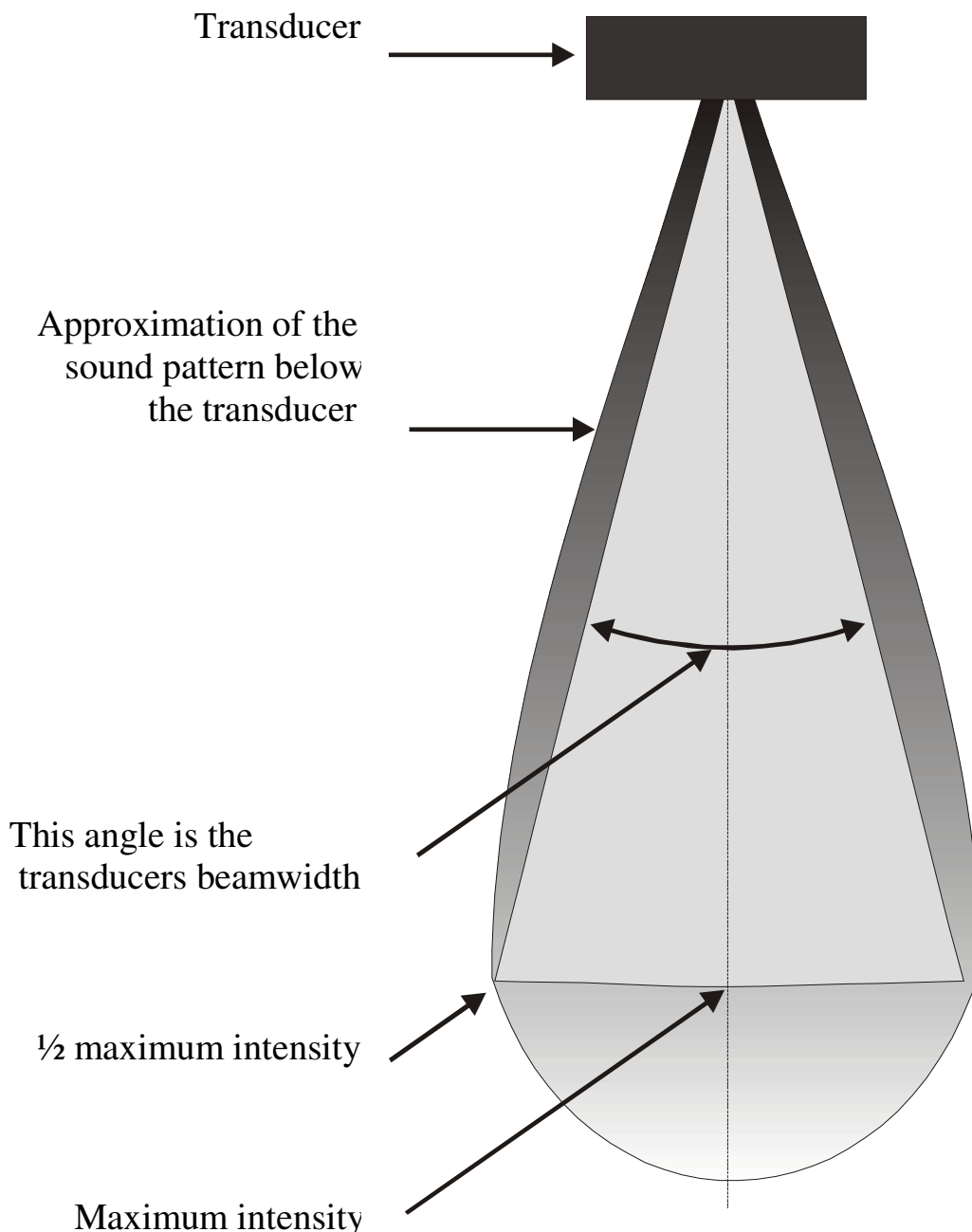
Figure 3 – A representation of a transducer beamwidth

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The center of the sound beam is the most intense, then as you move out towards the sides of the sound beam there is a point where the intensity of the sound is half what it was in the center. The distance moved is the "beamwidth". See Figure 3.

7.12 Effects of the vessel's speed

The display of fish on the CAXX depends directly on the vessel's speed, as well as on the depth of the fish. When the vessel is at rest, the echo traces will appear stretched and flattened. As the vessel's speed becomes greater, the echo traces will become shorter and more arched. The reason for this change in appearance is that as the vessel speed increases fewer number of sound "pings" strike each fish. A low vessel speed will provide the most accurate information of where fish are located.

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8. Radar operation

The CAXX combines chart plotting with radar navigation. For first time users of Radar, we have included a basic description of the radar presentation with a basic understanding of how the controls affect the radar's operation and display.

The following paragraphs describe the control settings used for initial display setup, turn-on procedure, inclement weather operation and finally the turn off procedure. Radar controls are described in chapter 8.2.

8.1 Radar map

The radar picture appearing on the display is a map-like representation of the area in which the radar is operating. Typically, the ship's position is at the center of the display. The operator may reposition or offset the ship's position up to 66% of the radius anywhere on the screen. The ship's dead ahead bearing is indicated by the heading line flashing at the 0° relative bearing with every revolution of the sweep trace (Head-Up mode).

Coastline contours and landmass are generally depicted in solid filled yellow (DAY) or green (NIGHT) echo areas. Other surface vessels, and channel buoys, are displayed as smaller single "pips" or echoes. The radar picture or map can be viewed in many different sizes or scales from own ship. These sizes are selected by the range scale controls. Greater detail of radar echoes nearby own ship is shown when the short or nearby range scales are selected. The best technique for assessing the radar presentation characteristics is to start with using a longer range scale and then switching to shorter ranges when nearby targets appear, or as the ship approaches the coastline, harbor, or other vessels in the area.

The long range scales (i.e. 3, 6, 12, 24nm) best show the overview of the ship's relationship to landmasses, weather fronts, and large ship targets at or beyond view.

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8.1.1 Map orientation

In the RELATIVE mode, the heading line always appears on the screen at 0° relative according to the on-screen bearing scale, and is coincident with the antenna beam passing the ship's bow. Thus the top of the displayed picture represents the direction in which the ship is heading.

All targets appearing on the display are "Relative" to own ship's position and heading. As you look outside at targets around you, you will see that the targets are appearing on the Radar display at the same relative bearing.

The Electronic Bearing Lines (EBL) are available radar tools used to measure bearings to radar targets from own ship. The bearing readouts may be in relative or true modes.

8.1.2 Environmental effects

The effects of **weather** and **water surface** conditions generally act to reduce the ability of radar to detect targets. Weather effects reduce the long range at which targets can be detected. Water surface clutter (waves) reduces the ability to detect targets close by. Either can obscure the echoes from targets that may prove dangerous to your vessel.

You can't see **wind** on your radar screen, however you can see its effects when it produces waves and spray on the water surface. "Sea Return" is most pronounced in the direction from which the wind is blowing. Proper use of your "Sea clutter" (also known as STC) adjustment can reduce the effect of wind and waves, but care must be taken not to increase the control to the point where weak targets will be overlooked.

Rain, hail and snow can return echoes that appear on your radar screen as a blurred or cluttered area. Targets within the area of **precipitation** can be masked by the clutter. The maximum range of the radar pulse is greatly reduced as the energy of the radar beam is scattered and absorbed by the water droplets. Proper use of your Rain Clutter (also known as FTC) adjustment helps you to look into areas of precipitation to detect targets.

Buoys are moored to the bottom with concrete via chain. The chain is longer than the depth of the water to allow the buoys to ride in the current and go up and down with the tide. Unfortunately this allows the buoys to lean in the direction of **the current.** Radar reflectors built into the buoy do not work well when the side of the buoy is pointed to the sky. Therefore if you are going with the current, the images of the channel markers may appear faint. If you are going against the current, the buoys will be leaning in your direction and produce a stronger image on the radar screen.

The iron mass and angles of the metal in the structure of a **bridge** can cause unpredictable interference patterns on your radar. It is not unusual for a reflected image to appear on the radar screen in front of you just as you pass under the bridge. A similar effect is also common on sailboats where the radar antenna is mounted close to an aluminum mast.

Overhead cable crossings can mimic a moving target on your radar screen. The cable target usually appears to be on a collision course. The entire length of cable does not appear on the screen, only a point on the cable, and that point keeps changing giving the illusion of a moving target.

8.1.3 Effects of ship's movement

Radar images can be drawn in two ways on the radar display to show the ship's motion. The type of display modes are called "Relative motion" and "True motion". In Relative motion, the most common radar display mode, own ship is permanently fixed at the center of the display but radar echoes (targets) move in relation to your vessel. With no movement of the ship, a steady display of fixed radar echoes is shown. If the ship is moving ahead on a constant course, echoes appearing at the top of the display will move downward across the display. Your own ship's position will always remain at the center of the display.

If the vessel alters course to the right, the displayed echoes will be displaced by an equal amount in bearing in a counterclockwise direction, and vice versa. These changes in the display pattern with ship movement is an extremely important characteristic to remember

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when maneuvering around nearby vessels, or buoys.
The True motion display mode can be compared to your vessel moving on a map or chart. In True motion mode, the surrounding landmass echoes remain stationary on the screen and if your ship is moving at a constant course and speed, you will see your position move across the screen towards the edge of the display. Any other targets which are underway will also be moving on the display screen at their True course and True speed. All motion seen on the True motion display is "TRUE" (meaning motion over the ground).

8.1.4 Navigational echoes

Echoes displayed on the radar screen may be large or small, bright or faint, depending on the size and shape of the object and its angle relative to your radar antenna. The radar indication is not always the same as an observer's visual indication; a nearby small object may appear to be the same size as a distant large object on the radar. With experience, however, different targets can be identified by the relative size, brightness, and position of their radar echo returns.

Buoys and small boats are one example of targets that are sometimes difficult to distinguish from each other. Their movement in the waves do not present a consistent reflecting surface. Consequently, their echoes have a tendency to fade and brighten or sometimes to disappear momentarily. Although buoys and small boats often resemble each other, usually the motion of one target identifies the boat from the buoy.

High coastlines and mountainous coastal regions are often observed at the longest ranges of the radar. However, the first sight of landfill on the radar's longest ranges may be a mountain several miles inland from the coastline and not the actual coastline. The coastline may not appear on the radar until the vessel has approached land nearer the line of sight distance.

8.1.5 Sea return

Not all radar echoes are produced by hard navigation items such as boats, buoys and land. Some radar echoes may be received from irregularities on the surface of the water, particularly at close range by

breaking wavecrests, particularly in windy weather and in heavy seas. These echoes appear on the radar screen on the very short range scales as multiple small echoes next to own ship. Under high winds and extreme conditions the echoes from sea clutter may appear as dense background of clutter forming the shape of an almost solid disc, as far as one to two miles in all directions from own ship. The radar has a control which can be used to minimize the effects of sea clutter pickup on the screen.

8.1.6 Storm and rain squall returns

The radar can also see echoes from rain or snow. Echoes from storm areas and rain squalls consist of countless small echoes, continuously changing in size, intensity, and position. These returns sometimes appear as large hazy areas on the display depending on the intensity of the rainfall or snow in the storm cell. The cells usually may be visible at long distances due to their high altitude above the radar horizon and are very helpful for observing potential bad weather conditions. If the returns from storm areas and rain squalls are not desired, the RAIN clutter control can be adjusted to minimize the effect on the radar screen.

8.1.7 Blind sectors or shadow effect

Funnels and masts, (when located near the antenna array) may cause shadows. Shadow areas can be recognized since beyond the obstruction there will be a reduction of targets and noise intensity, although not necessarily a complete cutoff seen on the screen. However, if the shadow angle is more than a few degrees, there will be a blind sector.

In some shadow sectors the beam intensity may not be sufficient to obtain an echo from a very small object even at close range, despite the fact that a large vessel can be detected at a much greater range. For this reason, the angular width and relative bearing of any shadow sector should be determined at installation. Sometimes shadowing can be seen on the screen by increasing the radar gain until noise is present. Darker sectors indicate possible shadowed areas. This information should be posted near the display unit, and operators must be alert for objects in these blind sectors.

8.1.8 Side lobes

Echoes on the radar screen are not always the direct returns to the radar antenna. There are many types of false echoes that can appear on the display if certain conditions occur. The sections that follow, briefly describe the echo patterns that may be produced by these false echoes and their likely cause. It should be noted that the radar operator, through observation, practice, and experience usually can detect these conditions very quickly.

A very small part of the RF (Radio Frequency) energy from each transmitted pulse is radiated outside the radar's narrow beam, producing side lobe patterns. Side lobes normally have no effect from distant or small surface objects, but the echo from a large object at short range may produce an arc pattern on the radar screen similar to a range ring, or appear as a series of echoes forming a broken arc. Side lobe echoes normally occur at a range below 3 miles and usually can be reduced by adjustment of the SEA clutter control.

8.1.9 Radar interference

Whenever two or more radar equipped vessels are operating within reception range of each other, mutual interference is likely when the radars are operating near the same frequencies. This interference usually appears on the screen as a series of small dots. The interference seems to move from the PPI center (radar screen), sometimes in a straight line, but more often in a long, sweeping curve. This type of interference is more noticeable on longer range scales. This does not, as a rule, impair the effectiveness of the radar as a navigational aid. Since the interference can be completely eliminated by turning IR "ON" in the function menu. The IR feature is normally left "on".

8.1.10 False echoes

Occasionally, echoes may appear on the screen at positions where there is no actual target. This type of target is called a False Echo. Sometimes they are known as Ghost Images, Indirect Echoes or Multiple Echoes depending on how they are generated.

Ghost images usually have the appearance of true echoes, but, in general, they are intermittent and poorly defined. A true ghost image retains

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a fixed relationship with respect to the true image and characteristically produces a more arc-like appearance with a tendency to smear on the screen. Ghost images are sometimes caused by large targets which have a wide, smooth surface as they pass by near your own ship. Ghost images sometimes are referred to as indirect echoes. Indirect echoes may appear when there is a large target, such as a passing ship at a short range, or a reflecting surface, such as a funnel or spotlight on your own ship in line with the antenna. The signal, on first striking the smooth side of the large target, will be reflected, and these subsequent echo returns to the antenna are shown on the display. However, the same reflection may also hit other masts or obstacles and then be picked up by the radar antenna with enough strength to appear as a target on the radar screen at various locations.

Multiple echoes could appear if there is a large target having a wide vertical surface to your own ship at a comparatively short range. The transmitted signal will be reflected back and forth between the wide vertical surface of the target and your own ship.

Thus, multiple echoes will appear beyond the true target's echo on the same bearing as shown below. This is not a very common phenomena.

True echo

Multiple echoes
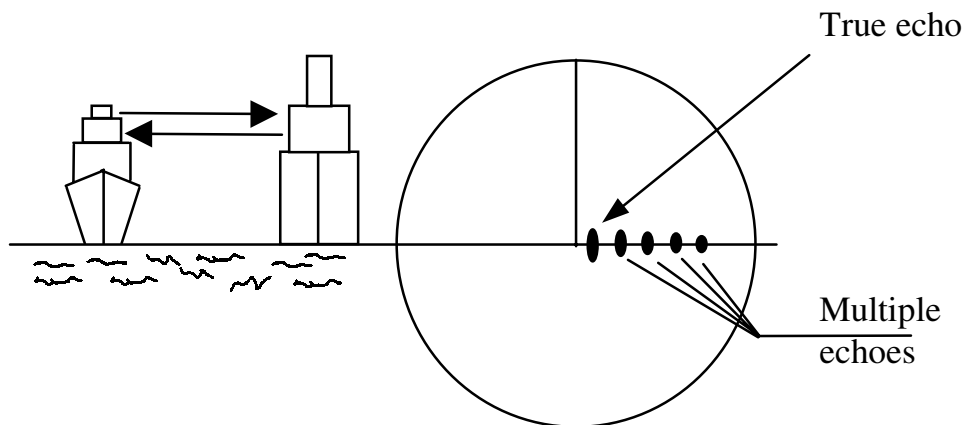
8.2 Starting operation

The Golden Rule!
Today's radars are packed full of neat features designed to make your cruising more enjoyable and safer. Use these features when you can, but remember the old axiom KISS (keep it simple sailor). If a target shows on the display, there most likely is something there. If there are no targets shown on your display, it doesn't guarantee there are no other objects around. *Maintain a good visual watch, proceed at a safe speed and enjoy your boating.*

8.2.1 Radar menus

Main radar menu:

`MENU` *Call up the menu bar, and…*
`6` *press* [6] *to call up the* RADAR *main menu*

```
                 6
              RADAR
    1   Radar
    2   Dual radar
    3   Radar setup
```

- see section 8.2.5
- see section 8.2.6
- see section 8.2.2

Radar quick menu:

`RADAR` *Hotkey to radar display*
`ENT` *press* [ENT] *to activate the pop-up window:*

```
          Radar quick menu
    5   Lock chart cursor to radar cursor
    6   Lock chart scale to radar range
    7   Show active navigation point
    8   Show cursor EBL
  MENU  Exit
```

- see section 8.2.7
- see section 8.2.7
- see section 8.2.7
- see section 8.2.8

8.2.2 Initial radar display setup

After the installation has been completed there are a number of para-meters to check out and adjust according to the actual circumstances. All defaults from the factory are tested for various situations, however, if your situation is such that adjustments are required, please refer to the details described in this section.

☞ The Scanner type is preset to Auto detect and as such, the system will automatically initiate the correct parameters for the connected scanner.

MENU *Call up the menu bar, and…*
6,3 *load Radar setup display*

Example:

HU	0.50nm
Power off	
TI	
Tune	AUTO
Gain	AUTO
Sea	AUTO
Rain	
Scanner type Auto detect	
Antenna height	05m
Heading adjust	000.0°
Tuning reference	079
Zero range/timing	0109
Sensitivity	048
GZ target threshold	5
Stand-by time	000000h
Transmit time	000000h
Auto sea minimum	035
Auto sea default	050
Auto sea maximum	070
Auto gain minimum	080
Auto gain default	090
Auto gain maximum	105
Test scanner	Activate

Head-**U**p, **N**orth-**U**p, **T**rue **M**otion.
Range scale is 0.50nm.
Power off, X-MIT, Stand-by.
TI: Tuning indicator.
*Tune, Gain, Sea: Press CLR to toggle between auto and manual operation.
*Rain: Rain Clutter / FTC.
Scanner type: Auto detect, Demo, (and RB714A, RB715A, RB716A)
Antenna height: 5m above water.
*Heading adjust: in degrees to 0°.
*Tuning reference: adjust if necessary.
*Zero range/timing: adjust if necessary.
*Sensitivity: adjust if necessary.
*GZ Target Threshold: levels of 1 to 7.
Stand-by time: Elapsed standby time.
Tx time: Elapsed transmission time.
*Auto sea and Auto gain are preset for best performance under normal conditions.
*= Only adjustable in X-MIT mode.
More details on next pages.
Test scanner (for technicians only).

ADJ *Open for adjustment*
- a warning will pop up that you are about to change settings for the

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radar, press [MENU] to abandon, or [ENT] to continue. Use the cursor key to move around in the settings. Toggle between available values with the +/- keys, and insert data by the numerical keys.

ENT   *Confirm the adjustments by* [ENT] (or [MENU])

Scanner type: is preset to Auto detect. After having installed the scanner (see the Installation manual for selection of scanner), the system will automatically set up the correct parameters for the connected scanner. However, if the Auto detection fails, you could try to manually set up the connected scanner. The radar function must stay in **Power off** mode until you have selected the correct scanner type – toggle through available types with the +/- keys, but…be careful not to select the wrong type of Scanner, as this may cause a system failure.
☞ Demo mode – see section 8.2.9.

Antenna height: enter the actual height above water of the radar antenna/scanner.

Heading adjust: Orientation should be HU (Head-Up). Turn the ship, so a target becomes visible in the front and adjust until target is straight ahead on the heading line. Use the +/- keys to position it correctly.

Tuning reference: is preset to 079. Normally there should be no need to adjust the Tuning reference. However, if sensitivity is poor or there are any symptoms at all suggesting improper tuning, you may need to make an adjustment: Choose a displayed range of 3nm or higher. Use cursor to go to the Tuning reference value. Use +/- keys to adjust the value in single steps (allowing 3-4 revolutions) until weak echoes in the distance becomes acceptable.

Zero range/timing: Most common settings are between 105 and 115. Default setting is: 109.
To adjust: Press the [9] key to set the displayed range to 0.125nm. Use cursor to highlight "Sea" and with +/- keys set the sea clutter very low, so you can see the transmitting pulse. Now adjust the value for Zero range so the ring around the ship is very small.
If you have knowledge of the distance to a nearby object, say a mast or a buoy, you can verify if the Zero range is set correctly by measuring

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the distance. To do so, place the VRM ring on top of the object and check the readout in the control panel (follow procedure in sec. 8.2.5). If the readout is not the same as the known distance, adjust the value in Zero range with 1 figure up/down for every 3 meter adjustment.

Sensitivity is preset to 048. Adjust value if echoes are not reasonable clear i.e. the higher the value, the less detailed presentation of echoes.

GZ target threshold: is preset to 5. Objects are identified according to weak/strong signals. 1= weakest, 7= strongest.

Auto sea and **Auto gain** settings i.e. Minimum, Default, Maximum: If necessary, the factory presets can be adjusted (0 to 255) to improve the clarity of the echoes. After the adjustment, the new values will be the new AUTO settings. Preset parameters can only be adjusted from X-MIT mode *after correct scanner type, etc. has been selected and Stretch mode is left in off position (Gain must be adjusted before Sea)*:

• **Auto gain values**
To adjust the preset values, you first have to:
1. Adjust Rain to minimum acceptable value: move cursor to the 'Rain' bar, and adjust with +/- keys.
2. Adjust Sea to minimum acceptable value: move cursor to the 'Sea' bar, and adjust with +/- keys.
3. Set 'Tune' bar to 'AUTO' mode: move cursor to the 'Tune' bar and press [CLR].
4. Choose a displayed range of 3nm (press key [4]) or higher.

Now you are ready to adjust the Auto Gain values in the last three lines of the Radar setup display:
Auto gain minimum (factory value 080): Adjust to optimum radar image - fairly clear targets and no noise.*
Auto gain default (factory value 090): Adjust to best picture.*
Auto gain maximum (factory value 105): Adjust to maximum allowable level of noise.*
*) wait for screen to update to see the result of adjustment.

Auto **Gain** adjustment bar

	AUTO	

Level: 080   090   105

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• **Auto sea values**

To adjust the preset values, you first have to:

1. Adjust Rain to minimum acceptable value: move cursor to the 'Rain' bar, and adjust with +/- keys.
2. Set 'Sea' bar to 'AUTO' mode: move cursor to the 'Sea' bar and press [CLR].
3. Set 'Gain' bar to 'AUTO' mode: move cursor to the 'Gain' bar and press [CLR].
4. Set 'Tune' bar to 'AUTO' mode: move cursor to the 'Tune' bar and press [CLR].
5. Choose a displayed range of 0.5nm (press key [7]).

Now you are ready to adjust the Auto sea values in the lower part of the Radar setup display:

<u>Auto sea minimum</u> (factory value 035): Adjust to visible Sea clutter on screen.*

<u>Auto sea default</u> (factory value 050): Adjust to best picture.*

<u>Auto sea maximum</u> (factory value 070): Adjust to max. allowable suppression of sea clutter.* (If the value is set too high, some targets may be invisible on close range).

*) wait for screen to update to see the result of adjustment.

Auto **Sea** clutter adjustment bar

Level: 035   050   070
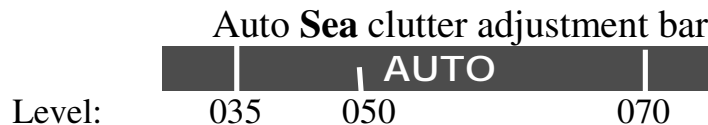
Test scanner – to activate press one of the +/- keys, which will call up an info window with technical details. (For technicians only).

8.2.3 Start transmission

Normally when starting the transmission, it will take approx. two minutes for the antenna to warm up and be ready for transmission. For initial start-up and after long storage, see below.

Make sure nobody is standing close to the radar antenna when it starts to rotate after the transmission is activated!

RADAR TX
2 sec's

Press [RADAR] *from full-screen window to load Radar display, and press for 2 seconds* [TX] *to start a count-down of 120 seconds to warm up the antenna*

However:
☞ Starting up the first time after installation or after long storage (6 months), the antenna will need an extra 20 minutes to warm up, so when the count-down of 120 seconds are finished, the radar must be left in Standby mode for the extra 20 minutes it takes for the antenna warm up properly. This way you will contribute to the lifetime of the magnetron in the radar antenna.

RADAR TX
2 sec's

Press [TX] *for 2 seconds again,*
- when you are ready to start transmitting.

8.2.4 Shut down procedure for the radar function, or back to 'Standby'

TX
2 sec's

Press [TX] *for 2 seconds to Power off, or press* [TX] *for 2 seconds twice to enter Standby mode*

Power off: Pressing [TX] once will start a count-down from 9 to 0 and the radar function will shut down.
Standby: Before the count-down reaches 0, press [TX] for two seconds again to return to the radar function in standby mode without shutting it off.

8.2.5 Standard radar display

The radar display can appear in ½ or full screen windows.
The Radar display can only appear in one PAGE at a time.

`RADAR` *Hotkey to Radar display*
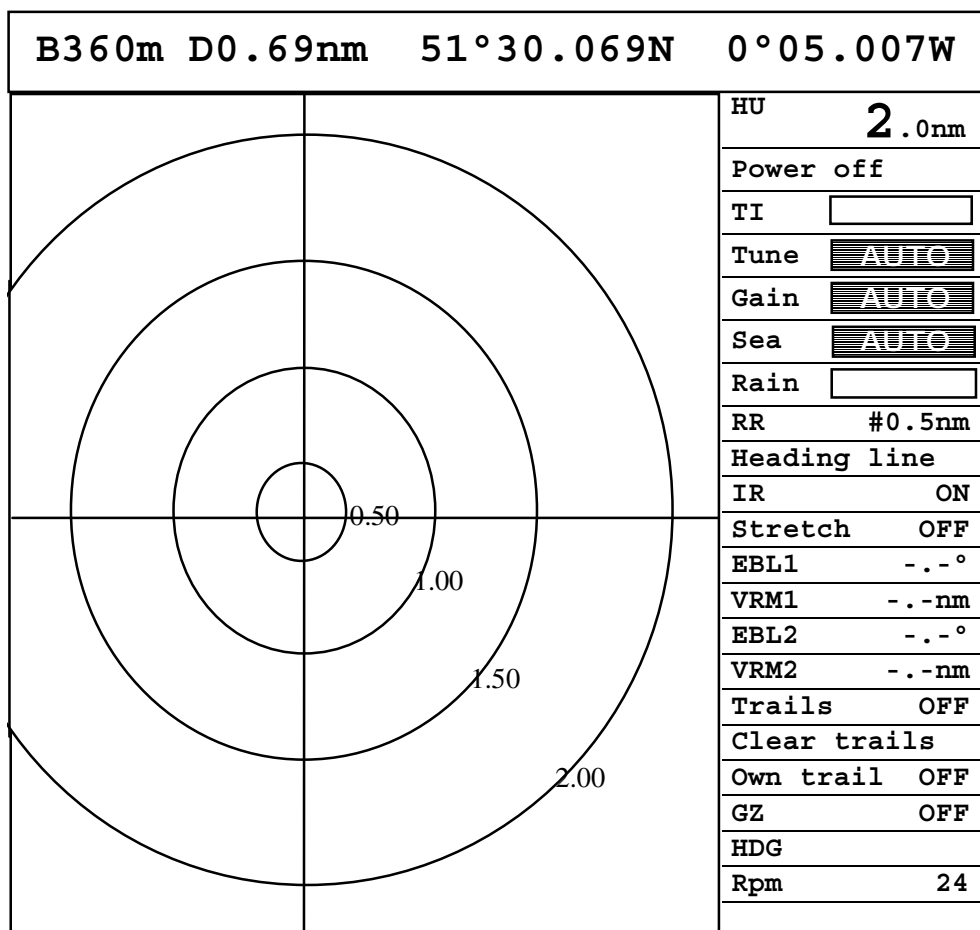-pressing the RADAR key from any other active ½ or full screen, will
load the radar display.

Or load the radar display via the menu:

`MENU` *Call up the menu bar, and…*
`WIN` *select the WINdow in which the radar display should appear, and…*

`6,1` *load Radar display*
- the top line indicates the bearing and distance from ship's position to
cursor position, or ships position with COG and SOG indications.

```
B360m D0.69nm   51°30.069N   0°05.007W
```

HU **2**.0nm	The control
Power off	panel will
TI [ ]	appear as this
Tune AUTO	example in full
Gain AUTO	screen presen-
Sea AUTO	tation.
Rain [ ]	
RR #0.5nm	In ½ windows,
Heading line	there will only
IR ON	be room for
Stretch OFF	half the size.
EBL1 -.-°	Toggle
VRM1 -.-nm	between first
EBL2 -.-°	half and second
VRM2 -.-nm	half of menu
Trails OFF	by pressing
Clear trails	[ADJ].
Own trail OFF	
GZ OFF	
HDG	
Rpm 24	

Radar display circles labeled 0.50, 1.00, 1.50, 2.00

`ADJ` *Open for adjustment*

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● *Use cursor to move around in the control panel*

ENT *Confirm changes by pressing* [ENT] (*or* [MENU])

There is no regret or "exit without making any change"-key from the control panel. As soon as the keys are pressed to change a function, the actual change is immediately carried out.

Orientation can be either: **HU**, **NU** or **TM**

HU (**H**ead-**U**p in relative motion): The heading line always appears on the display at 0 degrees as the antenna passes the bow of the vessel. Targets appearing on the display are relative to your own ship's position and heading. Most people will operate the radar in Head-up mode, as it allows for the easiest interpretation of the situation around your boat.

NU (**N**orth-**U**p in true motion): In this mode, targets are displayed at their measured distances in true direction from your boat. North being at the top of the display. In the NU mode, you must be interfaced with an electronic compass for proper operation.
Receiving the alarm: "Heading missing" the system will change to Head-Up in relative motion.

TM (**T**rue **M**otion): Targets are displayed at their measured distances in true direction from your boat. Own ship moves past land, buoys and fixed objects. In the TM mode, you must be interfaced with an electronic compass for proper operation.
Receiving the alarm: "Heading missing" the system will change to Head-Up in relative motion.

2.0nm in this example, indicates the displayed range in the radar picture.

Power off use the +/- keys to toggle between: Power off, X-MIT and Standby.

TI is the **T**uning **I**ndicator, which provides an indication of the signal strength.

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Tune – see Glossary.
To return to AUTO after manual adjustment, press [CLR].

Gain – see Glossary. Gain can also be adjusted directly from keypad.
+/- keys will adjust radar gain. Optimum adjustment: Press [+] till
noise appears, then press [-] till noise just disappears again.
Press [CLR] to toggle between manual and auto operation.

Sea – see Glossary + section 8.1.8 and 8.2.2.
Press [CLR] to toggle between manual and auto operation.

Rain – see also Glossary and section 8.2.2.
- adjusting for Rain clutter: Rain clutter or FTC (Fast Time Constant)
removes the leading edge of the returning signal. Rain or snow returns
cause many small echoes, continually changing in size and position to
appear as a hazy area on the display. Rain and snow targets do not have
much depth. By removing the leading edge, the unwanted echoes will
disappear leaving real targets visible. The amount of delay is controlled
by the rain clutter adjustment. As you increase the adjustment, the
delay will get larger causing the returning signals to decrease, or
disappear. Do not adjust the rain clutter too high, as this will eliminate
all small targets.

☞ To properly adjust for rain clutter:
1. Set rain clutter to the OFF position.
2. Set gain.
3. Slowly increase rain clutter until the hazy area caused by the rain
   or snow become less dense. Increasing it too much will not only
   remove the rain clutter, but also any targets inside the rain area.
   Note! Since Rain and Snow are continually changing in size and
   density, tweaking of the rain clutter adjustment is necessary to
   maintain the best results.

RR = RangeRings – toggle between # *.** (as display example), *.**
(no RR figures), OFF (no RR)

Heading line can disappear for approx. 5 seconds (move cursor to
highlight "Heading line", then press +/-).

IR (Interference Rejection) – toggle between ON and OFF, see sec.8.1.9.

Stretch – toggle between OFF, Auto, Pulse and Video.
Auto: the radar system will choose the optimum solution.
Pulse: will select the nearest longer pulse length on the screen, so the weaker targets far away will be enlarged.
Video: all targets will be enlarged.

EBL (Electronic Bearing Line) **mode:** In this mode a dashed line can be rotated counter-clockwise or clockwise by means of the zoom keys. The bearing from the boat to the target can be displayed in True or Relative degrees. Reset figures with [CLR].

VRM (Variable Range Marker) mode: This is an option that allows to increase or decrease a circular dashed line by means of the zoom keys. The control panel at the side or below the radar display, will indicate the distance in nautical miles that the dashed line is from the boat. By placing the dashed line over a target or over an object, it will indicate the distance to same. The readout automatically adjusts for the range the radar is on. This dashed line can be placed over either a moving target, such as another boat, or a fixed target, such as land. The VRM feature should only be active when needed, and otherwise turned off [CLR] to eliminate extra clutter on the radar screen.

Trails after targets – toggle between OFF, 30sec, 1min, 2min, 5min, 10min, 15min, 30min, PERM (permanent). See also Glossary.

Clear trails will clear all trails, both from targets and own boat.

Own trail – toggle between OFF and ON.

GZ (Guard Zone alarm) –can be set OFF / IN / OUT –see also Glossary. Define your "comfort" zone by means of the EBL and VRM markers. Procedure: Use cursor to go to EBL1 and set the EBL line with +/- keys – this is the first "wall" of the guard zone. Go to EBL2 and set the second "wall". Then go to VRM1 and set the top/bottom "wall" with +/- keys. Go to VRM2 and set the second of the top/bottom "wall".

Then go to GZ and choose:
IN = the alarm will be activated if any target enters the defined guard zone.
OUT = the alarm will be activated if a target leaves the defined guard

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zone i.e. a target must be present inside the GZ when the function is activated.

And lastly, go back to EBL1, EBL2, VRM1 and VRM2, and clear all four settings by pressing the [CLR] key from the value of each. This will give a better view of the defined guard zone.

☞ The guard zone is not available in the secondary radar display in Dual Radar mode.

HDG – your heading will be shown (full screen presentation) in degrees from connected compass. If no compass is connected, you can use the course (COG) from the built-in GPS module by setting "Heading" OFF in NMEA INPUT interface setup in [MENU], [8], [2].
☞ When using the GPS course for heading, the accuracy will be reduced in relation to speed, wind and current.

Rpm – will determine the scanner rotation (full screen presentation). The rotation speed will be controlled automatically when leaving Scanner type to Auto detect in Radar setup (MENU,6,3).
Manually, the rotation speed can be set to either 24 or *48 rpm, depending on the scanner type (use +/- keys).
*Running 48 rpm is liable to reduce the lifetime of the mechanical parts.
☞ Do not change the Scanner rotation while the radar is transmitting. Make sure the radar function is either in "Standby" or "Power off".

8.2.6 Dual radar display

|	
MENU	*Call up the menu bar*
WIN	*Select full-screen image*
6,2	*Load the Dual radar display* – see next page.

This feature requires a full-screen presentation, with the standard display in the left half of the screen and the secondary radar display in the right half of the screen. The two half-screen radar displays can be set up and operated independently. With the dual radar screen activated it is not possible to have a different radar display appearing in a different page. The radar function can only be presented in one page at a time.

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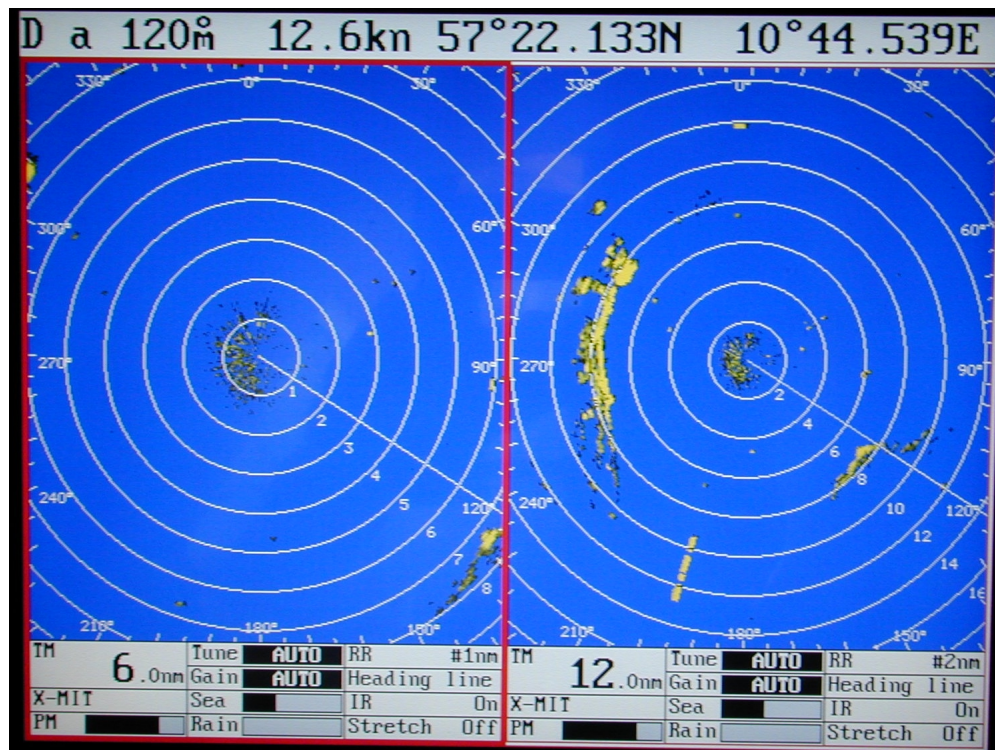
Standard radar display   Secondary radar display

To make adjustments in the standard radar display (left half of screen):

ADJ   *Open for adjustment*
- by pressing [ADJ] again will toggle between 1st and 2nd half of control panel.

●   *Use the cursor key to move around in the control panel*
- and toggle between available values with the +/- keys, and insert data by the numerical keys.

ENT   *Confirm changes by pressing* [ENT] *or* [MENU]

To make adjustments in the second radar display (right half of screen):

WIN   *Go to the second radar display*

Carry out adjustments by using the same procedures as mentioned above for the standard radar display, except for the guard zone which is not available in the secondary radar display.
☞ Indication of HDG (heading) and Rpm (scanner rotation speed) is only available in full screen presentation.

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8.2.7 Split-screen operation

Improve safe navigation with radar image and chart on the same screen. To split the screen in two halves from any window combination where you want to have a chart in the left half of the screen and the radar display in the right half of the screen:

`MENU` *Call up the menu bar, and…*

`WIN` *press the* [WIN] *key until the left half of the screen is highlighted in the screen symbol in the top right corner of the menu bar*

`1,1` *Select chart 1 from the chart menu*
- you now have a chart presented in the left half of the screen and are ready to load the radar display in the right half of the screen:

`MENU` *Call up the menu bar, and…*

`WIN` *press the* [WIN] *key until the right half of the screen is highlighted in the screen symbol in the top right corner of the menu bar*

`6,1` *Select radar display from the radar menu*
- you now have a chart and radar display presented on the same screen.

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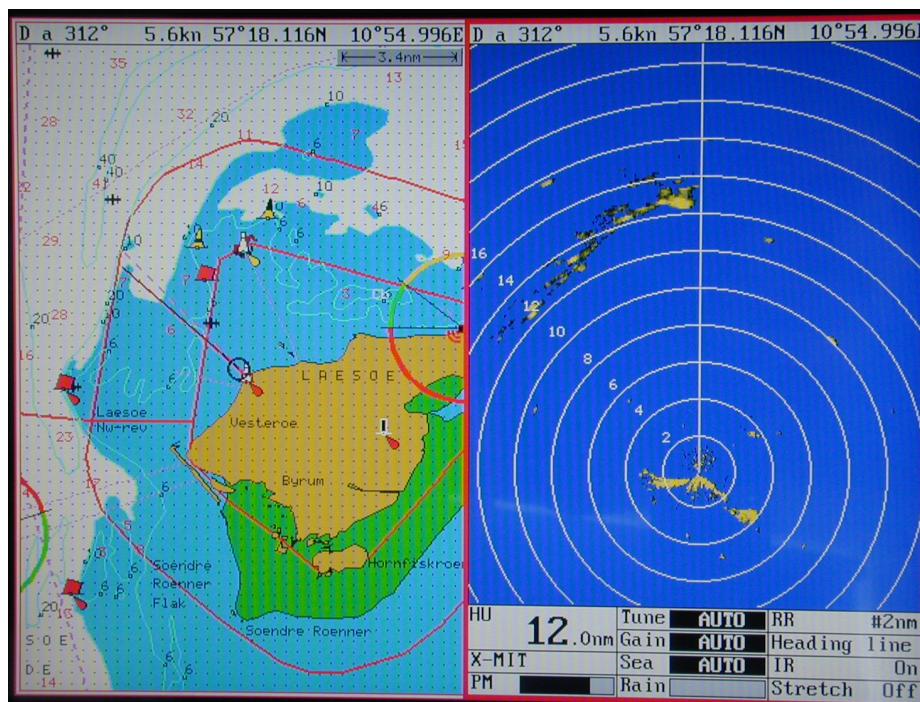
As an example you may want to try and match the ship's position on the two charts by setting them both to Head-Up orientation:

ENT From chart display (left window), *press* [ENT], [9] *Chart setup*

⬤ *Go to* Orientation

+/- *Toggle to* HEAD UP *and* RELATIVE *modes*

ENT *Confirm entry*

WIN *Go to the radar display (right window)*

ADJ *Open for change in the control panel*

+/- If orientation is not **HU** (HEAD UP), *use the +/- keys to toggle to* HU

ENT *Exit control panel*

• **Synchronize cursors or scale and range** (will require heading input from connected sensor)
Another method of obtaining a match between radar and chart displays is to lock the chart cursor to the radar cursor, or lock the chart scale to the radar range. The lock function is controlled by the radar display, which means that e.g. moving the cursor in the radar display will move the cursor in the chart display as well. However, when moving the cursor in the chart display, nothing will happen in the radar display, because the synchronization is 'one way only'. Also, when activated, the radar display will then automatically place itself in the left side of the screen - if it's not placed there already.

To activate cursor lock or scale/range lock from radar display with cursor active:

ENT *Press* [ENT] *to activate pop-up display 'Radar quick menu'*

5 *Press* [5] *to lock chart cursor to radar cursor*

6 *Press* [6] *to lock chart scale to radar range*

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Synchronizing cursors or scale/range can be applied individually or combined.
☞ To release the lock, repeat procedure or remove one of the displays from the screen.

• **Show active navigation point on radar display** (will require heading input from connected sensor)
Having activated one of the navigation modes from the chart display (refer to sections 6.5.1 to 6.5.4), you can make the approaching waypoint + next waypoint appear on the radar display as well:

`WIN`   *Go to radar display in right half of screen*

`ENT`   *Press* [ENT] *to activate pop-up display 'Radar quick menu'*

`7`   *Show active navigation point*

This function will stay active for as long as you wish. Turning the navigation mode off, will temporarily set it out of function, because there is nothing to show - but when you start navigating, the function will become active again. You do not have to turn it on and off all the time.
☞Repeat procedure to hide active navigation point on radar display.

8.2.8 General features for the radar operation

• **Alarms:**
The alarms that can appear in connection with the radar operation, are:
- Guard Zone alarm
- Rotation lock alarm (check connection to scanner)
- Trigger fail alarm (check connection to scanner)
- Heading missing alarm (check connection to compass)
- Communication failure alarm (check connection to scanner)
- Communication time-out failure alarm (no communication between
  display and scanner)
- Bearing zero alarm (check if scanner is rotating)
- Bearing pulse alarm (check if scanner is rotating)

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● **Cursor EBL** (HU or NU modes) - will provide an image on the radar display which will determine the risk of a collision if you continue on the proposed course line. Press [ENT] to activate the pop-up window 'Radar quick menu', and press [8] to show cursor EBL. Now position the radar cursor further ahead in the anticipated course line. A dotted line will be drawn from your own position to the cursor position, and thus reveal if there is a potential risk of colliding with a moving or fixed target.

The bearing and distance from ship's position to cursor position will be displayed in the top line of the screen.

☞ In TM mode the cursor will act as a dynamic cursor (not for anti-collision use).

● **Off-center mode** – permits the operator to obtain a greater view in the direction of interest. Place the cursor within 2/3 of the display and press the [0] key. The ship's position will now be moved to the cursor position and thereby increasing the desired area of view. To deactivate the Off-center mode, press [CLR] and [0]. This will replace the ship's position back at the center of the display. If the radar system is turned off while the Off-center mode is on, at next power up the offset mode will still be on.

● **PLOT function –** will require that a heading sensor (Gyro or Compass) is connected to the CAXX. If so, then you can plot the actual cursor position on the radar display by pressing the [PLOT] key from the radar display, and thereby save the position in the WP-list as a waypoint i.e. you can give the plotted waypoint a new name/number, symbol, color, etc.

● **Radar colors -** There are two color settings to choose from for the radar display i.e. DAY and NIGHT. See Palette setup ([MENU],[8],[6]).

● **Range rings:**

The extension of the range depends on how powerful the connected radar antenna is. There are several ways of adjusting the range on the

screen, the quickest way is:

1-9   *Use one of the shortcut keys to quickly go to a different range:*

Press [1] = 24nm   [2] = 12 nm   [3] = 6 nm
     [4] =   3 nm   [5] =   1.5 nm   [6] = 0.75 nm
     [7] =   0.50 nm   [8] =   0.25 nm   [9] = 0.125 nm

ZOOM   *Or you may use the IN/OUT* [ZOOM] *keys to go to a different range*
- each press will increase/decrease the range scale with 50 percent.

Or from the active control panel: use the cursor key to highlight the
current range scale, then adjust the range scale with approx. 10 percent

+/-   each time you press the +/- keys.

Table for range rings and displayed range

Range (nm)	0.125	0.25	0.5	0.75	1.5	3	6	12	24	36	48
Range rings	2	2	2	3	6	6	6	6	6	4	6
Interval	0.0625	0.125	0.25	0.25	0.25	0.5	1	2	4	8	8

Targets:
The **shape** of the target has a direct affect on the image displayed.
A flat surface at right angles reflects a good image. Flat surfaces at
shallow angles reflect very poor images. A concave surface will
concentrate the reflective energy and display an image larger than
normal. Convex surfaces will scatter the energy and display week
images. A conical surface may not display any image.

The **texture** of the target surface also controls the amount of reflective
signal, and therefore the image displayed. A smooth surface is a good
reflector, while rough surfaces tend to break up the reflection.
Composition - materials such as metal and water are good reflectors.
Others, such as wood and fiberglass are poor reflectors.

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8.2.9 Demo mode

For the purpose of a demonstration, the radar function has a demo mode, which can present a simulated radar picture without having a radar scanner connected.

To activate the demo mode:

MENU   *Call up the menu bar, and…*

6,3   *load Radar setup display*

ADJ   *Open for adjustment*
- a warning will pop up that you are about to change settings for the radar, press [MENU] to abandon, or [ENT] to continue.

⬤   *Use the cursor key to go to* 'Scanner type', and select 'Demo' with the +/- keys

ENT   *Accept change & exit Radar setup*

TX   *Press for 2 seconds to start a count-down of 30 seconds*

TX   *Press for 2 seconds again to activate the demo mode*

Use the [ZOOM] keys to adjust the range and presentation.

The legend **Demo** will stay in the top left of the screen to indicate the demo mode is active.

Bring the Demo mode in Standby:

TX   *Press for 2 seconds to start a count-down of 9 seconds and press again for 2 seconds before the count-down reaches 0*
- the radar function will now enter a Standby mode.
This way you can easily return to the simulated radar picture by pressing [TX] for 2 seconds.

Turn off the Demo mode and return to normal operation:

TX   *Press for 2 seconds to start a count-down of 9 seconds to Power off*

MENU   *Call up the menu bar, and…*

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6,3   *load Radar setup display*

ADJ   *Open for adjustment*
- a warning will pop up that you are about to change settings for the
radar, press [MENU] to abandon, or [ENT] to continue.

●   *Use the cursor key to go to* 'Scanner type', and select 'Auto detect'
with the +/- keys

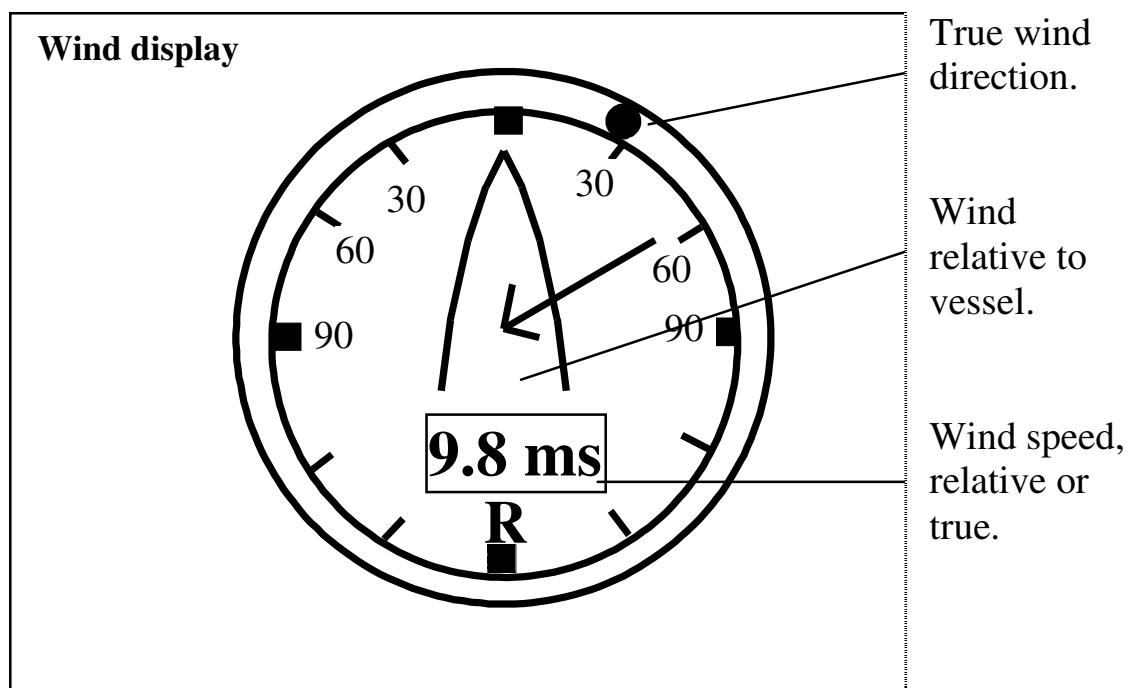**ENT**   *Accept change & exit Radar setup*

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9. Miscellaneous menu

7	
MISC	
1 Wind	- section 9.1
2 MOB position	- section 9.2
3 DSC alarm	- section 9.3
4 Data transfer	- section 9.4

9.1 Wind display

The CAXX is ready to present wind data from connected instruments.

Wind data – the "wind instrument" can provide both wind direction and wind speed, and the readings can be shown in relative or true (when the data is supplied from connected wind instrument).

MENU *Call up the menu bar, and…*
7,1 *load the "Wind instrument" display*

Wind display

True wind direction.

Wind relative to vessel.

9.8 ms
R

Wind speed, relative or true.

30   30
60   60
90   90

ENT   *Load "Setup for Wind" display*

```
Setup for Wind:

Damping level:                              MEDIUM

Relative wind scale:                        NORMAL

Wind angle offset:                            000°

Show wind speed as:                       RELATIVE

Wind speed unit:                  METERS/SECOND
```

The settings available for each function are described on the next page.

●   *Go to the function you wish to change*

+/-   *Toggle between settings, or…*

0-9   *key in new figure*

ENT   *Confirm entry and return to Wind display*

Damping level – can be set to LOW, MEDIUM or HIGH. The higher level the more steady and slow reacting reading.

Relative wind scale – can either be set to NORMAL (0-180°) or MAGNIFIED (0-60°).

Wind angle offset – can be from 0 to 360°.

Show wind speed as – TRUE or RELATIVE.

Wind speed unit – can be either METERS/SECOND, KNOTS, KILOMETERS/HOUR or MILES/HOUR.

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9.2 MOB position

MENU   *Call up the menu bar, and…*
7,2   *load MOB position display*

<table>
<tr><td colspan="2" align="center">MAN OVERBOARD</td></tr>
<tr><td>DATE</td><td align="right">12-02-2002</td></tr>
<tr><td>TIME</td><td align="right">14:23:34</td></tr>
<tr><td>MOB</td><td align="right">56°52.489N</td></tr>
<tr><td>POS</td><td align="right">009°50.305E</td></tr>
</table>

The MOB display will provide information of the last activated MOB position.

To delete a MOB track from the memory, see section 3.3.6.

9.3 DSC alarm (feature prepared for future DSC VHF)

☞ To receive a DSC Alarm and Message from VHF will require that the CAXX is connected to a compatible Simrad Shipmate VHF radiotelephone.

The message from the VHF will appear in a pop-up window together with an acoustic alarm. Press [CLR] to reset the alarm.

To view the last received message:

MENU   *Call up the menu bar, and…*
7,3   *press* [7] *and* [3] *to call up the message display*

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9.4 Data transfer via DataCard or disc

Data transfer *to and from* external memory can be performed via DataCard, or with a Simrad TL50 Turbo Loader: via an ordinary 1.44Mb disc.

DataCards and TL50 Turbo Loader are optional equipment available from you local Simrad dealer.
How to perform data transfers via TL50 Turbo Loader (inclusive data from Shipmate RS2500 Trackplotter) is described in the TL50 manual.

Use the Simrad DataCard or TL50 Turbo Loader to make backup files of all the user data you have created plus the current setups in the internal memory of the unit. Do it whenever you have added important data, or when you wish to transfer routes and waypoints, etc. to another compatible unit.
The storage capacity of the DataCard/TL50 disc is divided into two databanks of each 450 Kb, meaning that the entire internal memory can be stored in one databank.

• External memory with data transfer via DataCard:

MENU   *Call up the menu bar, and…*
7,4   *load the 'Data transfer' window*

Data transfer
1 DataCard upper drawer
3 DataCard lower drawer
7 NMEA connection   - section 9.5
MENU Exit

Select the drawer where you have inserted the DataCard i.e. [1] for the upper drawer, and [3] for the lower drawer.

You now have a choice of:
[1] DataCard status
[3] Save on DataCard
[9] Load from DataCard

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DataCard status

1 *Press* [1] *to find out what data (if any) is stored on the DataCard*
The capacity is divided into two databanks: DATABANK 1 and 2
which can hold approx. 2 x 450 Kb data. Toggle between the two
databanks with the +/- zoom keys.

Save on DataCard

3 *Press* [3] *to call up a new INFO window* where you can see which data
will be transferred i.e. how many routes, waypoints, etc. and how much
space it will take up in bytes + percentage of max. storage capacity.
Choose which databank you wish to transfer the data to (use the +/-
zoom keys).
The actual date and time will be saved with the data transfer.
A name can be added for easy identification later on.

ENT *Press* [ENT] *to activate 'Save on DataCard'*

☞ You will now receive a warning that existing data on the DataCard,
in the databank you have chosen, will be overwritten. You can not 'add
more information' to data already transferred. Whenever transferring
data either from an XX42/50/52 to Databank 1 or 2 on DataCard, or
from Databank 1 or 2 on DataCard to an XX42/50/52, the data package
will replace the entire capacity in the receiving unit, except when a
TL50 Turbo Loader is connected to the unit, then you can decide how
much data you want to transfer - refer to TL50 manual.

Load from DataCard

9 *Press* [9] *to call up a new INFO window* where you can see which data
is stored in Databank 1 or 2 on the DataCard - see example of display
on next page, without TL50 connected.

+/- *Use the +/- zoom keys to toggle between DATABANK 1 and 2*

ENT *Press* [ENT] x 2 *to transfer a copy of the data* in DATABANK 1 to the
internal memory in the unit. Any existing data in the internal memory
will be overwritten, except when a TL50 Turbo Loader is connected to
the unit, then you can decide which data should be overwritten - refer
to TL50 manual

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`MENU`   *Press* [MENU] *to Exit, and reboot**

* When the system makes a 'reboot' (only if loading "Setup") the
screen will turn black for a brief moment, then the system will re-start
and automatically return to the active display which was on the screen
before you made the transfer.

Load from DataCard: `DATABANK-1`

Data generated by:	Simrad CA42
Used internal memory:	672 bytes = 0%
Used DataCard memory:	85332 bytes = 19%
Used internal memory after operation:	85332 bytes = 19%
Date saved:	24-08-2000
Time saved:	09:26:59
Name:	MR14

Data type	Amount	Size [byte]
Marks/waypoints:	52	1120
Lines:	2	284
Routes:	8	6280
Targets:	3	72
Tracks:	5	75287
Setup:	1	2289

`MENU`   Exit   Load from DataCard   `ENT`

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9.5 Data transfer via PC interface

Data transfer to and from a route planning program on a Personal Computer can be made via NMEA connection (Refer to Installation manual section 11.8) by means of the standard NMEA0183 sentences WPL and RTE.

☞ The data transfer on these two sentences does not include WP symbol, color, XTE limit, etc.

`MENU` *Call up the menu bar, and…*
`7,4` *load the Data transfer window*

Data transfer	
`1` DataCard upper drawer	- see section 9.4
`3` DataCard lower drawer	- see section 9.4
`7` NMEA connection	
`MENU` Exit	

`7` *Select the NMEA connection*

WARNING!
Normal NMEA communication on selected channel will be interrupted.
`1` NMEA 1
`3` NMEA 2
`MENU` Exit

Press [1] or [3] to select the NMEA port where the PC data cable is connected. Example:

NMEA 1 connection
`1` Transmit WPs
`3` Transmit routes
`7` Receive WPs and routes
`MENU` Exit

The normal communication via this NMEA port is temporarily abrupted during the time of data transfer.

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Transmit WPs

`1` *Press* [1] *to start transmission of all waypoints stored in the CA42/50/52 WP list to PC*

When the transmission is completed you will receive a new info window informing of how many waypoints were transferred.

`MENU` *Exit function and return to normal NMEA communication*

Transmit routes

`3` *Press* [3] *to start transmission of all routes stored in the CA42/50/52 route list to PC*

When the transmission is completed you will receive a new info window informing of how many routes were transferred.

`MENU` *Exit function and return to normal NMEA communication*

Receive WPs and routes

`7` *Press* [7] *to enable reception of waypoints and routes from the planning program*

The transmission of waypoints and routes can now be activated from the PC program.

The info window below will inform you of the progress of the reception of data by keeping an eye on the counter. When the counter stops, means that all the data from the PC planner has been collected. However, some PC programs may continue to transmit the same data over and over again and will have to be stopped by pressing [ENT].

```
┌─────────────────────────────────┐
│     Receive WPs and routes      │
├─────────────────────────────────┤
│ Reception in progress           │
│                                 │
│        37 WPs received          │
│         5 routes received       │
│                                 │
│                                 │
│        Stop and save   ENT      │
└─────────────────────────────────┘
```

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`ENT`   *Stop and save*
- will stop collecting data (if not already finished) and start saving the collected data.

☞ Waypoints/routes transmitted to the CA42/50/52 are added to the WP/route list. However, if two waypoint/route names are identical, the latest transferred one will not be saved, even though position(s) may be different. Routepoints will not be included in the WP list.

Saving the collected data can take anywhere from less than a second and up to a few minutes, depending on the amount of data. If it takes too long and you need the CA42/50/52 in a hurry, then press the [MENU] key to <u>Stop saving</u> any more data – what has been saved until this point will stay in the memory, the rest will be lost.

`MENU`   *Stop saving*

Under normal circumstances we assume the saving procedure is allowed to finish and will indicate "Saving completed" in the info window. You are now ready to:

`MENU`   *Exit function and return to normal NMEA communication*

NB! PC-based planning systems differ in operation and performance beyond the control of Simrad.

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10. Setup menu

```
                    8
                  SETUP
    1   Speed alarm, units & language        - section 10.1
    2   NMEA interface                        - section 10.2
    3   Alarm/log output                      - section 10.3
    4   Decca lanes                           - section 10.4
    5   Loran C                               - section 10.5
    6   Display color                         - section 10.6
    7   Factory settings                      - section 10.7
```

10.1 Speed alarm, units & language

MENU *Call up the menu bar, and…*
8,1   *load Speed alarm, units & language display*

```
Setup for speed:
  LOG speed sensor:                          ON
  LOG speed calibration:       019000 PULSES/nm
  Speed alarm maximum:            000.0kn  OFF
  Speed alarm minimum:            000.0kn  OFF
Setup for units:
  Depth/altitude in:                     METERS
  Distance in:                   NAUTICAL MILES
  Speed in:                               KNOTS
  Temperature in:                DEGREE CELCIUS
Software version:                 CA42 MKII 4.30
TL50 version:                      Not connected
GPS receiver type:                        N12000
PAGE rotation interval:                   05 sec.
Display text in:                      English GB
MENU Exit                         Accept  ENT
```

To select new values for this setup display – see next page.

● *go to the function you wish to change*

0-9 *Key in new values, or…*
+/- *toggle between available values*

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ENT   *Confirm entry, or…*

MENU   *exit function without making any changes*

LOG speed sensor – set to ON, the dual speed display will show water speed from external log sensor (via ECHO1 port).
- set to OFF and NMEA sentence VHW set to ON, the readout will show water speed from external water speed instrument (via NMEA port 1 or 2).

LOG speed calibration – calibrate log speed readout by increasing/decreasing the number of pulses per nautical mile – see also Appendix A.

Speed alarm – can be set to maximum and/or minimum cruising speed. This may be handy for trawl fishing, entering into harbors with speed limits, etc. Speed stability and time of response can be adjusted in position setup display, press [MENU], [2], [1], [ENT], and use the cursor key to go to "Speed and course filter level" to adjust the setting, confirm with [ENT].
☞ Press [CLR] to reset an alarm – this applies to all activated alarms in the system.

Setup for units
- **Depth/altitude in** – can be set to meters (m), feet (ft) or fathoms (fm).
- **Distance in** – can be calculated in nautical miles (nm), kilometers (km) or statute miles (mi).
- **Speed in** – can be shown in knots (kn), kilometers/hour (kh) or miles/hour (mh).
- **Temperature in** – can be shown in Celcius or Fahrenheit.

Software version – indicates which software version is installed in the unit.

TL50 version - indicates if a TL50 Turbo Loader is connected and which version software is implemented.

GPS receiver type - information for technicians only.

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PAGE rotation interval – can be set to anywhere between 03 to 99 seconds. Refer to "Fundamentals of the WINdow and PAGE system" in section 2.1 for more details on how the function works.

Display text in – as standard the CAXX is supplied with the following display languages to choose from: Danish (DK), English (GB), English (US), French (F), German (D), Italian (I), Nederlands (NL), Spanish (E), Swedish (S), and Portuguese (P).

10.2 Interface setup, NMEA

The CAXX has 2 in/out ports:
1. NMEA1 contains both an NMEA port and the connection for the dual station. The NMEA1 data from the main unit is available from NMEA2 port on the dual station.
2. NMEA2 is recommended for standard NMEA interfacing.

The two ports can be set individually to:
-   NMEA0183
-   EXT. DGPS (External DGPS)
-   NMEA0180
-   NMEA0182

The next pages indicates the default settings for the interface setups. After the interface setups will follow a description of the input and output sentences available in the setups.

MENU   *Call up the menu bar, and…*
8,2   *load Interface setup*

+/-   *Toggle between INPUT and OUTPUT*

●   *Go to, and…*

+/-   *Toggle between individual port settings i.e.* NMEA0183, EXT. DGPS, NMEA0180, NMEA0182.

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●   *Go to any sentence you want to change*

+/-   *Toggle between values, and between ON and OFF*

ENT   *Confirm entry, and accept warning (press* [ENT] *again), or…*

MENU   *exit function without making any changes*

Interface setup: INPUT

Port: NMEA1 – NMEA0183.   NMEA2 – NMEA0183

Sentence	String	Status	NMEA
Wind data:			
Relative wind:	MWV	ON	2
True wind:	MWV	ON	2
Water data:			
Water temperature:	MTW	OFF	1
Water speed and heading:	VHW	OFF	1
Heading data:			
Heading:	HDG	ON	2
Position data:			
External position, course, speed:		OFF	
Datum:		000	
Name: World Geodetic System 1984			
Position:	GLL	ON	2
Course:	VTG	ON	2
Speed:	VTG	ON	2
Waypoint data:			
Waypoint location:	WPL	ON	ALL
Target data:			
Target latitude and longitude:	TLL	OFF	1

MENU   Exit   Accept   **ENT**

```
Interface setup:                    OUTPUT
Port:           NMEA1 – NMEA0183.        NMEA2 – NMEA0183
Sentence                          String   NMEA1   NMEA2
```

Sentence	String	NMEA1	NMEA2
Position data:			
Global Position System fixdata:	GGA	OFF	OFF
Geographic position, Lat/Lon:	GLL	WGS84	WGS84
Geographic position, Lat/Lon:	GL2	OFF	OFF
Recom. min. specific GPS data:	RMC	ON	ON
Track made good & ground speed:	VTG	ON	ON
Time and date:	ZDA	OFF	OFF
Navigation data:			
Autopilot sentence 'B':	APB	ON	ON
Bearing & distance to waypoint:	BWR	OFF	OFF
Recom. min. navigation info:	RMB	ON	ON
Routes:	RNN	OFF	OFF
Routes:	RTE	OFF	OFF
Cross-track error, measured:	XTE	OFF	OFF
Waypoint location:	WPL	OFF	OFF
UTC & time to destination WP:	ZTG	OFF	OFF
Water data:			
Water temperature:	MTW	ON	ON
Water speed and heading:	VHW	ON	ON
Depth below keel:	DBK	OFF	OFF
Depth below surface:	DBS	OFF	OFF
Depth below transducer:	DBT	OFF	OFF
Depth:	DPT	ON	ON

```
 MENU   Exit                                Accept  ENT
```

Description of NMEA0183 version 2.0 output sentences

GLL   Geographic position, latitude/longitude.
GL2   Geographic position, with 2 decimals.
GGA   Global Positioning System fix data.
APB   Autopilot sentence "B".
BWR   Bearing and distance to waypoint (Rhumbline).
BWC   Bearing and distance to waypoint (Great circle).
RMB   Recommended minimum navigation information.
RMC   Recommended minimum specific GPS data.
VTG   Course over ground and ground speed.
XTE   Cross-Track-Error, measured
ZTG   UTC & time to destination waypoint.
ZDA   Time and date.
WPL   Waypoint location.

RTE   Routes, ONC ON Complete route, or
                   ONW ON Working route.
RNN   Routes.
MTW Water temperature.
VHW Water speed and heading.
DBS   Depth below surface.
DBK   Depth below keel.
DBT   Depth below transducer.
DPT   Depth, including offset.
☞ Output must be set to NMEA0183 to receive input.
    GGA is invalid when operating on external position.

Description of NMEA0183 instrument input
WPL   Waypoint data. (will only be updated every 5 seconds)
TLL   Target data. (will only be updated every 5 seconds)
MTW Water temperature.
VHW Water speed and heading.
HDT   Heading, True
HDG   Heading, Deviation and Variation
HDM Heading, Magnetic
VWT True wind speed and angle.
VWR Relative wind speed and angle.
MWV Wind speed and angle.

Description of NMEA0183 external position, heading and speed input
GLL   Geographic position, latitude/longitude.
RMA Recommended minimum specific Loran C data.
RMC Recommended minimum specific GPS data.
GGA   Global Positioning System fix data.
VTG   Track made good (course) and ground speed.
☞ Input is only valid when output is set to NMEA0183.

The external position can be set to OFF, ON, or Dead reckoning where you can enter a speed value.

When set to Dead reckoning, the system can function as a Navigation simulator, which can be used for demonstration purpose or for practicing 'live' navigation in 'off season'. See further details in Appendix A under 'Navigation simulator'.

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10.3 Interface setup, alarm/log

MENU   *Call up the menu bar, and…*
8,3   *load Interface setup alarm/log display*

```
Interface setup, alarm:
 Output (pin 1,2):              OFF
 Alarm stand-by level:          LOW


Interface setup, pos-status:
 Output (pin 4,6):              OFF
 Pos-status, stand-by level:    LOW
Interface setup, log:
  Output (pin 5,6):              ON



MENU  Exit                  Accept  ENT
```

The stand-by level can be either: LOW = 0 volt or HIGH = 5 volt.

⬤   *Use cursor to move around in display, and…*

+/-   *toggle between available settings with the +/- keys*

ENT   *Confirm entry, or…*

MENU   *exit function without making any changes*

10.4 Decca lanes

`MENU` *Call up the menu bar, and…*
`8,4`   *load decca chain display*

`+/-`   *Leaf through the available chains* – see below.

`ENT`   *Confirm entry*

List of decca chains:

00 S Baltic	0A	24 Skagerak	10B
01 Vestlandet	0E	25 N Persian	5C
02 SW British	1B	26 S Persian	1C
03 North Humber	2A	27 Bombay	7B
04 Holland	2E	28 Calcutta	8B
05 British	3B	29 Bangladesh	6C
06 Lofoten, Norway	3E	30 Hokkaido	9C
07 German	3F	31 Tohoku	6C
08 N Baltic	4B	32 Kyusyu	7C
09 NW Spanish	4C	33 Namaqua	4A
10 Trondelag (N)	4E	34 Cape chain	6A
11 English	5B	35 E Province	8A
12 N Bothnian	5F	36 Dampier	8E
13 S Spanish	6A	37 Port Hedld	4A
14 N Scottish	6C	38 Hokuriku	2C
15 Finland	6E	39 Newfoundld.	2C
16 Danish	7B	40 Cabot strt	6B
17 Irish	7D	41 Nova Scotia	7C
18 Finnmarken	7E	42 Salaya	2F
19 French	8B	43 Kanto	8C
20 S Bothnian	8C	44 SW Africa	9C
21 Hebridean	8E	45 Natal	10C
22 Frisian	9B	46 Shikoku	4C
23 Helgeland	9E		

To change the position readouts to decca mode, see section 4.1 under Position setup, where "Display POS as" can be toggled to "Decca".

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10.5 Loran C

| MENU | *Call up the menu bar, and…* |
| 8,5 | *load Loran C chain display* |

| +/- | *Leaf through available chain numbers* – see below. |

● *If required, go to the slaves, and…*

| +/- | *Toggle between available slaves* (not all chains have more than one slave) |

| 0-9 | *and it is possible to alter the figures in the time delay* |

● *If required, go to Offset, and key in a positive or negative offset*

| 0-9 | *Key in a positive or negative offset to the time delay (toggle positive/ negative with +/-)* |

| ENT | *Confirm entry* |

List of Loran C chains:
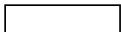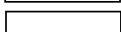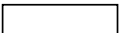
Central Pacific	4990	Commando Lion	5970
Gulf of Alaska	7960	North West Pacific	9970
Southeast U.S.	7980	Norwegian Sea	7970
Great Lakes	8970	Mediterranean Sea	7990
Northeast U.S.	9960	Icelandic	9980
Canadian West Coast	5990	Saudi Arabia South	7170
Canadian East Coast	5930	Saudi Arabia North	8990
Labrador Sea	7930	Eastern U.S.S.R.	7950
West Coast U.S.	9940	Western U.S.S.R.	8000
North Pacific	9990		

To change the position readouts to Loran C mode, see section 4.1 under Position setup, where "Display POS as" can be toggled to "Loran C".

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10.6 Display color

MENU   *Call up the menu bar, and…*
8,6   *load the Palette setup*

Palette setup:	5

There is a total of nine palettes, numbered from 1 to 9.

```
Name:
  Text:
  Background:
  Data cursor:
  Frame/fill in pop-up windows:
  Active frame:
  Inactive frame:
  Menu text:
  Inactive menu text:
  Menu text highlight:
  Menu background:
  Menu highlight:
  Menu frame:

  Menu example:                POS    POS

 Echogram background:
 Radar colors:                         DAY
 Chart colors:
  Ship & Cursor:
  Landfilling:
  Background:
                      CHART1   -   CHART2
  Depth 1:
  Depth 2:
  Depth 3:
  Grid:

 MENU  Exit                    Accept  ENT
```

Palette 1 to 4 are preset to bright daylight (sunshine) in 1 and 2, no. 3 to normal daylight, and no. 4 to nightlight, and they are not adjustable. Palette 5 to 9 can be customized to suit individual needs and wishes. If you wish to make your own special palette setup in e.g. Palette 5, then:

5   *Select Palette 5*

●   *Go to, and…*

`A-Z`   *rename display – max. 31 characters,*
- refer to "Naming of routes, points, etc." in section 2.6.

`+/-`   *Toggle between available color settings*

`ENT`   *Confirm new setup*

10.7 Factory settings

It is possible to erase a single category of objects entered into the unit by the user – for example, if moving to a different place in the world you may no longer need the routes, etc. you have in the memory. However, an alternative is to store the data on a DataCard - refer to section 9.4.

If the unit is acting strange, it is still "alive" but has ceased to respond to normal operation, it could become necessary to return to ALL factory presets – but first: check "Troubleshooting" in section 11.1.

☞ Activating the "Return to all factory presets!" will erase all settings including user data i.e. waypoints, routes, tracks, etc., and restore the basic settings from the factory.

Show test display
Information in this display is for technicians only.

`MENU`   *Call up the menu bar, and…*
`8,7`   *activate Factory settings display*
- see display example next page.

To activate any of the functions, please follow the instructions in the display, or exit without making any changes by pressing [MENU].

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```
        DELETE MEMORY:

   1     Delete all WAYPOINTS

   2     Delete all ROUTES

   3     Delete all LINES

   4     Delete all TRACKS

   5     Delete all TARGETS
 Used memory:                              0%

       FACTORY PRESETS:

   6     Return to NMEA presets

   7     Return to CHART presets

   8     Return to RADAR presets

   9     Return to SOUNDER presets

  CLR    Return to all factory presets


   0     Show test display

 MENU  Exit
```

Attempting to make any type of change from this display will first of all generate a WARNING display that you are about to erase some or all data/settings.
If you are absolutely sure, press [ENT] to complete the job.
If not absolutely sure, then press [MENU] to exit the function.

Power off - Reset
In case, for some reason, the unit is totally locked i.e. no immediate response from the keypad, the unit can be reset by disconnecting the power supply and then started up again.

Master reset (will return all settings to factory presets)
If the Power off - reset does not solve the problem, you may have to perform a master reset by disconnecting the power supply, and then while reconnecting the power cable you will have to press the [PWR] and [CLR] keys at the same time, and hold both keys depressed until a picture appears on the screen. All user-made data will be erased, and all settings are returned to factory presets.

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11.1 Troubleshooting

For all fault finding, first check that the supply voltage is between 10 – 32 V dc.		
Symptom	**Check**	**Remedy**
No picture on display screen.	Check that the unit is turned on.	Press the [PWR] key on keypad.
	Check fuse in CAXX power cable.	Replace fuse. Use only type F6.3A.
Picture appears on the display screen, but image is too dark or too bright.		Press [PWR], adjust light/contrast, press [ENT].
No normal picture or key operation.		Turn unit off and on again.
		Disconnect power and connect power again.
	Check if C-MAP chart is defective.	Remove C-MAP chart via [MENU], [1], [3].
		Return to factory presets, see section 10.7.
No GPS position update.	Check external position to be OFF, refer to interface display in [MENU], [8], [2].	
	Check antenna and cable.	Replace antenna or cable.
Screen update is extremely slow.	Check that the stored Tracks and Routes (not currently in use) are not all drawn up on the chart.	Turn off "Course line" for each stored route in sec.5.2, and turn off "Display track" in sec.5.6.
Picture appears normal, but no targets are shown or only random "noise" is seen	Check that the correct transducer is selected.	Go to Echosounder setup and select transducer type.
	Check the transducer connectors are wired properly.	If not properly wired, rewire the connectors.
	Check that the transducer connectors are securely mated with the console.	Correctly mate the connectors to the console.
	Check that the receiver gain is set high enough.	Increase the receiver gain in 7.9 Presentation setup.
	Check that the range is correct for the water depth.	Adjust the range in 7.9 Presentation setup.
Excessive noise in echo picture.	Check for correct grounding.	Connected equipment must be properly grounded between it and main unit.

Symptom	Check	Remedy
Echo image on radar display differs from actual image.	Check if ship's heading is incorrect.	Set ship's heading correctly – see section 8.2.2.
	Check if timing is incorrect.	Set Zero Range correctly – see section 8.2.2.
Echo images on radar display are blurred.	Check if GAIN, STC or FTC is not adjusted properly.	Make adjustment – see section 8.2.5.
Too much noise in radar display.	Check if tuning is incorrect.	Adjust TUNE – see section 8.2.2.
Alarm activated in radar function.	Check **Alarms** in section 8.2.8.	
All data is deleted after turning off the unit and turning it back on.	Check battery lifetime. Expected lifetime is **3-5** years.	Internal battery must be replaced by authorized dealer.

11.2 Preventive maintenance

Surface cleaning – to keep the CAXX cabinet and display screen clean, wipe the surfaces with a clean damp cloth. For heavier cleaning, use a clean, damp cloth which has been dipped in a solution of a mild dish detergent and water. Wring out firmly before wiping the unit.
☞ *Never use cleaning solutions containing spirit or alcohol.*

Transducer – periodically clean the face of the transducer with a plastic utensil using a scrubbing action.
☞ Do not use a harsh abrasive or a solvent to clean the transducer.

Electrical connections – periodically check the electrical connections. Make sure that connections are tight and that no cables are frayed or worn.

Radar antenna – periodically check that the scanner's fitting bolts are tight and not corroded. Every 6 to 12 months an even coating of grease should be applied to the entire surface of the antenna drive gear with a spatula or brush. Most of the maintenance of the radar antenna should be left to qualified personnel. If there are problems with the performance, please contact your authorized dealer.
☞ Warning! Do not open the radome before the cable between the radar antenna and CAXX has been disconnected. It is **not** sufficient just to turn off the power by the switch, as the radar antenna is still supplied power inside.

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11.3 Repair and service

The CAXX is sealed and does not contain any user serviceable parts. Opening of this unit will void its warranty. If the CAXX requires servicing or repair, call your authorized SIMRAD dealer, but first check section 11.1 Troubleshooting.

Spare parts – fuses may be bought from a chandler or a marine supply store. Use only fuses specified for this unit – see 11.4 Specifications.
If you require a SIMRAD part, please contact your authorized dealer.

11.4 Specifications of the CA42/50/52

General data

Power supply:	12 & 24V dc (10-32V dc max) 20-70 Watts.
Dimensions:	- CA40/42: H:220 (8.8") x L:365 (14.6") x D:75 (3") mm.
	- CA50: H:300 (12") x L: 445 (17.8") x D: 90 (3.6") mm.
	- CA52: H:330 (13") x L: 460 (18.1") x D: 95 (3.7") mm.
Environment:	0°C to +50°C, waterproof USC 46 CFR and IP55.
Housing:	Casted aluminum back, polycarbonate front.
Weight:	CA40/42: 3.7 kg (8.1 lbs.), CA50: 5.3 kg (11.7 lbs.),
	CA52: 6.6 kg (14.5 lbs).
Display:	TFT/ATFT color, power backlight, 640x480 pixels,
	CA40/42 = 10.4 in, CA50 = 13.8 in., CA52 = 15 in.
Presentation:	4 pages (screen layers) each with several screen combinations.
	Manual operation or automatic rotation of the 4 pages.
Interfacing:	2 ports in/out NMEA 0183/0182/0180.
Alarm/log	Alarm relay (contact closure).
output:	200 pulses/nm (5 Volt pulses).
Main fuse:	F6.3A.

GPS section

Receiver type:	14 channel parallel, C/A code, 8 state Kalman filter.	
Accuracy:	- standard:	Position: 8m RMS*
		15m – 95% of fixes.
		Speed: 0.1 kn*
		Heading: 1°*
	- DGPS:	Position: 1-3m RMS
	-SDGPS:	Position: 2-6m RMS
Speed filter:	10 settings.	
Update rate:	1 second interval, typical	
Dynamics:	Velocity: 600 km/h. Acceleration: $10m/s^2$	

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GPS Antenna RS5640

Type:	Quadrifilar Helix.
Dimensions:	L:230mm, D:38mm
Weight:	150gr (0.33 lbs)
Environment:	-35°C to +75°C, 95% rel.
Mounting:	1" 14 thread (standard US).
Cable:	10m RG58 (standard), 15m RG58 (option) - Max. 30m RG213.

DGPS Antenna MGL-3

Patch (GPS) H-field (diff.).
H:75mm, D:127mm
600gr (1.3 lbs)

Chartplotter section

Chart system:	C-MAP NT+
Presentation:	Two charts in different scales on screen simultaneously. Radar and chart split screen.

Echosounder section

Frequencies:	38, 50 and 200 kHz, selectable.
Output power:	Variable up to 1kW RMS per channel.
Impedance:	75 ohms
Display ranges:	3 to 3000 meters in 21 steps, and auto.
Detection ranges:	

Frequency	Beam	Fish*	Bottom*
38 kHz	13x21°	410m	1800m
50 kHz	10x16°	430m	1500m
200 kHz	7°	290m	550m

*Single Fish Target Strength: -30dB (60cm cod)
*Bottom Back Scattering Strength: -20dB
*Simrad transducer C38/200 or C50/200

Pulse length:	Short, medium, long and auto.
Max. transmission rate:	10 pings per second.
Alarms:	Fish, max. and min. depth.
Zoom mode:	Bottom and VRM expansion = 3 to 50 meters, feet or fathoms.
Event markers:	At current echo (ping) and depth memory.
Picture speed:	True distance or time (3 steps), 1 step/ping and freeze.
Noise filter:	User-selectable on/off.
Presentation:	A-scope and white line discrimination.
Temperature:	Transducer or NMEA.
Speed:	Transducer or NMEA.

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Dual frequency transducers

Simrad C38/200, 1kW high performance combi transducer 38 and 200kHz, 13x21° and 7° beams.
Simrad C50/200, 1kW high performance combi transducer 50 and 200kHz, 10x16° and 7° beams.
Airmar B250-22, 1kW combi transducer 50 and 200kHz, 19° and 6° beams.

Alternative 50/200kHz medium-range transducers (Airmar Des.A)

B256,	1kW medium range transducer 16x28° and 4x6° beams.
B45,	600W Bronze stem mount transducer 45° and 15° beam.
B744V,	600W Bronze through hull triducer, depth, speed and temperature, 45° and 15° beam.
P52,	600W plastic transom mount triducer, depth, speed and temperature, 45° and 15° beam.
P319,	600W plastic through hull transducer 45° and 15° beam.
ST650,	Speed and temperature only.

Radar section

Display modes:	Head Up, North Up, True Motion. Dual Range.
Range scale:	0.125 – 48nm in 11 steps or multi range.
Min. range:	30 meters
Range resolution:	30 meters
Bearing accuracy:	1° or better
Off-center:	Max 66%.
Guard zone:	Can be set at any desired distance and angle in any desired width. IN and OUT modes are available.
Stretch:	AUTO, PULSE, VIDEO.
Trail (wake):	30 sec., 1, 2, 5, 10, 15, 30 min. or permanent.

Radar supply box RS4050

Dimensions:	H:125mm, L:222mm, D:81mm
Cable to display unit:	1.5 meter (not extendable)
Fuse:	Radar supply fuse 4A F
	Main fuse 6A.3F

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Radar antennas		RB714A	RB715A	RB716A
Radome:		45cm	65cm	
Open array:				3 or 4 ft
Scanner:		2kW	4kW	4kW
Range:		to 24nm	to 36nm	to 48nm
Rotation speed:		24rpm	24 or 48rpm	24 or 48 (24V) rpm
Beamwidth:	Horizontal	5.9°	3.9°	2.5°, 1.8°
	Vertical	25°	25°	22°
Cables:	10m	153.3002.012	153.3002.015	153.3002.008
	15m	153.3002.013	153.3002.016	153.3002.009
	20m	153.3002.014	153.3002.017	153.3002.010
	30m	153.3002.314	153.3002.317	153.3002.310
	40m	153.3002.414	153.3002.417	153.3002.410

Options

Simrad DataCards
C-MAP NT+ electronic charts
TL50 Turbo Loader
6-channel NMEA Buffer RS5345
Universal connection cable, type AMW STYLE 2464
DS40/42 Dual station, 10” TFT/ATFT color LCD screen.
DS50 Dual station, 14” TFT color LCD screen.
DS52 Dual station, 15” TFT color LCD screen.
Sunhood

Glossary of terms

Active display – is the display placed in the window with the highlighted frame on the screen. Only the active display on the screen is operable. Press the [WIN] key to toggle which display (window) should be the active one on the screen with the highlighted frame. Switch between active displays (windows) as required.

Active window – is recognized by the window on the screen with the highlighted frame. A new active window can be selected via the menu, press [MENU] and toggle active window by pressing [WIN] repeatedly, then select a new display from one of the menus. The window you selected in the menu bar will now have the highlighted frame and are therefore the new active window on the screen.

Almanac – a satellite's almanac data, is data which determines an approximate lane for satellites in orbit. The almanac data is used by the GPS receiver to find and lock onto the satellite signal. The CAXX has a built-in basic almanac.

Auto trackpoint shift – will automatically shift to the next trackpoint in the track and provide new steering details (Track navigation).

Auto waypoint shift – will automatically shift to the next waypoint in the route and provide new steering details (Route navigation).

AVN – Approximate Velocity Necessary – to arrive at a specific waypoint at a specific time.

Bearing – is the direction of where to go e.g. towards a specific waypoint.

Course – *Course Over Ground,* magnetic or true. The direction of which the vessel is moving.

Configuration – the configuration functions of the CAXX allow you to adapt the system more specifically to your needs. You may set Units of measure (feet, fathoms, meters, etc.), Background color, Menu languages, Scroll speed, etc.

dGPS – differential data is received from built-in DGPS module or an external DGPS Receiver.

Great circle – the shortest distance between two points on the globe.

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Grid - on chart can be set to AUTO / ON / OFF.
ON = the grid is always visible on the chart display.
OFF = the grid is turned off and will not show on the chart display.
AUTO = the grid will not appear in the ordinary chart display, but will be there when in overzoom and when "Chart" is turned off in the Chart setup, which means that there will be no World chart presented and no C-MAP charts presented – only user-made data such as waypoints, routes, lines and tracks, etc.

Heading – the direction of which the vessel is pointing.

Lock cursors – will lock the cursors in two chart displays on the same screen and thus make the cursor movements synchronized. When moving the cursor to search for e.g. a harbor in one chart (large scale), the other chart (small scale) will automatically follow and thus reveal the details. This process is very demanding and may take some seconds extra for updating.

LOG speed calibration – the unit is preset to receive 19000 pulses per nautical mile from the log transducer (paddle wheel). However the figure might have to be changed to compensate for various transducers and actual water flow passing the transducer. The correct pulse rate is calculated by:

$$\frac{19000 \text{ x indicated speed (e.g. 4kn)}}{\text{actual speed (GPS) (e.g. 5kn)}} = 15.200 \text{ pulses/nm}$$

Measurement units – the user may select the displayed units to be one of the following:

m	meters
ft	feet
fm	fathoms
nm	*nautical mile,* 1 nm is 1,852 meters
kn	*knots,* nautical mile per hour
km	*kilometer,* 1 km is 1,000 meters
kh	*kilometer per hour*
mi	*statute mile,* 1 mile is 1,609 meters
mh	*mile per hour*

MENU – the selection of main menus will be shown in the upper part of the screen. Leaf through the menus by means of the cursor key and the [ENT] key, or use the numerical keys to activate one of the menus.

Navigation simulator - the chartplotter function features a built-in navigation simulator which can be used for demonstration purpose or for practicing 'live' navigation in 'off season'.
Navigation to cursor or waypoint, in route or in track is started as described in chapter 6. The navigation simulator is started via the NMEA interface setup: Press [MENU],[8],[2]; go to 'OFF' next to 'External position, course, speed:' and press the [+] zoom key twice to toggle to: Dead reck.; move cursor to the right and enter a speed value of e.g. 10 knots; press [ENT] twice.
The ship symbol will now 'sail' to the point of destination directly or via the route you have selected and you can see how the alarms and automatic waypoint shift all work, as if you were sailing yourself. You can also simulate making a track trailing the ship or plotting eventmarks, etc. as the ship is 'sailing'.

NMEA – National Marine Electronics Association. The NMEA is an organization of manufacturers of marine electronics equipment. They have adopted the NMEA0183 as a standard for communications between various types of marine electronic equipment.

Port side – left (red).

Release cursors – see "Lock cursors".

Restart to approaching point – will automatic recalculate the navigation data from current position to approaching point.

Rhumbline – is the straight line to a waypoint on a chart.

Route name – each route can be given a name for easy identification.

SDGPS - Satellite Differential Global Positioning System - will provide position corrections from received satellite signals.

Speed – *Speed Over Ground,* measured in knots, kilometers, and miles.

Starboard side – right (green).

TFT – Thin-Film Transistor (Active matrix).

Trackpoint advance - will automatically shift to the next trackpoint in the track and provide new steering details (Track navigation).

UTC – Universal Time Coordinates, which is equal to standard time in London (GMT). UTC is not affected by the local summertime adjustments.

Velocity – speed towards approaching waypoint.

Waypoint advance - will automatically shift to the next waypoint in the route and provide new steering details (Route navigation).

Waypoint name – a name can be added to each waypoint for easy identification.

WPplot – instant storage of actual position as a waypoint.

XTE – Cross-Track-Error (-Distance), measured magnitude of the position error perpendicular to the intended track line.

Echosounder section:

Alarms – can be set to sound a "beep" if the echosounder detects a target above (shallower than) a minimum alarm depth or below (deeper than) a maximum alarm depth. The CAXX allows you to set the alarm depths and to enable or disable both the minimum and maximum depth alarms.

A-Scope – a method of displaying the echosounder information. In A-Scope mode, the echoes are displayed in a "bar-graph" format, with stronger echoes displayed not only in the color representing their target strength, but also in a width representing their target strength.

Color threshold – the color threshold function allows the "weaker" targets and noise which may be shown on the display screen to be eliminated from the display. These targets are usually shown in the weaker target colors such as blues and greens. The Color threshold allows you to choose not to display the blues, or the blues and greens, etc. Doing this will leave only the stronger targets on the display screen.

Depths – DK = Depth below keel, DS = Depth below surface, DT = Depth below transducer.

Echogram background color – is the color shown on the CAXX in the event no target is present. There are three colors to choose from, white, blue or black,

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where black is especially useful during nighttime operation when the white background could appear too bright.

Echosounder frequency – 38 kHz, 50 kHz or 200 kHz can be selected to suit the task. 200 kHz is for general purpose and offers optimum discrimination and a narrow transmitter beam. 38 kHz and 50 kHz are for searching in a wider area, determining bottom conditions and going the deepest.

Event marker – allows the user to set a vertical marker on the screen at the current ping to indicate a school of fish, etc.

Expansion (zoom) – this function allows you to take a closer look at a particular section of the water underneath your boat. You can expand the view near the bottom (Bottom expansion) or near the Variable Range Marker (VRM expansion). The amount of expansion can be adjusted in "Expansion window", Presentation setup.

Gain – is another way o saying "sensitivity", or possibly "volume". Increasing the gain setting of the CAXX will allow you to see smaller and deeper targets. If the gain is set too high, however, you will begin to see "noise" and unwanted targets. Generally speaking, you want to set the gain control just below the point that you begin to see speckles of "noise" between surface and the bottom on the screen.

Ping to ping filter – can be set to either on or off. With the filter "off", then each received echo will be reflected on the screen. Whereas with the filter "ON", the system will compare every two echoes received and only reflect on the screen what is received from both echoes, which will give a more uncluttered and precise recording.

Pulse length – the transmitted pulse length can be set to OFF for observing noise in the water (Auto range will switch to manual mode). Set to AUTO, the optimum setting will be applied according to the water depth. Or it can be set manually, if a specific pulse length is required:

SHORT	less than 10m deep water
MEDIUM	between 10 and 50 m deep water
LONG	more than 50m deep water

☞ *A long pulse will reach deeper but give less resolution.*

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Range – refers to the distance shown from the top to the bottom of the display screen. Selecting **Auto range** will cause the CAXX to change the basic range setting(s) to keep the displayed bottom in the lower half of the display. For instance, as your boat moves into deeper waters, the system will automatically switch to a deeper range, always keeping the displayed bottom in the lower half of the display. **Manual range** allows the operator to set the range displayed on the screen.

Range start – allows the user to set the displayed depth range to begin at some point below the surface. For example, a 100 meter displayed range can be "phased" downwards, so that the screen shows a 100 meter section beginning at, say, 200 meters and going to 300 meters depth.

Scroll speed – is the rate of movement of the targets on the display screen, moving from right to left. It is adjustable, to allow the user to show a longer "history" on the display screen, if desired.

Scroll synchronization – the screen can be updated on the basis of time or distance (when data from last ping appears on the display).

Signal threshold – can be set to ON to eliminate the appearance of unwanted noise. The threshold level is automatic and the feature should be used with caution, as it may eliminate small fish and small unidentified objects on the screen.

Transducer – the transducer serves as the acoustic "loudspeaker" and "microphone" to send and receive the signals through the water. They are most often made from ceramic elements carefully built into a robust housing. The ceramic elements change shape when a voltage is placed across them (when the CAXX transmits a signal), and they also generate a voltage when they encounter sound waves (as when the CAXX is receiving an echo).

Transmit power – should normally be left on AUTOmatic.
The modes available are: AUTO, 1000W, 500W, 100W and 10W.

TVG – Time Varying Gain – is a control that allows the CAXX to make corrections for most of the losses and absorption that occurs as sound energy passes through sea water. There are three settings to choose from, Normal, Special and OFF.
The setting "Normal (20 log R) is for general fish finding at depths down to 50m (150') and it will also give a uniform bottom echo presentation at shallow, mid

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and deep water.
The setting "Special (40 log R) will adjust the TVG to show the same echo
strength for a given size fish at varying depths.The OFF position is used for net
sounders. In OFF position the TVG is inactive which means that the sounder
operates with a fixed gain between each transmitter pulse. Auto range is switched
to manual.

White line – is a control which places a white/black line at the displayed sea
floor and blanks out 4 pixels just below the line. The purpose of this is to help the
user detect targets, such as fish, which are very close to the sea floor and whose
echoes tend to merge with those of the sea floor itself.

VRM – Variable Range Marker – this refers to a horizontal black line shown on
the display screen. The user can measure the range to targets shown on the
display screen by use of the VRM. The depth to the VRM can be seen in the left
side of the screen. This function is not available if VRM expansion is ON.

Radar section:

Cursor EBL - can provide an image on the radar display which will determine
the risk of a collision if you continue on the proposed course line. The bearing
and distance from ship's position to cursor position will be displayed in the top
line of the screen.

Cursor feature – The cursor appears on the display as a large (+) character.
To activate the cursor, just press the cursor key. The cursor may now be
positioned by using the cursor key. When the cursor is set to a position on the
screen, the bearing and distance from ship's position to cursor position will be
displayed in the top line of the screen.
☞ To turn off the cursor, press CLR.

The chart cursor can be synchronized to the radar cursor, and thus be controlled
by the radar cursor in split screen operation.

EBL (Bearing mode) key – the EBL bearings may be displayed in either
degrees Relative "R" or True "T", depending on the selected orientation (HU,
NU, TM).

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GAIN control - adjusts the gain level of the radar's receiver. The Gain control level is usually set for the best target presentation with a slight noise speckle in the background on the 12 or 24nm range. The Gain control level may be reduced on shorter ranges to improve target definition as necessary and increased on longer ranges. Use some caution when adjusting the Gain control. If gain is set too low, small or weak targets may be missed. If the gain is set too high on short ranges, the CRT may become excessively covered with noise speckle making target observation difficult.

☞ On the longer range scales (24nm or greater), the sea clutter control may be advanced to decrease excessive video clutter around own ship's position in the center of the display if necessary.

Guard zone The use of the Guard zone feature built into the radar can detect approaching vessels entering your "comfort" zone and you can use the guard zone while you are moving or when anchored to protect you in a full 360 degrees.
The audio alarm can be sounded from the unit or through an external speaker/ buzzer wired into the system – see section 11.8 Electrical connections in Installation manual.

☞ Warning! When you have set up a guard zone, the system generates an alarm tone when there is an echo greater than the preset level in this zone. However, this does not mean that the alarm tone is always generated from ships or land alone. You may need to adjust sensitivity and set rain and sea clutter properly after considering the effects of sea surface conditions and meteorological conditions (rain or snow). Note also that this function does not eliminate the need for maintaining a watch in your ship.

HU – Head-Up The heading line always appears on the display at 0 degrees as the antenna passes the bow of the vessel. Targets appearing on the display are relative to your own ship's position and heading.

IR – Interference Rejection.

Lock chart cursor to radar cursor – will synchronize the two cursors in split screen operation. The synchronization is controlled from the radar display.

Navigation points - approaching + next navigation point can be shown on the radar display when operating in navigation mode.

NU – North-Up In this mode, targets are displayed at their measured distances in true direction from your boat. North being at the top of the display. In the North-Up mode, you must be interfaced with an electronic compass for proper operation.

Off-Center mode - lets you position the origin own ship to any point on the screen within 66% of the radius of the display (the center 2/3 of the display). The Off-Center mode permits the operator to obtain a greater view in the direction of interest.

PLOT function – will require that a heading sensor (Gyro or Compass) is connected to the CAXX. If so, then you can plot the actual cursor position on the radar display by pressing the [PLOT] key from the radar display, and thereby save the position in the WP-list as a waypoint i.e. you can give the plotted waypoint a new name/number, symbol, color, etc.

PPI center – Plan Position Indicator.

RAIN CLUTTER Control – also known as Fast Time Constant (FTC), is used to reduce large clutter masses caused by rain or snow and allow targets masked by this clutter to be seen on the radar display. This control differentiates the multitude of small radar returns from rain, effectively reducing or eliminating the rain clutter and allowing the operator to observe larger vessel traffic within the rain clutter. It has the effect of only displaying the leading edge of large echoes and will tend to effect the smaller echoes only slightly. This can be of great advantage on shorter ranges to distinguish between two very close echoes on the same bearing which may otherwise merge and appear as one echo.

Relative Motion Land, buoys and fixed objects move past own ship. In the North-Up mode, you must be interfaced with an electronic compass for proper operation.

SEA CLUTTER Control – also known as the Sensitivity Time Control (STC), is normally used on the shorter ranges to suppress the effects of sea clutter close to own ship by reducing the nearby gain level. It can effectively reduce the strength of the mass of random echoes received from nearby sea clutter for up to approx. 3 to 5 nm depending on wave and sea conditions. STC control is set to reduce the strength of these echoes such that the clutter appears only as intermittent small dots, yet small targets can still be distinguished.
☞ On short range scales, the setting of the sea clutter control should never be

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advanced so high as to obliterate all clutter, since this setting could prevent the detection of close in-target echoes.

Trails – is a feature which allows the operator to see the past history of target movement as an after-glow or "Wake" behind the moving targets or own ship. If the range scale is changed, the trails are cleared and new trails histories will be redrawn to the screen.
The trails are drawn for anything that moves on the screen, including sea gulls, sea clutter, buoys, lobster pots, and shoreline. In general it is better to use the trails feature away from harbors and the shoreline to avoid a cluttered display to better concentrate on trails of target vessels, etc.

True motion – land, buoys and fixed objects remain stationary while targets and own ship track across screen. In the North-Up mode, you must be interfaced with an electronic compass for proper operation.

TUNE control – is a variable control used to tune the receiver in the pedestal/ radome for maximum target returns on the display. If no land or ship targets are available, the operator may tune for maximum sea clutter. The tuning indicator will show the strength of tuning peak conditions and is tuned for maximum deflection. Normally, tuning of the radar is performed on the 3nm range scale or higher.

Select the appropriate datum by inserting the number prefix: Press [MENU], [2], [I], [ENT], and key in the desired number by means of the numerical keys or the +/- keys, confirm entry by [ENT].

000	World Geodetic System 1984
001	World Geodetic System 1984
002	European 1950
003	European 1979
004	North American 1927
005	North American 1983
006	Geodetic Datum 1983
007	Ordnance Survey of GB 1936
008	South American 1969
009	Adindan
010	Afgooye
011	Ain el Abd 1970
012	Anna 1 Astro 1965
013	Arc 1950
014	Arc 1960
015	Ascension Island 1958
016	Astro Beacon E
017	Astro B4 Sorol Atoll
018	Astro Dos 71/4
019	Astronomic Station 1952
020	Australian Geodetic 1966
021	Australian Geodetic 1984
022	Bellevue (IGN)
023	Bermuda 1957
024	Bogota Observatory
025	Campo Inchauspe
026	Canton Astro 1966
027	Cape
028	Cape Canaveral
029	Carthage
030	Chatham 1971
031	Chua Astro

032	Corrego Allegre
033	Djakarta
034	DOS 1968
035	Easter Island 1967
036	Gandajika Base
037	Guam 1963
038	GUX 1 Astro
039	Hjorsey 1955
040	Hong Kong 1963
041	Indian
042	Ireland 1965
043	ISTS 073 Astro 1969
044	Johnston Island 1961
045	Kandawala
046	Kerguelen Island
047	Kertau 1948
048	L. C. 5 Astro
049	Liberia 1964
050	Luzon
051	Mahe 1971
052	Marco Astro
053	Massawa
054	Merchic
055	Mercury 1960
056	Midway Astro 1961
057	Minna
058	Modified Mercury 1968
059	Nahrwan
060	Nanking 1960
061	Naparima, BW1
062	Observatorio 1966
063	Old Egyptian
064	Old Hawaiian
065	Oman
066	Pico de las Nieves
067	Pitcairn Astro 1967
068	Prov. South Chilean 1963
069	Prov. South American 1956

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070   Puerto Rico
071   Qatar National
072   Qornoq
073   Reunion
074   Rome 1940
075   Santo (DOS)
076   Sao Bras
077   Sapper Hill 1943
078   Schwarzeck
079   South Asia
080   Southeast Base
081   Southwest Base
082   Timbalai 1948
083   Tokyo
084   Tristan Astro 1968
085   Viti Levu 1916
086   Wake-Eniwetok 1960
087   Wake Island Astro 1952
088   Zanderij
089   Finnish Datum
090   Swedish Datum
091   World Geodetic System 1984
092   World Geodetic System 1984
093   World Geodetic System 1984
094   World Geodetic System 1984
095   World Geodetic System 1972
096   World Geodetic System 1984
097   World Geodetic System 1984
098   World Geodetic System 1984
099   Lisboa Datum
100   Pulkovo 1942
101   North Am. 1927 Alaska, Can.
102   South American – Yacare
103   Old Hawaiian Maui
104   Old Hawaiian Oahu
105   Old Hawaiian Kauai
106   Bukit Rimpah

107   Camp Area Astro
108   Guam 1963
109   G. Segara
110   Herat North
111   HU-TZU-SHAN
112   Indian (old)
113   Qornoq Datum 1927
114   Scoresbysund Datum 1952
115   Angmassalik Datum 1958
116   Tanarieve Observatory 1925
117   Timbalai
118   Special Indian (MGRS rel.)

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The optional detailed C-MAP NT+ cards can provide numerous of functions which are accessible via symbols presented on the electronic chart. Place the cursor on a C-MAP object e.g. a buoy or light to call up a small data window with details on the object. The data window will stay on screen for about 10 seconds or till cursor is moved. For expanded information, place the cursor on a C-MAP object and press [ENT] to call up an info window:

Scale: 1:200000		-Actual chart scale.
No user data at cursor position		
1	Edit user data	-Inactive function.
2	Chart info	-See details below.
3	Find nearest port services	-See details below.
4	Bearing & dist. from A to B	-Section 3.3 Info windows.
5	Lock cursors	
9	Chart setup	-Section 3.4 Chart setup.
0	Cursor to center	-Section 3.3 Info windows.
GOTO	Select NAV mode	-Section 3.3.8 GOTO function.
PLOT	Plot new data	-Section 3.3.9 PLOT function.
PAGE	More user data	-Inactive function.
MENU	Exit	-Exit info window.

2   *Chart info* will provide information on the C-MAP objects e.g. Lighthouse, Depth area, Fishery zone, Navigation mark, Buoy, Fog signal, etc.
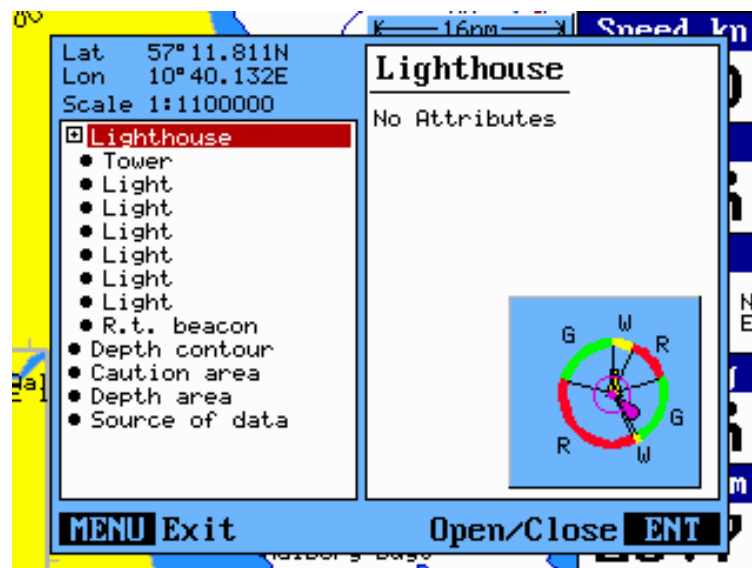
Even though it says "No attributes" for an object, you may try to press [ENT] to see if there is additional information available for the object.

● *Use the cursor to move up/down in the list of objects in the left column - details on the object will appear in the right column. In case the details overflows the window, use the +/- keys to move up/down in the text lines. Press [MENU] to exit the function.*

Service information

ENT *Press* [ENT] *from the chart display to call up the Info window*

3 *Find nearest port services* will call up a list of symbols with relevant information on each symbol.

● *Use the cursor to go to the object in the left column you wish to have information on*
- e.g. the **"Port/Marina"** symbol and then use the +/- keys to highlight the location you wish to locate on the chart by pressing [ENT].

The chart will now zoom in on the Port/Marina location you selected from the list – see example next page.

☞ Use the same procedure to locate a Hospital, Coast Guard, Fuel Station, Public Telephone, Provisions, etc.

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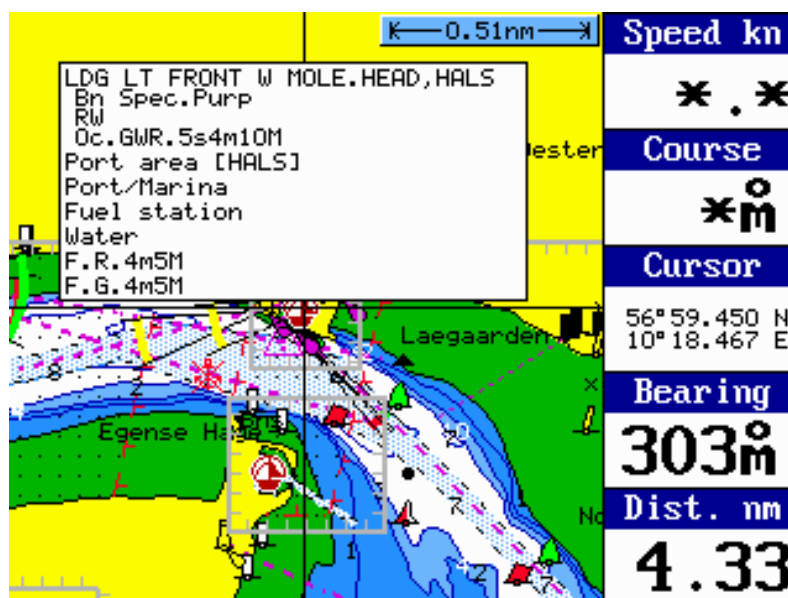
The facility information will stay on the screen for about 10 seconds.

Tide information

ENT   *Press* [ENT] *from the chart display to call up the Info window*

3   *Press* [3] *to call up the C-MAP symbols with available facilities*
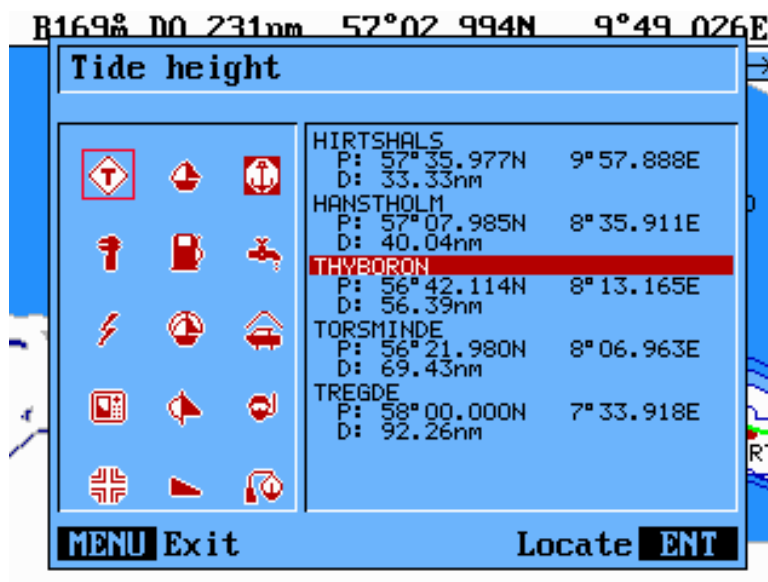
+/-   *Use the +/- keys to select the location where you want to know the tide height*

ENT   *Press* [ENT] *to go to the tide symbol on the location*

ENT   With the cursor placed on the tide symbol, *press* [ENT] *to call up the Info window*

2   *Press* [2] *to access Chart info*

MENU   *Exit function*

Example of Tide height information:
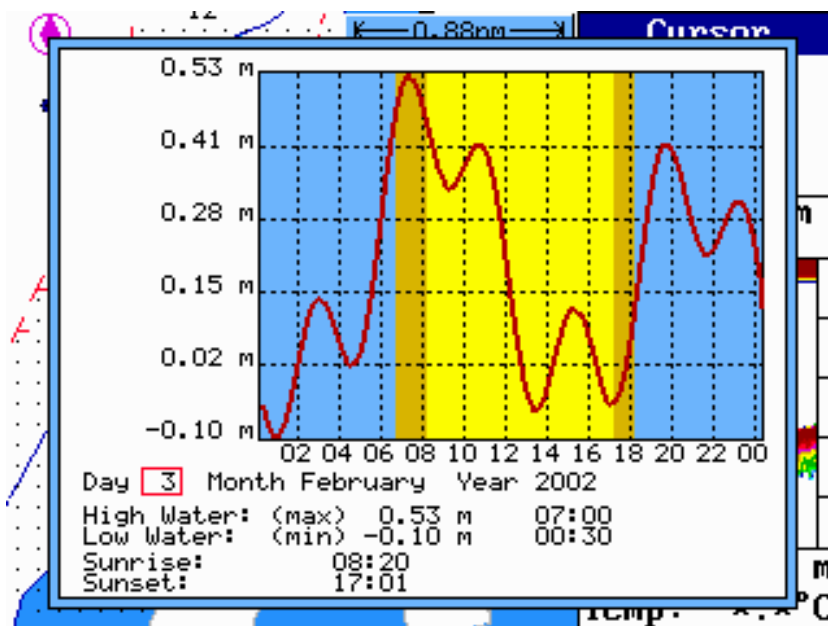
If you wish to see the low and high tides for a different date – in the past or in the future – it is possible to change the date:

Day   In the display there will be a red box cursor on the number of the day in the month. Toggle to a different number (date) with the +/- keys.

Month   Use the cursor to go to the present month. Toggle to a different month with the +/- keys.

Year   Use the cursor to go to the year. Toggle to a different year with the +/- keys.

The last two lines in the Tide display will inform of **Sunrise** and **Sunset** for the present day.

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Caution - the tide information system is quite accurate. However, the predictions
are subject to variables, which, like the weather, are beyond the control of man.
The tide predictions are based on normal weather conditions. Hurricanes and
strong winds will often have a strong influence on the water level, which can
vary several meters. Changes in coast lines, either due to natural erosion, major
storms or larger man-made constructions, like breakwaters or dredged canals, can
also have influence on the local tide situation.

Objects organized in categories

The purpose of the C-MAP functions is to select objects, which are to be
displayed on the screen (chart). The objects are organized in categories and each
category can be selected as one, without having to decide upon almost 300
objects separately. ☞ Refer to section 3.4 Chart setup.

The following functions are used to enable/disable visualization of the categories
listed below:

LAND SETTINGS		
Features:	Road in general	Landmarks:
Land area and coastline	Overhead cable w/pylons	Building, religious/single
Hill, dune area	Overhead pipeline	Cemetery
Land contour lines	Fence line	Fortifid structure
Salt pan	Telepheric	Siloway route part
Slope topline	Bridge	Tank, chimney
Tree point	Tunnel, tunnel entrance	Dish aerial
Vegetation area		Radar dome
Lake		Flagstaff/Flagpole
Waterfall		Flare stack
Airport area		Mast, tower
Built up area		Monument
Railway		Windmill, windmotor

MARINE SETTINGS		
Tideways, currents:	Depths:	Soundings:
Tide height (predictions)	Depth contour	Spot sounding
Current	Shallow water blue	
Water turbulence	Zero meter contour	

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Underwater objects:	Nature of seabed:	
Rocks	Seabed area	
Wreck area	Rocky area	
Obstruction	Coral reef	
Submarine cable	Weed / kelp	
Submarine pipeline	Sand waves	
Cable area, submarine pipeline area	Spring in seabed	

NAVAL AIDS SETTINGS		
Ports:	Coast Guard	Chaneler
Berthing facility-up area	Police	Provisions
Causeway	Customs	Bottle gas
Checkpoint	Health emergency	Car parking
Crane	Post office	Parking for boat + trailer
Dam	Yacht club	Caravan site
Distance mark	Boat yard	Camping site
Dock area	Marine electronics	Sewerage pump station
Dry dock	Electric/electronic repairs	Public telegraph
Dyke area	Engine repairs	Public radio
Dyke crown	Sailmaker	Public radiotelegraph
Floating dock	Fishing/diving gear	
Gate	Scuba recharge	
Harbor facility	Hotel/Inn	
Landing place	Restaurant	
Lock basin	Bank/Exchange office	
Oil barrier	Pharmacy	
Ramp area	Port/Marina	
Shoreline construction	Boat hoist	
Slipway	Fuel station	
Weir line	Water	
Small craft facility	Electricity	
Coastguard station	Showers	
Pilot boarding place	Laundrette	
Rescue station	Public toilets	
Signal station, traffic	Post box	
Signal station, warning	Public telephone	
Port area	Refuse bin	
Harbor master	Visitors' berth	

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Caution areas:	Tracks, routes:	Buoys:
Fishing facility	Deep water route part	Cardinal
Marine farm/culture	Deep water route centrel.	Installation
Cable, submarine	Fairway	Isolated danger
Cable area	Ferry route	Lateral
Offshore production area	Navigation line	Safe water
Pipeline area	Precautionary area	Special purpose
Anchor berth	Radar line	Generic
Anchorage area	Radar range	
Cargo transhipment area	Radio calling	Signals:
Contiguous zone	Recomm. route centreline	Anchor point
Continental shelf area	Recommended track	Cairn
Custom zone	Recomm. traffic lane part	Chain/Wire
Dumping ground	Traffic separation line	Fog signal
Exclusive economic zone	Traffic sep. boundary	Radar reflector
Fishery zone	Traffic sep. crossing	Top mark
Fishing ground	Traffic sep. lane part	Navigational aid, generic
Free port area	Traffic sep. roundabout	Extended nav.aid,generic
Harbor area (administr.)	Traffic separation zone	Radar station
Incineration area	Two-way route part	Radar transponder beacon
Log pond		Radio station
Military practice area		
National territorial area		
Restricted area		
Sea-plane landing area		
Spoil ground		
Straight territorial sea baseline		
Submarine transit lane		
Territorial sea area		

PAPER CHART SETTINGS		
Names:	Compass distance:	
Text	Control point	
	Compass	
	Local magnetic anomaly	

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SIMRAD
A KONGSBERG Company

Declaration of Conformity

(As required by Article 6.3 of Directive 1999/5/EC-RTTE Directive)

CE ①

We, **Simrad Støvring AS** - declare under our sole responsibility that the following products, intended for navigation and world-wide use aboard non-SOLAS vessels, comply with the relevant essential requirements of Directive 1999/5/EC:

SIMRAD CA42, CA42 SV, CA50, CA52

Chartplotters with GPS receiver

Conformity assessment under Annex II of 1999/5/EC (internal production control) has been undertaken by

Simrad Støvring AS

Østre Allé 6, DK-9530 Støvring
Denmark

Telephone +45 98373499   Telefax +45 98373807

Signed *Odin Sletten*.......   01 June 2002
Odin Sletten, Product Manager

SIMRAD warrants that every product shall be free of defects in material and workmanship as specified below:

CATEGORY "A":
•Autopilots •Radars •Instruments •Navigators •Radiotelephones •Plotters •Gyro compasses incl. sensitive elements •Sonars •Echosounders •Trawl Instrumentation. These products are warranted for a period of 24 months on parts and 12 months on labor from date of purchase, except for category B items. Consumable parts such as lamps, fuses, batteries, bearings, etc. are not covered by this warranty.

CATEGORY "B":
•Antennas •Transducers •Trawl sensors •Monitors (CRT/LCD) •Radar magnetrons •Disk drives.
These items are warranted for a period of 12 months on parts and labor from date of purchase.

WARRANTY SERVICE is available through authorized service dealers or national distributors worldwide. Products returned will, at the sole discretion of Simrad, either be repaired or replaced free of charge within normal working hours. Freight charges, insurance, duties or any other costs are the responsibility of the customer. Maximum liability shall not, in any case, exceed the contract price of the products claimed to be defective.

ON BOARD SERVICE can be arranged by authorized local service dealers or national distributors upon request. Labor costs for the repair/replacement of the defective modules/parts will be free of charge provided a valid warranty is confirmed. Overtime, travel, lodging, per diem, insurance, duties or any other costs are the responsibility of the customer. Additional expenses connected with replacement of transducers such as dry docking, diving and precautionary measures are not covered by this warranty.

VALIDITY: This warranty is effective only when warranty certificate or proof of purchase and equipment serial number is presented. Furthermore, the installation and operation has to be carried out in accordance with the product manual. Warranty liability does not apply to any equipment which has become inoperative due to misuse, accident, neglect, sea water damage or unauthorized repair. Simrad will not be liable for any loss, incidental or consequential damages whether based upon warranty, contract or negligence, or arising in connection with the sale, installation, use or repair of the product. Consequential damages include, but are not limited to, any loss of profit, property damage or personal injury.
The terms of warranty as described does not affect your statutory rights.

WARRANTY CARD
TO BE RETAINED BY THE OWNER

SIMRAD
A KONGSBERG Company

Simrad Støvring AS
Østre Allé 6
DK-9530 Støvring
Denmark

OWNER

ADDRESS

VESSEL

HOME PORT

TYPE   SERIAL NO.

EQUIPMENT

DATE OF PURCHASE   DATE OF INSTALLATION

YES: NO:
INSTRUCTION FOR USE GIVEN

SIMRAD warrants that every product
shall be free of defects in material and
workmanship as specified overleaf:

AUTHORIZED INSTALLER/DEALER STAMP

tear out

WARRANTY CARD

To be mailed to the NATIONAL DISTRIBUTOR (see overleaf) together with the installation report *WITHIN 14 DAYS* from the date of installation.

SIMRAD
A KONGSBERG Company

Simrad Støvring AS
Østre Allé 6
DK-9530 Støvring
Denmark

OWNER _____

VESSEL _____

ADDRESS _____

HOME PORT _____

EQUIPMENT

TYPE   SERIAL NO.

DATE OF PURCHASE _____

DATE OF INSTALLATION _____

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(CUSTOMER'S SIGNATURE)

_____
(DEALER'S SIGNATURE)

STAMP
HERE

NATIONAL SIMRAD DISTRIBUTOR: