Note!
Insert or remove C-MAP cartridges ONLY through SETUP 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.
MOB ‘MAN OVERBOARD’ function

MOB  In case someone falls overboard, press the [MOB] key and hold for 2 seconds (or activate an external MOB switch - hold for 5 seconds).

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

ENT  Before pressing [ENT] to start MOB navigation:
   • Reduce speed.
   • Turn off Autopilot.

ENT  Press [ENT] to start MOB navigation with all relevant data available for an efficient rescue operation and a precise track record of the vessel’s movements.

Window 1

Window 2

Window 3

Screen layout default after activating MOB.

Window 1: Data display will provide information of: Course, Bearing and Distance to MOB position, time elapsed since the incident occurred - first in seconds and then in minutes - if “*” is shown instead of numbers of minutes, means that the elapsed time has exceeded 9999 minutes. The two lines after the TIME shows the MOB position in Lat/Long.

Window 2: The chart display will provide a graphical impression of a man floating in the water at the MOB position together with a course line from actual position to the incident.

Window 3: Data display will provide information of: Date, time and position of MOB incident.

To turn MOB navigation off:
Press [GOTO], [3].

To recall the last registered MOB position, see section 8.8.
### Chapter 1 Introduction and safety summary
1.1 Introduction and system familiarization ........................................ 1-1
1.2 Safety summary ............................................................................ 1-2
1.3 How to get started ........................................................................ 1-3
1.3.1 Dedicated function keys ............................................................... 1-4
1.3.2 Radar and radar functions ............................................................ 1-6
1.3.3 Chart and chart functions............................................................. 1-6
1.3.4 Echosounder / Fishfinder ............................................................ 1-10

### Chapter 2 Fundamentals and initial start-up
2.1 Fundamentals of the display and page system ............................. 2-1
2.1.1 Example of how to exchange a page in the PAGE system ........... 2-2
2.1.2 Example of how to select a new display in a custom screen....... 2-2
2.2 Key functions ............................................................................... 2-3
2.3 Menu bar ....................................................................................... 2-5
2.4 Menu layout .................................................................................. 2-6
2.5 Choice of symbols ........................................................................ 2-7
2.6 Naming of routes, points etc......................................................... 2-7
2.7 Initial start-up ............................................................................... 2-7
2.8 Turn power on............................................................................... 2-9
2.9 Turn power off.............................................................................. 2-9

### Chapter 3 Radar menu
3. Radar operation ............................................................................ 3-1
3.1 Radar picture ................................................................................ 3-1
3.1.1 Orientation.................................................................................... 3-2
3.1.2 Effects of ship’s movement........................................................... 3-2
3.1.3 Environment effects ..................................................................... 3-3
3.1.4 Navigational echoes................................................................. 3-4
3.1.5 Racon (Radar Beacon) ................................................................. 3-4
3.1.6 Sea return ..................................................................................... 3-5
3.1.7 Storm and rain squall returns ....................................................... 3-5
3.1.8 Blind sectors or shadow effect ..................................................... 3-5
3.1.9 Side lobes...................................................................................... 3-6
3.1.10 Radar interference ................................................................. 3-6
3.1.11 False echoes .............................................................................. 3-7
3.2 Radar menu .................................................................................. 3-8
3.2.1 Shortcut to the pages in the radar-series .................................... 3-9
3.2.2 Initial radar display setup ........................................................... 3-9
3.2.3 Start transmission .................................................................... 3-10
3.2.4 Shut down procedure for the radar function, or back to ‘Standby’ .. 3-10
Table of contents

3.2.5 Standard radar display ................................................................. 3-11
3.2.6 Radar quick menu ...................................................................... 3-17
3.2.7 RadarChart overlay .................................................................... 3-19
3.2.8 Dual radar display ...................................................................... 3-24
3.2.9 Radar & Chart display ................................................................. 3-25
3.2.10 General features for the radar operation ..................................... 3-26
3.3 Demo mode .................................................................................. 3-28

Chapter 4 Chart menu and INFO windows
4. Chart menu .................................................................................. 4-1
4.1 Shortcut to the pages in the chart-series ...................................... 4-1
4.1.1 Data field on chart ................................................................. 4-2
4.1.2 Ship symbol ........................................................................... 4-3
4.1.3 Cursor function .................................................................... 4-3
4.1.4 Range or zoom function ........................................................... 4-4
4.2 Dual Chart display ................................................................. 4-5
4.3 Chart split screens ..................................................................... 4-6
4.4 Chart quick menu ....................................................................... 4-7
4.4.1 Cursor inactive ...................................................................... 4-7
4.4.2 Cursor active but not placed on any object or data ................... 4-8
4.4.3 Cursor placed on waypoint ..................................................... 4-9
4.4.4 Cursor placed on route leg or line section ............................... 4-10
4.4.5 Cursor placed on routepoint or linepoint ............................... 4-11
4.4.6 Cursor placed on trackpoint ................................................... 4-12
4.4.7 Cursor placed on target ......................................................... 4-13
4.4.8 GOTO menu .......................................................................... 4-14
4.4.9 PLOT menu .......................................................................... 4-15
4.5 Chart setup ............................................................................... 4-17
4.5.1 Display modes in the chart setup ........................................... 4-18
4.5.2 Description of chart features .................................................. 4-21

Chapter 5 Echo menu
5. Echosounder operation ............................................................... 5-1
5.1 Echo menu ............................................................................... 5-2
5.2 Shortcut to the pages in the echo-series ..................................... 5-2
5.3 Standard echo display ............................................................... 5-3
5.4 Variable range marker ............................................................... 5-4
5.5 Echo quick menu ....................................................................... 5-5
5.6 Plot waypoint or event mark via PLOT menu ......................... 5-6
5.7 Presentation setup ..................................................................... 5-7
5.8 How the echosounder works ...................................................... 5-10
5.9 Transducer beamwidth ............................................................. 5-11
5.10 Effects of the vessel’s speed ...................................................... 5-12
# Chapter 6 Pilot menu & navigation examples

6. Pilot menu..................................................................................... 6-1  
6.1 Shortcut to the pages in the pilot-series ....................................... 6-1  
6.2 Highway display and Navigation setup ........................................ 6-3  
6.2.1 Highway display when navigation mode is active........................ 6-5  
6.3 Position display.............................................................................6-6  
6.4 Dual speed display (trawling speed display)................................. 6-9  
6.5 ETA & AVN ............................................................................... 6-10  
6.6 Trim & Highway display............................................................ 6-11  
6.7 Set & Drift display ................................................................. 6-12  
6.8 Pilot split screens........................................................................ 6-13  
6.9 Navigation examples .................................................................. 6-14  
6.9.1 Cursor navigation ....................................................................... 6-14  
6.9.2 Waypoint navigation ................................................................ 6-15  
6.9.3 Route navigation ................................................................. 6-16  
6.9.4 Track navigation ....................................................................... 6-17  
6.10 Anchor guard.............................................................................. 6-19  
6.11 MOB alarm and navigation ........................................................ 6-19

# Chapter 7 Miscellaneous menu

7. Miscellaneous menu..................................................................... 7-1  
7.1 Wind display................................................................................. 7-1  
7.2 Speed diagram............................................................................. 7-3  
7.3 Decca lanes................................................................................... 7-5  
7.4 Loran C ......................................................................................... 7-6  
7.5 Satellite status............................................................................... 7-7  
7.6 DGPS information.......................................................................... 7-9  
7.7 SDGPS information....................................................................... 7-11  
7.7.1 Satellites in SDGPS system.........................................................7-13  
7.8 DSC VHF alarm..........................................................................7-14  
7.9 Depth and temperature diagram..................................................7-15

# Chapter 8 Waypoint / route menu

8. Waypoint / route menu ................................................................. 8-1  
8.1 Waypoints stored in the memory ................................................. 8-1  
8.1.1 Delete waypoints via menu ....................................................... 8-2  
8.2 Routes stored in the memory....................................................... 8-3  
8.2.1 Delete route via menu............................................................... 8-6  
8.2.2 Make new route from WP list ..................................................8-6  
8.3 Route calculation.......................................................................... 8-8  
8.4 Lines stored in the memory......................................................... 8-9  
8.4.1 Delete lines via menu............................................................... 8-10  
8.5 Start / stop track .......................................................................... 8-11  
8.6 Tracks stored in the memory....................................................... 8-12
Table of contents

8.6.1 Delete tracks via menu ............................................................... 8-13
8.7 Targets stored in the memory ...................................................... 8-14
8.7.1 Delete target via menu .............................................................. 8-15
8.8 MOB data ................................................................................... 8-15
8.9 Data transfer via DataCard or disc .............................................. 8-16
8.9.1 List of criteria for data transfer in the Action column ............... 8-19
8.10 Data transfer via PC interface .................................................... 8-20

Chapter 9 Setup menu
9. Setup menu ................................................................................... 9-1
  9.1 Radar setup ................................................................................ 9-1
  9.2 C-MAP cartridges ....................................................................... 9-5
  9.3 Echosounder setup .................................................................... 9-6
  9.4 Pilot / Position setup .................................................................. 9-9
  9.5 Speed alarm, units & language ................................................ 9-11
  9.6 Interface setup .......................................................................... 9-13
  9.6.1 Description of sentences ....................................................... 9-23
  9.7 Palette setup ............................................................................. 9-25
  9.8 Factory settings ......................................................................... 9-26
  9.9 QuickGuide ............................................................................. 9-28

Chapter 10 Troubleshooting, Maintenance and Service
10.1 Troubleshooting ......................................................................... 10-1
10.2 Preventive maintenance ............................................................ 10-3
10.3 Repair and service .................................................................... 10-3
10.4 Specifications .......................................................................... 10-4

Appendix A Glossary of terms ........................................................ A-1
Appendix B List of datum .................................................................. B-1
Appendix C C-MAP attributes ........................................................... C-1
Index ................................................................................................ end of manual

Declarations of conformity ........................................................... end of manual

International warranty ................................................................... end of manual

List of Simrad distributors ............................................................ end of manual
1.1 Introduction and system familiarization

Congratulations on your purchase of SIMRAD CA34/44/54 MultiRadar - a combination of the latest GPS and SDGPS receiver technology and optional built-in differential receiver for accurate positioning, plus: detailed cartography and high performance radar and echosounder technology; all in a unique slim-line design with a bright 7” TFT (CA34), 10” ATFT/TFT (CA44) or 15” TFT (CA54) color display.

The radar system with RadarChart overlay, 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 electronic chart system includes a built-in world chart for rough planning and overview. The choice of chart system best suitable for the CA34/44/54 was carefully singled out to be the C-MAP NT+ mini cards. The optional C-MAP charts are available world-wide at your local Simrad dealer.

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

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.

The SimNet data and control network provides high speed data transfer and control between Simrad products that are integrated as a total navigation, steering and communication system on board.

DS34/44/54 Dual Station for the CA34/44/54 is available with a bright 7” TFT, 10” ATFT/TFT or 15” TFT color display. The main unit and the dual station are identical in design and operation.

How to use this manual? This manual is written for the products: CA34, CA44 and CA54, which mainly share the same type of software. From hereon, these models will be 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. Also, “How to get started” further on in this chapter will give you a quick introduction to some of the features you have access to in your new MultiRadar.

The display examples shown in this manual are not always an exact copy of what you will see on the screen, as the presentation depends on your system configuration and choices of setup. How to interpret special marked key symbols etc. in the manual:

- Either the + (plus) or - (minus) key may be applied.
- Emphasizes important points.
- Indicates that you should press the keys [1] and [3] to obtain what is written in italic next to the key.

### 1.2 Safety summary

**Precaution:** Do not open the equipment, only qualified persons should work inside the equipment. If the glass in the screen breaks, be careful not to get cut on the sharp edges of the glass pieces.

- The lifetime of the internal battery is minimum 5 years. **If not exchanged before it goes flat, all data in the unit’s memory will be lost.** We strongly recommend that you frequently store your data on a Simrad DataCard. For exchange of battery, call your local Simrad workshop.

**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 (see the fuse rating in section 10.4 Specifications). 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 at the rear of the unit. Good grounding should also be exercised for connected equipment, refer to separate Installation manual.

**Cleaning:** Do not use any kind of strong solvents e.g. spirit, alcohol, gasoline or oils.

**Software:** The software version of the main unit (see start-up display) should always be informed in a service situation, or when ordering a Dual Station.
1.3 How to get started

When starting up for the very first time, the first time after loading a new software or after a master reset: Make sure that all hardware installation and electrical connections are completed in accordance to the installation instructions.

Press and hold the [PWR] key until you have a picture on the screen

The system will perform a software update and check for communication activity. When finished, a new start-up window will be presented on the screen:

After making sure that all connected products are turned ON:

Press [ENT] to start automatic input source setup, - if a new product is connected later on, refer to section 9.6 Interface setup.

New window: Automatic input source setup listing Data type, Group and Source of connected units.

Press [ENT] to continue

Press [PAGE] to scroll through a quick guide which informs of the use of the keys and where you can enter owner’s setup, etc. - the quick guide is also accessible via [MENU], [7], [5].

Press [ENT] when ready to assume normal operation
- go to [MENU], [7], [2] if you wish to make adjustments to the interface setup.
Heading is only available if a compass was detected at start-up.

Your present position will automatically be updated within a few minutes. When ready, the ship symbol on the chart will flash, the position coordinates will stop flashing, and the *** will be replaced by actual course and speed figures.

1.3.1 Dedicated function keys

**RADAR**  Short press will toggle overlay on/off:

- The toggle function will require:
  1. Valid position.
  2. Valid heading from compass
  3. Orientation set to NU
     - refer to section 3.2.7.

**RADAR**  Long press will toggle between:

- Radar display  Dual Radar  Radar & Chart  Custom screen

**CHART**  Short press will toggle between:

- Chart + data field placed either at the right side or at the top, and echo data.

**CHART**  Long press will toggle between:

- Chart display  Dual Chart  Custom screen1  Custom screen2
CA34/44/54 Introduction and safety summary

**ECHO**
Long press will toggle between:

- Echo + A-scope
- Dual frequencies
- Custom screen1 (CA44/54)
- Custom screen2

**PILOT**
Short press will toggle between:

- Highway
- Position
- Dual Speed
- Set & Drift

When navigation mode is active, these two displays will be included:

- ETA & AVN
- Trim & Highway

**PILOT**
Long press will toggle between:

- Highway
- Custom screen1
- Custom screen2

**PAGE**
Short press will toggle between active pages under the main function keys. Long press will start a rotation of the 4 pages (section 2.1).
1.3.2 Radar and radar functions

Press the [RADAR] key to call up a radar display. Press again to toggle between the radar shortcut series - see display examples in section 1.3.1.

To start the radar
1. Press [ENT], [RADAR] to initiate a warming up period of two minutes (countdown of 120 seconds), and then the radar will go in Standby mode.
2. Press [ENT], [GOTO] to start transmission.

Select and adjust radar range
Press one of the numeric keys 1 - 9 to select a fixed range. Key 9 will select the largest range and key 1 the smallest.

Press [ENT] to call up the Radar quick menu with access to e.g. Overlay Chart, Overlay User Data, activate EBL-VRM cursors, start and stop radar transmission, etc.

Toggle the EBL-VRM1 cursors on/off directly from the [EBL] key.

Turn off cursor. Long press on [CLR] will turn off all cursors on the radar screen.

The [ADJ] key will open for adjustment of the radar parameters. Use the cursor or the [ADJ] key to move around in the control panel; toggle between available values with the +/- keys or enter new values with the numeric keys. Press [ENT] to exit control panel.

In the Dual Radar display: after pressing the [ADJ] key to access the control panel, only half of the parameters will be visible. By pressing [ADJ] again will toggle between the 1st and 2nd half of the control panel.

1.3.3 Chart and chart functions

Press the [CHART] key to call up a chart display. Press again to toggle between the chart shortcut series - see chart examples in section 1.3.1.

C-MAP cartridges (standby)
Press [MENU], [7], [CHART] whenever inserting or removing a C-MAP card.
Select and adjust chart range/scale
Press one of the numeric keys 1 - 9 to select a fixed range (and chart level). Key 9 will select the largest range and key 1 the smallest. Use the +/- keys to adjust range in smaller steps.

Chart cursor and info windows
Press the cursor key to activate the cross hair cursor on the 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. Press [ENT], [2] to access further details on C-MAP objects or user data i.e. waypoints, routes, etc. Press [ENT], [5] to lock cursors in Dual Chart screen and [ENT], [5] to release cursors again. Press [CLR] to switch off cursor function. The ship symbol will now automatically ‘home’ and stay on screen.

Find nearest tide station and port services
1. Press [ENT], [3]
2. Move cursor up/down to select e.g. the Port/Marina symbol
3. Locate alternative port with the +/- keys, and press [ENT]

Navigate to cursor (point and go)
1. Move the cursor to where you wish to go (first point)
2. Press [GOTO]

You can now move the cursor to the next point and when ready to change leg, just press [GOTO], [2].

How to plot or insert waypoints and marks

• With cursor OFF (press [CLR])
Press [PLOT] and choose from:
[PLOT] Plot ship’s position as mark.
[1] Insert ship’s position. You can change the lat/lon figures, the symbol and the symbol’s size and color.
[3] Insert specific waypoint. Suggested name, symbol, etc. can be altered.
[6] Plot ship’s position as target.

• With cursor activated on the chart you also have access to:
[6] Plot cursor position as target.
**How to make a route on the chart**

1. Place the cursor on the position for the first routepoint.
2. Press [PLOT], [4]: Make route.
4. Press [ENT] when ready to save the route. You can enter a new name for the route, change type and color for the course line.
5. Press [ENT] to accept and save the route.

**How to make a route from existing waypoints stored in the WP list**

1. Press [MENU], [6], [2] to call up the route list.
3. Move cursor up/down to select the WP position for the first routepoint, and press [PLOT].
4. Repeat point 3 to add new WP positions to the route (the last routepoint in the right column is always empty, allowing that a new final routepoint can be added later on).
5. When the route is completed, press [ENT] to accept and go to Edit route.
6. In the Edit route display, you can give the route a new name, change type and color for the course line, etc.
7. Press [ENT] to accept changes and save the route.
8. Press [MENU] to go to the route list, which will provide an overall view of the total of routes stored in the CAXX.

**How to edit a route - rubberbanding**

- To move a point on the chart:
  1. Place cursor on the point you wish to move.
  2. Press [ENT], [1], [2].
  3. Move cursor to new location.

- To insert a new point on the chart:
  1. Place cursor on the leg where the new point is to be inserted.
  2. Press [ENT], [1], [2].
  3. Move cursor to where the new routepoint is to be placed.

**How to start waypoint navigation (two ways)**

- Place cursor on the symbol of the WP you wish to go to:
  1. Press [GOTO], [2].
• Without placing cursor on the symbol of the WP you wish to go to:
  1. Press [GOTO], [2].
  2. Use the +/- keys to select the WP you wish to go to.

How to start route navigation (two ways)

• Place cursor on the routepoint you wish to go to first:
  1. Press [GOTO], [3].
  2. Select direction in route: Forward or Reverse.

• Without placing cursor on the routepoint you wish to go to first:
  1. Press [GOTO], [3].
  2. Use the +/- keys to select the name of the route.
  3. Use the cursor to go to routepoint number, and select which one you wish to
goto first by means of the +/- keys.
  4. Select direction in route: Forward or Reverse.
  5. Press [ENT] to start navigation.

Advance or stop navigation
• Press [GOTO], [1] to advance to next point in the route.
• Press [GOTO], [3] to stop navigation.

Start and stop track
2. Before tracking is started, you can give the track a new name, make
   changes to track interval, track line type and color.
4. When you wish to stop tracking, press [PLOT], [8], [ENT].
1.3.4 Echosounder / Fishfinder

Press the [ECHO] key to call up an echosounder display. Press again to toggle between the echo shortcut series - see display examples in section 1.3.1.

Select and adjust echosounder range
Press one of the numeric keys 1 - 9 to select a fixed range. Key 9 will select the largest range and key 1 the smallest. Use the +/- keys to adjust range in smaller steps. Key 0 will select Auto Range.

A-scope - Press [ENT], [2] to toggle A-scope on/off. The strength of the actual echo is indicated by both width and color intensity.

Change frequency - Press [ENT], [1] to toggle between e.g. 50 and 200 kHz.

Gain - Adjust gain with cursor left/right to just below the point where you begin to see speckles of ‘noise’ on the screen.

Bottom lock display* - Press [ENT], [4] Bottom lock is a combination of standard echo display and extended area around the bottom.

Zoom display* - Press [ENT], [5] The expansion is a combination of standard echo display and extended area around the VRM - Variable Range Marker.

Shift display* - Press [ENT], [6] when operating in deep waters. Select the range for an expansion window. The expansion window can automatically follow a changing bottom or be set manually by the +/- keys.

*Return to standard echosounder display by pressing [ENT], [3].

Echo setup (presentation) - Press [ADJ] from echo display to access the setup display for either 38 (CA44/54), 50 or 200 kHz. Press [ENT] to confirm changes, or leave the setup without having made any changes by pressing [MENU].

Echosounder setup - Press [MENU], [7], [ECHO] when you need to make any general settings, selecting a transducer or selecting demo mode etc.

Transmit power off - Press [ENT], [ECHO] to stop transmission in order to observe noise picked up by the transducer or to reduce power consumption.
2.1 Fundamentals of the display and page system

The CA34/44/54 MultiRadar has a multi-function screen and data presentation system with full screen and different types of split screens. The series of pages under the function keys (situated in a vertical row to the right of the display) will in most situations be sufficient information for the operator.

In split screens consisting of up to four displays, the active display is indicated by a solid red frame. Use the [WIN] key to clockwise toggle between which display on the screen is active. Only active displays are operable.

The [PAGE] key differs from the other function keys. There are four pages under the [PAGE] key which can be set up to the presentation you prefer by exchanging an existing display in the PAGE system with a new one selected from a function key or via the menu - see next page. Single press on the [PAGE] key will toggle between the active pages under the function keys e.g.:
Long press on the [PAGE] key will start a rotation of the four pages in intervals of 5 seconds (increase/decrease the time in [MENU], [7], [1]). Press any key to stop rotation.

2.1.1 Example of how to exchange a page in the PAGE system

The four pages in the PAGE system are collected from the RADAR, CHART, ECHO and PILOT menus in the sequence of which the function keys appear on the keypad ie. the first page is from the RADAR function, the second page is from the CHART function, the third page is from the ECHO function, and the fourth page is from the PILOT function. This sequence can not be changed, only the choice of display collected from each function can be changed e.g.:

Press the [PAGE] key until the full screen Chart display appears

Call up the menu bar, and...

collect the Dual Chart display

- or you can toggle between the available displays in the CHART function by pressing (long press) the [CHART] key repeatedly.

The same applies for the other three pages in the PAGE system ie. press the [PAGE] key until a display from the RADAR, ECHO or PILOT function appears and then collect a new display from the appropriate menu.

The display sequence under the function keys is the same as the display sequence in the matching menu.

2.1.2 Example of how to select a new display in a custom screen

In custom screens with multiple window combinations, all displays, which are not main function displays, are exchangeable. It is also possible to change the right half of the screen from half screen window to two quarter windows and vice versa. Example:

Call up the menu bar, and...
Highlight a function e.g. Route calculation in the WP/RTE menu.

Press [WIN] several times to check the screen image (situated to the far right in the top line of the menu bar) which windows the function can be placed into

Press [ENT] to enter the highlighted function into the highlighted window

If the function text in the menu is red, the display will not be available for the selected window.

### 2.2 Key functions

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.

- **MOB** Press for two seconds to activate the MOB - “Man overboard” function.
- **MENU** Turns the menu bar on/off. Exits any data display without taking any action (except the radar function).
- **ENT** Confirms insertion and editing of data (except the radar function). Calls up quick menus, and information on marks, waypoints, etc. on chart together with several INFO windows from a chart display.

Moves cursor in data displays and charts + activates cursor on chart and radar. Moves left/right/up/down in the menu system. Adjusts gain (left/right), activates and moves VRM (up/down) in echo display.

Changes radar, chart or echosounder range i.e. + (plus) zooms out for better overview (larger range) and - (minus) zooms in for greater details (smaller range). Toggles between available values.

**GOTO** Activates GOTO menu with choice of navigation modes, etc.

**PLOT** Activates PLOT menu with choice of plotting and inserting waypoints, routes, lines etc. together with starting or stopping a track of own ship.
Shortcut to Radar functions. Short press will toggle overlay on/off. Long press will toggle between Radar display in full screen, Dual Radar, Radar & Chart, and a custom screen.

Shortcut to Chart function. Short press will toggle between different data fields on chart. Long press will toggle between Chart in full screen, Dual Chart, and two custom screens.

Shortcut to Echosounder functions. Long press will toggle between Echo display in full screen with A-scope, Dual Frequency (CA44/54), and two custom screens.


Toggles between active pages under the four main function keys i.e. [RADAR], [CHART], [ECHO] and [PILOT]. Long press starts automatic rotation of these pages. Press any key to stop rotation.

Gives access to setup displays related to active display. Scrolls through adjustable parameters.

Toggles EBL-VRM1 on/off. The Electronic Bearing Lines may be displayed in either degrees Relative “R” (to ship’s centerline) or True “T” (Relative to north), depending on the selected orientation (HU or NU).

Toggles between active windows in split screen. The active window will have a solid red frame. Only active windows are operable.

The alphanumeric keys inserts and selects data in data displays. Keys 1-9 are also Quick-range keys, which each represent a fixed radar, chart or echosounder range. Key 0 will center the cursor/ship on the chart, activate auto range in sounder mode, and activate/deactivate ‘off-center to cursor’ on the radar display.

Deletes data in enter or edit mode. Turns cursor off in active display. Long press will turn off all active cursors on radar display. From radar control menu: Returns Tune, Gain or Sea to AUTOMATIC mode, and clears the EBL and VRM readings.
Power on - hold key depressed till you have a picture on the screen. Calls up a window where you can adjust the brightness in the screen, background light in keypad, and select Daylight displays, Night display or custom made color palettes. Hold two seconds to turn the power off.

### 2.3 Menu bar

**MENU**  
*Toggles the menu bar on/off*

To fit 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.

<table>
<thead>
<tr>
<th>MISCELLANEOUS</th>
<th>WIN</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>RADAR</td>
</tr>
<tr>
<td>2</td>
<td>CHART</td>
</tr>
<tr>
<td>3</td>
<td>ECHO</td>
</tr>
<tr>
<td>4</td>
<td>PILOT</td>
</tr>
<tr>
<td>5</td>
<td>MISC</td>
</tr>
<tr>
<td>6</td>
<td>WP/RTE</td>
</tr>
<tr>
<td>7</td>
<td>SETUP</td>
</tr>
<tr>
<td>1</td>
<td>Wind</td>
</tr>
<tr>
<td>2</td>
<td>Speed diagram, etc.</td>
</tr>
</tbody>
</table>

Having selected e.g. 5:MISC 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 left/right to move to the adjacent menu.

Most functions in the menus are general, and can be called forward at any time. Functions not currently available will have a different color from the rest of the functions. Not all functions are available in any window size i.e. full screen, half screen or quarter window. Use the [WIN] key to toggle between the windows in which the highlighted function can be presented. Keep an eye on the functions in the menu to see how they may change color as you toggle from window to window.

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

<table>
<thead>
<tr>
<th>1</th>
<th>RADAR</th>
<th>2</th>
<th>CHART</th>
<th>3</th>
<th>ECHO</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Radar</td>
<td>1</td>
<td>Chart</td>
<td>1</td>
<td>50kHz</td>
</tr>
<tr>
<td>2</td>
<td>Dual Radar</td>
<td>2</td>
<td>Dual Chart</td>
<td>2</td>
<td>200kHz</td>
</tr>
<tr>
<td>3</td>
<td>Radar &amp; Chart</td>
<td>3</td>
<td>Custom screen 1</td>
<td>3</td>
<td>Dual Frequency (44/54)</td>
</tr>
<tr>
<td>4</td>
<td>Custom screen</td>
<td>4</td>
<td>Custom screen 2</td>
<td>4</td>
<td>Custom screen 1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5</td>
<td></td>
<td>5</td>
<td>Custom screen 2</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>4</th>
<th>PILOT</th>
<th>5</th>
<th>MISC</th>
<th>6</th>
<th>WP/RTE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Highway</td>
<td>1</td>
<td>Wind</td>
<td>1</td>
<td>Waypoints</td>
</tr>
<tr>
<td>2</td>
<td>Position</td>
<td>2</td>
<td>Speed diagram</td>
<td>2</td>
<td>Routes</td>
</tr>
<tr>
<td>3</td>
<td>Dual Speed</td>
<td>3</td>
<td>Decca lanes</td>
<td>3</td>
<td>Route calculation</td>
</tr>
<tr>
<td>4</td>
<td>ETA &amp; AVN</td>
<td>4</td>
<td>Loran C</td>
<td>4</td>
<td>Lines</td>
</tr>
<tr>
<td>5</td>
<td>Trim &amp; Highway</td>
<td>5</td>
<td>Satellites</td>
<td>5</td>
<td>Tracks</td>
</tr>
<tr>
<td>6</td>
<td>Set &amp; Drift</td>
<td>6</td>
<td>DGPS</td>
<td>6</td>
<td>Targets</td>
</tr>
<tr>
<td>7</td>
<td>Custom screen 1</td>
<td>7</td>
<td>SDGPS</td>
<td>7</td>
<td>MOB data</td>
</tr>
<tr>
<td>8</td>
<td>Custom screen 2</td>
<td>8</td>
<td>DSC info</td>
<td>8</td>
<td>Data transfer</td>
</tr>
<tr>
<td></td>
<td></td>
<td>9</td>
<td>Depth &amp; Temp. diagram</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>7</th>
<th>SETUP</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Radar setup</td>
</tr>
<tr>
<td>2</td>
<td>Interface setup</td>
</tr>
<tr>
<td>3</td>
<td>Palette setup</td>
</tr>
<tr>
<td>4</td>
<td>Factory settings</td>
</tr>
<tr>
<td>5</td>
<td>QuickGuide</td>
</tr>
</tbody>
</table>

When selecting a sub-menu in the SETUP menu, the display will always appear in a pop-up window, so once you have accepted the changes or decided to just exit the display, then the display will disappear from the screen.
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:

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>X</td>
<td>Waypoint</td>
</tr>
<tr>
<td>↓</td>
<td>Beacon</td>
</tr>
<tr>
<td>O</td>
<td>Marker</td>
</tr>
<tr>
<td>▲</td>
<td>Starboard</td>
</tr>
<tr>
<td>1</td>
<td>Red buoy</td>
</tr>
<tr>
<td>◆</td>
<td>Fish</td>
</tr>
<tr>
<td>▲</td>
<td>North</td>
</tr>
<tr>
<td>▼</td>
<td>Port</td>
</tr>
<tr>
<td>2</td>
<td>Green buoy</td>
</tr>
<tr>
<td>◇</td>
<td>Platform</td>
</tr>
<tr>
<td>▼</td>
<td>South</td>
</tr>
<tr>
<td>❁</td>
<td>MOB</td>
</tr>
<tr>
<td>⚥</td>
<td>Wreck</td>
</tr>
<tr>
<td>⚥</td>
<td>Rock awash</td>
</tr>
<tr>
<td>⚥</td>
<td>East</td>
</tr>
<tr>
<td>⚥</td>
<td>EVENT 4</td>
</tr>
<tr>
<td>5</td>
<td>Harbour</td>
</tr>
<tr>
<td>5</td>
<td>West</td>
</tr>
</tbody>
</table>

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 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 in that row.

2.7 Initial start-up

When starting up for the very first time, the first time after loading a new software or after a master reset: Make sure that all hardware installation and electrical connections are completed in accordance to the installation instructions.

Press and hold the [PWR] key until you have a picture on the screen

The system will perform a software update and when finished, a new start-up window will be presented on the screen (see example on next page).
After making sure that all connected products are turned ON:

Press [ENT] to start automatic input source setup, - if a new product is connected later on, refer to section 9.6 Interface setup.

New window: Automatic input source setup listing Data type, Group and Source of connected units.

Press [ENT] to continue

Press [PAGE] to scroll through a quick guide which informs of the use of the keys and where you can enter owner’s setup, etc. - the quick guide is also accessible via [MENU], [7], [5].

Press [ENT] when ready to assume normal operation
- go to [MENU], [7], [2] if you wish to make adjustments to the interface setup.

Heading is only available if a compass was detected at start-up.

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...

Confirm with [ENT]

Your present position will automatically be updated within a few minutes. When ready, the ship symbol on the chart will flash, the position coordinates will stop flashing, and the *** will be replaced by actual
course and speed figures - see section 6.3 Position display.

Do not start radar transmission before the antenna is warmed up, refer to section 3.2.3 Start transmission.

**Select display language:**

MENU

*Call up the menu bar, and...*

7,1

*press [7], [1] to call up the language display*

Press up on the cursor to go to the bottom line in the display

+/-

*Select language*

ENT

*Confirm entry*

**2.8 Turn power on**

Starting up for the first time, or after loading a new software, or after a master reset - see section 2.7. Starting up at any other time:

PWR

*To turn on the CAXX, press and hold the [PWR] key until you have a picture on the screen*

ENT

*Press [ENT] when the system is ready*

**2.9 Turn power off**

PWR

*Call up INFO window, and...*

PWR

*Press and hold until the curtains begin to close*

The CAXX is now turned off. All the data and setups are saved and stored in the internal memory and, of course, will be available next time the unit is turned on.
3. 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 3.2.

3.1 Radar picture

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 at the 0° relative bearing.

Coastline contours and landmass are generally depicted in solid filled yellow, purple, multi-colored (DAY settings) or green (NIGHT settings) echo areas - choose colors in Pallette setup, section 9.7. Other surface vessels, and channel buoys, are displayed as smaller single “blips” or echoes. The radar picture or map can be viewed in many different ranges from own ship. These sizes are selected by the range 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.
3.1.1 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.

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 when maneuvering around nearby vessels, or buoys.

In North Up mode, the heading line will indicate the ship’s heading in relation to the radar picture, which is presented in north up like a chart.

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.

3.1.2 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 own ship is permanently fixed at the center of the display and 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.

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 posi-
tion 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).

3.1.3 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 control 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 control 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, the images of the channel markers may appear faint.

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 can appear 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.

### 3.1.4 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.

### 3.1.5 Racon (Radar Beacon)

A racon is a radar transponder which emits a characteristic signal when triggered by a ship’s radar. The signal may be emitted on the same frequency as that of the triggering radar, in which case it is superimposed on the ship’s radar screen automatically. The racon signal appears on the screen as a radial line originating at a point just beyond the position of the radar beacon or as a Morse code signal displayed radially from just beyond the beacon.
3.1.6 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 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 three miles in all directions from own ship, but the worst direction is where the wind is blowing towards the ship. The radar has a sea clutter control, which can be used to minimize the effects of sea clutter pickup on the screen.

3.1.7 Storm and rain squall returns

The radar can also see echoes from rain or snow. Echoes from 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 rain squalls are not desired, the Rain clutter control can be adjusted to minimize the effect on the radar screen.

3.1.8 Blind sectors or shadow effect

Funnels, masts or derricks, (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.

3.1.9 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 through careful reduction of the Gain or proper adjustment of the Sea clutter control.

3.1.10 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 (center of 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”.
3.1.11 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 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.
3.2 Radar menu

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.*

<table>
<thead>
<tr>
<th></th>
<th>The displays obtained from this menu can easily be accessed from the main function key [RADAR] - see section 3.2.1.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Radar</td>
</tr>
<tr>
<td>2</td>
<td>Dual Radar</td>
</tr>
<tr>
<td>3</td>
<td>Radar &amp; Chart</td>
</tr>
<tr>
<td>4</td>
<td>Custom screen</td>
</tr>
</tbody>
</table>

The **Radar** display will be presented in full screen with the radar control menu placed in the right side of the display. Press [ADJ] to access the control menu, where the most common adjustments are made - see section 3.2.5.

The **Dual Radar** display 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 - see section 3.2.8.

The **Radar & Chart** display requires a full screen presentation, with the radar display in the left half of the screen and the chart display in the right half of the screen - see section 3.2.9.

The **Custom screen** will present multiple window combinations (section 3.2.1), where the radar display will be fixed in the left half window and the two quarter windows i.e. (default) a chart display and an echo display can be exchanged with different displays.

To access one of the displays via the menu e.g.:

*Call up the menu bar, and...
press [1] and [1] to call up the Radar display in full screen*
3.2.1 Shortcut to the pages in the radar-series

The RADAR function is one of the main functions in the CAXX. Each page under the [RADAR] key will include a window representing the radar function. It is not possible to exchange main function displays with a new display. Refer to section 2.1, 2.1.1 and 2.1.2 for further information on the display and page system.

From any display:
Long press on the [RADAR] key will toggle between:

- Radar full screen
- Dual Radar
- Radar & Chart
- Custom screen

All the displays are fixed, except for the two quarter windows in the custom screen, which can be exchanged with a different display selected via the menu.

From radar display:
Short press on the [RADAR] key will toggle overlay on/off - see section 3.2.6.

3.2.2 Initial radar display setup

After the installation is completed, check the Radar setup (section 9.1) if the Antenna height is correct and the Heading adjust is zero degrees to ship’s center line. If not, carry out adjustments as described in the Radar setup. The Scanner type is preset to Auto detect and as such, the system will automatically initiate the correct parameters for the connected scanner.
3.2.3 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 Shortcut to radar display

ENT Call up the Radar quick menu

RADAR Turn ‘Power on’

The legend ‘Detecting’ will appear on the screen while the system is checking which scanner is connected. When the scanner is detected, a countdown to zero will appear on the screen which will allow two minutes for the scanner to warm up before it enters Standby mode and is ready for use.

When ready to start transmission:

ENT Call up the Radar quick menu

GOTO Start transmission

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 after Power on and going into Standby, the radar must be left in Standby mode for the extra 20 minutes it will take to warm up the antenna properly. This way you will contribute to the lifetime of the magnetron in the radar antenna.

3.2.4 Shut down procedure for the radar function, or back to ‘Standby’

To disengage the radar transmission temporarily, you can return the radar function to Standby mode:

ENT Call up the Radar quick menu

GOTO Enter Standby mode
To resume the radar transmission:

**ENT**

*Call up the Radar quick menu*

**GOTO**

*Start transmission*

To shut down the radar function:

**ENT**

*Call up the Radar quick menu*

**RADAR**

*Turn ‘Power off’*

### 3.2.5 Standard radar display

The standard radar display will require full screen presentation.

**RADAR**

*Shortcut to radar display*

Or load the radar display via the menu:

**MENU**

*Call up the menu bar, and...*

*load the Radar display*

The top line in the radar display indicates the course and speed of the ship together with the position of the ship, which will be exchanged with the position of the cursor when activated on the radar display (heading input is required). The control menu will appear in the right side of the radar display in full screen.

‘Press ENT to operate’ - refer to section 3.2.6 Radar quick menu.
Use cursor to activate and move the cross cursor on the radar background - press [CLR] to remove cursor.

**EBL**
Activate EBL-VRM1, and use cursor to move EBL-VRM1 around in the radar background - more details further ahead in this section - press [EBL] again, or [CLR] to remove EBL-VRM1.

**ADJ**
Open for adjustment

**+/−**
Use cursor to move around in the control panel

**0-9**
Toggle between available values

**ENT**
Key in new values

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 set to:

**HU RM** (Head-Up in Relative Motion): The heading line always appears on the display at 0 degrees as the antenna beam passes the bow of the vessel. Targets appearing on the display are relative to your own ship. Head-up mode gives an easy interpretation of the situation around your boat.

**NU** (North-Up): In this mode, targets are displayed at their measured distances and direction relative to north. North being at the top of the display. To operate in NU mode will require valid heading from connected compass.

**CU** (Course Up): The heading line appears to point upwards within the range of the rotation resolution (default is 15°). If the vessel turns more than e.g. 15°, the radar picture will also turn to make the heading line continue pointing upwards.

**TM** (True Motion): Own ship moves past land, buoys and fixed objects. To operate in TM mode will require valid GPS position and compass heading.
**RM** (Relative Motion): The ship will stay in the center of the screen or at an offset position and targets will appear relative to own ship’s position.

If receiving the alarm: “Heading missing” or “Position mising” the system will change to Head-Up in Relative Motion after 60 seconds and at the same time inform of “Changing to HeadUp” in a pop-up window.

**0.50nm** indicates the displayed range in the radar picture.

**Power off** indicates that the radar function is not active.

**TI** is the Tuning Indicator, which provides an indication of the receiver tuning.

**Tune** – make manual adjustments to Tune by means of the +/- keys, and return to AUTO mode by pressing [CLR].

**Tune control** – is a variable control used to tune the receiver in the radar antenna 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. Tuning of the radar should be performed on a 3nm range scale or higher.

**Gain – Auto mode** can be used in most situations, but in some situations manual adjustment leads to better performance of the system. Make manual adjustments to Gain by means of the +/- keys, and return to AUTO mode by pressing [CLR].

**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. A semi-automatic Gain reduction is used on shorter ranges to improve target definition. 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 display may become excessively covered with noise speckle making target observation difficult.

**Sea – Auto mode** is optimized for open sea and is recommended when the distance to shore is over 300 meters. Closer to shore and when approaching a harbor, choose Harbor mode.

Make manual adjustments to Sea by means of the +/- keys, and
return to AUTO mode by pressing [CLR]. Press [CLR] to toggle between HBR (Harbor) and AUTO mode.

**Sea control** – is 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. 1 to 2 nm depending on wave and sea conditions. Sea control is set to reduce the strength of these echoes such that the clutter appears only as intermittent small dots, yet stable targets can still be distinguished.

If manual adjustments are made, the setting will affect the system’s ability to detect targets and remove sea clutter in heavy sea situations.

**Rain** – the rain clutter filter enhances the leading edge of a target whereas the signal behind the leading edge area of rain will be depressed. This can also 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.

To properly adjust for rain clutter:
1. Set rain clutter to zero.
2. 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 other weak targets.

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. Manual fine tuning of Gain and Sea may improve the performance.

**EBL** (Electronic Bearing Line) - bearing and distance (read-only) from ship’s position to cursor. Two independent EBLs are available - see section 3.2.6.

**VRM** (Variable Range Marker) - bearing and distance (read-only) from ship’s position to VRM cursor. Two independent VRMs are available - see section 3.2.6.

**Cursor** - bearing and distance (read-only) from ship’s position to cursor.

**Trails** after targets – toggle between OFF, 30sec, 1min, 2min, 5min, 10min, 15min, 30min, PERM (permanent). Using the Trails feature will show the trails 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 will be drawn on the screen. The trails are drawn for anything that moves on the screen, including sea gulls, sea clutter, buoys, and shoreline.

**Own trail** – toggle between OFF and ON. This function will require that ‘Trails’ (above) is activated and mode of orientation is TM.

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

**GZ** (Guard Zone alarm) – The use of the Guard zone feature built into the radar can detect approaching vessels entering your guard zone. 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 Electrical connections in Installation manual.

In Head Up mode the GZ relates to the vessel and in North Up or Course Up it relates to geographic north.

Define the guard zone by means of the EBL and VRM markers:

1. Press the [EBL] key and move cursor (EBL-VRM1) to make the left side and top of the guard zone.

2. Press [ENT], [2] and move cursor (EBL-VRM2) to make the right side and bottom of the guard zone. The guard zone will be generated clockwise from EBL1 to EBL2.

3. Press [ADJ] and move cursor to the GZ line. Use the [+] key to toggle between: IN / OUT / OFF.

   **IN** = the alarm will be activated if any target enters the defined guard zone.

   **OUT** = the alarm will be activated when all targets have left the defined guard zone i.e. at least one target must be present inside the GZ when the function is activated.

4. Press [ENT] to exit the control panel.

5. Press and hold [CLR] to clear the EBL-VRMs. 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.

**IR** (Interference Rejection) – will reduce false echoes from other radars nearby, see section 3.1.10.

**Stretch** – toggle between AUTO, ON, OFF.
- AUTO (default) - small targets are enhanced at ranges above 12 nm.
- ON - all targets will be enhanced.
- OFF - all targets will remain unchanged.

**Rpm** – will determine the scanner rotation (full screen presentation). Manually, the rotation speed can be set to either 24 or *48 rpm, depending on the scanner type (use +/- keys).
- *Running 48 rpm (double update rate) is liable to reduce the lifetime of the mechanical parts.

**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 changing “Use COG as internal heading” from NO to YES in the interface setup. Press [MENU], [7], [2], and then press [PLOT] repeatedly until the tab reads Compass.

When using the GPS course as replacement for heading input, the accuracy will be reduced in relation to speed, wind and current.

**Pulse** - can be set to SHORT, NORMAL or LONG.
- NORMAL (default) will not change the presentation of targets.
- SHORT - (press the [-] key to access) will enhance target resolution at range 0.5-6.0 nm. However, this setting may result in making some smaller targets disappear.
- LONG - (press the [+] key to access) will enlarge targets on screen and improve target detection. However, this setting will also enlarge any noise picked up.

**Depth** - readout in meters, feet or fathoms from built-in echosounder function or external depth source.
3.2.6 Radar quick menu

From active radar display:

*Call up the Radar quick menu*

<table>
<thead>
<tr>
<th>Radar quick menu</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>RADAR</strong> Power On</td>
</tr>
<tr>
<td><strong>GOTO</strong> Transmit</td>
</tr>
<tr>
<td>1 Activate EBL-VRM1</td>
</tr>
<tr>
<td>2 Activate EBL-VRM2</td>
</tr>
<tr>
<td>3 Activate Cursor</td>
</tr>
<tr>
<td>4 Show Navigation Point</td>
</tr>
<tr>
<td>5 Heading Line</td>
</tr>
<tr>
<td>6 Clear Trails</td>
</tr>
<tr>
<td><strong>CHART</strong> Show Overlay Chart</td>
</tr>
<tr>
<td><strong>PLOT</strong> Show Overlay User Data</td>
</tr>
<tr>
<td><strong>ADJ</strong> Overlay Chart Setup</td>
</tr>
<tr>
<td><strong>MENU</strong> Exit</td>
</tr>
</tbody>
</table>

If working with both EBL-VRM cursors, you can toggle between which one should be active via the quick menu.

**Power On/Off** - Turning power on will activate scanner warm up and enter standby mode, see section 3.2.3.

**Transmit/Standby** - Transmit will start transmission and antenna rotation, see section 3.2.3.

**Activate EBL-VRM1**
A dotted line + circle will be drawn on the screen. Use the cursor key to move the EBL-VRM1 cursor. By placing the square cursor point over a target or over an object, it will indicate the distance to same.

To turn off: Press [ENT], [1] again to hide EBL-VRM1.
Long press on [CLR] will turn off all active cursors.
Toggle on/off directly from the [EBL] key.
Activate EBL-VRM2

A dotted line + circle will be drawn on the screen. Use the cursor key to move the EBL-VRM2 cursor. By placing the square cursor point over a target or over an object, it will indicate the distance to same.


Activate Cursor - will activate cursor on radar display. Press again to turn off cursor, or press [CLR]. Long press on [CLR] will turn off all active cursors on the radar display.

Show/Hide Navigation Point - this function will require a valid position, and heading input from connected sensor. When a navigation mode is active, the approaching waypoint can be shown on the radar display. Turning the navigation mode off will temporarily disable the function, because there is nothing to show - but when navigation is started up again, the function will also become active again. You will not have to turn it on and off all the time. Press [ENT], [4] Hide Navigation Point if you no longer want the waypoint to be shown on the radar display.

Heading Line - by pressing the [5] key the heading line will disappear for approx. 5 seconds.

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

Show/Hide Overlay Chart - dedicated chart overlay on the radar display. This function will require a valid position, and heading input from connected sensor. The type of chart data/objects shown on the screen can be adjusted in the ‘Overlay chart setup’, see section 3.2.7.

Show/Hide Overlay User Data - plotted user data overlay on the radar display. This function will require a valid position, and heading input from connected sensor. The type of user data shown on the screen can be adjusted in the ‘User data’ group in the ‘Overlay chart setup’, see section 3.2.7.

Overlay Chart Setup - will open for change to the current setup. The changes will only affect the chart used with the overlay - see section 3.2.7, and section 4.5.2 Description of chart features.

Exit Radar quick menu
3.2.7 RadarChart overlay

Radar and chart images merged into one presentation takes away the guesswork of interpreting radar information by providing the full picture. The overlay is a feature under the radar function, which consists of three layers of information. The first layer is the chart with the ship’s symbol indicating precisely where you are at all times. The second layer is the radar image with targets. And finally the third layer adds the coast lines, buoys, lights, user data and other vital navigational data which always will be shown on top of the radar targets. Radar operation will be as usual with full access to the radar control menu. The dedicated chart used with the overlay is adjustable via the Radar quick menu.

The overlay function will require the following conditions: Valid position, valid heading information, and Radar orientation mode must be in NU (North Up) or CU (Course Up). The overlay is disabled in HU (Head Up).

The overlay function can not be activated in the ‘Radar & Chart’ display.

From active radar display:

**RADAR**

*Short press will toggle the overlay on/off*

Calling up the overlay function via the [RADAR] key will automatically show the dedicated chart together with any user data plotted in the area presented on the screen.

The amount of information in the overlay is controlled via the Radar quick menu where you can Hide/Show Overlay Chart or Hide/Show Overlay User Data, or enter Overlay Chart Setup to turn off some of the objects if the screen is too cluttered with information.

**ENT**

*Call up the Radar quick menu*

**CHART**

*Hide/Show Overlay Chart*

- special chart dedicated to the overlay.

**PLOT**

*Hide/Show Overlay User Data*

- plotted waypoints, routes, etc. stored in the memory.

If you choose to e.g. Hide Overlay User Data, then the Overlay Chart will be shown on the radar display and a short press on the [RADAR] key will toggle the overlay on/off, but now only with the Chart data, as the User Data is currently ‘hidden’.
Chapter 3-20 CA34/44/54 Radar menu

Color presets for the overlay display
Different color combinations of radar targets and chart or radar background color are available:

- **PWR** Call up the Light and power pop-up window
- **1 - 9** Select a different number in the color Palette
- **ENT** Confirm the change

The color palettes from 1 to 4 are fixed, palette 9 is preset with multi color radar targets, the rest (5-8) can be customized to suit individual needs. See how in section 9.7.

Adjustment of overlay settings
The special chart used with the overlay is not used anywhere else in the system and therefore has its own individual setup. A description of the chart features can be found in section 4.5.2. To access the overlay chart setup, the active window must contain a radar display, and then:

- **ENT** Call the Radar quick menu
- **ADJ** Open for change in the overlay chart setup
The tabs indicate which groups are available in each display mode e.g. in the above example, OVERLAY display mode, you have access to the groups in black: General, Areas and User data. The two groups in red i.e. Presentation and Depth are only adjustable in CUSTOM display mode. See further on in this chapter for more details.

Select display mode: OVERLAY, FULL, CUSTOM, SIMPLE, FISHING, LOW

Go to the next group

Step back to the previous group

Scroll up/down in the chart settings
- functions in light grey are not accessible in selected display mode.

Toggle between available settings

Confirm changes, or...

Abandon Chart setup without making any changes

Display modes in the overlay chart setup
There are 6 different display modes to choose from: OVERLAY (default), FULL, CUSTOM, SIMPLE, FISHING and LOW. When a group is shown in red or a function is shown in light grey it is not available in the selected display mode. The default settings in the various display modes are:

Group: General - specification of chart display in general. The available functions are according to display example on previous page for all display modes and any change of the default settings will be applied in all display modes.

Group: Presentation - specifies presentation of marine, land and chart topics. The default settings in this group are fixed in all display modes, except for *Custom where it is possible by the user to turn a feature ON (shown on the chart) or OFF (not shown on the chart), etc. - see next page.
<table>
<thead>
<tr>
<th>C-MAP features</th>
<th>Overlay</th>
<th>Full</th>
<th>*Custom</th>
<th>Simple</th>
<th>Fishing</th>
<th>Low</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Marine:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Names</td>
<td>OFF</td>
<td>ON</td>
<td>OFF</td>
<td>ON</td>
<td>ON</td>
<td>OFF</td>
</tr>
<tr>
<td>Nav-Aids</td>
<td>INT</td>
<td>INT</td>
<td>INT</td>
<td>INT</td>
<td>INT</td>
<td>INT</td>
</tr>
<tr>
<td>Light Sectors</td>
<td>OFF</td>
<td>ON</td>
<td>OFF</td>
<td>OFF</td>
<td>OFF</td>
<td>OFF</td>
</tr>
<tr>
<td>Attention Areas</td>
<td>ON</td>
<td>ON</td>
<td>ON</td>
<td>ON</td>
<td>ON</td>
<td>OFF</td>
</tr>
<tr>
<td>Tides, currents</td>
<td>ON</td>
<td>ON</td>
<td>ON</td>
<td>ON</td>
<td>OFF</td>
<td>OFF</td>
</tr>
<tr>
<td>Nature of seabed</td>
<td>ON</td>
<td>ON</td>
<td>ON</td>
<td>OFF</td>
<td>ON</td>
<td>OFF</td>
</tr>
<tr>
<td>Ports</td>
<td>OFF</td>
<td>ON</td>
<td>OFF</td>
<td>ON</td>
<td>OFF</td>
<td>OFF</td>
</tr>
<tr>
<td>Tracks, routes</td>
<td>ON</td>
<td>ON</td>
<td>ON</td>
<td>OFF</td>
<td>OFF</td>
<td>OFF</td>
</tr>
<tr>
<td>Buoys</td>
<td>ON</td>
<td>ON</td>
<td>ON</td>
<td>ON</td>
<td>ON</td>
<td>OFF</td>
</tr>
<tr>
<td>Signals</td>
<td>ON</td>
<td>ON</td>
<td>ON</td>
<td>ON</td>
<td>ON</td>
<td>OFF</td>
</tr>
<tr>
<td><strong>Land:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Natural features rivers</td>
<td>OFF</td>
<td>ON</td>
<td>OFF</td>
<td>ON</td>
<td>OFF</td>
<td>OFF</td>
</tr>
<tr>
<td>Natural features</td>
<td>OFF</td>
<td>ON</td>
<td>OFF</td>
<td>OFF</td>
<td>OFF</td>
<td>OFF</td>
</tr>
<tr>
<td>Cultural features</td>
<td>OFF</td>
<td>ON</td>
<td>OFF</td>
<td>OFF</td>
<td>OFF</td>
<td>OFF</td>
</tr>
<tr>
<td>Landmarks</td>
<td>OFF</td>
<td>ON</td>
<td>OFF</td>
<td>ON</td>
<td>OFF</td>
<td>OFF</td>
</tr>
<tr>
<td><strong>Chart:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grid</td>
<td>AUTO</td>
<td>AUTO</td>
<td>AUTO</td>
<td>AUTO</td>
<td>AUTO</td>
<td>AUTO</td>
</tr>
<tr>
<td>Boundary lines</td>
<td>OFF</td>
<td>AUTO</td>
<td>OFF</td>
<td>AUTO</td>
<td>OFF</td>
<td>OFF</td>
</tr>
<tr>
<td>Mixing levels</td>
<td>ON</td>
<td>ON</td>
<td>ON</td>
<td>OFF</td>
<td>ON</td>
<td>OFF</td>
</tr>
<tr>
<td>Declutter</td>
<td>ON</td>
<td>ON</td>
<td>ON</td>
<td>ON</td>
<td>ON</td>
<td>ON</td>
</tr>
</tbody>
</table>

**Group: Depth** - specifies the presentation of depth lines, levels, etc. on chart
The default settings in this group are fixed in all display modes, except for
*Custom where it is possible by the user to alter the features. The color indication for depth levels 1, 2 and 3 is determined by the color palette in the SETUP menu.

<table>
<thead>
<tr>
<th>C-MAP features</th>
<th>Overlay</th>
<th>Full</th>
<th>*Custom</th>
<th>Simple</th>
<th>Fishing</th>
<th>Low</th>
</tr>
</thead>
<tbody>
<tr>
<td>Soundings</td>
<td>OFF</td>
<td>ON</td>
<td>OFF</td>
<td>ON</td>
<td>ON</td>
<td>OFF</td>
</tr>
<tr>
<td>Underwater objects</td>
<td>OFF</td>
<td>ON</td>
<td>OFF</td>
<td>ON</td>
<td>ON</td>
<td>OFF</td>
</tr>
<tr>
<td>Depth Lines</td>
<td>ON</td>
<td>ON</td>
<td>ON</td>
<td>ON</td>
<td>OFF</td>
<td>OFF</td>
</tr>
<tr>
<td>Depth Lines&gt;</td>
<td>0000m</td>
<td>0000m</td>
<td>0000m</td>
<td>0000m</td>
<td>0000m</td>
<td>0000m</td>
</tr>
<tr>
<td>Depth Lines&lt;</td>
<td>9999m</td>
<td>9999m</td>
<td>9999m</td>
<td>5m</td>
<td>9999m</td>
<td>5m</td>
</tr>
<tr>
<td>Depth Areas</td>
<td>ON</td>
<td>ON</td>
<td>ON</td>
<td>ON</td>
<td>ON</td>
<td>OFF</td>
</tr>
<tr>
<td>Depth</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Level 1</td>
<td>0-002m</td>
<td>0-002m</td>
<td>0-002m</td>
<td>0-002m</td>
<td>0-002m</td>
<td>0-002m</td>
</tr>
<tr>
<td>Level 2</td>
<td>2-009m</td>
<td>2-009m</td>
<td>2-009m</td>
<td>2-009m</td>
<td>2-009m</td>
<td>2-009m</td>
</tr>
<tr>
<td>Level 3</td>
<td>9-MAX</td>
<td>9-MAX</td>
<td>9-MAX</td>
<td>9-MAX</td>
<td>9-MAX</td>
<td>9-MAX</td>
</tr>
</tbody>
</table>
**Group: Areas** - specifies the presentation of different areas on chart.
The default settings in this group are the same for all display modes and any change of the default settings will be applied in all display modes.
The features can be changed from FILLED to CONTOUR:

<table>
<thead>
<tr>
<th>C-MAP features</th>
<th>All display modes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Land areas</td>
<td>FILLED</td>
</tr>
<tr>
<td>Depth areas</td>
<td>FILLED</td>
</tr>
<tr>
<td>Caution areas</td>
<td>FILLED</td>
</tr>
<tr>
<td>Dredged areas</td>
<td>FILLED</td>
</tr>
</tbody>
</table>

**Group: User data** - user defined objects can be visible or invisible on chart.
The default settings in this group are the same for all display modes and any change of the default settings will be applied in all display modes.

<table>
<thead>
<tr>
<th>Chart features</th>
<th>Defaults and choice of settings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Waypoints</td>
<td>All the features in the user data level that are set as default to ON= shown on chart, can be changed to OFF= not shown on chart.</td>
</tr>
<tr>
<td>Non active waypoints</td>
<td>ON</td>
</tr>
<tr>
<td>Waypoint names</td>
<td>ON</td>
</tr>
<tr>
<td>Waypoint depths</td>
<td>ON</td>
</tr>
<tr>
<td>Routes</td>
<td>Non active routes and tracks, all lines and all targets are default to:</td>
</tr>
<tr>
<td>Non active routes</td>
<td>AS SELECTED</td>
</tr>
<tr>
<td>Route names</td>
<td>ON</td>
</tr>
<tr>
<td>Tracks</td>
<td>AS SELECTED</td>
</tr>
<tr>
<td>Non active tracks</td>
<td>AS SELECTED</td>
</tr>
<tr>
<td>Track names</td>
<td>ON</td>
</tr>
<tr>
<td>Lines</td>
<td>Lines</td>
</tr>
<tr>
<td>Lines</td>
<td>AS SELECTED</td>
</tr>
<tr>
<td>Line names</td>
<td>ON</td>
</tr>
<tr>
<td>Targets</td>
<td>AS SELECTED</td>
</tr>
<tr>
<td>Targets</td>
<td>AS SELECTED</td>
</tr>
<tr>
<td>Target names</td>
<td>ON</td>
</tr>
</tbody>
</table>
3.2.8 Dual radar display

Call up the menu bar, and...
load the Dual Radar display

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.

To make adjustments in the standard radar display (left half screen), the window must be active:

- **WIN**: Toggle between active windows on screen

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

- **nEnter**: Use the cursor to move around in the control menu
  - and toggle between available values with the +/- keys, and insert data by the numeric keys.

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

To make adjustments in the secondary radar display:

- **WIN**: Make the secondary radar display active
Carry out adjustments by using the same procedures as described in section 3.2.5 for the standard radar display, except for the guard zone which is not available in the secondary radar display.

Indication of HDG (heading), Rpm (scanner rotation speed) and Pulse is only available in full screen presentation.

3.2.9 Radar & Chart display

Call up the menu bar, and...
load the Radar & Chart display

The RadarChart overlay is not available in this display!

Toggle between active windows on screen

- **Synchronize cursors or scale and range** (will require a valid position, and heading input from connected sensor)
  In synchronized mode the orientation mode of the chart is set to the same as the radar orientation. When position data is available the chart scale is adjusted to approximately the same range as the radar. When heading data is available and a cursor is active, the chart cursor will be set to the radar cursor position.

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’.

The lock function is automatically activated when the required data is available. When the data is not available, the radar display and the chart display will both function as individual standard displays. This synchronized feature is only available in the Radar & Chart display.

### 3.2.10 General features for the radar operation

- **Alarms:**
  The alarms that can appear in connection with the radar operation, are:

  - Bearing pulse alarm (check if scanner is rotating)
  - Bearing zero alarm (check if scanner is rotating)
  - Changing to Head-Up alarm (indicates the orientation mode has changed - see section 3.2.5 and 3.2.7)
  - Communication failure alarm (check connection to scanner)
  - Communication time-out failure alarm (no communication between display and scanner)
  - Guard Zone alarm (see GZ under section 3.2.5)
  - Heading missing alarm (check connection to compass)
  - Position missing alarm (see Position update under section 6.3)
  - Rotation lock alarm (check if scanner is rotating)
  - Trigger fail alarm (check connection to scanner)

- **Off-center mode** (only when operating in RM - Relative Motion)
  – 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 [PLOT], [2] 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 several color settings to choose from for the radar display. See Palette setup ([MENU],[7],[3]).

• **Range** - 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] = 0.125 nm  
  [2] = 0.25 nm  
  [3] = 0.50 nm
  
  [4] = 0.75 nm  
  [5] = 1.5 nm  
  [6] = 3 nm
  
  [7] = 6 nm  
  [8] = 12 nm  
  [9] = 24 nm

  **Or you may use the +/- zoom keys to go to a different range**

  **ADJ**
  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.

• **Show navigation waypoint on radar display** - (will require a valid position, and heading input from connected sensor)

  When a navigation mode is active, the approaching waypoint can be shown on the radar display:

  **ENT**
  *Call up Radar quick menu*

  **4**
  *Show navigation waypoint*

  Turning the navigation mode off will temporarily disable the function, because there is nothing to show - but when navigation is started up again, the function will also become active again. You will not have to turn it on and off all the time. Press [ENT], [4] Hide navigation waypoint if you no longer wish to have it shown on the radar display.

• **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 reflected 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.

### 3.3 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.

 предостережение! Любые настройки, которые были уже сделаны для радарной функции, вернутся к значению по умолчанию при выборе режима демонстрации.

To activate the demo mode:

- **Call up the menu bar, and...**
- **Open the SETUP menu**
- **Load the Radar setup**
- 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 to go to ‘Scanner type’, and select ‘Demo’ with the +/- keys**
- **Accept change & exit Radar setup**
- **Call up Radar quick menu**
- **Turn ‘Power on’**
- The legend ‘Detecting’ will appear on the screen for a short while, then a countdown of 20 seconds will start before the system enters Standby mode. It now says ‘Standby’ on the screen.

- **Call up Radar quick menu**
- **Start transmission**
- **Use the +/- 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:

**ENT**

*Call up Radar quick menu*

**GOTO**

*Go to Standby mode*

- this way you can easily return to the simulated radar picture by repeating the [ENT] and [GOTO] sequence.

**Turn off the Demo mode and return to normal operation:**

**ENT**

*Call up Radar quick menu*

**RADAR**

*Turn ‘Power off’*

**MENU**

*Call up the menu bar, and...*

**7**

*Open the SETUP menu*

**RADAR**

*Load the Radar setup*

- 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 to go to ‘Scanner type’, and select ‘Auto detect’ with the +/- keys**

**ENT**

*Confirm changes & exit Radar setup*
4. Chart menu

The displays obtained from this menu can easily be accessed from the main function key [CHART] - see section 4.1.

RadarChart overlay is accessed via the radar display - see section 3.2.7.

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

The chart display opens for the built-in world chart, as well as the optional, detailed C-MAP electronic chart system, which of course will require that a C-MAP NT+ C-card is inserted in one of the drawers below the keypad. The chart appearing in full screen with smaller range as default, is the only chart which can be inserted into a different display via the menu.

The Dual Chart display will provide a chart in two different scales, one for detail (smaller range) and one for overview (greater range).

The two custom screens will present multiple window combinations (section 4.1), where the chart with greater range as default will be fixed in a quarter window. The chart with smaller range will be fixed in the left half window in both custom screens. Adjustments can be made individually to each chart (section 4.5).

To access one of the displays via the menu e.g.:

Call up the menu bar, and...
press [2] and [1] to call up a Chart in full screen

4.1 Shortcut to the pages in the chart-series

The CHART function is one of the main functions in the CAXX. Each page under the [CHART] key will include a window representing the chart function. It is not possible to exchange main function displays with a new display. Refer to section 2.1, 2.1.1 and 2.1.2 for further information on the display and page system.
Chapter 4-2  CA34/44/54 Chart menu and INFO windows

From any display:
Long press on the [CHART] key will toggle between:

- Chart
- Dual Chart
- Custom screen 1
- Custom screen 2

From full chart display:
Short press on the [CHART] key will toggle between different presentations of the data field on the chart e.g.:

4.1.1 Data field on chart

Chart range indicator (0.11nm) can be set ON/OFF in ‘Show range’ - section 4.5 Chart setup under General.

During chart update/redraw a progress bar will cover the chart radar indicator.

Depending on different situations, the data field on the chart display will give you the ship’s current speed, speed through water, course, *position in lat/
long, compass and depth indication, bearing and distance to either approaching point or cursor position; together with time and date in local or UTC.
*)Refer to section 6.3 Status indicator and accuracy.

### 4.1.2 Ship symbol

The ship symbol indicates the present position on the chart and the vector informs of the actual heading (input from compass) or 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).

0 *** Press [0] to instantly center the ship on the chart (with cursor off).

### 4.1.3 Cursor function

With chart display active:

Press the cursor key to activate the chart cursor (cross hairs)

CLR Press [CLR] to turn the chart cursor off

As default (section 4.5 Chart setup under General), 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.

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.

0 *** Press [0] to instantly center the cursor on the chart (with cursor on).

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.
4.1.4 Range or zoom function

With chart display active:

1-9

Press one of the numeric keys to quickly change the chart scale:

[7] = 1:600,000 [8] = 1:2,000,000 [9] = 1:6,600,000

- Press the minus key to zoom in for details (smaller range)

+ Press the plus key to zoom out for overview (greater range)

Using the extended level range will give the best result when changing chart range. First use one of the numeric keys (Quick-Range 1-9) to select the required chart, then ‘fine tune’ the range within the same chart level by using the +/- keys. Depending on the actual chart, you can zoom in or out two to three times before the extended level range is switched off and the chart changes to a new level of details.

The extended level range can be toggled OFF/ON in General settings (default = OFF) - see section 4.5 Chart setup.

Chart details may not be available in all scales in all areas. Non-covered areas will be marked as hatched or all blue/white with coordinate grid (when Grid is set to AUTO (default) in chart setup), depending on the actual scale - see section 4.5 Chart setup for more details in regard to what can be shown on the chart and what you may choose not to have shown.

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. ‘Auto chart select’ must be switched OFF, see section 4.5 Chart setup.
### 4.2 Dual Chart display

It is possible to have two charts in different scales on the screen at the same time, one for detail and one for overview. Each chart can be operated individually, and each will have its own cursor and individual chart setup.

**MENU**

Call up the menu bar, and...

**press [2] and [2] to call up the Dual Chart display**

**WIN**

Press the [WIN] key to select active display (red frame).

**ENT**

Press the [ENT] key to call up the chart’s Quick menu with access to e.g. Chart info, Lock cursors to the same position in both charts on the screen, etc. - refer to sections 4.4.2 for more details.

**ADJ**

Press the [ADJ] key to call up the chart setup for the active chart - refer to section 4.5 for more details.
4.3 Chart custom screens

The two custom screens in the chart menu consist of multiple window combinations e.g.:

The displays, which are not related to the chart function, can be exchanged with a different one. It is also possible to change the right half of the screen from two quarter windows to half screen window, and vice versa. See section 2.1.2 how you go about changing the displays.
4.4 Chart quick menu

Access the chart quick menu from active chart display. The functions available depends on the actual situation - refer to sections 4.4.1 to 4.4.7.

4.4.1 Cursor inactive

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

<table>
<thead>
<tr>
<th>Scale: 1:6600000</th>
<th>Actual chart scale</th>
</tr>
</thead>
<tbody>
<tr>
<td>No user data at ship’s position</td>
<td></td>
</tr>
<tr>
<td>1 Edit user data</td>
<td>Inactive function</td>
</tr>
<tr>
<td>2 Chart info</td>
<td>Refer to Appendix C</td>
</tr>
<tr>
<td>3 Find nearest port services</td>
<td>Refer to Appendix C</td>
</tr>
<tr>
<td>4 Bearing and dist from A to B</td>
<td>Inactive function</td>
</tr>
<tr>
<td>5 Lock cursors</td>
<td>Inactive function</td>
</tr>
<tr>
<td>0 Ship to center</td>
<td></td>
</tr>
<tr>
<td>PAGE More user data</td>
<td></td>
</tr>
<tr>
<td>MENU Exit</td>
<td>Exit info window</td>
</tr>
</tbody>
</table>

**0** *Ship to center* will update the chart and place the ship’s position in the center of the chart display.

**PAGE** *More user data* will toggle between available data on the ship’s position.
4.4.2 Cursor active but not placed on any object or data

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

<table>
<thead>
<tr>
<th>Scale: 1:6600000</th>
<th>Actual chart scale</th>
</tr>
</thead>
<tbody>
<tr>
<td>No user data at cursor position</td>
<td>Inactive function</td>
</tr>
</tbody>
</table>

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Edit user data</td>
<td>Inactive function</td>
</tr>
<tr>
<td>2</td>
<td>Chart info</td>
<td>Refer to Appendix C</td>
</tr>
<tr>
<td>3</td>
<td>Find nearest port services</td>
<td>Refer to Appendix C</td>
</tr>
<tr>
<td>4</td>
<td>Bearing and dist from A to B</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Lock cursors</td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>Cursor to center</td>
<td>Inactive function</td>
</tr>
<tr>
<td>PAGE</td>
<td>More user data</td>
<td></td>
</tr>
<tr>
<td>MENU</td>
<td>Exit</td>
<td>Exit info window</td>
</tr>
</tbody>
</table>

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 [CLR] 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], [5] to ‘Release cursors’ again. See also ‘Lock cursors’ in Appendix A.

0 Cursor to center will update the chart and place the cursor position in the center of the chart display.
4.4.3 Cursor placed on waypoint

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

<table>
<thead>
<tr>
<th>WP found</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name: WP 1</td>
<td>Verschiedene Optionen zur Auswahl.</td>
</tr>
<tr>
<td>LAT 57°15.504N</td>
<td></td>
</tr>
<tr>
<td>LON 9°17.249E</td>
<td></td>
</tr>
</tbody>
</table>

- **1** Edit user data
- **2** Chart info Refer to Appendix C
- **3** Find nearest port services Refer to Appendix C
- **4** Bearing and dist from A to B Refer to section 4.4.2
- **5** Lock cursors Refer to section 4.4.2
- **0** Cursor to center Refer to section 4.4.2

**PAGE** More user data will toggle between available data on cursor’s position.

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

<table>
<thead>
<tr>
<th>Waypoint</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1</strong> Edit</td>
<td>Edit name, symbol, color etc.</td>
</tr>
<tr>
<td><strong>2</strong> Move</td>
<td>Move waypoint with cursor</td>
</tr>
<tr>
<td><strong>CLR</strong> Delete</td>
<td>Delete waypoint</td>
</tr>
<tr>
<td><strong>MENU</strong> Exit</td>
<td>Exit info window</td>
</tr>
</tbody>
</table>

**PAGE** More user data will toggle between available data on cursor’s position.
4.4.4 Cursor placed on route leg or line section

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

<table>
<thead>
<tr>
<th>Route leg found:</th>
<th>5-6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name: RTE 1</td>
<td></td>
</tr>
<tr>
<td>Leg: B130°</td>
<td>34.26nm</td>
</tr>
<tr>
<td>Total: 5 legs</td>
<td>143.1nm</td>
</tr>
</tbody>
</table>

- **1** Edit user data
- **2** Chart info Refer to Appendix C
- **3** Find nearest port services Refer to Appendix C
- **4** Bearing and dist from A to B Refer to section 4.4.2
- **5** Lock cursors Refer to section 4.4.2
- **0** Cursor to center Refer to section 4.4.2

**PAGE** More user data Exit info window

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

<table>
<thead>
<tr>
<th>Route leg</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1</strong> Edit leg</td>
</tr>
<tr>
<td><strong>2</strong> Insert point</td>
</tr>
<tr>
<td><strong>3</strong> Edit</td>
</tr>
<tr>
<td><strong>CLR</strong> Delete</td>
</tr>
<tr>
<td><strong>MENU</strong> Exit</td>
</tr>
</tbody>
</table>

**PAGE** *More user data* will toggle between data on routepoint and route leg.
4.4.5 Cursor placed on routepoint or linepoint

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

<table>
<thead>
<tr>
<th>Routepoint found</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name: RTE 1</td>
<td></td>
</tr>
<tr>
<td>From start:</td>
<td>108.8nm</td>
</tr>
<tr>
<td>To end:</td>
<td>34.26nm</td>
</tr>
</tbody>
</table>

1. Edit user data
2. Chart info Refer to Appendix C
3. Find nearest port services Refer to Appendix C
4. Bearing and dist from A to B Refer to section 4.4.2
5. Lock cursors Refer to section 4.4.2
0. Cursor to center Refer to section 4.4.2

More user data will toggle between data on routepoint and route leg
4.4.6 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.

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

<table>
<thead>
<tr>
<th>Trackpoint found</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name: TRACK 1</td>
<td></td>
</tr>
<tr>
<td>Total: 836 points</td>
<td></td>
</tr>
</tbody>
</table>

1. Edit user data
2. Chart info  Refer to Appendix C
3. Find nearest port services  Refer to Appendix C
4. Bearing and dist from A to B  Refer to section 4.4.2
5. Lock cursors  Refer to section 4.4.2
0. Cursor to center  Refer to section 4.4.2

Press [1] to delete points from A to B - move cursor to point B, and press [ENT] to delete all trackpoints between cursor position on chart and point B.

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.
4.4.7 Cursor placed on target

With chart in active window, and cursor placed on a target symbol, press [ENT] to call up the quick menu with the following to choose from:

<table>
<thead>
<tr>
<th>Target found</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Name: TARGET 1</td>
<td></td>
</tr>
<tr>
<td>LAT 57°02.825N</td>
<td></td>
</tr>
<tr>
<td>LON 7°45.555E</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Edit user data</td>
</tr>
<tr>
<td>2</td>
<td>Chart info</td>
</tr>
<tr>
<td>3</td>
<td>Find nearest port services</td>
</tr>
<tr>
<td>4</td>
<td>Bearing and dist from A to B</td>
</tr>
<tr>
<td>5</td>
<td>Lock cursors</td>
</tr>
<tr>
<td>0</td>
<td>Cursor to center</td>
</tr>
<tr>
<td>PAGE</td>
<td>More user data</td>
</tr>
<tr>
<td>MENU</td>
<td>Exit</td>
</tr>
</tbody>
</table>

1. Edit user data opens a new info window:

<table>
<thead>
<tr>
<th>Target</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Edit</td>
</tr>
<tr>
<td>2</td>
<td>Move</td>
</tr>
<tr>
<td>CLR</td>
<td>Delete</td>
</tr>
<tr>
<td>MENU</td>
<td>Exit</td>
</tr>
</tbody>
</table>

Edit name, color, position etc.
Move point with cursor
Delete target
Exit info window

PAGE More user data will toggle between available data on cursor’s position
4.4.8 GOTO menu

Call up the GOTO menu with access to navigation modes:

<table>
<thead>
<tr>
<th>Select NAV mode</th>
<th>To select “Cursor” navigation will require that the chart cursor is active.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Cursor</td>
<td>“Waypoint”, “Route” and “Track” navigation requires that a waypoint, route or track is stored in the memory.</td>
</tr>
<tr>
<td>2 Waypoint</td>
<td></td>
</tr>
<tr>
<td>3 Route</td>
<td></td>
</tr>
<tr>
<td>4 Track</td>
<td></td>
</tr>
<tr>
<td>5 Anchor guard</td>
<td></td>
</tr>
</tbody>
</table>

For further details on the different NAV modes, refer to section 6.9 Navigation examples.

**Anchor guard** - when setting anchor, a pre-set alarm distance will be activated, so in case the ship is drifting too far away from the anchored position, the system will initiate a visual and acoustic alert - refer to section 6.10 Anchor guard.

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

<table>
<thead>
<tr>
<th>Navigation is ON</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Advance</td>
<td></td>
</tr>
<tr>
<td>2 Restart to approaching point</td>
<td></td>
</tr>
<tr>
<td>3 Turn NAV OFF</td>
<td></td>
</tr>
</tbody>
</table>

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.
4.4.9 PLOT menu

The CAXX is designed to make navigation easy and safe. Waypoints can easily be plotted with a single keystroke, or be inserted via the keypad. Making routes and drawing lines are done directly on the chart. Very straightforward, uncomplicated and with a high level of confidence as you can follow your actions ‘live’ on the chart.

Call up the PLOT menu with the following to choose from:

<table>
<thead>
<tr>
<th></th>
<th>PLOT new data</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Plot mark - ship</td>
</tr>
<tr>
<td>2</td>
<td>Insert mark - ship</td>
</tr>
<tr>
<td>3</td>
<td>Plot waypoint - cursor</td>
</tr>
<tr>
<td>4</td>
<td>Insert waypoint</td>
</tr>
<tr>
<td>5</td>
<td>Make route</td>
</tr>
<tr>
<td>6</td>
<td>Draw line</td>
</tr>
<tr>
<td>7</td>
<td>Plot target</td>
</tr>
<tr>
<td>8</td>
<td>Start track</td>
</tr>
<tr>
<td>9</td>
<td>Stop track</td>
</tr>
<tr>
<td></td>
<td>Set vertical mark</td>
</tr>
<tr>
<td></td>
<td>MENU Exit</td>
</tr>
</tbody>
</table>

From any display: Plot and save mark on ship’s position, including actual depth indication. Preset name sequence: SHIP 1, SHIP 2 etc.

From any display: Plot and save waypoint. Ship’s position is suggested, but you can key in a new position from keypad, change the location name (cf. section 2.6), or change the symbol (cf. section 2.5) and the color (select with +/- keys). Any changes made will be new presets for plotting/insertion of ship’s position.

From active chart display with cursor on: Plot and save cursor position as a waypoint. Preset name sequence: WP 1, WP 2 etc.

From any display: Plot and save waypoint. The position coordinates are filled with zeroes, so you can key in the position you want from
the keypad, change the location name (cf.section 2.6), or change the symbol (cf.section 2.5) and the color (select with +/- keys). Any changes made will be new presets for plotting/insertion of the cursor position.

- From active chart display with cursor on: Same options as above, except that the zeroes in the position coordinates have been exchanged with the cursor position.

- From active echo display: Plot and save waypoint from echogram. Move cursor and press [ENT] to register spot as waypoint, including actual depth indication. Name, symbol, color etc. can be changed.

4 From active chart display with cursor on: You can quickly make a route by means of the cursor and the [PLOT] key. 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 until the route is completed. Existing waypoints can be used for making the route, simply by placing the cursor on the waypoints and plot the positions. 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.

Do not use the exact position of buoys, markers etc. as waypoints and routepoints. The high accuracy of the system may result in a collision when sailing in the dark or navigating with an autopilot.

5 From active chart display with cursor on: To draw lines or to make a route is the same procedure, please see above.

6 From active chart display: With cursor on, plot target at cursor position and with cursor off, plot target at ship’s position. After plotting the target it will be saved in the memory, and you can edit the target later on, either via the menu (cf.section 8.7) or directly from the chart (cf.section 4.4.7).

7 From any display: Call up info window to start track. To change default values, see section 8.5.

8 From any display: Call up info window to stop track.

9 From active echo display: Plot vertical marker (line) at the current ping in the echo display.
4.5 Chart setup

The settings are dedicated to the chart in the active window and does not affect the second chart in dual chart mode. See section 3.2.7 for chart settings related to the RadarChart overlay.

Load chart setup related to active chart

The tabs indicate which groups are available in each display mode e.g. the above example shows that in FULL display mode you have access to the groups in black: General, Areas and User data. The two groups in red i.e. Presentation and Depth are only adjustable in CUSTOM display mode. See further on in this chapter for more details.

Select display mode: FULL, CUSTOM, SIMPLE, FISHING, LOW, GRID

Go to the next group

Step back to the previous group

Scroll up/down in the chart settings
4.5.1 Display modes in the chart setup

There are 7 different display modes to choose from: FULL (default), CUSTOM, SIMPLE, FISHING, LOW, GRID, and a special OVERLAY mode, which only can be activated from the radar function - see section 3.2.7. When a group is shown in red or a function is shown in light grey it means that it is not available in the selected display mode. The default settings in the various display modes are:

**Group: General** - specification of chart display in general

The available functions are according to display example on previous page for all display modes and any change of the default settings will be applied in all display modes, except for GRID, which has three adjustable functions:

- Motion = RELATIVE
- Cursor 5 min. time-limit = ON
- Show range = WITH BACKGROUND

**Group: Presentation** - specifies presentation of marine, land and chart topics

The default settings in this group are fixed in all display modes, except for *Custom where it is possible by the user to turn a feature ON (shown on the chart) or OFF (not shown on the chart), etc.

C-MAP features are not available in GRID display mode.

<table>
<thead>
<tr>
<th>C-MAP features</th>
<th>Full</th>
<th>*Custom</th>
<th>Simple</th>
<th>Fishing</th>
<th>Low</th>
</tr>
</thead>
<tbody>
<tr>
<td>Marine:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Names</td>
<td>ON</td>
<td>ON</td>
<td>ON</td>
<td>ON</td>
<td>OFF</td>
</tr>
<tr>
<td>Nav-Aids</td>
<td>INT</td>
<td>INT</td>
<td>INT</td>
<td>INT</td>
<td>INT</td>
</tr>
<tr>
<td>Light Sectors</td>
<td>ON</td>
<td>ON</td>
<td>OFF</td>
<td>OFF</td>
<td>OFF</td>
</tr>
<tr>
<td>Attention Areas</td>
<td>ON</td>
<td>ON</td>
<td>ON</td>
<td>ON</td>
<td>OFF</td>
</tr>
<tr>
<td>Tides, currents</td>
<td>ON</td>
<td>ON</td>
<td>ON</td>
<td>OFF</td>
<td>OFF</td>
</tr>
<tr>
<td>Nature of seabed</td>
<td>ON</td>
<td>ON</td>
<td>OFF</td>
<td>ON</td>
<td>OFF</td>
</tr>
<tr>
<td>Ports</td>
<td>ON</td>
<td>ON</td>
<td>ON</td>
<td>OFF</td>
<td>OFF</td>
</tr>
<tr>
<td>Tracks, routes</td>
<td>ON</td>
<td>ON</td>
<td>OFF</td>
<td>OFF</td>
<td>OFF</td>
</tr>
<tr>
<td>Buoys</td>
<td>ON</td>
<td>ON</td>
<td>ON</td>
<td>ON</td>
<td>OFF</td>
</tr>
<tr>
<td>Signals</td>
<td>ON</td>
<td>ON</td>
<td>ON</td>
<td>ON</td>
<td>OFF</td>
</tr>
</tbody>
</table>

.....continued next page....
.....continued from previous page....

<table>
<thead>
<tr>
<th>C-MAP features</th>
<th>Full</th>
<th>*Custom</th>
<th>Simple</th>
<th>Fishing</th>
<th>Low</th>
</tr>
</thead>
<tbody>
<tr>
<td>Land:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Natural features</td>
<td>ON</td>
<td>ON</td>
<td>ON</td>
<td>OFF</td>
<td>OFF</td>
</tr>
<tr>
<td>Natural features</td>
<td>ON</td>
<td>ON</td>
<td>OFF</td>
<td>OFF</td>
<td>OFF</td>
</tr>
<tr>
<td>Cultural features</td>
<td>ON</td>
<td>ON</td>
<td>OFF</td>
<td>OFF</td>
<td>OFF</td>
</tr>
<tr>
<td>Landmarks</td>
<td>ON</td>
<td>ON</td>
<td>ON</td>
<td>OFF</td>
<td>OFF</td>
</tr>
<tr>
<td>Chart:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grid</td>
<td>AUTO</td>
<td>AUTO</td>
<td>AUTO</td>
<td>AUTO</td>
<td>AUTO</td>
</tr>
<tr>
<td>Boundary lines</td>
<td>AUTO</td>
<td>AUTO</td>
<td>AUTO</td>
<td>OFF</td>
<td>OFF</td>
</tr>
<tr>
<td>Mixing levels</td>
<td>ON</td>
<td>OFF</td>
<td>OFF</td>
<td>ON</td>
<td>OFF</td>
</tr>
<tr>
<td>Declutter</td>
<td>ON</td>
<td>ON</td>
<td>ON</td>
<td>ON</td>
<td>ON</td>
</tr>
</tbody>
</table>

**Group: Depth** - specifies the presentation of depth lines, levels, etc. on chart
The default settings in this group are fixed in all display modes, except for
*Custom where it is possible by the user to alter the features. The color indication
for depth levels 1, 2 and 3 is determined by the color palette in the SETUP menu.

C-MAP features are not available in GRID display mode.

<table>
<thead>
<tr>
<th>C-MAP features</th>
<th>Full</th>
<th>*Custom</th>
<th>Simple</th>
<th>Fishing</th>
<th>Low</th>
</tr>
</thead>
<tbody>
<tr>
<td>Soundings</td>
<td>ON</td>
<td>ON</td>
<td>ON</td>
<td>ON</td>
<td>OFF</td>
</tr>
<tr>
<td>Underwater objects</td>
<td>ON</td>
<td>ON</td>
<td>ON</td>
<td>ON</td>
<td>ON</td>
</tr>
<tr>
<td>Depth Lines&gt;</td>
<td>ON</td>
<td>ON</td>
<td>ON</td>
<td>ON</td>
<td>OFF</td>
</tr>
<tr>
<td>Depth Lines&lt;</td>
<td>0000m</td>
<td>0000m</td>
<td>0000m</td>
<td>0000m</td>
<td>0000m</td>
</tr>
<tr>
<td>Depth Areas</td>
<td>ON</td>
<td>ON</td>
<td>ON</td>
<td>ON</td>
<td>OFF</td>
</tr>
<tr>
<td>Depth Level 1</td>
<td>0-002m</td>
<td>0-002m</td>
<td>0-002m</td>
<td>0-002m</td>
<td>0-002m</td>
</tr>
<tr>
<td>Level 2</td>
<td>2-009m</td>
<td>2-009m</td>
<td>2-009m</td>
<td>2-009m</td>
<td>2-009m</td>
</tr>
<tr>
<td>Level 3</td>
<td>9-MAX</td>
<td>9-MAX</td>
<td>9-MAX</td>
<td>9-MAX</td>
<td>9-MAX</td>
</tr>
</tbody>
</table>
Group: Areas - specifies the presentation of different areas on chart. The default settings in this group are the same for all display modes and any change of the default settings will be applied in all display modes, except GRID, which do not include C-MAP features. The features can be changed from FILLED to CONTOUR:

<table>
<thead>
<tr>
<th>C-MAP features</th>
<th>All display modes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Land areas</td>
<td>FILLED</td>
</tr>
<tr>
<td>Depth areas</td>
<td>FILLED</td>
</tr>
<tr>
<td>Caution areas</td>
<td>FILLED</td>
</tr>
<tr>
<td>Dredged areas</td>
<td>FILLED</td>
</tr>
</tbody>
</table>

Group: User data - user defined objects can be visible or invisible on chart. The default settings in this group are the same for all display modes and any change of the default settings will be applied in all display modes.

<table>
<thead>
<tr>
<th>Chart features</th>
<th>Defaults and choice of settings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Waypoints</td>
<td>All the features in the user data level that are set as default to ON= shown on chart, can be changed to OFF= not shown on chart.</td>
</tr>
<tr>
<td>Non active waypoints</td>
<td>ON</td>
</tr>
<tr>
<td>Waypoint names</td>
<td>ON</td>
</tr>
<tr>
<td>Waypoint depths</td>
<td>ON</td>
</tr>
<tr>
<td>Routes</td>
<td>Non active routes and tracks, all lines and all targets are default to:</td>
</tr>
<tr>
<td>Route names</td>
<td>AS SELECTED</td>
</tr>
<tr>
<td>Non active routes</td>
<td>ON</td>
</tr>
<tr>
<td>Tracks</td>
<td>Non active tracks and Track names are default to:</td>
</tr>
<tr>
<td>Track names</td>
<td>AS SELECTED</td>
</tr>
<tr>
<td>Non active tracks</td>
<td>AS SELECTED</td>
</tr>
<tr>
<td>Track names</td>
<td>ON</td>
</tr>
<tr>
<td>Lines</td>
<td>Non active tracks and Track names are default to:</td>
</tr>
<tr>
<td>Lines</td>
<td>AS SELECTED</td>
</tr>
<tr>
<td>Line names</td>
<td>ON</td>
</tr>
<tr>
<td>Targets</td>
<td>‘AS SELECTED’ can also be changed to ‘ALL ON’= shown on the chart, or ‘ALL OFF’= not shown on the chart.</td>
</tr>
<tr>
<td>Targets</td>
<td>AS SELECTED</td>
</tr>
<tr>
<td>Target names</td>
<td>ON</td>
</tr>
</tbody>
</table>
4.5.2 Description of chart features

**Auto chart select** - When sailing with ‘Auto chart select’ ON and cursor turned off, the range will automatically change to match the chart which is available. But when set to OFF, then the selected range will remain, also when sailing ‘out of the chart’.

**Boundary lines** - will indicate available C-MAP chart areas.

**Caution areas** - can be set to FILLED or CONTOUR.
FILLED= The caution areas will be filled with a preset color from C-MAP.
CONTOUR= The caution areas will be shown with a contour line only and the fill will be the same as the background/water color on the chart.

**Cursor 5 min. time-limit** - can be set ON or OFF. When set to ON, the chart cursor will automatically turn off if not used in a period of five minutes.

**Declutter** - when set to ON there will be no overlapping text on the chart e.g. Names, Spot soundings etc.

**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 in the Palette setup.

**Depth areas** - can be set ON or OFF= Not shown on chart.
FILLED - the depth areas will be filled with the color preset in the Palette setup.
CONTOUR - the depth areas will be marked by a contour line only, and the fill will be the same as the background/water color on the chart.

**Depth lines** - can be set ON or OFF= Not shown on chart.

**Dredged areas** - can be set to FILLED or CONTOUR.
FILLED= The dredged areas will be filled with a preset color from C-MAP.
CONTOUR= The dredged areas will be shown with a contour line only, and the fill will be the same as the background/water color on the chart.

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

**Grid** - the LAT/LON grid can be set to ON or AUTO
ON= The LAT/LON grid will be visible on the chart display all the time.
AUTO= The LAT/LON grid will appear on the chart display when there is no actual chart available in the selected scale.
The color of the grid is preset in the Palette setup.
Land areas - can be set to FILLED or CONTOUR. FILLED= The land areas will be filled with a preset color in the Palette setup. CONTOUR= The land areas will be shown with a contour line only and the landfill will be the same as the background/water color on the chart.

Land settings - can all be set ON=Shown on chart or OFF=Not shown on chart.

Marine settings - can all be set ON or OFF, except for Nav-Aids which can be set to INTERNATIONAL, INT. SIMPLIFIED, US, US SIMPLIFIED or OFF. INTERNATIONAL - will present NavAids in ‘real life’ shapes and colors for quick visual recognition (as per official INT1 standard paper chart presentation). INT. SIMPLIFIED - the NavAids will be shown in generic symbols for minimum visual clutter on-screen. US - will present NavAids in simplified shapes and real colors (as generally found on NOAA paper charts). US SIMPLIFIED - the NavAids will be shown in generic symbols for minimum visual clutter on-screen. OFF - will shown no Nav-Aids on the chart.

Mixing levels - when set to ON, the number of blank chart areas will be reduced, 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.

Orientation - can be set to NORTH UP, COURSE UP or NAV UP, and the mode can be RELATIVE or TRUE motion. NORTH UP - the chart will always be presented as north up. COURSE UP - the chart will automatically turn, so your actual course (COG) is up. If chart cursor is active it will stop the chart from rotating, press [CLR] to turn cursor off. 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. If chart cursor is active it will stop the chart from rotating, press [CLR] to turn cursor off. RELATIVE motion - the ‘ship is positioned at the center of the screen and the chart will move. TRUE motion - the ‘ship’ will move across the chart.

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.

Rotation resolution - can be set to adjust the chart for each 5, 10, 15, 20 or 25° changes in relation to present course or heading.
**Show range** - can be set to WITH BACKGROUND, ON or OFF:
WITH BACKGROUND - will add a small line to the chart display indicating that the length of the line equals a certain number of nautical miles/km - the indication is highlighted with a background color.
ON - same as above, but without background color.
OFF - indication is not shown on chart.

**Soundings** - can be set to ON or OFF.
ON - the information will be shown as selected i.e. in feet, fathoms or meters.
OFF - soundings are not shown on chart.

**Underwater objects** - can be set ON or OFF= Not shown on chart.
5. Echosounder operation

The echosounder function of the CAXX determines the distance between its transducer and underwater objects such as fish, lake bottom or sea bed. 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 various types of echosounder displays: standard echogram, bottom expansion (zoom), VRM expansion, and shift mode. Each display has its special advantages. Select the appropriate setup for the echosounder display in the presentation “Setup” and “Echosounder setup” displays, considering current sea area and target fish.
5.1 Echo menu

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>ECHO</td>
</tr>
<tr>
<td>1</td>
<td>50kHz (or 38kHz CA44/54)</td>
</tr>
<tr>
<td>2</td>
<td>200kHz</td>
</tr>
<tr>
<td>3</td>
<td>Dual Frequency (CA44/54)</td>
</tr>
<tr>
<td>4</td>
<td>Custom screen 1</td>
</tr>
<tr>
<td>5</td>
<td>Custom screen 2</td>
</tr>
</tbody>
</table>

Low and high frequency echosounder display can be set up separately. 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.

The Dual Frequency display (CA44/54) will provide both the 50kHz and the 200kHz echo displays in one screen.

The two custom screens will present multiple window combinations (section 5.2), where one of the main echo displays i.e. 50kHz or 200kHz will be fixed in the left half of the screen. Adjustments can be made individually to both displays (section 5.7).

To access one of the displays via the menu e.g.:

*Call up the menu bar, and...*

*press [3] and [2] to call up the Echo display for 200kHz in full screen - see display example on next page.*

5.2 Shortcut to the pages in the echo-series

The ECHO function is one of the main functions in the CAXX. Each page under the [ECHO] key will include a window representing the echo function. It is not possible to exchange main function displays with a new display. Refer to section 2.1, 2.1.1 and 2.1.2 for further information on the display and page system.
From any display:
Long press on the [ECHO] key will toggle between:

**Standard**                     **Dual Frequency**        **Custom screen 1**        **Custom screen 2**

(CA44/54)

### 5.3 Standard echo display

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

Transmission line.

Time scale.

Depth range is adjustable with +/- keys or the Quick-range keys 1-9.
Press key 0 to return to Auto range.

The data field is preset to show: Gain level, Frequency, Transmit Pulse length **A- SHORT** (set to AUTO), Transmit Power **A- 10W** (set to AUTO) - see section 5.7.

Water temperature **T** in Celcius or Fahrenheit (in 1/10 degrees),
water or SOG speed **S** in knots or kilometers/hour or miles/hour,
actual depth **DK** - units can be changed in Setup for units (MENU,7,1).

*) Actual depth i.e. Depth below Keel/Surface/Transducer - settings can be changed in Echosounder setup (MENU,7,ECHO).
1-9  Select range in 9 steps

+/-  Adjust range with the + and - keys

0  Activate Auto range

Press cursor left/right to adjust gain

ADJ  Direct access to Setup display related to active echo display 50kHz or 200kHz - (see section 5.7)

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

+/-  Toggle between available values

ENT  Confirm changes, or...

MENU  Abandon changes and exit Setup display

### 5.4 Variable range marker

The VRM (Variable Range Marker) 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 top left side of the screen for a few seconds after the VRM line is moved.

From active echo display:

Activate the Variable Range Marker function, and...

Move the VRM up/down

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

CLR  Turn VRM off again
5.5 Echo quick menu
A number of echo features can easily be accessed from the Echo quick menu.

From active echo display:

Call up the Echo quick menu with access to the following features:

<table>
<thead>
<tr>
<th>Echo quick menu</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
</tr>
<tr>
<td>2</td>
</tr>
<tr>
<td>3</td>
</tr>
<tr>
<td>4</td>
</tr>
<tr>
<td>5</td>
</tr>
<tr>
<td>6</td>
</tr>
<tr>
<td>ECHO</td>
</tr>
<tr>
<td>MENU</td>
</tr>
</tbody>
</table>

1. **Change frequency** will toggle between 38 (CA44/54), 50 or 200 kHz displays (Airmar transducers) to suit the task. 200 kHz is for general purpose and offers optimum discrimination and a narrow transmitter beam. 38/50 kHz is for searching in a wider area, determining bottom conditions and going the deepest.

2. **Activate/Hide A-scope** The amplitude scope at the right side of the echo display 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.

3. **Standard echo display** Return to the basic presentation mode (standard display) from echo display with an added feature e.g. bottom expansion, VRM expansion, etc.

4. **Bottom lock display** The advanced bottom lock and expansion feature ensures a reliable depth readout and provides a compressed standard display in the upper half of the display. The bottom area can be magnified for better separation of echoes. The actual range of
the expansion window can be adjusted in the Setup display.

5 Zoom display  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 range of the expansion window can be adjusted in the Setup display.

*) see section 5.4.

6 Shift display  This feature can be applied when operating in deep waters and select the range for an expansion window. The expansion window can automatically follow a changing bottom or be set manually by the +/- keys.

ECHO Transmit power off  Stop transmission in order to observe noise picked up by the transducer.

MENU Abandon the Echo quick menu without making any changes

5.6 Plot waypoint or event mark via PLOT menu

From active echo display:

PLOT Call up the PLOT menu with the following to choose from:

9 Set vertical mark will plot a vertical marker (line) at the current ping.

- or you can plot the position of a given echo on the chart:

3 Insert waypoint will activate a cursor on the echo display

Move cursor to the echo which position you wish to place as a waypoint

ENT Press [ENT] to register the waypoint on the echo display

A new info window will open where you can change the name of the waypoint, adjust the position if necessary, change symbol and color of the waypoint. When satisfied with the information in the info window:

ENT Press [ENT] to save waypoint
5.7 Presentation setup

The general Echosounder setup e.g. Selecting transducer, Alarm settings, Demo mode etc. is placed in the SETUP menu (section 9.3).

The echo setup in this chapter are the most common settings for adjusting the presentation of the high or low frequency echo picture, and can be accessed by a single keystroke.

*Press [ADJ] from active echo display*

<table>
<thead>
<tr>
<th>Setup 200kHz:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Range start: 000 m</td>
</tr>
<tr>
<td>Range: AUTO 25 m</td>
</tr>
<tr>
<td>Gain: 050%</td>
</tr>
<tr>
<td>White line: OFF</td>
</tr>
<tr>
<td>Expansion window: 6 m</td>
</tr>
<tr>
<td>TVG: Normal (20 log R)</td>
</tr>
<tr>
<td>Ping to ping filter: ON</td>
</tr>
<tr>
<td>Signal threshold: OFF</td>
</tr>
<tr>
<td>Color threshold: OFF</td>
</tr>
<tr>
<td>Depth grid: OFF</td>
</tr>
<tr>
<td>Transmit pulse length: AUTO</td>
</tr>
<tr>
<td>Transmit power: AUTO</td>
</tr>
<tr>
<td>Scroll synchronization: TIME</td>
</tr>
<tr>
<td>Scroll speed: HIGH</td>
</tr>
</tbody>
</table>

*Use the cursor key to move cursor around in the display*

*Key in new figures, or...*

*Toggle between available values*

*Confirm changes, or...*

*Abandon changes and exit display*

**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.

**Range** – refers to the distance shown from the top to the bottom of
Chapter 5-8

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.

**Gain** – is another way of 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.

**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.

**Expansion window (zoom level)** – can be selected in eight steps, ranging from 1 to 50 meters, or converted to feet or fathoms (refer to Setup for units, section 9.5). 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).

**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 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.

**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 recording.

**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.

**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.

**Depth grid** - enables a more precise reading of depth and target relations across the screen.

**Transmit pulse length** – can be set OFF to observe 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:

<table>
<thead>
<tr>
<th>Setting</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SHORT</td>
<td>less than 10m deep water</td>
</tr>
<tr>
<td>MEDIUM</td>
<td>between 10 and 50 m deep water</td>
</tr>
<tr>
<td>LONG</td>
<td>more than 50m deep water</td>
</tr>
</tbody>
</table>

* A long pulse will reach deeper but give less resolution.

**Transmit power** – should normally be left on AUTOMATIC. CA34 settings are: AUTO, 600W, 100W, 10W and OFF. CA44/54 settings are: AUTO, 1000W, 500W, 100W, 10W and OFF.

**Scroll synchronization** – the screen can be updated on the basis of time or distance (when data from last ping appears on the display).

**Scroll speed** – is the ping rate and movement of the presentation of echoes on the screen, moving from right to left. It is adjustable (Low, Medium, High, Freeze), to allow the user to show a longer “history” on the display screen, if desired.
5.8 How the echosounder works

When the CAXX is turned on, a transmitter begins to send electrical pulses to the transducer. The ceramic resonators in the transducer have 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.

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 amplifies and processes the signals and presents them on the display screen. See Fig. 2.
The transducer mounted to the hull of your vessel serves as both a ‘speaker’ when transmitting, and as a ‘microphone’ when the echosounder 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’.

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 Fig. 3.
5.10 Effects of the vessel’s speed

The presentation 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.
### 6. Pilot menu

<table>
<thead>
<tr>
<th></th>
<th>PILOT</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Highway</td>
</tr>
<tr>
<td>2</td>
<td>Position</td>
</tr>
<tr>
<td>3</td>
<td>Dual Speed</td>
</tr>
<tr>
<td>4</td>
<td>ETA &amp; AVN</td>
</tr>
<tr>
<td>5</td>
<td>Trim &amp; Highway</td>
</tr>
<tr>
<td>6</td>
<td>Set &amp; Drift</td>
</tr>
<tr>
<td>7</td>
<td>Custom screen 1</td>
</tr>
<tr>
<td>8</td>
<td>Custom screen 2</td>
</tr>
</tbody>
</table>

See also section 6.10 Anchor guard, section 6.11 MOB navigation and 6.9 Navigation examples.

All functions in the Pilot menu are relevant information to use for navigation. The two custom screens will present multiple window combinations (section 6.1), where the window in the top left quarter of the screen will present a fixed display from the pilot menu.

To access one of the displays via the menu e.g.:

*Call up the menu bar, and...*

*press [4] and [1] to call up the Highway display in full screen*

### 6.1 Shortcut to the pages in the pilot-series

The PILOT function is one of the main functions in the CAXX. Each page under the [PILOT] key will include a window representing the pilot function. It is not possible to exchange main function displays with a new display. Refer to section 2.1, 2.1.1 and 2.1.2 for further information on the display and page system.
Press the [PILOT] key from any display to call up a display in the pilot-series, and:

**Long press on the [PILOT] key will toggle between (default):**

- Highway
- Custom screen 1
- Custom screen 2

From one of the pilot displays i.e. full screen and active window in the top left quarter:

**Short press on the [PILOT] key will toggle between:**

- Highway
- Position
- Dual Speed
- Trim & Highway
- Set & Drift

The sequence of the six displays under the [PILOT] key is available when a navigation mode is active. If no navigation mode is active, then the ETA & AVN and the Trim & Highway displays will not be present in the sequence.
6.2 Highway display and Navigation setup

Call up the menu bar, and...
load Highway display

When there is no navigation mode active, you will receive the legend: NAVIGATION IS OFF.

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.

Load Navigation setup

<table>
<thead>
<tr>
<th>Navigation setup:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anchor alarm distance:</td>
</tr>
<tr>
<td>WP circle alarm:</td>
</tr>
<tr>
<td>WP and cursor navigation:</td>
</tr>
<tr>
<td>XTE alarm:</td>
</tr>
<tr>
<td>Navigation mode:</td>
</tr>
<tr>
<td>Route navigation:</td>
</tr>
<tr>
<td>XTE alarm:</td>
</tr>
<tr>
<td>Auto waypoint shift:</td>
</tr>
<tr>
<td>Track navigation:</td>
</tr>
<tr>
<td>XTE alarm:</td>
</tr>
<tr>
<td>Auto trackpoint shift:</td>
</tr>
<tr>
<td>Navigation mode:</td>
</tr>
</tbody>
</table>

Toggle between available values, or...
key in a new alarm limit

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 between 0.01 and 9.99nm. See also section 6.10 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 8.2.

**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 all the legs in a route are not 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.
6.2.1 Highway display when navigation mode is active

Call up the menu bar, and...
load Highway display

With navigation mode active, the highway display will provide a graphical steering display:

![Highway Display Diagram]

Intended track between two waypoints.
XTE alarm lines - refer to sec.6.2 for alarm setup.
Ship’s position and course in relation to intended track.

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/number of active route and approaching routepoint
BN: Bearing to next point
TDG: Total distance to go to end of route
TTG: Total time to go to end of route
6.3 Position display

Call up the menu bar, and...
load the Position display

Datum currently selected.
Trip log 1 and 2.
Position with three decimals in minutes.
Speed over ground.
Course, magnetic or true.
Depth or Compass from external sensor.

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.

Position update - if, for some reason, there is no position update from GPS or external sensor, the displayed position will start to flash and an alarm will be activated to alert the operator. Reset the ‘Position missing’ alarm by [CLR]. The alarm can be set ON/OFF - see section 7.5. The displayed position will stop flashing once normal position update is resumed.

Internal POS - indicates the source of position data i.e. Internal, External or DeadReckoning.

GPS A - 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 2-5 meters for DGPS and 3-7 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 display setup below.

When using C-MAP electronic charts, the datum will be aligned automatically.

**Position display setup**

The general Position setup e.g. Display position as: LAT/LON, Decca or Loran C, etc. is placed in the SETUP menu (section 9.4).

From position display, press [ADJ] to load Position display setup:

```
Pos display setup:

Datum: 000: World Geodetic System 1984

Log 1: 00000.0nm
Log 2: 00000.0nm

Additional data: COMPASS
```

Go to the function you wish to change

Reset log
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 (GLL+GL2) will refer to the selected datum. To select a new datum: place the cursor next to “Datum” and key in a new number or go two spaces to the right (000) and leaf through the datum list with +/-.

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.

Additional data - can be set to COMPASS, DEPTH or ANT. HEIGHT.

COMPASS will show heading from connected sensor.
DEPTH will be shown from built-in echosounder.
ANT. HEIGHT will indicate the actual antenna altitude (height above sea level).
6.4 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.

**Call up the menu bar, and...**

**load Dual Speed display**

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:**

*Open for change*

*Reset dual speed, or...*

*exit function without making any changes*
6.5 ETA & AVN display

Call up the menu bar, and...
load the ETA & AVN display
-to receive any data will require that navigation mode is active.

ETA:
Arrival time: 18:10
Date: 14-03-2002
ETA mode: AUTO ETA speed: 1.0kn

AVN:
Velocity: 1.6kn
Planned arrival time: 12:00
Date: 14-03-2002
Route: DENMARK

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 alter-
native ETA speed (MANUAL).

Open for change - in route navigation the approaching point is auto-
matically suggested and present speed is used for calculation.

If required - go to, and...

Insert alternative routepoint - only in Route navigation.

Go to ETA mode, and...

Select AUTO or MANUAL
Go to AVN, and...

Insert time and date

Confirm entry

6.6 Trim & Highway display

Some of the readings rely on data from external log and compass.

The Trim & Highway display will provide information on actual and mean speed, velocity and water speed - see also section 6.7 Set & Drift display.

Call up the menu bar, and...
load the Trim & Highway display

Open for change

Reset mean speed indication in display
The readings rely on data from external log and compass.

**Call up the menu bar, and...**

**load the Set & Drift display**

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 6.6.
6.8 Pilot custom screens

The two custom screens in the pilot menu consist of multiple window combinations e.g.:

The displays presented in the example above are the default displays for Custom screen 1 under the PILOT menu.

Top left quarter window shows the Highway display, which can be exchanged with a different display from the pilot menu, either by single press on the [PILOT] key which will toggle through all the displays available from the pilot menu, or via the menu.

Bottom left quarter window shows the Position display, which can be exchanged with any display that will fit into a quarter window.

Right half screen shows the Chart display, which can be exchanged with a different one in same size window, or you can change the window combination from half to two quarter windows.

These custom screens can actually have several displays presented from the pilot menu. However, when the top left window is active and you toggle through the available displays from the pilot menu, the sequence will skip the displays already presented on the screen, as they can not appear twice on the same screen.

See section 2.1.2 how you go about changing the displays.
6.9 Navigation examples

6.9.1 Chart/cursor navigation. 6.9.2 Waypoint navigation. 6.9.3 Route navigation. 6.9.4 Track navigation.

Relevant for all navigation modes are:

- the highway 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 6.5.
- the *Trim & Highway display with information on actual and mean speed over ground, velocity (VMG) and water speed - section 6.6.
- 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) - see section 6.7.

* These readings rely on data from external log and compass.

With the [PILOT] key you can toggle between all the displays in the pilot-serie - see section 6.1 Shortcut to the pages in the pilot-serie.

6.9.1 Cursor navigation

Cursor navigation is the easiest and most straightforward way of navigation - point and go!

**CHART** Shortcut to chart display

Press the cursor key to activate the cursor, then move the cursor to your destination

**GOTO** Call up the GOTO menu

Select Cursor navigation mode

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...

Call up the GOTO menu
Restart to approaching point
- a new course line will be drawn from ship’s position to destination.

To turn NAV mode off again: Press [GOTO], [3].

6.9.2 Waypoint navigation

To start Waypoint navigation will require that at least one waypoint is stored in the memory. Refer to section 4.4.9 PLOT menu.

Shortcut to chart display
Place cursor on destination waypoint
Call up the GOTO menu, and...
Select Waypoint navigation mode

This will activate the pop-up window “Navigate to WP” - and if the highlighted waypoint is the point you wish to sail to, then just press [ENT] to start navigation.

However, if you wish to sail to a different waypoint:

Scroll up/down in the waypoint list, or...
Key in the number/name of the waypoint you wish to sail to
Start navigation

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

To turn NAV mode off again: Press [GOTO], [3].
6.9.3 Route navigation

To start Route navigation will require that at least one route is stored in the memory. Refer to section 4.4.9 PLOT menu.

There are two ways to start Route navigation:

• From the chart:

  Place cursor on the routepoint you wish to start your navigation from

  GOTO

  Call up the GOTO menu, and...

  3

  Select Route navigation mode

  This will activate the pop-up window “Navigate in route” with the selected routepoint as first destination point. Check if any of the current settings need to be changed e.g. forward or reverse direction in route.

  ENT

  Start navigation

• From the chart, without first placing cursor on a routepoint:

  GOTO

  Call up the GOTO menu, and...

  3

  Select Route navigation mode

  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 first routepoint you wish to sail to

  ENT

  Start navigation

A course line will now be drawn from ship’s position to the first
route point.

**GOTO** Pressing [GOTO] from chart display during navigation will activate an INFO window with the following functions to choose from:

1. Advance (to next route point)
2. Restart to approaching point (in case you have drifted off course)
3. Turn NAV OFF

### 6.9.4 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 cannot be used for navigation. Refer to section 8.5 Start / Stop track.

There are two ways to start Track navigation:

- From the chart:

  > Place cursor on the track at the point where you wish to start your navigation from

  **GOTO** Call up the GOTO menu, and...

  4 Select Track navigation mode

  This will activate the pop-up window “Navigate in track” with the selected trackpoint as first destination point. Check if any of the current settings need to be changed.

  **ENT** Start navigation

- From the chart, without first placing cursor on a track:

  **GOTO** Call up the GOTO menu, and...

  4 Select Track navigation mode
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

**ENT** Start navigation

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

**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
6.10 Anchor guard

Call up the GOTO menu, 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:
Call up the menu bar, and...
load the highway display
Enter the navigation setup display
Key in a new value with numeric keys
Confirm the change

To turn Anchor guard off again:
Call up the GOTO menu, and...
turn anchor guard off

6.11 MOB alarm and navigation

The MOB - Man overboard - alarm and display will be activated if you press the [MOB] key on the CAXX keypad and hold it depressed for two seconds, or activate an external MOB switch (hold five seconds) and then press the [ENT] key to start MOB navigation. The MOB display will provide all relevant data for an efficient rescue operation - refer to details on the rear of the first page of the manual.

To turn the MOB function off again:
Call up the GOTO menu, and...
turn the MOB function off

To check the last activated MOB position:
Call up the menu bar, and...
select MOB data
7. Miscellaneous menu

<table>
<thead>
<tr>
<th>5</th>
<th>MISC</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Wind - see section 7.1</td>
</tr>
<tr>
<td>2</td>
<td>Speed diagram - see section 7.2</td>
</tr>
<tr>
<td>3</td>
<td>Decca lanes - see section 7.3</td>
</tr>
<tr>
<td>4</td>
<td>Loran C - see section 7.4</td>
</tr>
<tr>
<td>5</td>
<td>Satellites - see section 7.5</td>
</tr>
<tr>
<td>6</td>
<td>DGPS - see section 7.6</td>
</tr>
<tr>
<td>7</td>
<td>SDGPS - see section 7.7</td>
</tr>
<tr>
<td>8</td>
<td>DSC info - see section 7.8</td>
</tr>
<tr>
<td>9</td>
<td>Depth &amp; temperature diagram - see section 7.9</td>
</tr>
</tbody>
</table>

7.1 Wind display

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

Call up the menu bar, and...
load the ‘Wind instrument’ display

Wind display

True wind direction.

Wind relative to vessel.

Wind speed, apparent or true.
Load Setup for Wind display

**Setup for Wind:**

- **Damping level:** MEDIUM
- **Apparent wind scale:** NORMAL
- **Wind angle offset:** 000°
- **Show wind speed as:** APPARENT
- **Wind speed unit:** METERS/SECOND

- **Go to the function you wish to change**
- **Toggle between settings, or...**
- **Key in new figure**
- **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.

**Apparent 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** - APPARENT or TRUE.

**Wind speed unit** - can be either METER/SECOND, KNOTS, KILOMETERS/HOUR or MILES/HOUR.
7.2 Speed diagram

Call up the menu bar, and...
load “Speed diagram”

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.

Call “Speed diagram setup”
- see next page.
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
7.3 Decca lanes

Call up the menu bar, and...

load decca chain display

Open for change

Leaf through the available chains - see below.

Confirm entry

To change the position readouts to decca mode, see section 9.4 under Pilot/Position setup, where ‘Display position as’ can be toggled to ‘Decca’.

List of decca chains:

<table>
<thead>
<tr>
<th>Decca Chain</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>00</td>
<td>S Baltic</td>
</tr>
<tr>
<td>01</td>
<td>Vestlandet</td>
</tr>
<tr>
<td>02</td>
<td>SW British</td>
</tr>
<tr>
<td>03</td>
<td>North Humber</td>
</tr>
<tr>
<td>04</td>
<td>Holland</td>
</tr>
<tr>
<td>05</td>
<td>British</td>
</tr>
<tr>
<td>06</td>
<td>Lofoten, Norway</td>
</tr>
<tr>
<td>07</td>
<td>German</td>
</tr>
<tr>
<td>08</td>
<td>N Baltic</td>
</tr>
<tr>
<td>09</td>
<td>NW Spanish</td>
</tr>
<tr>
<td>10</td>
<td>Trondelag (N)</td>
</tr>
<tr>
<td>11</td>
<td>English</td>
</tr>
<tr>
<td>12</td>
<td>N Bothnian</td>
</tr>
<tr>
<td>13</td>
<td>S Spanish</td>
</tr>
<tr>
<td>14</td>
<td>N Scottish</td>
</tr>
<tr>
<td>15</td>
<td>Finland</td>
</tr>
<tr>
<td>16</td>
<td>Danish</td>
</tr>
<tr>
<td>17</td>
<td>Irish</td>
</tr>
<tr>
<td>18</td>
<td>Finnmarken</td>
</tr>
<tr>
<td>19</td>
<td>French</td>
</tr>
<tr>
<td>20</td>
<td>S Bothnian</td>
</tr>
<tr>
<td>21</td>
<td>Hebridean</td>
</tr>
<tr>
<td>22</td>
<td>Frisian</td>
</tr>
<tr>
<td>23</td>
<td>Helgeland</td>
</tr>
<tr>
<td>24</td>
<td>Skagerak</td>
</tr>
<tr>
<td>25</td>
<td>N Persian</td>
</tr>
<tr>
<td>26</td>
<td>S Persian</td>
</tr>
<tr>
<td>27</td>
<td>Bombay</td>
</tr>
<tr>
<td>28</td>
<td>Calcutta</td>
</tr>
<tr>
<td>29</td>
<td>Bangladesh</td>
</tr>
<tr>
<td>30</td>
<td>Hokkaido</td>
</tr>
<tr>
<td>31</td>
<td>Tohoku</td>
</tr>
<tr>
<td>32</td>
<td>Kyusyu</td>
</tr>
<tr>
<td>33</td>
<td>Namaqua</td>
</tr>
<tr>
<td>34</td>
<td>Cape chain</td>
</tr>
<tr>
<td>35</td>
<td>E Province</td>
</tr>
<tr>
<td>36</td>
<td>Dampier</td>
</tr>
<tr>
<td>37</td>
<td>Port Hedld</td>
</tr>
<tr>
<td>38</td>
<td>Hokuriku</td>
</tr>
<tr>
<td>39</td>
<td>Newfoundld.</td>
</tr>
<tr>
<td>40</td>
<td>Cabot strt</td>
</tr>
<tr>
<td>41</td>
<td>Nova Scotia</td>
</tr>
<tr>
<td>42</td>
<td>Salaya</td>
</tr>
<tr>
<td>43</td>
<td>Kanto</td>
</tr>
<tr>
<td>44</td>
<td>SW Africa</td>
</tr>
<tr>
<td>45</td>
<td>Natal</td>
</tr>
<tr>
<td>46</td>
<td>Shikoku</td>
</tr>
</tbody>
</table>

Listings are in numerical order, with the first digit representing the channel number, the second digit representing the region code, and the third digit representing the nation code.
7.4 Loran C

Call up the menu bar, and...

load Loran C chain display

Open for change

Leaf through the available chains - see listing below.

If required, go to the slaves, and...

Toggle between available slaves (not all chains have more than one slave)

...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

Key in a positive or negative offset to the time delay (toggle positive/negative with +/-)

Confirm entry

To change the position readouts to Loran C mode, see section 9.4 under Pilot/Position setup, where ‘Display position as’ can be toggled to ‘Loran C’.

List of Loran C chains:

<table>
<thead>
<tr>
<th>Central Pacific</th>
<th>4990</th>
<th>Commando Lion</th>
<th>5970</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gulf of Alaska</td>
<td>7960</td>
<td>North West Pacific</td>
<td>9970</td>
</tr>
<tr>
<td>Southeast U.S.</td>
<td>7980</td>
<td>Norwegian Sea</td>
<td>7970</td>
</tr>
<tr>
<td>Great Lakes</td>
<td>8970</td>
<td>Mediterranean Sea</td>
<td>7990</td>
</tr>
<tr>
<td>Northeast U.S.</td>
<td>9960</td>
<td>Icelandic</td>
<td>9980</td>
</tr>
<tr>
<td>Canadian West Coast</td>
<td>5990</td>
<td>Saudi Arabia South</td>
<td>7170</td>
</tr>
<tr>
<td>Canadian East Coast</td>
<td>5930</td>
<td>Saudi Arabia North</td>
<td>8990</td>
</tr>
<tr>
<td>Labrador Sea</td>
<td>7930</td>
<td>Eastern U.S.S.R.</td>
<td>7950</td>
</tr>
<tr>
<td>West Coast U.S.</td>
<td>9940</td>
<td>Western U.S.S.R.</td>
<td>8000</td>
</tr>
<tr>
<td>North Pacific</td>
<td>9990</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### 7.5 Satellite status

**Call up the menu bar, and...**

**load satellite status display**

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.

**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:

**Open for change, and...**

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

The minus key will exclude the satellite, and...

**the plus key will reinstate it**

**Confirm entry**
**Position update alarm** “Alarm” in the satellite status display is preset to “OFF”. If the received position data is invalid, the position shown in the position display will start to flash. A position update alarm can be set ON/OFF from the satellite status display [MENU], [5], [5]:

1. **Open for change**
2. **Go to “Alarm”**
3. **Toggle alarm ON/OFF**
4. **Confirm entry**
5. Reset the alarm by [CLR].

**Status indicator:** GPS * - see section 6.3.

**HDOP, PDOP and DOP limits** 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 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 to higher than 8 (default), as this may result in poor accuracy i.e. false position. To change the DOP limit from the satellite status display [MENU], [5], [5]:

1. **Open for change**
2. **Go to DOP limit (6-20), and...**
3. **Insert new limit**
4. **Confirm entry**
7.6 DGPS information (optional)

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.

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

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

Frequency (station) and bit rate can be selected manually:

Open for change, and...
Go to the function you wish to alter
Toggle the function, or...
insert new figures
Confirm entry

Beacon - informs the name of the beacon the navigator is locked on to (if any), together with indication of bearing and distance.
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.
### 7.7 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 7.6) or satellite differential GPS signals from WAAS, EGNOS or MSAS (refer to section 7.7.1).

**Call up the menu bar, and...**

**load SDGPS setup display**

<table>
<thead>
<tr>
<th>SDGPS setup:</th>
<th>AUTO</th>
</tr>
</thead>
<tbody>
<tr>
<td>SDGPS select mode:</td>
<td>AUTO</td>
</tr>
<tr>
<td>Uses corrections from:</td>
<td>*****</td>
</tr>
</tbody>
</table>

**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

**Open for change**

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

**Toggle the function**

**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).
- **PASSIVE** mode: SDGPS corrections are never used (see section 7.7.1).
- **MANUAL** mode: SDGPS corrections are used (if available). Local area DGPS corrections are not used.
**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.

**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: “Ignore type 0 warnings: NO” should be changed to “YES”.

---

It is possible (but not recommendable) to override the Type 0 warnings - refer to last line in SDGPS setup: “Ignore type 0 warnings: NO” should be changed to “YES”.
7.7.1 Satellites in SDGPS system

The SDGPS system consist of eight orbiting geostationary satellites and is designed to form a seamless global augmentation system consisting of Waas (USA), EGNOS (Europe) and MSAS (Japan). If all three parts would become operative at the same time, there would be no performance problem. However, since WAAS is the only system currently in normal operation, the WAAS correction signals can have a negative effect on receivers operating in Europe and Far East outside the intended WAAS coverage area. In these areas, we recommend that the ‘SDGPS select mode’ is changed from ‘AUTO’ to ‘PASSIVE’.

Refer to Addendum no. 183-0002-000 (included in the package) for up-to-date information on the current status of the SDGPS system.

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

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.
7.8 DSC VHF info

To receive an iDSC Alarm and Message from VHF will require that the CAXX is connected to a compatible Simrad VHF radiotelephone. The data is transmitted via NMEA or SimNet.

The message from the VHF will appear in a pop-up window together with an acoustic alarm. Press [CLR] to reset the alarm, or press [ENT] to stop alarm and select the suggested channel for communication - refer to the VHF manual for further details.

To view the last received message:
Call up the menu bar, and...
5,8
load the DSC info display
7.9 Depth & temperature diagram

Call up the menu bar, and...
activate Depth & temperature diagram

Present water temperature and depth.
Depth over time or distance.
Temperature over time or distance.

Call Setup for Depth

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
Key in new figures, or...
change settings

Confirm changes

**Scale for depth** - there are six depth scales to choose from, ranging from 0 -> 10m to 0 -> 3000m. Toggle between values 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** - the 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 speed of the ship, and you can freeze the reading.
8. Waypoint / route menu

<table>
<thead>
<tr>
<th>WP/RTE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Waypoints</td>
</tr>
<tr>
<td>2 Routes</td>
</tr>
<tr>
<td>3 Route calculation</td>
</tr>
<tr>
<td>4 Lines</td>
</tr>
<tr>
<td>5 Tracks</td>
</tr>
<tr>
<td>6 Targets</td>
</tr>
<tr>
<td>7 MOB data</td>
</tr>
<tr>
<td>8 Data transfer</td>
</tr>
</tbody>
</table>

8.1 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:

Call up the menu bar, and...
load waypoint list

Waypoint: WP 2

<table>
<thead>
<tr>
<th>Waypoint</th>
<th>Lat</th>
<th>Long</th>
</tr>
</thead>
<tbody>
<tr>
<td>x WP 1</td>
<td>57°14.853N</td>
<td>9°51.966E</td>
</tr>
<tr>
<td>x WP 10</td>
<td>55°59.954N</td>
<td>10°47.247E</td>
</tr>
<tr>
<td>x WP 11</td>
<td>55°59.203N</td>
<td>11°15.562E</td>
</tr>
<tr>
<td>x WP 2</td>
<td>57°20.289N</td>
<td>10°01.404E</td>
</tr>
<tr>
<td>x WP 3</td>
<td>57°24.990N</td>
<td>10°15.561E</td>
</tr>
<tr>
<td>x WP 4</td>
<td>57°24.990N</td>
<td>10°39.831E</td>
</tr>
<tr>
<td>x WP 5</td>
<td>57°14.490N</td>
<td>10°58.708E</td>
</tr>
<tr>
<td>x WP 6</td>
<td>57°01.385N</td>
<td>11°06.798E</td>
</tr>
<tr>
<td>x WP 7</td>
<td>56°50.773N</td>
<td>10°47.921E</td>
</tr>
</tbody>
</table>

Number of stored waypoints: 11
Chapter 8-2   CA34/44/54 Waypoint / route menu

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
ENT  Confirm entry and return to WP list
Plot new waypoints with the [PLOT] key - refer to section 4.4.9.

8.1.1 Delete waypoints via menu

MENU  Call up the menu bar, and...
6,1  load waypoint list
+/−  Select waypoint you wish to delete
ENT  Open for editing
WIN  Delete waypoint
CLR  Confirm that you want to delete the selected waypoint, if not sure: press [MENU] to exit the display without having made any changes.

Edit waypoints directly on the chart via info windows, refer to section 4.4.3.
8.2 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 4.4.4 and 4.4.5. To delete a route - refer to section 8.2.1.

Making new routes can be done directly on the chart with the PLOT function - refer to section 4.4.9, or from the WP list using existing waypoints - refer to section 8.2.2.

Call up the menu bar, and...

load route list display

ROUTE: DENMARK

Number of stored routes: 2

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

Select route by entering its name

Move the cursor up/down to select a specific route

Call up the details on highlighted route
- see next page.
This display provides information on course line, XTE line, route legs, routepoints etc.

**Call up the Edit route display** - if you wish to make any changes. (Editing a route currently used for navigation is not possible)

Setting the Course line to OFF in this display will make the route invisible on the screen. Put it back on the screen by setting it ON again. The course line and XTE line can be changed in color - there are a total of 15 colors to choose from together with 9 different line types.
If the XTE distance is not the same in all legs, the value will be ** instead of the 00.10nm. Navigation mode can be either RHUMB-LINE 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** can be set to either NAVIGATION for navigational data in the route display (example on the previous page), or POINTS for a list of routepoints together with the position in lat/long and the XTE limit of each point.

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 the routepoint you wish to remove, and press [CLR]

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 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
8.2.1 Delete route via menu

**MENU**  
*Call up the menu bar, and...*  
*load route list display*

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

**ENT**  
*Call up the details on highlighted route*

**ENT**  
*Open for editing*

**WIN**  
*Delete route*

**CLR**  
*Confirm that you want to delete the selected route,*  
*if not sure: press [MENU] to exit the display without having made any changes.*

*Edit routes directly on the chart via info windows, refer to section 4.4.4 and 4.4.5.*

8.2.2 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...*  
*load route list display*

**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 position 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 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 display example]

**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**

**Key in new figures, and...**
**toggle between available values**

**Confirm editing**

**Return to route list**
8.3 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.

*Call up the menu bar, and...*

*load route calculation display*

---

**Route calculation:**

<table>
<thead>
<tr>
<th>Route:</th>
<th>RTE 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Course line:</td>
<td></td>
</tr>
<tr>
<td>XTE:</td>
<td></td>
</tr>
</tbody>
</table>

**Route point A:** 0001

**Route point B:** 0002

**ETA speed:** 13.8kn AUTO

| Total distance from A to B: 0.16nm |
| Time to go from A to B: 0m42s      |
| Arrival time: 13:18                |
| Date: 26-02-2002                   |

**Toggle between available routes in the memory**

**Go to Routepoint A, and...**

**Select the first routepoint (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:

**Open for change**

**Key in a new speed value**

**Toggle between AUTO and MANUAL**

**Confirm entry**
8.4 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 4.4.9. Lines can also be edited directly on the chart via info windows, refer to section 4.4.4 and 4.4.5.

Call up the menu bar, and...
load line list display

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

Select line by entering its name

Move the cursor up/down to select a specific line

Call up the details on highlighted line

This display indicates how many line sections are used for the drawing.
Leaf through the line points by moving cursor up/down

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

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 editing

MENU Return to line list

8.4.1 Delete lines via menu

MENU Call up the menu bar, and...

6,4 load line list display

+/‐ Select the line you wish to delete

ENT Call up the details on highlighted line

ENT Open for editing

WIN Delete line

CLR Confirm that you want to delete the selected line, if not sure: press [MENU] to exit the display without having made any changes.

Edit lines directly on the chart via info windows, refer to section 4.4.4 and 4.4.5.
8.5 Start / stop track

The track function will provide a track trailing the movement of your ship. As default from the factory, the first track is stored as TRACK 1, the next as TRACK 2 etc.

To start track function:

Call up the PLOT menu
Load Start track pop-up window

If you wish to change the default values:

Move cursor to where you wish to make a change

Toggle between available values, or...
key in new values

Start track

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:

- **PLOT**
- **8**
- **ENT**

8.6 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**
- **6,5**
- **+/−**
- **A-Z**
- **ENT**

Example:

Active track
“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

Confirm changes

Return to track list

**8.6.1 Delete tracks via menu**

Call up the menu bar, and...

load track list display

Select the track you wish to delete

Call up the details on highlighted track

Open for editing

Delete track

Confirm that you want to delete the selected track, if not sure: press [MENU] to exit the display without having made any changes.

Edit tracks directly on the chart via info windows, refer to section 4.4.6.
8.7 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 - refer to section 4.4.9, or keyed in via the keypad - refer to section 4.4.7.

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 4.4.7.

Call up the menu bar, and...
load target display

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

Open for change, and...

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

Key in new values, alphabetical or numerical
8.7.1 Delete target via menu

Call up the menu bar, and...
load target display

Select the target you wish to delete

Open for editing

Delete target

Confirm that you want to delete the selected target, if not sure: press [MENU] to exit the display without having made any changes.

Edit targets directly on the chart via info windows, refer to section 4.4.7.

8.8 MOB data

Call up the menu bar, and...
load MOB data display

<table>
<thead>
<tr>
<th>MAN OVERBOARD</th>
</tr>
</thead>
<tbody>
<tr>
<td>DATE 12-03-2004</td>
</tr>
<tr>
<td>TIME 14:23:34</td>
</tr>
<tr>
<td>MOB 56°52.489N</td>
</tr>
<tr>
<td>POS 009°50.305E</td>
</tr>
</tbody>
</table>

The MOB display will provide information of the last activated MOB position. To delete a MOB track from the memory, see section 4.4.6.
Chapter 8-16 CA34/44/54 Waypoint / route menu

8.9 Data transfer via DataCard or disc

Data transfer to and from external memory can be performed via Simrad DataCard (CA34/44/54), or with a Simrad TL50 Turbo Loader (CA44/54) via an ordinary 1.44Mb disc.

DataCards and TL50 Turbo Loader are optional equipment available from your local Simrad dealer. How to perform data transfers via TL50 (including 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:

Call up the menu bar, and...
load the Data transfer window

<table>
<thead>
<tr>
<th>Data transfer</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 DataCard upper drawer</td>
</tr>
<tr>
<td>3 DataCard lower drawer</td>
</tr>
<tr>
<td>7 NMEA connection</td>
</tr>
</tbody>
</table>

- see section 8.10

Select the drawer where you have inserted the DataCard e.g. [1]:

<table>
<thead>
<tr>
<th>DataCard upper drawer</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 DataCard status</td>
</tr>
<tr>
<td>3 Save on DataCard</td>
</tr>
<tr>
<td>9 Load from DataCard</td>
</tr>
</tbody>
</table>

MENU Exit
DataCard status
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 +/- keys.

Save on DataCard
Press [3] to call up a new INFO window where you can see which data will be transferred, i.e., routes, waypoints, etc., and how much space it will take up in bytes + percentage of max. storage capacity. The actual date and time will be saved with the data transfer.

Use the +/- keys to toggle between Databank 1 and 2.

Use the alphanumeric keys to add a name to the data in the selected databank.

Use the cursor key to go to the ‘Action’ column to decide which action you want taken for each mentioned category of data (toggle with +/- keys) - see section 8.9.1.

If you choose to MERGE the data already stored on the DataCard with the data coming from the Internal memory, the bottom line in the window will ask you to press [ENT] to: Calculate databank after merge.

Press [ENT] to activate ‘Save selected data on DataCard’

You will now receive a warning about which data on the DataCard, in the selected databank, will be overwritten. Press [ENT] to accept. After the data has been transferred, you will receive a status report.

Press [MENU] to exit function.

Load from DataCard
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 display example next page.

Use the +/- keys to toggle between Databank 1 and 2.
User data generated by other chartplotter models e.g. CE33/40/42/52, CP33/40/42/52, CA40/42/52, CR40/42/52 can all be transferred to a CA34/44/54 unit via the Data transfer system.

However, it is not immediately accessible to transfer data via DataCard from the new model CA34/44/54 to the older model CA42, etc., as this would require an update of the CA42.
- For more information, please contact an authorized Simrad dealer.

---

**Load from DataCard:**

<table>
<thead>
<tr>
<th>Data generated by:</th>
<th>Simrad CA44</th>
</tr>
</thead>
<tbody>
<tr>
<td>Used internal memory:</td>
<td>193393 bytes = 42%</td>
</tr>
<tr>
<td>Used DataCard memory:</td>
<td>2677 bytes = 1%</td>
</tr>
<tr>
<td>Used internal memory after operation:</td>
<td>191400 bytes = 42%</td>
</tr>
<tr>
<td>Date saved:</td>
<td>15-02-2003</td>
</tr>
<tr>
<td>Time saved:</td>
<td>19:43:00</td>
</tr>
<tr>
<td>Name:</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Data type</th>
<th>Internal Amount Bytes</th>
<th>DataCard Amount Bytes</th>
<th>Internal after Amount Bytes</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Marks/waypoints:</td>
<td>9</td>
<td>244</td>
<td>11</td>
<td>256</td>
</tr>
<tr>
<td>Lines:</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>168</td>
</tr>
<tr>
<td>Routes:</td>
<td>1</td>
<td>168</td>
<td>4</td>
<td>408</td>
</tr>
<tr>
<td>Targets:</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>100</td>
</tr>
<tr>
<td>Tracks:</td>
<td>8</td>
<td>190480</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

| Setup: | 1 | 2501 | 1 | 1745 | 0 | 0 | NO |

**MENU** Exit   **Load selected data from DataCard**  **ENT**

Use the cursor key to go to the ‘Action’ column to decide which action you want taken for each mentioned category of data (toggle with +/- keys) - see section 8.9.1.

If you choose to MERGE the data already stored in the Internal memory with the data coming from the DataCard, the bottom line in the window will ask you to press [ENT] to: Calculate databank after merge.

**ENT** Press [ENT] to activate ‘Load selected data from DataCard’

You will now receive a warning about which data in the internal memory of the unit will be overwritten. Press [ENT] to accept. After the data has been transferred, you will receive a status report.
**MENU**  
*Press [MENU] to exit and *reboot (only if loading “Setup”)*

*) When the system makes a ‘reboot’ 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.

**8.9.1 List of criteria for data transfer in the Action column**

**OVERWRITE** - will overwrite existing data in the memory you are transferring data to. Whenever a new ‘Setup’ is transferred into the main unit, the system will reboot, the screen will turn black for a brief moment and then restart and automatically return to the active display on the screen before you made the transfer.

领军  Transfer of ‘Setup’ can only be completed between identical units.

**MERGE** - will mix the transferred data with the data in the memory you are transferring to. Press [ENT] to calculate memory after merge. Identical data will be sorted automatically and not saved twice i.e.:

- ‘Marks/waypoints’ of same position, name and symbol.
- ‘Lines’ which are identical.
- ‘Routes’ of same name, equal number of routepoints (not necessarily in the same position), but with the exact same start point and end point.
- ‘Targets’ of same position, name and symbol.
- ‘Tracks’ which are identical.
- ‘Setup’ can not be merged.

**DELETE** - will delete existing type of data from the memory you are transferring data to.

**NO** - no action will take place. The data will remain unchanged.
8.10 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 Optional connections in the Installation manual) 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.

PC-based planning systems differ in operation and performance beyond the control of Simrad.

Call up the menu bar, and...

load the Data transfer window

Select the NMEA connection

CA44/54 example:

WARNING!

Normal NMEA communication on selected channel will be interrupted.

Press [1] or [3] to select the NMEA port where the PC data cable is connected. This will activate a new window, see next page.
CA34 example:

**WARNING!**

Normal NMEA communication will be interrupted.

Press [ENT] to accept warning and continue.

**NMEA (1) connection**

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Transmit WPs</td>
</tr>
<tr>
<td>3</td>
<td>Transmit routes</td>
</tr>
<tr>
<td>7</td>
<td>Receive WPs and routes</td>
</tr>
</tbody>
</table>

**Transmit WPs**

Press [1] to start transmission of all waypoints stored in the CAXX WP list to PC

When the transmission is completed you will receive a new info window informing of how many waypoints were transferred.

**Transmit routes**

Press [3] to start transmission of all routes stored in the CAXX Route list to PC

When the transmission is completed you will receive a new info window informing of how many routes were transferred.
Receive WPs and routes

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

<table>
<thead>
<tr>
<th>Reception in progress</th>
</tr>
</thead>
<tbody>
<tr>
<td>37 WPs received</td>
</tr>
<tr>
<td>5 routes received</td>
</tr>
</tbody>
</table>

**Stop and save**
- will stop collecting data (if not already finished) and start saving the collected data.

Waypoints/routes transmitted to the CAXX 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 CAXX in a hurry, then press the [MENU] key to *Stop saving* any more data - what has been saved until this point will stay in the memory, the rest will be lost.

**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:

**Exit function and return to normal NMEA communication**
9. Setup menu

<table>
<thead>
<tr>
<th>7</th>
<th>SETUP</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>RADAR</strong></td>
<td>Radar setup</td>
</tr>
<tr>
<td><strong>CHART</strong></td>
<td>C-MAP cartridges</td>
</tr>
<tr>
<td><strong>ECHO</strong></td>
<td>Echosounder setup</td>
</tr>
<tr>
<td><strong>PILOT</strong></td>
<td>Pilot/Position setup</td>
</tr>
<tr>
<td>1</td>
<td>Speed alarm, units &amp; language</td>
</tr>
<tr>
<td>2</td>
<td>Interface setup</td>
</tr>
<tr>
<td>3</td>
<td>Palette setup</td>
</tr>
<tr>
<td>4</td>
<td>Factory settings</td>
</tr>
<tr>
<td>5</td>
<td>QuickGuide</td>
</tr>
</tbody>
</table>

9.1 Radar setup

After the installation is completed, check the Radar setup to see if the **Antenna height** is correct and the **Heading adjust** is zero degrees to ship’s center line. If not, then they need to be corrected - see further ahead in this section. All default settings 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.

**Call up the menu bar, and...**

**activate the SETUP menu, and...**

**load the Radar setup**

- see example of Radar setup next page.

You will now receive a warning that you are about to change settings for the radar. Press [ENT] to Continue, or [MENU] to Abandon.

Use the cursor key to move around in the settings. Toggle between available values with the +/- keys, and insert data by the numeric keys.

**Confirm the adjustments by [ENT] or [MENU]**
## Example of Radar setup:

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Head-Up in Relative Motion</td>
<td>Range= 0.50nm</td>
<td>Head-Up in Relative Motion</td>
</tr>
<tr>
<td>Power off</td>
<td>Power off, X-MIT</td>
<td></td>
</tr>
<tr>
<td>Relative Motion</td>
<td>0.50nm</td>
<td></td>
</tr>
<tr>
<td>Tuning Indicator</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Tune</td>
<td>AUTO</td>
<td>*Tune, Gain, Sea: adjust with +/- keys, and press [CLR] to return to AUTOmatic mode.</td>
</tr>
<tr>
<td>Gain</td>
<td>AUTO</td>
<td>*Rain Clutter / FTC</td>
</tr>
<tr>
<td>Sea</td>
<td>AUTO</td>
<td>*Rain Clutter / FTC</td>
</tr>
<tr>
<td>Rain</td>
<td>0</td>
<td>*Rain Clutter / FTC</td>
</tr>
<tr>
<td>Scanner type</td>
<td>Auto detect</td>
<td>*Rain Clutter / FTC</td>
</tr>
<tr>
<td>Antenna height</td>
<td>05m</td>
<td>5 meters above water</td>
</tr>
<tr>
<td>Heading adjust</td>
<td>000.0°</td>
<td>*In degrees to ship’s center line</td>
</tr>
<tr>
<td>Tuning reference</td>
<td>079</td>
<td>*Adjust with +/-/numeric keys</td>
</tr>
<tr>
<td>Zero range/timing</td>
<td>0109</td>
<td>*Adjust with +/-/numeric keys</td>
</tr>
<tr>
<td>MBS</td>
<td>050 050</td>
<td>Main Bang Suppression, level and length (area)</td>
</tr>
<tr>
<td>Sensitivity</td>
<td>048</td>
<td>*Adjust with +/-/numeric keys</td>
</tr>
<tr>
<td>GZ target threshold</td>
<td>5</td>
<td>*Levels of 1 to 7</td>
</tr>
<tr>
<td>Stand-by time</td>
<td>000000 h</td>
<td>Elapsed stand-by time</td>
</tr>
<tr>
<td>Transmit time</td>
<td>000000 h</td>
<td>Elapsed transmission time</td>
</tr>
<tr>
<td>Sea Auto</td>
<td>025 050 090</td>
<td>*Sea Auto, Sea Harbor and Gain Auto are preset for best performance under normal conditions.</td>
</tr>
<tr>
<td>Sea Harbor</td>
<td>000 025 030</td>
<td>For technicians only.</td>
</tr>
<tr>
<td>Gain Auto</td>
<td>020 082</td>
<td>*= only adjustable in X-MIT mode.</td>
</tr>
<tr>
<td>Test scanner</td>
<td>Activate</td>
<td>More details on next pages</td>
</tr>
</tbody>
</table>

### Scanner type:
- is preset to Auto detect. After having installed the scanner (see the Installation manual for selection of scanner), the radar function must stay in **Power off** mode until the scanner type is detected. The system will automatically set up the correct parameters for the connected scanner.
- Demo mode – see section 3.3.

### 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 is just in front and adjust until target is straight ahead on the heading line. Use the +/- keys to position it correctly.
**Tuning reference:** 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 depend on which scanner type is connected. To adjust: Press the [1] key to set the displayed range to 0.125nm. Use cursor to highlight “Sea” and with +/- keys set the sea clutter to zero, then move cursor to MBS level and change all figures to zero, so you can see the transmitting pulse. Now adjust the value for Zero range so the ring around the ship is just closing. 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 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. 3.2.5). 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.

**MBS - Main Bang Suppression:** Each transmitter pulse will result in an immediate strong return signal, which will form a ‘sun’ (main bang) in the center of the screen. Main bang suppression is a filter, which will eliminate or minimize this effect. The first 3-digit number indicates the level and the last 3-digit number indicates the length (area). Adjustments can be made for best performance for individual antennas. The first 25 to 30 meters, however, will always be ‘blinded’ by the transmission pulse. Adjustment of MBS requires STC=0 and reasonable GAIN. If the suppression zone around the center is too large, suppression length can be lowered. If strong targets disappear within the suppression zone, the level of suppression can be lowered.

**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.

**Sea Auto and Sea Harbor** values for the automatic STC modes i.e. Minimum, Maximum, and Sensitivity. The first two 3-digit numbers define the limits of the automatic functions. These numbers
refer to minimum (first set of numbers) and maximum (second set of numbers) allowed STC value, the automatic function will never use an STC outside this interval. The third set of numbers equals the sensitivity of the function. The higher the number (more sensibility), the more STC filter.

If necessary, the factory presets can be adjusted to expand or limit the effect of the auto function, but first check if Gain Auto needs to be adjusted (see below). After the adjustment, the new values will be the new AUTO settings. If a new scanner type is recognized, these parameters are set to default. During adjustment of minimum and maximum, the display will show the current value. The auto function is active when the sensitivity is adjusted. The auto function parameters will take effect when the auto function is selected.

**Gain Auto** values for the automatic Gain mode. The first two set of numbers will define the limits of the automatic functions.

- **Gain Auto settings**
  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.
  4. Choose a displayed range of 6nm (press key [7]) or higher.

  Now you are ready to adjust the Gain Auto values in the lower part of the Radar setup display:
  - **First 3 digits - minimum**: Adjust to a minimum value, which will show an acceptable radar image.*
  - **Last 3 digits - maximum**: Adjust to maximum acceptable level of noise.*

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

- **Sea Auto and Sea Harbor settings**
  Sea Auto should be adjusted to an offshore situation, and Sea Harbor to a harbor situation.

  To adjust the preset values, you first have to check that Gain Auto is set correctly - see above, and then:
  1. Choose a displayed range of 0.5nm (press key [3]).
  2. Set ‘Tune’ bar to ‘AUTO’ mode: move cursor to the ‘Tune’ bar and press [CLR].
4. Set ‘Rain’ to minimum: move cursor to the ‘Rain’ bar, and adjust with +/- keys.

Now you are ready to adjust the Sea Auto and Sea Harbor limits in the lower part of the Radar setup display:
- **First set of 3 digits - minimum**: Adjust to lowest figure with acceptable amount of sea clutter on screen.*
- **Second set of 3 digits - maximum**: Adjust to highest figure with acceptable amount of sea clutter on screen.*
- **Third set of 3 digits - Sensitivity**: Adjust to max. acceptable suppression of sea clutter.* 0 = no suppression - Low STC level, and 100 = 100% suppression - High STC level. (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.

Note! As the auto mode is always working in the background, any new adjustments may not be immediately visible on the screen. Depending on the weather and personal requirement, these adjustments will need to be aligned more than once.

**Test scanner** – to activate press one of the +/- keys, which will call up an info window. Press [CLR] to initiate a test of the scanner, which will provide measurement values and other technical details. (For technicians only).

### 9.2 C-MAP cartridges

On the unit’s front, below the keypad, are two watertight drawers wherein you place the C-MAP cartridge/C-card you wish to load.

Do not attempt to insert or remove a cartridge unless the unit is turned off, or chart reading is in stand-by - see below.

**Call up the menu bar, and...**
open the SETUP menu, and...
**load the pop-up window for C-MAP cartridges** (which also brings the chart system in stand-by)

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 - make sure it is closed tight, so it remains watertight.
Press [ENT] to test the data on the C-MAP C-card

If a C-card is defect, it must be removed before you can exit the display.

Exit the window
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 section 4.5 Chart setup.

Other chart areas can quickly be reached by means of the zoom keys:
Zoom out until desired area becomes visible

Move cursor to approximate area, and...

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.

9.3 Echosounder setup

The Echosounder setup display mainly consist of general settings, but also applies to a specific frequency where stated. The CAXX features single and dual transceiver transmitting at 38 (44/54), 50 and 200 kHz.

Call up the menu bar, and...
open the SETUP menu, and...
load Echosounder setup display

CA34 example:

Echosounder setup:

Transducer:                      SINGLE 200kHz
Keel depth below surface:        00.0 m
Display:                        DEPTH BELOW KEEL
Data on NMEA-out from:           NONE
Alarm for fish:                  Strength: 065%     OFF
Depth DS fish:                   min: 0005 m   max: 0030 m
Depth DK alarm min.:             0005.0 m   OFF
Depth DK alarm max.:             0030.0 m   OFF
Water profile:                   SALT
Velocity of sound in water:     1470m/s
Time/distance scale:             ON
Restart of AUTO pulse/power:    20 sec.
Echo sampling:                  BOTTOM
Demo mode:                      OFF

CA44/54 example:

Echosounder setup:

Select transducers:

<table>
<thead>
<tr>
<th>Transducer 1:</th>
<th>TYPE</th>
<th>PORT</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>NONE</td>
<td>ECHO1</td>
</tr>
<tr>
<td>Transducer 2:</td>
<td>NONE</td>
<td>ECHO2</td>
</tr>
</tbody>
</table>

Keel depth below surface:        00.0 m
Display:                        DEPTH BELOW KEEL
Data on NMEA-out from:           NONE
Alarm for fish:                  Strength: 065%     OFF
Depth DS fish:                   min: 0005 m   max: 0030 m
Depth DK alarm min.:             0005.0 m   OFF
Depth DK alarm max.:             0030.0 m   OFF
Water profile:                   SALT
Velocity of sound in water:     1470m/s
Time/distance scale:             ON
Restart of AUTO pulse/power:    20 sec.
Echo sampling:                  BOTTOM
Demo mode:                      OFF

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

Confirm changes, or...

Abandon changes and exit display

**Transducer** - select transducer type. Insert the depth (position) of the transducer below surface.

**Display** can show: DEPTH BELOW KEEL / SURFACE / TRANSDUCER

**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. 000 (weak echo) to max. 0999% (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 the fish alarm.

**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**: 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 5.7.

**Restart of AUTO pulse/power** - will automatically restart the echosounder if bottom detection has been lost for the chosen time interval i.e. 10, 20 or 40 seconds. The AUTO pulse and power will restart from 10W and SHORT pulse.

**Echo sampling** - is preset to BOTTOM, which enables auto range and a view all the way to the bottom. For vessels moving at high
speed with the risk of losing bottom detection, RANGE or a max.
depth setting (50 to 2000m) is recommended. The unit will not wait
for a bottom echo, but transmit a new pulse as soon as the selected
range has been reached. Auto range is automatically switched off.
The depth alarm setting will have a higher priority than the selected
depth range.

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

### 9.4 Pilot / Position setup

**Call up the menu bar, and...**
**open the SETUP menu, and...**
**load Pilot/Position setup display**

#### Pilot/Pos setup:

<table>
<thead>
<tr>
<th>Display position as:</th>
<th>LAT/LON</th>
</tr>
</thead>
<tbody>
<tr>
<td>Start position:</td>
<td>56°57.000N 010°25.000E</td>
</tr>
<tr>
<td>Speed and course filter level:</td>
<td>3</td>
</tr>
<tr>
<td>Display speed as:</td>
<td>SOG</td>
</tr>
<tr>
<td>Course and bearing as:</td>
<td>MAGNETIC</td>
</tr>
<tr>
<td>COG vector length:</td>
<td>06 min</td>
</tr>
<tr>
<td>Time:</td>
<td>UTC</td>
</tr>
<tr>
<td>Time:</td>
<td>13:43:56</td>
</tr>
<tr>
<td>Date:</td>
<td>14-02-2004</td>
</tr>
</tbody>
</table>

**Go to the function you wish to change**

**Key in new values, or...**

**Toggle between available values**

**Confirm editing**

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

**Start position** - can be inserted if the exact start position is known. 

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

**Display speed as** - SOG Speed Over Ground or STW Speed Through Water. Toggle with +/-.

To receive STW information will require connection of external instrument via the SimNet system or the NMEA port. 

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

**COG vector length** - (default to 6 minutes) - indicates own course and speed. The length of the COG vector reflects a distance run during the specified number of minutes at the immediate speed. 

**Time** - can be set to UTC or local. Toggle with +/-

Correct actual time and date by means of the numeric keys.
9.5 Speed alarm, units & language

Call up the menu bar, and...

load Speed alarm, units & language display

Scroll up/down to go to the function you wish to change

Key in new values, or...

Toggle between available values

Confirm changes, or...

exit function without making any changes

Speed alarm - can be set to maximum and/or minimum cruising speed. This may be handy for trawl fishing, entering harbors with speed limits, etc. Speed stability and time of response can be
adjusted in Pilot/Position setup, press [MENU], [7], [PILOT], 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.

**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 (CA44/54)** - indicates if a TL50 Turbo Loader is connected and which software version is implemented.

**AT44 version (CA44/54)** - indicates if an AT44 SimNet converter is connected and which revision hardware and software is implemented.

**Serial number (CA34)** - indicates the unit’s internal serial number.

**Interface software version (CA34)** - indicates which version is installed in the CA34 unit (for technicians only).

**GPS receiver type** - indicates which type is installed in the unit (for technicians only).

**PAGE rotation interval** - can be set to anywhere between 03 to 99 seconds. Refer to “Fundamentals of the display 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 national display languages: Danish (DK), English (GB) and (US*), French (F), German (D), Italian (I), Dutch(NL), Spanish (E), Swedish (S), and Portuguese (P).

*) The difference from GB English to US English is: Celcius is changed to Fahrenheit, meters is changed to feet, and the date presentation is changed from dd.mm.yy to mm.dd.yy.
9.6 Interface setup

**CA34** has a connector for SimNet control or NMEA2000 plus one NMEA in/out port.

**CA44/54** has two NMEA in/out ports:
1. NMEA1 contains both an NMEA port and connection for the dual station. The NMEA1 data from the main unit is available from NMEA2 port on the dual station i.e. DS44 or DS54.
2. NMEA2 is used for connection to SimNet or NMEA2000 via AT44 Active Tee or for standard NMEA interfacing.

**Plug-and-play:** SimNet offers easy and uncomplicated interfacing with a unique cable and plug solution and automatic system setup. SimNet is the optimum solution for integrating SimNet products and other products with NMEA 2000.

**Group selection or stand-alone:** Main products, e.g. MultiRadar, Chartplotter and Autopilot will automatically select the optimum sources for position, heading, depth, speed etc. for all other SimNet products connected. This means that if two Chartplotters are connected, they will both use position data from the same GPS and heading from the same compass. If you wish to use the built-in GPS, also on the Chartplotter, which automatically was set to operate with an external position, you can change the Group selection from SIMRAD to STAND-ALONE.

**Multi source:** If a main product recognizes e.g. two heading devices it will automatically select a gyro compass before a fluxgate compass, and DGPS before GPS.

**NMEA 0183 input:** If there is no data available from the SimNet bus for e.g. heading, position or depth, the system will automatically look for data via the NMEA 0183 port.

The next pages show examples of interface settings, which are divided into the following groups:

*Call up the menu bar, and...*  
*load interface setup - see display example next page.*
Searching interface channels for valid sources and data. Please wait till the first page appears on the screen which will show the nodes (products) operating on the SimNet bus. See below example:

Move the cursor up/down to select one of the listed products

Press the [+] key to access additional data

Example:
- CA34 MULTI RADAR
- SimNet number=100003, Address: 1
- Device: class = 60, function = 170
- Instance: system = 0, device = 1
- SimNet: Compatible=YES, Ver= 1.000 E
- Ver.: NMEA2000 = 1.004, SW = 02.00
- Product code=FFFF, Unique no=138003

The name MULTI RADAR can be user defined - see the Identification interface (last tab).

Press the [-] key to hide additional data

General information: Go to the next interface by pressing [PLOT] and step back to the previous interface by pressing [GOTO]. Use the cursor key to move around in the display and toggle between available settings and sentences with the +/- keys.

Confirm editing, or...

exit function without making any changes
Group selection can be set to:
**SIMRAD** - auto-selected SimNet units from the Simrad group.
**STAND-ALONE** - manually selected data source and third party units.

**Source:** - depending on which products (sources) are connected, the legend will indicate: ‘none available’, ‘one available’, ‘multiple available’ or ‘owned, data type locked’.

*Go to Position interface* - step back with [GOTO]

Position mode:

**INTERNAL** - the applied position is compiled by the in-built GPS receiver.

**EXTERNAL** - the applied position is compiled by an external unit.

**DEAD RECKONING** - will allow the system to function as a Navigation simulator, which can be used for demonstration purpose or for practicing ‘live’ navigation in ‘off season’. If you wish to change the preset speed (10 kn), refer to description next page. Navigation to cursor or waypoint, in route or in track is started as described in
chapter 6. 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’.

**External DGPS mode** - set to ON (XX34), NMEA1 or NMEA2 (XX44/54) will enable reception of DGPS data from external receiver. The input port will switch from NMEA0183 to RTCM104 standard, but the output will continue transmitting NMEA0183 data.

**Datum:000-World Geodetic System 1984** - the internal datum is applied if the datum line is light grey. If you wish to apply the datum received from external unit and as such need to change the type, the position mode must be EXTERNAL. Enter a new datum by means of the numeric keys or the +/- keys. Refer to list of datums in Appendix B.

**Dead reckoning speed** - is preset to 010.0 knots, but can be increased or decreased when DEAD RECKONING is selected as position mode. Enter a new speed by means of the numeric keys or the +/- keys.

**NMEA0183 output** - see also section 9.6.1 Description of sentences.

*Go to Navigation interface* - step back with [GOTO]

---

**Input:** INTERNAL ONLY - indicates that no external source can be selected for navigation.

**NMEA0183 output** - see also section 9.6.1 Description of sentences.
Go to Water interface - step back with [GOTO]

**Input:** INTERNAL ONLY - indicates that no external source can be selected for depth.

**Water temperature offset** - a figure can be keyed in to compensate for differences in temperature sensor.

**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:

\[
\frac{19000 \times \text{indicated speed (e.g. 4kn)}}{\text{actual speed (GPS) (e.g. 5kn)}} = 15.200 \text{ pulses/nm}
\]

**NMEA0183 output** - see also section 9.6.1 Description of sentences.
**Go to Compass interface** - step back with [GOTO]

**Source** - indicates that there is one source available: Simrad RC35.

**Use COG as internal heading** - if no compass is connected, you can use the course (COG) from the built-in GPS module by changing NO to YES.

When using the GPS course as replacement for heading input, the accuracy will be reduced in relation to speed, wind and current.

**Go to Wind interface** - step back with [GOTO]

**Source** - will indicate how many units are connected and available.
Go to Waypoint interface - step back with [GOTO]

Waypoint location input:
Source (none available):
NONE

Target Lat/Lon input:
Source (none available):
NONE

NMEA0183 output:
Waypoint location: WPL OFF
Routes: RNN OFF
Routes: RTE OFF

Source - will indicate how many units are connected and available.

NMEA0183 output - see also section 9.6.1 Description of sentences.

Go to Alarm interface - step back with [GOTO]

Alarm:
Output (REMOTE pin 2,5): ON
Alarm stand-by level: LOW

MOB-input:
(REMOTE pin 1,5)
Long press (5 sec.): EXTERNAL MOB
Short press: OFF

Stand-by level can either be: LOW = 0 volt or HIGH = 5 volt.
Chapter 9-20 CA34/44/54 Setup menu

Example: CA44/54

<table>
<thead>
<tr>
<th>Alarm:</th>
<th>Output (pin 1,2):</th>
<th>ON</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Alarm stand-by level:</td>
<td>LOW</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Pos-status:</th>
<th>Output (pin 4,6):</th>
<th>ON</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pos-status stand-by level:</td>
<td>HIGH</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Log:</th>
<th>Output (pin 5,6):</th>
<th>ON</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>MOB-input:</th>
<th>(pin 3,6)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Long press (5 sec.):</td>
<td>EXTERNAL MOB</td>
</tr>
<tr>
<td>Short press:</td>
<td>OFF</td>
</tr>
</tbody>
</table>

MOB-input

- Press the external switch for more than 5 seconds to activate the MOB function (fixed setting), and press the [ENT] key to start MOB navigation.

- Short press on the external switch (less than 5 seconds) will shift page or plot ship’s position. Use the +/- keys to toggle between OFF, SHIFT PAGE and PLOT SHIP’s POS:

  SHIFT PAGE - short press on the external switch will shift to next page stored under the PAGE key.

  PLOT SHIP’s POS - short press on the external switch will plot and save the actual position, which will be registered in the WP list.
Go to SimNet diagnostic interface - step back with [GOTO]

SimNet error frame counter - if the figure is not 0 it could be due to a number of things and not necessarily that there is a system error. However, if the counter is active and the number is rapidly increasing, then the system has detected a fault.

For instance, if the SimNet cable is pulled, the counter will be activated and once the cable is back in place, the counter will stop, but will stay at the figure it has reached. So therefore, a figure other than 0 does not necessarily mean that something is wrong, only if the figure continues to increase.

Prior to call for technical assistance:
1. Check connected cabling.
2. Check supply voltage to be between 10.8-15 VDC to the SimNet system.
3. Systematically disconnect one unit at a time to see which one is causing the problem. Start at the opposite end of the 12V power supply.

The three last lines in the SimNet diagnostic interface are for technicians only.
Go to the next interface - step back with [GOTO]

The interfaces: SimNet input, SimNet output, NMEA0183 input and NMEA0183 output are for technicians only.

Go to the next and last interface: Identification
- step back with [GOTO]

Unit description - can be customized to read e.g. MAIN UNIT or BACK-UP UNIT. Maximum number of characters is 16.

The identification name can be seen in the Nodes interface - refer to the beginning of this section.

Confirm editing, or...

effect function without making any changes
9.6.1 Description of sentences

Description of NMEA0183 version 3.0 output sentences

- APB  Autopilot sentence ‘B’.
- BWC  Bearing and distance to waypoint (Great circle).
- BWR  Bearing and distance to waypoint (Rhumbline).
- DBK  Depth below keel.
- DBS  Depth below surface.
- DBT  Depth below transducer.
- DPT  Depth, including offset.
- GGA  Global Positioning System fix data.
- GLL  Geographic position, latitude/longitude.
- GL2  Geographic position, with 2 decimals.
- GNS  Satellite Fault Detection.
- MTW  Water temperature.
- RMB  Recommended minimum navigation information.
- RMC  Recommended minimum specific GPS data.
- RNN  Routes.
- RTE  Routes, ONC ON Complete route, or...
    ONW ON Working route.
- VHW  Water speed and heading.
- VTG  Course over ground and ground speed.
- WPL  Waypoint location.
- XTE  Cross-Track-Error, measured.
- ZTG  UTC & time to destination waypoint.
- ZDA  Time and date.

Description of NMEA0183 instrument input

- HDG  Heading, Deviation and Variation.
- HDM  Heading, Magnetic.
- HDT  Heading, True.
- MTW  Water temperature.
- MWV  Wind speed and angle.
- TLL  Target data (will only be updated every 5 seconds).
- VHW  Water speed and heading.
- VWR  Relative wind speed and angle.
- VWT  True wind speed and angle.
- WPL  Waypoint data (will only be updated every 5 seconds).
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.
9.7 Palette setup

Quick change of preset color palettes via the [PWR] key.

Call up the menu bar, and...
load the Palette setup

Palette 1 to 4 are preset to 1: Bright (sunshine), 2: Day (normal daylight), 3: Dusk and 4: Night settings. These four setups are not adjustable. Palette 9: Multi is preset with multi color radar targets. Palette 5 to 8 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:

Select Palette setup: 5

Use cursor to scroll up/down in display
9.8 Factory settings

**DELETE MEMORY:** It will be 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 or disc - refer to section 8.9.

**FACTORY PRESETS:** If the unit is still ‘alive’ but has ceased to respond to normal operation, it could become necessary to return to the factory presets - but first check ‘Troubleshooting’ in section 10.1.

Call up the menu bar, and...

*activate the display for Factory settings*

<table>
<thead>
<tr>
<th>DELETE MEMORY:</th>
<th>FACTORY PRESETS:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Delete all WAYPOINTS</td>
<td>6 Return to SimNet/NMEA presets</td>
</tr>
<tr>
<td>2 Delete all ROUTES</td>
<td>7 Return to CHART presets</td>
</tr>
<tr>
<td>3 Delete all LINES</td>
<td>8 Return to RADAR presets</td>
</tr>
<tr>
<td>4 Delete all TRACKS</td>
<td>9 Return to SOUNDER presets</td>
</tr>
<tr>
<td>5 Delete all TARGETS</td>
<td>CLR Return to all factory presets</td>
</tr>
<tr>
<td>Used memory:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>0%</td>
</tr>
</tbody>
</table>

Show test display

Exit
To activate any of the functions, please follow the instructions in the display. However, any attempt to make any type of change, will first of all generate a WARNING display to inform you that you are about to erase some or all data/settings.

**ENT** If you are absolutely sure, *press [ENT] to complete the job*

**MENU** If not absolutely sure, *press [MENU] to exit function without having made any changes*

Activating ‘Return to all factory presets’ will erase all user-made settings including waypoints, routes, tracks etc. and restore the basic settings from the factory. The unit will restart with ‘Automatic input source setup’ as described in section 2.7 Initial start-up.

Activating ‘Return to SimNet/NMEA presets’ will give two choices:

Press [1]   Product SimNet reset  
            Reset this unit only

Will bring this unit only back to factory defaults of the Interface setup. The unit will restart with ‘Automatic input source setup’ as described in section 2.7 Initial start-up.

            Reset entire Simrad group on the network

Will bring this unit together with all connected units (which are not turned off at the moment) back to factory defaults of the Interface setup. The units will restart with ‘Automatic input source setup’ as described in section 2.7 Initial start-up.

**Show test display**
Information in this display is for technicians only.

**POWER OFF - RESET**
In case, for some reason, the unit is totally locked i.e. no immediate response from the keypad, then first try to reset the unit by disconnecting the power supply. Reconnect the power cable and then start up the unit again by pressing and holding the [PWR] key until a picture appears on the screen.
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.

### 9.9 QuickGuide

A description of the key functions and general guidance* is available in a QuickGuide, which can be accessed either at start-up display - press [PAGE], or via the menu:

- **MENU**  
  *Call up the menu bar, and...*
  *activate the QuickGuide*

- **PAGE**  
  *Leaf through the information/help text in the PAGE system, General, RADAR, CHART, ECHO, PILOT, Owner’s setup, and Connectors*

- **MENU**  
  *Exit QuickGuide*

* Some of the information will refer to several models in the XX34/44/54 series.
## 10.1 Troubleshooting

For all fault finding, first check that the supply voltage is between 10-32 VDC.

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Check</th>
<th>Remedy</th>
</tr>
</thead>
<tbody>
<tr>
<td>No picture on display screen</td>
<td>Check that the unit is turned on</td>
<td>Press the [PWR] key on keypad</td>
</tr>
<tr>
<td></td>
<td>Check fuse in power cable fuse holder</td>
<td>Replace fuse. Use only type T6.3A slow (5x20 mm)</td>
</tr>
<tr>
<td>Picture appears on the display screen, but</td>
<td>Press [PWR], adjust light and press [ENT]</td>
<td></td>
</tr>
<tr>
<td>image is too dark or too bright</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No normal picture or key operation</td>
<td>Turn unit off and on again</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Disconnect power and connect power again</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Check via [MENU], [7], [CHART] if C-MAP chart is defective</td>
<td>Remove C-MAP chart if defective</td>
</tr>
<tr>
<td>No GPS position update</td>
<td>Check that position mode is INTERNAL, refer to interface setup in [MENU],[7],[2], Position</td>
<td>Return to factory presets, see section 9.8</td>
</tr>
<tr>
<td>Screen update is extremely slow</td>
<td>Check that the stored Tracks and Routes (not currently in use) are not all drawn up on the chart</td>
<td>Turn off ‘Course line’ for each stored route in sec.8.2, and turn off ‘Display track’ in sec.8.6</td>
</tr>
<tr>
<td>Echo picture appears normal, but no target are shown or only random “noise” is seen</td>
<td>Check that the correct transducer frequency is selected</td>
<td>Change frequency from Echo quick menu, press [ENT], [1] - see section 5.5.</td>
</tr>
<tr>
<td></td>
<td>Check that the transducer connectors are securely mated with the unit</td>
<td>Correctly mate the connectors to the unit</td>
</tr>
<tr>
<td></td>
<td>Check that the receiver gain is set high enough</td>
<td>Increase the receiver gain in 5.7 Presentation setup</td>
</tr>
<tr>
<td></td>
<td>Check that the range is correct for the water depth</td>
<td>Adjust the range in 5.7 Presentation setup</td>
</tr>
</tbody>
</table>


<table>
<thead>
<tr>
<th>Symptom</th>
<th>Check</th>
<th>Remedy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Excessive noise in echo picture</td>
<td>Check for correct grounding</td>
<td>Connected equipment must be properly grounded to the main unit</td>
</tr>
<tr>
<td>Echo image on radar display differs from actual image</td>
<td>Check if ship’s heading is incorrect</td>
<td>Set ship’s heading correctly - see section 9.1</td>
</tr>
<tr>
<td>Echo images on radar display are blurred</td>
<td>Check Gain, Sea and Rain settings</td>
<td>Make adjustments - see section 3.2.5</td>
</tr>
<tr>
<td>Too much noise in radar display</td>
<td>Check if tuning is incorrect</td>
<td>Adjust TUNE - see section 3.2.5</td>
</tr>
<tr>
<td>Alarm activated in radar function</td>
<td>Check Alarms in section 3.2.10</td>
<td></td>
</tr>
<tr>
<td>All data is deleted after turning off the unit and turning it back on</td>
<td>Check battery lifetime. Expected lifetime is min. 5 years</td>
<td>Internal battery must be replaced by authorized dealer</td>
</tr>
</tbody>
</table>
10.2 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, alcohol, gasoline or oils.

Electrical connections – periodically check the electrical connections. Make sure that connections are tight and that no cables are frayed or worn.

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.

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.

10.3 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 Troubleshooting in section 10.1.

Spare parts – fuses may be bought from a chandler or a marine supply store. Use only fuses specified for this unit – see 10.4 Specifications. If you require a SIMRAD part, please contact your authorized dealer.
10.4 Specifications

**General data**

- **Power supply:** 12 and 24 V DC (10-32 V DC max) 20 - 70 watts  
  + Radar supply box to run radar antenna - see below.
- **Power cable:** With fuse T6.3A, 4 pin connector, 2 m (153-5000-006)
- **Dimensions:** CA34: H:220 mm (8.7”) L:220 mm (8.7”) D:112 mm (4.5”)
  
  CA44: H:220 mm (8.7”) L:365 mm (14.6”) D:75 mm (3”)
  
  CA54: H:330 mm (13”) L:460 mm (18.1”) D:95 mm (3.7”)
- **Weight:** CA34: 3.2 kg (7 lbs), CA44: 3.7 kg (8.1 lbs), CA54: 6.6 kg (14.5 lbs)
- **Environment:** 0 to +50°C, waterproof USC 46 CFR and IP55
- **Housing:** Casted aluminum back, polycarbonate front
- **Display:** TFT/ATFT color, power backlight, 640x480 pixels
- **Interfaces:** XX34: 1 port in/out NMEA 0183  
  1 port SimNet/NMEA2000
  
  XX44/54: 2 ports in/out NMEA 0183 (incl. SimNet/ 
  NMEA2000 via AT44 Active Tee)
  
  PC up/download WPL and RTE
- **- alarm:** Alarm relay (contact closure), (CA44/54)
  
  Signal output 5 V 50 mA (CA34)
- **- log out:** 200 pulses/nm (5 Volt pulses), (CA44/54)
- **Main fuse:** T6.3A slow (5x20 mm)

**SimNet control**

- Maximum number of products connected in a network:..............50 units
- Maximum cable length (excl. 30 m wind transducer cable):......120 m (400’)
- Bit rate of the bus:.................................................................250 kbit/second
- Maximum DC current through a single SimNet plug:...............5A
- SimNet power supply:............................................................10.8 - 15 VDC
- Maximum drop cable length:...................................................6 m (20’)
- Maximum total length of all drop cables .................................60 m (200’)
- Environmental protection: Cable and plug/connector system:..........IP66
- Temperature:........................................................................max. 70°C (158°F)

**Radar supply box RS4050 to run radar antennas RB714/5/6A**

- **Addendum:** 183-0700-003
- **Dimensions:** H:125mm, L:222mm, D:81mm
- **Power supply:** 12 and 24 V DC (10-32 V DC max)
- **Fuses:** Radar supply fuse 4A F  
  Main fuse 6A.3F  
  High voltage fuse 160 mAF  
  Radar motor fuse 6A.3F
Radar supply box RS4052 to run radar antennas RB717/8A
Addendum: 183-0700-004
Dimensions: H:161.9mm, L:263mm, D:91mm
Power supply: 24 V DC (18-32 V DC max)
Fuses: Radar supply fuse 10 AT
        Main fuse 6A.3F
        High voltage fuse 200 mAF
        Radar motor fuse 3.16AT

GPS section
Receiver type: 14 channel parallel, C/A code, 8 state Kalman filter
Accuracy:
        Position (DGPS): 2-5 m RMS
        Position (SDGPS): 3-7 m RMS
        Position (GPS): 8 m RMS
        Speed: 0.1 kn
        Course: 1°
Speed filter: 10 settings
Update rate: 1 second interval, typical
Dynamics:
        Velocity: 600 km/h
        Acceleration: 10 m / s²

GPS antenna RS5640
Type: Quadrifilar Helix
Dimensions: L:230 mm
        D:38 mm
Weight: 150 g (0.33 lbs)
Environment: -35°C to +75°C, 95% rel.
Mounting: 1” 14 thread (standard US)
Cable: 10 m RG58 (standard), 15 m RG223 (option), max. 30 m RG213

DGPS antenna MGL-3
Type: Patch and H-field
Dimensions: H:75 mm
        D:127 mm
Weight: 600 g (1.3 lbs)

Chartplotter section
Chart system: C-MAP NT+
Presentation: Dual chart - two charts in individual scales and detail levels
Internal memory: Dynamic storage with combinations of/or totals up to:
        35,000 marks/waypoints,
        10,000 waypoints w/name (25 characters),
        50,000 trackpoints,
        50,000 line sections,
        1,000 routes.
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 radome antennas

<table>
<thead>
<tr>
<th>Radomé antennas</th>
<th>RB714A</th>
<th>RB715A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Radome:</td>
<td>45cm</td>
<td>65cm</td>
</tr>
<tr>
<td>Scanner:</td>
<td>2kW</td>
<td>4kW</td>
</tr>
<tr>
<td>Range:</td>
<td>to 24nm</td>
<td>to 36nm</td>
</tr>
<tr>
<td>Rotation speed:</td>
<td>24rpm</td>
<td>24 or 48rpm</td>
</tr>
<tr>
<td>Beamwidth:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Horizontal</td>
<td>5.9°</td>
<td>3.9°</td>
</tr>
<tr>
<td>Vertical</td>
<td>25°</td>
<td>25°</td>
</tr>
<tr>
<td>Cables:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10m</td>
<td>153.3002.012</td>
<td>153.3002.015</td>
</tr>
<tr>
<td>15m</td>
<td>153.3002.013</td>
<td>153.3002.016</td>
</tr>
<tr>
<td>20m</td>
<td>153.3002.014</td>
<td>153.3002.017</td>
</tr>
<tr>
<td>30m</td>
<td>153.3002.314</td>
<td>153.3002.317</td>
</tr>
<tr>
<td>40m</td>
<td>153.3002.414</td>
<td>153.3002.417</td>
</tr>
</tbody>
</table>

### Radar open antennas

<table>
<thead>
<tr>
<th>Open array</th>
<th>RB716A</th>
<th>RB717A</th>
<th>RB718A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Open array:</td>
<td>3 or 4 ft</td>
<td>4 or 6 ft</td>
<td>4 or 6 ft</td>
</tr>
<tr>
<td>Scanner:</td>
<td>4kW</td>
<td>6kW</td>
<td>12kW</td>
</tr>
<tr>
<td>Range:</td>
<td>to 48nm</td>
<td>to 72nm</td>
<td>to 96nm</td>
</tr>
<tr>
<td>Rotation speed:</td>
<td>24 or 48 (24V) rpm</td>
<td>24 or 48 (24V) rpm</td>
<td>24 or 48 (24V) rpm</td>
</tr>
<tr>
<td>Beamwidth:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Horizontal</td>
<td>2.5°, 1.8°</td>
<td>1.8°, 1.2°</td>
<td>1.8°, 1.2°</td>
</tr>
<tr>
<td>Vertical</td>
<td>22°</td>
<td>22°</td>
<td>22°</td>
</tr>
<tr>
<td>Cables:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10m</td>
<td>153.3002.008</td>
<td>153.3002.008</td>
<td>153.3002.008</td>
</tr>
<tr>
<td>15m</td>
<td>153.3002.009</td>
<td>153.3002.009</td>
<td>153.3002.009</td>
</tr>
<tr>
<td>20m</td>
<td>153.3002.010</td>
<td>153.3002.010</td>
<td>153.3002.010</td>
</tr>
<tr>
<td>30m</td>
<td>153.3002.030</td>
<td>153.3002.030</td>
<td>153.3002.310</td>
</tr>
<tr>
<td>40m</td>
<td>153.3002.040</td>
<td>153.3002.040</td>
<td>153.3002.410</td>
</tr>
</tbody>
</table>
Echosounder section (CA34)
Frequencies: 50 and 200 kHz, selectable
Output power: Variable up to 600W RMS (4,800 W PP)
Impedance: 175 / 425 ohms
Display ranges: 5 to 1000 m in 21 steps, manual and auto mode
Detection ranges:

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Beam</th>
<th>Fish</th>
<th>Bottom</th>
</tr>
</thead>
<tbody>
<tr>
<td>50 kHz</td>
<td>45°</td>
<td>800 m</td>
<td>2,400 ft</td>
</tr>
<tr>
<td>200 kHz</td>
<td>15°</td>
<td>350 m</td>
<td>1,050 ft</td>
</tr>
</tbody>
</table>

Pulse length: Short, medium, long and auto
Transmission rate: 10 pings per second
Alarms: Fish, max. and min. depth
Zoom mode: Shift, bottom and VRM expansion, 1 to 50 meters, feet or fathoms
Event marker: At current ping and depth memory
Picture speed: True distance or time, high, medium, low, and freeze
Noise filter: User selectable on/off
Echo presentation: A-scope and white line discrimination
Temperature: Sensor or NMEA
Speed: Sensor or NMEA

Echosounder section (CA44/54)
Frequencies: 38, 50 and 200 kHz, selectable
Output power: Variable up to 1kW RMS per channel
Impedance: 75 ohms
Display ranges: 3 to 3000 m in 21 steps, manual and auto mode
Detection ranges:

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Beam</th>
<th>Fish*</th>
<th>Bottom*</th>
</tr>
</thead>
<tbody>
<tr>
<td>38 kHz</td>
<td>13x21°</td>
<td>410m</td>
<td>1800 m</td>
</tr>
<tr>
<td>50 kHz</td>
<td>10x16°</td>
<td>430m</td>
<td>1500 m</td>
</tr>
<tr>
<td>200 kHz</td>
<td>7°</td>
<td>280m</td>
<td>400 m</td>
</tr>
</tbody>
</table>

*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
Transmission rate: 10 pings per second
Alarms: Fish, max. and min. depth
Zoom mode: Shift, bottom and VRM expansion, 3 to 50 meters, feet or fathoms
Event marker: At current ping and depth memory
Picture speed: True distance or time, high, medium, low, and freeze
Noise filter: User selectable on/off
Echo presentation: A-scope and white line discrimination
Temperature: Sensor or NMEA
Speed: Sensor or NMEA

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 thru hull transducer, depth, speed and temperature, 45° and 15° beam.
P66: 600W plastic transom mount transducer, depth, speed and temperature, 45° and 15° beam.
P319: 600W plastic thru-hull transducer, 45° and 15° beam.
ST650: Speed and temperature only.

Dual frequency transducers (CA44/54)
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.
Simrad W38/200, 300W wide beam high performance combi transducer 38 and 200kHz, 32° beams.
Airmar B260-22, 1kW combi transducer 50 and 200kHz, 19° and 6° beams.

Cables included
Power cable, 2 m, 4-pin female connector, incl. fuse (153-5000-006)
NMEA cable, 1.5 m, 9-pin female connector (153-3002-005)
Antenna cable, 10 m RG58

Accessories included for CA44/54
AT44 Active Tee with connector for SimNet control (153-5555-449)

SimNet cables and accessories (not included)
SimNet cable 0.3 m (1’), (24005829)
SimNet cable 2 m (6.6’), (24005837)
SimNet cable 5 m (16.6’), (24005845)
SimNet cable 10 m (33’), (24005852)
SimNet cable Tee Joiner (24005860)
SimNet cable gland (24005878)
SimNet protection plug (24005886)
SimNet termination plug (24005894)
2 m (6.6’) SimNet power incl. termination (24005902)
2 m (6.6’) SimNet power excl. termination (24005910)
AT10 Universal NMEA0183 converter (24005936)
SimNet cable protection cap (24005928)
SimNet/NMEA2000 adapter cable

Options for CA34/44/54
Simrad DataCards
C-MAP NT+ electronic charts
6-channel NMEA Buffer RS5345
PC data cable, 1.5 m (153-3002-024)
Universal connection cable for echo transducer, 2 m (153-3004-002)
Antenna cable 15 m RG223

DS34 Dual Station*, 7” TFT LCD color screen
DS44 Dual Station*, 10” TFT/ATFT LCD color screen
DS54 Dual Station*, 15” TFT LCD color screen
*) incl. 15 m cable (153-3002-023) - max. length 25 m.
Extension cable for dual station, 10 m (153-6080-004)

Options only for CA34
Alarm/NMEA cable, 2 m (153-6080-001)

Options only for CA44
TiltFrame, 10” (700-5000-042)

Options only for CA44/54
NMEA1 cable, 1.5 m, 9-pin male connector (153-3002-004)
TL50 TurboLoader, external disc drive and NMEA interface
Sunhood, 10” (140-6515) or 15” (140-6752)
General

**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. CAXX has a built-in basic almanac.

**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.), Menu language, Scroll speed, etc.

**dGPS** – differential data is received from satellites via built-in DGPS module or an external DGPS Receiver.

**ETA** - Estimated Time of Arrival - at a specific waypoint if keeping a steady speed.

**Great circle** – the shortest distance between two points on the globe.

**Heading** – the direction of which the vessel is pointing (from ext.compass).

**Measurement units** – the user may select the displayed units to be one of the following:

- m meters
- ft feet, 1 foot is 0.3048 meter
- fm fathoms, 1 fathom is 1.83 meters
- nm nautical mile, 1 nm is 1852 meters
- kn knots, nautical mile per hour
- km kilometer, 1 km is 1000 meters
- kh kilometer per hour
- mi statute mile, 1 mile is 1609 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.
Appendix A-2 CA34/44/54 Glossary of terms

**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 interface setup: Press [MENU], [7], [2], [PLOT]; under index tab ‘Position’ use the cursor to go to ‘Position mode’ and use the +/- keys to toggle to ‘Dead Reckoning’; then go to ‘Dead reckoning speed’ if you wish to change the current speed by entering a new figure; press [ENT] to confirm.

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).

**Position update** - if, for some reason, there is no position update from GPS or external sensor, the displayed position will start to flash and an alarm will be activated to alert the operator. ‘Position missing’ alarm can be set ON/OFF - see section 7.5. Reset the alarm by [CLR]. The displayed position will stop flashing once normal position update is resumed.

**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.

**SDGPS** - Satellite Differential Global Positioning System - will provide position corrections from received satellite signals (WAAS, EGNOS, and MSAS).

**Speed** – Speed Over Ground, indicated in knots, kilometers, or miles.

**Starboard** side – right (green).

**TFT** – Thin-Film Transistor (Active matrix) display.

**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.

**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.

**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, where black is especially useful during nighttime operation when the white background could appear too bright.

**Echosounder frequency** 38 (CA44/54), 50 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. 38/50 kHz is for searching in a wider area, determining bottom conditions and going the deepest.

**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 applied 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).

**Radar section:**

**Cursor function** – The cursor appears on the display as a small ⬈️ symbol. 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.

When heading and valid position data is available, the chart cursor will be synchronized to the radar cursor, and thus be controlled by the radar cursor in the Radar & Chart display.

**HU – Head-Up** The heading line always appears on the display at 0 degrees as the antenna beam passes the bow of the vessel. Targets appearing on the display are relative to your own ship’s position and heading.

**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. To operate in North-Up mode will require valid heading from connected compass.

**Off-Center mode** - lets you position the origin of 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 longer view in the direction of interest.

**Overlay** - live radar images shown in a separate layer directly on the chart gives you full control in difficult situations. To activate the overlay will require the following conditions: Valid position, valid heading information, and Radar orientation mode must be in NU RM (North Up, Relative Motion) or NU TM (North up, True Motion).

Short press on the [RADAR] key will toggle overlay on/off.

In HU RM (Head Up, Relative Motion) mode and in the Radar & Chart display, the overlay is disabled.

**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.

**Relative motion** Land, buoys and fixed objects move past own ship.

**True motion** – land, buoys and fixed objects remain stationary on the screen while moving targets and own ship track across screen.
Select the appropriate datum by inserting the number prefix:

Press [MENU], [4], [2], [ADJ], and key in the desired number by means of the numerical keys or the +/- keys, confirm entry by [ENT].

<table>
<thead>
<tr>
<th>Number</th>
<th>Datum Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>000</td>
<td>World Geodetic System 1984</td>
</tr>
<tr>
<td>001</td>
<td>World Geodetic System 1984</td>
</tr>
<tr>
<td>002</td>
<td>European 1950</td>
</tr>
<tr>
<td>003</td>
<td>European 1979</td>
</tr>
<tr>
<td>004</td>
<td>North American 1927</td>
</tr>
<tr>
<td>005</td>
<td>North American 1983</td>
</tr>
<tr>
<td>006</td>
<td>Geodetic Datum 1983</td>
</tr>
<tr>
<td>007</td>
<td>Ordnance Survey of GB 1936</td>
</tr>
<tr>
<td>008</td>
<td>South American 1969</td>
</tr>
<tr>
<td>009</td>
<td>Adindan</td>
</tr>
<tr>
<td>010</td>
<td>Afgooye</td>
</tr>
<tr>
<td>011</td>
<td>Ain el Abd 1970</td>
</tr>
<tr>
<td>012</td>
<td>Anna 1 Astro 1965</td>
</tr>
<tr>
<td>013</td>
<td>Arc 1950</td>
</tr>
<tr>
<td>014</td>
<td>Arc 1960</td>
</tr>
<tr>
<td>015</td>
<td>Ascension Island 1958</td>
</tr>
<tr>
<td>016</td>
<td>Astro Beacon E</td>
</tr>
<tr>
<td>017</td>
<td>Astro B4 Sorol Atoll</td>
</tr>
<tr>
<td>018</td>
<td>Astro Dos 71/4</td>
</tr>
<tr>
<td>019</td>
<td>Astronomic Station 1952</td>
</tr>
<tr>
<td>020</td>
<td>Australian Geodetic 1966</td>
</tr>
<tr>
<td>021</td>
<td>Australian Geodetic 1984</td>
</tr>
<tr>
<td>022</td>
<td>Bellevue (IGN)</td>
</tr>
<tr>
<td>023</td>
<td>Bermuda 1957</td>
</tr>
<tr>
<td>024</td>
<td>Bogota Observatory</td>
</tr>
<tr>
<td>025</td>
<td>Campo Inchauspe</td>
</tr>
<tr>
<td>026</td>
<td>Canton Astro 1966</td>
</tr>
<tr>
<td>027</td>
<td>Cape</td>
</tr>
<tr>
<td>028</td>
<td>Cape Canaveral</td>
</tr>
<tr>
<td>029</td>
<td>Carthage</td>
</tr>
<tr>
<td>030</td>
<td>Chatham 1971</td>
</tr>
<tr>
<td>031</td>
<td>Chua Astro</td>
</tr>
<tr>
<td>032</td>
<td>Corrego Allegre</td>
</tr>
<tr>
<td>033</td>
<td>Djakarta</td>
</tr>
<tr>
<td>034</td>
<td>DOS 1968</td>
</tr>
<tr>
<td>035</td>
<td>Easter Island 1967</td>
</tr>
<tr>
<td>036</td>
<td>Gandajika Base</td>
</tr>
<tr>
<td>037</td>
<td>Guam 1963</td>
</tr>
<tr>
<td>038</td>
<td>GUX 1 Astro</td>
</tr>
<tr>
<td>039</td>
<td>Hjorsey 1955</td>
</tr>
<tr>
<td>040</td>
<td>Hong Kong 1963</td>
</tr>
<tr>
<td>041</td>
<td>Indian</td>
</tr>
<tr>
<td>042</td>
<td>Ireland 1965</td>
</tr>
<tr>
<td>043</td>
<td>ISTS 073 Astro 1969</td>
</tr>
<tr>
<td>044</td>
<td>Johnston Island 1961</td>
</tr>
<tr>
<td>045</td>
<td>Kandawala</td>
</tr>
<tr>
<td>046</td>
<td>Kerguelen Island</td>
</tr>
<tr>
<td>047</td>
<td>Kertau 1948</td>
</tr>
<tr>
<td>048</td>
<td>L.C. 5 Astro</td>
</tr>
<tr>
<td>049</td>
<td>Liberia 1964</td>
</tr>
<tr>
<td>050</td>
<td>Luzon</td>
</tr>
<tr>
<td>051</td>
<td>Mahe 1971</td>
</tr>
<tr>
<td>052</td>
<td>Marco Astro</td>
</tr>
<tr>
<td>053</td>
<td>Massawa</td>
</tr>
<tr>
<td>054</td>
<td>Merchic</td>
</tr>
<tr>
<td>055</td>
<td>Mercury 1960</td>
</tr>
<tr>
<td>056</td>
<td>Midway Astro 1961</td>
</tr>
<tr>
<td>057</td>
<td>Minna</td>
</tr>
<tr>
<td>058</td>
<td>Modified Mercury 1968</td>
</tr>
<tr>
<td>059</td>
<td>Nahrwan</td>
</tr>
<tr>
<td>060</td>
<td>Nanking 1960</td>
</tr>
<tr>
<td>061</td>
<td>Naparima, BW1</td>
</tr>
<tr>
<td>062</td>
<td>Observatorio 1966</td>
</tr>
<tr>
<td>063</td>
<td>Old Egyptian</td>
</tr>
<tr>
<td>064</td>
<td>Old Hawaiian</td>
</tr>
<tr>
<td>065</td>
<td>Oman</td>
</tr>
<tr>
<td>066</td>
<td>Pico de las Nieves</td>
</tr>
<tr>
<td>067</td>
<td>Pitcairn Astro 1967</td>
</tr>
<tr>
<td>068</td>
<td>Prov. South Chilean 1963</td>
</tr>
<tr>
<td>069</td>
<td>Prov. South American 1956</td>
</tr>
<tr>
<td>070</td>
<td>Puerto Rico</td>
</tr>
<tr>
<td>071</td>
<td>Qatar National</td>
</tr>
<tr>
<td>072</td>
<td>Qornoq</td>
</tr>
<tr>
<td>073</td>
<td>Reunion</td>
</tr>
<tr>
<td>074</td>
<td>Rome 1940</td>
</tr>
<tr>
<td>075</td>
<td>Santo (DOS)</td>
</tr>
<tr>
<td>076</td>
<td>Sao Bras</td>
</tr>
<tr>
<td>077</td>
<td>Sapper Hill 1943</td>
</tr>
<tr>
<td>078</td>
<td>Schwarzeck</td>
</tr>
<tr>
<td>079</td>
<td>South Asia</td>
</tr>
<tr>
<td>080</td>
<td>Southeast Base</td>
</tr>
</tbody>
</table>
Appendix B-2

CA34/44/54 List of datum

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
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.)
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:

<table>
<thead>
<tr>
<th>Scale: 1:20000</th>
<th>Actual chart scale</th>
</tr>
</thead>
<tbody>
<tr>
<td>No user data at cursor position</td>
<td></td>
</tr>
</tbody>
</table>

| 1 | Edit user data | Inactive function |
| 2 | Chart info | See details below |
| 3 | Find nearest port services | See details below |
| 4 | Bearing and dist from A to B | See sec. 4.4.2 |
| 5 | Lock cursors | See sec. 4.4.2 |
| 0 | Cursor to center | See sec. 4.4.2 |
| 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.

More details next page.
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

With cursor placed on the chart, the service information will be provided in relation to the cursor position. With the chart cursor turned off (press [CLR], the service information will be provided in relation to the ship’s position:

Press [ENT] from the chart display to call up the Info window

Find nearest port services will call up a list of symbols with relevant information on each symbol. The details in the right column will indicate the distance from the ship to the selected service. The services with the shortest distance are listed first.

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.
The facility information will stay on the screen for about 10 seconds.

With the cursor left on the Port/Marina symbol, press [ENT], and [2] to call up the details on the facilities at this location.

Use the cursor key to scroll up/down in the objects in the left column, and look in the right column for details on the objects.

The objects next to symbols have additional information for which you can Open/Clo by the [ENT] key.

Exit Chart info
**Tide information**

**Press [ENT] from the chart display to call up the Info window**

**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**

**Press [ENT] to go to the tide symbol on the location**

**Press [ENT] to go to the tide symbol on the location**

**With the cursor placed on the tide symbol, press [ENT] to call up the INFO window**

**Press [2] to access chart info**

**Press [MENU] when you are ready to exit Tide height**

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 (right side) to go to the present month. Toggle to a different month with the +/- keys.
Year

Use the cursor (right side) to go to the year. Toggle to a different year with the +/- keys.

The last four lines in the tide display will inform of **Begin** and **End Twilight**, **Sunrise** and **Sunset** for the selected date.

### Example of Tide height information:

**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 a coastal line, 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 4.5 Chart setup.

The following functions are used to enable/disable visualization of the categories listed below:

### LAND SETTINGS

<table>
<thead>
<tr>
<th>Natural features:</th>
<th>Cultural features:</th>
<th>Landmarks:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Land area and coastline</td>
<td>Airport area</td>
<td>Building, religious / single</td>
</tr>
<tr>
<td>Hill, dune area</td>
<td>Built-up area</td>
<td>Cemetery</td>
</tr>
<tr>
<td>Land contour lines</td>
<td>Railway</td>
<td>Fortified structure</td>
</tr>
<tr>
<td>Salt pan</td>
<td>Road in general</td>
<td>Siloway route part</td>
</tr>
<tr>
<td>Slope topline</td>
<td>Overhead cable, w/pylons</td>
<td>Tank, chimney</td>
</tr>
<tr>
<td>Tree point</td>
<td>Overhead pipeline</td>
<td>Dish aerial</td>
</tr>
<tr>
<td>Vegetation area</td>
<td>Fence line</td>
<td>Radar dome</td>
</tr>
<tr>
<td>Natural features rivers:</td>
<td>Telephereric</td>
<td>Flagstaff / Flagpole</td>
</tr>
<tr>
<td>Lake, Waterfall</td>
<td>Bridge</td>
<td>Flare stack</td>
</tr>
<tr>
<td>River, Canal</td>
<td>Tunnel, tunnel entrance</td>
<td>Mast, tower</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Monument</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Windmill, windmotor</td>
</tr>
</tbody>
</table>

### MARINE SETTINGS

<table>
<thead>
<tr>
<th>Names:</th>
<th>Nature of seabed:</th>
<th>Signals:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Text</td>
<td>Seabed area, rocky area, coral reef</td>
<td>Anchor point</td>
</tr>
<tr>
<td>Nav-Aids/Light Sectors:</td>
<td>Weed / kelp</td>
<td>Cairn</td>
</tr>
<tr>
<td>Lighthouse, Light float</td>
<td>Sand waves</td>
<td>Chain / Wire</td>
</tr>
<tr>
<td>Lighted offshore platform</td>
<td>Spring in seabed</td>
<td>Fog signal</td>
</tr>
<tr>
<td>Light in general</td>
<td></td>
<td>Radar reflector</td>
</tr>
<tr>
<td>Attention Areas:</td>
<td></td>
<td>Top mark</td>
</tr>
<tr>
<td>- see Caution Areas</td>
<td></td>
<td>Navigational aid, generic</td>
</tr>
<tr>
<td>Tides, currents:</td>
<td></td>
<td>Extended nav.aid, generic</td>
</tr>
<tr>
<td>Tide height (predictions)</td>
<td></td>
<td>Radar station</td>
</tr>
<tr>
<td>Current</td>
<td></td>
<td>Radar transponder beacon</td>
</tr>
<tr>
<td>Water turbulence</td>
<td></td>
<td>Radio station</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ports:</td>
<td>Restaurant</td>
<td>Tracks, routes:</td>
</tr>
<tr>
<td>--------------------------------------------</td>
<td>-----------------------------------------------</td>
<td>-------------------------------------------------</td>
</tr>
<tr>
<td>Berthing facility-up area</td>
<td>Restaurant</td>
<td>Deep water route part</td>
</tr>
<tr>
<td>Causeway</td>
<td>Bank/Exchange office</td>
<td>Deep water route centrel.</td>
</tr>
<tr>
<td>Checkpoint</td>
<td>Pharmacy</td>
<td>Fairway</td>
</tr>
<tr>
<td>Crane</td>
<td>Port/Marina</td>
<td>Ferry route</td>
</tr>
<tr>
<td>Dam</td>
<td>Boat hoist</td>
<td>Navigation line</td>
</tr>
<tr>
<td>Distance mark</td>
<td>Fuel station</td>
<td>Precautionary area</td>
</tr>
<tr>
<td>Dock area</td>
<td>Water</td>
<td>Radar line</td>
</tr>
<tr>
<td>Dry dock</td>
<td>Electricity</td>
<td>Radar range</td>
</tr>
<tr>
<td>Dyke area</td>
<td>Showers</td>
<td>Radio calling</td>
</tr>
<tr>
<td>Dyke crown</td>
<td>Laundrette</td>
<td>Recomm. track</td>
</tr>
<tr>
<td>Floating dock</td>
<td>Public toilets</td>
<td>Recomm. traffic lane part</td>
</tr>
<tr>
<td>Gate</td>
<td>Post box</td>
<td>Traffic separation line</td>
</tr>
<tr>
<td>Harbor facility</td>
<td>Public telephone</td>
<td>Traffic sep. boundary</td>
</tr>
<tr>
<td>Landing place</td>
<td>Refuse bin</td>
<td>Traffic sep. crossing</td>
</tr>
<tr>
<td>Lock basin</td>
<td>Visitor’s berth</td>
<td>Traffic sep. land part</td>
</tr>
<tr>
<td>Oil barrier</td>
<td>Chandelier</td>
<td>Traffic sep. roundabout</td>
</tr>
<tr>
<td>Ramp area</td>
<td>Provisions</td>
<td>Traffic separation zone</td>
</tr>
<tr>
<td>Shoreline construction</td>
<td>Bottle gas</td>
<td>Two-way route part</td>
</tr>
<tr>
<td>Slipway</td>
<td>Car parking</td>
<td></td>
</tr>
<tr>
<td>Weir line</td>
<td>Parking for boat+trailer</td>
<td></td>
</tr>
<tr>
<td>Small craft facility</td>
<td>Caravan site</td>
<td></td>
</tr>
<tr>
<td>Coastguard station</td>
<td>Shopping</td>
<td></td>
</tr>
<tr>
<td>Pilot boarding place</td>
<td>Camping site</td>
<td></td>
</tr>
<tr>
<td>Rescue station</td>
<td>Sewerage pump station</td>
<td></td>
</tr>
<tr>
<td>Signal station, warning</td>
<td>Chalet</td>
<td></td>
</tr>
<tr>
<td>Port area</td>
<td>Provisions</td>
<td></td>
</tr>
<tr>
<td>Harbor master</td>
<td>Bottle gas</td>
<td></td>
</tr>
<tr>
<td>Coast guard</td>
<td>Refuse bin</td>
<td></td>
</tr>
<tr>
<td>Police</td>
<td>Visitor’s berth</td>
<td></td>
</tr>
<tr>
<td>Customs</td>
<td>Chandelier</td>
<td></td>
</tr>
<tr>
<td>Health emergency</td>
<td>Provisions</td>
<td></td>
</tr>
<tr>
<td>Post office</td>
<td>Bottle gas</td>
<td></td>
</tr>
<tr>
<td>Yacht club</td>
<td>Shopping</td>
<td></td>
</tr>
<tr>
<td>Boat yard</td>
<td>Provisions</td>
<td></td>
</tr>
<tr>
<td>Marine electronics</td>
<td>Shopping</td>
<td></td>
</tr>
<tr>
<td>Electric/electronic repairs</td>
<td>Shopping</td>
<td></td>
</tr>
<tr>
<td>Engine repairs</td>
<td>Shopping</td>
<td></td>
</tr>
<tr>
<td>Sailmaker</td>
<td>Shopping</td>
<td></td>
</tr>
<tr>
<td>Fishing/diving gear</td>
<td>Shopping</td>
<td></td>
</tr>
<tr>
<td>Scuba recharge</td>
<td>Shopping</td>
<td></td>
</tr>
<tr>
<td>Hotel/Inn</td>
<td>Shopping</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Attention Areas/ Caution Areas:
- Fishing facility
- Marine farm/culture
- Cable, submarine
- Offshore production area
- Pipeline area
- Anchor berth
- Anchorage area
- Cargo transhipment area

### Contiguous zone
- Continental shelf area
- Custom zone
- Dumping ground
- Exclusive economic zone
- Fishery zone
- Fishing ground
- Free port area
- Harbor area (administr.)
- Incineration area
- Log pond

### Military practice area
- National territorial area
- Restricted area
- Sea-plane landing area
- Spoil ground
- Straight territorial sea baseline
- Submarine transit lane
- Territorial sea area

### DEPTH SETTINGS

#### Soundings:
- Spot sounding

#### Underwater objects:
- Rocks
- Wreck area
- Obstruction
- Submarine cable
- Submarine pipeline
- Cable area, submarine pipeline area

#### Depths:
- Depth contour
- Shallow water blue
- Zero meter contour
<table>
<thead>
<tr>
<th>Term</th>
<th>Page(s)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agents</td>
<td>end of manual</td>
<td>Chart quick menu</td>
</tr>
<tr>
<td>Alarms</td>
<td></td>
<td>- cursor active but not placed on any object or data</td>
</tr>
<tr>
<td>- anchor</td>
<td>6-3</td>
<td>- cursor inactive</td>
</tr>
<tr>
<td>- circle</td>
<td>6-3</td>
<td>- cursor placed on route leg or line section</td>
</tr>
<tr>
<td>- depth</td>
<td>9-7,A-3</td>
<td>- cursor placed on route leg or line section</td>
</tr>
<tr>
<td>- fish</td>
<td>9-7</td>
<td>- cursor placed on route point or linepoint</td>
</tr>
<tr>
<td>- MOB</td>
<td>back of front cover, 8-15</td>
<td>- cursor placed on route point or linepoint</td>
</tr>
<tr>
<td>- position update</td>
<td>7-8</td>
<td>- cursor placed on target or trackpoint</td>
</tr>
<tr>
<td>- radar</td>
<td>3-24</td>
<td>- cursor placed on waypoint</td>
</tr>
<tr>
<td>- speed</td>
<td>9-11</td>
<td>- cursor placed on waypoint</td>
</tr>
<tr>
<td>- XTE</td>
<td>6-3,A-3</td>
<td>- GOTO menu</td>
</tr>
<tr>
<td>Almanac</td>
<td>A-1</td>
<td>- PLOT menu</td>
</tr>
<tr>
<td>Anchor guard</td>
<td>6-19</td>
<td></td>
</tr>
<tr>
<td>select</td>
<td>4-14</td>
<td></td>
</tr>
<tr>
<td>Antenna, altitude</td>
<td>9-2,6-8</td>
<td>C-MAP</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- attributes</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- chart info</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- features</td>
</tr>
<tr>
<td>Chart functions</td>
<td>1-6</td>
<td></td>
</tr>
<tr>
<td>- built-in world chart</td>
<td>4-4</td>
<td>- find nearest port services</td>
</tr>
<tr>
<td>- chart features</td>
<td>4-21</td>
<td>- insert/remove cartridge</td>
</tr>
<tr>
<td>- colors</td>
<td>9-25</td>
<td>- objects organized in categories</td>
</tr>
<tr>
<td>- cursor</td>
<td>4-3,4-17</td>
<td>- tide information</td>
</tr>
<tr>
<td>- custom screen</td>
<td>4-1,4-6</td>
<td>Configuration</td>
</tr>
<tr>
<td>- data field</td>
<td>4-2</td>
<td></td>
</tr>
<tr>
<td>- declutter</td>
<td>4-19</td>
<td>COG vector length</td>
</tr>
<tr>
<td>- display modes</td>
<td>4-17,4-18</td>
<td></td>
</tr>
<tr>
<td>- dual chart</td>
<td>4-5</td>
<td>- filter</td>
</tr>
<tr>
<td>- GOTO menu</td>
<td>4-14</td>
<td>- magnetic or true</td>
</tr>
<tr>
<td>- grid</td>
<td>4-4,4-18</td>
<td>- cursor navigation setup</td>
</tr>
<tr>
<td>- menu</td>
<td>4-1</td>
<td></td>
</tr>
<tr>
<td>- orientation</td>
<td>4-17</td>
<td>Data transfer,</td>
</tr>
<tr>
<td>- PLOT menu</td>
<td>4-15</td>
<td>- via DataCard or disc</td>
</tr>
<tr>
<td>- quick menu</td>
<td>4-7</td>
<td>- via PC interface</td>
</tr>
<tr>
<td>- radar &amp; chart display</td>
<td>3-24</td>
<td>Datums</td>
</tr>
<tr>
<td>- range</td>
<td>4-4</td>
<td>- list of datums</td>
</tr>
<tr>
<td>- return to chart presets</td>
<td>9-26</td>
<td>Daylight display</td>
</tr>
<tr>
<td>- rotation resolution</td>
<td>4-17</td>
<td>Dead reckoning</td>
</tr>
<tr>
<td>- setup</td>
<td>4-17</td>
<td>Decca lanes</td>
</tr>
<tr>
<td>- ship symbol</td>
<td>4-3</td>
<td>- list of decca chains</td>
</tr>
<tr>
<td>- shortcut to chart serie</td>
<td>4-1</td>
<td>Declaration of conformity</td>
</tr>
<tr>
<td>- show range</td>
<td>4-17</td>
<td></td>
</tr>
<tr>
<td>- symbols</td>
<td>2-7</td>
<td>- display depth in POS display</td>
</tr>
<tr>
<td>- zoom</td>
<td>4-4</td>
<td></td>
</tr>
<tr>
<td>Index</td>
<td>Page</td>
<td></td>
</tr>
<tr>
<td>----------------------------------------------------------------------</td>
<td>------</td>
<td></td>
</tr>
<tr>
<td>Depth &amp; temperature diagram</td>
<td>7-15</td>
<td></td>
</tr>
<tr>
<td>Differential data</td>
<td>6-7</td>
<td></td>
</tr>
<tr>
<td>- DGPS information</td>
<td>7-9</td>
<td></td>
</tr>
<tr>
<td>- SDGPS information</td>
<td>7-11</td>
<td></td>
</tr>
<tr>
<td>- SDGPS systems</td>
<td>7-11</td>
<td></td>
</tr>
<tr>
<td>- status indicator &amp; accuracy</td>
<td>6-7</td>
<td></td>
</tr>
<tr>
<td>DOP limit</td>
<td>7-8</td>
<td></td>
</tr>
<tr>
<td>DSC info</td>
<td>7-14</td>
<td></td>
</tr>
<tr>
<td>Echosounder functions - continued,</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- A-scope</td>
<td>5-5,A-3</td>
<td></td>
</tr>
<tr>
<td>- background color</td>
<td>9-25,A-3</td>
<td></td>
</tr>
<tr>
<td>- bottom lock display</td>
<td>5-5</td>
<td></td>
</tr>
<tr>
<td>- change frequency</td>
<td>5-5</td>
<td></td>
</tr>
<tr>
<td>- color threshold</td>
<td>5-7</td>
<td></td>
</tr>
<tr>
<td>- custom screen</td>
<td>5-1</td>
<td></td>
</tr>
<tr>
<td>- data field</td>
<td>5-3</td>
<td></td>
</tr>
<tr>
<td>- demo mode</td>
<td>9-7</td>
<td></td>
</tr>
<tr>
<td>- depth</td>
<td>9-7,A-3</td>
<td></td>
</tr>
<tr>
<td>- depth grid</td>
<td>5-7</td>
<td></td>
</tr>
<tr>
<td>- dual frequency (CA44/54)</td>
<td>5-2</td>
<td></td>
</tr>
<tr>
<td>- effects of the vessel’s speed</td>
<td>5-12</td>
<td></td>
</tr>
<tr>
<td>- event marker</td>
<td>5-6,4-16</td>
<td></td>
</tr>
<tr>
<td>- expansion window</td>
<td>5-7</td>
<td></td>
</tr>
<tr>
<td>- frequency</td>
<td>9-7,A-3</td>
<td></td>
</tr>
<tr>
<td>- gain</td>
<td>5-7</td>
<td></td>
</tr>
<tr>
<td>- how the echosounder works</td>
<td>5-10</td>
<td></td>
</tr>
<tr>
<td>- menu</td>
<td>5-2</td>
<td></td>
</tr>
<tr>
<td>- operation</td>
<td>5-1</td>
<td></td>
</tr>
<tr>
<td>- ping to ping filter</td>
<td>5-7</td>
<td></td>
</tr>
<tr>
<td>- plot waypoint from echogram</td>
<td>4-16,5-6</td>
<td></td>
</tr>
<tr>
<td>- presentation setup</td>
<td>5-7</td>
<td></td>
</tr>
<tr>
<td>- quick menu</td>
<td>5-5</td>
<td></td>
</tr>
<tr>
<td>- range</td>
<td>5-3,5-7</td>
<td></td>
</tr>
<tr>
<td>- restart of AUTO pulse/power</td>
<td>9-7</td>
<td></td>
</tr>
<tr>
<td>- return to sounder presets</td>
<td>9-26</td>
<td></td>
</tr>
<tr>
<td>- sampling</td>
<td>9-7</td>
<td></td>
</tr>
<tr>
<td>- scroll speed</td>
<td>5-7</td>
<td></td>
</tr>
<tr>
<td>- scroll synchronization</td>
<td>5-7</td>
<td></td>
</tr>
<tr>
<td>- selecting displays</td>
<td>5-1,5-2</td>
<td></td>
</tr>
<tr>
<td>- setup</td>
<td>9-6</td>
<td></td>
</tr>
<tr>
<td>- set vertical mark</td>
<td>5-6,4-16</td>
<td></td>
</tr>
<tr>
<td>- shift display</td>
<td>5-5</td>
<td></td>
</tr>
<tr>
<td>- shortcut to echo serie</td>
<td>5-2</td>
<td></td>
</tr>
<tr>
<td>ETA &amp; AVN display</td>
<td>6-10,A-1</td>
<td></td>
</tr>
<tr>
<td>External switch</td>
<td>9-20</td>
<td></td>
</tr>
<tr>
<td>Factory settings</td>
<td>9-26</td>
<td></td>
</tr>
<tr>
<td>- master reset</td>
<td>9-28</td>
<td></td>
</tr>
<tr>
<td>- power off - reset</td>
<td>9-27</td>
<td></td>
</tr>
<tr>
<td>- return to all factory presets</td>
<td>9-26</td>
<td></td>
</tr>
<tr>
<td>Fundamentals</td>
<td>2-1</td>
<td></td>
</tr>
<tr>
<td>Global Positioning System</td>
<td>1-1</td>
<td></td>
</tr>
<tr>
<td>Glossary of terms</td>
<td>A-1</td>
<td></td>
</tr>
<tr>
<td>GOTO menu</td>
<td>4-14</td>
<td></td>
</tr>
<tr>
<td>- advance to next point</td>
<td>4-14</td>
<td></td>
</tr>
<tr>
<td>- restart to approaching point</td>
<td>4-14</td>
<td></td>
</tr>
<tr>
<td>- select NAV mode</td>
<td>4-14</td>
<td></td>
</tr>
<tr>
<td>- turn NAV off</td>
<td>4-14</td>
<td></td>
</tr>
<tr>
<td>GPS receiver type</td>
<td>9-11</td>
<td></td>
</tr>
<tr>
<td>How to get started</td>
<td>1-3</td>
<td></td>
</tr>
<tr>
<td>HDOP limit</td>
<td>7-8</td>
<td></td>
</tr>
<tr>
<td>Initial start-up</td>
<td>2-7</td>
<td></td>
</tr>
<tr>
<td>Interface setup, alarm output</td>
<td>9-20</td>
<td></td>
</tr>
<tr>
<td>Interface setup</td>
<td>9-13</td>
<td></td>
</tr>
<tr>
<td>- description of sentences</td>
<td>9-23</td>
<td></td>
</tr>
<tr>
<td>- return to SimNet/NMEA presets</td>
<td>9-26</td>
<td></td>
</tr>
<tr>
<td>Introduction</td>
<td>1-1</td>
<td></td>
</tr>
<tr>
<td>Key functions</td>
<td>2-3</td>
<td></td>
</tr>
<tr>
<td>-dedicated function keys</td>
<td>1-4</td>
<td></td>
</tr>
<tr>
<td>Key symbols in manual</td>
<td>1-2</td>
<td>Navigation - continued,</td>
</tr>
<tr>
<td>---------------------------</td>
<td>-----</td>
<td>----------------------------</td>
</tr>
<tr>
<td>Language</td>
<td>2-9,9-11</td>
<td>- restart to approaching point 4-14</td>
</tr>
<tr>
<td>Light &amp; contrast</td>
<td>2-8</td>
<td>- route navigation 6-16</td>
</tr>
<tr>
<td>Lines,</td>
<td></td>
<td>- set &amp; drift display 6-12</td>
</tr>
<tr>
<td>- delete all</td>
<td>8-10</td>
<td>- setup 6-3</td>
</tr>
<tr>
<td>- edit via chart</td>
<td>4-10,4-11</td>
<td>- trim &amp; highway display 6-11</td>
</tr>
<tr>
<td>- edit via menu</td>
<td>8-10</td>
<td>- turn navigation off 4-14, 6-15</td>
</tr>
<tr>
<td>- line list</td>
<td>8-9</td>
<td>- waypoint navigation 6-15</td>
</tr>
<tr>
<td>- stored in the memory</td>
<td>8-9</td>
<td>NMEA/SimNet interface 9-13</td>
</tr>
<tr>
<td>Local time and date</td>
<td>9-9</td>
<td>- return to SimNet/NMEA presets 9-26</td>
</tr>
<tr>
<td>Log</td>
<td>6-6, 6-7</td>
<td>Page system 2-1</td>
</tr>
<tr>
<td>- reset</td>
<td>6-7</td>
<td>- exchange a display 2-2</td>
</tr>
<tr>
<td>- speed calibration</td>
<td>9-17</td>
<td>- ETA &amp; AVN 6-10, A-1</td>
</tr>
<tr>
<td>Loran C</td>
<td>7-6</td>
<td>- highway display 6-3, 6-5</td>
</tr>
<tr>
<td>- list of Loran C chains</td>
<td>7-6</td>
<td>- NAV active 6-5</td>
</tr>
<tr>
<td>Maintenance</td>
<td>10-3</td>
<td>- NAV inactive 6-3</td>
</tr>
<tr>
<td>Master reset</td>
<td>9-28</td>
<td>- shortcut to pilot serie 6-1</td>
</tr>
<tr>
<td>Measurement units</td>
<td>9-11, A-1</td>
<td>Pilot menu 6-1</td>
</tr>
<tr>
<td>- setup</td>
<td>9-11</td>
<td>- custom display 6-1, 6-13</td>
</tr>
<tr>
<td>Memory,</td>
<td></td>
<td>- highway display 6-3, 6-5</td>
</tr>
<tr>
<td>- delete</td>
<td>9-26</td>
<td>- NAV active 6-5</td>
</tr>
<tr>
<td>- used</td>
<td>9-26</td>
<td>- NAV inactive 6-3</td>
</tr>
<tr>
<td>Menu bar</td>
<td>2-5</td>
<td>PLOT menu 4-15</td>
</tr>
<tr>
<td>Menu layout</td>
<td>2-6</td>
<td>- draw line 4-15</td>
</tr>
<tr>
<td>Miscellaneous menu</td>
<td>7-1</td>
<td>- make route 4-15</td>
</tr>
<tr>
<td>MOB function</td>
<td>back of front cover</td>
<td>- plot ship’s position as WP 4-15</td>
</tr>
<tr>
<td>- alarm and navigation</td>
<td>6-19</td>
<td>- plot target 4-15</td>
</tr>
<tr>
<td>- check last activated MOB</td>
<td>6-19, 8-15</td>
<td>- plot waypoint 3-25, 4-15</td>
</tr>
<tr>
<td>- external switch</td>
<td>9-20</td>
<td>- set vertical mark 4-15</td>
</tr>
<tr>
<td>- turn MOB function off</td>
<td>6-19</td>
<td>Position</td>
</tr>
<tr>
<td>Naming of routes, points, etc.</td>
<td>2-7</td>
<td>- display 6-6</td>
</tr>
<tr>
<td>Navigation,</td>
<td></td>
<td>- display setup 6-7</td>
</tr>
<tr>
<td>- advance to next point</td>
<td>4-14</td>
<td>- flashing 6-6, A-2</td>
</tr>
<tr>
<td>- Approx.Velocity Necessary</td>
<td>6-10</td>
<td>- setup 9-9</td>
</tr>
<tr>
<td>- auto waypoint shift</td>
<td>6-3</td>
<td>- start 9-9</td>
</tr>
<tr>
<td>- cursor navigation</td>
<td>6-14</td>
<td>- update alarm 7-7, 7-8</td>
</tr>
<tr>
<td>- Estimated Time of Arrival</td>
<td>6-10</td>
<td>Power off 2-9</td>
</tr>
<tr>
<td>- examples</td>
<td>6-14</td>
<td>Power on 2-9</td>
</tr>
<tr>
<td>- highway display</td>
<td>6-5</td>
<td>QuickGuide 9-28</td>
</tr>
<tr>
<td>- orientation on chart</td>
<td>4-17</td>
<td></td>
</tr>
</tbody>
</table>
Radar functions 1-6  Radar functions - continued,  
- alarms 3-26  - Range Rings 3-15  
- blind sectors 3-5  - relative motion 3-12,A-4  
- colors on screen 3-27,9-25  - Rpm 3-16  
- control menu 3-11,3-24  - scanner type 9-2  
- cursors function 3-11,3-17,3-17  - control 3-13  
- EBL-VRM 3-17  -auto sea values 9-2  
- radar cursor 3-11,3-17  -shadow effect 3-5  
- demo mode 3-28  - Sea return 3-5  
- dual Radar display 3-24  - sensitivity 9-2  
- effects of ship’s movement 3-2  - setup 9-1  
- environmental effects 3-3  - standard display 3-11  
- false echoes 3-7  - shortcut to radar series 3-9  
- Gain 3-11  - shut down procedure 3-10  
- auto gain values 9-2  - side lobes 3-6  
- control 3-13  - Sea return 3-5  
- Guard Zone 3-15  - standby mode 3-10  
- GZ target threshold 9-2  - standby time elapsed 9-2  
- heading 3-16  - start transmission 3-10,3-17  
- adjust 9-2  - storm and rain squall returns 3-5  
- line 3-17  - stretch 3-16  
- initial setup 3-9  - synchronize chart cursor to radar cursor 3-25  
- interference 3-6  - true motion 3-12,A-4  
- menu 3-8  - synchronize chart scale to radar range 3-25  
- navigational echoes 3-4  - test scanner 9-2  
- navigation waypoint on radar screen 3-27  - trails 3-14,3-15  
- off-center mode 3-26,A-4  - clear 3-17  
- operation 3-1  - transmit time elapsed 9-2  
- orientation 3-2,3-12  - true motion 3-12,A-4  
- overlay chart 3-17,3-19  - Tune 3-11  
- overlay chart setup 3-17,3-18,3-20  -control 3-13  
- overlay user data 3-17,3-19  - tuning reference 9-2  
- picture 3-1  - zero/range timing 9-2  
- PLOT function 3-26,4-15  
- power on/off 3-17  Repair and service 10-3  
- pulse 3-16  Routes,  
- quick menu 3-17  - calculation 8-8  
- quick-range keys 3-27  - delete all 9-26  
- racon (Radar Beacon) 3-4  - edit via chart 4-10,4-11  
- Radar & Chart display 3-25  - edit via menu 8-4,8-5,8-6  
- Rain 3-11  - make new route from WP list 8-6  
- clutter control 3-14  - menu 8-1  
- Range 3-11,3-27  - navigation 6-16
Routes - continued,
- navigation setup 6-3
- plot new route 4-15
- route list 8-3
- stored in the memory 8-3
- time to go 8-8

Safety summary 1-2
Satellite status 7-7
Satellites in SDGPS system 7-13
- tracking state 7-13
Setup menu 9-1
Show test display 9-26
SimNet/NMEA interface 9-13
- return to SimNet/NMEA presets 9-26
Software version 9-11
Specifications 10-4
Speed,
- average 6-9
- diagram 7-3
- display as SOG/STW 9-9
- dual speed display 6-9
- filter 9-9
- over ground 6-6,7-4
- setup 9-11
- through water 6-9
Status indicator and accuracy 6-7
Symbols 2-7

Targets,
- delete all 9-26
- edit via chart 4-13
- plot new target 4-15
- setup / edit target 8-14,8-15
- stored in the memory 8-14
Track function 8-11
- auto trackpoint shift 6-3
- delete all 9-26
- display track 8-11
- edit via chart 4-12
- edit via menu 8-13
- interval 8-11
- line type 8-12
- navigation 6-17

Track function - continued,
- navigation setup 6-3
- start / stop track 8-11
- stored in the memory 8-12
- track list 8-12
- trackpoints 8-11
Troubleshooting 10-1

UTC time and date 6-6,9-9

Warranty end of manual

Waypoints,
- auto waypoint shift 6-3
- delete all 9-26
- edit via chart 4-9
- edit via menu 8-2
- menu 8-1
- navigation 6-15
- navigation setup 6-3
- plot new waypoints 4-15
- stored in the memory 8-1
- WP list 8-1
Wind display 7-1

Wind display 7-1
- wind direction 7-1
- wind relative to the vessel 7-1
- wind speed, apparent or true 7-1

XTE - cross-track-error 8-4,8-6,5,A-3
EU Declaration of Conformity

I, the undersigned, hereby declare that the following equipment complies with the relevant essential requirements in the Directive 1999/5/EC of the European Parliament and the Council of 9 March 1999 on radio equipment and telecommunication terminal equipment and the mutual recognition of their conformity.

<table>
<thead>
<tr>
<th>Conformity assessment</th>
<th>Annex II of 1999/5/EC (internal production control)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Employed standards</td>
<td>Article 3(1)(a) EN60945</td>
</tr>
<tr>
<td></td>
<td>Article 3(1)(b) EN60945</td>
</tr>
<tr>
<td>Equipment category</td>
<td>Navigational equipment intended for world-wide use aboard non-SOLAS vessels</td>
</tr>
<tr>
<td>Model(s)</td>
<td>Simrad CR34, CR44 and CR54 DGPS ChartRadar</td>
</tr>
<tr>
<td></td>
<td>Simrad CA34, CA44 and CA54 DGPS MultiRadar</td>
</tr>
<tr>
<td>Remarks</td>
<td>Interfaces to the following Simrad branded radar antennas:</td>
</tr>
<tr>
<td></td>
<td>RB714A, RB715A, RB716A, RB717A, RB718A</td>
</tr>
<tr>
<td>Manufacturer</td>
<td>Simrad Støvring AS</td>
</tr>
<tr>
<td></td>
<td>Østre Allé 6, DK-9530 Støvring</td>
</tr>
<tr>
<td></td>
<td>Denmark</td>
</tr>
<tr>
<td></td>
<td>Telephone +45 98373499</td>
</tr>
<tr>
<td></td>
<td>Telefax +45 98373807</td>
</tr>
</tbody>
</table>

Signed …………………………………… 06 February 2004
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
- SatCom
- SatTV.

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

**WARRANTY CARD**

**TO BE RETAINED BY THE OWNER**

---

**OWNER**

**ADDRESS**

---

**VESSEL**

**HOME PORT**

---

**TYPE**

<table>
<thead>
<tr>
<th>SERIAL NO.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

---

**DATE OF PURCHASE**

**DATE OF INSTALLATION**

---

**YES:**

**NO:**

**INSTRUCTION FOR USE GIVEN**

---

**AUTHORIZED INSTALLER/DEALER STAMP**

---

SIMRAD warrants that every product shall be free of defects in material and workmanship as specified overleaf:
WARRANTY CARD
To be mailed to the NATIONAL DISTRIBUTOR (see overleaf) together with the installation report WITHIN 14 DAYS from the date of installation.

<table>
<thead>
<tr>
<th>OWNER</th>
<th>VESSEL</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ADDRESS</th>
<th>HOME PORT</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TYPE</th>
<th>SERIAL NO.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>EQUIPMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>DATE OF PURCHASE</th>
<th>DATE OF INSTALLATION</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(CUSTOMER’S SIGNATURE) (DEALER’S SIGNATURE)