



FURUNO MARITIME TRAINING

FURUNO ECDIS TRAINEE's COURSE MANUAL.

FMD-3100/3200/3200BB/3300.

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Controls

The system can be operated with the controls or the trackball module. The procedures in this operator's guide use the trackball module.

BRILL knob

Rotate: Adjusts the brilliance of the monitor.

Push: Selects a color palette.



GAIN knob

Rotate: Adjusts the sensitivity of the radar receiver.

A/C RAIN knob

Rotate: Suppresses rain clutter.

Push: Toggles between manual and automatic rain clutter adjustment.

A/C SEA knob

Rotate: Suppresses sea clutter.

Push: Toggles between manual and automatic sea clutter adjustment.

Status LED

The color and state of the LED change according to alert status.

OFF: Heater on CPU board is on.

Green, lighting: Normal operation status; no alerts generated.

Red, flashing rapidly: Alert not acknowledged nor rectified.

Red, flashing slowly: Alert not acknowledged, but rectified.

Red, lighting: SYSTEM FAIL, or acknowledged but not rectified alert.

Rotary encoder for VRM

Adjusts the active VRM.

VRM1, VRM2

Activates, deactivates respective VRM.

POWER key

Turns the system on or off. (This key may or may not control monitor on/off depending on monitor setting.)

USB port (under cover)

Connects a USB flash drive.

Trackball module

Operates like a PC mouse.

Rotary encoder for EBL

Adjusts the active EBL.

EBL1, EBL2

Activates, deactivates respective EBL.

ALARM ACK key

Acknowledges alerts; silences the audio alarm.

InstantAccess knob

Accesses functions on the InstantAccess bar™.

Rotate: Selects item.

Push: Confirms selection.

ESC key

Goes back one step in current InstantAccess bar™ operation.

Keyboard

A keyboard for entering alphanumeric data.

MFD key

Toggles operating modes.

UNDO key

Undoes the last operation, when creating a route or user chart.

RANGE key

Selects a chart scale.

VIEW/HIDE key

Shows, hides EBLs, Instant Access bar™, Overlay/NAV Tools box, VRMs, Route Information box.

VIEW/
HIDE

ACQ/ACT key

Activates selected sleeping AIS target.

ACQ/
ACT

TARGET DATA key

Displays the detailed target data for selected TT, AIS target.

TARGET
DATA

TARGET CANCEL key

Sleeps selected activated AIS target.

TARGET
CANCEL

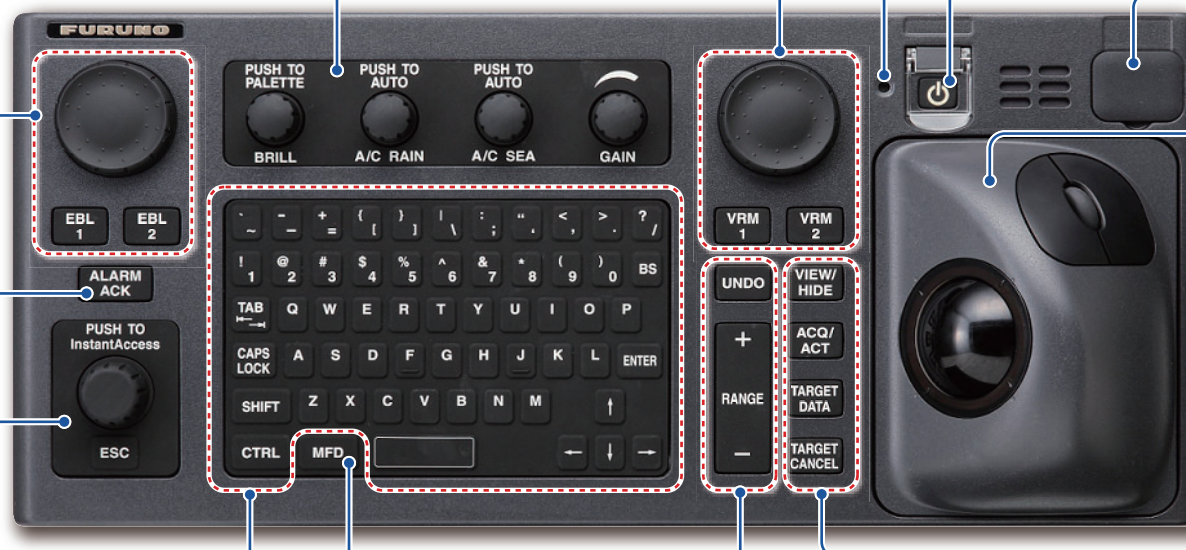


Chart Display Layout

Status bar (see page 3)



InstantAccess bar™ (see page 4)



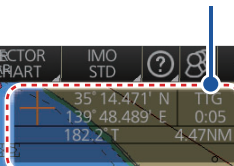
Upper section

Lower section

Chart scale, presentation mode box



Cursor position box



Sensor information box

HDG	121.8°	GYRO1
SPD	10.1kn	GPS1
COG	121.5°	BT
SOG	10.1kn	GPS1
POSN	35°18.956' N	
DGPS1	139°48.684' E	

Own ship functions box

Offset	
WGS84	
Ship off screen	

Route information box

Route Information	
Route : route1	
Plan Speed :	20.0 kn
Plan Course :	206.5°
Course to Steer :	181.1°
XTD Limit :	185.0 m
XTD :	4388.4 m
TC :	****
To WPT :	2
DIST to WOP :	6.95 NM
Time to Go :	0: 8'21"
Turn RAD :	0.80 NM
ROT :	***°/min
Next WPT :	3
Next Course :	218.1°

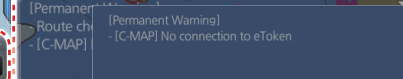
Overlay/NAV Tools box

Overlay / NAV Tools	
TT / AIS	
FILT OFF	AIS
Vector	3min REL
CPA / TCPA	OFF
AIS CPA	OFF
Lost TGT	OFF
Past POSN	OFF REL
TT Source:	ANT 1
<input checked="" type="checkbox"/> SYNC. ANT	Datum: CORP

EBL1 box, EBL2 box



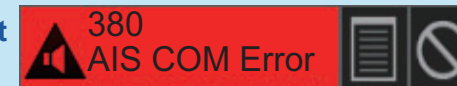
Permanent warning box



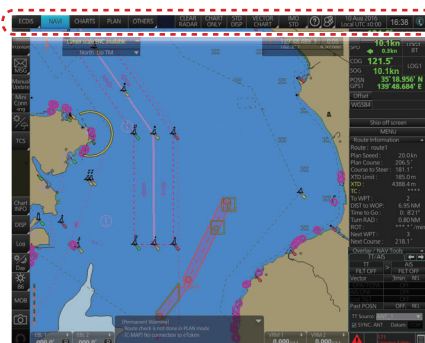
VRM1 box, VRM2 box



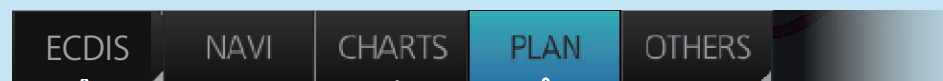
Alert box



Status Bar (chart for radar mode)



How to open a drop-down list



OTHERS Sets system in silent mode (standby); plays back data (AMS* connection must be off).

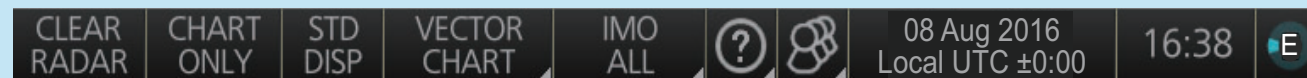
PLAN Selects the Voyage planning mode.

CHARTS Selects the Chart maintenance mode.

NAVI Selects the Voyage navigation mode.

Operating mode Selects the operating mode: ECDIS, RADAR, CONNING, or AMS*.

* Option



CLEAR RADAR

Hide radar overlay, AIS symbols and TT symbols, when any of the above-mentioned items are displayed. Greyed out otherwise.

Chart type selection

Selects which chart type to display (vector or raster), when both are available.

STD DISP

Restores the standard display for the chart object display mode.

CHART ONLY

Shows only the chart, when left button is pressed and held down.

Chart database

Selects the chart database (IMO BASE, IMO STD, IMO ALL or CUSTOM) for displayed ENC.

User profiles, Settings menu

Manages user profiles; opens the Settings menu.

Working indicator

Rotates clockwise if the system is working properly.

Time

Displays the time.

Date

Displays the date; selects the time to use, local or UTC.

Upper section (by chart operating mode)

Voyage navigation mode



Opens the Message dialog box to manage AIS Safety and NAVTEX messages.



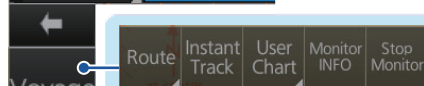
Manual Update:
Inserts chart update symbols manually.

Mini Conning:
Shows, hides the mini conning display.



Weather Overlay:
Shows, hides the weather overlay.

TCS State: Shows or hides the Track Control Status window.
GoAW, GoSEA: Activates respective autopilot steering mode.



Route:
- Select/Unselect monitored route.
- Switch monitored route to Voyage planning mode for editing.

Instant Track:
Creates temporary track to return to or deviate from monitored route.

User Chart:
Select/unselect monitored user chart.

Monitor INFO:
Show Monitor [Information] dialog box.

Stop Monitor:
Stop monitoring user chart and route.

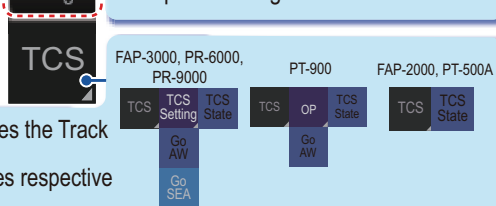


Chart maintenance mode



AUTO Load:
Starts automatic installation of the chart data (CD or DVD ROM).



Manage Charts:
Manages chart cells (grouping, deleting, etc.).



Cell Status:
Shows the chart catalog to get info about charts installed in the system.



License:
Manages chart licenses.



Public Key:
Manages public keys.



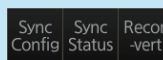
Sync Config:
Selects units to synchronize.

Sync Status:

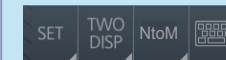
Checks synchronization status.

Reconvert:

Reconverts SENC data.



Lower section



SET:

Shows or hides chart features; sets chart alerts.

TWO DISP:

Splits the screen in two, horizontally or vertically.

NtoM:

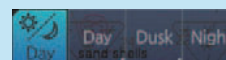
Displays Notice to Mariners info.



Shows or hides software keyboard.



Selects a color palette.



MOB:

Enters a MOB mark.

Takes a screenshot.

Restores previous condition in route and user chart creation.



Chart Legend:

Displays chart info when own ship is at center of screen.

Viewing Dates:

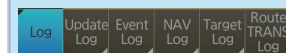
Shows "display date" dialog box.

Chart 1:

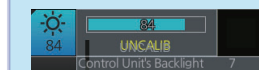
Provides overview of chart symbols.

Log:

Records user/position events to the event log; accesses various logs.



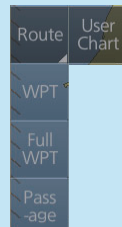
Adjusts brilliance of monitor and backlighting for control unit.



Voyage planning mode

Report:

See reports on waypoints and voyage planning related routes and user charts.



Route: Creates a route (see page 5).

User Chart: Creates a user chart (see page 7).



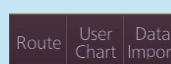
Guide Box:

Provides range and bearing information between the last waypoint and the cursor position when creating a route.

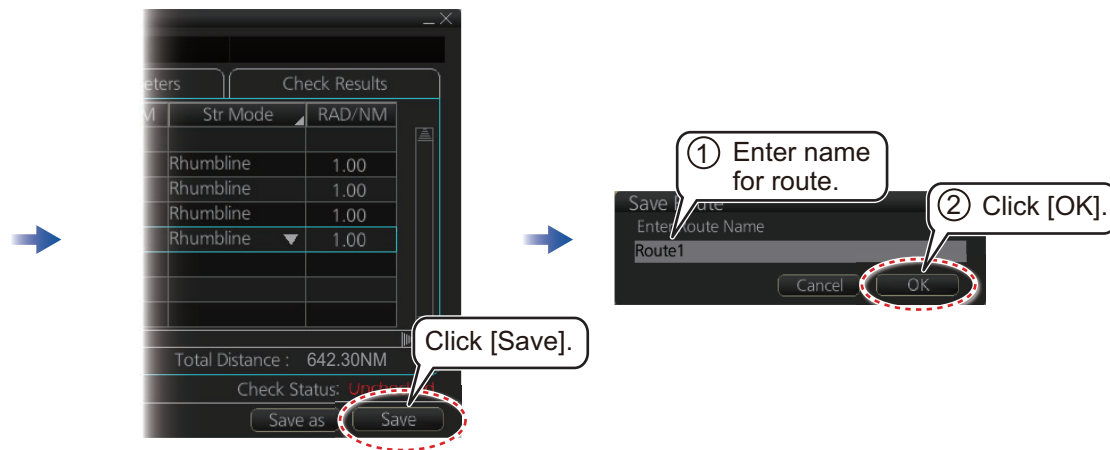
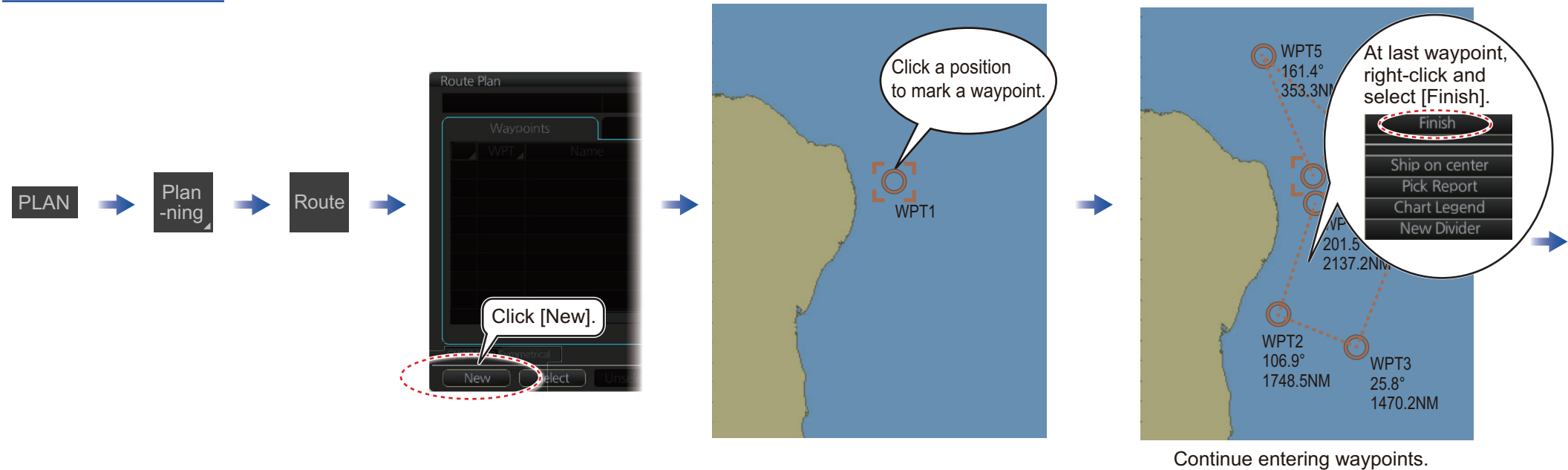


Manage Data:

Deletes, imports routes and user charts.



How to create a route



Routes (con't.)

How to select a route to monitor

Route Information
Route: cc_import_03
Plan Speed: 20.0 kn
Plan Course: 337.5°
Course to Steer: 332.9°
XTD Limit: 185.0 m
XTD: 0.9 m
CTC:
To WPT:
DIST to:
Time:
Turn:
ROT:
Next WPT:
Next Course: 341.2°

In Voyage navigation mode, right click anywhere.

Select Route
Unselect Route
Move to Plan
Monitor User Chart
Monitor INFO
Stop Monitor
XTD

Click [Select Route].

Select Route
Filter
☒ Planned Route ☐ Instant Track
ID Name Date
14 2ntitled1 25 Apr 2016
15 Untitled1 05 Apr 2016
17 Untitled1a 21 Mar 2016
16 Untitled2 02 Feb 2016
13 route1 21 June 2016
7 route11 07 May 2016
Total WPTS: 4
Start WPT: 36° 53.396' N 133° 59.390' E
Cancel Open

Select a route.

Select Route
Filter
☒ Planned Route ☐ Instant Track
ID Name Date
14 2ntitled1 25 Apr 2016
15 Untitled1 05 Apr 2016
17 Untitled1a 21 Mar 2016
16 Untitled2 02 Feb 2016
13 route1 21 June 2016
7 route11 07 May 2016
Total WPTS: 4
Total DIST: 177.5NM
Start WPT: 36° 53.396' N 133° 59.390' E
Cancel Open

Route selected.

Click [Open].

To stop monitoring a route:



How to view route waypoint information

Route Information
Route: cc_import_03
Plan Speed: 20.0 kn
Plan Course: 337.5°
Course to Steer: 332.9°
XTD Limit: 185.0 m
XTD: 0.9 m
CTC:
To WPT:
DIST to:
Time:
Turn:
ROT:
Next WPT:
Next Course: 341.2°

In Voyage navigation mode, right click anywhere.

Select Route
Unselect Route
Move to Plan
Monitor User Chart
Monitor INFO
Stop Monitor
XTD

Click [Monitor INFO].

Monitor Information
Route: Untitled3
Waypoints
To WPT:
WPT Name Longitude Latitude ETA Plan SPD
1 1.997° E 20.308° E 20.0
2 50.326° E 04:57 29 Jun 2016 20.0
3
Total WPTS: 3 Total Distance: 1.82NM

Click [Waypoints] tab.

Check ETA
WPT:
Distance: 1.11NM
Plan: 04:57 29 Jun 2016
Actual: 04:55 29 Jun 2016
Off Plan: -00:01
SPD Calculation:
Suggested SPD: 0.0kn
Close

How to delete a route

PLAN → Manage Data → Route →

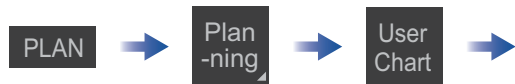
Route Data Management
Filter
☒ Planned Route ☐ Instant Track
Name Date
14 2ntitled1 25 Apr 2016
Total WPTS: 5
Start WPT: 33° 20.000' N 135° 45.000' E
Total DIST: 1919.4NM
Final WPT: 03° 09.614' N
Delete Import Close

Check route(s) to delete.

Click [Delete].

User Charts

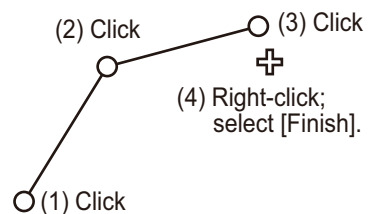
How to create a user chart



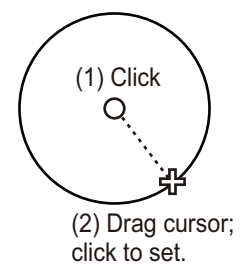
Click object to draw.

Tidal: - Current - Predicted		Area
Line: - Coast - Route - Nav - Depth		Circle
Clearing line: - NMT - NLT		Label: - Label - Point

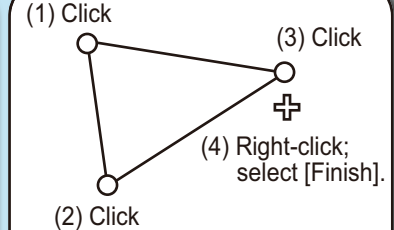
How to create a line



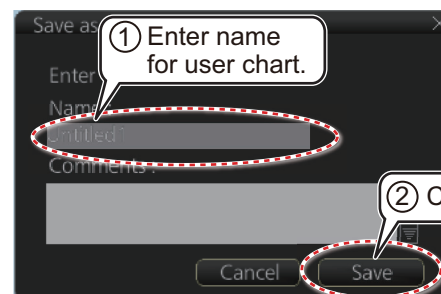
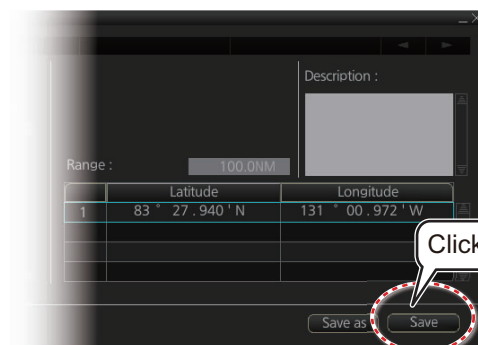
How to create a circle



How to create an area

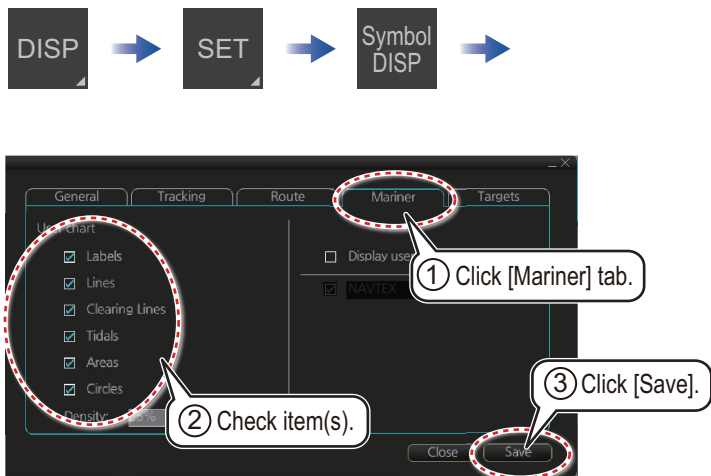


Example objects

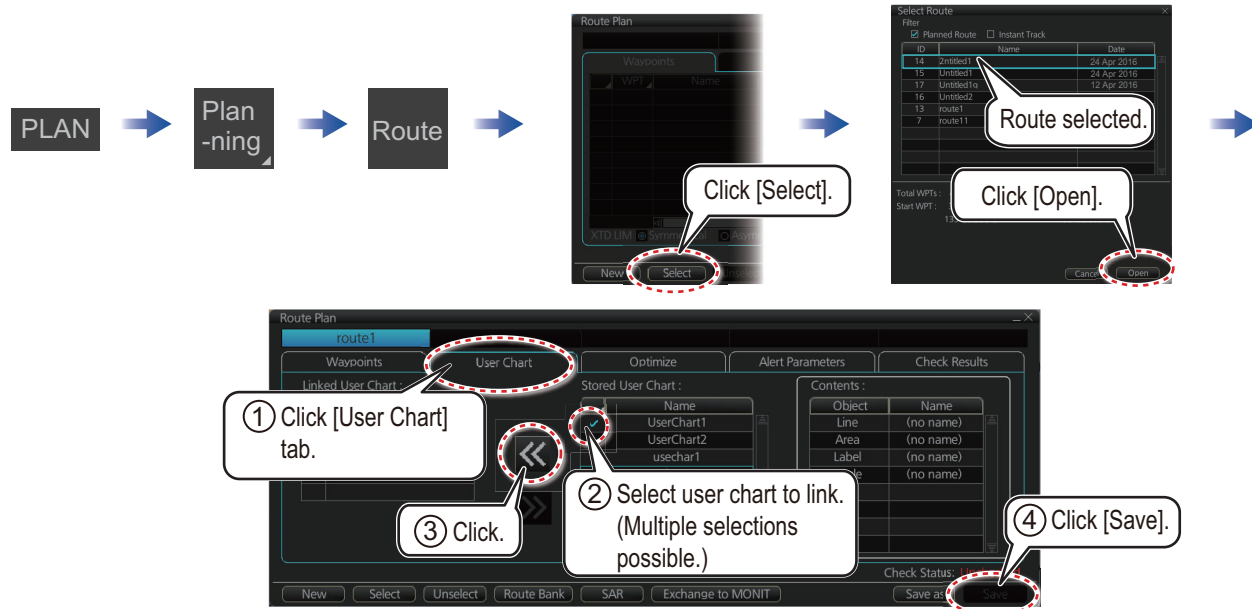


User Charts (con't)

How to select objects to display in user chart

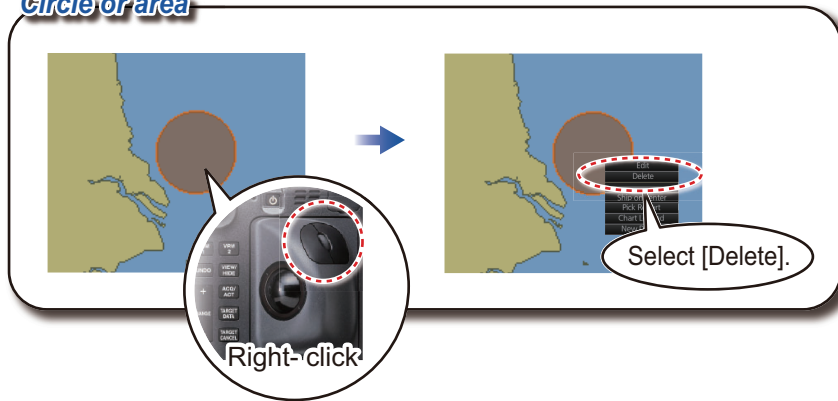


How to link a user chart to a route

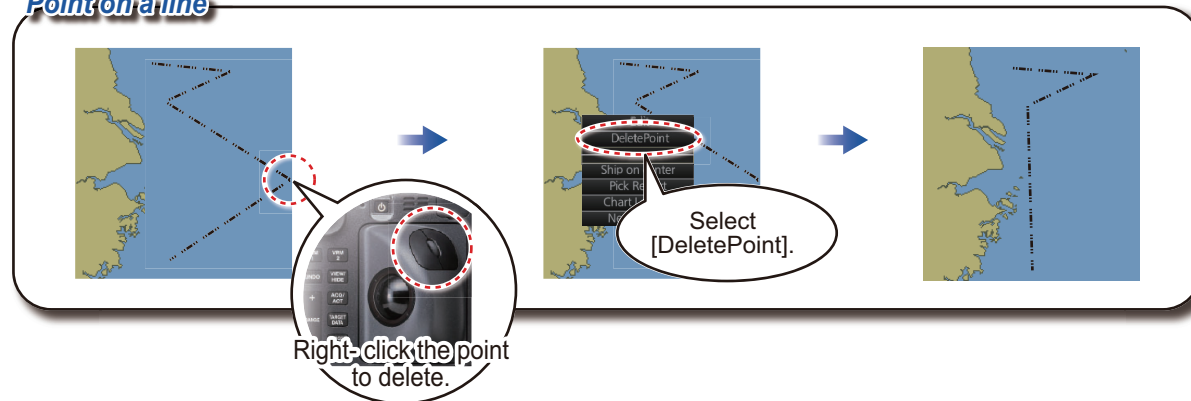


How to delete objects from a user chart

Circle or area



Point on a line



How to delete user charts

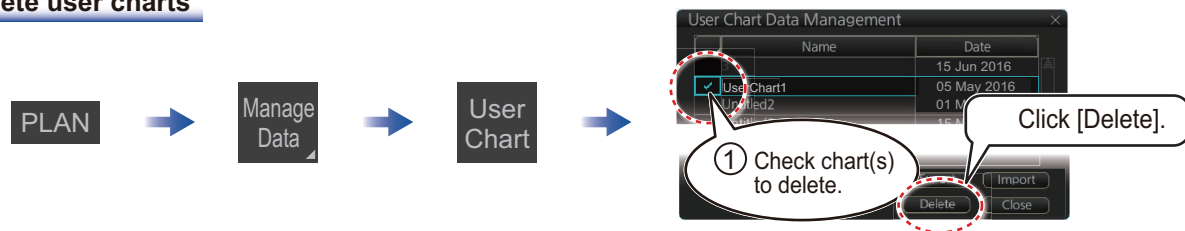


Chart Operations

How to control visibility of chart objects

DISP

SET

Chart DISP

Symbol DISP

Basic Setting
Control basic chart settings

Control chart objects

Control navigational features

Basic Setting

Light Popup:

Attributes Display:

TM Reset:

General Standard Other Text NtoM

Symbols:

Boundaries:

☐ Four Shades

☐ Full Light Lines

☐ Scale MIN

☐ Shallow Pattern

☐ Shallow Water Dangers

☐ Unknown

☐ Accuracy

☐ Highlight Date Dependent

☐ Highlight INFO

☐ Highlight Document

☐ Contour Labels

☐ LAT/LON Grid

General Standard Other Text NtoM

☐ Important Text (Clearances, Bearings, Routes, Radio Channels)

☐ Other Text

☐ Names

☐ Light Description

☐ All Other

☐ Nature of Seabed

☐ Magnetic Variation and Sweep

☐ Depth

☐ Height of Islet or Land Feature

☐ NtoM

☐ Others

General Tracking Route Mariner Targets

Ship Outlines:

AIS Outlines:

True outlines shown if > limit

Own Ship Limit = 3 mm

AIS Limit = 3 mm

Velocity Vectors

Ship Vectors:

Target Vectors:

Style:

☐ Time Increments

☐ Path Predictor

☐ Radar Antenna

General Tracking Route Mariner Targets

User chart

☒ Labels

☒ Lines

☒ Clearing Lines

☒ Tidal

☒ Areas

☒ Circles

Density:

☐ Display user chart symbol name

General Standard Other Text NtoM

☐ Drying Line

☐ Buoy, Beacons, Aids to Navigation

☐ Buoy, Beacons, Structures

☐ Buoy, Beacons

☐ Radar

☐ Fog Signals

☐ Others

☐ Lights

☐ Boundaries and Limits

☐ Prohibited and Restricted Areas

☐ Chart Scale Boundaries

☐ Cautionary Notes

☐ Ships' Routing System and Ferry Routes

☐ Archipelagic Sea Lanes

☐ Services

☐ Miscellaneous

General Standard Other Text NtoM

AIO

☒ Temporary Notice

☒ Preliminary Notice

☒ No Information

C-MAP

☒ Temporary Notice

☒ Preliminary Notice

☒ No Information

General Tracking Route Mariner Targets

Own Ship Past Tracks

☐ CCRP

☐ Primary

☐ Secondary

☐ Pivot

Style:

Length: min

Labels: min

Events

☐ User Events

☐ Auto Events

☐ Position Events

Show:

General Tracking Route Mariner Targets

Color:

AtON Symbol Color:

TT Size:

AIS ROT TAG Limit: "/min

TT Label:

AIS Label:

TT Pop-up INFO:

AIS Pop-up INFO:

Past Position

TT/AIS Points:

Style:

General Standard Other Text NtoM

☐ Spot Soundings

☐ Submarine Cables and Pipelines

☐ All Isolated Dangers

☐ Magnetic Variation

☐ Depth Contours

☐ Seabed

☐ Tidal

☐ Natural and Man-made Features

☐ Port Features

☐ Miscellaneous

General Standard Other Text NtoM

General Tracking Route Mariner Targets

Monitored Route

☐ XTD Limit

☐ Safety Margin

☐ Leg Marks

☒ True ☒ Relative

☐ Wheel Over Line

Planned Route

☐ XTD Limit

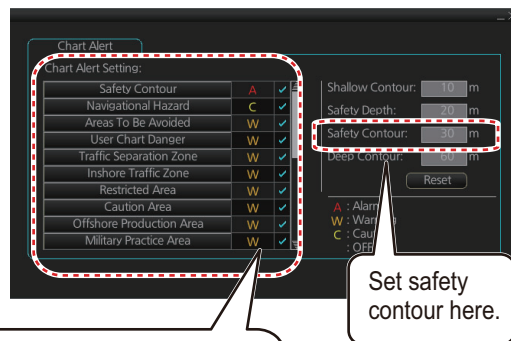
☐ Safety Margin

☐ Leg Marks

☒ True ☒ Relative

Chart Operations

How to set safety contours and chart alerts



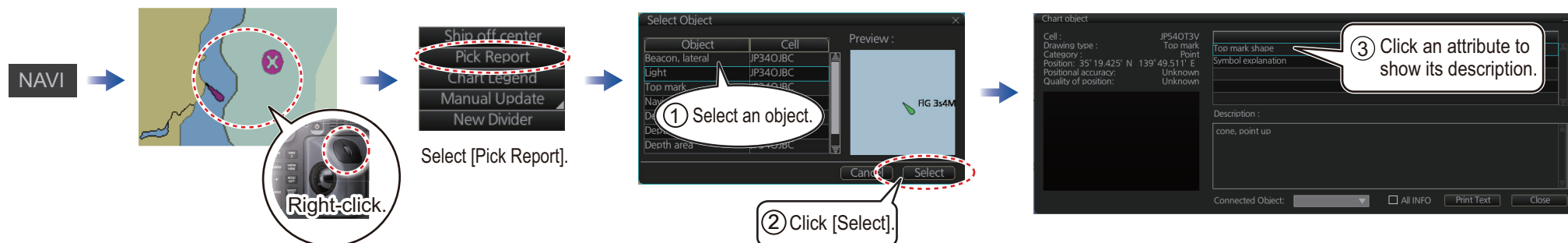
Click to select chart alert type:

- A** (Alarm): Audio+visual indications
- W** (Warning): Visual indication
- C** (Caution): No indication

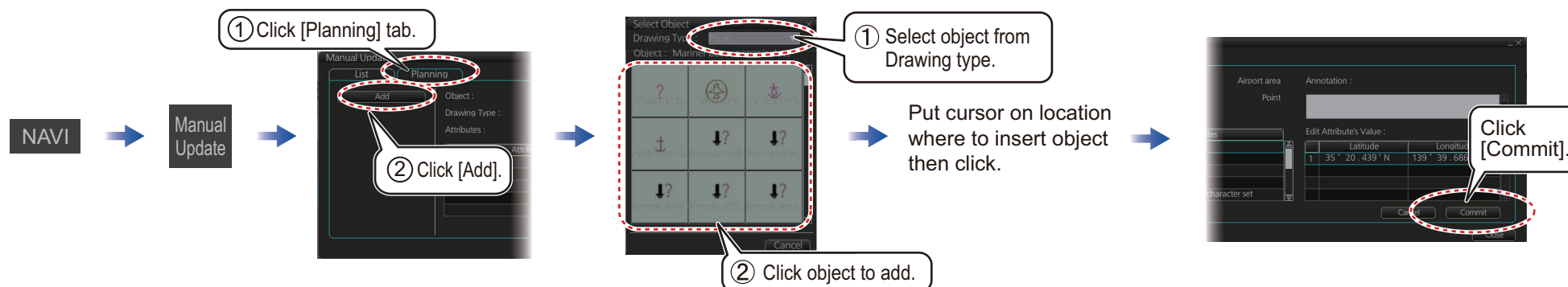
Click icon to switch between **C** and **W** vice versa.

To turn off display of a chart object in route monitoring, remove check mark from alert (alarm, warning, caution).

How to find chart object information (ENC chart)



How to manually insert a "new" chart object



TT/AIS Operations

How to find target info

Click a target to show its information.

TT Info (1/2)

TT No. TT 06

Scroll buttons

Close

Bearing BRG 102.9° T

Range RNG 7.800 NM

Course over ground COG 270.0° T

Speed over ground SOG 10.0 kn

CPA CPA 0.100 NM

TCPA TCPA 00:06

Bow crossing range BCR **.* NM

Bow crossing time BCT **.*

TT symbols (main)

Symbol (Color)	Name
(Green)	Past position point
(Green)	Target under acquisition
(Green)	Acquired target

AIS Info (1/2)

MMSI MMSI 000001003

Vessel name VESSEL B

Expand

Click to switch level of detail

Scroll buttons

Close

Bearing BRG 141.5° T

Range RNG 74.57 NM

Course over ground COG 90.0° T

Speed over ground SOG 14.0 kn

CPA CPA 28.58 NM

TCPA TCPA -79:29

Bow crossing range BCR 104.0 NM

Bow crossing time BCT >99:59

Position 34° 17.923' N
140° 39.636' E

HDG 90.0° T

ROT +0.0° /min

NAV status: Underway using engine

Heading

Rate of turn

Navigation status

AIS symbols (main)

Symbol (Color)	Name
(Green)	Past position point
(Green)	Sleeping AIS target
(Green, thick line)	Activated AIS target

How to set up TT and AIS on the TT/AIS page in Overlay/NAV Tools box

Shows or hides TT symbols.

Sets past position point interval (time).

1min True-G

Setting cannot be changed from this equipment.

(ex. AIS)

Set association method.

Shows or hides AIS symbols.

Sets vector time (shared AIS/TT).

6min REL

Sets vector mode (shared AIS/TT).

Vector

(ex. TT)

No use.

Selected TT data source.

TT Source: ANT_1

☒ SYNC. ANT Datum: CCRP

[CCRP/ANT] button (available only when an antenna not compliant with IEC 62388 Ed.2 is connected.)

Selects the reference position (CCRP or ANT) for use in the TTM sentence.

Checked when the antenna that displays radar echoes automatically feeds TT data.

Note: For systems which have the optional RADAR function, this section of the TT/AIS page appears blank.

TT/AIS Operations (con't)

Open the chart menu, select TT/AIS Setting and then Setting. The below menus can also be displayed by clicking the radio button on the pop-up menu that appears when an item other than TT/AIS is selected on the Overlay/NAV Tools box.

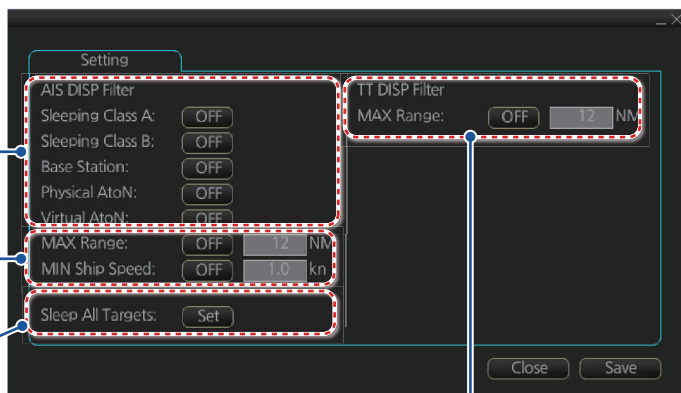
Vector 6min REL
AIS FILT OFF
TT FILT ON

How to filter TT and AIS displays, sleep all targets

Limit AIS display by AIS category.

Filters AIS targets by range, speed.

Sleeps all activated AIS targets.



Set range (from own ship) to hide vessels beyond the range set

Radar Overlay

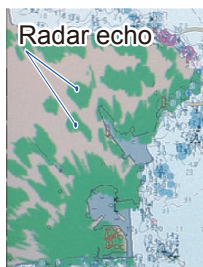
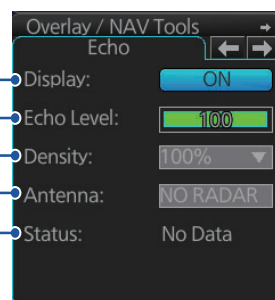
Activates, deactivates the radar overlay.

Adjusts the picture gain.

Sets the degree of transparency for the overlay.

Selects the antenna to feed the radar echo data.

Status of the radar echo data, "OK" or "No Data".



Alert Icons and Their Meanings

No.	Icon	Alert state	Description
Emergency, Alarm alert			
1		Active - unacknowledged alarm	Flashing red triangle. Loudspeaker symbol at center. Presented together with alert text.
2		Active - silenced alarm	Flashing red triangle. Loudspeaker symbol at center with diagonal line through symbol. Presented together with alert text.
3		Active - acknowledged alarm	Steadily displayed red triangle. Exclamation mark at center. Presented together with alert text.
4		Active - responsibility transferred alarm	Steadily displayed red triangle. Right arrow at center. Presented together with alert text.
5		Rectified - unacknowledged alarm	Flashing red triangle. Tick mark at center. Presented together with alert text.
Warning alert			
6		Active - unacknowledged warning	Flashing yellow-orange circle. Loudspeaker symbol at center. Presented together with alert text.
7		Active - silenced warning	Flashing yellow-orange circle. Loudspeaker symbol at center with diagonal line through symbol. Presented together with alert text.
8		Active - acknowledged warning	Steadily displayed yellow-orange circle. Exclamation mark at center. Presented together with alert text.
9		Active - responsibility transferred warning	Steadily displayed yellow-orange circle. Right arrow at center. Presented together with alert text.
10		Rectified - unacknowledged warning	Flashing yellow-orange circle. Tick mark at center. Presented together with alert text.
Caution alert			
11		Caution	Steadily displayed yellow square. Exclamation mark at center. Presented together with alert text.
Other icons			
12		Aggregation	Plus sign. Presented together with icon numbers 1 to 11.
13		Acknowledged not allowed for alarm	Red triangle. Cross in center of circle. Presented together with icon numbers 1, 2 and 5.
14		warning	Yellow-orange circle. Cross in center of circle. Presented together with icon numbers 6, 7 and 10.

Area Settings

Sufficient information should be available on the electronic charts in use to safely navigate the vessel. On the top of the 'BASE' and 'STANDARD' display categories (by default selected), some additional information should also be displayed from the 'OTHER' display category, depending on the needs of the mariner. In order to optimise the information received from the bridge watch keeper, for each leg of the passage the following information from the 'STANDARD' and 'OTHER' display category are recommended to be selected:

Standard display				
Viewing Group Layer	Name of viewing group layer in the ECDIS	Open/Deep Sea	Coastal Passage	Approaches ¹
1	Display Base	X	X	X
2	Drying line	X	X	X
3	Buoys, beacons, aids to navigation	X	X	X
3.1	Buoys, beacons, structures	X	X	X
3.2	Lights	X	X	X
4	Boundaries and limits			
5	Prohibited and restricted areas		X	X
6	Chart scale boundaries			
7	Cautionary notes			
8	Ships' routing systems and ferry routes		X	X
9	Archipelagic sea lanes	X		
10	Miscellaneous			
11	Spot soundings	X	X	X
12	Submarine cables and pipelines		X	X
13	All isolated dangers	X	X	X
14	Magnetic variation			
15	Depth contours	X	X	X
16	Seabed			X
17	Tidal			X
18	Miscellaneous			
Other display				
11	Spot soundings	X	X	X
12	Submarine cables and pipelines		X	X
13	All isolated dangers	X	X	X
14	Magnetic variation			
15	Depth contours	X	X	X
16	Seabed			X
17	Tidal			X
18	Miscellaneous			

¹ Including Anchoring and Berthing/Unberthing

Depth Contours in ENC's in Relation to Safety Contour and Safety Depth Function

1) Introduction

In the era of paper charts the colours defining different depth areas were permanently set. The mariner's only option to clearly distinguish between areas where he could safely navigate and areas he could not (No Go Areas) was to manually draw the outline of the No Go Areas and clearly mark them. By doing that the OOW had a clear picture which waters were safe to navigate through when monitoring the passage of the vessel.

The arrival of ECDIS has changed that. ENC's give the Navigator the option to change the colours of the various depth areas. He can effect this change by simply inputting in metres the safety contour (**safety contour=depth boundary between 'safe' and 'unsafe' waters**).⁷

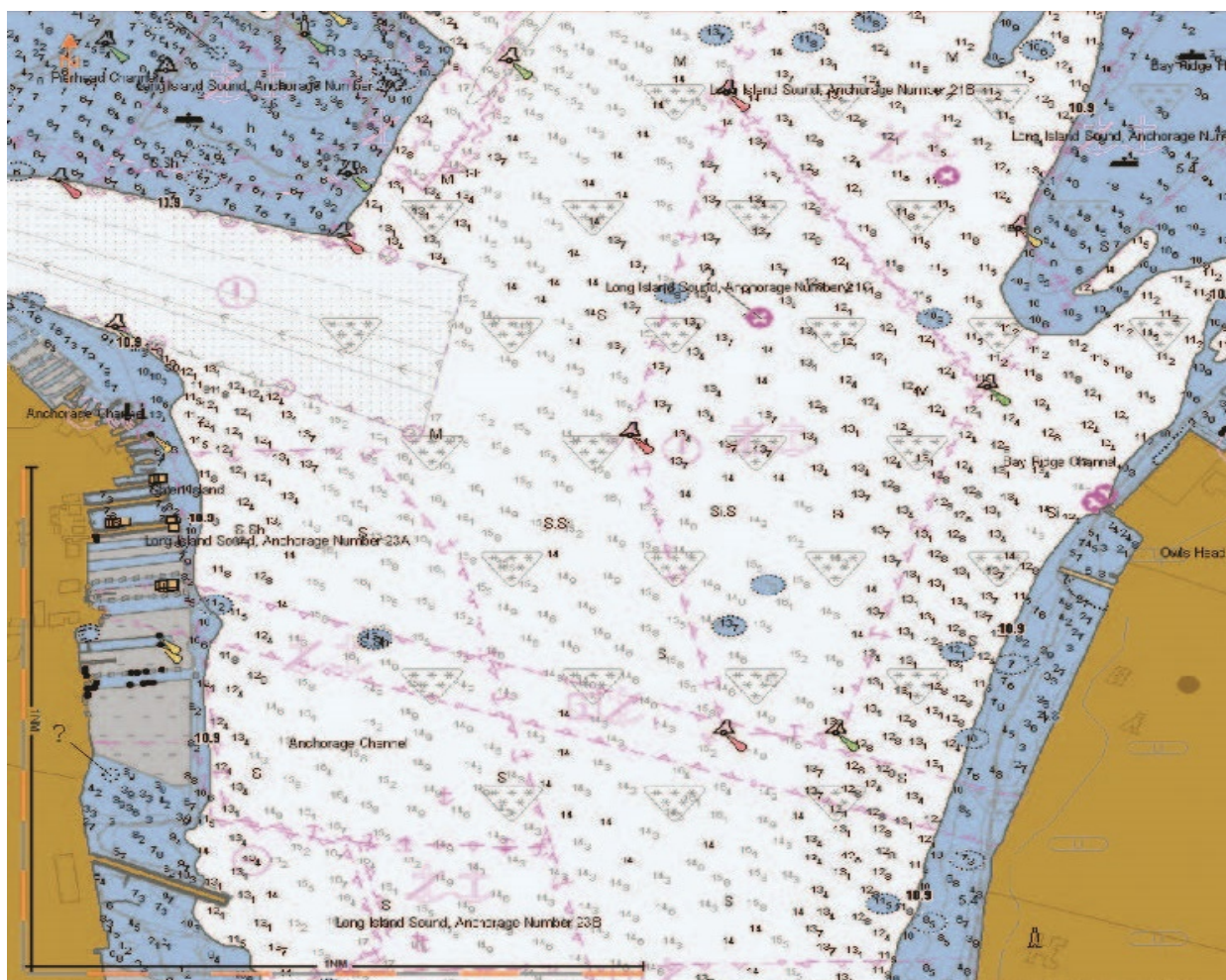
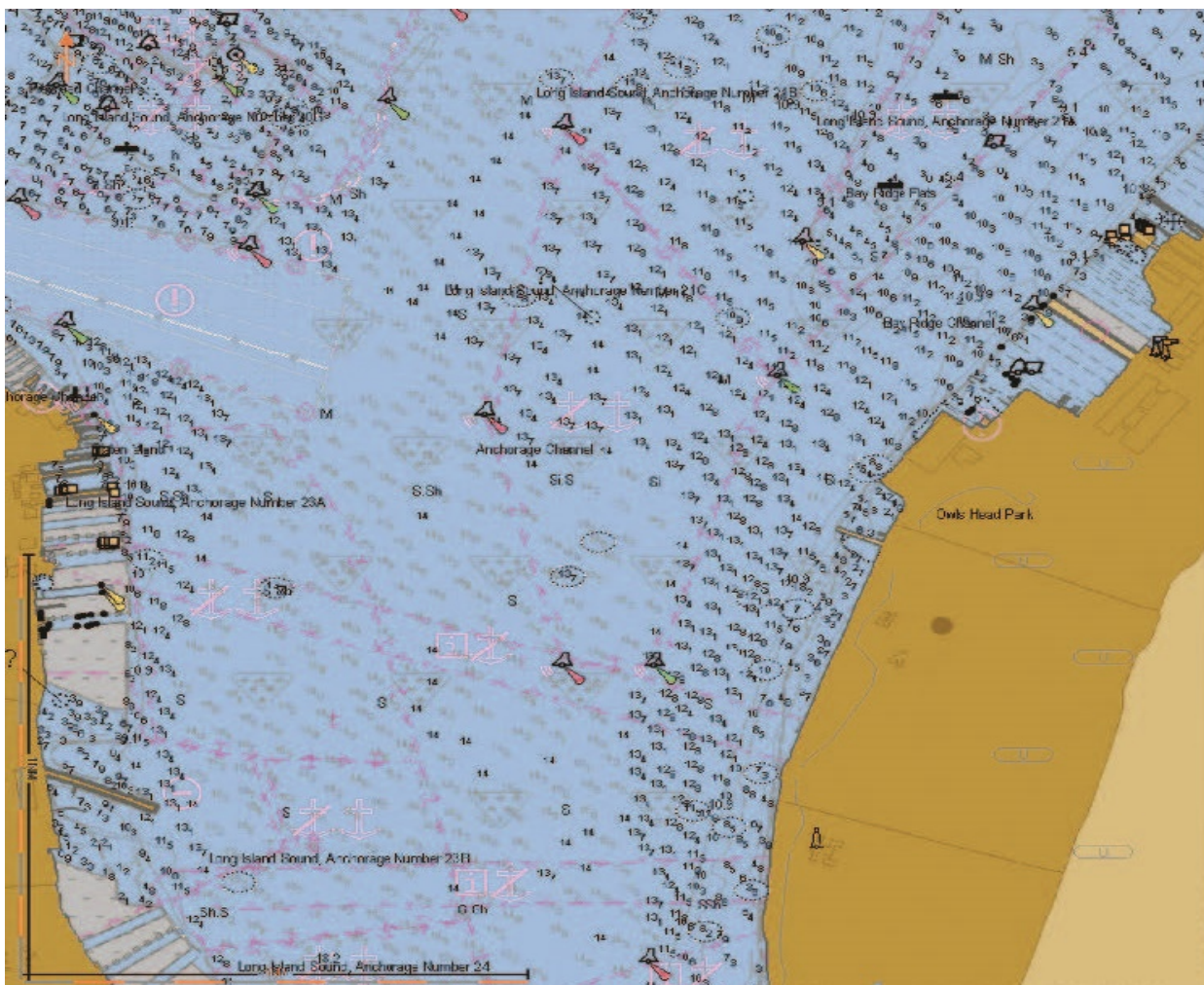


Fig 4: Safety Depth 14 metres, Safety contour 10 metres, Isolated dangers with a depth equal to or below 10m shown

⁷ The safety contour as explained above intends to provide a visible boundary between 'safe' and 'unsafe' water with respect to depth, and is highlighted on the display to enable easy identification, however, to date and because of the limitation of available depth contours, the safety contour usually cannot perform this function. This is described at length in para 2) of this chapter.

The choice of safety contour is of great importance as it is used to trigger alarms and is also used to decide how and where on the chart isolated dangers (small shoals, rocks, wrecks, obstructions) are shown. This is in accordance with IMO ECDIS Performance Standards and IHO S52 Ed 6.1.1, where it is defined that isolated dangers of depth equal to or less than the own-ship safety contour must always be displayed in 'safe waters' (waters deeper than the safety contour). Systems must also provide the navigators with the option to decide if they want the isolated dangers displayed within 'unsafe waters' (waters between the safety contour and the zero metres contour). This can be seen in Fig 4 and 5. The latter option is given because, as we will see further on in the chapter, the mariner might be forced to navigate in such 'unsafe' waters.

In Fig 5 the safety contour has been set to 20 metres so the isolated dangers which were visible with the previous setting of 10 metres are not visible anymore since the area enclosed by the safety contour is considered an 'unsafe' area as a whole and the "show isolated danger in shallow area" is not activated.



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Z:\Training Courses\TST FMD\TST FMD (out of house)\03.17\04 Trainees Manual\Furuno ECDIS Trainee course manual version 4.0

The mariner finally has the option to choose between a two colour depth area pattern (shown in Fig 6 below and explained in table 2) and a four colour depth area pattern (shown in Fig 7 overleaf and explained in Table 3).

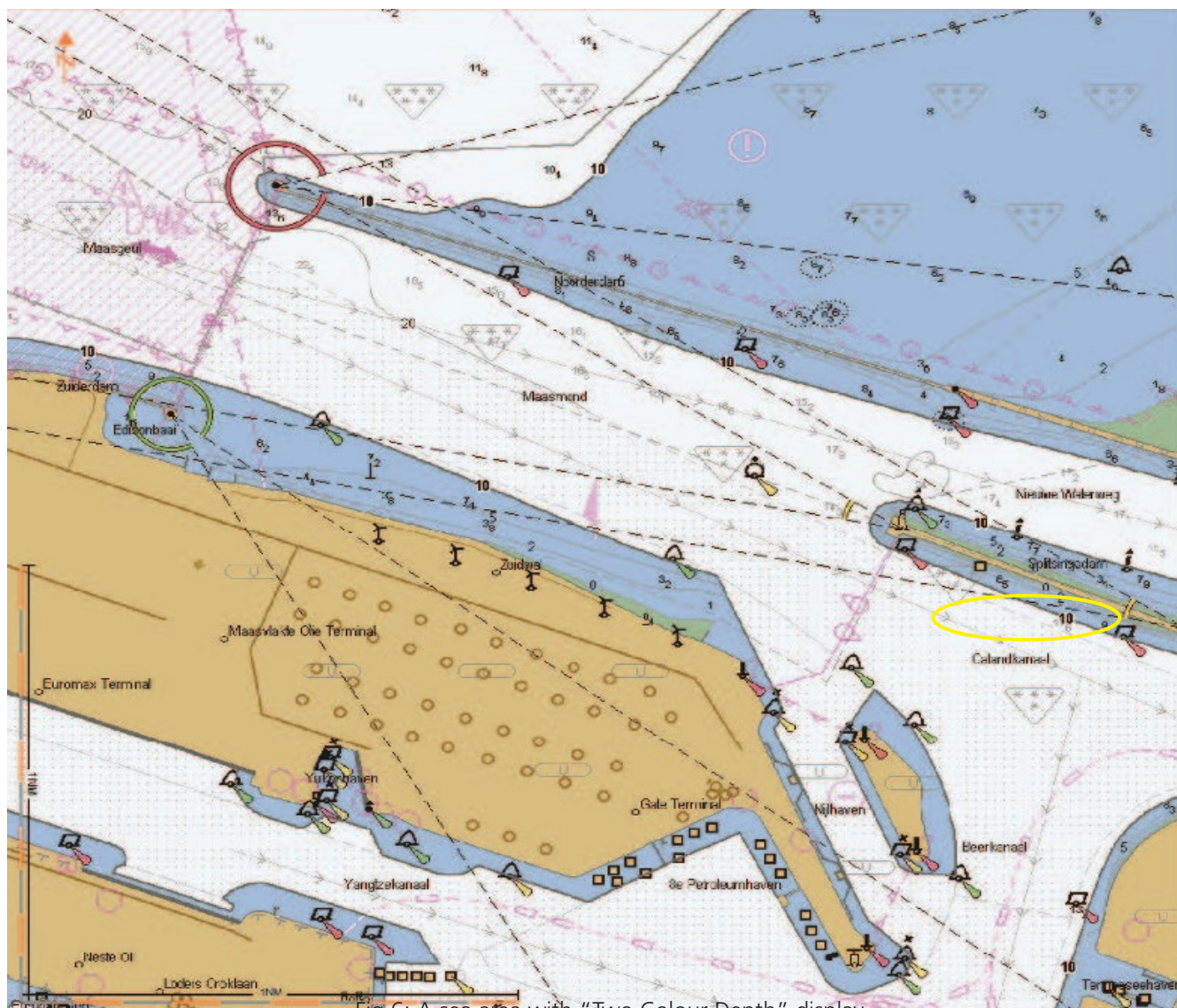


Fig 6: A sea area with "Two Colour Depth" display

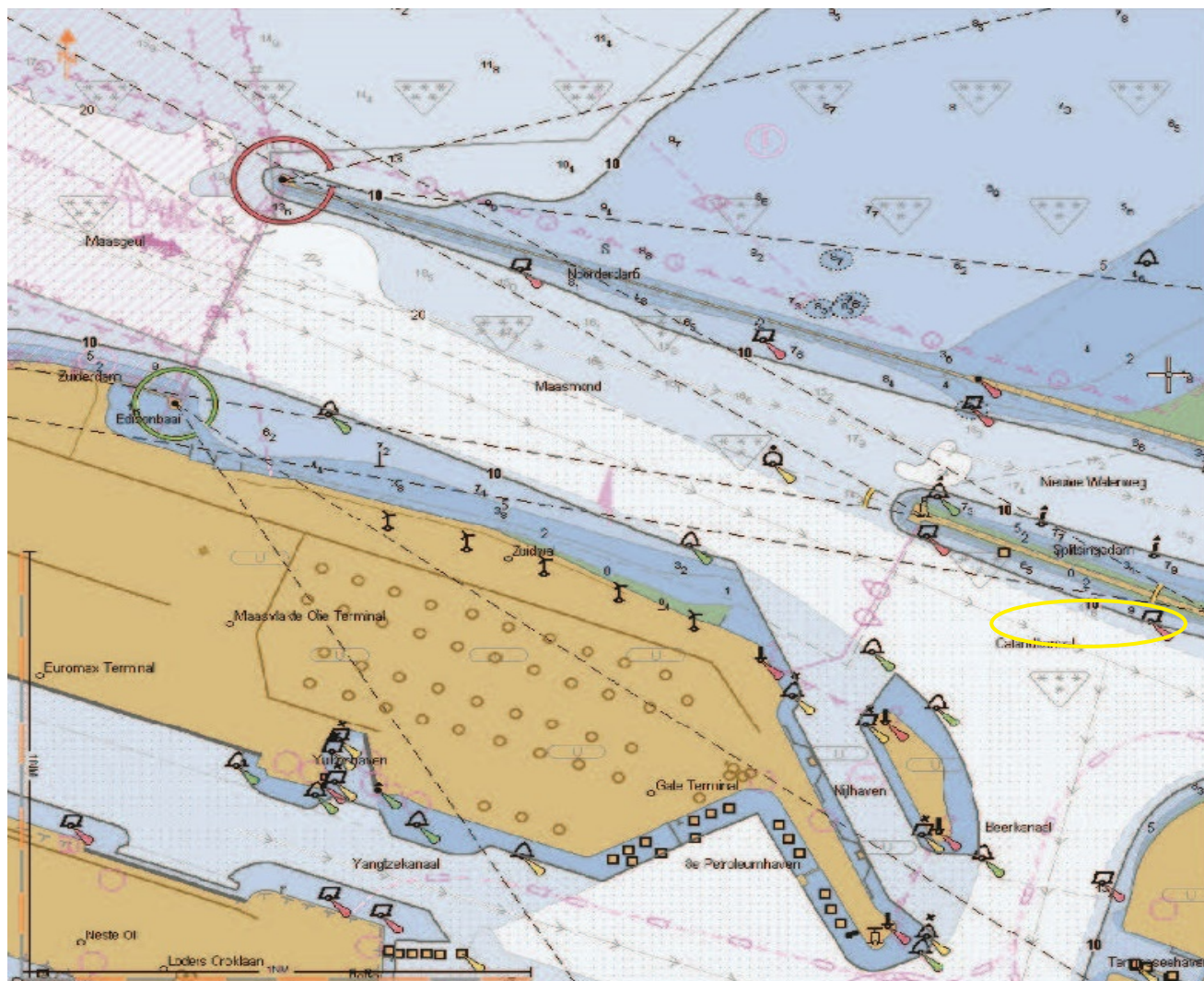


Fig 7: The same sea area as Fig 6 with “Four Colour Depth” display

2) The Problem

In the best ENC's you get 5-10-15-20⁸ metres depth contours but the safe draft (safe draft=dynamic draft+UKC requirement as per company policy) of ocean going vessels varies considerably and can be anywhere from 4 metres for a small gas carriers to 25 metres for a ULCC. As one can imagine it is a very rare occurrence that the safe draft of a vessel coincides exactly with the currently available depth contour.

Depending on the safe draft of the vessel and the available depth contours there are the two possible scenarios.

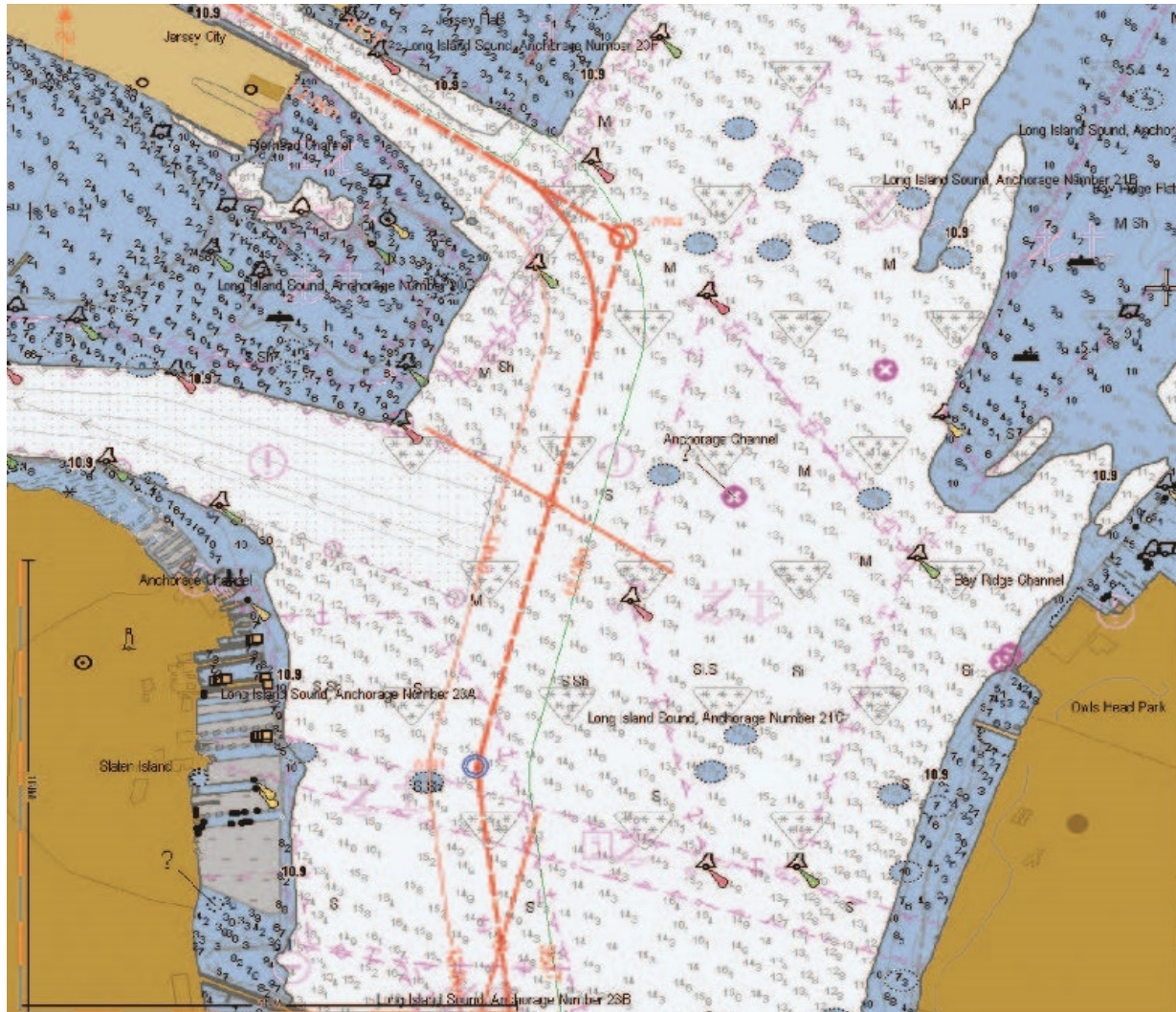


Fig 8 Safe draft equal with one of the available depth contours

Scenario one: The safe draft of the vessel is equal with one of the available depth contours for example, the safe draft of the vessel is 10.9 metres and the depth contours available in the ENC are 5.4-9.1-10.9-18.26 metres.

⁸ Please note that there might be variations of the 5-10-15-20 metres contour pattern when the charts are based on fathoms soundings. In those situations we usually have 5.4-9.1-10.9-18.2 metres depth contours available.

Scenario two: The safe draft of the vessel is not equal with any of the available depth contours for example the safe draft of the vessel is 13 metres and the depth contours available in the ENC are 5.4-9.1-10.9-18.26 metres.

For scenario one the situation is clear (Fig 8, p22). The mariner will set the safety contour and safety depth equal to the safe draft. The safety contour will become the boundary that distinguishes between 'safe' and 'unsafe' waters and the depiction of this boundary will be clear to the OOW.

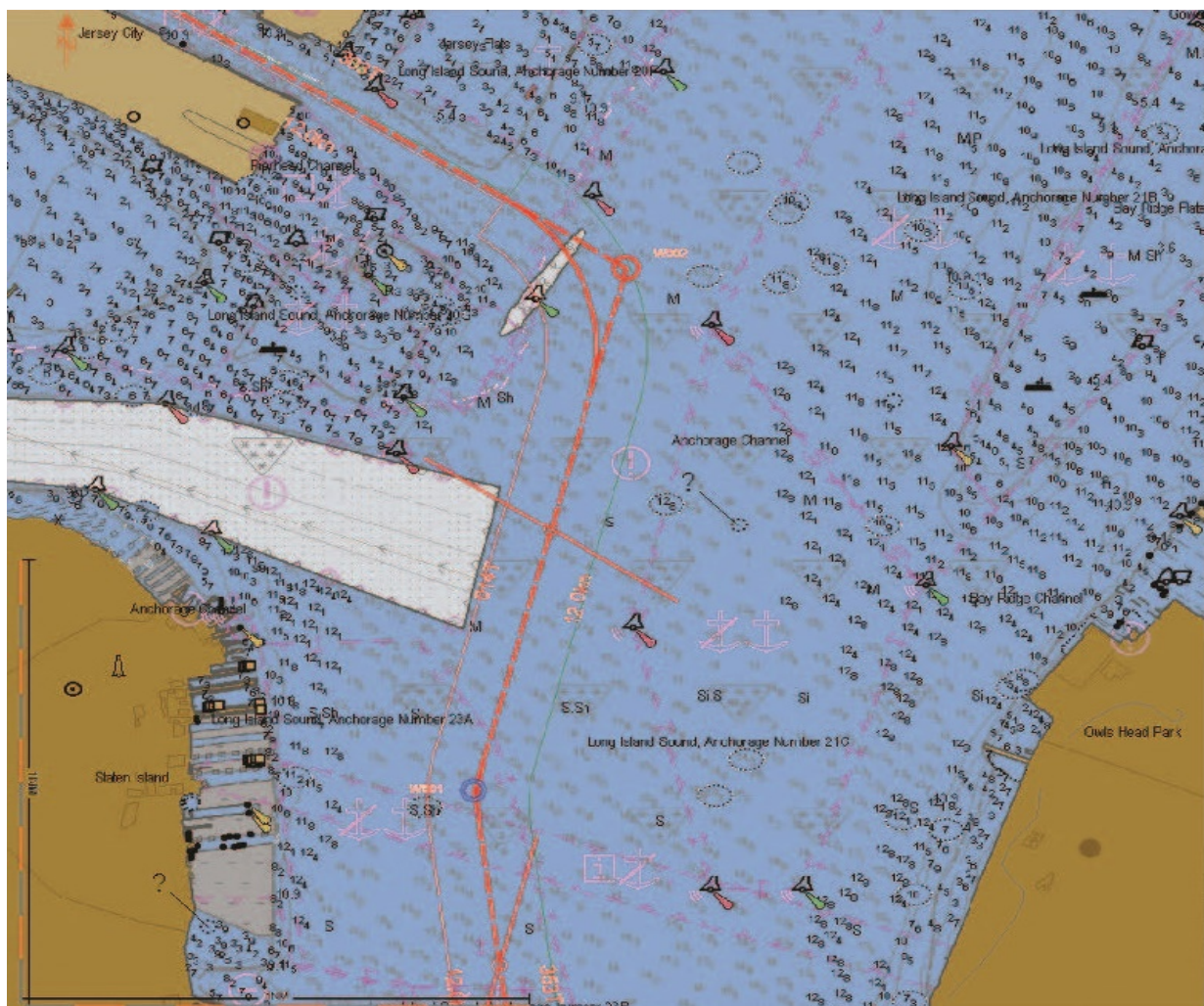


Fig: 9 Safe draft not equal with one of the available depth contours

For scenario two the situation becomes unclear (Fig 9 above). ECDIS systems are designed in such a way that when the selected safety contour does not coincide with an available depth contour they default to the next deeper depth contour. In the above example the safety contour will not perform its function namely, to be the depth boundary between 'safe' and 'unsafe' waters. This of course results in an ENC image that does not reflect the reality and herein lays the problem.

3) Possible Workarounds for Scenario #2

Scenario two can be addressed/worked around in a variety of ways. Each one has distinct advantages and disadvantages but all of them include the manual drawing of No-Go Areas so that the safe area is easily visible to the navigator. Any approach to this No-Go area will give a visible and audible alarm to the navigator.

Without drawing the No-Go Areas none of the following can be considered safe.

i. Workaround #1

Two colour pattern is used.

Safety contour and safety depth are set equal to safe draft and No-Go Areas are drawn manually by the navigator.

Advantages

- Procedure for deciding the safety contour and safety draft are clear, simple and always remains the same, irrespective of the situation.
- Isolated dangers which are applicable for the vessel will be shown (***please note that isolated dangers will be shown only if the function "show isolated danger in shallow area" is activated.***)

Disadvantages

- Vessel will sail through blue waters, which is considered 'unsafe' in scenario one.
- Safety contour alarm will not sound at the proper depth but will sound at a much earlier stage.
- Area portrayed as 'unsafe' (area inside the safety contour) will not correspond to reality.
- Image not clear in dusk and night time setting.
- Misinterpretation and feeling of complacency by navigating with an activated anti-grounding alarm.

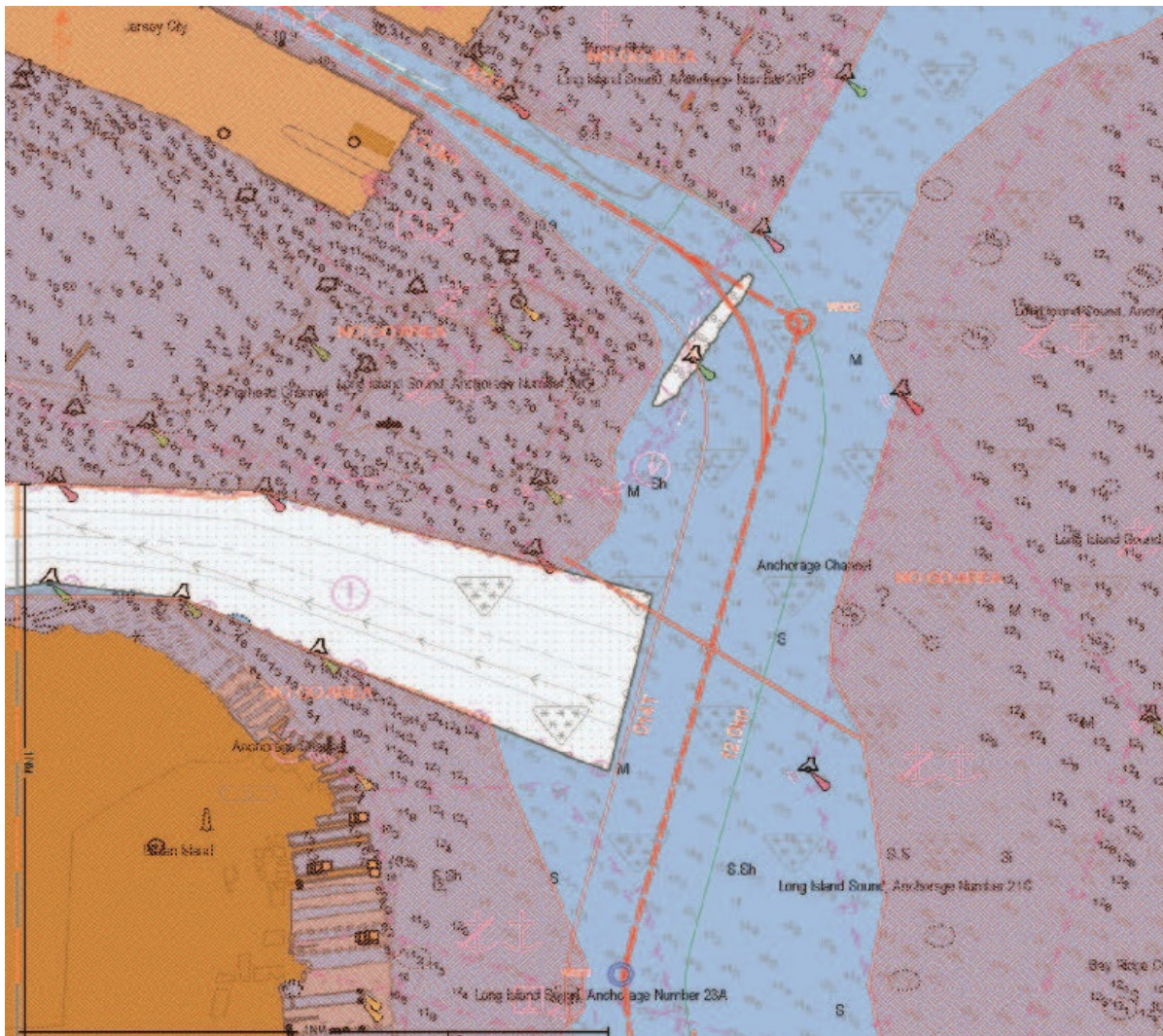


Fig 10: Safety contour=13m, Safety depth=13m, two color depth selected No-Go Areas are drawn manually by the navigator

ii. Workaround #2

Two colour pattern is used.

Safety contour is set to the previous shallower depth contour than the safe draft. For example if the safe depth is 13 metres and the available depth contours are 10m and 20m then the safety contour is set at 10m.

Safety depth is set equal to safe draft and No-Go Areas are drawn manually by the navigator.

Advantages

- Image clear even in dusk and night time setting.
- Applicable isolated dangers will be shown up to the safety contour depth setting.
- Vessel will sail through 'safe' waters. This might be considered as a disadvantage as more water will be portrayed as safe than what is actually safe but the advantage will be that the navigators are getting accustomed to how the display should look.
- Safety contour alarm will not sound without it being actually applicable.

Disadvantages

- Procedure for setting depth alarm settings (safety depth, safety contour) is more complicated than the procedure in Workaround #1
- Area portrayed as safe (area outside the safety contour) does not correspond to the reality.
- Safety contour alarm will not sound at the proper depth but will sound at a later stage.

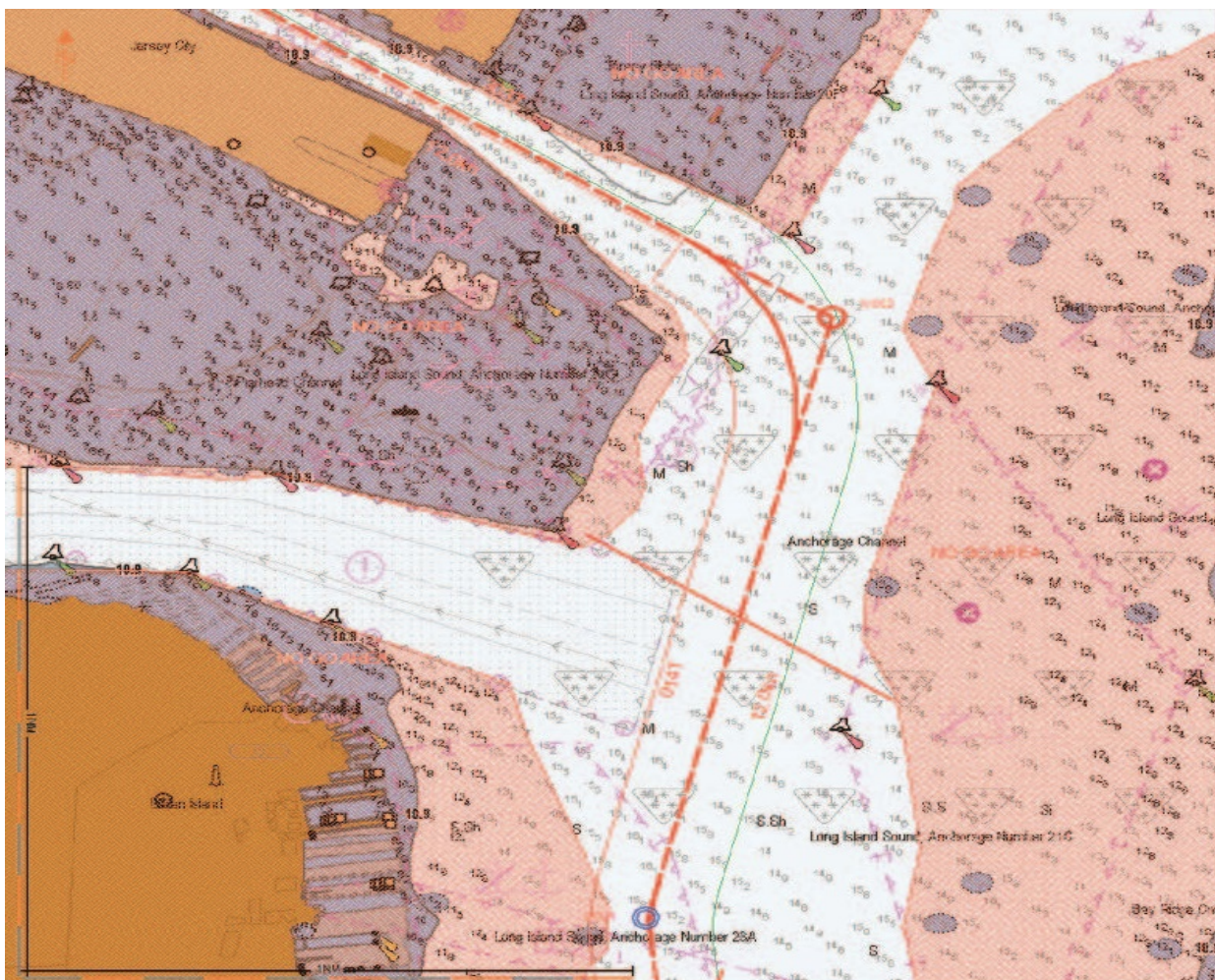


Fig 11: Safety contour=10m, Safety depth=13m, two color depth selected and No-Go Areas are drawn manually by the navigator

iii. Workaround #3

Four colour pattern is used.

Safety contour is set to the previous shallower depth contour than the safe draft. For example if the safe depth is 13 metres and the available depth contours are 10m and 20m then the safety contour is set at 10m.

Deep contour is set to the next deeper depth contour than the safe draft. For example if the safe depth is 13 metres and the available depth contours are 10m and 20m then the deep contour is set at 20m.

Shallow contour may be set to any available contour lower than the safety contour.

Safety depth set equal to safe draft and No-Go Areas are drawn manually by the navigator.

Advantages

- Applicable isolated dangers will be shown up to the safety contour depth setting.
- Vessel will sail through 'safe' waters. This might be considered as a disadvantage as more water will be portrayed as safe than what is actually safe but the advantage is that the navigators are getting accustomed to how the display should look.
- Safety contour alarm will not sound without it being actually applicable.
- The navigable waters area in this case is narrower and provides to the navigator an extra visual warning that they are approaching dangerous waters.
- No doubt about the safety of the white area (deep water area in the four colour pattern) as this area is clearly distinguishable and contains all of the area which is deeper than the deep contour setting.

Disadvantages

- Procedure for setting depth alarm settings (safety depth, safety contour, deep contour, shallow contour) more complicated than the procedure in workaround #1 and workaround #2
- Area portrayed as safe (area outside the safe contour) does not correspond to reality.
- Safety contour alarm will not sound at the proper depth but will sound at a later stage.

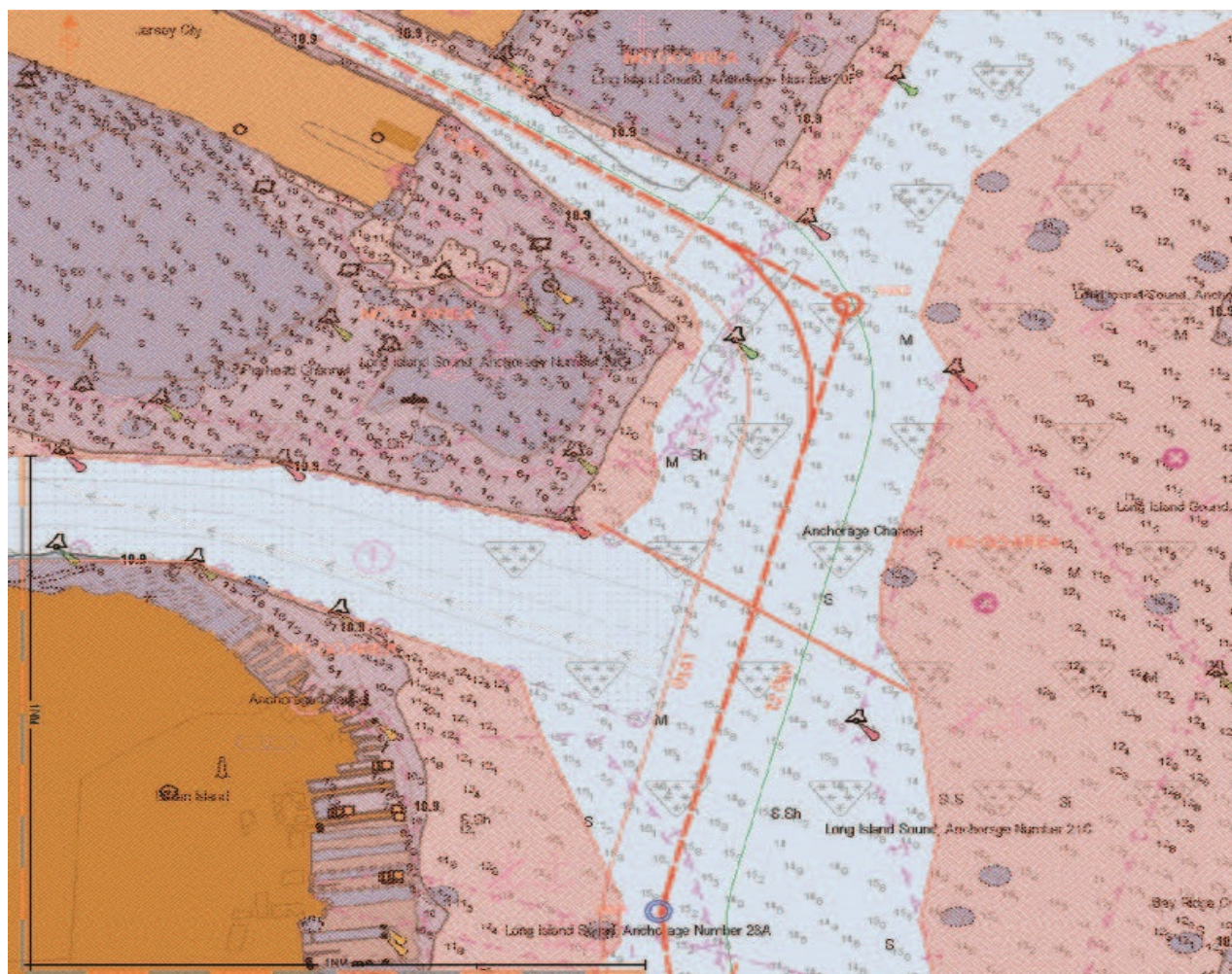


Fig 12: Safety contour=10m, Safety depth=13m, Four Colour Depth selected and No-Go Areas drawn manually by the navigator

4) Conclusion

Until the day when bathymetric data are portrayed in ENCs with greater density (so that the safe draft always coincides with a depth contour) each company should choose for itself one of the above workarounds after it weighs each one's advantages and disadvantages.

It is worth clarifying the fact that the main tool to clearly distinguish between safe and unsafe waters remains the No-Go Area manually plotted by the navigator.

INTERTANKO, along with other industry stakeholders, will push regulators to legislate measures which will solve the problem.

UKC (Under Keel Clearance)

When selecting Sounding UKC Limit, the Look-ahead will warn the navigator about violation of the company's Under Keel Clearance policy

The Sounding UKC Limit is continuously calculating the squat effect, taking the vessel present speed into account, making the Sounding UKC Limit a dynamic tool monitoring company's Under Keel Clearance policy

The navigator must define and activate the UKC Limit in UKC page (Overlay/NAV Tools)

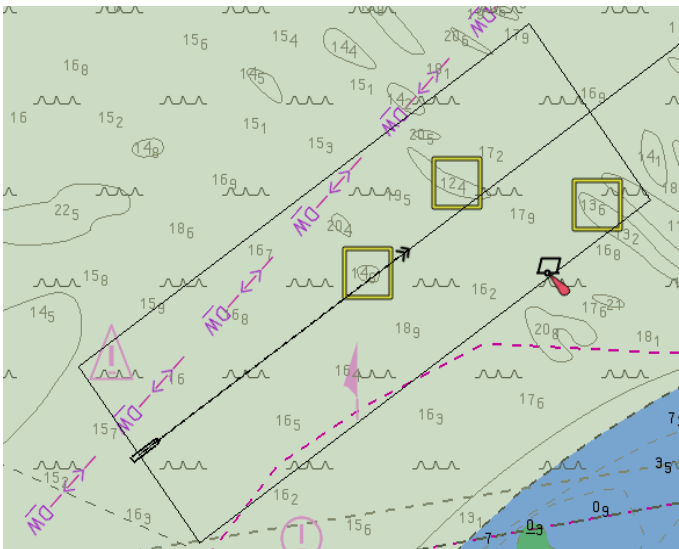


Chart Alert		
Chart Alert Setting:		
Anchorage Area	C	
Marine Farm / Aqua Culture	C	
PSSA Area	C	
No Vector Chart	C	
Too Many Dangers	C	✓
UKC Limit	C	
Sounding UKC Limit	C	✓
Non-official ENC	C	
Not Up-to-date	C	
Permit Expired	C	

How to set the UKC (Overlay / NAV Tools)

1. Select the [UKC] page from the [Overlay/NAV Tools] box.
2. Use [Echo Alarm Limit] to set the distance for the echo alarm. To activate the alarm, click the [ON/OFF] button to show [ON].
3. At [UKC Limit], set ship's UKC limit. To activate the UKC feature, click the [ON/OFF] button to show [ON].
4. Use [Current Draught] to set your ship's draught. Be sure to change the setting whenever the draught changes.
5. Use [Type] to set how to show the seabed in the [UKC] window, [V-shape] or [Concave].
6. Click the [Apply] button to affect the changes.

Under Keel Clearance (UKC)

Each shipping company issues instructions on their own particular Under Keel Clearance (UKC) policy.

Below is an example of a generic, acceptable UKC policy. Members should produce their own policy. The generic policy here is for demonstration purposes only.

- (a) Open/Deep Sea¹
 - 1. When the water depths are more than twice the vessel's static draft then no UKC calculations are required.
 - 2. When the water depths are less than or equal to twice the vessel's static draft, the minimum UKC should be 50% of the static draft.
- (b) Coastal Passage/Shallow waters passage² 20% of ship's static draft.
- (c) Port approaches, channels, fairways 10% of the static draft.
- (d) Alongside 1.5% of the vessel beam or 0.3m whichever is the greater.
- (e) SBM/CBM should not be less than 20% of ship's static draft.
- (f) At anchor
 - 1. Unprotected waters should not be less than 20% of ship's static draft.
 - 2. Protected/Sheltered waters should not be less than 10% of ship's static draft.

If Charterers³, Port and Canal Authorities have rules that are stricter than the above criteria then such stricter UKC allowance should be adhered to. It is essential that information is made available to the vessel prior to fixing the vessel in order for the vessel to safely load.

The UKC applies to the dynamic condition of the vessel where variables as listed below are applied to the static draft.

- (a) The effect of squat based on the vessel's speed through the water.
- (b) The location of the vessel: open waters or confined waters.
- (c) Environmental conditions such as: water density, prevailing weather, height of swell, tidal height and range, atmospheric pressure, local anomalies, current.
- (d) The nature and stability of the bottom (e.g. sand wave phenomena, silting).
- (e) Reduced depths over pipelines or any other obstructions.
- (f) The vessel's size and handling characteristics and how the vessel squats, whether by head or stern.
- (g) The reliability of the ship's draft observations and calculations, including estimates of hogging or sagging.
- (h) Increase in draft due to heel when turning/rolling.
- (i) Wave response allowance, which is the vertical displacement of the hull due to heave, roll and pitch motions.
- (j) The accuracy/reliability of hydrographic data and tidal predictions. This is generally found described on tabulated source diagrams or as Zones of Confidence and takes into account how the depths were obtained originally, i.e. via hand leads or sophisticated survey methods (see chapter on CATZOC).

¹ A vessel is considered to perform Open/Deep Sea passage when transiting at a distance more than 12 nm from the coastline.

² A vessel is considered to perform coastal passage/shallow waters passage when transiting at a distance equal to or less than 12 nm from the coastline.

³ Please note that it might not be within the Charterers' contractual rights to ask Owners to adhere to a higher UKC allowance.

5.1 ECDIS and prudent navigation

It is easy to be misled into thinking that, because ENC data is in digital format, and the ECDIS is linked to GNSS, that everything seen on the ECDIS screen must be complete and accurate.

However, the ENC data is only as complete and accurate as the original survey data from which it has been derived. In the majority of cases this will be the same as used to derive the equivalent paper charts currently available.

As described in detail in the Admiralty publication NP100 ('The Mariner's Handbook'), mariners have always been advised that it is good practice to use nautical charts with caution, and to recognise that no chart is infallible either through imperfections in the original survey, or in terms of changes which have occurred since.

Mariners must be the final judge of the reliance they can place on the information given, bearing in mind their particular circumstances, safe and prudent navigation, local pilotage guidance and the judicious use of available navigational aids. Whilst navigating with ECDIS has the potential to provide significant safety benefits through improved situational awareness, this important advice holds equally true when using ENC data in an ECDIS, and perhaps more so given the trust that end users tend to place on electronic devices over paper products.

It is therefore important that the appraisal stage of voyage planning (Chapter 6) includes a careful assessment of the information contained in the ENC data regarding its sources and their degree of completeness and accuracy.

This chapter outlines what types of accuracy information is likely to be available in ENC data, and how it can be accessed and interpreted.

5.2 The components of accuracy

The chart features seen on the ECDIS display have gone through a number of complex processes, from the initial recording during survey to the display on ECDIS. These processes all have the potential to affect the eventual accuracy of the ENC data. The individual elements of the compilation process are explored in detail within NP100. This chapter concentrates on how survey accuracy and quality information may be accessed from an ECDIS.

5.3 Survey accuracy

Since many areas of the world have not been surveyed to modern standards, the positional accuracy of the chart features being displayed on the ECDIS may not be as accurate as positions derived from GNSS.

Caution:

The prudent navigator should never rely solely on GNSS derived positions for navigation, and should regularly cross check the ship's position using other means, such as via a radar overlay, or visual positioning by taking bearing and distance measurements from conspicuous features.

The survey data used in the ENC is often based on information from different sources whose relative accuracies may vary widely. On the paper chart, this information is shown on the source data diagram which the mariner is advised to use at the appraisal stage of voyage planning. This ensures that the mariner can apply an appropriate safety margin when determining their route. Bigger margins should be applied where the survey data is old, or is of insufficient resolution or quality to fully depict the sea floor.

ENCs do not contain an equivalent source data diagram, but provide information on the quality of data within the ENCs in other ways. The primary mechanism used to communicate this information is through an attribute known as 'CATZOC' (category of zone of confidence in data).

ENC producers divide the ENC data into areas of differing survey quality based on positional accuracy, depth accuracy and seafloor coverage. Each area is included in the ENC data as an area meta-feature object known as 'Quality of Data' (M_QUAL) and is allocated one of the six possible CATZOC attribute values. In 'All' / 'Other' display mode, the ECDIS will display the appropriate CATZOC symbol within each area (but not the limits of the areas) depending on its assigned value as detailed in the following table.

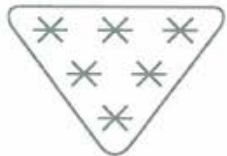
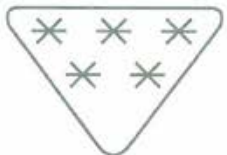
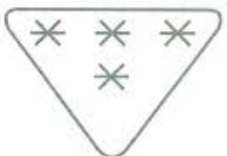



ECDIS Symbol	Position Accuracy	Depth Accuracy	Seafloor Coverage
	±5m	0.5m + 1% depth (i.e. 0.8m accuracy for 30m depth)	Full area search. Significant seafloor features detected and depths measured.
	±20m	1.0m + 2% depth (i.e. 1.6m accuracy for 30m depth)	Full area search. Significant seafloor features detected and depths measured.
	±50m	1.0m + 2% depth (i.e. 1.6m accuracy for 30m depth)	Systematic survey, but some uncharted hazardous features may exist but are not expected.
	±500m	2.0m + 5% depth (i.e. 3.5m accuracy for 30m depth)	Depth anomalies may be expected.
	More than ±500m	More than 2.0m + 5% depth	Large depth anomalies may be expected.
	Not assessed		

Table of CATZOC values and their meanings

Five and six star symbols therefore denote high accuracy surveys produced using modern equipment and techniques. A four star symbol denotes a medium accuracy survey where the positional accuracy is not quite as high and full seafloor coverage cannot be guaranteed.

Two and three star symbols denote low accuracy surveys, often based on data collected on an opportunity basis only (such as soundings reported whilst on passage), and so where significant seafloor features (i.e. those which are more than 10% shallower than the soundings being shown in the area) are considered likely to exist.

SCAMIN

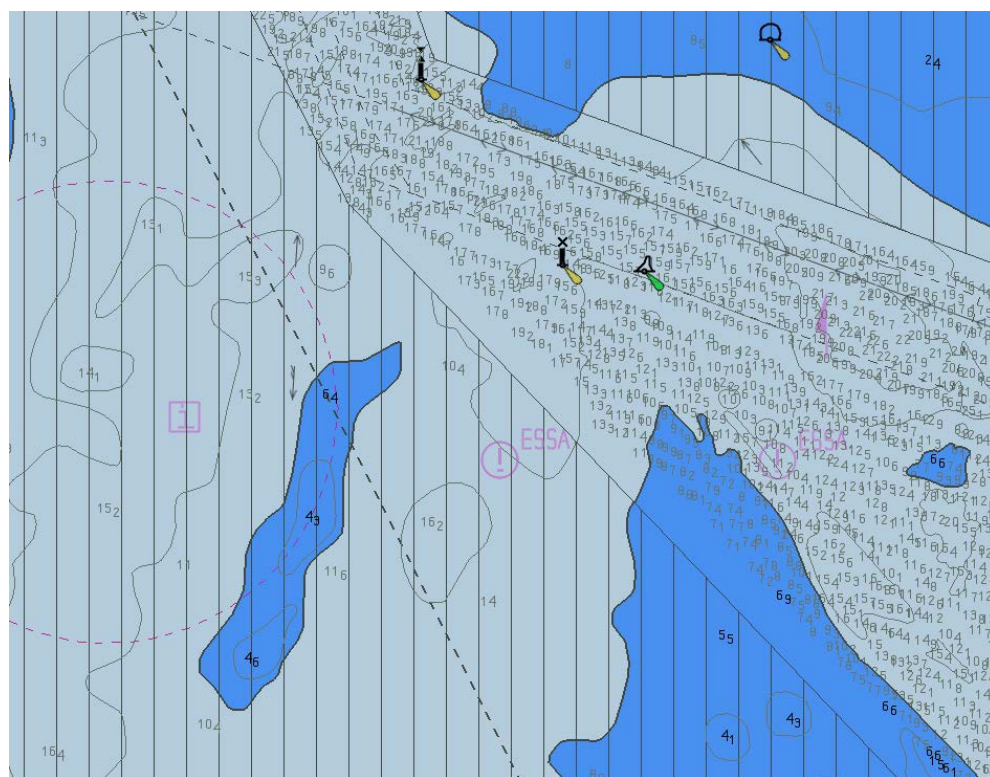
There will be occasions where it is appropriate to display ENC data at smaller than its compilation scale (i.e. zoomed out). For example, it may be appropriate to improve the look-ahead when navigating in confined waters. Equally, when heading inbound towards a port such that the limit of the larger scale 'harbour' ENC comes into view on the edge of the screen, the ECDIS may choose to load this ENC cell rather than continue to display the smaller scale 'approach' ENC that is currently being used to cover this area. The larger scale 'harbour' ENC will therefore be reduced in size to match the scale of the 'approach' ENC.

By viewing an ENC cell under scale in this way, its content will be compressed into a smaller area on screen. Halving the display scale, say from 1:50,000 to 1:100,000, reduces the data into an area only a quarter of the size.

Whilst the problem of enlarging any positional inaccuracies in the ENC data is no longer a concern when zooming out (like it is when zooming in), compressing the same data into a smaller area introduces the problem that the display may become too cluttered such that important navigational information becomes obscured from view.

As described in Section 2.2, the ECDIS operator can limit this problem by changing his ECDIS display settings to filter the information being displayed. However, this change of display mode has the effect of switching off all examples of a given category of feature, such as all soundings, and so important navigational information which should remain displayed may be lost.

Where it is likely that an ENC cell may be required to be used at smaller scales in certain situations, ENC producers are able to use the scale minimum attribute (SCAMIN) that forms part of the S-57 standard, and which allows the ENC producer to define the minimum display scale at which they wish individual features in the ENC data to remain on display. If the ECDIS is zoomed out beyond this scale, it will no longer display the feature, and therefore reduce clutter.



SCAMIN OFF

Display scale 1:22000

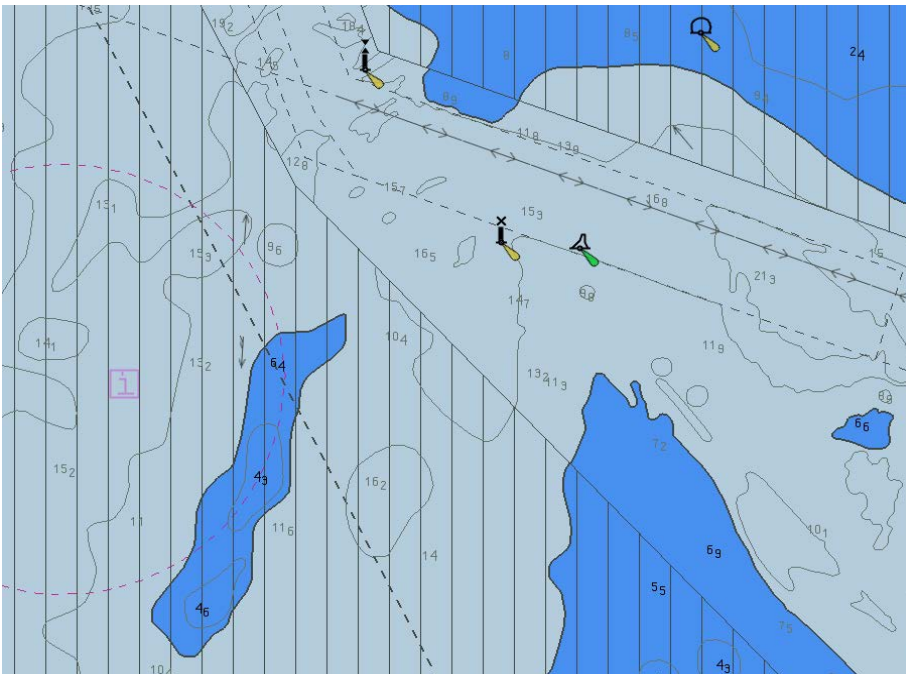
Compilation scale 1:4000

SCAMIN

Unlike the example illustrated above, where different SCAMIN values are assigned to specific examples of a particular feature type depending on their navigational significance, in many cases the ENC producer may simply apply the same value to all examples of a specific feature type giving a similar result to altering the ECDIS display settings.

For example, the ENC producer may set the value of 179,999 against all soundings contained in an 'approach' ENC with compilation scale of 1:45,000. If this ENC cell is displayed at its intended scale of 1:45,000, or zoomed out one step to 1:90,000, all of the soundings will be displayed. However, if the ENC cell is zoomed out a second step to 1:180,000, none of the soundings will be displayed.

Whilst at face value this may not appear to be any better than simply changing the ECDIS display settings yourself, when defining these minimum values ENC producers will normally consider the relative priority of different types of feature to navigation. So for example, a producer is likely to set a higher value (i.e. the feature remains on display longer) for important navigational feature types such as caution areas, floating navigational aids, obstructions, and overhead cables. Similarly they are likely to set a lower value (i.e. the feature disappears quickly as the ENC cell is zoomed out) for features which are less important to navigation, such as lakes and other shore-based features. This therefore ensures the filtering of the display is conducted in a controlled manner automatically.



DISPLAY SCALES

Unlike paper charts, which have to be used at the fixed compilation scale, ECDIS allows the operator to zoom in and zoom out, which changes the scale at which the ENC data is displayed. ✓

Whilst this is a significant benefit in certain scenarios, and cannot be avoided in others (such as displaying two adjacent ENC cells of different scales on screen at the same time), caution is always advised whenever displaying an ENC cell at anything other than the compilation scale assigned by the ENC producer. ✓

Zooming in to a larger scale introduces the risk that any positional errors that may exist in the ENC data are magnified to a point where the data becomes unsafe to use – and this fact will not be immediately apparent as the ECDIS will continue to display the text and symbols at a fixed size. ✓

Zooming out to a smaller scale introduces the risk that the display may become cluttered as the same amount of information is compressed into a smaller area on the screen. Important navigational features may therefore become obscured from view. ✓

When selecting which ENC cells to purchase, it is therefore important to ensure sufficient coverage at an appropriate scale is installed in order to avoid the need to have to spend long periods of time displaying ENC data at scales other than those they were intended to be used at. ✓

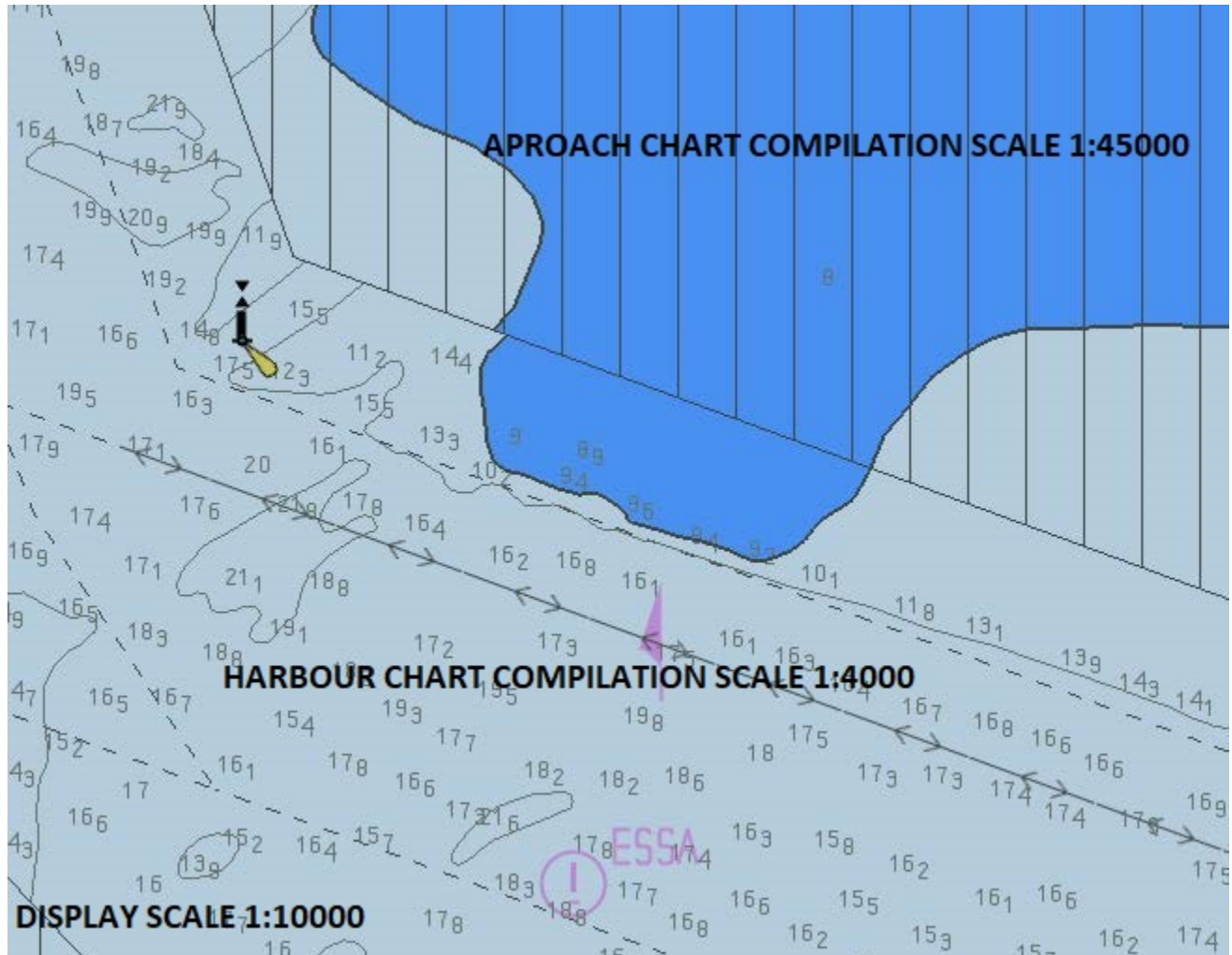
When deciding which ENC coverage to purchase, it is also helpful to be familiar with how the ECDIS in use determines which ENC cells to load based on different combinations of ENC scale and display scale. Different ECDIS types will use different ENC loading strategies which will affect how the data is displayed. By having an understanding of this, the mariner can reduce the risk that he will end up with the 'no data area' symbol described in Section 1.9 at the display scale required to navigate at in that area. ✓

There are occasions where displaying an ENC cell zoomed in to a larger scale is unavoidable. For instance, where a vessel is leaving port and heading outbound towards open waters the limit of the large scale 'harbour' ENC coverage will soon be reached, beyond which there is only smaller scale 'coastal' and 'approach' ENC coverage. ✓

As the vessel approaches this limit, it will come into view on the screen, which will still be zoomed to match the large scale 'harbour' ENC. At this point, the ECDIS should automatically load the smaller scale ENC cell which exists beyond this limit, displaying it at a larger scale in order to match the scale of the 'harbour' ENC. As this will result in enlarging the smaller scale ENC cell, the ECDIS should display an 'over scale area' warning symbol over the area of the chart display which is being enlarged. ✓

This warning symbol, consisting of a series of parallel vertical lines, should only appear where the smaller scale ENC cell is being enlarged by more than twice its compilation scale, as illustrated in the example below where three ENC cells of different scales are being displayed together on screen: ✓

DISPLAY SCALES



If the ECDIS operator chooses to zoom in manually to display an ENC cell at a larger scale, then the ECDIS will include an on-screen warning to the side of the chart display to indicate that the ENC data is being displayed over scale. The content of this warning will vary depending on how far the ENC data has been enlarged.



POSITION VERIFICATION

When paper charts were used, the frequency was heavily dependent on the hazards around the area of sailing. As a matter of fact, the frequency was such that the vessel could not run into danger during the interval between two fixes. At that time, without a position fixing, it is true, the Master was not aware of the vessel's position. Nowadays, the GNSS units constantly feed the ECDIS with position information and therefore the Master witnesses the vessel's position in real time. This is actually one of the main strong points of the ECDIS. Since the ship's position is "live" on a chart, spatial awareness is improved, making the decision making process simple and robust.

Taking into account the fact that the ship's position can be seen in real time, we should stop talking about position fixing. It should be called "position verification" since the position of the vessel is well known. In other words, the bridge watch keeper verifies that the vessel is indeed on the position appeared on the screen. Since the ECDIS consists of many parts, their harmonious interaction is verified. The bridge watch keeper has to verify that all of the following function harmoniously:

- the hardware (ECDIS unit)
- the software (the operating system, and ECDIS presentation software)
- and the data (ENCs, their corrections and GNSS signal).

To date there are no reports in the market for frequent ECDIS failures. In addition, as a piece of equipment its good working condition should be verified periodically, not constantly. Bearing in mind these two facts, it is not necessary for the position verification to be frequent. The following example will better illustrate the above statement. The steering gear is very important to safely navigate the vessel in confined waters. Yet, it is not tested every few minutes to verify its working condition. We rely on the pre-arrival test which is conducted many hours before the arrival at the port. The same applies to the main engine. It is tested ahead and astern before the arrival at the port and we rely on the test to safely enter a port.

The same should be applied on the ECDIS, particularly when the vessel is sailing in coastal waters/port approaches and the Master needs all the bridge team members to safely navigate his vessel. The accuracy of the system and its components should be tested periodically, not frequently. We should also take into account one more fact. In the era of the paper chart, the junior officers were only plotting position fixes on the chart and were unable to offer any other assistance to the Master. The position fixes were so frequent that in some instances they actually were not able to visually observe where the vessel was sailing, they were solely relying on the position plotted on the paper chart. If the same frequent intervals for position fixing are applied to the ECDIS, we will end up with the same bad practice, i.e., during the approach to a port, a junior deck officer solely takes the duty of position fixing and thus he minimises his input to the bridge team. In addition, the value of his duty is meaningless since the position of the vessel, as a piece of information, is already available to the Master.

Position verification methods include, but are not limited to, any or combination of the following methods:

- Visual observations
- Radar observations
- Parallel Index
- Radar Overlay⁴/ENC Underlay⁵
- Dilution of Precision (DOP) checking⁶
- Signal or Carrier to Noise Ratio (SNR or CNR).⁶

Whichever of the above methods the OOW may choose to verify the ship's position, it is necessary to mark the verification on the ENC. The methods available for plotting the verification on the ENCs vary depending on the options provided by each ECDIS maker. Options such as "Entering Position", "Event Mark", "User Map Editor" are just a few.

POSITION VERIFICATION

A plotted line on which a vessel is located, determined by observation or measurement of the range or bearing to an aid to navigation or other charted element. Two or more simultaneous observations can be combined to produce an estimate of the ship's current position. If the position is based on only two observations, it is an "estimated position" (EP); otherwise it is called a fix. A maximum of 6 observations can be entered to obtain a fix.

Default values for bearing and range are approximated from ship's current position information. The time of observation is stopped when the object is selected (or when the [Add] button is clicked). Click the [Add] box to include the observation in the fix computation. The counter shows "new/1", at the input of the second observation. The word "new" indicates that the observation currently displayed is not yet included in the fix computation, and it appears as a dashed line or ring on the chart. The added observations can be edited or deleted after selecting them at the counter. When at least two measurements are entered, the EP or fix is computed and the coordinates are shown in the top part of the dialog. To show a position symbol on the chart, click the [Record] button. In the case of an EP, the letters EP are shown on the right side of the coordinates. If a valid position estimate cannot be obtained, a message is displayed under the coordinates. This may happen, for example, if the lines / circles have multiple crossings that are far apart, or if two lines are nearly parallel or don't intersect at all. The accuracy limit (estimated standard error) is 1.0 NM. If the estimate is valid, the [Record] box can be clicked to record the current position estimate in the [Voyage] log. Discrepancy between LOP result and ship position is also recorded in the log (this information may be viewed by Info query on the position event symbol on the chart - which is displayed if position event display is on in chart display settings).

Time transfer: If the observations are not simultaneous, they should be transferred to a common time. Transferring is based on dead reckoning of ship movement. If a position line (or ring) is transferred, the letters TPL are shown beside its

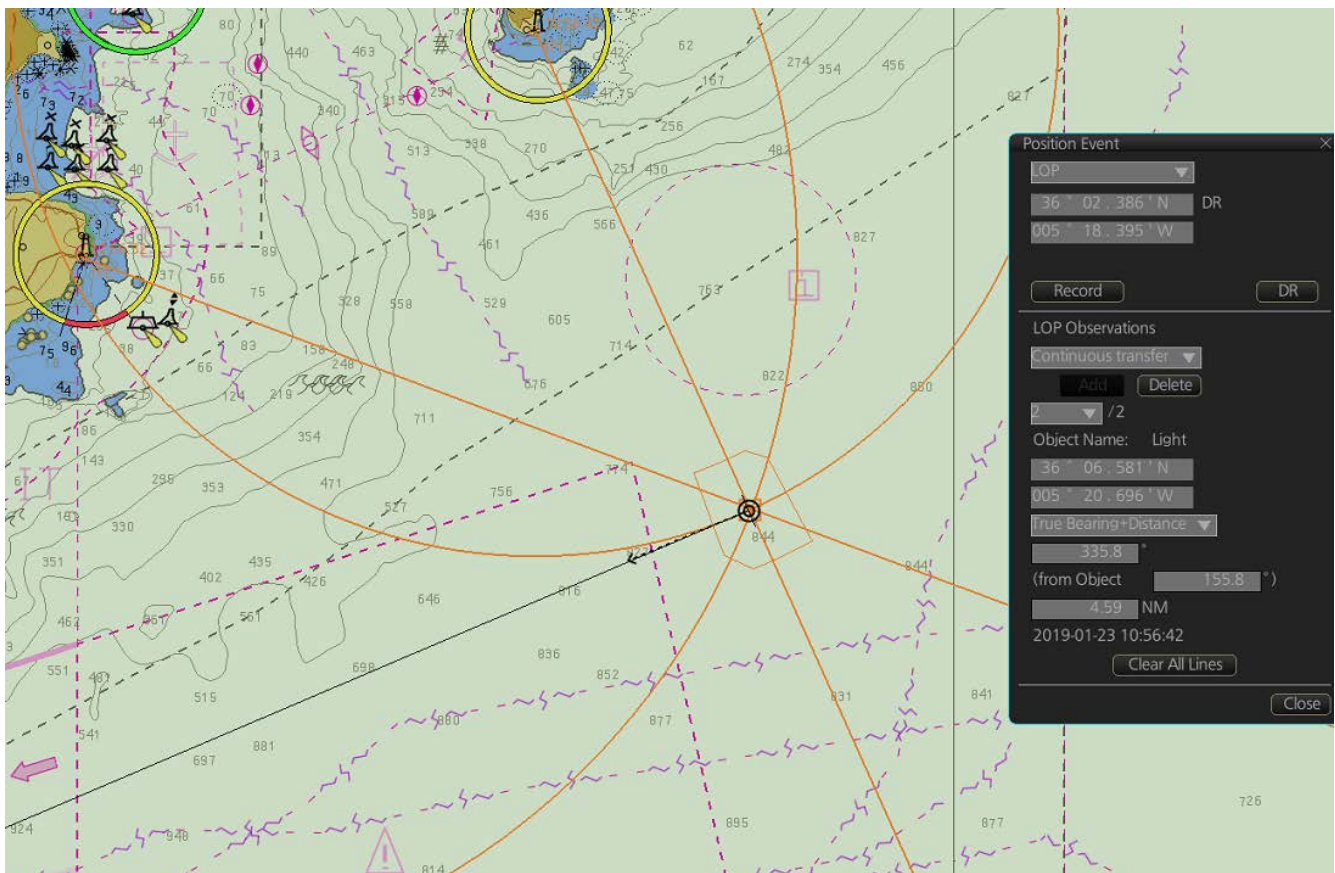
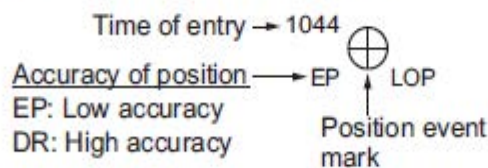
POSITION VERIFICATION

timestamp on the chart. The method of transfer may be selected in the bottom of the dialog. **Transfer to latest** transfers the measurements as if they were all made at the time of the newest measurement. **Continuous transfer** transfers all measurements to real time. **Transfer off** can be used to check where the measurement origins are. The position estimate and the record function follow the same logic, which means that Transfer off shows a position that has no relevance and Transfer to latest sends an old position to the [Voyage] log (timestamp in the log does not match the position).

If you are satisfied with the position shown in the latitude and longitude fields, then click the [Record] button to save the position observation to the Voyage log. If you wish you can also enter latitude and longitude values manually.


Timeouts: The observations cannot be used long after they were made because dead reckoning is inaccurate.

Click the [Record] button to put a position event at the LOP-calculated position. The position is recorded to the [Voyage] log.



Color of nav data indications and sensor name

The color of the nav data indications and sensor name change according to the state of the sensor data. The table shown below provides basic information. For detailed information, see Appendix 4. When no sensor data is received, the sensor source indication is blank. These indication methods comply with IEC62288 Ed.2.

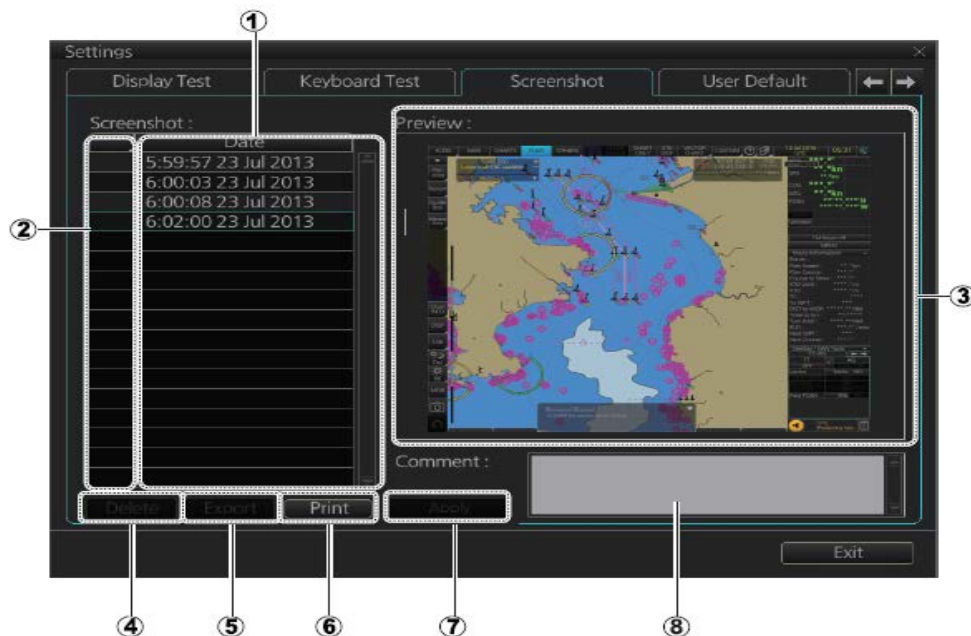
Nav data indication	Color of nav data indication	Color of sensor name	State
	Green	White	Sensor is normal.
	Yellow	White	Validity of data is low or offset is applied.
	Yellow-orange	Yellow-orange	Data is invalid.
	Green, data shown with asterisks (**.*)	No display	Data is not being received.
	Yellow	White	Data is input manually (dead reckoning).

Note: Depending on settings selected at installation, the integrity check (see section 18.7) result colors can be changed. In this case, nav data color changes according to status as follows:

- [Passed] or [Low Accuracy]: Green
- [Doubtful]: Yellow
- [Failed], [Excluded] or [Not Available]: Bright yellow

How to Take a Screenshot of the Display

Click the [Capture] button on the InstantAccess bar™ to take a screenshot and save it to the SSD (Solid State Drive). You can save a maximum of 100 screenshots. When the capacity for screenshots is reached, the oldest screenshot is automatically deleted to make room for the latest. In this case, delete unnecessary screenshots. You cannot take a screenshot when a menu or a dialog box is open. Screenshots can be copied to a USB flash memory. For how to process **screenshots**, see section 23.11.



No.	Name	Description
1	List	List of screenshots taken. Screenshots are automatically assigned a file name consisting of the time and date the screenshot was taken.
2	Check boxes	Put a checkmark in the box of the screenshot to process.
3	Preview	Preview of the screenshot selected.
4	[Delete] button*	Delete the screenshot(s) selected.
5	[Export] button*	Export selected screenshot(s) to a USB flash memory.
6	[Print] button	Prints the selected (checked) screenshot.
7	[Apply] button*	Save comment.
8	Comment box	Enter comment for screenshot. Put a check in appropriate checkbox then enter comment.

* Button does not appear until related action is completed.

If any questions regarding the operational use of the Furuno ECDIS, please take a screenshot and contact your Furuno NavSkills Training center or Furuuno Maritime Training at FMT@furuno.dk.

Familiarisation Exercise

1. Change the colour palette on the ECDIS using the control unit
2. Find and view the software version on the ECDIS
3. Find and adjust the "key beep" volume to 1
4. Change the UTC time to local time (UTC+4)
5. Start a keyboard test in the settings menu, and test the keyboard functions
6. Put the system in SILENT MODE
7. Change the display to CONNING display
8. Display the ON SCREEN keyboard
9. Locate the OPERATORS MANUAL and find the "Alert list"
10. Locate the "Chart Legend" - what are the optimal scale on your present chart
11. Reset the Kalman filter.
12. Set the chart to IMO base
13. Right click on the chart, open the "Object Info"
14. Locate the TT/AIS window in the Overlay/ NAV tools – Set the TT's to "OFF" on the ECDIS
15. Change the chart display to view the RASTER chart on the system
16. Change the chart display to view the VECTOR chart on the system
17. Change the NAV status in the TT/AIS tabs in the "MENU", to "moored"
18. Set the Ship to centre
19. Toggle between the operating modes to locate the "Public key" button
20. Toggle between the operating modes to locate the "Manage Data" button
21. Toggle between the operating modes to locate the "License" button
22. Toggle between the operating modes to locate the "Manual Update" button
23. Locate the Ship & Route Parameters in the menu
24. Set the "Default Line Radius" to 0,6 nm
25. Set the "Default Safety Margin" to 20 meters
26. Set the "Boundaries" to "Plain"
27. Calibrate the "TM Reset" to 70%
28. In Chart Display tick and untick "Four Shades"
29. Locate the "Chart Display" menu, tick the boxes – "Contour labels", "Spot Soundings" and "Depth contours"
30. Display the AIO overlay with "Temporary Notice" and "Preliminary Notice" in the Chart Display menu
31. In "Symbol Display" set the "Velocity Vectors" style to "Conventional" and tick the "Radar Antenna" box
32. In "Symbol Display" select to display - "Labels" – "Lines" – "Areas" – "Circles" for the User Charts
33. Set the "Own Ship Past Tracks" to "Primary", with style of "Points"- Length "60 min".
34. Set "Navigational Hazard" – "Seaplane landing area" – "Offshore production area" to give a warning
35. Set the Shallow Contour to 5 meters Set the Safety Depth to 9 meters Set the Safety Contour to 12 meters Set the "Depth contour" to 27 meters
36. Untick the AIO overlay with "Temporary Notice" and "Preliminary Notice"

37. Select IMO Standard
38. Select Four Shades
39. Set Boundaries to Symbolized
40. Select Scale MIN
41. Select Shallow Water Dangers
42. Select Highlight Date Dependent
43. Select Contour Labels
44. Select Spot Soundings
45. Select All isolated dangers
46. Select Depth Contours
47. Select Natural and Man-made Features
48. Select Port features
49. Select Miscellaneous
50. Select Important Text
51. Select Other text
52. Save your display in Profile 9
53. Display the Rings on the ECDIS
54. Display the Predictor to 60 seconds
55. Set the Anchor Watch "Drag circle" to 0,3 nm
56. Locate the USB FLASH and reinstall all licenses
57. Locate the Public key button. Display the content.
58. Delete the charts from Australia in the charts database. The Australian charts begin with AU
59. Locate the GB80001
60. Delete the ENC charts from Australia. The Australian charts begins with "AU"
61. Reinstall the ENC charts you just deleted
62. Find a Route plan, and display the charts covering the voyage.
63. Locate the system button and view the Synchronization settings for the system
64. Look at the colour legend to find chart related issues and status.
65. Locate the Auto Load function and install the AIO file from the USB Flash
66. Tick the NtoM AIO – "Preliminary", "Temporary and "No Information" in the menu, so the AIO information's are displayed on the chart
67. Set the NtoM AIO overlay to ALL
68. Scroll out on the chart to locate an area where a red AIO box appears
69. Right click on the box, select Pick report and read about the (T) or (P) info on present position
70. Right click, open chart legend and locate the T&P button
71. Locate Chart 1
72. Locate the Weather overlay function on the system
73. Load the Weather file from the USB flash over the Strait of Gibraltar
74. Display the Wind overlay for the area
75. Tick the colour and Arrow boxes
76. Tick the Isobar box
77. Run the time-line hour for hour, to see the weather change
78. Locate an interesting area and right click, select Weather info
79. Switch to Wave overlay

80. Open the MSG function on the system
81. Read the latest NAVTEX message
82. Open the Safety tab
83. Create a new safety message to all ship on both channel A and B - stating: Dead whale observed in port of Milford Haven on position 51°41'5N – 005°07'3W
84. Create manual position using LOP. Try all three types: Bearing, Distance and Bearing+ Distance.
85. Activate Dead Reckoning by LOP
86. Create a User Event and write" Pilot onboard" in description box.
87. Check your latest LOP, DR and User Event in your Voyage log
88. Show Track for the last 24 hours in the Voyage log
89. Change the time in the settings menu, to log positions every 2 hours
90. Set sensors from System to Local mode
91. Reset the Filter
92. Change the priority of the HDG in the sensor settings menu
93. Change the SPD stabilization mode to water
94. Reset the trip meter on the system
95. Make a backup on the route plans in the settings menu
96. Offset the EBL and VRM on the chart
97. Split the screen, and active the other window
98. Locate the Divider and make distance and bearing measurement on the chart
99. Activate the screen shot button and locate the picture, save the picture on the USB Flash
100.Change the Chart viewing dates to Auto

Voyage number _____ from _____ to _____ Date _____

	YES	NO	N/A
Is the Chart Display set up using safe settings for Safety Contour and Depth Contours in compliance with company Under-Keel-Clearance policy and with due regard to Trim, Heal, Squat Effect and prevailing weather conditions?			
Or is the Safety Contour set up to meet the UKC requirements in to the UKHO's "Guide to ECDIS implementation, policy and procedures" as described below? <ul style="list-style-type: none"> - In areas of charting CATZOC A1/A2, the UKC should be 10% of calculated draft - In areas of charting CATZOC B the UKC should be 15% of calculated draft - In areas of charting CATZOC C/D, the UKC should be 25% of calculated draft - In areas of un-assessed CATZOC, reference should be made to other sources of data accuracy (e.g. Pick report, source data diagram on ARCS or paper chart or Sailing Directions). 			
Is Viewing Date set to [AUTO]?			
Shallow Contour : _____m Safety Depth: _____m Safety Contour: _____m Deep Contour: _____m UKC Limit: _____m Current Draught: _____m	Pilotage		
Shallow Contour : _____m Safety Depth: _____m Safety Contour: _____m Deep Contour: _____m UKC Limit: _____m Current Draught: _____m	Confined Waters		
Shallow Contour : _____m Safety Depth: _____m Safety Contour: _____m Deep Contour: _____m UKC Limit: _____m Current Draught: _____m	Open Waters		
Has the Look ahead function been configured according to recommendation? In Confined waters, the length should be between 30 seconds and 2 minutes, 1 x beam In Coastal waters, the length should be between 12 to 15 minutes, 10 x beam In Open waters, the length should be between 30 and 60 minutes, 20 x beam			
Is Safety Contour selected as recommended?			
Is Navigation Hazard selected as recommended?			
Is Sounding UKC Limit selected as recommended?			
Is UKC Limit set to [ON]?			
Is UKC Limit set to the correct value?			
Is Current Draught set to [ON]?			
Is Current Draught set to the correct value?			

	YES	NO
Is the Chart Display set up to meet the minimum requirements of the IMO Standard display setting?		
Light Popup displayed?		
Attributes Display set to Text Box as recommended?		
Boundaries set for Symbolized?		
Four Shades selected as recommended?		
Full Light Lines displayed?		
Scale MIN displayed?		
Shallow Pattern displayed?		
Shallow Water Danger selected as recommended?		
Unknown displayed?		
Accuracy displayed?		
Highlight Date Dependent as recommended?		
Highlight INFO displayed?		
Highlight Document displayed?		
Contour Labels displayed?		
LAT/LON Grid displayed?		
Spot Soundings as recommended?		
Submarines Cables and Pipelines displayed?		
All Isolated Dangers as recommended displayed?		
Magnetic Variation displayed?		
Depth Contours displayed?		
Seabed displayed?		
Tidal displayed?		
Natural and Man-made Features displayed?		
Port Features displayed?		
Miscellaneous displayed?		
Important Text displayed?		
Names displayed?		
Light Description displayed?		
Nature of Seabed displayed?		
Magnetic Variation and Swept Depth displayed?		
Height of Islet or Land Feature displayed?		
NtoM displayed?		
Others displayed?		

It is crucial for the safety of navigation that the Navigator checks all settings in the ECDIS **Chart Display**, the **Chart Alert** and the **Look Ahead** functions at the beginning of each navigational watch.

When the personalized display settings in Profiles are being used, then a screenshot of each of the personalized Profiles should be created and the configuration of each Profile should be verified at regular intervals.

Navigation Officer of the watch

Chart Display checked by Master
(If applicable)

FMD 3X00 ECDIS – Pre-Monitor and change of watch - Checklist

Voyage number _____ from _____ to _____ Date _____

	YES	NO	N/A
Is Chart Viewing date set to AUTO?			
Is the ENC Charts updated with latest temporary and preliminary notices from e.g. NAVTEX			
Is the Route Plan checked both visually and using the ECDIS's automatic check function before going to monitor mode – as recommended?			
Please write the name of the present Route Plan(s) to be used for this voyage <i>Route Plan:</i> _____ <i>Route Plan:</i> _____ <i>Route Plan:</i> _____			
Please write the name of the present User Chart(s) to be used for this voyage <i>Route Plan:</i> _____ <i>Route Plan:</i> _____ <i>Route Plan:</i> _____			
Is the Route plan in monitor mode?			
Is the User Chart in monitor mode?			
Is the Chart Display set up according to company policy (Please see ECDIS Chart Display Checklist			
Is the Look Ahead Area active?			
Is GPS1 input checked and found in order?			
Is GPS2 input checked and found in order?			
Is Gyro1 input checked and found in order?			
Is Gyro2 input checked and found in order?			
Is Speed Log input checked and found in order?			
Is AIS input checked and found in order?			
Is Radar Overlay checked and found in order?			
Voyages lasting more than one week	Date	Week	
If available: ENC Charts updated with latest Base and Update DVD/CDs/download?			
If available: ENC Charts updated with latest AIO DVD/CD/download?			
ENC Charts updated with latest with latest temporary and preliminary notices from e.g. NAVTEX			

Navigation Officer of the watch

Master
(If applicable)

Voyage number _____ from _____ to _____ Date _____

	YES	NO	N/A
ENC Charts updated with latest AIO CD/DVD/download?			
ENC Charts updated with latest temporary and preliminary notices from e.g. NAVTEX			
Viewing Dates: use [Single Date] or [Date Range] with correct start and end date for planning of your up-coming voyage			
Is the route prepared using safe settings for Draught, Safety Contour and Depth Contours in compliance with company Under Keel Clearance policy and with due regard to Squat Effect (Including Trim & Heel)? Safety Contour Planning: _____ m			
Is the route prepared in compliance with company Under Keel Clearance policy and with due regard to Squat Effect (Including Trim & Heel)? UKC Limit: _____ m			
Is the route prepared with vessel's correct draught?			
XTD Limits set to a minimum of 2 nautical miles at open sea (If possible)?			
Calculated ETA in route planning tool using present departure date?			
User Chart created and/or updated for the voyage?			
Is relevant Parallel Index prepared?			
It is recommended to check to Route Plan using IMO AII. When the Route Plan check is completed, the operator should re-select the Company approved Chart Display with all relevant settings.			
Is the Route Plan checked both visually and using the ECDIS's automatic check function? – as recommended?			
Is the Route Plan rectified for Safety Contour alerts? – as recommended?			
Route plan checked together with User Chart using voyage specific Safety Contour?			
Has the Route Plan's Check Result been read and evaluated?			
Print Passage Plan Report?			
Alert Parameters selected for planning this route:	Selected	Off	
Safety Contour			
Navigational Hazard			
Areas To be avoided			
User Chart Danger			
Traffic Separation Zone			
Inshore Traffic Zone			
Restricted Area			
Caution area			
Offshore Production Area			
Military Practice Area			
Seaplane Landing Area			
Submarine Transit Lane			
Anchorage Area			
Marine Farm / Aquaculture Area			
PSSA Area			
No Vector Chart?			
UKC Limit?			
Sounding UKC Limit?			
Non-official ENC?			
Not Up-to-date?			
Permit Expired?			

Navigation Officer of the watch

Route Plan checked by Master
(If applicable)

Vessel information M/S Martha.

**PILOT CARD
&
WHEEL HOUSE POSTER**

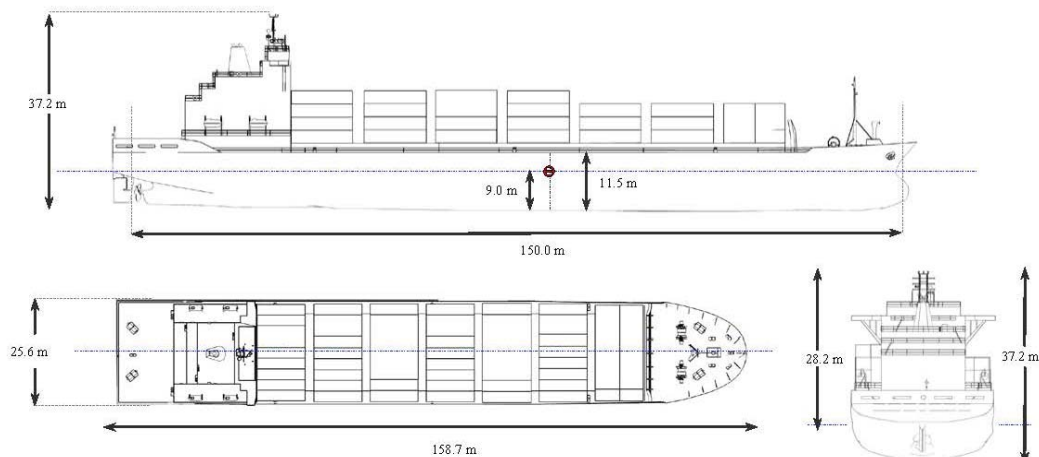


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Revision : 01/12
Date : 09/02/12



SHIP'S PARTICULARS

Name: S/S Martha		Call Sign: VRU7/ LASL4/3E117		MMSI: 355074000		
Length (O.A): 158.7 m		Length (B.P): 150.0 m		Beam: 25.6 m	Max Height: 37.2 m	Air Draft(B): 29.8 m
Propulsion:	Diesel, Single Right Hand FPP			Power: 9730 KW		
Steering:	Rudder Type: Semi balanced, Max Angle: 35°					
Thruster:	Bow Thruster x 1 / 670 KW Stern Thruster: None					
BALLAST	Displacement: 9235 MT		Deadweight: 2818 MT		Draft (F): 4.73 m (A): 7.40 m	
PARTLY LOADED	Displacement: 16980 MT		Deadweight: 10560 MT		Draft (F): 6.50 m (A): 7.80 m	
LOADED	Displacement : 21735 MT		Deadweight: 15316 MT		Draft (F): 9.0 m (A): 9.0 m	



The information contained herein is proprietary to ARI