Section 7 True and False Echoes on Display

The radar operator has a role of interpreting the radar displays to provide his best aid in maneuvering the ship.
For this purpose, the operator has to observe the radar displays after fully understanding the advantages and disadvantages that the radar has.
For better interpretation of radar display, it is important to gain more experiences by operating the radar equipment in fair weathers and comparing the target ships watched with the naked eyes and their echoes on the radar display.
The radar is mainly used to monitor the courses of own ship and other ships in open seas, to check buoys and other nautical marks when entering a port, to measure own ship's position in the coastal waters relative to the bearings and ranges of the shore or islands using a chart, and to monitor the position and movement of a heavy rain if it appears on the radar display.
Various types of radar display are explained below.

7.1 Radar Wave with the Horizon

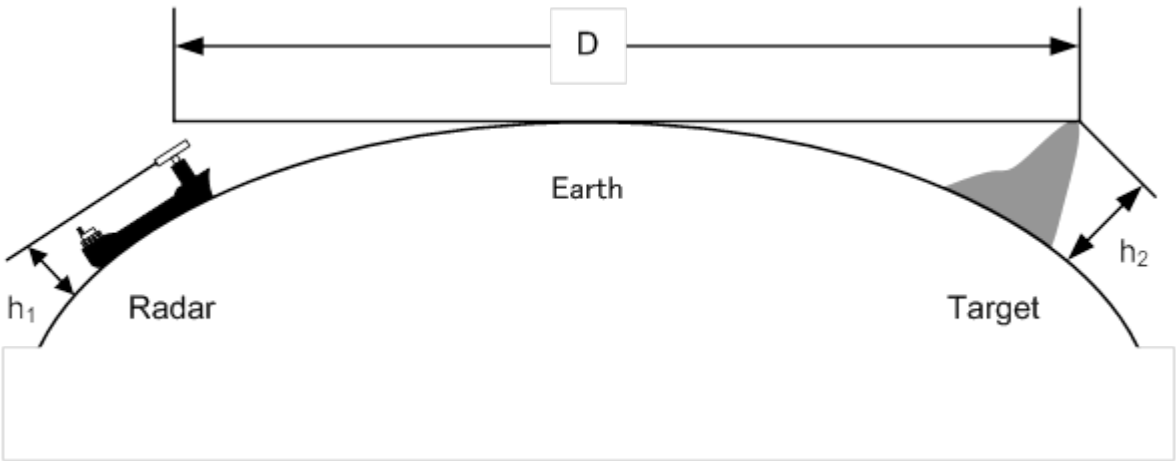
Radar beam radiation has the nature of propagating nearly along the curved surface of the earth. The propagation varies with the property of the air layer through which the radar beam propagates. In the normal propagation, the distance (D) of the radar wave to the horizon is approximately 10% longer than the distance to the optical horizon. The distance (D) is given by the following formula:

$D = 2.23(\sqrt{h_1} + \sqrt{h_2})$ (NM)

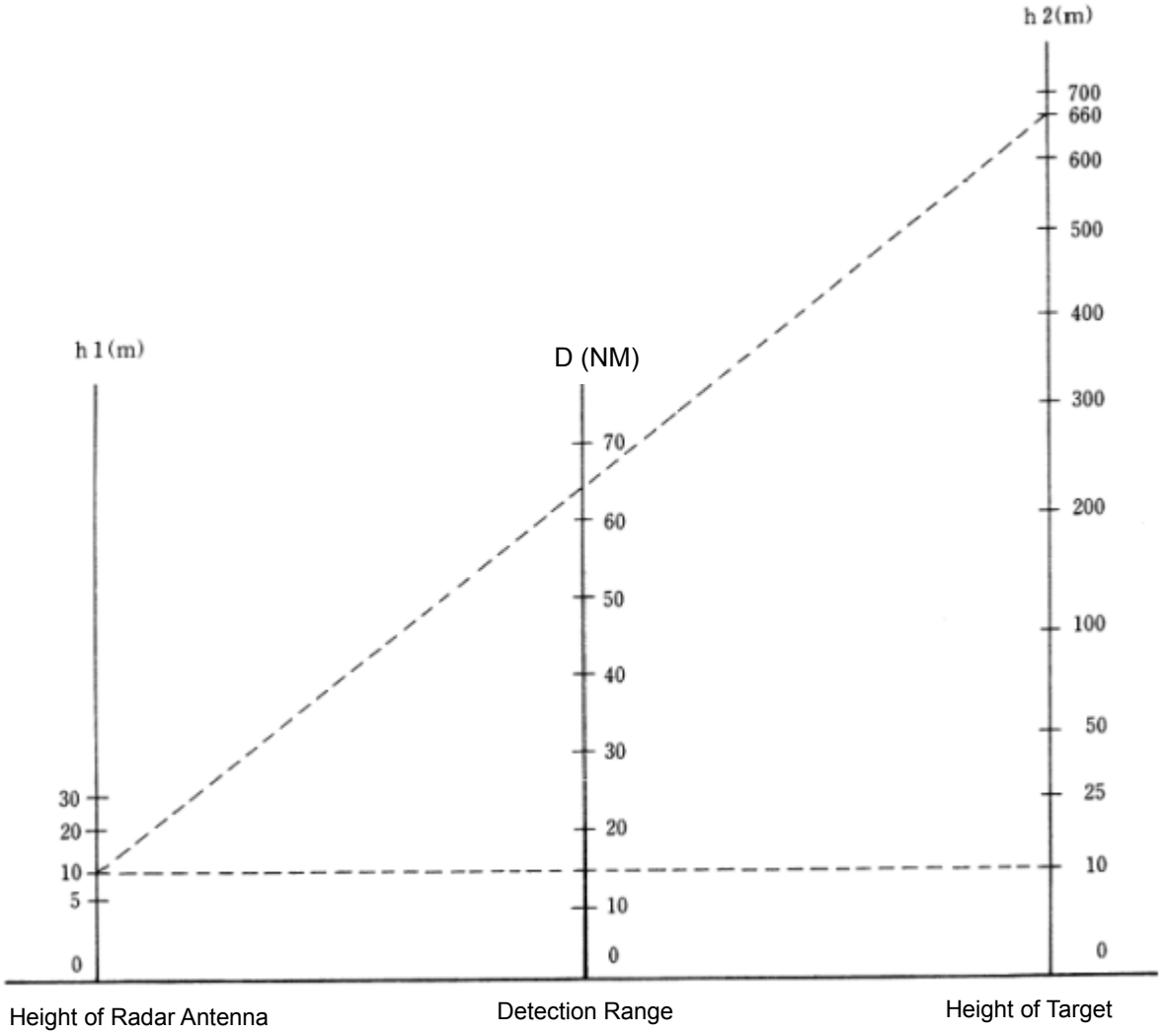
h_1: Height (m) of radar antenna above sea level

h_2: Height (m) of a target above sea level

The following figure illustrates a diagram for determining the maximum detection range of a target that is limited by the curve of the earth surface in the normal propagation.



Radar Wave with the Horizon



Maximum Radar Range

When the height of own ship's radar antenna is 10 m for instance,

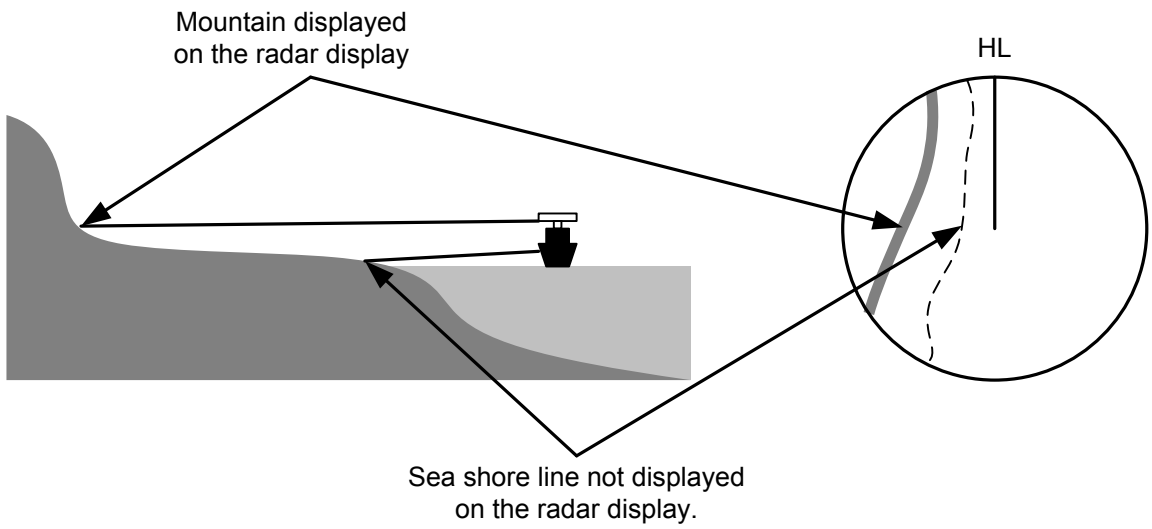
(1) A target that can be detected at the radar range of 64 NM on the radar display is required to have a height of 660 m or more.

(2) If the height of a target is 10 m, the radar range has to be approx. 15 NM.
However, the maximum radar range at which a target can be detected on the radar display depends upon the size of the target and the weather conditions, that is, the radar range may increase or decrease depending upon those conditions.

7.2 Intensity Reflected from the Target

The signal intensity reflected from a target depends not only on the height and size of the target but also on its material and shape. The echo intensity from a higher and larger target is not always higher in general.

In particular, the echo from a coast line is affected by the geographic conditions of the coast. If the coast has a very gentle slope, the echo from a mountain of the inland like the figure below appears on the radar display. Therefore, the distance to the coast line should be measured carefully.



Sea Shore Line Not Displayed on the Radar Display

The next table shows the relation between the target detection range and the radar reflection cross-sectional area (RCS) with regard to the type and the height of the target in a situation in which the weather is good, the sea state is calm and the radio wave propagation is normal. As revealed by this table, even on the same sea shore line, detection range greatly differs depending on the height of the target from the surface of the sea. Furthermore, because the target detection range is greatly influenced by the shape and material of the target and environmental conditions, such as the sea state, weather, and radio wave propagation, caution should be taken when detecting range of target.

Relation between Type and Height of Target and Detection Range and RCS

Type of target	Height from sea surface (m)	Detection range (NM)		RCS (m²)	
		X band	S band	X band	S band
Sea shore line	60	20	20	50,000	50,000
Sea shore line	6	8	8	5,000	5,000
Sea shore line	3	6	6	2,500	2,500
SOLAS target ship (>5000GT)	10	11	11	50,000	30,000
SOLAS target ship (>500GT)	5	8	8	1,800	1,000
Small boat with IMO standard compatible radar reflector	4	5.0	3.7	7.5	0.5
Marine buoy with corner reflector	3.5	4.9	3.6	10	1
Standard marine buoy	3.5	4.6	3.0	5	0.5
10-meter small boat without radar reflector	2	3.4	3.0	2.5	1.4
Waterway location beacon	1	2.0	1.0	1	0.1

Note

Detection range shown in the above table may greatly decrease depending on the shape of the target, sea state, weather and radio wave propagation conditions.

7.3 Sea Clutter and Rain/Snow Clutter

In addition to the echo required for observing ships and land, radar video image also includes undesirable echo, such as reflection from waves on the sea surface and reflection from rain and snow. Reflection from the sea surface is called "sea clutter," and reflection from rain and snow is called "rain and snow clutter," and those spurious waves must be eliminated by the clutter rejection function ([Signal Process]-[Video Noise Rejection] in the Menu. (Refer to "18.3 Performing basic adjustments on the radar".)

7.3.1 Sea clutter

Sea clutter appears as an image radiating outwardly from the center of the radar display and changing depending on the size and the shape of waves. Generally, as waves become larger, image level of the sea clutter is intensified and the clutter far away is also displayed. In this case, it is difficult to distinguish sea clutter from a small boat whose reflection intensity is weak. Accordingly, it is necessary to properly adjust the sea clutter rejection function.
The following tables show the relation between the sea state (SS) showing the size of waves generated by wind and the radar's detection probability.

Sea State and Probability of Target Detection

RCS	SS1 to 2	SS2 to 3	SS3 to 4	SS4 to 5
0.1 m^2	V	V-M	M-NV	
0.5 m^2	V	V	V-M	M-NV
1 m^2	V	V	V	V-M

S band radar (probability to detect a target at a range of 0.4 NM)

RCS	SS1 to 2	SS2 to 3	SS3 to 4	SS4 to 5
1m^2	V-M	M-NV		
5 m^2	V	V-M	M-NV	
10 m^2	V	V	V	V-M

X band radar (probability to detect a target at a range of 0.7 NM)

V: Detection probability of 80 %
M: Detection probability of 50 %
NV: Detection probability of less than 50 %

As shown in the following table, the number of SS increases as the wind speed becomes high and the waves become large. The tables in the previous page show that detection probability decreases from V (80 %) to NV (less than 50 %) as the number of SS increases. Therefore, even if the sea state is calm and a target clearly appears on the radar display, when the sea state becomes rough, target detection probability decreases resulting in difficulty of target detection by the radar.

Relation between Douglas Sea State and Average Wind Speed and Significant Wave Height

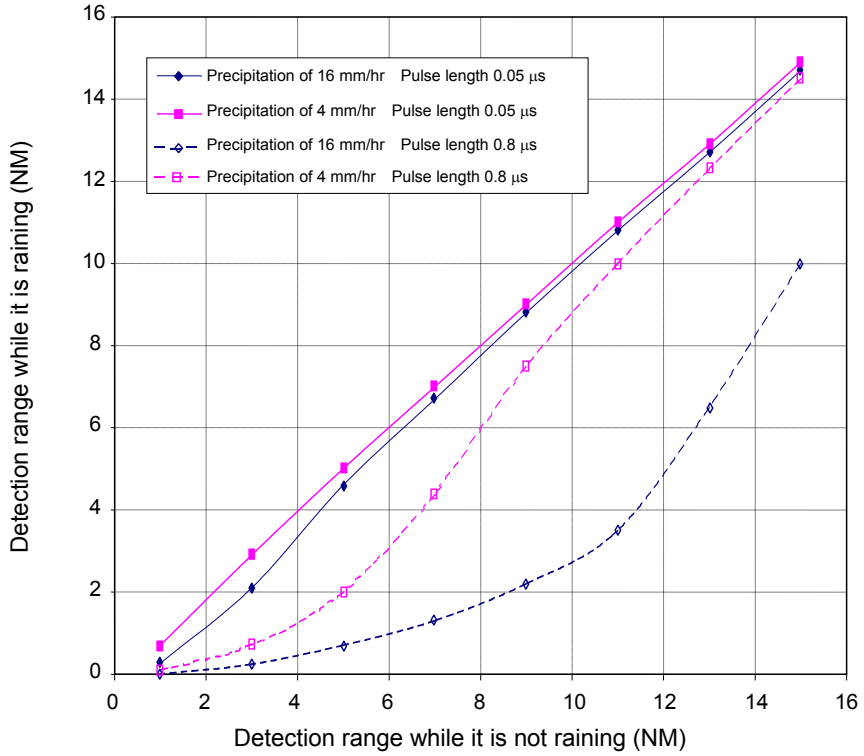
Sea state	Average wind speed (kn)	Significant wave height (m)
0	<4	<0.2
1	5-7	0.6
2	7-11	0.9
3	12-16	1.2
4	17-19	2.0
5	20-25	3.0
6	26-33	4.0

Significant wave height: an average of top N/3 higher waves when the number of waves detected within a constant time duration is N

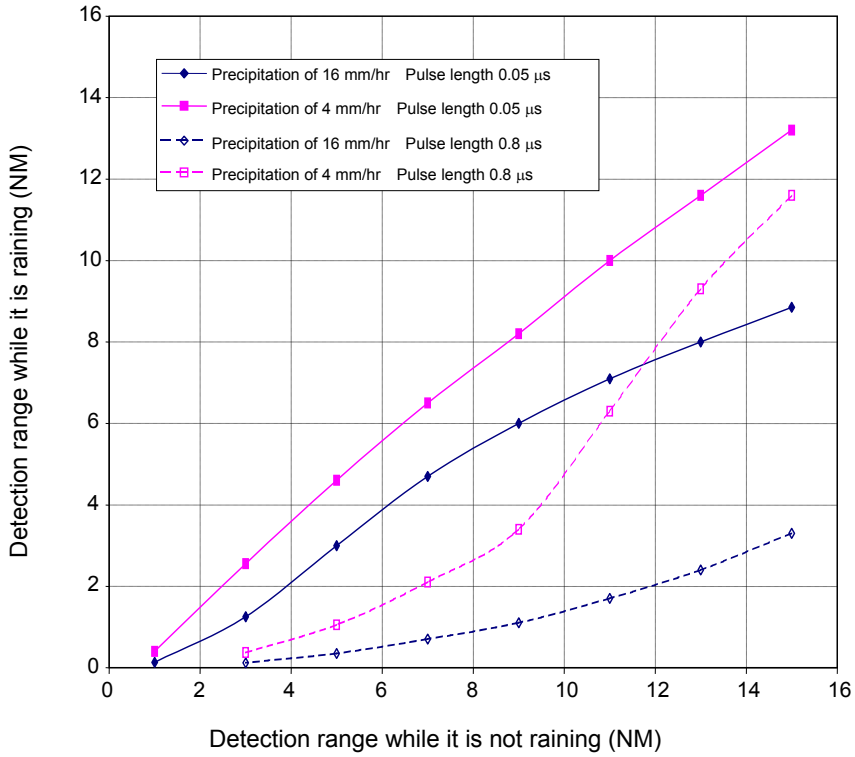
For example, in the case of a standard marine buoy, RCS of X band radar is 5 m^2 as shown in the Table “Relation between Type and Height of Target and Detection Range and RCS” on Page 7-4. When observing such a target in the sea state (SS3) in which significant wave height exceeds 1.2 meters, detection probability is M-NV, as shown in the Table on page 7-5, which indicates 50 % or less.

7.3.2 Rain and snow clutter

Rain and snow clutter is a video image that appears in a location where rain or snow is falling. The image changes according to the amount of rain (or the amount of snowfall). As precipitation increases, the image of rain and snow clutter becomes intensified on the radar display, and in the case of localized heavy rain, an image similar to the image indicating land is displayed in some cases. Furthermore, because radio waves tend to attenuate due to rain and snow, the ability to detect a target in the rain and snow clutter or a target beyond the rain and snow clutter may decrease. The amount of attenuation depends on the transmission frequency, antenna beam width, and the pulse length. The following 2 graphs show examples in which detection range is reduced due to the influence of precipitation. Because of this, a target, which clearly appeared up to 10 NM by an X band radar (pulse length of 0.8 μs) when it was not raining, may become dimly visible up to 5 NM when the amount of rain becomes 4 mm/hr. Furthermore, when comparing the X band radar with the S band radar, target detection range decreases less when an S band radar is used, which means it is influenced less by precipitation.



Decreased Target Detection Range by S Band Radar due to Precipitation



Decreased Target Detection Range by X Band Radar due to Precipitation

Note

Under rain, the targets that enter within sea clutter may be more difficult to detect.

7.3.3 Coping with sea clutter and rain/snow clutter

When the weather is bad and the ocean is rough, the use of an S band radar is effective because the radar is not influenced by sea clutter so much and attenuation due to rain drops is small. When an X band radar is used, reducing the pulse length will reduce the influence by undesired signal, and also the undesired signal rejection function effectively works; therefore, the use of short pulse is effective when the weather is bad. The effect of undesired signal control can be enhanced further by setting the various items on the RADAR process dialog box that is displayed by clicking the RADAR signal processing setting button.

By using the observation scene selection function that is described above, a suitable setting value can be retrieved according to various conditions such as weather (in the case of storm it is recommended to set a value for Storm or Rain).

For the description of the observation scene button, refer to "5.3.7 Adjusting to optimal images (Selection of observation scenes)". While these settings are effective, targets, particularly, those that move at high speed may not be recognized visually.

7.4 False Echoes

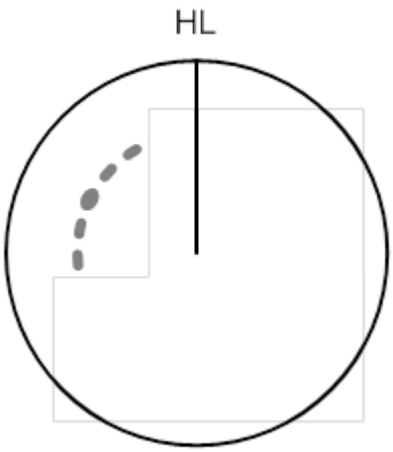
The radar observer may be embarrassed with some echoes that do not exist actually. These false echoes appear by the following causes that are well known:

7.4.1 Shadow

When the radar antenna is installed near a funnel or mast, the echo of a target that exists in the direction of the funnel or mast cannot appear on the radar display because the radar beam is reflected on the funnel or mast. Whether there are some false echoes due to shadows can be checked monitoring the sea clutter, in which there may be a part of weak or no returns. Such shadows appear always in the same directions, which the operator should have in mind in radar operation.

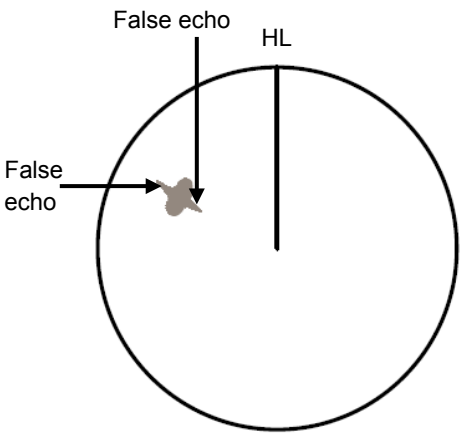
7.4.2 Side lobe effect

A broken-line circular arc may appear at the same range as the main lobe of the radar beam on the radar display. This type of false echo can easily be discriminated when a target echo appears isolated.



False Echoes

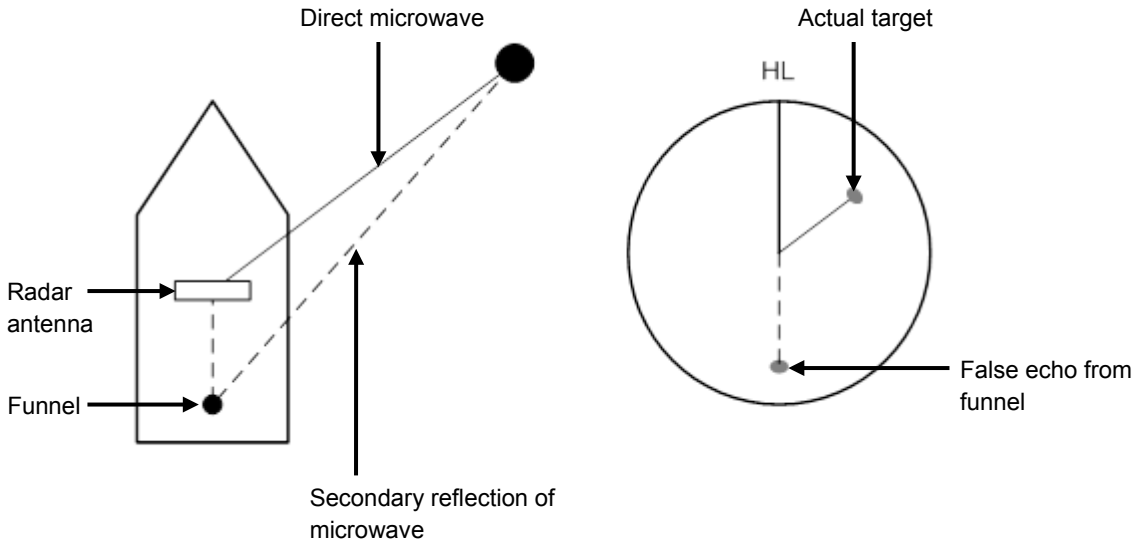
When a radar antenna for the solid-state radar is connected, a false echo may occur in the range direction of the target image. This false echo normally means a range side lobe, which is generated as a result of pulse compression processing when a large target such as a vessel is at a short distance.



Range Side Lobe

7.4.3 False echo by secondary reflection

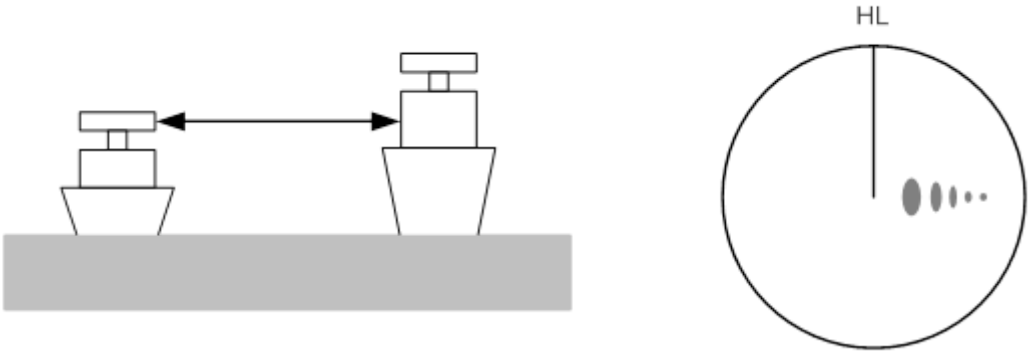
When a target exists near own ship, two echoes from the single target may appear on the radar display.
One of those echoes is the direct echo from the target and the other is the secondary reflection from a mast or funnel that stands in the same direction as shown in the following Figure.



Example of false echo by secondary reflection

7.4.4 False echo by multiple reflection

When there is a large structure or ship with a high vertical surface near own ship as shown in the following Figure, multiple refection may appear on the radar display. These echoes appear in the same intervals, of which the nearest echo is the true echo of the target.



False Eco by Multiple Reflection

7.4.5 Second time echoes

The maximum radar detection range depends upon the height of the radar antenna and the height of a target as described in the section "7.1 Radar Wave with the Horizon". If a so-called "duct" occurs on the sea surface due to a certain weather condition, however, the radar beam may propagate to an abnormally long distance, at which a target may be detected by the radar.

For instance, assuming that the transmitter pulse length is MP3 (on the repetition frequency of 1400 Hz), the primary pulse is reflected about 58 NM or more away from a target and received during the next pulse repetition time. In this case, a target image appears as a false echo (second time echo) at a position that is about 58 NM less than the actual range on the radar screen.

If the false echo appears at 5 NM on the radar display, the true range of the target is 5 + 58 = 63 NM.

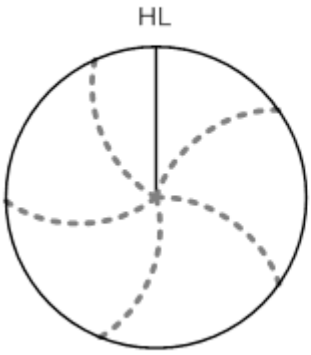
On the transmitter pulse length is SP1 (on the repetition frequency of 2250 Hz), a false echo may appear at a position that is about 36 NM less than the actual range.

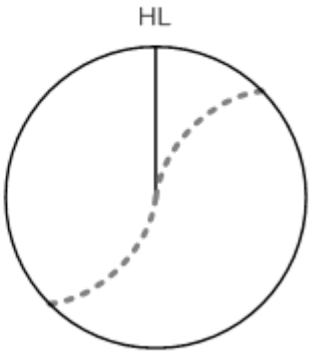
This type of false echo can be discriminated by checking the change of the target range by switching the transmitted pulse length (the repetition frequency).

False echoes can be suppressed by setting [Economy] to [TXRX] - [TXRX] - [PRF] on the Settings menu or setting ON in [TXRX] - [TXRX] - [Stagger Trigger]. (For the details, refer to "18.6 Setting up Radar Antennas".)

7.4.6 Radar interference

When another radar equipment using the same frequency band is near own ship, a radar interference pattern may appear on the radar display. This interference pattern consists of a number of spots which appear in various forms. In many cases, these spots do not always appear at the same places, so that they can be discriminated from the target echoes.





If radar equipment causing an interference pattern and this equipment are of the same model, their transmitting repetition frequency is nearly the same. As a result, interference patterns may be displayed concentrically.

In this case, since the interference patterns cannot be rejected by using only the interference rejection function, fine-tune the transmitting repetition frequency. (Refer to "18.6 Setting up Radar Antennas")

By applying different transmitting repetition frequencies, the interference rejection effect can be improved.

7.5 Radar Transponder (SART) Screen Display

SART is life-saving equipment that was approved by GMDSS and is used for detecting positions of survivors who suffer from distress accidents. SART, which operates under the frequency band of 9GHz, receives a radar wave of 9GHz that is launched from the radar of the rescue boat or plane and generates a series of response signals to notify the accident position to the searchers.
Set the equipment to the following in order to receive SART signals. Use the settings for SART reception for detecting beacons and target enhancers also.

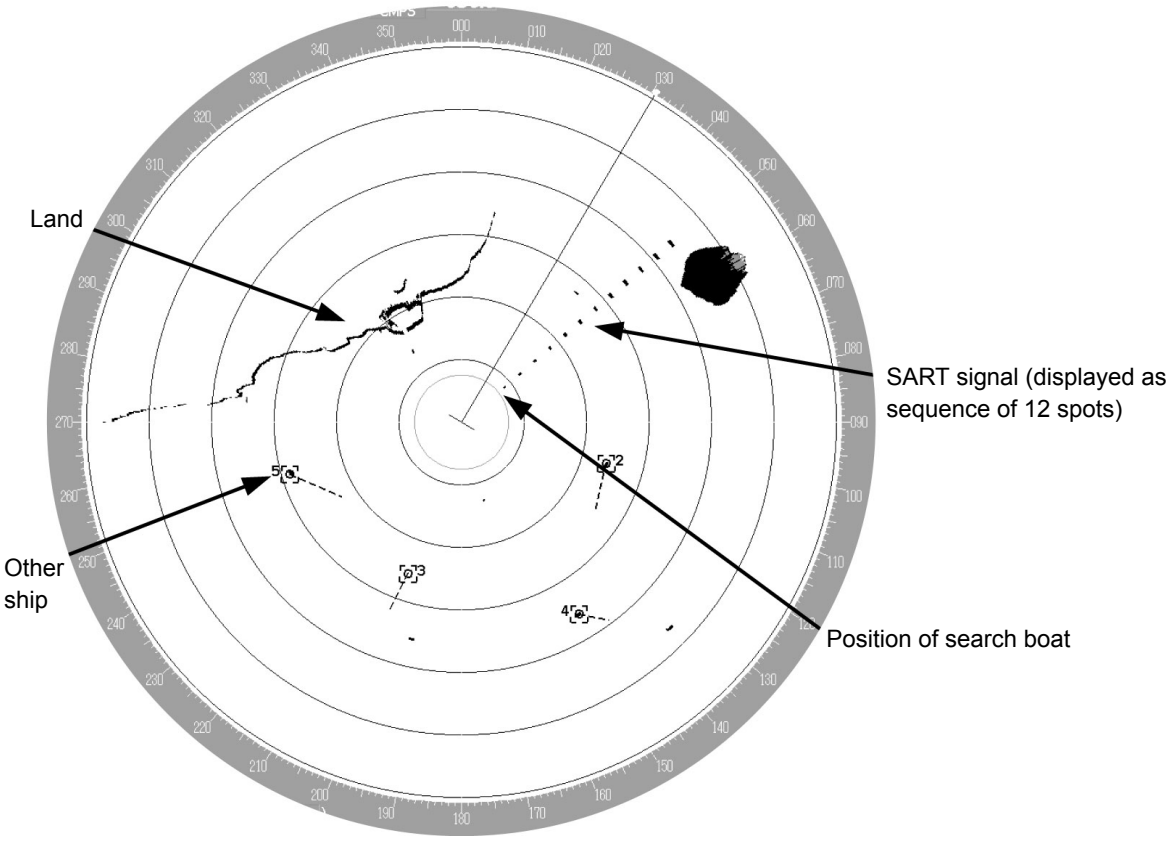
1 **Set the range scale to [6 NM] or [12 NM] by using the Range Scale button on the RADAR screen.**

2 **Set to ON the settings of [Echo]-[Signal Process]-[SART] in the Settings menu (Select the check box.).**

Note
The SART setting check boxes are not displayed at connection of a solid-state radar antenna.

The SART display mode is set to ON. In this case, the following items in the Settings menu are automatically changed to the values as indicated in the table below.
For the settings of SART, refer to “18.3 Setting Radar Signal Processing”

Setting item	Setting value
Sea (Sea clutter control)	In MAN (manual) mode, the value is changed to 0 (minimum value) and in AUTO (automatic) mode, the mode is changed to MAN and the value is changed to 0 (minimum value).
Rain (rain/snow clutter control)	
Manual Tune (Tuning)	Off (Set tuning to Off to weaken clutter display)
IR (Interference removal)	Off
Echo Process (Image processing)	Process Off



Note

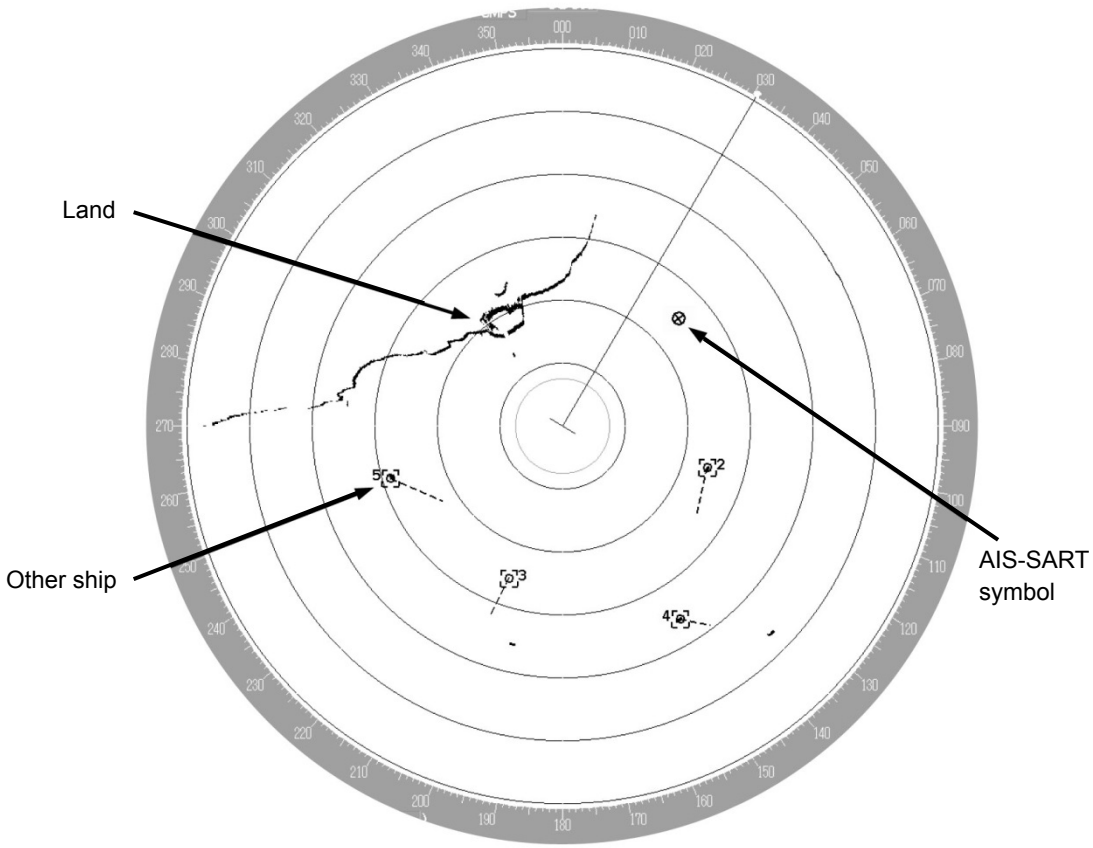
- When the SART display mode is set to ON to detect SART signals, small targets around own ship may no longer be displayed on the radar screen. Therefore, implement sufficient monitoring for the periphery of own ship to prevent collision and grounding. When multiple radars are installed, use one 9GHz-band radar for detection of SART signals and use other radars as normal radars for collision prevention, monitoring of targets in periphery of own ship, prevention of grounding, and checking of own ship's position.
- After termination of SART signal detection, set the SART display mode to OFF (Uncheck the check boxes of [Echo]-[Signal Process]-[SART] in the Settings menu). The radar is reset to the normal navigation mode.

7.6 Display of AIS-SART

AIS-SART is a device to display data relating to the position of the ship in distress on the AIS display unit of the ship station and coast radio station which install the AIS.
This device can be applied instead of Radar Transponder (SART).
When connecting this device with the AIS, AIS-SART symbols can be also displayed on the radar screen.

7.6.1 Radar screen display example

If receiving AIS-SART signals from its device, an AIS-SART symbol is displayed on the radar screen.

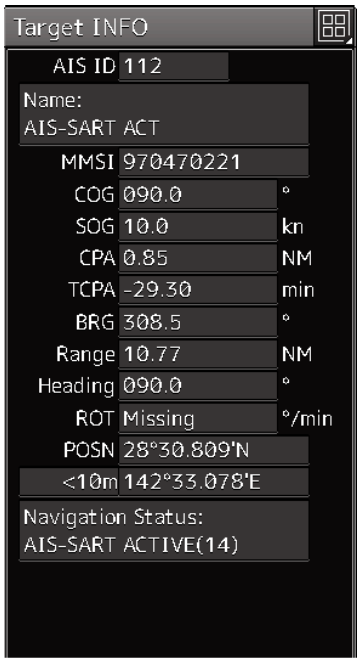


Example of AIS-SART Symbol Display

*For the details of AIS-SART symbols, refer to "6.3.3 Types and Definitions of AIS Target Symbols".

7.6.2 Numeric data display example

When the AIS-SART symbol is clicked on while it is displayed, AIS-SART numeric data is displayed in the Target Info on the information monitoring window.



Example of AIS-SART Numeric Data Display

The following are displayed in Navigation Status area according to operating conditions:

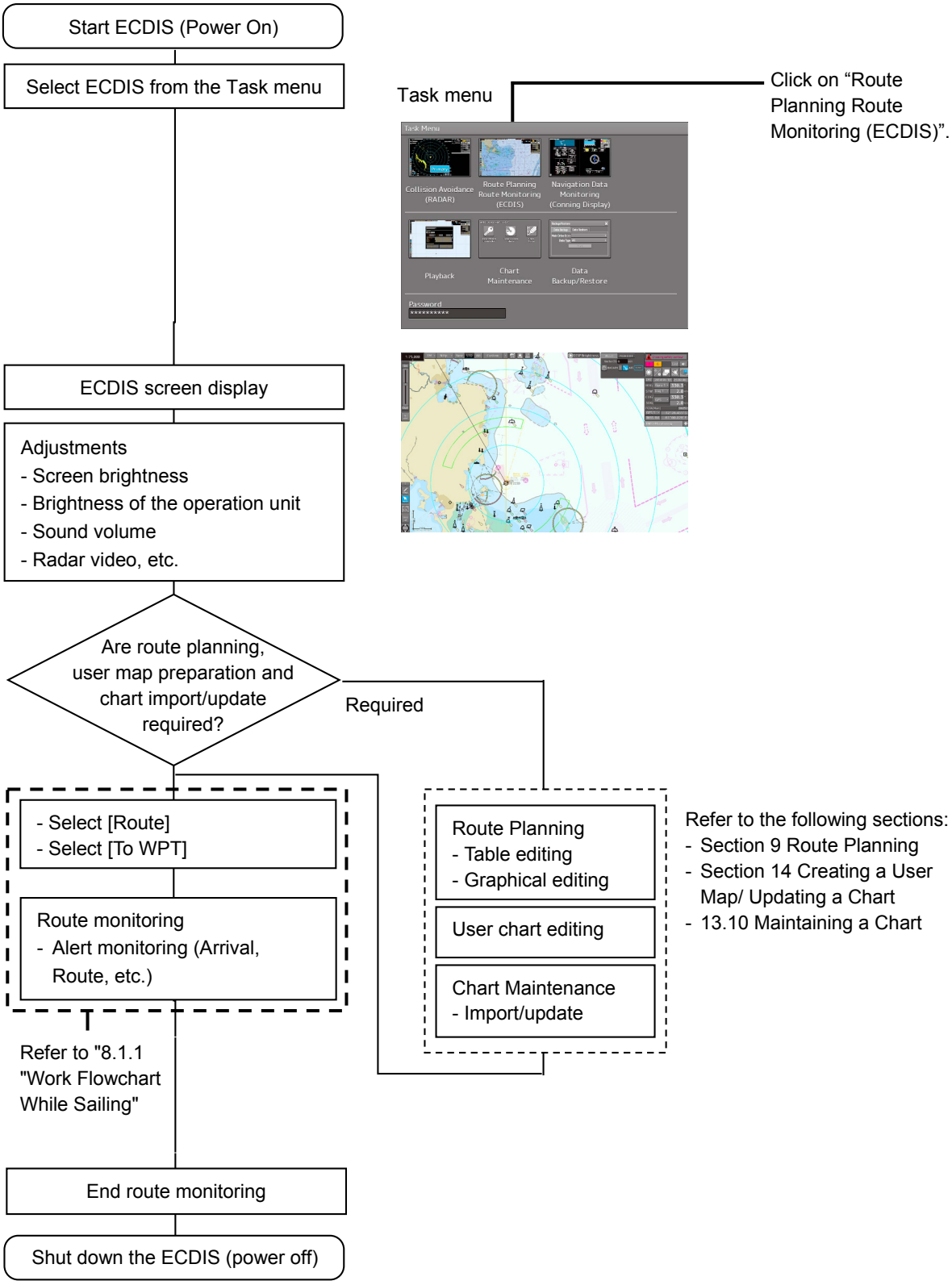
- Normal operation: AIS-SART ACTIVE (14)
- Trial operation: AIS-SART TEST (15)

If displaying "AIS-SART TEST (15)", it indicates that the AIS-SART operation test is performing.

Section 8 Functions of the ECDIS (Option)

8.1 General Flowchart

A general flowchart of sailing using the ECDIS is shown.



8.1.1 Work Flowchart While Sailing

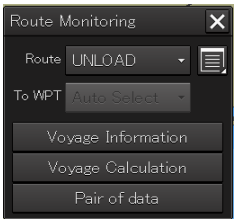
Sailing start

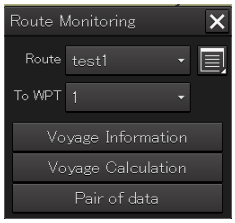
Display the "Route Monitoring" dialog box

Click [Route Monitoring] on the menu.

Select [Route]

Select the route to be used. (Initially, UNLOAD is being displayed.)



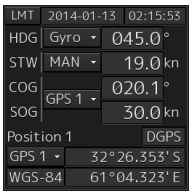


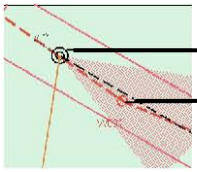
Select a waypoint

Select a waypoint from [To WPT].

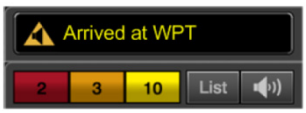
Move own ship to the waypoint

Navigate own ship along the route.





Route monitoring ("Arrived at WPT" alert is activated when arrived at the WPT.)

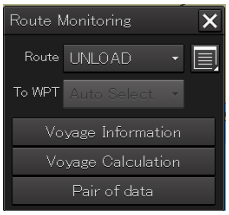


When the ship arrives at the WPT, an "Arrived at WPT" alert is activated and the next WPT is updated.
After confirming the alert, click on the [ALERT ACK] (alert acknowledgment) button and stop the alert.

Just before the arrival at the final destination (“End Of Track” alert is issued)

The “End of Track” alert is issued just before the arrival of the ship at the final destination.
After confirming the content of the alert, click on the [ALERT ACK] button and stop the alert.

Select [UNLOAD] from [Route] and finish route monitoring.



End of sailing

8.2 Starting and Preparing the ECDIS

8.2.1 Powering on and starting

The ECDIS is powered on according to the following procedure.

⚠CAUTION	
	Do not leave a disk in the DVD drive. This may result in a drive problem.
	In the case of turning on the power under the condition of low temperature, do pre-heat more than 30 minutes. The equipment may not be operated normally. And accidents may result.

1 Press the Power ON button on the operation unit.

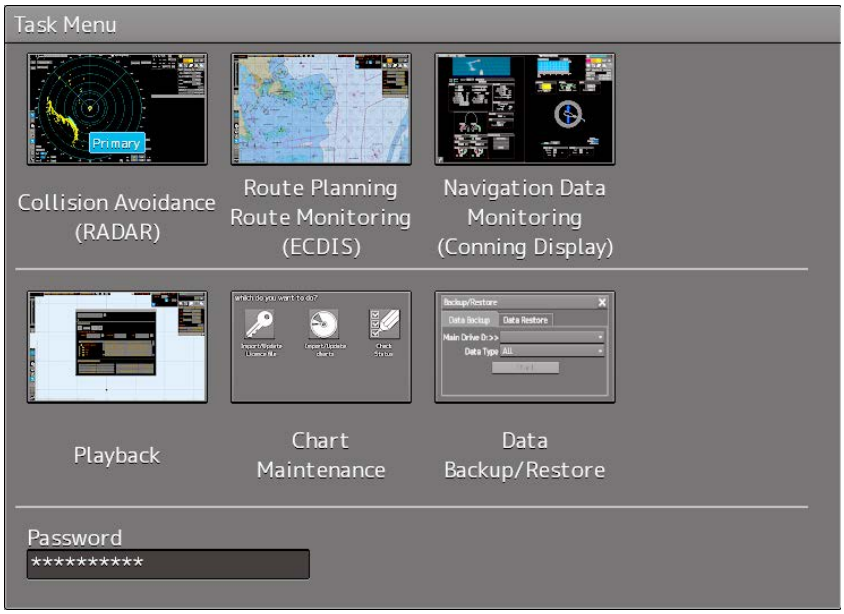
The Power button illuminates. After a while, the Task menu is displayed.

8.2.2 Starting the ECDIS

8.2.2.1 Starting the ECDIS from the Task Menu

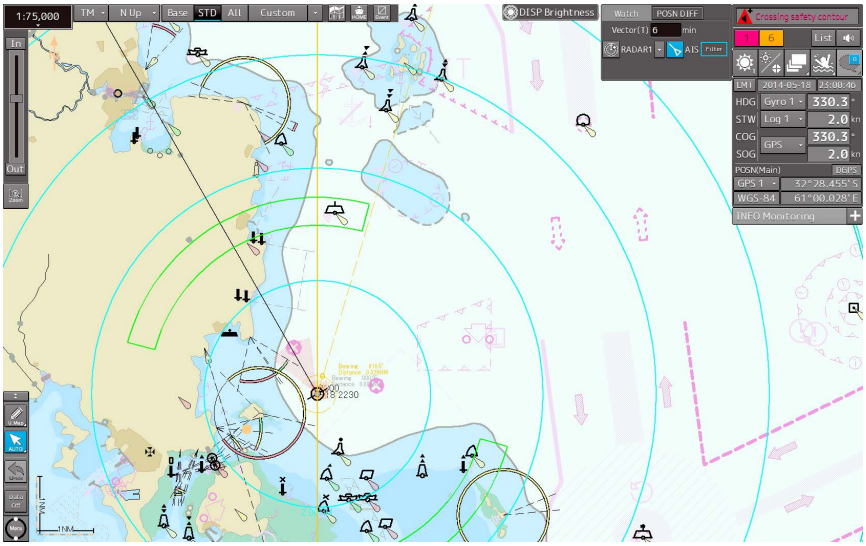
When the ECDIS is started, the Task menu appears on the screen.

Start the ECDIS from the Task Menu.



1 Click on the [Route Planning Route Monitoring (ECDIS)] button on the Task menu.

The ECDIS screen is displayed.



8.2.2.2 Starting ECDIS from a non-ECDIS task screen

1 Click on the task switching button on the right toolbar on the non-ECDIS task screen.

The Task Switch dialog box appears.

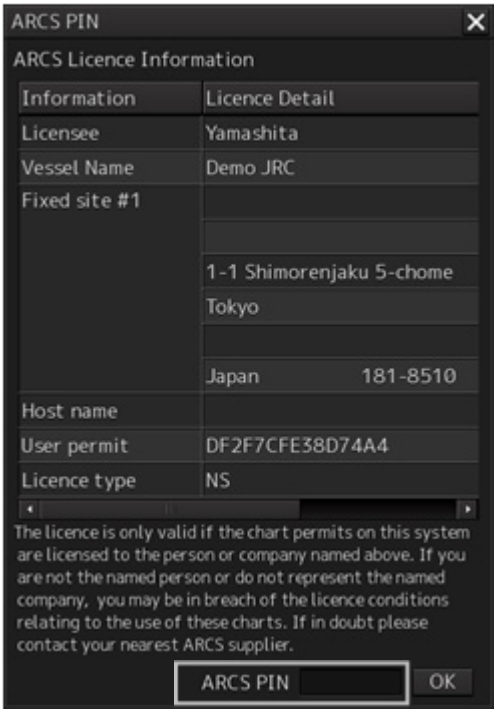
2 Click on the ECDIS thumbnail.

The ECDIS starts.

8.2.3 Entering an ARCS PIN Number (ARCS Only)

When ARCS charts have been imported, the ARCS PIN code input dialog box appears when the ECDIS is started.
Since ARCS is restricted by the ARCS PIN number, ARCS is not displayed unless the correct ARCS PIN number is input.
To use ARCS charts, be sure to perform the following operation.

1 Input a PIN number in [ARCS PIN] of the "ARCS PIN" dialog box



2 Click on the [OK] button.

When the [X] button is clicked on, ECDIS starts without displaying ARCS.

Note

ARCS is not displayed when the contract has expired even if the correct ARCS PIN number is input.

Memo

It is necessary to enter an ARCS PIN code only when the ECDIS screen will be displayed for the first time.

8.3 Moving the Chart

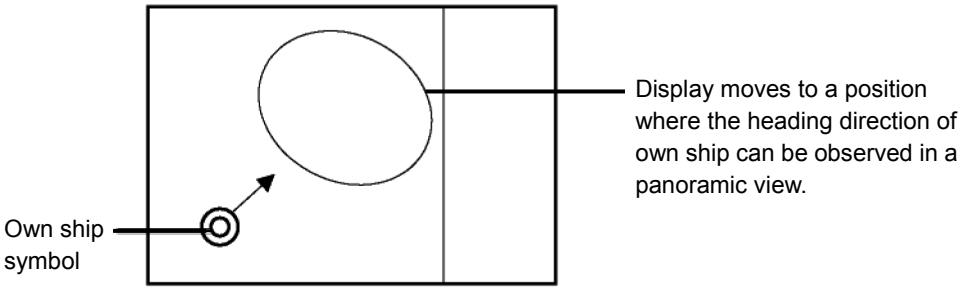
Charts can be moved by the following methods.

- Moving by the [Home] button
- Moving by the cross-hair cursor
- Moving by the hand cursor
- Switching display from the "My Port List" dialog box
- Displaying by entering a position

8.3.1 Moving the chart with the [HOME] button

Display can be moved to a position where the heading direction of own ship can be observed in a panoramic view. Use this feature if own ship is lost from charts.

1 Click on the [Home] button in Chart Information Area.



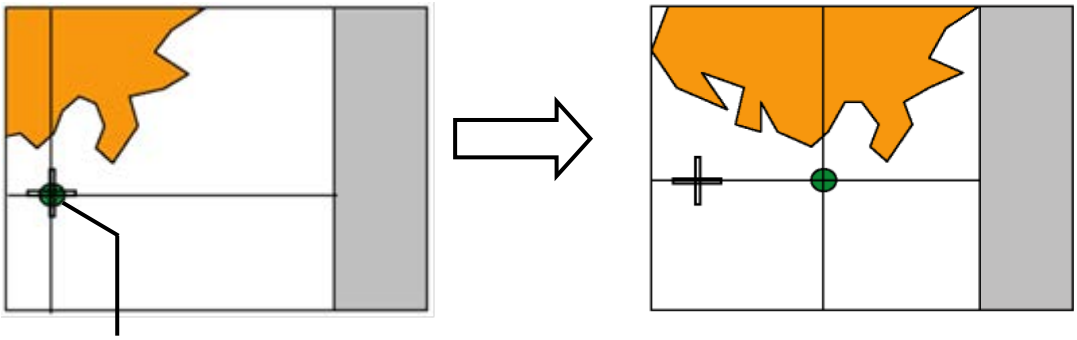
Screen Display of Home Position

8.3.2 Moving the chart with the cross-hair cursor

When the cross-hair cursor is moved to an arbitrary position on the chart and then clicked, the chart can be moved. The chart moving position varies with the setting of the motion mode.
For information about the motion mode, refer to "8.6 Selecting Motion/Bearing Mode".

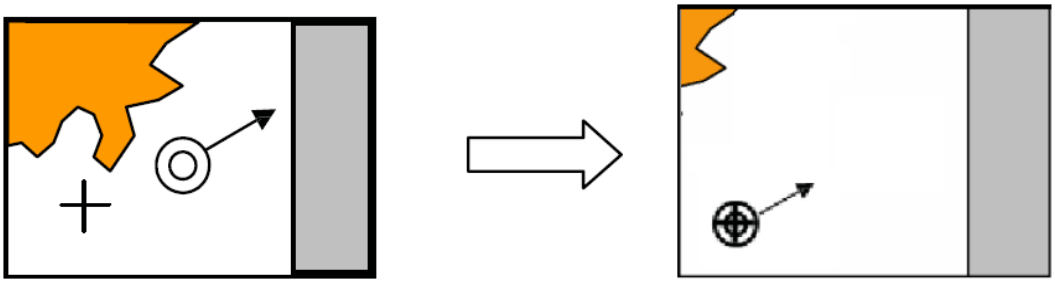
[When the motion mode is set to true motion]

The position of the cross-hair cursor becomes the center of the screen.



[When the motion mode is set to relative motion]

The position of the cross-hair cursor becomes own ship's display position.



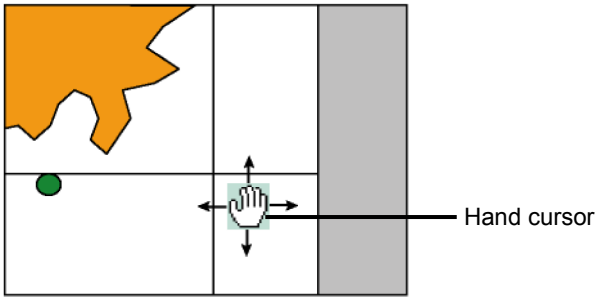
Moving the position of own ship’s display

8.3.3 Moving the chart with the hand cursor

The chart can be moved by grabbing it with the hand cursor.

1 Move the cursor to the position where you want to grab the chart.

2 When the trackball is turned while the button is pressed, the cursor changes to a hand cursor and the chart moves.



Memo

If own ship sails outside of the screen, the motion mode will automatically be set to Free (free motion).

8.3.4 Switching a chart to be displayed by "My Port List"

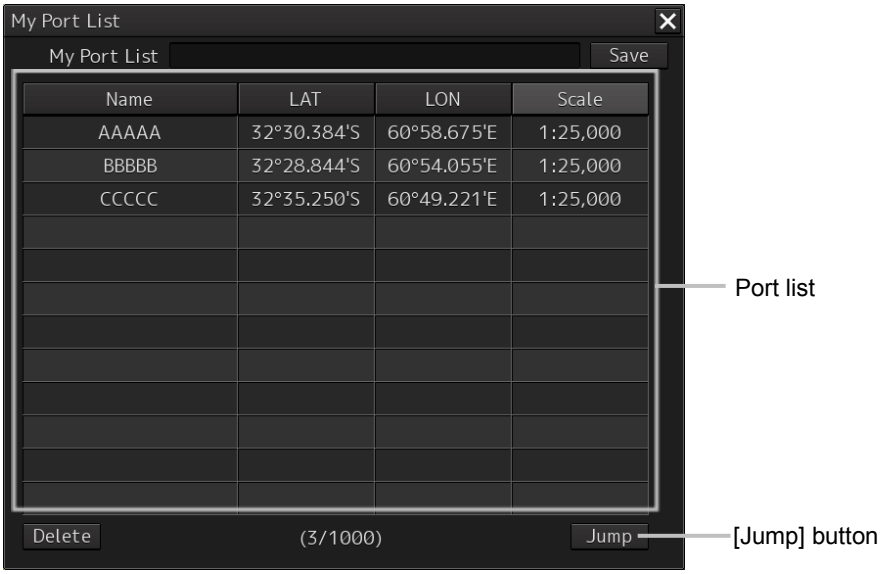
If port names are registered in My Port List in the "My Port List" dialog box, chart display can be switched to the one having the latitude and longitude of a registered port at the center of the chart.

1 Click on the [Menu] button on the left toolbar.

The menu is displayed.

2 Click on [Chart] - [My Port List] on the menu.

The "My Port List" dialog box appears.

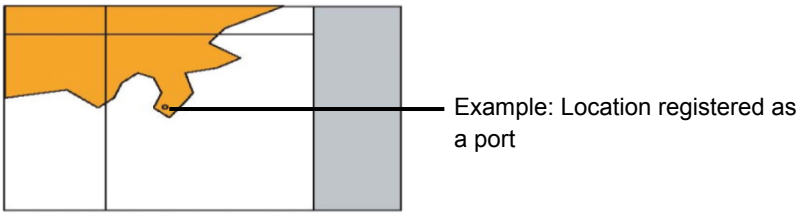


For how to register and delete ports, refer to "8.7 Registering and Displaying My Port List".

3 Click on a port in the list to select it.

4 Click on the [Jump] button.

The chart is displayed having the latitude and longitude of the selected port at the center of the chart.



8.3.5 Displaying the chart by entering the position

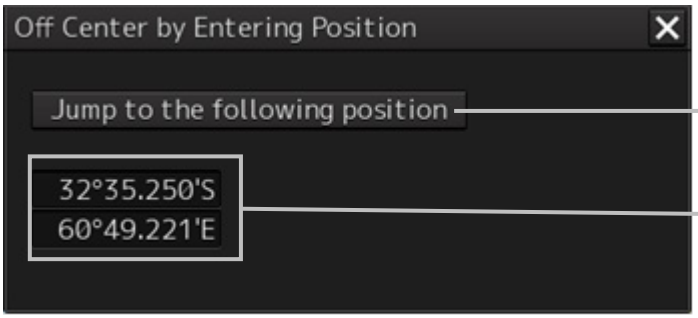
By entering a position, the chart of a desired position can be displayed.

1 Click on the [Menu] button on the left toolbar.

The menu is displayed.

2 Click on [Chart] - [Off Center by Entering Position] on the menu.

The "Off Center by Entering Position" dialog box appears.



[Jump to the following position] button

Latitude and longitude input boxes

The latitude and longitude of the center of the current screen is displayed in the latitude and longitude input boxes.

3 Click the latitude and longitude input boxes.

4 Enter the latitude and longitude of the chart you want to display with the software keyboard.

5 Click on the [Jump to the Following Position] button.

The chart is displayed having the entered latitude and longitude at the center of the chart.

8.4 Zooming In/Out the Chart

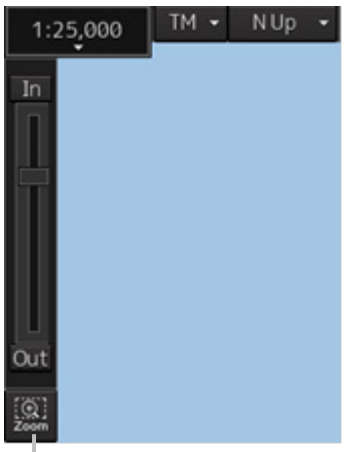
The chart can be enlarged and reduced by the following methods.

Item	Related sections
Enlarging a selected area	8.4.1 Enlarging a Selected Area (S-57/C-MAP Only)
Enlarging/reducing with the [ZOOM IN]/[ZOOM OUT] key on the operation unit (S-57/C-MAP only)	8.4.2.1 Enlarging/reducing with the [ZOOM IN]/[ZOOM OUT] key on the trackball operation unit
Enlarging/reducing with the zoom slider (S-57/C-MAP only)	8.4.2.2 Enlarging/reducing with the zoom slider (S-57/C-MAP only)
Enlarging/reducing with the Large/Small buttons (RNC only)	8.4.2.3 Enlarging/reducing with the Large/Small buttons (RNC only)

8.4.1 Enlarging a Selected Area (S-57/C-MAP Only)

A selected area can be enlarged to the full chart screen size.

1 Click on the [Zoom Area] button.



[Zoom Area] button

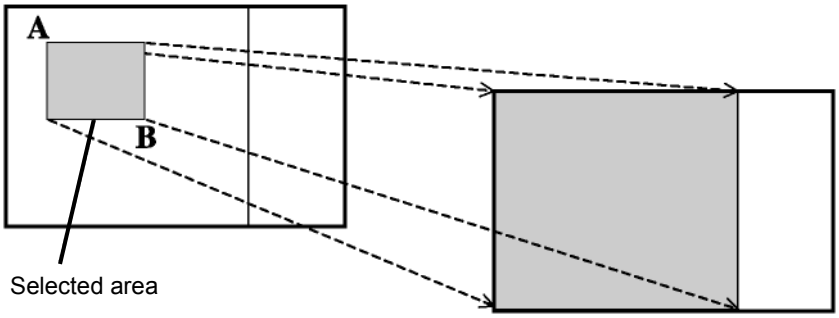
The cross-hair cursor changes to a zoom cursor.

2 **Using the trackball, move the cursor to "A" located at the upper left of the range you want to enlarge, and then click.**

3 **Using the trackball, move the cursor to "B" located at the lower right of the range you want to enlarge, and then click.**

The enlarging range is enclosed with a rubber band and then that range is enlarged to the full screen size.

Once enlarged, the zoom cursor changes back to the cross-hair cursor.



Memo

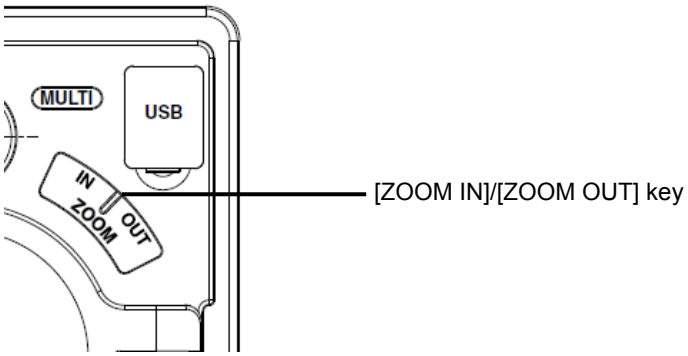
Switching charts

- Generally, multiple charts with different scales are provided for the same area; charts having matching scale values are selected/displayed by enlargement or reduction.
- When a displayable scale range is assigned to an original scale of a chart and the original scale is beyond this range, the chart will not be displayed unless there are other displayable charts.
- This equipment is installed with a world map background chart as the reference chart and the chart is always displayed in the background.

8.4.2 Enlarging/reducing a chart with the Zoom function

8.4.2.1 Enlarging/reducing with the [ZOOM IN]/[ZOOM OUT] key on the trackball operation unit (S-57/C-MAP only)

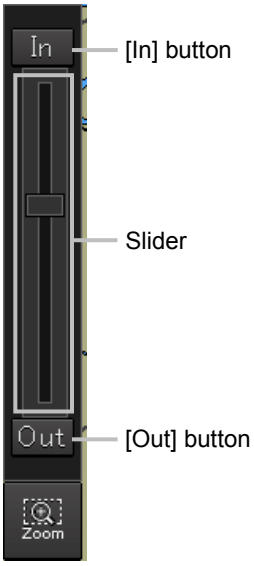
1 Each time the [ZOOM IN] key is pressed, the chart is enlarged according to the range or scale that has been set up.
Each time the [ZOOM OUT] key is pressed, the chart is reduced according to the range or scale that has been set up.



For the details of switching between range and scale, refer to "8.4.3 Switching between scale and range (S-57/C-MAP only)".

8.4.2.2 Enlarging/reducing with the zoom slider (S-57/C-MAP only)

1 When the slider handle is clicked upward, display is enlarged. When it is clicked downward, display is reduced.
Each time the [In] (zoom in) button is clicked on, the chart is enlarged according to the range or scale that has been set up.
Each time the [Out] (zoom out) button is clicked on, the chart is reduced according to the range or scale that has been set up.

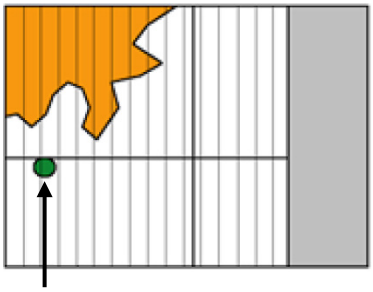


For more information about switching between range and scale, refer to "8.4.3 Switching between scale and range (S-57/C-MAP only)".

Memo

Over scale notification

- When the ship enters a different chart, an over-scale activated if the displayed chart is more than double in size than the original data. The vertical lines as seen in the figure below will be displayed on the "chart" to notify lower chart accuracy and clarity. The vertical lines will not be displayed if the size has been made larger (double or more) through proper operation.



Notification line at over scale

8

8.4.2.3 Enlarging/reducing with the Large/Small buttons (RNC only)

1 Each time the [Large] button is clicked on, the chart is enlarged by one scale level (larger scale charts).
Each time the [Small] button is clicked on, the chart is reduced by one scale level (smaller scale charts).

[Large] button

[Small] button

8.4.3 Switching between scale and range (S-57/C-MAP only)

The current scale or range is displayed on the Scale/Range button in Chart Information Area.

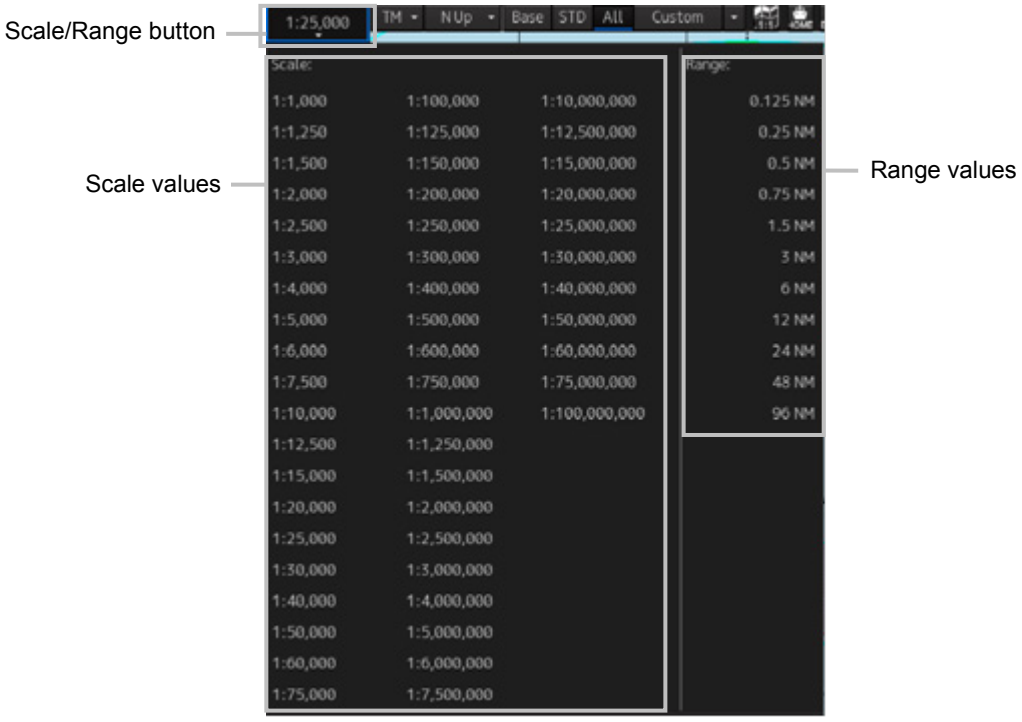
Scale Display

Range Display

The settings of scale and range as well as their switching method are as follows.

1 Click on the Scale/Range button.

The scale and range settings menu appears.



2 Select a scale or range value from the menu.

The chart is displayed having the selected scale or range.

Memo

For range display, the half of the screen width becomes the specified range when displayed.

For a multi screen (refer to “8.10 Multi screen display and wide range view screen display of chart”), the half the display screen View1/View2 becomes the specified range when displayed.

8.5 Changing the Object Category (S-57/C-MAP Only)

SENC (System Electronic Navigation Chart) information available for display in the chart is subdivided into three object groups; Base (Base display), STD (Standard Display), and All (All display). You can change the object category using the display panel.

Base (Base Display)

A group of important objects that cannot be deleted from the charts (coastline and safety contour lines)

STD (Standard: Standard display)

A group of objects less important than base display (fixed and floating objects for monitoring)

All (All display)

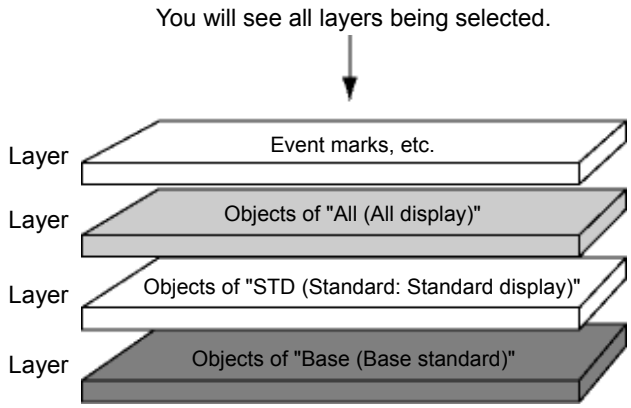
All objects

Custom (Custom)

Refer to "8.5.2 Customizing object display"

Memo

- About display in the chart
  Display in the chart can be considered as the composite of various layers. For example, STD (Standard: Standard display) is the composite of object layers for Base (Base display) and object layers for STD (Standard: Standard display).
  In addition to the object layers of the S-57/C-MAP charts themselves, own ship, user charts, event marks, EBL/VRM, radar images, etc. can be combined and then displayed.



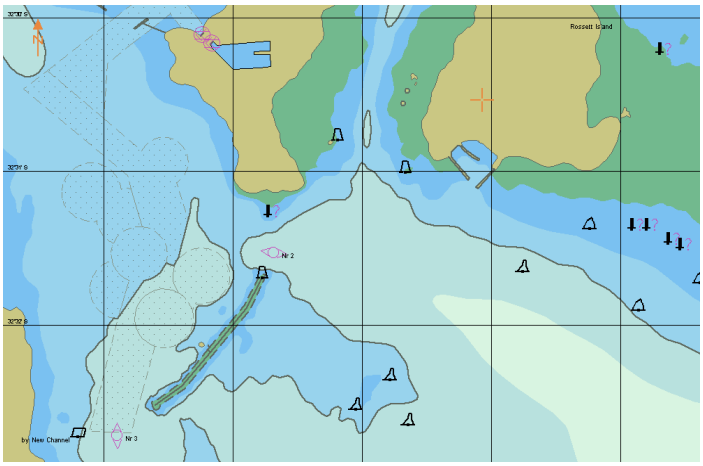
Note

The initial chart screen status is "STD (Standard: Standard display)". For safe sailing, use the "STD (Standard: Standard display)" or "All (All display)", not the "Base (Base display)".

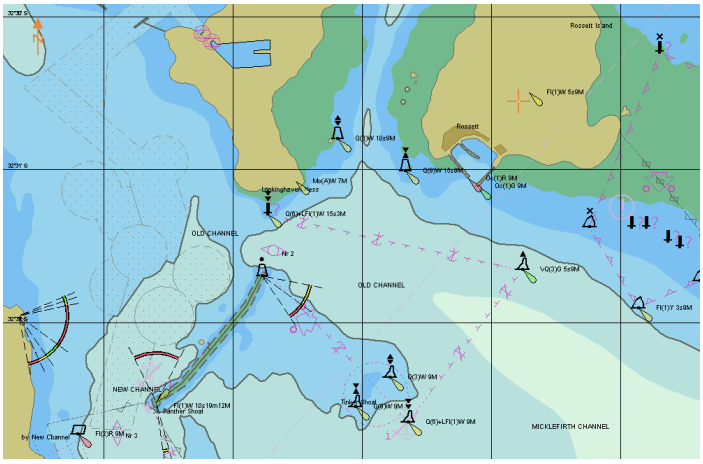
8.5.1 Switching object display

1 Click on one of the buttons of the Chart Information Area display category.

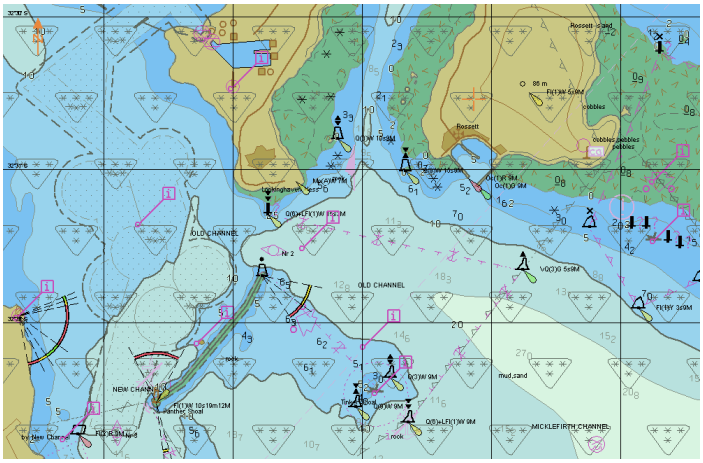
Information displayed on the chart changes.



"Base (Base display)" Example



"STD (Standard: Standard display)" Example



"All (All display)" Example

Note

The display will be in gray without displaying a chart when a corresponding chart does not exist in the display area, when a chart exists with only a part of data, or when the display scale does not match the chart scale. In this case, change the scale to check for a chart can be displayed.

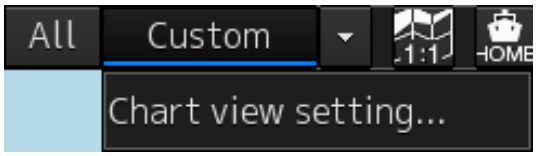
8.5.2 Customizing object display

When the [Custom] button of the Chart Information Area is clicked on, the object corresponding to the setting in the "Chart View" dialog is displayed.
Any of the objects that are displayed on the "Chart View" dialog can be set.

1 Click on the Custom menu display button.

[Custom] button

The display changes as follows.



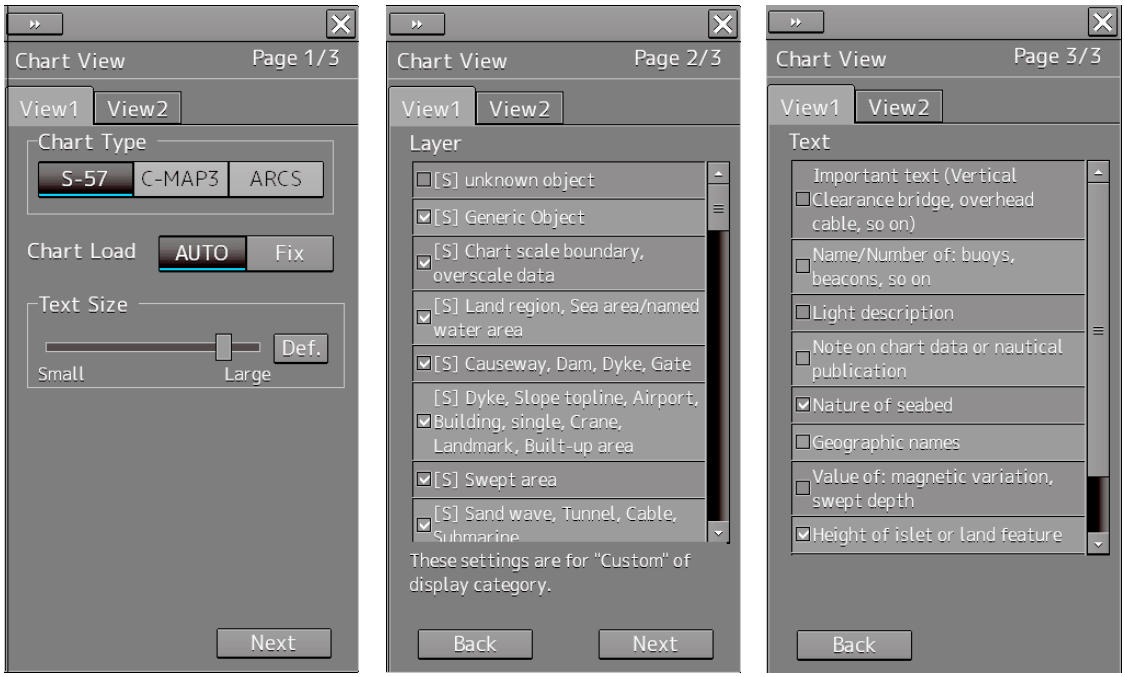
2 Click on the [Chart view setting] button.

[Chart View] dialog is displayed.

The edit pane is divided into three dialogs.

To advance to the next dialog: Click on the [Next] button.

To return to the previous dialog: Click on the [Back] button.



3 Set the object to be displayed.

For the setting of the [Chart View] dialog, refer to "16.2.11 Setting up the Display of ECDIS Chart".

Memo

The [Chart View] dialog can also be displayed by selecting [View] - [Options] - [Chart View] on the menu.

8.6 Selecting Motion/Bearing Mode

Using the Motion/Bearing Mode combo box in Chart Information Area, set up the motion mode and the bearing mode on own ship's chart. The mode that can be selected varies with the chart type.

S-57/C-MAP Ed.3 Charts

Motion mode button Bearing mode button

[Selectable combinations in the motion mode and the bearing mode]

Motion mode \ Bearing mode	N UP	H UP	C UP	WPT UP
TM	○	×	○	×
RM	○	○	○	○
Free	○	×	○	×

ARCS Charts

Motion mode button

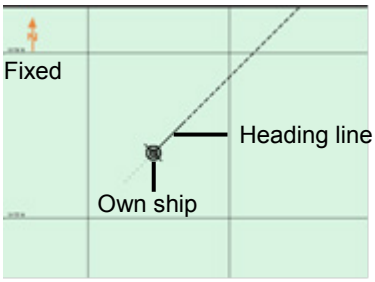
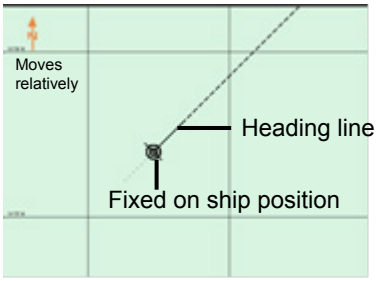
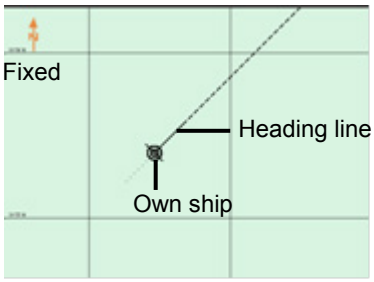
*The bearing of the ARCS chart is fixed to N UP.

8.6.1 Setting motion mode

Set a motion mode with the Motion Mode combo box in Chart Information Area.

1 Click on the Motion Mode combo box.

2 Select a motion mode.

Setting item	Description	Display image
[TM]	True Motion Mode • Land and other fixed objects are fixed on the display and only own ship moves on the display. When own ship reaches the predetermined limit, the chart is automatically shifted so that own ship always remains on the screen.	
[RM]	Relative Motion Mode • Own ship is fixed at the center of the screen and the fixed objects such as land move relatively.	
[Free]	Free • You can freely move the chart on the display regardless of the own ship's direction. As the own ship goes, it disappears from the screen.	

Mode change by the operation:

In the following cases, the motion/bearing mode will be automatically changed from the current mode to another one.

- From [TM] mode to [Free] mode:
  - When the own ship goes exceeding the display limit of the screen by scrolling the chart.
  - When an area outside of the own ship range was displayed by loading charts or clicking the [Jump] button in the "My Port List" dialog box.
- From [RM] mode to [Free] mode:
  - When the own ship goes exceeding the display limit of the screen by scrolling the chart.
  - When an area outside of the own ship range was displayed by loading charts or clicking the [Jump] button in the "My Port List" dialog box.
- From [Free] mode to [TM] mode:
  - When the [Home] button was clicked on,
    the rotation in the Free mode is retained after changing to the TM mode.

Note

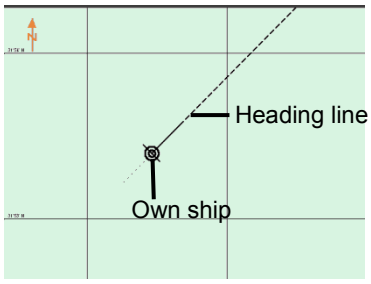
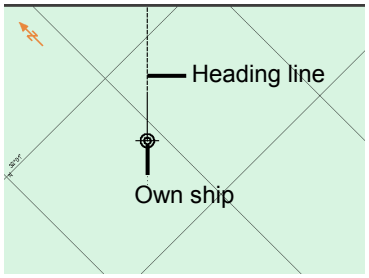
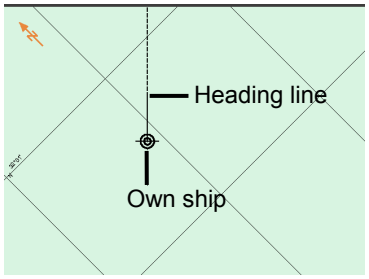
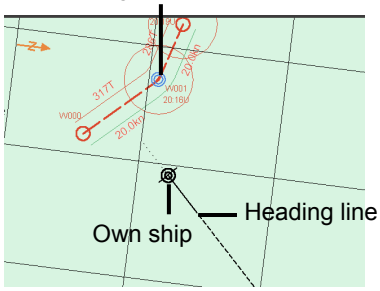
H UP, WPT UP, C UP are valid only the chart scale is not lower than 1/5,000,000.

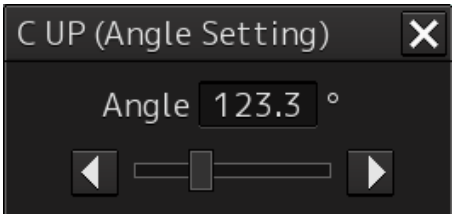
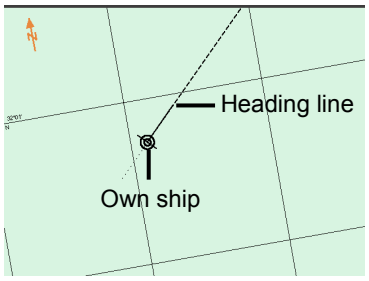
8.6.2 Setting Bearing mode (S-57/C-MAP only)

Set a bearing mode with the Bearing Mode button in Chart Information Area.

1 Click on the Bearing Mode combo box.

2 Select a bearing mode.

Setting item	Description	Display image
[N UP]	North up • The chart is always displayed towards true north. Fixed objects do not flicker and are easily identified on the chart, and the true bearing of the objects can readily be read out.	
[H UP]	Head up The chart is displayed by orienting the ship's heading upward. Cannot be selected under TM (true motion).	
[C UP]	Course up • At the setting of Course Up, the ship's heading (HDG) is fixed and displayed immediately above the screen.	
[WPT UP]	Way point up • The chart rotates automatically so that the screen is always oriented upward until the target WPT.	Target WPT 

Setting item	Description	Display image
[C UP (Angle Setting)]	Course UP by angle setting • When this item is selected, the "C UP (Angle Setting)" dialog box appears. The course angle that was set on the dialog is displayed right above the chart and fixed.  – Input the angle of the ship's heading in the [Angle] input box of the "C UP (Angle Setting)" dialog box. – The angle can be input (increase/decrease) by operating the angle input slider. – After completing the setting, click on the [X] button.	

Display changes according to the selected bearing mode.

8.7 Registering and Displaying My Port List

8.7.1 Registering to My Port List

You can register any position on the chart to the "My Port List" dialog box. After registration, you can directly access to that position by selecting a port name from the My Port List.

1 Set the location to be registered.

S-57/C-MAP

Since the center position and the display scale of the screen that is currently displayed are registered in the port name list, move the location to be registered to the center of the screen in advance.

To display another position, shift the chart area (refer to "8.3 Moving the Chart") or zoom in to/out from the chart. (Refer to "8.4 Zooming In/Out the Chart".

ARCS

Since the center position and the display scale of the screen that is currently displayed are registered in the port name list, move the location to be registered to the center of the screen in advance.

To display another position, display the chart according to the procedures provided below.

• 8.9.1 Selecting charts from all

• 8.9.2 Changing active panels (ARCS only)

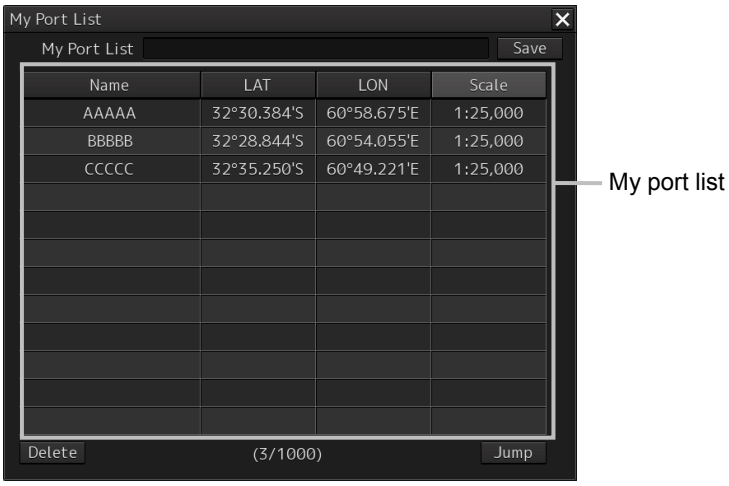
2 Click on the [Menu] button on the left toolbar.

The menu is displayed.

3 Click [Chart] - [My Port List] on the menu.

The "My Port List" dialog box appears.

In the "My Port List" dialog, the Name, LAT (latitude), LON (longitude), and display Scale (scale) of the port that is currently registered are displayed.



4 **Enter the registration name of the port in the [My Port List] (port name) input box.**

5 **Click on the [Save] button.**

The coordinates (latitude and longitude) of the center of the chart display and the display scale according to the registration name designated in the step 4 are registered in the list as the port.

8.7.2 Deleting a port

1 **Click on the [Menu] button on the left toolbar.**

The menu is displayed.

2 **Click [Chart] - [My Port List] on the menu.**

The "My Port List" dialog box appears.

3 **Click on the port to be deleted from the My Port List.**

The port is selected.

4 **Click on the [Delete] button.**

The selected port is deleted from the My Port List.

8.8 Selecting a S-57 chart

Because the chart of own ship's position is automatically called up after power on, generally route monitoring can be performed instantly.
If you want to display charts other than the chart automatically called up, select a chart from those that are displayed by selecting [Chart] - [Select S-57 Chart] on the menu.

For the details, refer to "13.2 Displaying/Searching an S-57 Chart [Select S-57 Chart] ".

8.9 Selecting an ARCS chart

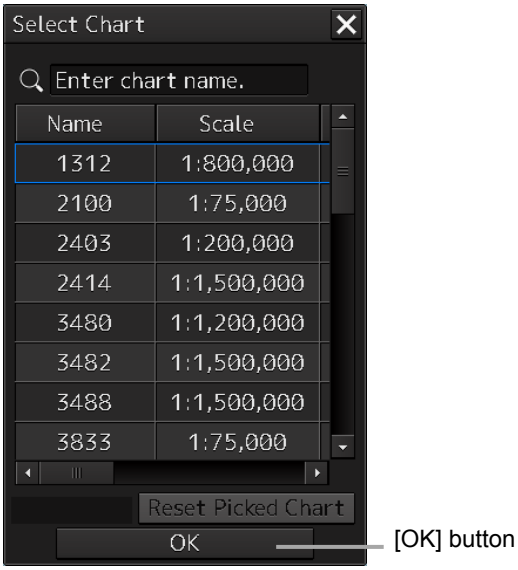
This section describes chart selection and the functions on the display, which are available on the ARCS chart.

8.9.1 Selecting charts from all

You can select desired charts from all the charts stored in this system.

1 Click on the [Select] button in Chart Information Area.

The "Select Chart" dialog box appears.



2 Select the desired chart in the list by clicking it and then click on the [OK] button.

The selected chart is displayed on the screen.

8.9.2 Changing active panels (ARCS only)

The active panel on the chart can be changed.

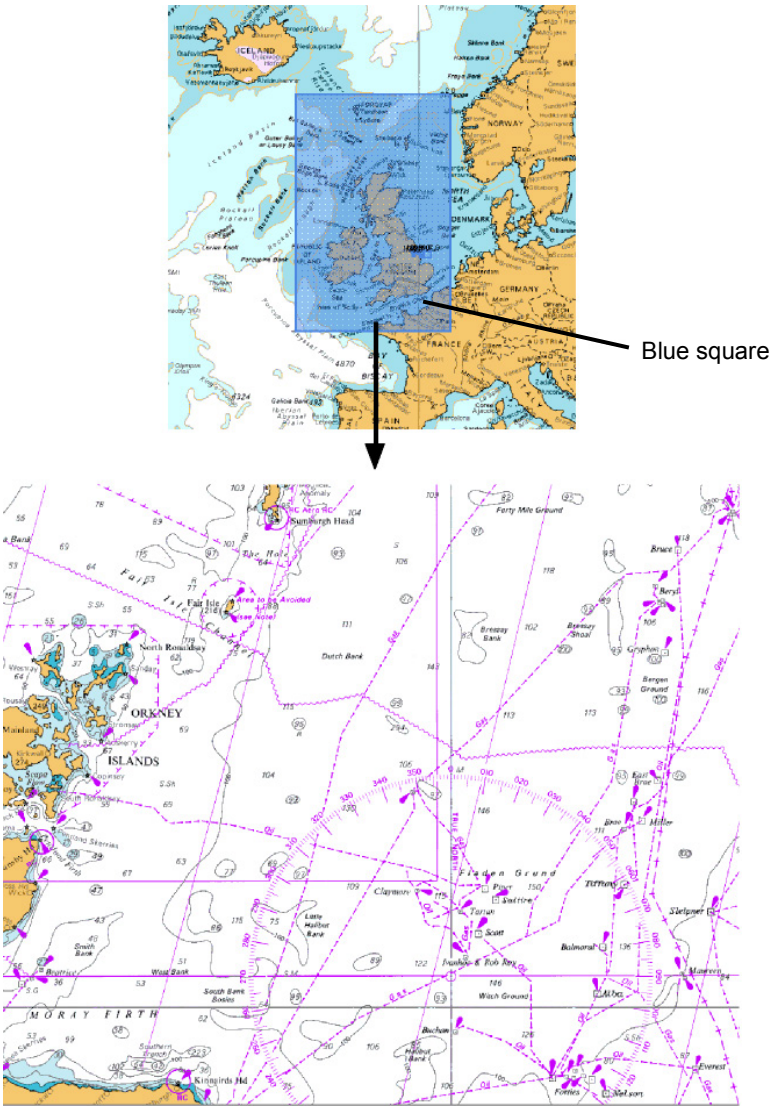
1 Right-click on the chart

The context menu is displayed.

2 On the Context menu, click on the [Change Active Panel].

The selectable active panel painted in blue is displayed.

3 Click on in the blue panel. The corresponding chart is then displayed.



Selected chart

8.9.3 Changing a low resolution chart (ARCS only)

1 Right-click on the chart

The context menu is displayed.

2 On the Context menu, click on the [Load Low Resolution].

The low resolution chart is displayed on the screen.

8.9.4 Changing a high resolution chart (ARCS only)

1 Right-click on the chart

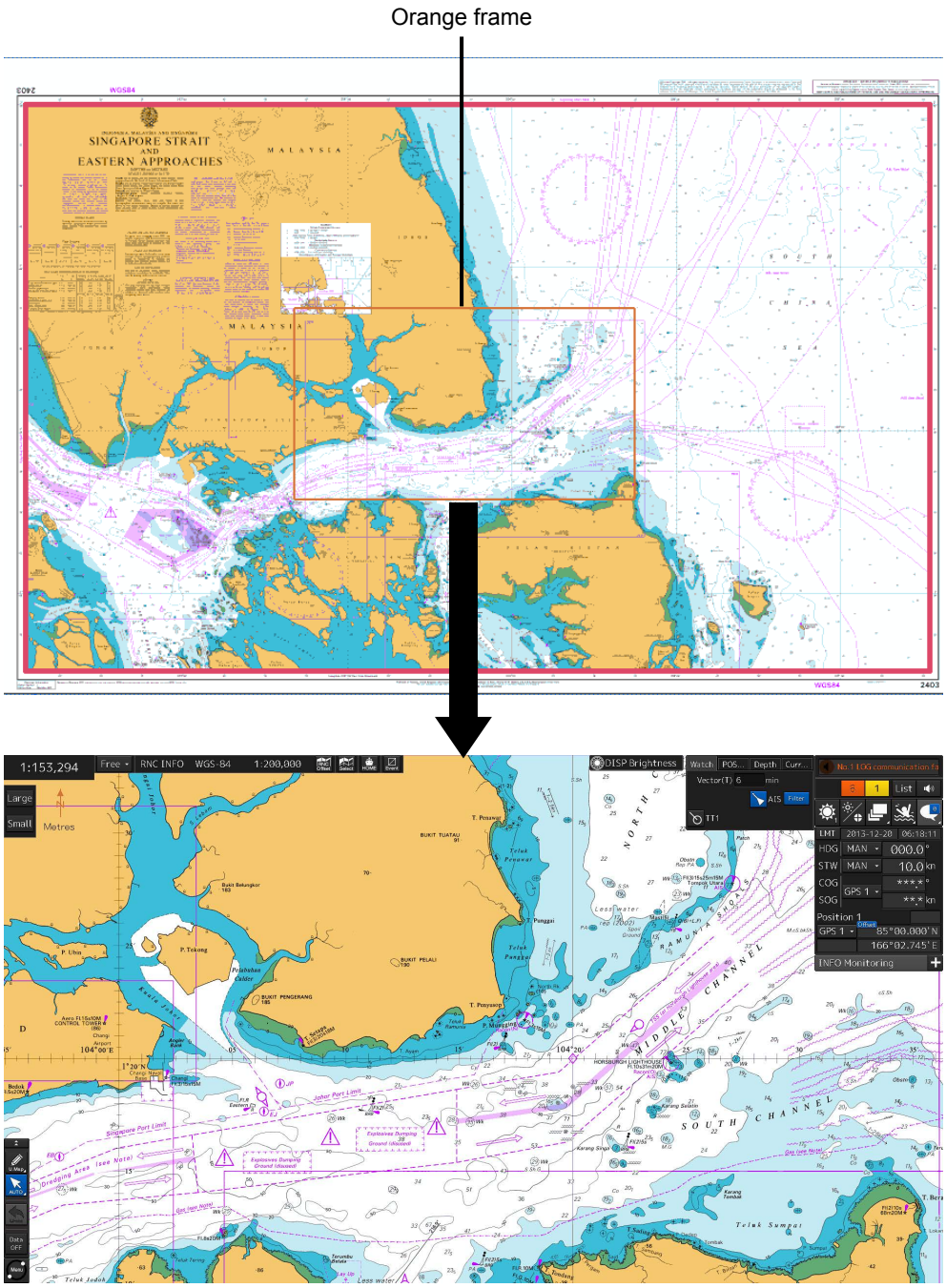
The context menu is displayed.

2 On the Context menu, click on the [High Resolution Area].

The cursor changes to the zoom cursor and an orange frame appears on the chart.

3 Move the cursor to the area to be expanded (the frame moves together with the cursor) and click the mouse button.

The high-resolution chart in the area within the frame is displayed on the screen.



High resolution chart

8.9.5 Displaying the note and diagram (ARCS only)

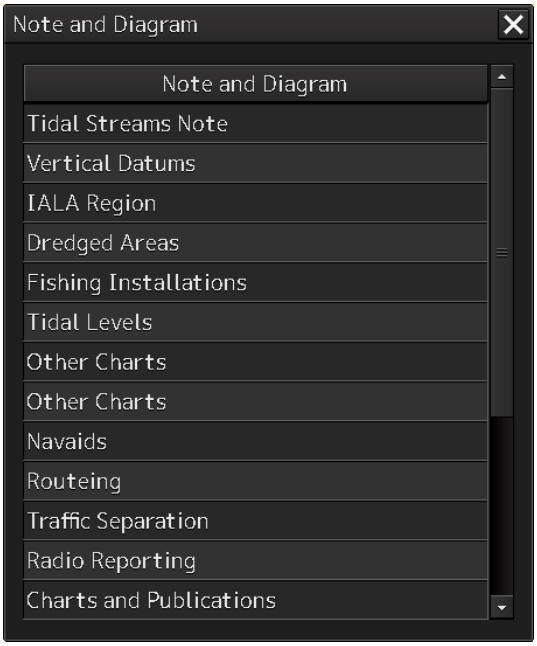
You can display the note and diagram list defined by the current chart.

1 Right-click on the chart

The context menu is displayed.

2 On the Context menu, click on the [Note and Diagram].

The "Note and Diagram" dialog box appears.



3 Click on the item you want to display. The note or diagram on the corresponding chart is displayed.

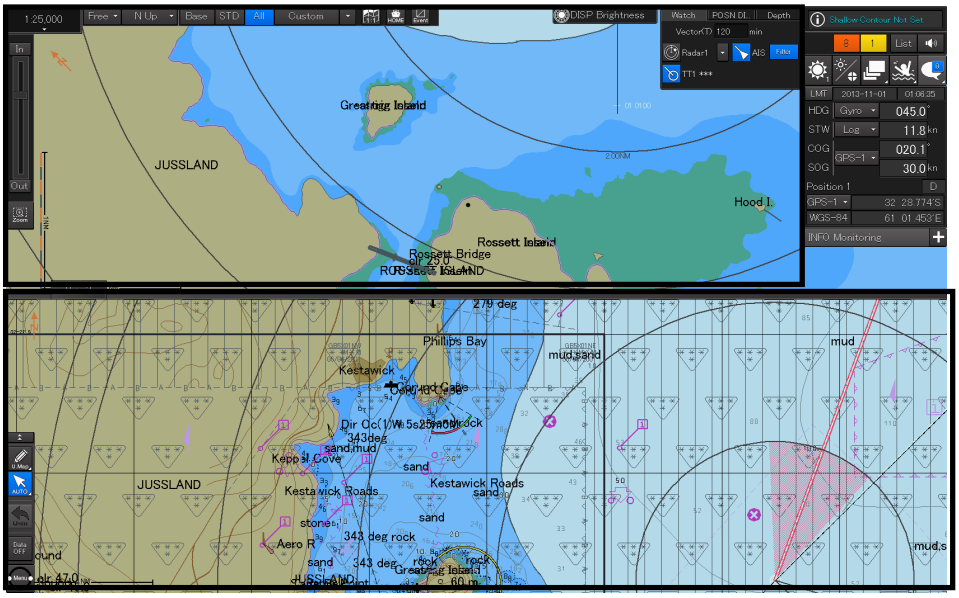
Clicking the [X] buttons, the dialog box is closed and the chart display returns to the original display position.

8.10 Multi View Display and Wide Range View Window Display of Charts

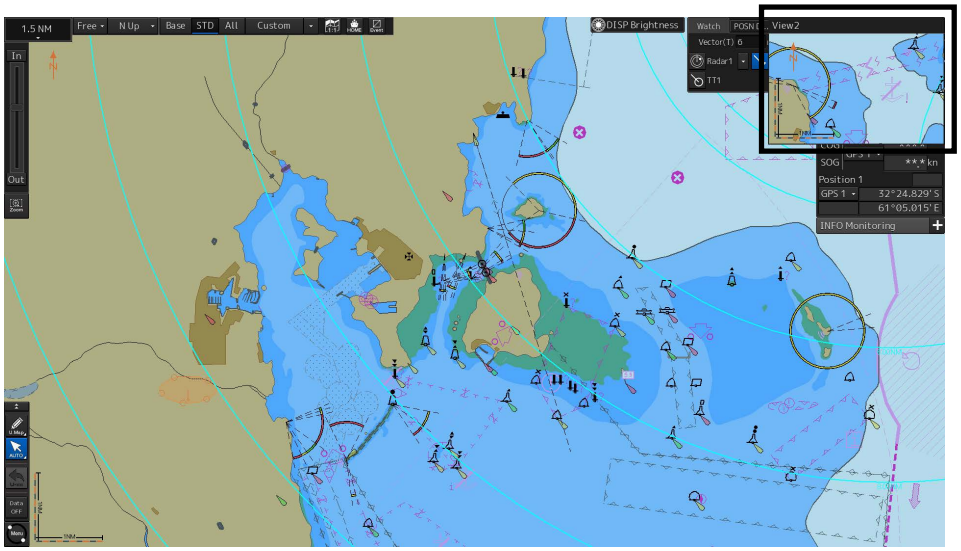
The multi view display function divides the chart window into two windows and displays the same chart or different charts separately in these two windows.

Note

ARCS and C-MAP Ed.3 cannot display charts of other models simultaneously.



Example of Multi Window Display (Top-Bottom)



Example of Multi Window Display (Picture in Picture)

8.10.1 Display of multi view

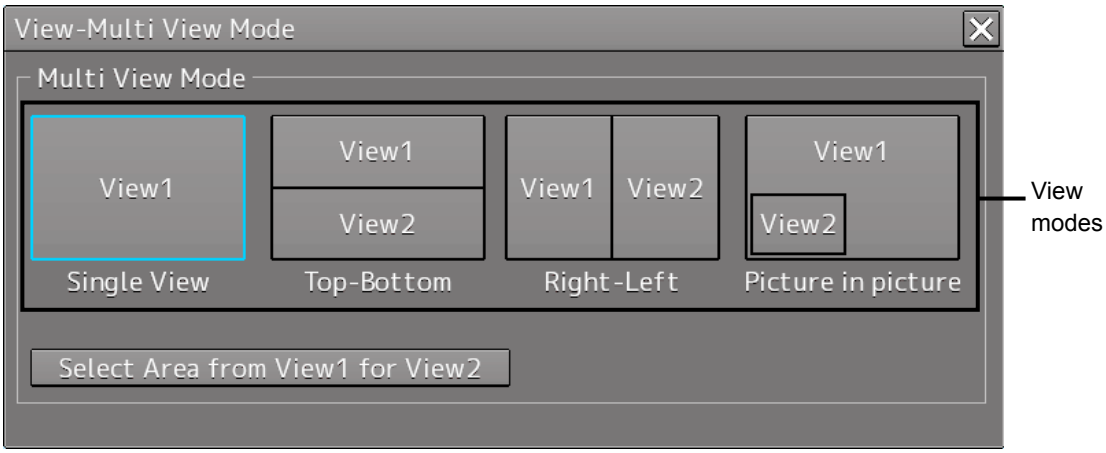
8.10.1.1 Displaying multi view

1 Click on the [Menu] button on the left toolbar.

The menu is displayed.

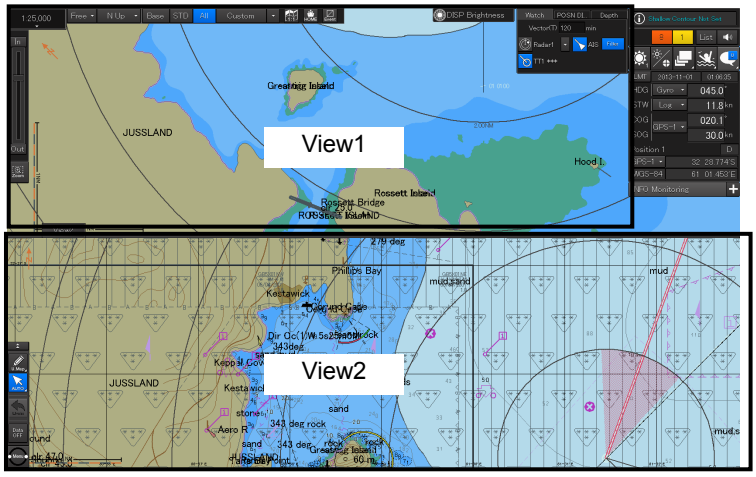
2 Select [View] - [Multi View Mode] on the menu.

The "Multi View Mode" dialog box appears.

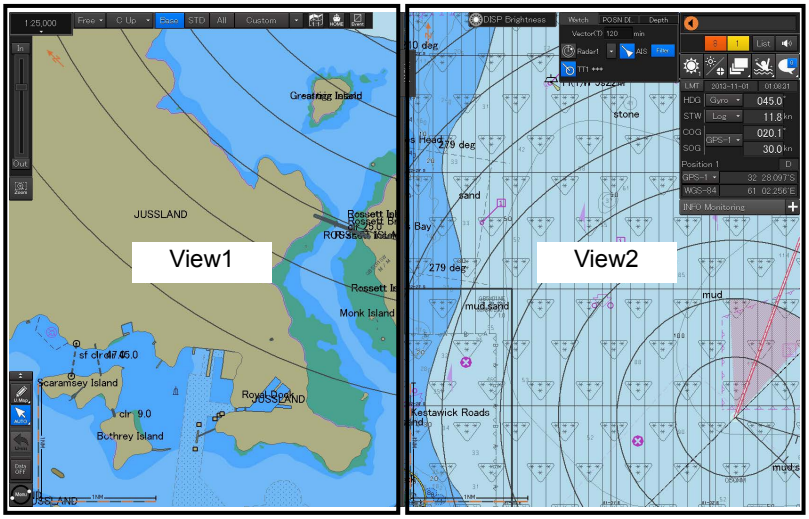


3 Click on a multi view mode to select it.

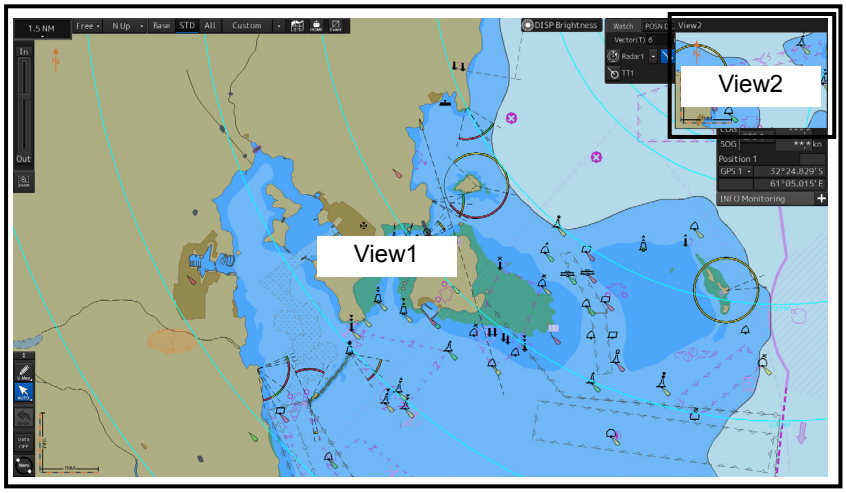
The selected multi view mode takes effect.



Top-Bottom



Right-Left



Picture in picture

8.10.1.2 Multi view operation procedure

[Operation When Manipulating Multi View]

- The same view is displayed in View1 and View2.
- Except for the items that can be set up separately in View2, View1 and View2 are displayed by linking.
- Rubber bands during create or edit operation (such as Route Planning) can only be displayed in active view.
- EBL/VRM and EBL maneuvers are shared between View1 and View2 and the same contents are displayed (however, the contents may differ depending on the setting of the measurement reference point.).

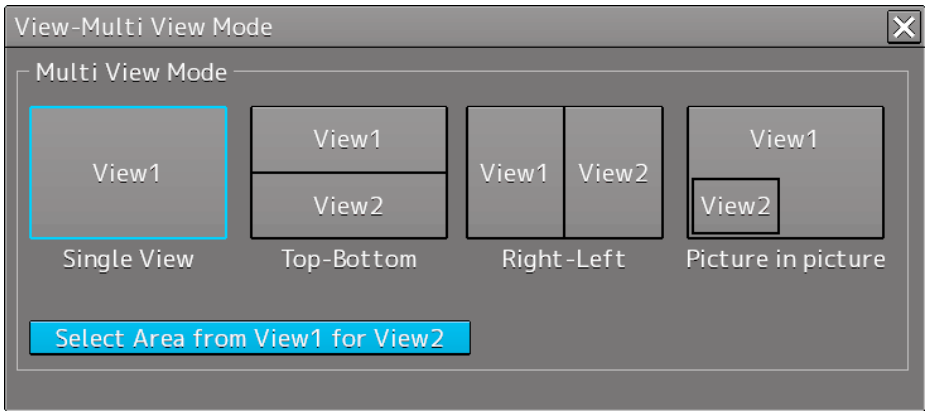
Note

The bearing mode of View2 operates by interlocking with the bearing mode of View1.

[Specifying an area to be displayed in View2]

In View1, you can specify an area you want to display in View2.

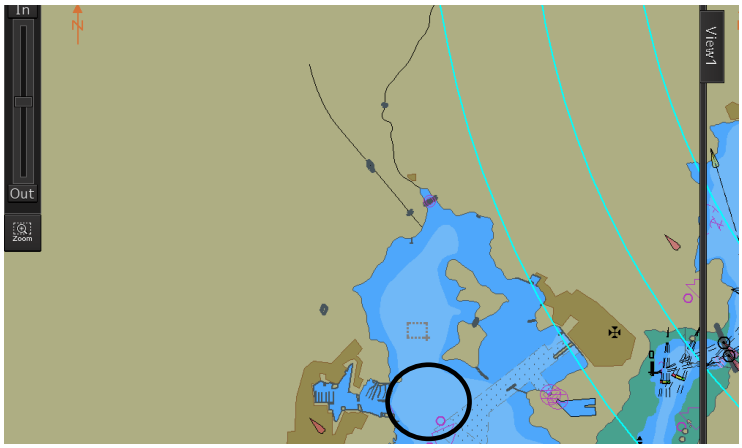
1 Click on the [Select Area from View1 for View2] button in the "Multi View Mode" dialog.



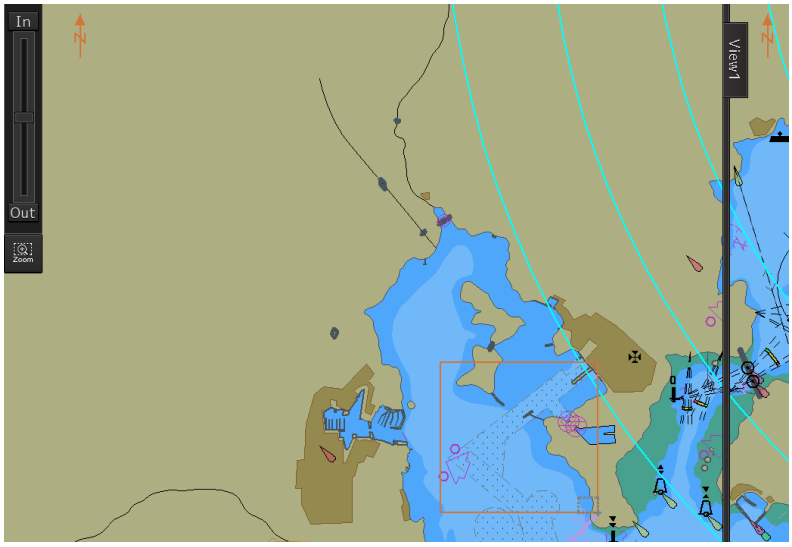
The button is displayed in reverse video.

2 Move the cursor to View1.

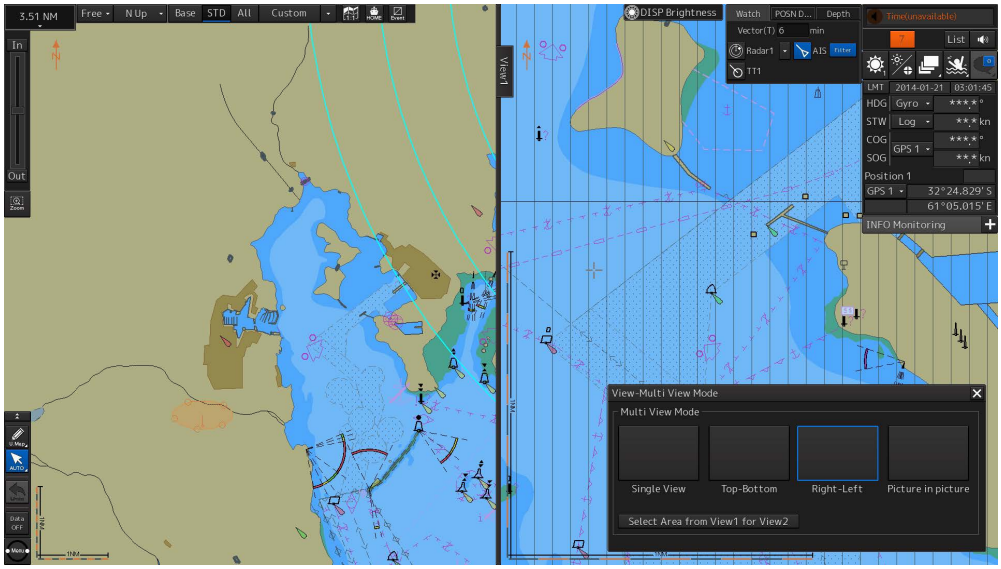
The cursor changes to the range selection cursor.



3 Drag the cursor and specify an area you want to display in View2.



4 Click on.



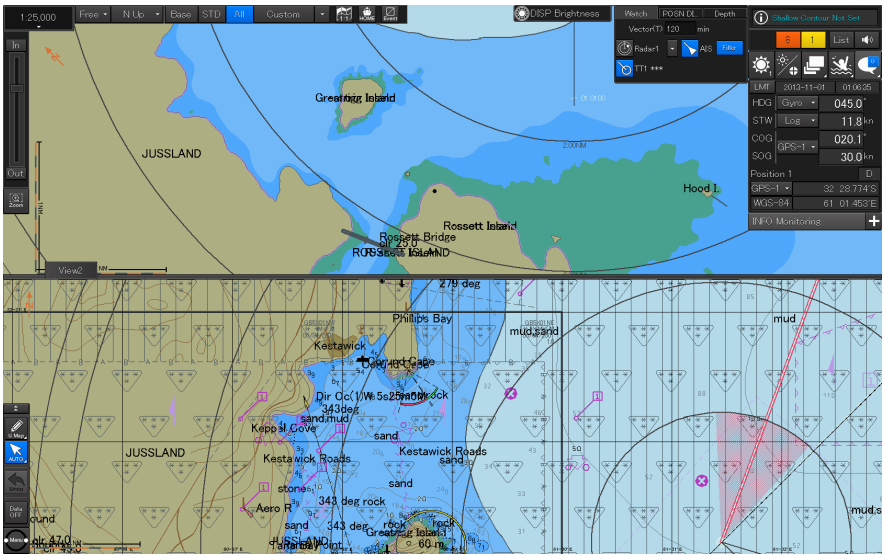
The specified range is displayed in View2.

The [Select Area from View1 for View2] button is displayed in normal video.

[Selecting a View]

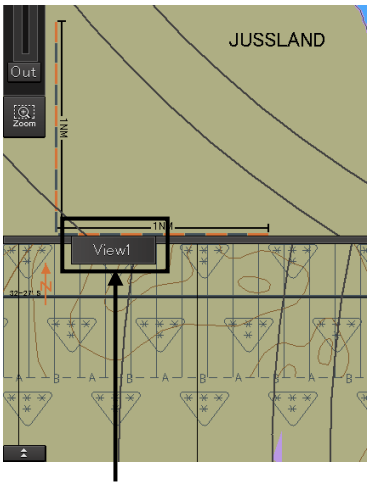
Various operations can be performed in the selected view.

1 Click on the view you want to make active.

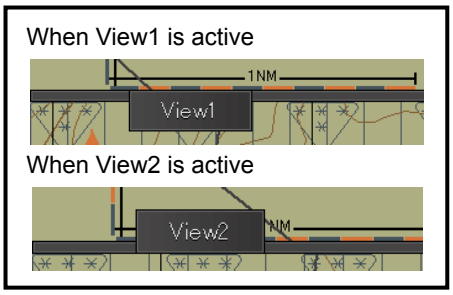


The clicked view becomes the active view.

Which view is active can be checked in active information display.



Active information display area



[Moving the Boundary Line of View]

When the view mode is either Top-Bottom or Right-Left, the boundary line of view can be moved.

1 **To move the boundary line of view, click on the boundary line.**

2 **When the cursor changes to the arrow shape shown below, move the boundary by dragging the cursor to the arrow directions.**

[Moving View2]

When the view mode is Picture in picture, the position of View2 can be moved.

1 **Click on the title bar of View2**

2 **When the cursor changes to the arrow shape shown below, move View2 by dragging the cursor to the arrow directions.**

8.11 Verifying Object Information (Pick Report Function)

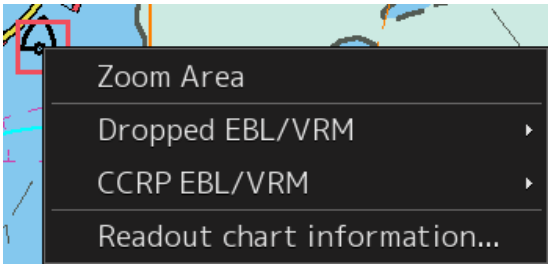
Each of the objects on the chart has its own attributes (e.g. lighthouse, buoy, depth contour, land and river).
For example, if an object is a lighthouse, attributes such as lighting color and frequency can be read out. If the object is depth contour, the water depth can be read out.

Attribute information of these objects can be read and verified by using the pick report function.
The pick report displays the following information.
- S-57 chart
- C-MAP chart
- ARCS chart
- AIO
- Manual update

8.11.1 Pick Report of the S-57 chart

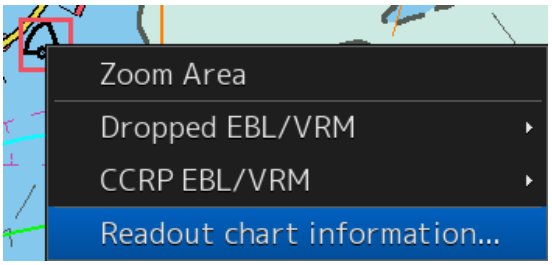
8.11.1.1 Displaying a Pick Report of the S-57 chart

1 Click the right button on the chart.

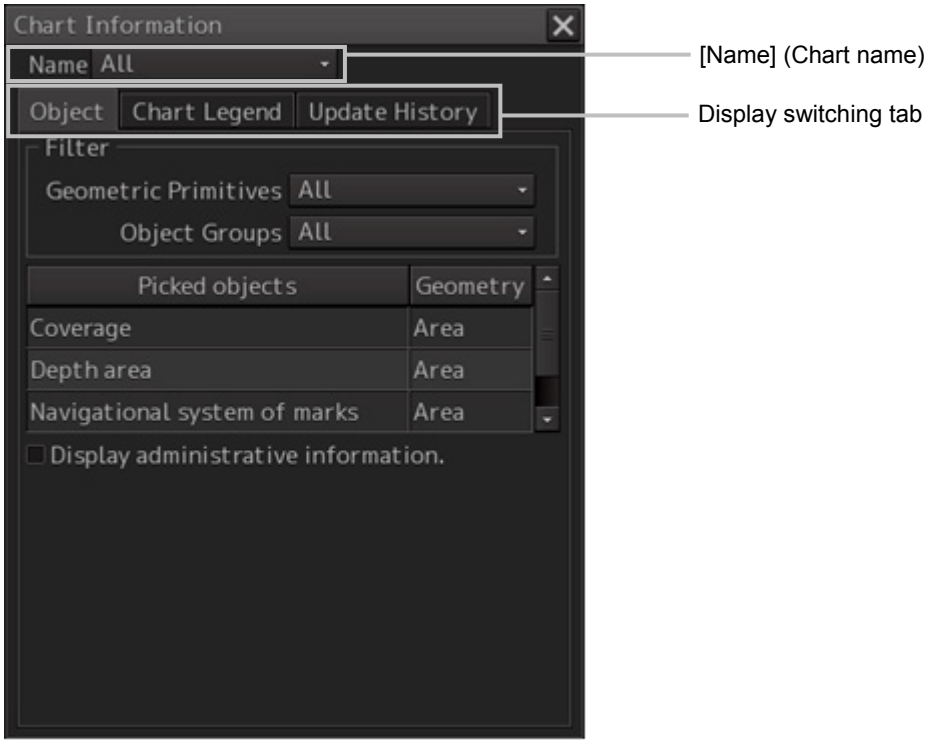


A pick mark and the context menu are displayed.

2 **Click on [Readout chart information] on the context menu.**



"Chart Information" dialog box appears.



[Name] (Chart name display)

When multiple charts exist at the chart position that was clicked on and a chart is selected from the list, the information on the chart is displayed. When [All] is selected from the list, the information on all the charts is displayed.

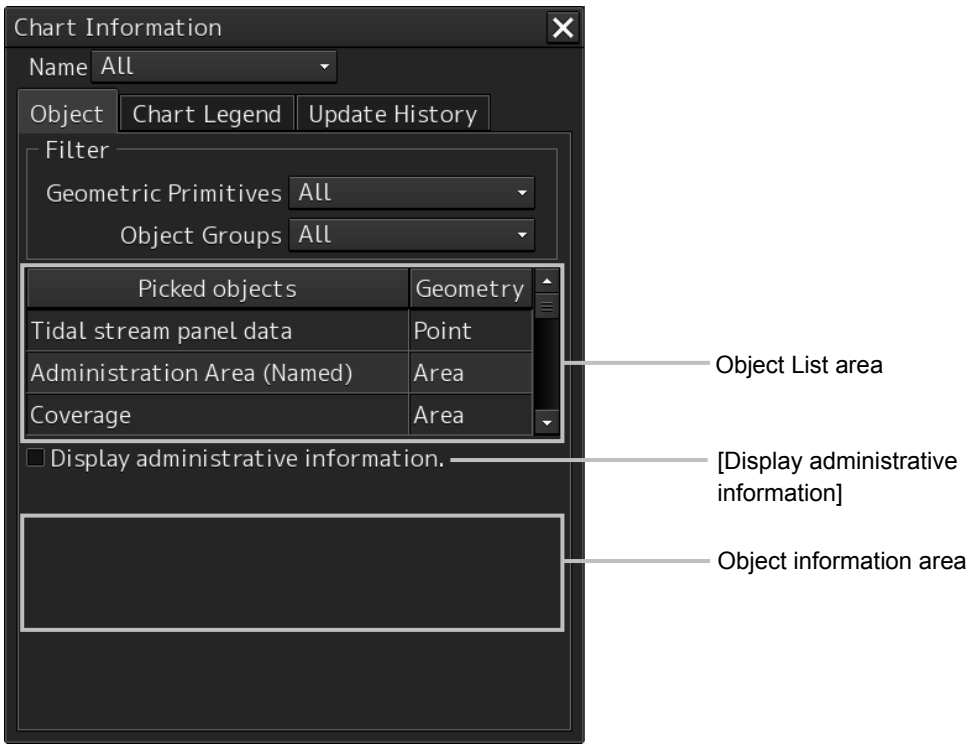
> **Memo**
>
> When Chart Legend or Update History is selected, the entire information is displayed regardless of the selection from the list.

Display switching tab

This tab switches the information that is displayed. When the [Object] (object information) tab is clicked on, object information is displayed. When the [Chart Legend] tab is clicked on, chart information is displayed. When the [Update History] tab is clicked on, chart update history is displayed.

8.11.1.2 Verifying Object Information

When the [Object] tab on the display switching tab is clicked on, object information is displayed.



Object list area

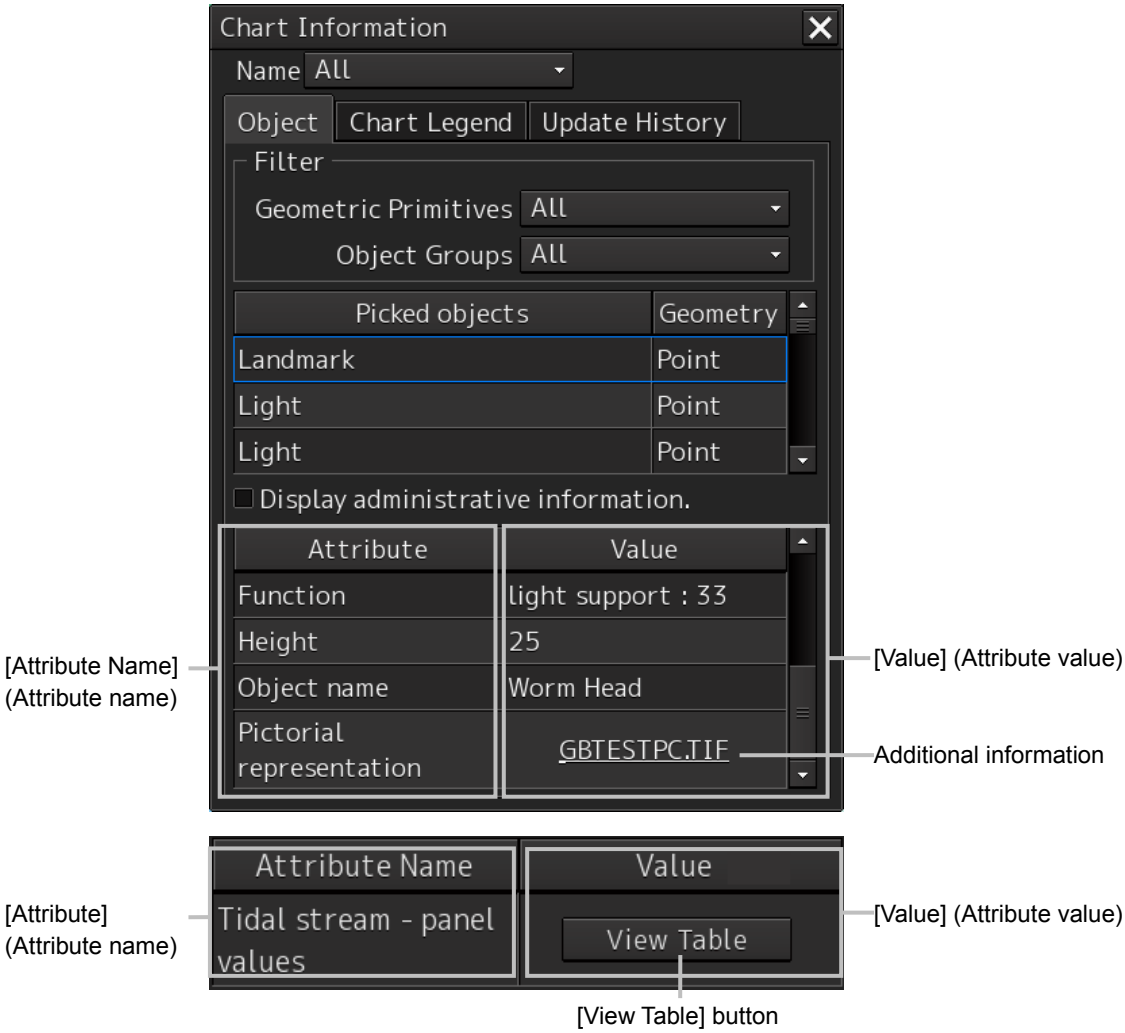
The object within the pick cursor and its geometry are displayed in the object information area.

[Display administrative information]

When this item is selected, the attributes of the administrative information and the contents are displayed.

Object information area

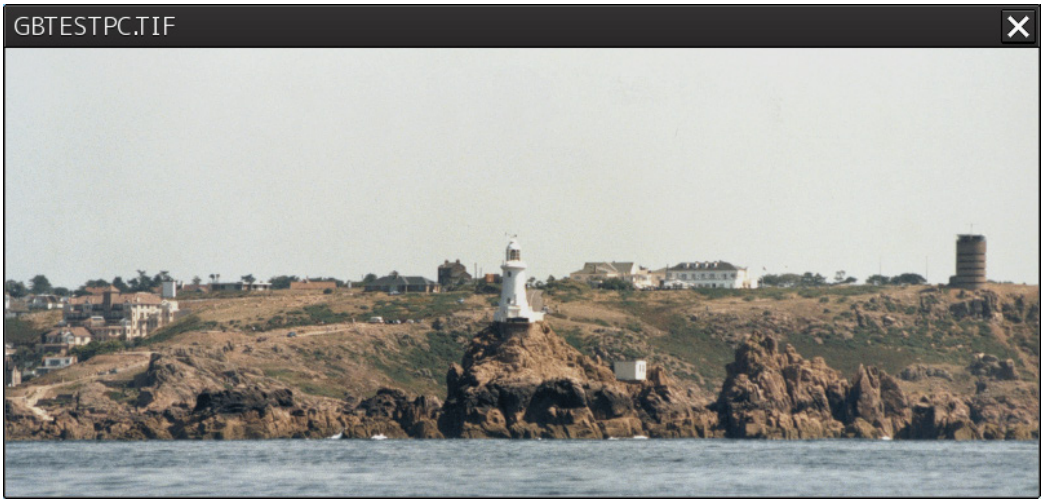
Information (attributes) of the object that was selected from the object list is displayed.



Displaying an additional information file

The additional information file on the object that was selected from the object list is displayed in [Value] in hyperlink format.

When Hyperlink is clicked on, the additional information file is displayed in a separate dialog box.



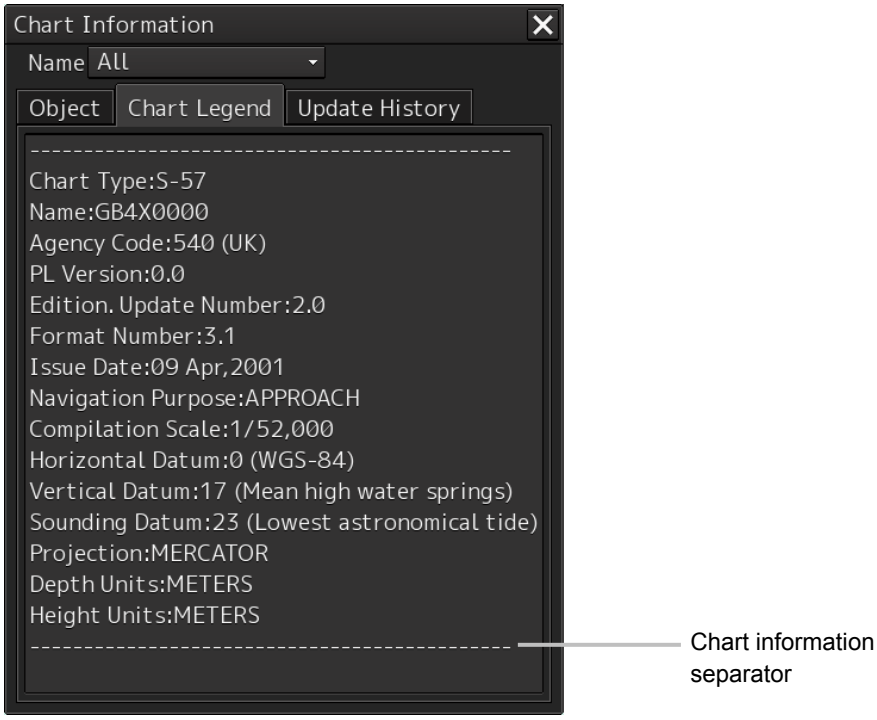
[View Table] button

When the [View Table] button of [Value] is clicked on, the data is displayed in a separate dialog box in the format that is specified as the attribute.

View Table

0, Lookinghaven, HW

Hours		Set [deg]	Drift [kn]
Before High Water	-6	255	1.0
	-5	278	1.2
	-4	279	1.7
	-3	293	1.1
	-2	299	1.1
	-1	300	0.6
High Water	0	75	0.7
After High Water	+1	102	1.0
	+2	105	1.1
	+3	100	1.3
	+4	98	1.1
	+5	97	0.4
	+6	212	0.6

8.11.1.3 Verifying Chart Information

When the [Chart Legend] tab of the display switching tab is clicked on, chart information is displayed.