

1.30 Orientation Modes

This radar has the following orientation modes available:

Mode	Description
Relative Motion (RM) modes	
[HEAD UP RM]	Not stabilized
[STERN UP RM]*	The radar image is rotated 180°. Graphics and relative and true bearings are also rotated 180°.
[STAB HEAD UP RM]	Head-up with compass bearing scale (True Bearing) where the bearing scale rotates with the compass reading.
[COURSE UP RM]	Compass-stabilized relative to ship's orientation at the time of selecting COURSE UP.
[NORTH UP RM]	Compass-stabilized with reference to North.
True Motion (TM) modes	
[NORTH UP TM]	Land objects and sea are stationary. Requires compass and speed data.

*: [STERN UP RM] is only available for A/B/W-types.

1.30.1 How to select an presentation mode

Select the [ORIENTATION MODE] box at the top left corner of the screen, then left-click to cycle through the available orientation modes.



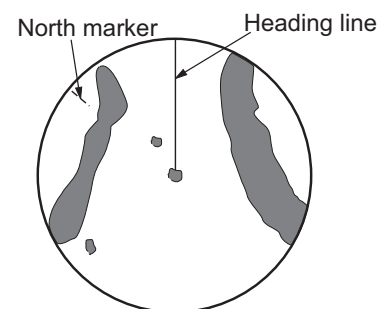
Loss of gyrocompass signal

When the compass signal is lost, "LOST GYRO SIGNAL" appears in yellow-orange in the [ALERT] box, the orientation mode automatically becomes HEAD UP, and TT and AIS objects, map and chart are erased. Stop the alert with the **ALARM ACK** key or left-click the [ALERT] box. Check the GYRO data.

1.30.2 Description of presentation modes

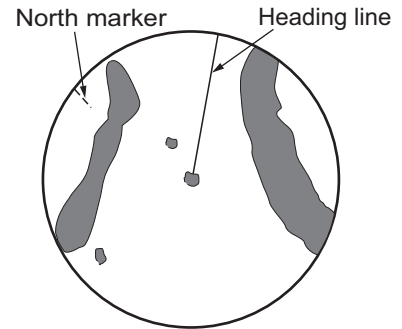
HEAD UP mode

A display without azimuth stabilization in which the line that connects the center with the top of the display indicates your heading. Targets are shown at their measured distances and their directions relative to your heading. The short dotted line on the bearing scale is the north marker.



COURSE UP mode

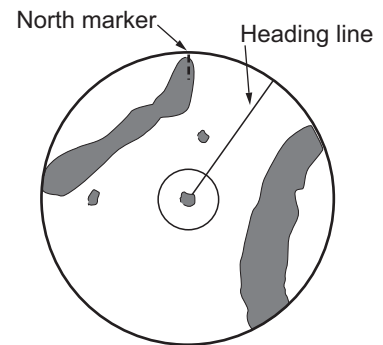
The radar picture is stabilized and displayed with the currently selected course at the top of the screen. When you change the heading, the heading line moves with the course selected. If you select a new course, select the course up mode again to display the new course at the top of the display. Targets are shown at their measured distances and their directions relative to the set course, which is at the 0-degree position. The heading line moves according to the yawing and any course change.



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NORTH UP mode

Targets are shown at their measured distances and their true (compass) directions from your ship. North is at the top of the screen. The heading line changes its direction according to your heading.

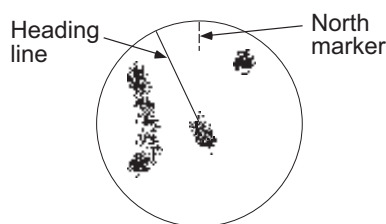
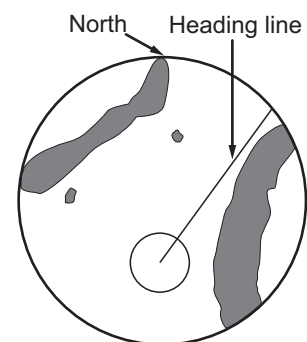
**STAB HEAD UP mode**

Radar echoes are shown in the same way as in the HEAD UP mode. The difference from normal HEAD UP presentation lies in the orientation of the bearing scale. The bearing scale is heading sensor stabilized. That is, it rotates in accordance with the heading sensor signal, enabling you to know own ship's heading at a glance.

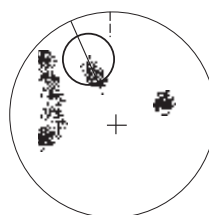
This mode is available when the radar is interfaced with a gyrocompass. If the gyrocompass fails, the bearing scale returns to the state of HEAD UP mode.

True motion mode

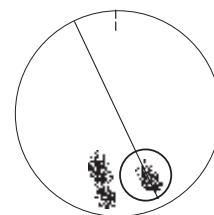
Your ship and other objects in motion move with their true courses and speed. All fixed targets, like landmasses, appear as fixed echoes in ground stabilized TM. When your ship reaches a point that is 50% of the radius of the display, the position is reset. The ship appears at 75% radius opposite to the extension of the current course. You can manually reset your ship symbol if you highlight the [CU/TM RESET] indication at the top of the screen, then left-click.



(a) True motion is selected



(b) Your ship has reached a point 50% of display radius



(c) Your ship is automatically reset to 75% of display radius

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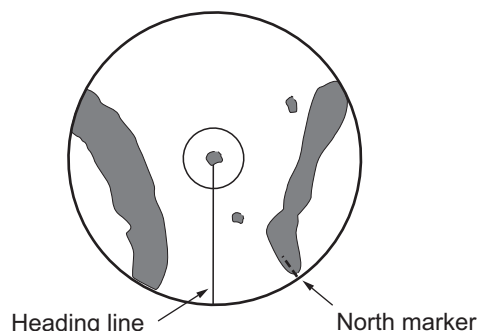
Note: The position of the own ship marker and bearing scale change according to reference position and off-centering.

- [ANT]: When OFF CENTER is active, the bearing scale intervals change accordingly.
- [CCRP]: When the CCRP moves outside the operational display area, the bearing scale intervals may not be displayed correctly.

STERN UP mode

The STERN UP mode rotates the HEAD UP mode picture, relative and true bearings and display graphics 180°. This mode is useful on dual-radar tugboats when backing up; one radar shows HEAD UP and another shows STERN UP. To enable the STERN UP mode, turn on [STERN UP] on the [OPERATION] menu.

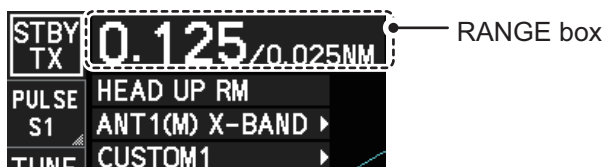
Note: STERN UP mode is only available for A/B/W-types.



1.31 How to Select a Range Scale

The selected range scale and range ring interval are shown at the upper left corner on the screen. When a target of interest comes closer, reduce the range scale so that it appears in 50-90% of the display radius.

1. Place the cursor in the [RANGE] box at the top left corner of the screen.



In the above example, the range scale is set to 0.125 NM and the interval between range rings is set to 0.025 NM.

2. Left-click to lower the range; right-click to raise the range.

You can also select the range with the **RANGE** key on the control unit. Press "+" to increase the range, or press "-" to reduce the range. Press and hold a key to successively change the range upwards or downwards.

Changing the plotter range

(A/B/W-types with Radar Plotter functionality only)

With the radar in standby (STBY) mode, you can change the plotter range by pressing the **RANGE** key. In this case, "range" means the on-screen displayed distance from the left-hand edge of the screen to the right-hand edge of the screen.

[+]: expands the range scale with the cursor location as the center.

[-]: reduces the range scale with the cursor location as the center.

Press and hold the [+] or [-] key to change the range scale continuously.

1.32 How to Measure Range

The range to a target can be measured three ways: with the fixed range rings, with the cursor, or with the VRM.

Use the fixed range rings to get an estimate of the range to a target. The rings are the concentric solid circles on the display. The number of rings is automatically set by the current range scale. The distance between the rings is the range ring interval, and the current interval appears at the upper-left position on the screen. To measure the range to a target with the range rings, count the number of rings between the center of the display and the target. Check the range ring interval and estimate the distance of the echo from the inner edge of the nearest ring.

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1.32.1 How to show/hide the range rings

Main menu operation

1. Open the menu.
2. Select [3 NAV TOOLS] to show the [NAV TOOLS] menu.
3. Select [4 RANGE RINGS].
4. Select [ON] or [OFF] as appropriate.
5. Close the menu.

Using the [CURSOR] menu (on-screen box)

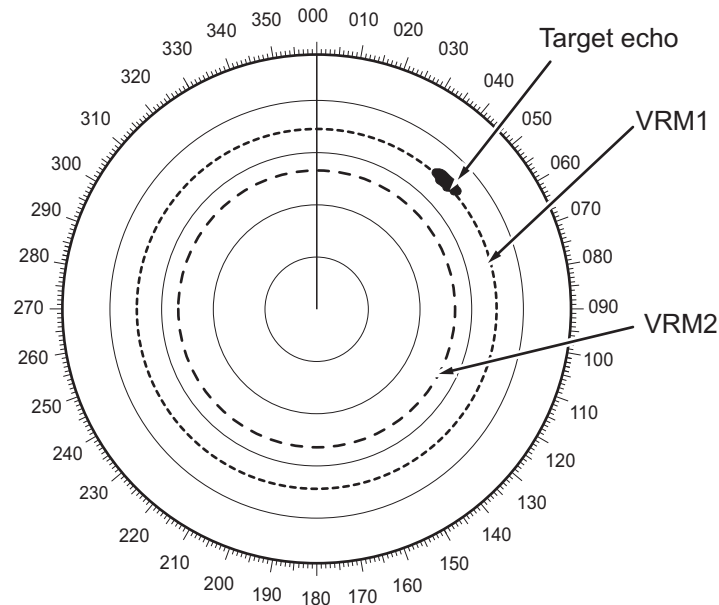
1. Select the operational display area, then right-click. The [CURSOR] context menu appears.
2. Select [RANGE RINGS].
3. Select [ON] or [OFF] as appropriate.
4. Close the menu.

Scrollwheel operation

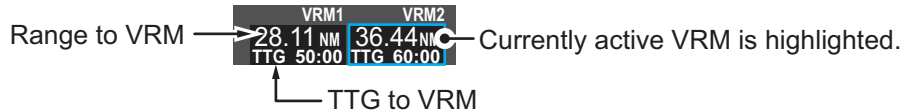
With the menu closed, place the cursor inside the operational display area, spin the scrollwheel to show "RANGE RINGS/EXIT" on the guidance box, then press the **left button** to show/hide the range rings.

1.32.2 How to measure range with the variable range marker (VRM)

There are two VRMs, No. 1 and No. 2, which appear as dashed rings so that you can distinguish them from the fixed range rings. The two VRMs can be distinguished from each other by the different lengths of their dashes; the dashes on the No. 2 VRM are longer.



There are two methods for measuring range with the VRMs, using the **VRM** key and on-screen menu box operation.



Note: The maximum VRM distance is set by the current display range and can be set as high as twice the distance of the display range.

Using the VRM keys

1. Press the **VRM ON** key to activate the VRM1 box. Press the **VRM ON** key again to activate the VRM2 box. Press the **VRM ON** key again to switch between active VRMs. The currently active VRM marker is displayed as shown in the above figure.
2. Rotate the **VRM** knob to align the active VRM with the inner edge of the target, then read the distance at the lower right of the screen. In the previous figure, the active VRM reads "36.44 NM".
Each VRM remains at the same geographical distance when you operate the **RANGE** key or the [RANGE] box. This means that the apparent radius of the VRM ring changes in proportion to the selected range scale.
3. Press the **VRM OFF** key to hide the VRMs.

On-screen menu box operation

1. Select the appropriate [VRM] box.
2. The guidance box reads "VRM ON/".
Left-click to turn on the VRM.
The guidance box now reads "VRM SET L = DELETE /".
Further, the box is highlighted and the corresponding VRM appears.
3. Left-click again and the cursor jumps to inside the operational display area. The guidance box now reads "VRM FIX L = DELETE / EXIT".
4. Move the trackball to adjust the VRM.
5. Left-click to anchor the VRM and fix its readout, or right-click to cancel and return the VRM to its previous location (range).
6. To hide the VRM, left-click the [VRM] box to show "VRM SET L = DELETE /" in the guidance box, then press and hold the **left button** on the trackball.

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1.32.3 How to set the VRM unit of measurement (B-type only)

VRMs can be displayed in the following units of measurement:

- NM (Nautical Miles)
- km (Kilometers)
- SM (Statute Miles)
- kyd (Kiloyards)

To change the unit of measurement, do the following:

1. Open the menu.
2. Select [3 NAV TOOLS].
3. Select [3 EBL•VRM•CURSOR SET].
4. Select [VRM1] or [VRM2] as appropriate.
5. Select the unit of measurement.
6. Close the menu.

Note: Changes made to the measurement units also affect active VRMs.

1.32.4 How to show TTG to VRM

TTG (Time To Go) to a selected VRM can be displayed as follows:

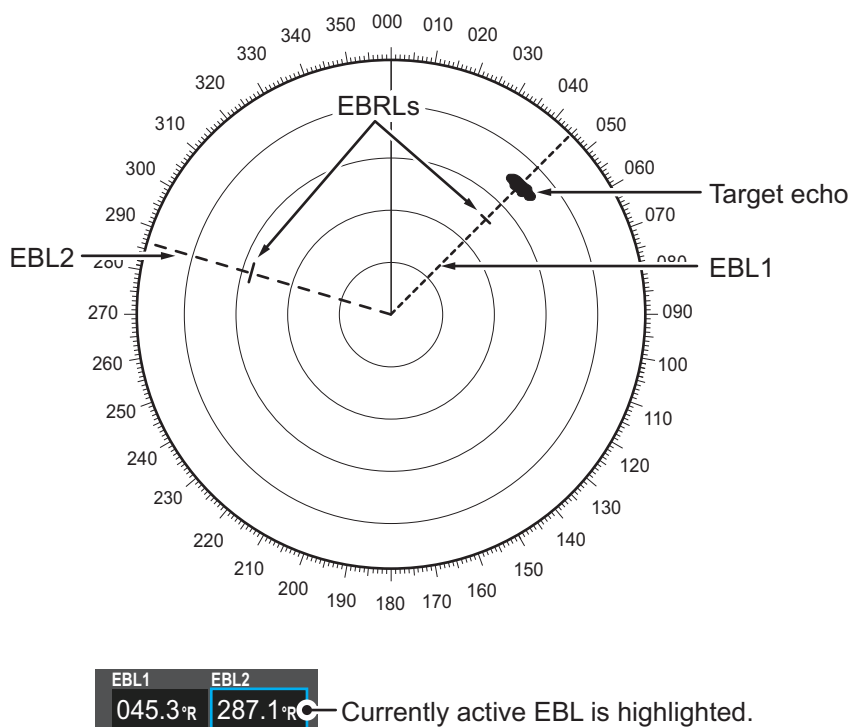
1. Open the menu.
2. Select [3 NAV TOOLS].
3. Select [3 EBL•VRM•CURSOR SET].
4. Select [3 VRM TTG].
5. Select [OFF], [1], [2] or [1&2] as appropriate.
 - [OFF] : No TTG to VRM displayed.
 - [1] : TTG from OS to VRM1 displayed.
 - [2] : TTG from OS to VRM2 displayed.
 - [1and2] : TTG from OS to VRM1 and VRM2 displayed.
6. Close the menu.

1.33 How to Measure Bearing

The Electronic Bearing Lines (EBLs) are used to take bearings of targets. There are two EBLs, EBL1 and EBL2. Each EBL is a straight dashed line extending out from the own ship position up to the circumference of the radar picture. The two EBLs can be distinguished from each other by the different lengths of their dashes; the dashes on EBL2 are longer.

Each EBL has an EBRL (Electronic Bearing Range Line, indicated as a short line, crossing the EBL at right angles). When VRM is not displayed and only EBL is displayed, the EBRL shows the range from the EBL origin.

When VRMs are displayed with EBLs the VRM overlaps the EBRL. The value for EBRL and VRM is the same and is displayed in the VRM box at the bottom-right of the screen.



1.33.1 Methods to measure bearing

There are two methods for measuring bearing, using the **EBL** key and on-screen menu box operation.

Using the EBL keys

1. Press the **EBL ON** key to activate the [EBL1] box. Press the **EBL ON** key again to activate the EBL2 box. Press the **EBL ON** key again to toggle active EBLs. The active EBL marker is displayed as shown on the previous page.
2. Rotate the **EBL** knob clockwise or counterclockwise until the active EBL bisects the target of interest, then read its bearing at the lower-left corner of the screen.
3. Press the **EBL OFF** key to erase the active EBL.

On-screen menu box operation

1. Select the appropriate EBL box.
2. The guidance box reads "EBL ON/". Press the **left button** to turn on the EBL. The guidance box now reads "EBL SET L=DELETE /".
3. Press the **left button** again and the cursor jumps to inside the operational display area. The guidance box now reads "EBL FIX L=DELETE/".
4. Spin the scrollwheel, or use the trackball, to move the EBL until the active EBL bisects the target of interest, then press the **left button** to anchor the EBL. Read the bearing at the lower-left corner of the screen.
5. Press the **EBL OFF** key to erase EBLs.

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1.33.2 True or relative bearing

The EBL readout is affixed by "R" (relative) if it is relative to own ship's heading, "T" (true) if it is referenced to the north. True or relative indication is available regardless of presentation mode.

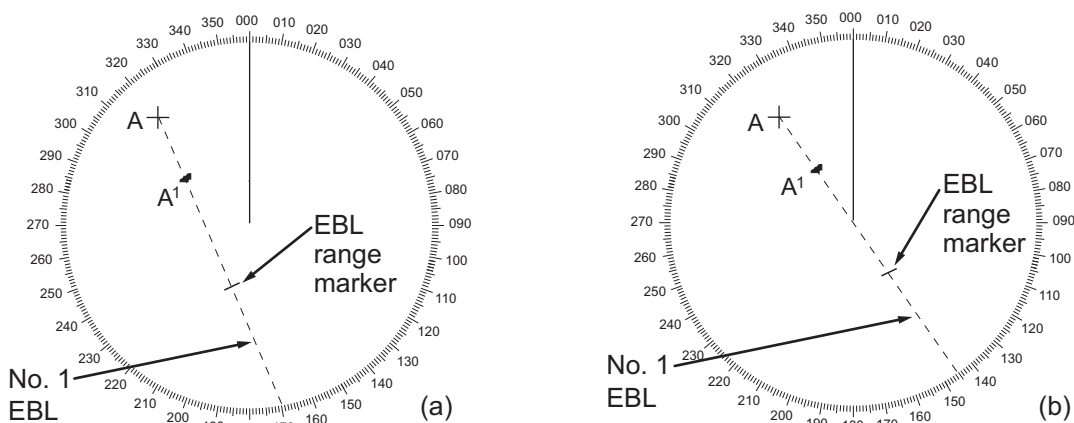
1. Open the menu.
2. Select [3 NAV TOOLS].
3. Select [3 EBL•VRM•CURSOR SET].
4. For IMO/A/R-type radars, select [5 EBL•CURSOR BEARING].
For B-type radars, select [2 EBL1] or [3 EBL2] as appropriate.
5. Select the [REL] or [TRUE] as required, then press the **ENTER MARK** key.
6. Close the menu.

Note: The EBL and its indication change with gyrocompass changes as follows:

Gyro heading	EBL changes
HEAD UP / relative	EBL indication and EBL marker are unchanged.
HEAD UP / true	EBL indication does not change, however the EBL marker moves accordingly
COURSE UP / relative	EBL indication does not change, however the EBL marker moves accordingly.
COURSE UP / true	EBL indication and EBL marker are unchanged.
NORTH UP / relative	EBL indication does not change, however the EBL marker moves accordingly
NORTH UP / true	EBL indication and EBL marker are unchanged.

1.34 Collision Assessment by Offset EBL

The origin of the EBL can be placed anywhere to enable measurement of range and bearing between any two targets. This function is also useful for assessment of the potential risk of collision. It is possible to read CPA (Closest Point of Approach) by using the EBL range marker as shown in (a) in the illustration below. If the EBL passes through the sweep origin (own ship) as shown in (b) in the illustration below, the target ship is on a collision course.



1.34.1 How to assess risk of collision using the offset EBL

There are two methods for assessing risk collision. You can use the control unit or the [CURSOR] menu.

Using the control unit (RCU-014)

1. Press the **EBL ON** key to display or activate an EBL (EBL1 or EBL2).
2. Place the cursor on a target appearing as threatening (indicated as "A" in the example figure on the previous page).
3. Press the **EBL OFFSET** key and the origin of the active EBL shifts to the cursor position.
4. Press the **EBL OFFSET** key again to anchor the EBL origin.
5. After waiting for a few minutes (at least 3 minutes), operate the **EBL** knob until the EBL bisects the target at the new position (A^1). The EBL readout shows the target ship's course, which can be true or relative depending on the EBL bearing reference setting.

Note: If relative motion is selected, it is also possible to read CPA by using the range marker as shown in left-hand figure at the top of the next page. If the EBL passes through the sweep origin (own ship) as illustrated in the right-hand figure above, the target ship is on a collision course.

6. To return the EBL origin to the own ship's position, then press the **EBL OFFSET** key.

Using the [CURSOR] menu (on-screen box)

1. Select the operational display area, then right-click. The [CURSOR] context menu appears.
2. Select [EBL OFFSET].
3. Select the operational display area, then left-click. The EBL line is attached to the cursor.
4. Place the offset EBL on the target appearing as threatening, then left-click.
5. After waiting for a few minutes (at least 3 minutes), operate the EBL used in step 4 until it bisects the target at the new position (A¹). The EBL readout shows the target ship's course, which can be true or relative depending on the EBL bearing reference setting.
6. To return the EBL origin to the own ship's position, repeat steps 1 to 3.
7. Close the menu.

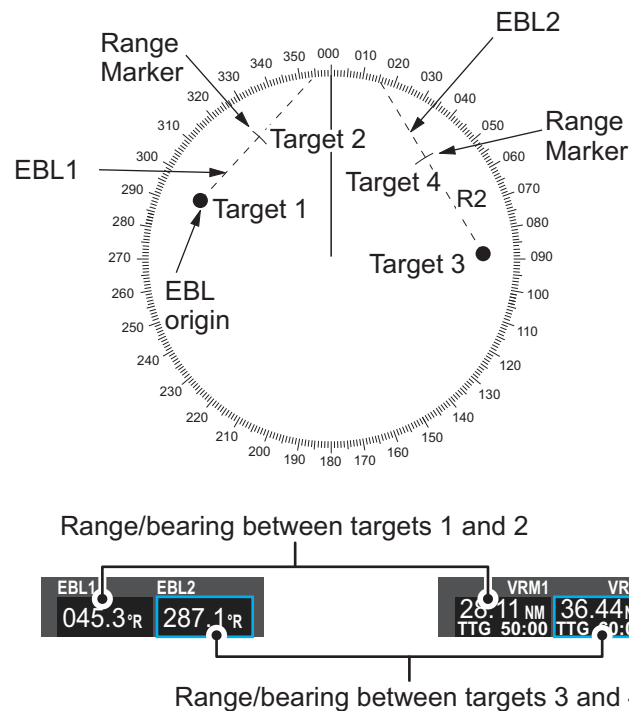
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1.34.2 How to set the origin point reference for EBL OFFSET

The origin point of the offset EBL can be ground stabilized (geographically fixed), north stabilized (true) or referenced to own ship's heading (relative).

1. Open the menu.
2. Select [3 NAV TOOLS].
3. Select [3 EBL•VRM•CURSOR SET].
4. Select [2 EBL OFFSET BASE].
5. Select [STAB GND], [STAB HDG] or [STAB NORTH] as appropriate.
 - [STAB GND]: Reference to latitude and longitude. Origin position is always fixed regardless of your ship's movement.
 - [STAB HDG]: Reference to heading. The relationship between origin position and own position is kept always.
 - [STAB NORTH]: Reference to North. The origin position changes with North position.
6. Close the menu.

1.35 How to Measure Range and Bearing Between Two Targets



How to measure range and bearing from the [CURSOR] menu

This procedure uses EBL1 and VRM1 as an example and is written on the premise that neither of the EBLs or VRMs is active.

1. Place the cursor on the EBL1 box, then left-click. EBL1 is now active.
2. Place the cursor inside the operational display area, then right-click to show the [CURSOR] context menu.
3. Select [EBL OFFSET]. The cursor is displayed with a red surround, indicating that the [EBL OFFSET] mode is now active.
4. With the cursor in the operational display area, left-click. EBL1 moves to the cursor location.
5. Place the offset EBL on the target of interest (Target 1), then left-click.
6. Right-click to deactivate the [EBL OFFSET] mode. The red surround on the cursor disappears.
7. Place the cursor on the [EBL1] box, then spin the scrollwheel until EBL1 intersects the secondary target (Target 2 in the example figure).
8. Place the cursor on the [VRM1] box, then spin the scrollwheel until the range marker on EBL1 aligns with Target 2. The readouts for EBL1 and VRM1, at the bottom of the screen, indicate the bearing and range between the Target 1 and Target 2.
9. You can repeat the same procedure on third and fourth targets (shown as "Target 3" and "Target 4" in the above example) by using EBL2 and VRM2.

Bearing is shown relative to own ship with suffix "R" or as a true bearing with suffix "T" depending on EBL relative/true settings in the [EBL•VRM•CURSOR SET] menu.

How to measure range and bearing from the control unit (RCU-014)

Range and bearing can be measure using the **EBL OFFSET** key.

1. Press the **EBL ON** key to activate EBL1.
2. Place the cursor inside the operational display area, then press the **EBL OFFSET** key. EBL1 moves to the cursor.
3. Place the cursor (EBL1 moves with the cursor) on a target of interest. (Shown as "Target 1" in the above example), then press the **EBL OFFSET** key.
4. Rotate the **EBL** knob to move the EBL until it passes through another target of interest. (Shown as "Target 2" in the above example).
5. Place the cursor on the [VRM1] box.
6. Rotate the **VRM** knob until the range marker on the EBL is on the inside edge of Target 2. The readouts for EBL1 and VRM1, at the bottom of the screen, indicate the bearing and range between the Target 1 and Target 2.
7. You can repeat the same procedure on third and fourth targets (shown as "Target 3" and "Target 4" in the above example) by using the No. 2 EBL and the No. 2 VRM.

Bearing is shown relative to own ship with suffix "R" or as a true bearing with suffix "T" depending on EBL relative/true settings in the [EBL•VRM] menu.

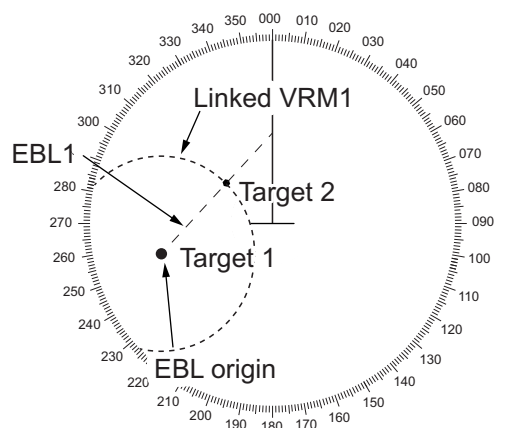
How to reset the EBL origin to the center of the screen

1. Place the cursor on the box for the EBL to reset, then left-click. The selected EBL is now active and highlighted.
2. Place the cursor inside the operational display area, then right-click. The [CURSOR] context menu appears.
3. Select [EBL OFFSET]. The cursor is now displayed with a red surround.
4. Left-click to return the EBL to the center of the display.
5. Right-click to deactivate the [EBL OFFSET] mode. The red surround on the cursor disappears.

How to link EBL and VRM OFFSET

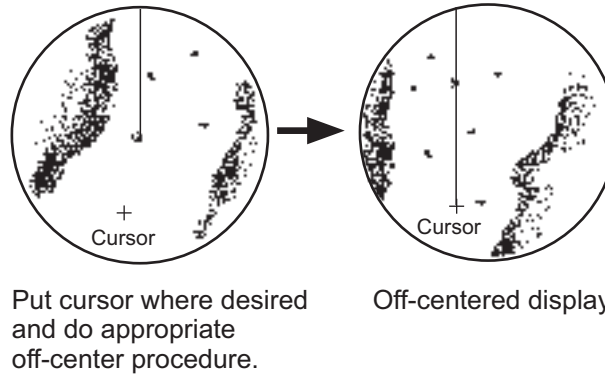
You can link the EBL and VRM offset to show the VRM range ring with one target as the center-point. This may helpful if the range marker on the EBL is difficult to see.

1. Open the menu.
2. Select [3 NAV TOOLS].
3. Select [3 EBL•VRM•CURSOR].
4. Select [8 VRM OFFSET].
5. Select [LINK EBL] to link the offset EBL is now displayed with the VRM range ring, as indicated in the figure below.
Select [OFF] to deactivate the link between the offset EBL and the VRM.
6. Close the menu.



1.36 How to Off-Center the Display

Own ship position, or sweep origin, can be displaced to expand the view field without switching to a larger range scale. The sweep origin can be off-centered to the cursor position, but not more than 75% of the range in use; if the cursor is set beyond 75% of the range scale, the sweep origin will be off-centered to the point of 75% of the limit.



This feature is not available on the 96 nm range or in the true motion mode.

If the conning position is outside the effective radar display, some parts of the bearing scale are not shown. For details, see section 1.50.

How to off-center the display from the control unit (RCU-014)

1. Place the cursor at the position where you wish to move the sweep origin.
2. Press the **OFF CENTER** key. The sweep origin is now off-centered at the cursor position.
3. To cancel off-centering, press the **OFF CENTER** key again.

How to off-center the display from the on-screen menu

1. Place the cursor inside the operational display area, then right-click to show the [CURSOR] menu.
2. Select [OFF CENTER]. The cursor is now displayed with a red surround, indicating that [OFF CENTER] mode is active.
3. Move the cursor to the position where you wish to move the sweep origin, then left click. The display is now centered at the cursor position.

Note: If you need to move off-center position, you can reset the off-center while the cursor is displayed with the red surround by left-clicking the operational display area.

4. Right-click to cancel [OFF CENTER] mode.
5. To reset the sweep origin to the center of the operational display area, repeat steps 1 to 2, then left-click the operational display area.

Note: When the conditions shown below are met, off-center cannot be canceled. This is because the radar antenna position is located at a position greater than 75% of the effective radar display.

- Own ship marker is large.
- The distance between antenna position and conning position is large.
- Short-distance display range.

To cancel the off-center in these cases, select a larger range, then cancel the off-center.

1.37 Target Trails

The trails of the radar echoes of targets can be displayed in the form of synthetic afterglow. Target trails are shown either relative or true and can be sea or ground stabilized. True motion trails require a compass signal, and position and speed data. When the range is changed, trails are continued for targets which were already displayed in the previous range. Newly detected targets have no trail when first detected.

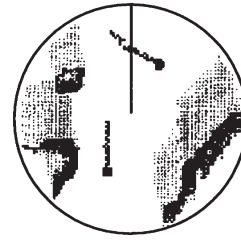
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1.37.1 True or relative trails

You can display echo trails in true or relative motion. Relative trails show relative movements between targets and own ship. True motion trails present true target movements in accordance with their over-the-ground speeds and courses.



True target trails - Stationary targets are not smeared.



Relative target trails - Targets move relative to own ship, stationary targets are smeared.

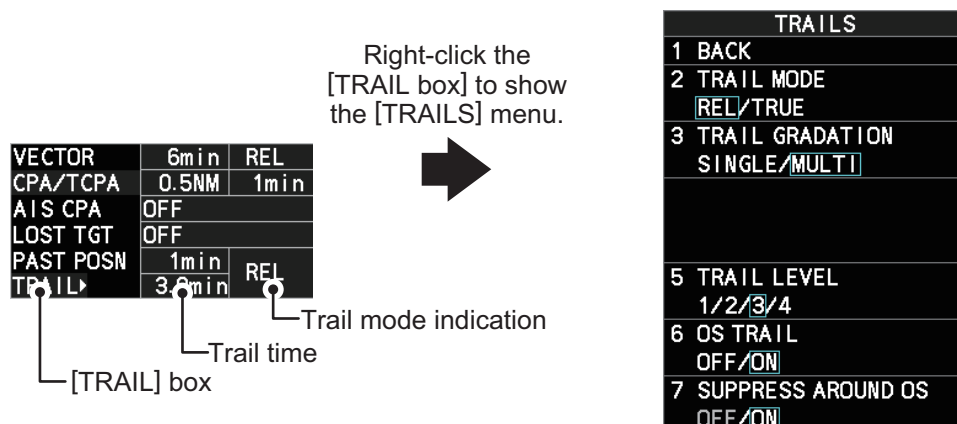
Note: The indication in the [TRAIL MODE] box changes color based on the trail mode and orientation, as shown in the following table.

Trail mode	Orientation	Color
True trails (TRUE-G or TRUE-S)	HEAD UP (relative)	Yellow
	STERN UP (relative)	
	CURSOR GYRO (relative)	White
	COURSE UP (relative)	
	NORTH UP (relative)	

The reference for the past position displays for AIS and TT is also switched whenever the trail reference is switched.

1. Open the menu.
2. Select [1 ECHO].
3. Select [0 NEXT].
4. Select [4 TRAILS]. The [TRAILS] menu appears.

Note: You can also right-click the [TRAIL] box to access this menu.



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5. Select [2 TRAIL MODE].
6. Select the appropriate trail mode.
 - [REL]: Relative target trails. Targets move relative to own ship and stationary targets appear smeared.
 - [TRUE]: True target trails. Targets true movements are shown, stationary targets are not smeared.
7. Close the menu.

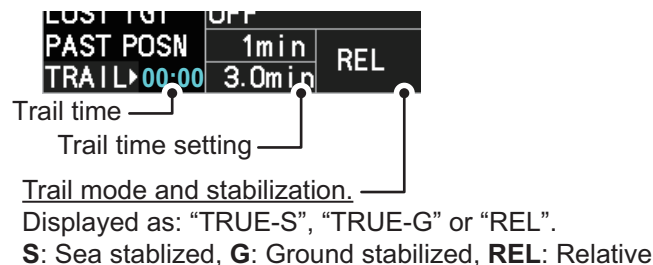
You can also click the trail mode indication to toggle between relative and true trails.

1.37.2 Trail time

Trail time is the interval at which the trail is plotted on-screen. You can change the trail time as follows:

Using the control unit (RCU-014)

Press the **CANCEL TRAILS** key to cycle through and select the desired setting.



The options, in cyclic order, are:

[OFF] → [15 sec] → [30 sec] → [1 min] → [3 min] → [6min] → [15 min] → [30 min] → [CONT] → [OFF]...

For B/W-types, the available options depend on the setting for [TRAIL LENGTH] in the [TRAILS] section of the [ECHO] menu.

[TRAIL LENGTH] setting	Available options
[NORMAL]	[OFF], [15 sec], [30 sec], [1 min], [3 min], [6 min], [15 min], [30 min], [CONT].
[12H]	[OFF], [30 min], [1 hr], [3 hr], [6 hr], [12 hr], [CONT].
[24H]	[OFF], [1 hr], [2 hr], [3 hr], [6 hr], [12 hr], [18 hr], [24 h], [CONT].
[48H]	[OFF], [2 hr], [4 hr], [8 hr], [16 hr], [24 hr], [36 hr], [48 h], [CONT].

Using the on-screen box

1. Place the cursor on the trail time setting inside the [TRAIL] box, at the bottom-right of the screen.
2. Left-click the [TRAIL] box to change the trail time. The options, in cyclic order, are: [OFF] → [15 sec] → [30 sec] → [1 min] → [3 min] → [6min] → [15 min] → [30 min] → [CONT] → [OFF]...

For B/W-types, the available options depend on the setting for [TRAIL LENGTH] in the [TRAILS] section of the [ECHO] menu.

Spin the scrollwheel to change the trail time. The options for each [TRAIL LENGTH] setting are listed the following table.

[TRAIL LENGTH] setting	Available options
[NORMAL]	[OFF], [15 sec], [30 sec], [1 min] to [30 min] at 30-seconds intervals, [CONT].
[12H]	[OFF], [00:30] to [12:00] at 30 minute intervals, [CONT].
[24H]	[OFF], [00:30] to [24:00] at one hour intervals, [CONT].
[48H]	[OFF], [00:30] to [48:00] at two hour intervals, [CONT].

Note 1: The timer displays the elapsed time of the selected trail. Use caution when using this feature, as the displayed time is not the overall trail time. Also, when the trail timer is displayed, the trail accuracy of other ship's echoes may be lowered. When the trail time reaches the preset interval, the timer disappears.

Note 2: The [CONT] option sets the trail time plotting as continuous. When the plotting time reaches 29:59, the timer is hidden. The timer reappears when [TRAIL ALL CLEAR] is selected, or when the range is changed.

1.37.3 Trail gradation

The trail afterglow can be displayed in a single tone or with gradual shading.



1. Open the menu.
2. Select [1 ECHO].
3. Select [0 NEXT].
4. Select [4 TRAILS]. The [TRAILS] menu appears.
Note: You can also right-click the [TRAIL] box to access this menu.
5. Select [3 TRAIL GRADATION].
6. Select [SINGLE] or [MULTI] (Multiple) as appropriate.
7. Close the menu.

1.37.4 Trail level

The level, or intensity, of the afterglow that extends from radar targets can be selected as below.

1. Open the menu.
2. Select [1 ECHO].
3. Select [0 NEXT].
4. Select [4 TRAILS]. The [TRAILS] menu appears.
Note: You can also right-click the [TRAIL] box to access this menu.
5. Select [5 TRAIL LEVEL].
6. Select the appropriate setting. The higher the number, the greater the intensity of the afterglow.
7. Close the menu.

1.37.5 Narrow trails (B/W-type only)

Target trails can be painted with thinner lines if desired. This csection 1.37.2an be useful when there are a lot of targets on the screen and it is hard to distinguish one from another.

1. Open the menu.
2. Select [1 ECHO].
3. Select [0 NEXT].
4. Select [4 TRAILS]. The [TRAILS] menu appears.
Note: You can also right-click the [TRAIL] box to access this menu.
5. Select [8 NARROW TRAIL].
6. Select the appropriate setting from [OFF], [1] or [2], then press the **ENTER MARK** key. A trail with a setting of [2] is thinner than a trail with a setting of [1].
7. Close the menu.

1.37.6 How to hide the trails temporarily

Following the procedure outlined in section 1.37.2, set the trail time to [OFF]. The trails are hidden from view, but are continued. To show the trails again, repeat the procedure, setting the trail time to any interval other than [OFF].

1.37.7 Trail stabilization in true motion

True motion trails can be ground stabilized or sea stabilized. The [TRAIL] box shows current stabilization as "TRUE-G" or "TRUE-S". You can change the stabilization mode with the following procedure.

Note: The stabilization mode is applied to own ship speed and TT trails.

Using the on-screen box

Click the stabilization mode button to toggle the mode (BT (ground stabilization) or WT (see stabilization)).



Stabilization mode button

Using the menu

1. Open the menu.
2. Select [7 INFORMATION BOX].
3. Select [2 OWN SHIP INFO].
4. Select [3 SPEED]. The [SPEED] menu appears.
Note: You can also right-click the [SPD ►] indication to access this menu.
5. Select [2 SHIP SPEED].
6. Select [LOG(BT)] (ground stabilization) or [LOG(WT)] (sea stabilization) as required.
7. Close the menu.

1.37.8 How to erase/restart trails

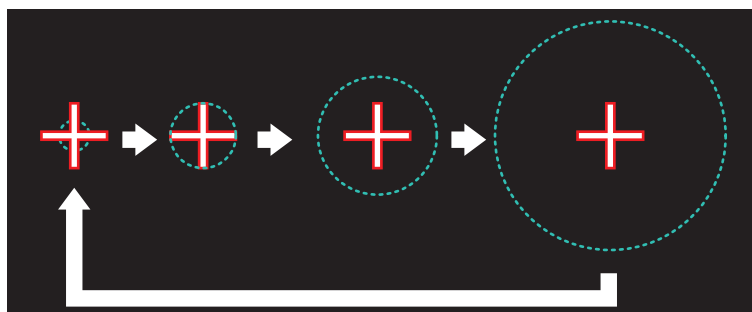
All trails can be erased (including those in the memory) and restarted to start fresh trails. There are three methods you can use to erase trails.

To erase all trails displayed in the operational display area:

- Select the [TRAIL] box, then press and hold the **left button** on the trackball; or
- Press and hold **CANCEL TRAILS** key.

To erase a section of a trail (B/W-types only):

1. Place the cursor inside the operational display area, then right-click to show the [CURSOR] menu.
2. Select [TRAIL ERASER]. The cursor is now displayed with a red surround and a dashed circle, indicating that [TRAIL ERASER] mode is active.
3. Press the **left button** to change the diameter of the dashed circle, as shown in the figure below.



4. Place the cursor on the trail whose section you want to erase, then press and hold the **left button**.
5. With the **left button** pressed, drag the cursor over the section of the trail you want to erase. The section of trail “covered” by the dashed circle is erased.
6. Release the **left button**.
7. Right-click to deactivate the [TRAIL ERASER] function. The cursor is no longer highlighted and the dashed circle disappears.

1.37.9 How to prevent sea clutter in true trails

You can prevent the display of sea clutter in true trails about your ship to clear the radar picture. Your ship's trails can also be shown or hidden.

1. Open the menu.
2. Select [1 ECHO].
3. Select [0 NEXT].
4. Select [4 TRAILS]. The [TRAILS] menu appears.
Note: You can also right-click the [TRAIL] box to access this menu.
5. Select [7 SUPPRESS AROUND OS].
6. Select [OFF] or [ON] as appropriate.
Note: When [6 OS TRAIL] is set to [ON], [7 SUPPRESS TRAILS] is automatically fixed at [ON]. To disable the sea clutter suppression feature, change [6 OS TRAIL] to [OFF], then change the setting for [7 SUPPRESS TRAILS].
7. Close the menu.

1.37.10 How to show/hide OS trails

To show or hide the OS trail at any time, follow the procedure below.

1. Open the menu.
2. Select [1 ECHO].
3. Select [0 NEXT].
4. Select [4 TRAILS]. The [TRAILS] menu appears.
Note: You can also right-click the [TRAIL] box to access this menu.
5. Select [6 OS TRAIL].S
6. Select [OFF] or [ON] as appropriate.
Note: When [6 OS TRAIL] is set to [ON], [7 SUPPRESS AROUND OS] is automatically fixed at [ON]. To disable the sea clutter suppression feature, change [6 OS TRAIL] to [OFF], then change the setting for [7 SUPPRESS AROUND OS].
7. Close the menu.

1.37.11 How to show/hide land trails (B/W-type only)

You can improve the on-screen display visibility by hiding trails generated by land-masses and non-moving objects. Hiding the trails has the following possible benefits:

- Land-masses have no trail, allowing you to use relative trails near coastlines.
- Only moving echoes create a trail, improving target identification.

1. Open the menu.
2. Select [1 ECHO].
3. Select [0 NEXT].
4. Select [4 TRAILS]. The [TRAILS] menu appears.
Note: You can also right-click the [TRAIL] box to access this menu.
5. Select [0 NEXT].
6. Select [2 HIDE LAND TRAILS(T)] or [3 HIDE LAND TRAILS(R)] as appropriate.

TRAILS (2/2)	
1	BACK
2	HIDE LAND TRAILS (T) OFF/1/2
3	HIDE LAND TRAILS (R) OFF/1/2
4	TRAIL LENGTH NORMAL/12H/24H/48H

7. Referring to the table below, select the appropriate setting.

Setting	Trails for non-moving objects		Trails for moving objects
	Large objects	Small objects	
[OFF]	Trails are shown	Trails are shown	Trails are shown
[1]	Trails are hidden	Trails are shown	Trails are shown
[2]	Trails are hidden	Trails are hidden	Trails are shown

8. Close the menu.

Note: When option [1] or [2] is selected trails for echoes outside the displayed area are not generated. It is important to note that, where the displayed area is moved by functions such as off-centering or true motion, newly displayed echoes do not have trails.

1.37.12 How to set the trail length (B/W-type only)

You can save up to 48 hours of trails. the [TRAIL LENGTH] can be set to one of the following lengths: [NORMAL], [12H], [24H] or [48H]. To set the trail length, follow the procedure below.

1. Open the menu.
2. Select [1 ECHO].
3. Select [0 NEXT].
4. Select [4 TRAILS]. The [TRAILS] menu appears.
5. Select [0 NEXT] to show the second page of the menu.
6. Select [4 TRAIL LENGTH].

Note: You can also right-click the [TRAIL] box to access this menu.

7. Select the desired length.

[NORMAL]: Trails are displayed in a single, continuous line with a single color.

[12H], [24H] or [48H]: Trails appear in segments. The interval for each segment change depends on your selection, as shown below.

- 12H: One hour intervals.
- 24H: Two hour intervals.
- 48H: Four hour intervals.

Note: When a length other than [NORMAL] is selected, set [3 TRAIL GRADATION] to [SINGLE]. If you select [MULTI], the interval between each colored segment may be difficult to see clearly.

8. Close the menu.

1.37.13 How to set the trail color (B/W-type only)

The setting for trail coloration depends on the setting for [3 TRAIL GRADATION] and [4 TRAIL LENGTH], as shown in the following table.

Length	Gradation	Setting location
NORMAL	SINGLE	[MAIN] → [2 ECHO] → [0 NEXT] → [4 TRAILS] → [4 TRAIL COLOR]
	MULTI	
[12H], [24H], [48H]	MULTI	[MAIN] → [2 ECHO] → [0 NEXT] → [4 TRAILS] → [0 NEXT] → [6 LONG TRAIL COLOR]
	SINGLE	

When [TRAIL LENGTH] is set to [NORMAL]

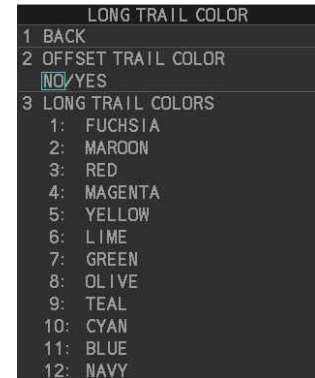
You can assign one of six colors when [4 TRAIL LENGTH] is set to [NORMAL].

1. Open the menu.
2. Select [1 ECHO].
3. Select [0 NEXT].
4. Select [4 TRAILS]. The [TRAILS] menu appears.
5. Select [4 TRAIL COLOR].
6. Select the required color. The available colors are: [GRN] (green), [BLU] (blue), [CYA] (cyan), [MAG] (magenta), [WHT] (white) and [YEL] (yellow).
7. Close the menu.

When [TRAIL LENGTH] is set to other than [NORMAL]

When [4 TRAIL LENGTH] is set to [12H], [24H] or [48H], you can select the color for each trail segment.

1. Open the menu.
2. Select [1 ECHO].
3. Select [0 NEXT].
4. Select [4 TRAILS]. The [TRAILS] menu appears.
Note: You can also right-click the [TRAIL] box to access this menu.



5. Select [0 NEXT] to show the second page of the menu.
6. Select [6 LONG TRAIL COLOR]. The [LONG TRAIL COLOR MENU] appears (see figure to the right).
7. Select [3 LONG TRAIL COLORS].
8. Set the colors as desired.
 Left-click to move the cursor through the colors, spin the scrollwheel to change the highlighted color. The menu shows 12 colors, numbered accordingly from [1] to [12]. The first segment of the trails is assigned the color for number [1].
9. Close the menu.

1.37.14 How to remove the colors from a section of a multicolor trail (B/W-type only)

You can remove the color(s) from a section of a multicolor trail, leaving the selected section as a gray trail. To remove the color(s), follow the procedure below.

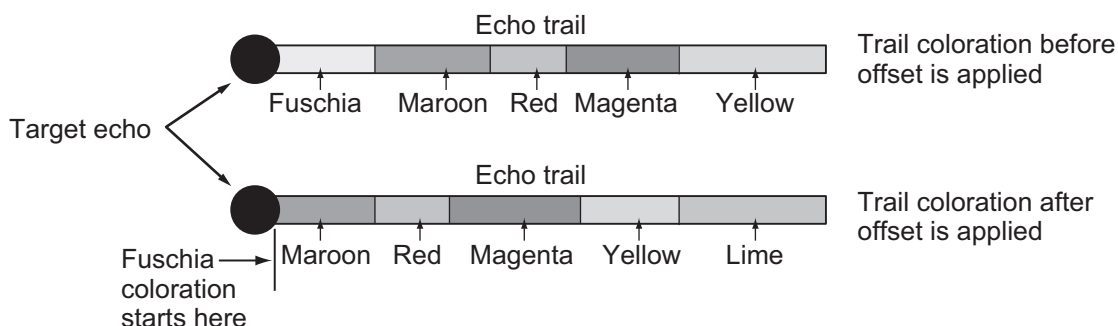
Note: This function is only available when [4 TRAIL LENGTH] is set to other than [NORMAL].

1. Open the menu.
2. Select [1 ECHO].
3. Select [0 NEXT].
4. Select [4 TRAILS]. The [TRAILS] menu appears.
Note: You can also right-click the [TRAIL] box to access this menu.
5. Select [0 NEXT] to show the second page of the menu.
6. Select [5 TRAIL GRAY-OUT TIME].
7. Select the start and end times for the period you want to gray-out.
8. Close the menu.

To disable the color removal, set the start and end to [00:00] at step 7 of the above procedure.

1.37.15 How to offset the colors for multicolored trail (B/W-type only)

You can “shift” the order of the trail colors. When this function is active, the first color used to paint the trail is changed.



Note: If the trail time set at the [TRAIL] box is longer than the time selected at [4 TRAIL LENGTH] in the [TRAIL] menu, trails are not displayed after the trail time elapses. For example, based on the above figure, if the trail time is set to [05:00] at the [TRAIL] box and [4 TRIAL LENGTH] is set to [12H], the trail coloration will stop after Yellow.

To offset the colors, follow the procedure below.

1. Open the menu.
2. Select [1 ECHO].
3. Select [0 NEXT].
4. Select [4 TRAILS]. The [TRAILS] menu appears.
Note: You can also right-click the [TRAIL] box to access this menu.
5. Select [0 NEXT] to show the second page of the menu.
6. Select [6 LONG TRAIL COLOR].
7. Select [2 OFFSET TRAIL COLOR].
8. **To offset the color by one**, select [ON].
 For example, if you selected [FUSCHIA] as the starting color for multicolor trails, the first color after the offset becomes [MAROON].
To leave the colors in their original order, select [OFF].
9. Close the menu.

1.38 Target Analyzer (B/W-type only)

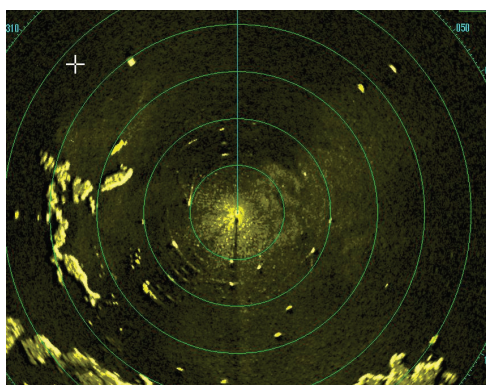
The target analyzer function analyzes echoes and assists the operator to determine dangerous targets. This function is particularly useful under heavy rain/snow or where there is surface reflection, which can cause interference and noise.

The target analyzer function can also place hatching over heavy rain areas, reducing the visible interference and allowing a clearer view of potential targets.

Echoes are displayed in five different colors to assist the operator in identifying targets. The colors and their respective echoes change depending on the echo color selected from the [BRILL] menu (see section 1.45) are shown in the table below.

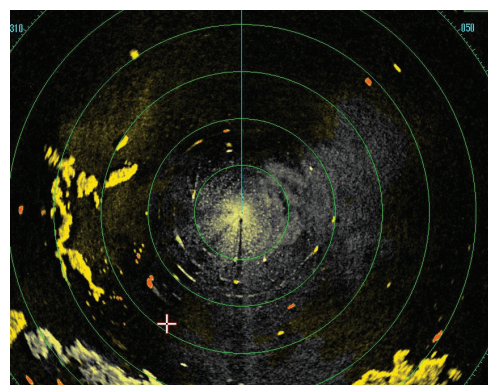
Echo	Selected echo color					
	YEL	GRN	WHT	AMB	M-GRN	M-CYA
Surface reflection	Green	Green	Green	Green	Green	Green
Rain	Gray	Gray	Gray	Gray	Gray	Gray
Moving target	Red	Red	Red	Red	Pink	Pink
Approaching target	Pink	Pink	Pink	Pink	White	White
Other echoes	Yellow	Green	White	Amber	Red to green	Red to blue

The following example figures show the manner in which this function affects displayed echoes.



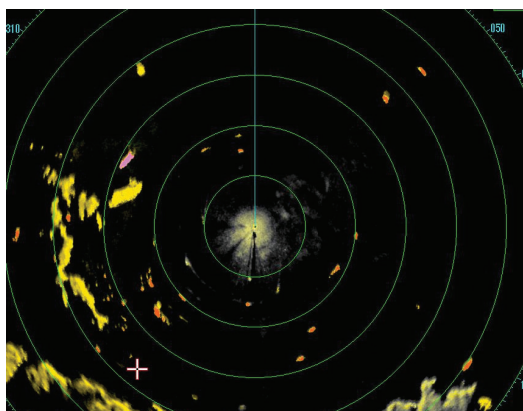
No echo adjustment

(Target analyzer off, EAV off, hatching off)
Rain, moving targets and surface reflections are all displayed with no filtering.



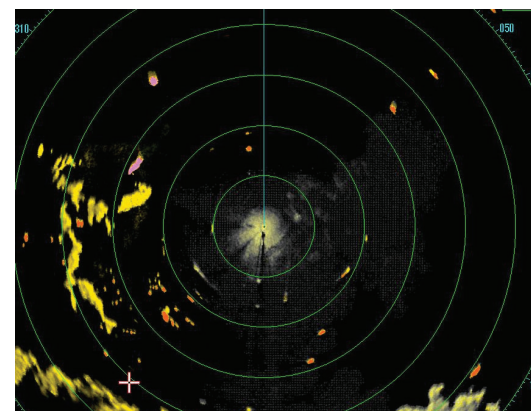
Minimal echo adjustment

(Target analyzer on, EAV off, hatching off)
Echoes are colored, surface reflections are filtered, rain is displayed.



Moderate echo adjustment

(Target analyzer on, EAV on, hatching off)
Echoes are colored, surface reflections and rain are filtered.



Maximum echo adjustment

(Target analyzer on, EAV on, hatching on)
Echoes are colored, surface reflections are filtered, rain is displayed in gray colored hatching.

Note 1: This function works best when the settings for [GAIN], [STC], [RAIN], [NOISE REJECT] and [VIDEO CONTRAST] are properly adjusted (surface reflections are displayed in green and rain is displayed in gray).

Note 2: This function recognizes moving targets as approaching targets. Buoys and other stationary objects are not recognized as approaching targets by this function.

Note 3: The target analyzer function requires a short period of time to analyze echoes and display them on-screen. If your antenna revolves at more than 40 rpm, moving targets may not be displayed correctly. For this reason, caution is advised when using the target analyzer function.

Note 4: The target analyzer function's performance may be affected by factors such as target size, weather and sea conditions, physical equipment configuration, offset settings and other factors.

Note 5: When the high speed function mode is activated (at installation), this function is automatically deactivated at a range of 2 NM or less. For details of the high speed rotation mode, contact your dealer.

What is "hatching"?

Where echo averaging may hide light rain on the display, the hatching feature, when activated, places a gray "veil" over the areas where rain is detected. This allows the operator to see where the rain is without affecting the quality of the displayed echoes.

1.38.1 How to activate/deactivate the target analyzer

1. Open the menu.
2. Select [1 ECHO].
3. Select [2 CUSTOMIZED ECHO].
Note: You can also right-click the [PICTURE] box to access this menu.
4. Select [5 TARGET ANALYZER].
5. Select [OFF] to deactivate the function, or [ON] to activate the function.
6. Select [6 RAIN ECHO HATCHING].
7. Select [OFF] to deactivate the function, or [ON] to activate the function.
8. Close the menu.



Target Analyzer indication

1.39 Target Alarm

The target alarm serves to alert the navigator to targets (ships, landmasses, etc.) entering a specific area, with audiovisual alerts.

The operator can set the alarm zones at any location, with any size, however, the zones must be inside the operational display area.

Note: The target alarm boxes are not displayed when the setting for [AZ/ALR SELECT] in the [TT•AIS] menu is set to the default setting [ACQUISITION ZONE]. To enable this function, set [AZ/ALR SELECT] in the [TT•AIS] menu to [TARGET ALARM ZONE].

CAUTION

- ♦ The alarm should not be relied upon as the sole means for detecting possible collision situations.
- ♦ A/C SEA, A/C RAIN and GAIN controls should be properly adjusted to be sure the alarm system does not overlook target echoes.

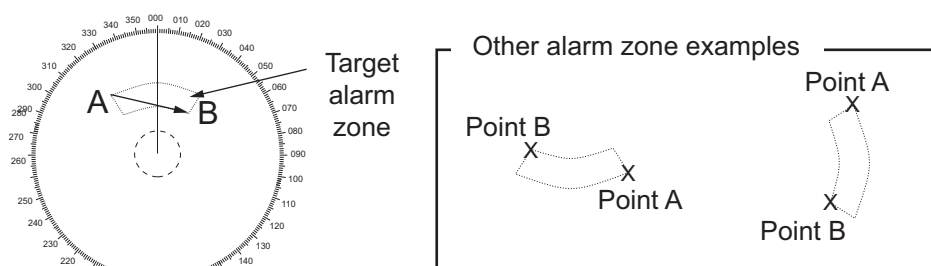
1.39.1 How to set a target alarm

The procedure below shows how to set a target alarm using the figure below as an example. The alarm boxes are labeled [1:] and [2:], and are located at the bottom-right of the screen, near the VRM boxes.

1. Select the appropriate alarm box, then left-click. The cursor jumps into the operational display area and the indication "SET" appears inside the target alarm box selected.



2. Using the trackball, move the cursor to Point A, then left-click.
3. Using the trackball, move the cursor to Point B, then left-click. The indication "SET" is replaced with "WORK" in the box. The target alarm zone's lines are shown as dashed lines.



Note 1: To create a 360° alarm zone, set Point B at the same location as Point A.

Note 2: Two alarm zones can be set simultaneously. The second alarm zone is only available when the first alarm zone is active, however.

Note 3: When the target alarm zone is not within the range in use the indication "UP RNG" appears to the right of the target alarm box. In this case select a range that will display the target alarm zone.

1.39.2 How to mute the target alarm

A target in the target alarm zone produces both visual (flashing) and audible (beep) alarms. To silence the audio alarm select the appropriate target alarm box then left-click. The target alarm box indication shows "MUTE". This will deactivate the audio alarm but will not stop the flashing of the offending target. You can also stop the alarm by deactivating the target alarm zone (see section 1.39.3).

To reactivate the audio alarm, select the target alarm box then left-click to show "WORK" in the box.

1.39.3 How to deactivate a target alarm

Select the target box to be deactivated, then press and hold the **left button** on the Control Unit.

Note: When both alarm zones are active, the second ([2:]) alarm zone must be deactivated before the first ([1:]) can be deactivated.

If both zones are active when you try to deactivate zone [1:], the system releases two audible beeps and shows the message "DELETE ALR2 FIRST".

1.39.4 How to change target alarm attributes

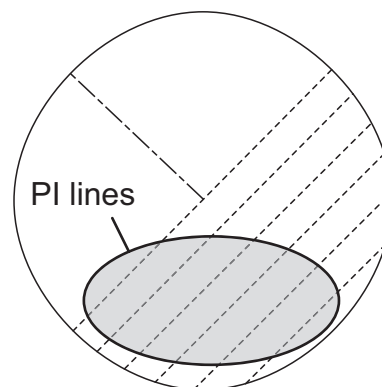
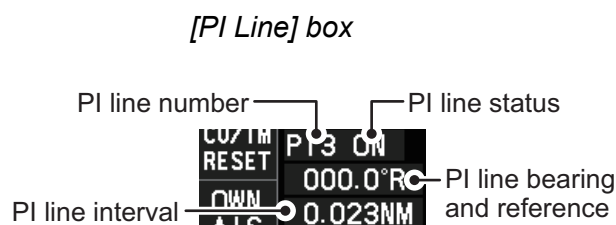
You can select the echo strength level that triggers the alarm, the condition that generates the alarm and the volume of the audio alarm as follows:

1. Open the menu.
2. Select [4 ALERTS].
3. Select [6 TARGET ALARM].
4. Select [2 ALR1 MODE] or [3 ALR2 MODE] as appropriate.
5. Select [IN] or [OUT] as appropriate.
[IN]: Targets entering the alarm zone trigger the alarm.
[OUT]: Targets leaving the alarm zone trigger the alarm.
6. Select [4 LEVEL].
7. Select the appropriate level of echo strength to trigger the alarm. [1]: weak echoes can trigger the alarm, [4]: only strong echoes trigger the alarm.
8. Select [1 BACK] to return to the [ALERT] menu.
9. Select [3 ALERT VOLUME].
10. Select [OFF], [LOW], [MID] or [HIGH] as appropriate.
Note 1: This setting is applied to all alarms output from this radar system.
Note 2: The [OFF] options is not shown for IMO/R-type radars.
11. Close the menu.

1.40 PI (Parallel Index) Lines

PI lines are useful for keeping a constant distance between own ship and a coastline or a partner ship when navigating.

You can control the presentation and interval of the PI lines from the [PI Line] box, which is at the lower-left corner of the screen.



1.40.1 How to show/hide the PI lines

You can show or hide the PI lines as required with the following procedure.

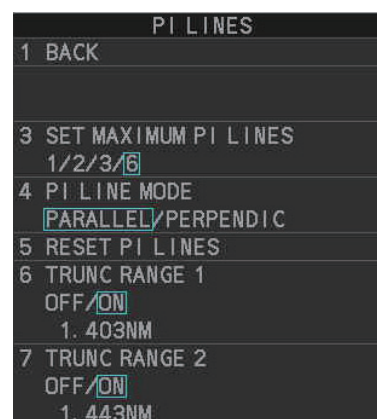
1. Place the cursor on the PI line number or PI line status in the PI line box.
2. Spin the scrollwheel to select the PI line (PI1 to PI6) you want to show or hide.
Note 1: For IMO/A/B/R-types, PI5 and PI6 are only available when [SET MAXIMUM PI LINES] is set to [1].
Note 2: For W-types, PI5 and PI6 are not available.
3. Left-click to toggle between [ON] (PI line is shown) or [OFF] (PI line is hidden).

1.40.2 How to set the maximum number of lines to display

The maximum number of PI lines available to display depends on your radar type. Further, the actual number of lines visible can be less depending on line interval.

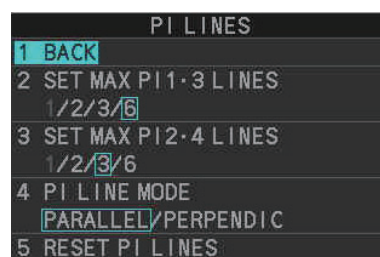
IMO/A/B/R-types

1. Open the menu.
2. Select [3 NAV TOOLS].
3. Select [2 PI LINES]. The [PI LINES] menu appears.
4. Select [3 SET MAXIMUM PI LINES].
 Up to six sets of PI lines are available depending on the maximum number of PI lines selected on the menu.
 - [1]: Six sets of PI lines (PI1 to PI6) are available.
 - [2], [3] or [6]: Four sets of PI lines (PI1 to PI4).
5. Select the appropriate option.
6. Close the menu.



W-types

1. Open the menu.
2. Select [3 NAV TOOLS].
3. Select [2 PI LINES]. The [PI LINES] menu appears.
4. Select [2 SET MAXIMUM PI 1•3 LINES] or [3 SET MAXIMUM PI 2•4 LINES] as required.
Up to four sets of PI lines are available depending on the maximum number of PI lines selected on the menu.
 - [1]: Not available for W-types.
 - [2], [3] or [6]: Four sets of PI lines (PI1 to PI4).
5. Select the appropriate option.
6. Close the menu.



1

1.40.3 How to change PI line bearing and interval

1. If not already displayed, show a PI line, referring to section 1.40.1.
2. Place the arrow on the PI line bearing and reference indication in the [PI Line] box.
3. Spin the scrollwheel to adjust the PI line bearing, between 000.0° to 359.9°.
4. Place the cursor on the PI line interval.
5. Spin the scrollwheel to adjust the PI line interval.
A negative interval value moves to the PI line to one side of the line which intersects the own ship position. A positive interval value moves the line to the other side of the own ship position.

1.40.4 How to change the PI line bearing reference (B/W-type only)

IMO/A/R-type radars' PI line bearing reference is fixed to North (True). For B/W-type radars however, PI line bearing reference can be relative to own ship's heading (Relative) or referenced to North (True) as below.

B-types

1. Open the menu.
2. Select [3 NAV TOOLS].
3. Select [2 PI LINES].
4. Select [2 PI LINE BEARING].
5. Select [REL] or [TRUE] as appropriate.
6. Close the menu.

W-types

Place the cursor on the PI line bearing and reference indication at the bottom-left of the screen, then right-click to toggle between [T] (True) and [R] (Relative).

1.40.5 How to change the PI line orientation

PI lines orientation can be selected from parallel or perpendicular.

Note: This function is only available when [SET MAXIMUM PI LINES] is set for other than [1].

1. Open the menu.
2. Select [3 NAV TOOLS].
3. Select [2 PI LINES].
4. Select [4 PI LINE MODE].
5. Select [PARALLEL] or [PERPENDIC] as appropriate.
6. Close the menu.

1.40.6 How to reset the PI lines to default (ship's heading)

You can automatically return PI lines to default orientation (ship's heading), 0-degrees for parallel orientation, 90-degrees for perpendicular orientation. This is faster than doing it manually.

From the PI line box

Place the cursor on the PI line number box indication, then press and hold the **left button**.

From the menu

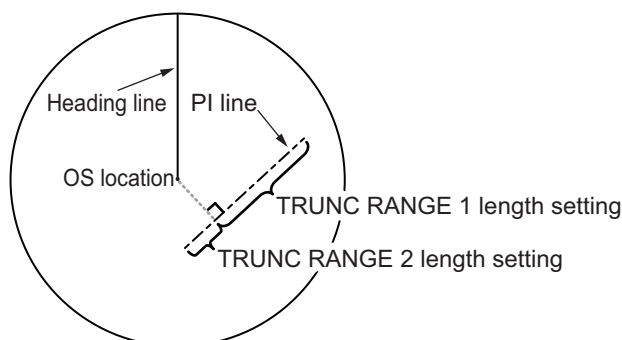
1. Open the menu.
2. Select [3 NAV TOOLS].
3. Select [2 PI LINES].
4. Select [5 RESET PI LINES]. The PI lines are reset.
5. Close the menu.

1.40.7 How to change PI line length (IMO/A/B/R-types only)

You can change the length of the PI lines. This function is only available when [SET MAXIMUM PI LINES] is set to [1]. If not already displayed, you can show PI lines for which you wish to change the length by referring to section 1.40.2.

1. Open the menu.
2. Select [3 NAV TOOLS].
3. Select [2 PI LINES].
4. Select [6 TRUNC RANGE 1].
5. Select [ON].
6. Spin the scrollwheel to adjust the front PI line length. The available range is 0.000 NM to 24.000 NM. All PI lines beyond this mark will be hidden.
7. Left-click to confirm the setting.
8. Select [7 TRUNC RANGE 2].
9. Select [ON].

10. Spin the scrollwheel to adjust the front PI line length. The available range is 0.000 NM to 24.000 NM. All PI lines beyond this mark will be hidden.
11. To change the length of other PI lines, activate the line you wish to adjust, then repeat steps 1 through 10.
12. Close the menu.

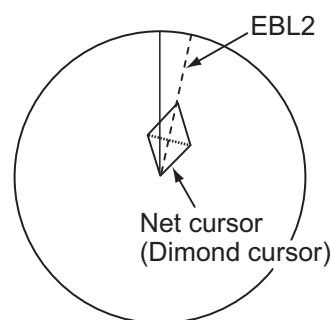


1

1.41 How to Use the Net (Diamond) Cursor (B/W-type only)

The net cursor is used to depict your fishing net on the radar display.

It is especially useful for bottom trawlers for knowing where the net is located. Enter the dimensions of your net in the menu to show the net in scale on the display.



1.41.1 How to activate the net cursor

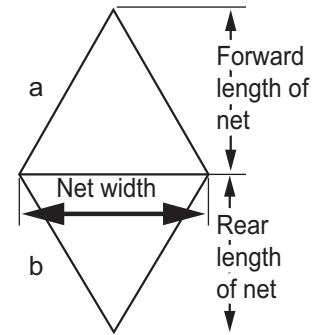
To activate the net cursor, do the following procedure.

- 1) Open the menu.
- 2) Select [3 NAV TOOLS].
- 3) Select [3 EBL•VRM•CURSOR SET].
- 4) Select [0 NEXT] to show the second page of the menu.
- 5) Select [NET CURSOR].
- 6) Select [NET CURSOR DISPLAY].
- 7) Select [ON] to activate, or [OFF] to deactivate the net cursor.
- 8) Close the menu.

NET CURSOR	
1	BACK
2	NET CURSOR DISPLAY
	OFF/ON
3	FRONT HALF LENGTH
	0. 0m
4	REAR HALF LENGTH
	0. 0m
5	NET WIDTH
	0. 0m
6	ROTATE STEP
	360/32 POINTS
	WARP LENGTH
	0. 0m

1.41.2 How to set the net cursor dimensions and orientation

1. Open the menu.
2. Select [3 NAV TOOLS].
3. Select [3 EBL•VRM•CURSOR SET].
4. Select [0 NEXT] to show the second page of the menu.
5. [3 FRONT HALF LENGTH].
6. Rotate the **scrollwheel**, then left-click to set the length of selected net section.
Note: The length appears in the [WARP LENGTH] indication. Adjust the values so that the total length for front and rear is equal to, or less than 3000m.
7. Select [4 REAR HALF LENGTH].
8. Rotate the **scrollwheel**, then left-click to set the length of selected net section.
Note: The length appears in the [WARP LENGTH] indication. Adjust the values so that the total length for front and rear is equal to, or less than 3000m.
9. Select [5 NET WIDTH].
10. Rotate the **scrollwheel**, then left-click to set the net width.
11. Select [6 ROTATE STEP].
Select [360°] or [32 POINTS], then left-click.
The net cursor moves in the same manner as EBL2 moves. Select [360°] to move with 0.1° steps, or select [32 POINTS] to move with 11.25° steps.
12. Close the menu.
13. Insert the net cursor at the location of the net with the EBL offset function.
 - 1) Press the **EBL OFFSET** key.
 - 2) Move the cursor onto the net location, then left-click.
14. Rotate the **EBL** knob to adjust the orientation the net cursor until the cursor is in line with, or against, the tide direction.



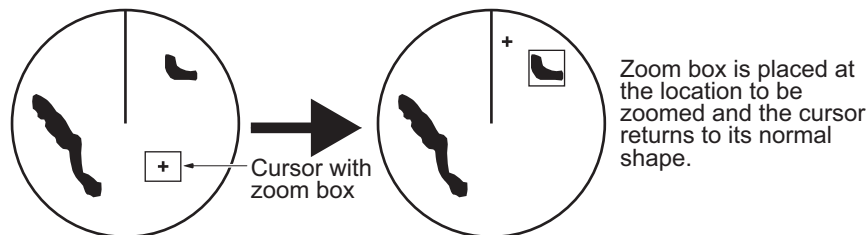
1.42 Zoom

The zoom function enlarges an area of interest as large as twice the normal viewing size, in the [INFORMATION BOX]. Zoom can be selected using the control unit or from a preset function key (see section 1.9 for how to assign functions to the function keys).

Zoom is not available when the [INFORMATION BOX] setting for [TARGET DATA] is [LARGE].

To enable/disable the zoom magnification, select the appropriate zoom setting ([2TIMES]: Enables magnification at 2×, or [3TIMES]: Enables magnification at 3× from the [ZOOM] option in the [INFORMATION BOX] menu. (See section 1.47.)

1. Select the operational display area, then right-click to show the [CURSOR] context menu.
2. Select [ZOOM].
3. Place the cursor inside the operational display area, then left-click. The cursor is now displayed with a zoom box.
4. Place the cursor and zoom box at the location you wish to zoom, then left-click to anchor the box.
If the zoom box is not placed where you intended to place it, left-click twice, then move the box to the correct place. Left-click to anchor the box.
5. Right-click to complete the procedure. The selected area is displayed on the right-side of the screen and the cursor returns to normal shape.



To disable the zoom function, repeat steps 1 to 3. At step 3, the zoom box is removed from the display.

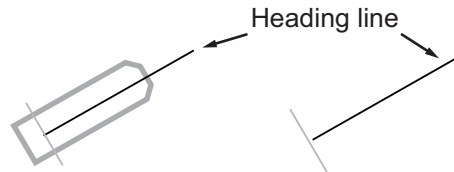
Note: Where the zoom function is assigned to a function key, press the function key to cycle through the zoom settings in the following order: [OFF] → [2TIMES] (2× magnification) → [3TIMES] (3× magnification) → [OFF]...

This operation works in direct relation with the settings selected from the [ZOOM] option in the [INFORMATION BOX] menu. To use the zoom function on a different area, do the procedure (step 1 to step 5) listed above.

1.43 How to Use Marks

1.43.1 Heading line mark

The heading line is a line from the own ship position to the outer edge of the radar display area and appears at zero degrees on the bearing scale in HEAD UP mode. The orientation of the line changes depending on the ship orientation in NORTH UP and True Motion modes.



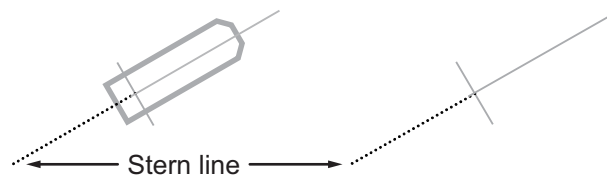
How to hide the heading line temporarily

To temporarily extinguish the heading line to look at targets existing dead ahead of own ship, press and hold the **HL OFF** key, or place the cursor on the [HL OFF] box in the InstantAccess bar™ then left-click and hold.

In addition to the heading line, the stern marker and all graphics within the operational display area are also erased. To redisplay the heading line, etc., release the key or the **left button**.

1.43.2 How to hide/show the stern mark

The stern marker, which is a dotted line, appears opposite to the heading line.



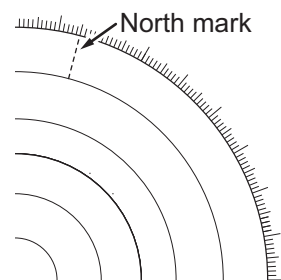
To display or erase this marker do the following:

1. Open the menu.
2. Select [2 MARKS].
For A/B/W-types with Radar Plotter functionality, select [2 MARKS•CHART].
3. Select [3 STERN MARK].
4. Select [ON] or [OFF] as appropriate.
5. Close the menu.

1.43.3 North mark

The north mark is displayed as a short dotted line on the inside edge of the operational display area. In HEAD UP mode, the north mark moves according to the own ship bearing.

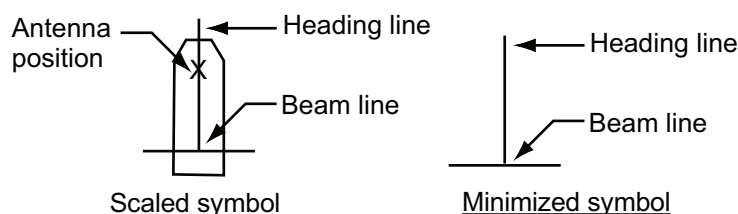
The north mark is hidden when the radar is in standby mode.



1

1.43.4 How to set up the own ship symbol

The own ship symbol marks own position on the display. It can be turned on or off and its configuration selected from the [MARK] menu. Two configurations are available: minimized symbol and scaled symbol. If the largest dimension of the symbol gets smaller than 6 mm, the scaled symbol will disappear and the own ship mark will be shown as a minimized symbol. The scaled symbol is scaled to indicate the length and beam of the vessel. Ship's dimensions should be entered at installation to use the scaled ship symbol.



1. Open the menu.
2. Select [2 MARKS].
For A/B/W-types with Radar Plotter functionality, select [2 MARKS•CHART].
3. Select [2 OWN SHIP MARK].
4. Select [MINIMIZED] or [SCALED] as appropriate.
5. Close the menu.

1.43.5 How to set the barge marker

You can mark the locations of barges on the display with icons.

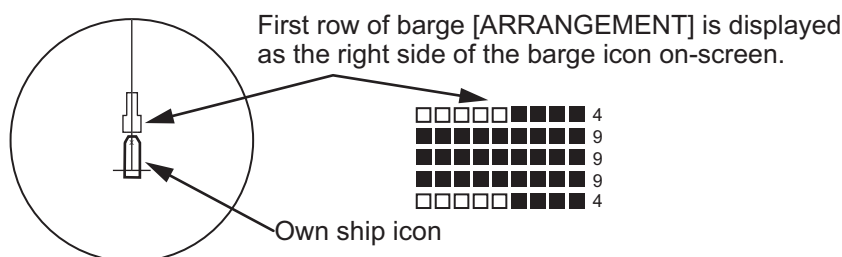
Note: This function is not available if [ECDIS] is set to [SERIAL] or [LAN] at installation. Consult your dealer for details.

Set up barge information as follows:

1. Open the menu.
2. Select [2 MARKS].
For A/B/W-types with Radar Plotter functionality, select [2 MARKS•CHART].
3. Select [6 BARGE MARK].
4. Select [2 BARGE MARK DISPLAY].
5. Select [ON] to display barge marks, [OFF] to hide barge marks, as appropriate.
6. Select [3 BARGE SIZE]. Spin the scrollwheel, then left-click to enter the [LENGTH] and [WIDTH] of the barge.

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7. Select [4 BARGE ARRANGEMENT]. This item lets you set a single barge or a barge chain. Spin the scrollwheel to select a value, then left click to move the cursor to the next line. Select number of barges (max. 9) to display. As you spin the scrollwheel the squares light or extinguish and the number of barges selected appears at the right side.

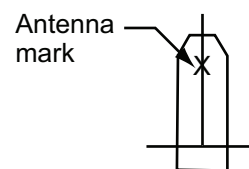


You can also use the number keys on the Control Unit to select the number of barges.

8. Close the menu. The barge mark is now displayed as shown in the example figure on the previous page.

1.43.6 Antenna mark

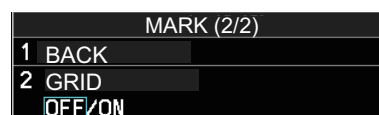
When [2 OWN SHIP MARK] in the [2 MARKS] (for A/B/W-types with Radar Plotter functionality, this menu appears as [2 MARKS•CHART]) menu is set to [SCALED], the antenna location is shown as a blue cross. The location of the antenna, and therefore the antenna mark, is set at installation.



1.43.7 Latitude/longitude grid

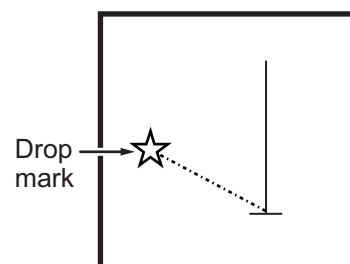
You can show/hide the lat/lon grid to suit your preferences.

1. Open the menu.
2. Select [2 MARK].
For A/B/W-types with Radar Plotter functionality, select [2 MARKS•CHART].
3. Select [0 NEXT] to show the next page.
4. Select [2 GRID], then select [ON] to show the grid, or [OFF] to hide the grid.
5. Close the menu.



1.44 Drop Mark

The operator can inscribe a drop mark at a selected location to find the range and bearing from own ship to the mark. This can be useful for marking a point to avoid while navigating to a destination.



1

1.44.1 How to activate the drop mark

To active the drop mark feature, do the following:

1. Open the menu.
2. Select [2 MARKS].
For A/B/W-types with Radar Plotter functionality, this menu appears as [2 MARKS•CHART].
3. Select [4 DROP MARK].
4. Select [ON] to enable [DROP MARK]. Two indications appear at the bottom of the screen.



Drop mark boxes show the mark number, bearing and range to the mark.

5. Close the menu.

1.44.2 How to inscribe a drop mark

1. Select a drop mark box, then left-click.
2. Place the cursor at the location to inscribe the drop mark, then left-click.
The drop mark box shows the range and bearing to the marked location.

1.44.3 How to erase drop marks

Select the drop mark to be erased, then press and hold the **left button**. The mark is erased and the range/bearing indications are no longer shown.

1.45 Brilliance and Color Schemes

Brilliance and color schemes are preset “palettes” that let you change the brilliance and color of on-screen data together.

1.45.1 How to select a brilliance and color scheme

The system has four presets of brilliance and color settings to choose from. Each preset is customizable (see section 1.45.3).

The following list shows each preset along with their default settings.

- [PLT1] (default [DAY-GRY]): preset for use in daylight with a gray background.
- [PLT2] (default [DAY-BLU]): preset for use in daylight with a blue background.
- [PLT3] (default [DUSK-BLU]): preset for use at dusk with a blue background.
- [PLT4] (default [NIGHT-GRY]): preset for use at night with a gray background.

To change the current scheme, do the following:

1. Place the cursor on the [PLT] indication, inside the brilliance settings box at the bottom-left of the screen.

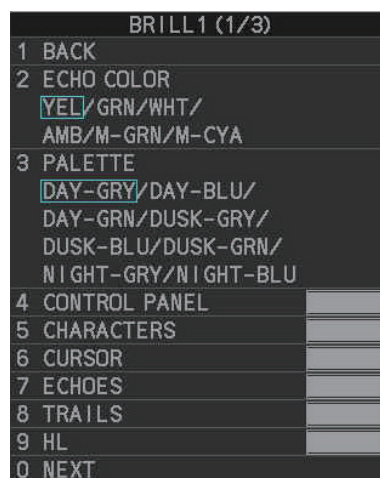
Place cursor here, then left-click to change brilliance preset, right-click to open the [BRILL] menu.



2. Spin the scrollwheel to show the scheme you want to use, then left-click. You can also left-click the indication to cycle through the schemes.

1.45.2 How to change the color and brilliance assigned to a palette

1. Referring to section 1.45.1, select the scheme whose settings you want to change.
2. Open the menu.
3. Select [9 INITIAL SETTINGS].
4. Select [2 BRILL]. The [BRILL] menu appears.



Note: You can also access this menu by right-clicking the [PLT] indication, inside the brilliance settings box at the bottom-left of the screen.

5. Select the appropriate item to adjust.

Menu item	Description
Page 1	
[2 ECHO COLOR]	Changes the color used to display echoes. The available colors are: [YEL] (yellow), [GRN] (green), [WHT] (white), [AMB]* (amber), [M-GRN]* (mutli-green), [M-CYA]* (multi-cyan). *: Shown for B/W-types only. If you select [M-GRN] or [M-CYA], the echo color changes depending on the echo strength. • [M-GRN]: red for strong echoes, ranging through to green for weak echoes. • [M-CYA]: red for strong echoes, ranging through to green for weak echoes.
[3 PALETTE]	Changes the color scheme (see subsection 1.45.3).
[4 CONTROL PANEL]	Adjusts control panel back-light brilliance.
[5 CHARACTERS]	Adjusts on-screen text brilliance.
[6 CURSOR]	Adjusts cursor brilliance.
[7 ECHOES]	Adjusts the echo brilliance.
[8 TRAILS]	Adjusts echo trail brilliance.
[9 HL]	Adjusts heading line brilliance.
Page 2	
[2 RANGE RINGS]	Adjusts range ring brilliance.
[3 BEARING CURSOR]	Adjusts bearing cursor brilliance.
[4 EBL]	Adjusts EBL line brilliance.
[5 VRM]	Adjusts VRM line brilliance.
[6 PI LINES]	Adjusts PI line brilliance.
[7 TT SYMBOLS]	Adjusts target trail symbol brilliance.
[8 AIS SYMBOLS]	Adjusts AIS symbol brilliance.
[9 L/L GRID]	Adjusts latitude/longitude grid brilliance.
Page 3	
[2 MARKS]	Adjusts latitude/longitude grid brilliance.
[3 CHART]	Adjusts chart brilliance. (Appears only for A/B/W-types with Radar Plotter functionality.)

6. Spin the scrollwheel, or press the appropriate menu number to change or adjust the settings, then left-click, or press the **ENTER MARK** key to confirm the setting.
7. Close the menu.

1.45.3 How to change the color palette

This radar provides eight sets of color and brilliance schemes to match any ambient lighting condition and can be assigned to a [BRILL] box preset.

1. Open the menu.
2. Select [9 INITIAL SETTINGS].
3. Select [2 BRILL]. The [BRILL] menu appears.
4. Select [3 PALETTE].
5. Select the appropriate palette. The default settings for each palette are shown in the following table.

Display item	Palette							
	DAY-GRY	DAY-BLU	DAY-GRN	DUSK-GRY	DUSK-BLU	DUSK-GRN	NIGHT-GRY	NIGHT-BLU
Screen brilliance	100	100	100	40	40	40	4	4
Panel brilliance	15	15	15	7	7	7	3	3
Character brilliance	15	15	15	15	15	15	15	15
Cursor brilliance	15	15	15	12	12	12	12	12
Echo brilliance	15	15	15	12	12	12	12	12
Trail brilliance	15	15	15	8	8	8	8	8
Heading Line brilliance	15	15	15	12	12	12	12	12
Range ring brilliance	15	15	15	7	7	7	15	15
Bearing ring brilliance	15	15	15	6	6	6	15	15
EBL brilliance	15	15	15	12	12	12	12	12
VRM brilliance	15	15	15	12	12	12	12	12
PI Line brilliance	15	15	15	12	12	12	12	12
TT symbol brilliance	15	15	15	12	12	12	12	12
AIS symbol brilliance	15	15	15	12	12	12	12	12
LL Grid brilliance	15	15	15	12	12	12	12	12
Mark brilliance	15	15	15	12	12	12	12	12
Chart brilliance ^{*1}	7	7	7	6	6	6	6	6
Character color ^{*2}	White	White	Green	White	White	Green	Orange	White
Background color ^{*2}	Gray/black	Blue/dark blue	Gray/black	Dark gray/dark blue	Dark blue/blue	Dark gray/black	Dark gray/black	Dark blue/blue
ODA color ^{*2}	Black	Dark blue	Black	Dark blue	Blue	Black	Black	Blue

^{*1}: Available for A/B/W-types only

^{*2}: This setting is fixed and cannot be changed.

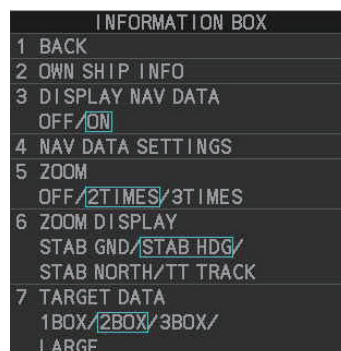
6. Close the menu.

1.46 How to Display and Set Up Navigational Data

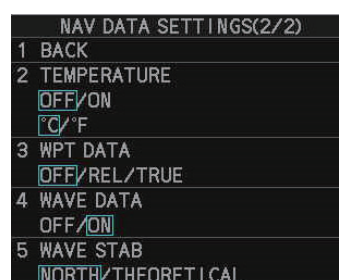
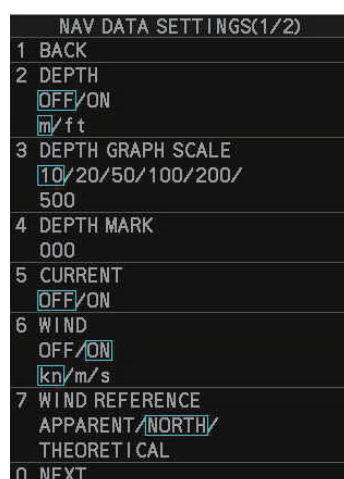
Wind, depth, ocean current, wave data, water temperature, date and time and way-point data can be displayed on this radar, however appropriate sensors are required.

1.46.1 How to set up the navigational data

1. Open the menu.
2. Select [7 INFORMATION BOX].



3. Select [4 NAV DATA SETTINGS].



4. Referring to the table below, select the appropriate menu item, then press the **ENTER MARK** key.

Menu item	Available settings
Page 1	
[2 DEPTH]	[OFF], [ON]; [m], [ft]
[3 DEPTH GRAPH SCALE]	[10], [20], [50], [100], [200], [500] (m)
[4 DEPTH MARK]	[000] to [500] (m)
[5 CURRENT]	[OFF], [ON]
[6 WIND]	[OFF], [ON]; [kn], [m/s]
[7 WIND REFERENCE]	[APPARENT], [NORTH], [THEORETICAL]
Page 2	
[2 TEMPERATURE]	[OFF], [ON]; [°C], [°F]
[3 WPT DATA]	[OFF], [REL], [TRUE]
[4 WAVE DATA]	[OFF], [ON]
[5 WAVE STAB]	[NORTH], [THEORETICAL]

Note 1: [4 WAVE DATA] requires connection to a PC with the wave analysis software installed.

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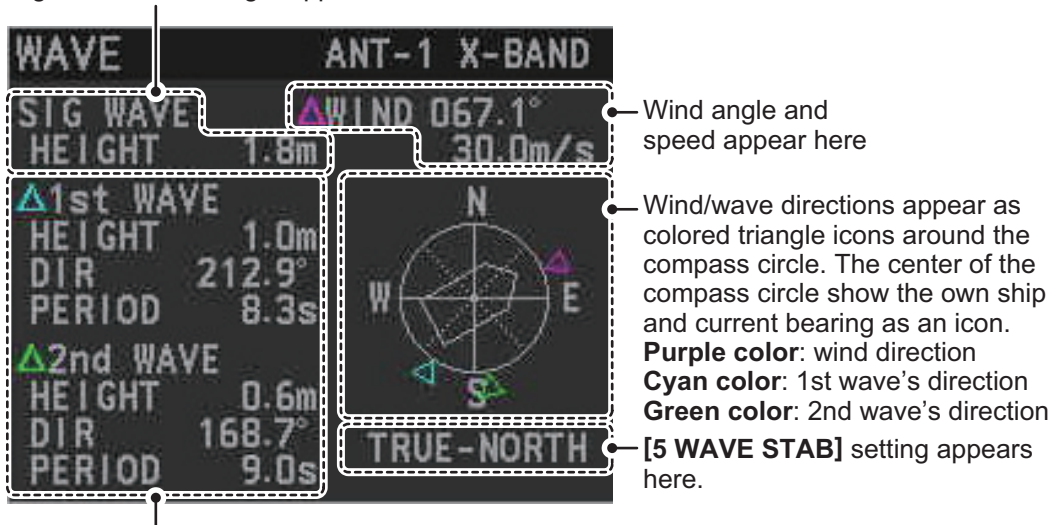
Note 2: [4 WAVE DATA] can only be active at one radar at any time. If [4 WAVE DATA] is turned [ON] at another radar in the same network, it is automatically turned [OFF] at this radar.

- Referring to the table above, select the appropriate setting, then press the **ENTER MARK** key.
- Close the menu.

Wave data display

You can view wave data when a PC with the wave analysis software installed is connected to the same network as this radar. When [4 WAVE DATA] is set to [ON], the wave data appears in the information box in a manner similar to that shown below.

Significant wave height appears here.



Wave information appears here.

[HEIGHT]: Wave height
[DIR]: Direction from which the wave is approaching.
[PERIOD]: Time until the wave meets own ship.

Note: Analysis data which has low integrity or reliability is displayed in yellow text.

For further details regarding the wave analysis data, see the operator's manual (OMC-36181) supplied with the wave analysis software.

1.46.2 How to display navigational data

- Open the menu.
- Select [7 INFORMATION BOX].
- Select [3 DISPLAY NAV DATA].
- Select [ON] to display navigational data, [OFF] to hide navigational data.
- Close the menu.

1.47 How to Use the Information Box

The information box shows target data, navigational data and zoomed areas of the radar display. To set up the information box, do the following:

1. Open the menu.
2. Select [7 INFORMATION BOX].
3. Select and set the appropriate menu item, referring to the table below.
4. Close the menu.

1

Menu item	Settings	Description
[2 OWN SHIP INFO]	See section 1.11, section 1.12 and section 1.13 for details.	Set up various own ship information, such as sensors used for position fix, date and time format/offsets, heading and speed sensors used.
[3 DISPLAY NAV DATA]	• [OFF] • [ON]	• Disable navigational data display. • Enable navigational data display.
[4 NAV DATA SETTINGS]	See section 1.46 for details.	Set up the format in which various navigational data is displayed in the [INFORMATION BOX].
[5 ZOOM]	• [OFF] • [2TIMES] • [3TIMES]	• Disable zoom magnification. • Set zoom magnification at 2× • Set zoom magnification at 3×
[6 ZOOM DISPLAY]	• [STAB GND] • [STAB HDG] • [STAB NORTH] • [TT TRACK]	• Ground stabilized zoom (Geographically fixed). • Heading stabilized zoom (Relative). • North stabilized zoom (True). • Tracked targets are zoomed.
[7 TARGET DATA]	• [1BOX] • [2BOX] • [3BOX] • [LARGE]	See the figure on the following page.

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Zoom and navigational data are displayed here.	Zoom and navigational data are displayed here.	Zoom and navigational data are displayed here, but can be hidden by TT/AIS data.	Zoom and navigational data are displayed here.
Zoom and navigational data are displayed here.	Zoom and navigational data are displayed here, but can be hidden by TT/AIS data.	Zoom and navigational data are displayed here, but can be hidden by TT/AIS data.	Only TT/AIS Data is displayed in the large box. Up to three AIS objects or up six TT targets. For MU-270W configurations, up to two TT targets can be shown.
Zoom can be displayed here, but can be hidden by TT/AIS data.	Zoom can be displayed here, but can be hidden by TT/AIS data.	Zoom can be displayed here, but can be hidden by TT/AIS data.	
1BOX	2BOX	3BOX	LARGE

- TT/AIS data displayed in the information box is shown in order of acquisition in the bottom half of the box.
- When the target data is no longer displayed (TT is cancelled, etc.) in the upper box, the previous display is restored.
- When using the 2BOX or 3BOX setting and the bottom half of the information box is full, the upper half is overlaid with the newly aquired TT/AIS data.
- Each box may display up two TT targets or one AIS object. (For MU-270W configurations, up to three TT targets can be shown)

1.48 Interswitch

The interswitch of this radar uses an Ethernet to transfer video and control signals. A digital signal transfers the video and control signals. You can connect up to four antennas and four display units. Set radar display and antenna groups from the [ANTENNA SELECT] display.

When you switch to a different antenna, the heading skew and timing adjustment (set at installation) for that antenna are automatically applied.

The [ANTENNA] box at the upper left position shows current antenna selection.



Antenna box

ANTx: "x" indicates antenna selected.

(M) or (S): indicates antenna is (M)aster or (S)lave.

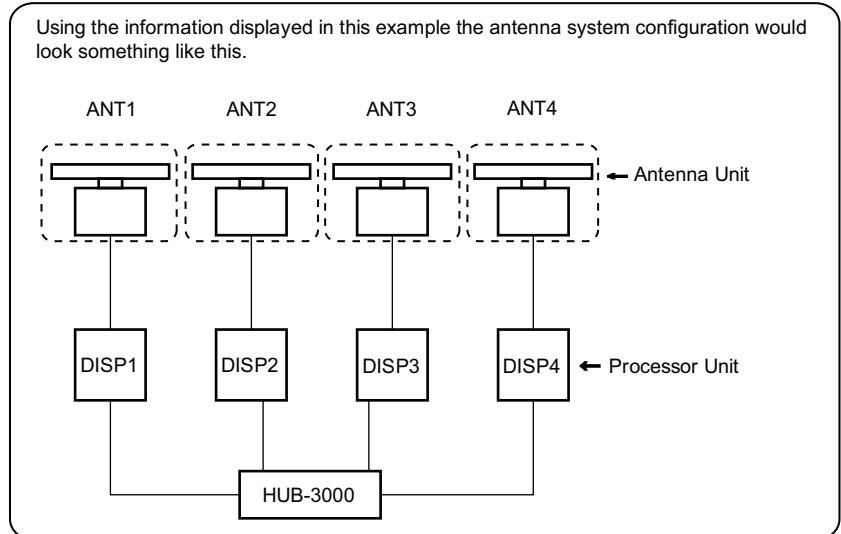
X-Band or S-Band: indicates antenna bandwidth.

1.48.1 How to display antenna information

1. Open the menu.
2. Select [9 INITIAL SETTINGS].
3. Select [3 SELECT ANTENNA]. The [SELECT ANTENNA] menu appears.

Note: You can also right-click the [ANTENNA] box to access this menu.

SELECT ANTENNA	
1	BACK
ANT 1 :	X-BAND
25UP	Main Top
ANT 2 :	S-BAND
30UP	Main 2nd
ANT 3 :	X-BAND
12	Fore
ANT 4 :	X-BAND
12	Aft
OWN RADAR NO.1	
2	DISP1 ANT1
	MASTER
	DISP2 ANT2
	MASTER
	DISP3 ANT3
	MASTER
	DISP4 ANT4
	MASTER
9	SAVE INTER-SWITCH
	NO / YES
0	CLEAR INTER-SWITCH
	NO / YES



The following information is displayed in the [SELECT ANTENNA] menu:

- Radar band, output power and antenna position of each antenna currently powered. (If an antenna is not powered, its data area is blank.)
- Own ship radar number (radar in use).
- Current antenna and display combinations.

Note: For configurations with processors assigned as [DISP5]/[DISP6]/[DISP7]/[DISP8] at installation, the processor unit automatically connects to the system as [SLAVE] when first turned on. You can change this setting after the first connection. See section 1.48.2.

1.48.2 How to preset antenna and display combinations

You can preset the antenna and display combinations for each antenna and display in the radar system. As an example, the procedure below shows how to select the no. 1 antenna unit for the no. 2 display unit.

1. Open the menu.
2. Select [9 INITIAL SETTINGS].
3. Select [3 SELECT ANTENNA]. The [SELECT ANTENNA] menu appears.
Note: You can also right-click the [ANTENNA] box to access this menu.
4. Select the display unit for which to select an antenna (at the next step). For the purpose of this example, select [DISP2] to select the no. 2 display unit. The indication for the antenna is highlighted.
5. Spin the scrollwheel to toggle between [MASTER] and [SLAVE]. The MASTER system passes on settings such as [CPA], [TCPA] and alarm settings to SLAVE radars connected to the same network.
6. Repeat steps 2 and 3 to set other display and antenna combinations.
7. Select [SAVE INTER-SWITCH], then select [YES] to save your selections.
8. Close the menu.

Antenna selection considerations

- An antenna unit cannot be controlled from multiple display units. Select one Master display unit for one antenna unit. If two antenna units are set as masters, the display last-set as master becomes the master and all other displays are automatically changed to slave.
- An antenna unit without a Master display cannot be selected on the sub display units. If there is no antenna unit set as master, the lowest number display is automatically set as master.
- If the Alert "LOST ISW FUNC" appears, do one of the following, as applicable:
 - If only your antenna is not displayed on the [ANT SELECT] display, the LAN line in the Processor Unit may be faulty. In this case, use the standalone mode.
 - If the antenna that was in use does not appear on the [ANT SELECT] display, the LAN line in other Processor Unit may be faulty. In this case, see the preceding page for how to select a different antenna unit
- When the Network fails, the Interswitch does not work, but standalone operation is possible.
- Disable the Dual Radar function from the [RADAR INSTALLATION] menu (see the Installation manual IME-36520) before setting up the Interswitch feature.
- Interswitch connection is NOT available between the different software versions (ex.: 03.xx version and 50.xx version), including FAR-2xx8 radars.
- When using a FAR-2xx7 series radar for Interswitch connection, the following settings must be done from the FAR-2xx7 [RADAR INSTALLATION] menu.
 - Set [SCANNER] → [DUAL RADAR SETTINGS] → [DUAL RADAR] to [OFF].
 - Set [NETWORK] → [LAN1•3 IP ADDRESS] → CLASS to [C].
- When using a FAR-3xx0 series radar for Interswitch connection, the following settings must be done from the FAR-3xx0 [RADAR INSTALLATION] menu.
 - Set [SCANNER] → [OTHERS] → [COMBINE FUNC] to [OFF].
 - Set [NETWORK] → [LAN1•3 IP ADDRESS] → CLASS to [C].
 - Set the radar number as [1], [2], [3] or [4].
 - Disable the [Icing Prevention] feature.

- Radar functions are controlled independently, dependently or commonly depending on selection as [MASTER] or [SLAVE] (see the following table).

Radar Functions	Control	Master Display Option	Slave Display Option
AIS function	Independent	Desired value can be set	Desired value can be set
Brilliance			
Echo trails			
EBL			
Lat/long data			
Presentation mode			
Speed data			
Target alarm			
TT, AIS on/off			
TT, AIS track interval			
Vector mode			
Vector time			
VRM			
Wiper			
Zoom			
TT COLLISION alarm	Dependent Control		Cannot control
Range* ³			
A/C SEA* ¹			
A/C RAIN* ¹			
Automatic Clutter Elimination (ACE)* ¹			
Gain* ¹			
IR* ²			
Echo stretch* ¹			
Echo averaging* ¹			
Picture setting* ¹ (Customize echo)			
STBY/TX	Independent		Desired value can be set
Tuning			
Reference Point	Common Control	Item Commonly Controlled	Item Commonly Controlled
TT LOST warning			
TT alerts ACK			
TT acquire			
TT/AIS AZ			

- *1. When the connected radar is a FAR-2xx8/FAR-3xx0 series radar, these items can be adjusted from the "Slave" radar.
- *2. When the connected radar antenna is a FAR-3xx0/FAR-2xx8 series magnetron-type, and the radar is assigned as "Slave", the desired value can be set for these functions. For FAR-3xx0/FAR-2xx8 series SSD-types, these functions cannot be controlled.
- *3. The desired value can be set when the radar is assigned as "Slave", however the maximum displayable range is dependent on the setting at the "Master" radar.

Compatibility of display and operation

When connecting with FAR-2xx7 series radar

When switching the antenna from FAR-2xx8 to FAR-2xx7, the image for FAR-2xx7 is displayed on the screen and each function is operative. However, when switching the antenna from FAR-2xx7 to FAR-2xx8, the following functions are not operative.

- Automatic Clutter Elimination (ACE) function.
- Selection of the transmit frequency by the [TX CH] button for solid state radar.
- Target Analyzer function.
- Hatching.
- Berthing STC.

1.48.3 How to clear the interswitch

You can clear the interswitch settings by following the procedure below.

1. Open the menu.
2. Select [9 INITIAL SETTINGS].
3. Select [3 SELECT ANTENNA]. The [SELECT ANTENNA] menu appears.
Note: You can also right-click the [ANTENNA] box to access this menu.
4. Select [0 CLEAR INTER-SWITCH].
5. Select [YES] to clear the interswitch settings. The antenna settings are restored to default.

1.49 Performance Monitor

The performance monitor, installed in the antenna unit, produces a visual indication on the radar display screen when the radar transmitter power and radar receiver sensitivity are within the prescribed limits.

1.49.1 How to activate/deactivate the performance monitor

1. Set the radar to TX (transmit) mode.
2. Open the menu.
3. Select [1 ECHO].
4. Select [5 PERFORMANCE MONITOR].
5. Select the appropriate setting, then press the **ENTER MARK** key.
 - [OFF]: Deactivate the performance monitor.
Note: You can also deactivate the performance monitor by adjusting the range manually.
 - [ON]: Activate the performance monitor and show the graph.
 - [GRAPH ONLY]: Show the performance monitor graph, however the performance monitor is not activated.
6. Close the menu.

When the performance monitor is active, the indication "PM xARCS" (x: setting value of [6 PM ARC]) appears in yellow characters at the top of the display.

Note: If the blind sector and the direction of the PM antenna overlap one another, turn off the blind sector in order to display echoes correctly.

The radar is automatically set as follows when the performance monitor is activated.

Setting	Setting at PM activation	Adjustable while PM is active	Setting at PM deactivation
[GAIN]	70 ^{*1}	Yes ^{*3}	Setting before PM activation.
[SEA]	0	No	
[SEA AUTO]	MAN	No	
[RAIN]	0	No	
[RAIN AUTO]	MAN	No	
[TUNE] (Shown for magnetron radars only)	AUTO	No	
[TX CH] (Shown instead of [TUNE] for solid-state radars only)	CH1	No	
[ACE]	OFF	No	
[ES]	OFF	No	
[EAV]	OFF	No	
[IR]	2	No	
[NOISE REJECT]	OFF	No	
[VIDEO CONTRAST]	4-B	No	
[PULSE]	LONG	No	
[2ND ECHO REJ]	OFF	No	
[LOW LEVEL ECHO]	Previous setting kept, fixed.	No	
[WIPER]	OFF	No	
[CUSTOMIZED ECHO]	Previous setting kept, fixed.	No	Return to active display.
[PRESENTATION MODE]	No change. ^{*2}	Yes	Setting at PM deactivation.
[RANGE]	24 NM, 24 SM, 48 km, 48 kyd ^{*5}	Yes ^{*4}	Setting before PM activation.
[OFF CENTER]	OFF	Yes	Setting at PM deactivation.
Antenna revolution	24 rpm	No	Setting before PM activation.
[VIDEO CONTRAST TYPE]	4-B ^{*6}	No	

^{*1}: Gain is automatically set according to [PM GAIN ADJ], if it was adjusted at installation.

^{*2}: [NORTH UP RM] is selected when the [PRESENTATION MODE] is set to [NORTH UP TM].

^{*3}: The setting is not memorized.

^{*4}: The performance monitor is deactivated if the range is changed manually.

^{*5}: Range units other than NM are available for B/W-types only.

^{*6}: When Ice Mode is enabled, the video contrast setting for Ice Mode is used.

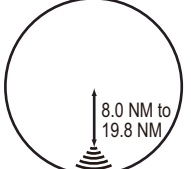
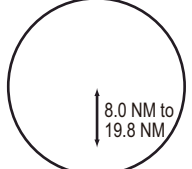
1.49.2 How to check the radar's performance

The range scale is automatically set to 24 NM. The radar screen will show arcs. If the radar transmitter and receiver are in good working conditions in as much as the original state when the monitor was turned on, the innermost arcs should appear between 8.0 NM to 19.8 NM. The performance monitor can observe a total of 10 dB loss in transmitter and receiver.

How to set the number of arcs

1. Open the menu.
2. Select [1 ECHO].
3. Select [6 PM ARC].
4. Select [2], [3], [5] or [6] as appropriate, then press the **ENTER MARK** key.
5. Close the menu.

The figure belows shows an example where [PM ARC] is set to [5].

Display	Radar State	Display	Radar State
	Transmitter: normal Receiver: normal		Transmitter and receiver: No arc indicates 10 dB loss. Contact your dealer for advice. (For magnetron radars, have a technician check the magnetron.)

Note 1: The lengths of the arcs can vary according to installation environment. Judge the strength of the echo that appears within 60° from the arc location to confirm if the radar is working properly or not.

Note 2: The location of the arcs changes according to the [PM ARC] setting.

Turn the performance monitor off when finished.

1.50 How to Change the Reference Position

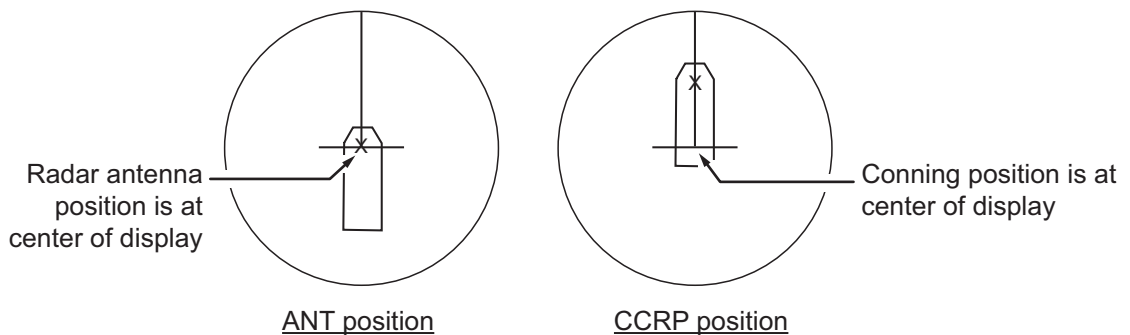
The reference position for measurements (range, bearing, etc.) and markers (heading line, stern mark, etc.) can be the radar antenna position ([ANT]) or the consistent common reference point ([CCRP]).

The reference position is a location on own ship to which all horizontal measurements, for example range, bearing, relative course, relative speed, closest point of approach (CPA) or time to closest point of approach (TCPA), are normally referenced.

[CCRP] for this series of radars is fixed at the conning position and [ANT] is fixed at the radar antenna position.

To change the reference position, use the trackball to place the cursor over the "REF POINT" indication at the top of the screen, then left-click to select [ANT] or [CCRP] as required. You can also change the reference by spinning the scrollwheel when the cursor is placed over the indication.

The position of the own ship marker changes according to reference position as shown below. If the CCRP is positioned outside of the effective display area, the bearing scale is indicated with the appropriate reduced detail.



Range and bearing are measured and graphics are drawn according to reference position as in the table below.

Category	Item	Reference point	
		ANT	CCRP
Range and bearing measurements	EBL	Range and bearing measured from antenna position.	Range and bearing measured from CCRP.
	VRM		
	Cursor		
	PI line		
	Range ring		
	Drop mark		
Graphics	Heading line	Drawn from antenna position.	Drawn from CCRP.
	Stern mark		
	Beam line		
	Own ship vector		
	Own ship track		
Bearing cursor		Drawn with antenna position at center.	Drawn with CCRP at center.
Course, speed		Calculated with antenna position at center.	Calculated with CCRP at center.

Table continued on following page

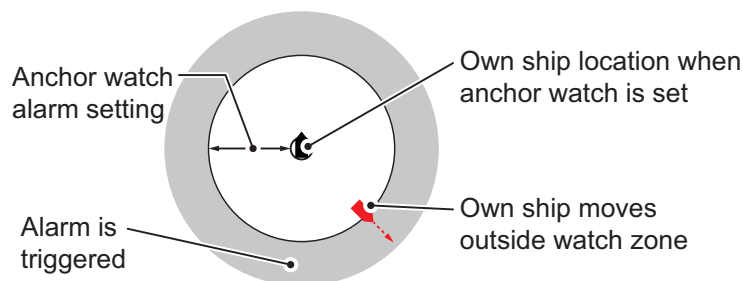
Category	Item	Reference point	
		ANT	CCRP
Table continued from previous page			
CPA, TCPA		Calculated with an- tenna position at center.	Calculated with CCRP at center.
BCR, BCT		Calculated from bow position.	
Own ship data	Heading	Data is taken from respective sensors, re- gardless of reference point selected.	
	Speed		
	Course over ground		
	Speed over ground		
	Own L/L	Location of the CCRP.	

Note: When the antenna is located some distance from the CCRP, the CCRP can be outside the bearing cursor in true-motion or off-center. Also, when the CCRP is set as a reference point, some parts of the bearing cursor are not displayed.

1.51 Anchor Watch

The anchor watch feature alerts you when your ship has traveled a distance greater than a threshold value, when it should be at rest. When the anchor watch is active, an orange dashed circle marks the anchor watch range.

If your ship drifts more than the anchor watch setting, the alert "ANCHOR WATCH" appears in the [ALERT] box. Also, if your vessel returns to within the tolerable radius, the alert status is automatically changed to rectified.



1. Open the menu.
2. Select [4 ALERTS].
3. Select [4 ANCHOR WATCH].
4. Select [ON] to enable [ANCHOR WATCH], then press the **ENTER MARK** key.
5. Spin the scrollwheel to set the distance for the alert. Press the **ENTER MARK** key to apply the setting.
6. Close the menu.

1.52 Alerts

1.52.1 What is an alert?

“Alert” is a generic name for a notice to any unusual or potentially dangerous situation generated within the system.

For detailed information regarding specific alerts and alert codes, including possible remedies, see "ALERT LIST" on page AP-11.

Alerts are classified according to priority and category.

Note 1: This equipment does not provide the functional alert group function.

Note 2: The reserved cluster identifier for this equipment, which is defined in IEC62923-2 is “Nav”.

Alert priority

The level of priority, from highest to lowest, is ALARM → WARNING → CAUTION.

Alarm: Situations or conditions which require immediate attention, decision and (if necessary) action by the bridge team to avoid any kind of hazardous situation and to maintain the safe navigation of the ship.

Warning: Conditions or situations which require immediate attention for precautionary reasons, to make the bridge team aware of conditions which are not immediately hazardous, but may become so.

Caution: Awareness of a condition which continues to require attention out of the ordinary consideration of the situation or of given information.

Note: All active-unacknowledged warnings are repeated as warnings after 60 seconds (manufacturer’s fixed time period).

Alert category

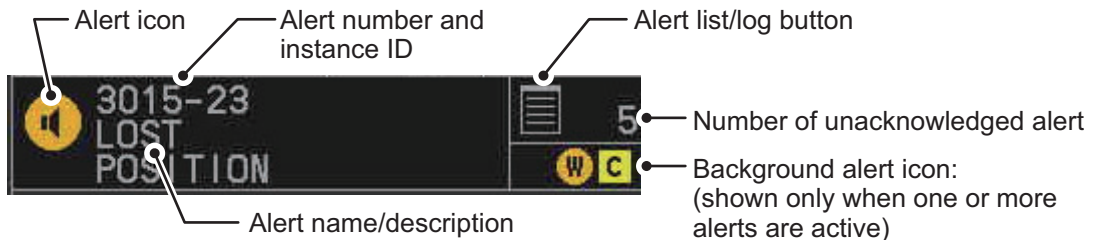
An alert is further classified by category, A, B or C, according to its degree of severity or source.

Category	Description
A	Category A alerts include the following, and must be confirmed from the equipment that generated the alert. • Danger of collision
B	Category B alerts are alerts where no additional information for decision support is necessary. Category B alerts are all alerts not falling under category A.
C	Category C alerts are not shown on this equipment.

1.52.2 How to interpret the [ALERT] box

When an alert condition is found, the applicable alert message appears in the [ALERT] box. A buzzer sounds for alarm and warning alerts. When no active alert and indication occurs, "NO ACTIVE ALERTS" appears in the [ALERT] box.

The [ALERT] box is composed of three lines of text information, and several icons, as shown below.



The alert icon shows the level of the alert (alarm, caution, warning or indication) and the active alert counter shows how many alerts are unacknowledged.

When an Alarm or Warning level alert is released, the alert message flashes in the [ALERT] box. The message is accompanied by the appropriate alert icon and the buzzer sounds. The buzzer and alert continue to flash and sound until the buzzer is silenced or the alert condition is rectified.

The alert also appears in the [ALERT LIST] (see section 1.52.5) until acknowledged and rectified.

1.52.3 How to acknowledge an alert

Alerts can be acknowledged in one of the following manners:

- Press the **ALARM ACK** key.
- Click the alert name in the [ALERT] box.
- Click the alert name in the [ALERT LIST].

The icon for an acknowledged alert changes as shown in section 1.52.6.

1.52.4 How to silence the alert buzzer

You can temporarily silence the buzzer by menu operation or the function key. The icon for a silenced alert also changes, as shown in section 1.52.6.

To silence the buzzer by the function key, assign the buzzer stop function to the function key, referring to section 1.9. For the menu operation, do as follows.

1. Open the menu.
2. Select [4 ALERTS].
3. Select [6 BUZZER STOP].
4. Close the menu.

1.52.5 Alert list

The alert list displays the names of violated alerts, including the time and date violated. Up to 100 alerts are stored in the internal memory. Unacknowledged alarms are displayed first in the list (in red text), in the order in which they appear in the [ALERT] box. Unacknowledged warnings are displayed in the list (in yellow-orange text), in the order in which they appear in the [ALERT] box.

Cautions are displayed in the list (in yellow text), in the order in which they appear in the [ALERT] box.

Indications are displayed with a yellow “i” surrounded with a yellow box.

To display the alarm list, place the cursor on the alert list/log button in the [ALERT] box then left-click.

ALERT LIST (1/2)

1	BACK(L=TOP)		
2	3015-23 LOST POSITION	23:15 03/FEB RADAR1	
3	3015-25 LOST UTC SIGNAL	23:15 03/FEB RADAR1	
4	3015-22 LOST LOG(BT) SIG	23:15 03/FEB RADAR1	
5	3015-20 LOST GYRO SIGNAL	23:15 03/FEB RADAR1	
6	3015-7 LOST RADAR ANT	23:15 03/FEB RADAR1	
0	NEXT(L=LAST)		

Annotations:

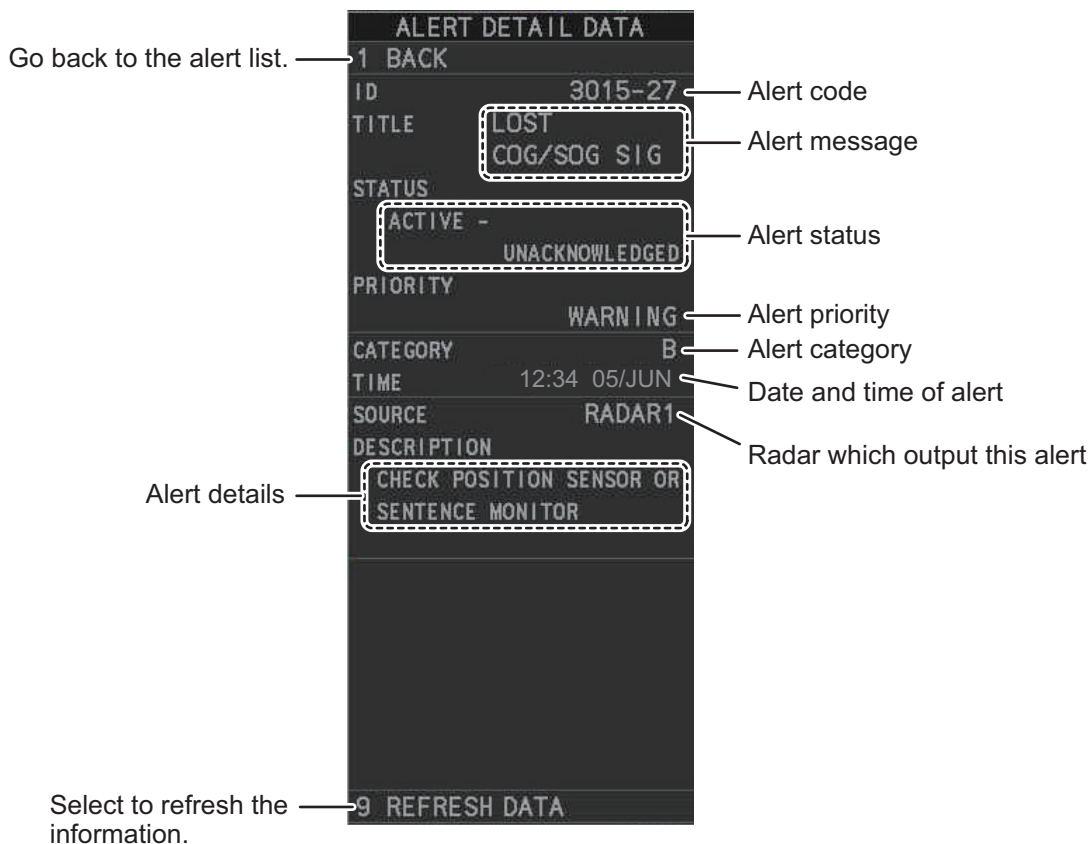
- Alert code and alert message: Points to the first row of the list.
- Alert icon: Points to the yellow speaker icon in the first row.
- Displayed page/Pages available: Points to the title "ALERT LIST (1/2)".
- Radar which output this alert: Points to "RADAR1" in the first row.
- Date and time of alert*: Points to "23:15 03/FEB" in the first row.
- Navigation instructions:
 - 1 BACK(L=TOP): - When selected at page 1, closes the list. - When selected at page 2 or later, goes back to the previous page. - Long-press the **left button** to go to page 1.
 - 0 NEXT(L=LAST): - Select to go to the next page. - Long-press the **left button** to go to the last page.

*: The date and time of alert is synchronized with UTC, using the ZDA sentence. If the ZDA sentence is lost, the date and time cannot be synchronized with UTC.

An unacknowledged alert can be acknowledged from the list by selecting it, then left-clicking. To erase the data for the number selected, left-click again.

Detailed alert information

To view detailed information for an alert, open the alert list, place the cursor on the alert you want to view detailed information for, then press and hold the **left button**.



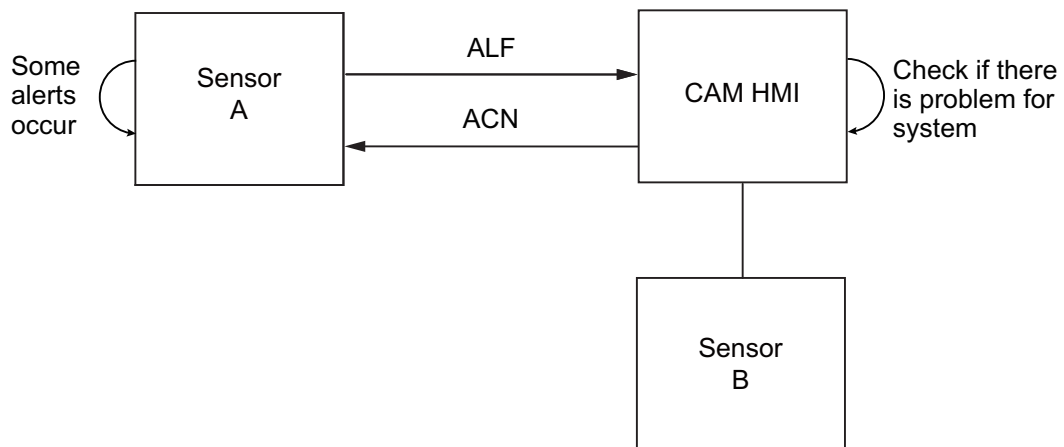
1.52.6 Alert icons and their meanings

Icon	Status	Visual indication	Audible alert
	Active - unacknowledged alarm	Red, flashing	3 short, audible alerts repeated every 7 seconds.
	Active - silenced alarm	Red, flashing	Silent
	Active - acknowledged alarm	Red	Silent
	Active - responsibility transferred alarm	Red	Silent
	Rectified - unacknowledged alarm	Red, flashing	Silent
	Active - unacknowledged warning	Yellow-orange, flashing	2 short, audible alerts repeated every 60 seconds.
	Active - silenced warning	Yellow-orange, flashing	Silent
	Active - acknowledged warning	Yellow-orange	Silent
	Active - responsibility transferred warning	Yellow-orange	Silent
	Rectified - unacknowledged warning	Yellow-orange, flashing	Silent
	Caution	Yellow	Silent
	Indication	Yellow	Silent

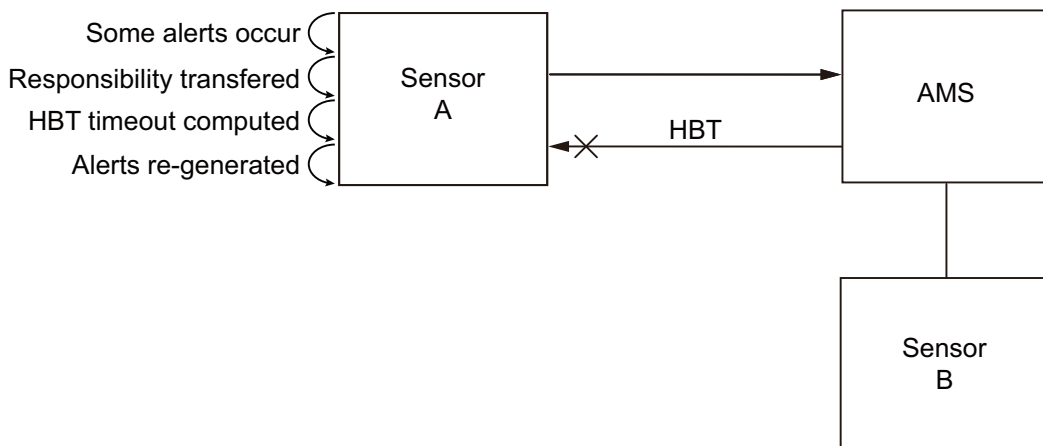
1.52.7 Responsibility transfer alert

MSC302(87) requires the use of the “responsibility transfer alert” which functions in the multiple sensor, multiple equipment installation. When one sensor or one equipment fails but does not disturb the system operation (other sensor or equipment is normal), the AMS automatically sends the “responsibility transfer alert” (ACN sentence) to the sensor or equipment that generated the alert.

If the sensor or equipment refuses the responsibility transfer, normal operation is restored.



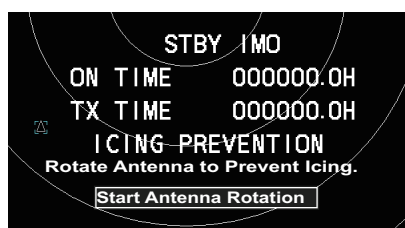
If the HBT sentence is not received from the AMS within the prescribed time interval, the alert processed as responsibility transfer alert is made active.



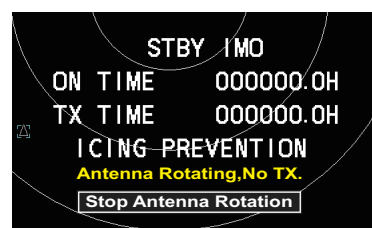
1.53 Icing Prevention

You can rotate the antenna (24 rpm) without transmission to keep the antenna from freezing.

1. Open the menu.
2. Select [9 INITIAL SETTINGS].
3. Select [5 OPERATION].
4. Select [7 ICING PREVENTION].
5. Select [ON] or [OFF] as appropriate. If you select [ON], the message "Rotate Antenna to Prevent Icing." appears at the bottom of the screen.
6. Click [Start Antenna Rotation] to rotate the antenna without transmission. The message changes to read "Antenna Rotating, No TX.".



When the antenna stops



When the antenna rotates

To stop the antenna rotation, left-click [Stop Antenna Rotation].

With this feature active and the antenna stopped, pushing the **STBY TX** key on the Control Unit or click the [STBY TX] button on the Status bar rotates the antenna and transmits pulses. Operating one of the above-mentioned controls again stops transmission but the antenna rotates.

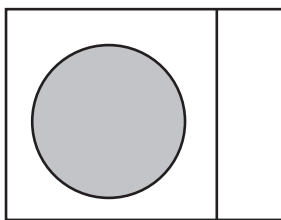
1.54 How to Select a Display Mode (B/W-type Only)

B/W-type radars of this series have three echo display modes available:

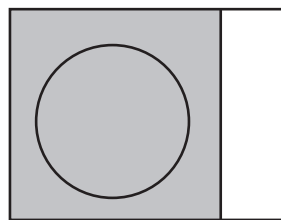
- [CIRCLE] mode: The echoes are displayed inside a circle on the screen. This is the default (IMO compliant) mode.
- [WIDE] mode: The echoes are displayed in a square area, but are not displayed in the data display area.
- [ALL] mode: The echoes are displayed across the entire screen.

Follow the procedure below to change display modes.

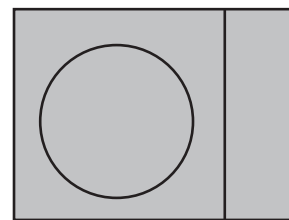
1. Open the menu.
2. Select [1 ECHO]. The [ECHO] menu appears.
3. Select [8 ECHO AREA].
4. Select the appropriate setting, then press the **ENTER MARK** key.



CIRCLE



WIDE



ALL

5. Close the menu.

1.55 How to Manage SD Card Data

The following data can be stored on an SD Card: marks, lines, user settings, installation settings, own track, target track (for A/B/W-types only), alert history and some logs (for example, the alert log).



1

Note: The menu operations outlined in this section are only available when a SD-Card is inserted. When there is no SD-Card inserted, the [FILES] menu is not selectable. SD Cards must be formatted as FAT32. Other formats are not usable.

1.55.1 Formatting the SD card

You do not normally need to format an SD card. If the card becomes unreadable, format the card with a formatting program that is compatible with the specifications of the card.

1.55.2 Cautionary notes on handling SD cards

- Handle the cards carefully. Improper use can damage the card and destroy its contents.
- Make sure the card slot cover is closed, unless removing/inserting a card.
- Remove or insert a card using only your fingers. Do not use metal instruments (such as tweezers) to remove the card.
- Do not remove the card when data is loading from, or saving to, the card.

1.55.3 Compatible SD cards

The table below lists the SD cards that have been verified as compatible for use with this equipment.

Note 1: The cards were verified using basic functions. All functions were not verified. FURUNO does not guarantee card operations.

Note 2: SD cards other than those listed below have not been verified.

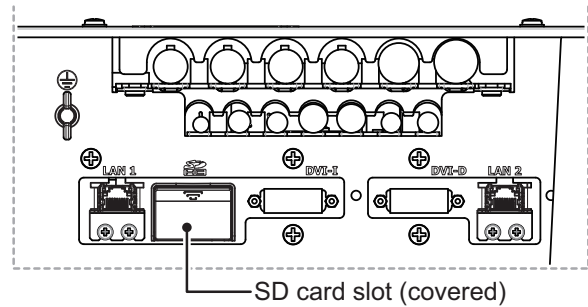
Maker	SD card type	Capacity
Panasonic	RP-SDUC16GJK	16GB
	RP-SDUC32GJK	32GB
	RP-SDWA16GJK	16GB
	RP-SDWA-32GJK	32GB
SanDisk	SDSDB-016G-J35U	16GB
	SDSDC-032G-J35U	32GB
	SDSDXPA-016G-JU3	16GB
	SDSDXPA-032G-JU3	32GB
	SDSDXVE-032GB-JNJIP	32GB
TOSHIBA	SDAR40N16G	16GB
	SDAR40N32G	32GB
	SD-L016G4	16GB
	SD-L032G4	32GB
	SDXU-B016G	16GB
	SDXU-B032G	32GB

1.55.4 How to insert SD cards

The SD card slot is located on the front face of the processor unit, between the LAN1 port and the DVI-I port.

Note: Do not use any instruments to insert the card.

1. Remove the rubber cover on the SD card slot.
2. To insert a card, gently push the card into the slot, making sure that the card connectors are facing downwards.
3. Close the rubber cover.



1.55.5 How to remove SD cards

Follow the procedure below to safely remove an SD card.

Note 1: When the system power is turned off, skip steps 1 to 3.

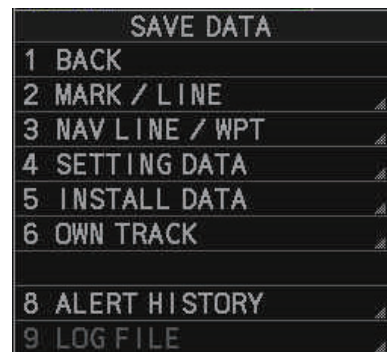
Note 2: Do not use any instruments/tools to insert or remove the SD card.

1. Open the menu.
2. Select [6 FILES]. The [FILES] menu appears.
3. Select [REMOVE EXT MEDIA], then select [YES].
You can now remove the SD card safely.
4. Remove the rubber cover on the SD card slot.
5. Gently push the SD cards to release the card from the card slot.
6. Remove the SD card. Do not use any instruments to remove the card.
7. Close the menu.



1.55.6 How to save data to an SD card

1. Open the menu.
2. Select [6 FILES]. The [FILES] menu appears.
3. Select [2 SAVE DATA].
4. Select the data to save.
5. Do the following operation according to the data selected at step 4.
 - [6 OWN TRACK]: You can set a password (6 to 64 characters). To set the password, set [2 PASSWORD] to [ON], then enter the password. If you don't set the password, go to the next step.
 - [9 LOG FILE]*: You can encrypt the data using the encryption key specific to this radar. To encrypt the data, set [2 ENCRYPT] to [ON]. If you don't encrypt the data, go to the next step.
 - Other data: Go to the next step.



*: Available only when you log in as an administrator.

6. Select [3 NAME] to set the file name.
The software keyboard appears.
7. Using the software keyboard, name the file, then select [END] to start saving data.
The file name can be up to seven characters in length.

Note: Depending on the data saved, the first letter of the filename is preset and cannot be changed. The presets are listed below.

- Marks/Lines: M
- Nav lines/Waypoints: W
- Setting data: S
- Install data: I
- Own track: T
- Target track^{*1}: A
- Alert history: H
- Log file^{*2}: L

^{*1}: Shown only for A/B/W-types.

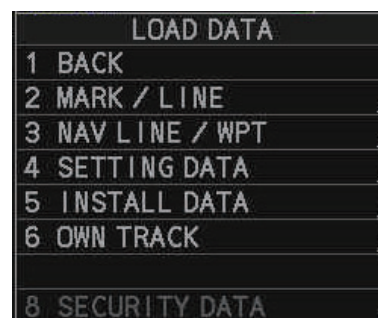
^{*2}: It is required to log in as an administrator to save the log file. For how to log in, see section 6.10. Setting data, install data and maintenance logs are also saved to the SD card.

The indication "WR CARD DATA" appears during the save process and the menu closes automatically.

When the process is complete, the indication "COMPLETED" appears in the guidance box and the menu automatically closes.

1.55.7 How to read (load) data from an SD card

1. Open the menu.
2. Select [6 FILES]. The [FILES] menu appears.
3. Select [3 LOAD DATA].
4. Select the data to load.
Note: [3 NAV LINE/WPT] cannot be selected when a route(s) is displayed.
5. Select the file name to load. If the data is protected with a password, enter the password with the software keyboard.

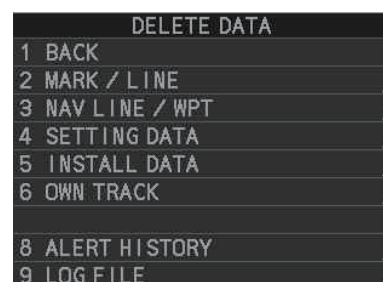


The indication "RD CARD DATA" appears during the read process. When the process is complete, the indication "COMPLETED" appears and the menu closes automatically.

Note: For [5 INSTALL DATA], the installation settings that can only be changed by the administrator cannot be loaded. To load all installation settings, log in as an administrator. See section 6.10 for details.

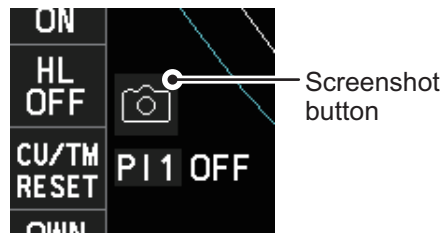
1.55.8 How to delete data from an SD card

1. Open the menu.
2. Select [6 FILES]. The [FILES] menu appears.
3. Select [4 DELETE DATA].
4. Select the data to delete.
5. Select the file name to delete.
The indication "DELETE CARD DATA" appears during the delete process.
When the process is complete, the menu automatically closes.



1.56 How to Take a Screenshot

The system has an in-built screenshot feature. To use the feature, an SD Card must be inserted in the Processor Unit. If there is no card inserted, the screenshot button on the screen is not active.



To take a screenshot of the currently displayed screen, click the screenshot button.

Note: The screenshot function can also be assigned to a function key. For how to set up the function keys, see section 1.9.

1.57 How to Use the Watch Alert (A/B/W-types only)

The watch alert provides a visual alert at regular intervals to remind you to monitor the radar picture for safety or other purposes. When the watch alert is enabled, the WATCH box appears at the top of the screen. The watch alert function is available only for A/B/W-types.



When the timer reaches 00:00, an audible alert is released. To silence the buzzer, click the watch box. The timer is reset and begins to countdown again. You can reset the timer at any time by clicking the watch box.

To enable or disable the watch alert, follow the procedure below.

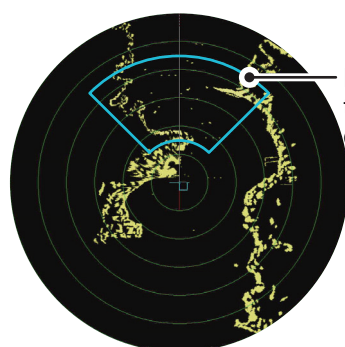
1. Open the menu.
2. Select [4 ALERTS]. The [ALERTS] menu appears.
3. Select [2 WATCH ALERT].
4. Select the [OFF] to disable the alert, or select the required interval at which the alert is released.
The available intervals are: [6min], [10min], [12min], [15min] and [20min].
5. Close the menu.

1.58 Dual Radar (A/B-types only)

When installing two FAR-2xx8 series radars, the image from both radars (main radar and external radar) may be shown together on one radar display. This allows you to take advantage of the best characteristics each type of radar has to offer. The dual radar function is available only for A/B-types.

The following should be done from the [DUAL RADAR SETTINGS] menu, located in the [RADAR INSTALLATION] → [SCANNER] menu, at the time of installation in order to enable the dual radar display:

- Set the number of the radar to use for external input at [6 EXT RADAR].
- Set [2 DUAL RADAR] to [COMBINE]. This enables the dual radar function.
- Set the sector and range to combine radar images at [4 COMBINE SECTOR] and [5 COMBINE RANGE] respectively.
- Set the radar image you want to show in the sector at [3 COMBINE MODE]. The manner in which the radar images appear on-screen depends on the combination mode selected.



Dual radar function's display area (set at installation). Images shown in this area change depending on the setting for [COMBINE MODE] as follows:

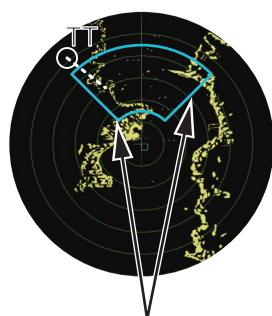
- [OWN] : Own radar images appear inside the display area, external images appear outside the display area.
- [EXT] : External radar images appear inside the display area, own images appear outside the display area.

TT information

When a TT target crosses over the boundary line of the display area, its information is passed to the other radar display. Tracking of the TT continues. The TT number changes depending on the number of the antenna which acquires the TT target.

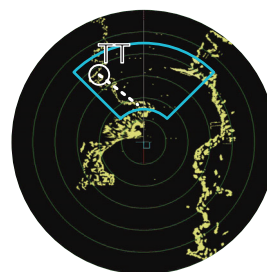
The lowest numbered Processor Unit assigns TT numbers "001" to "100", the other Processor Unit assigns "101" to "200".

Note: Only manually acquired target data is transferred.



Boundary lines of display area

TT target crosses over the boundary line of the display area.



TT information is passed to the other radar display. Tracking on the TT continues.

1.58.1 How to toggle control of each dual radar display

Note: Dual radar mode must be enabled and both radars must be turned on.

You can switch between radars to control either your own, or the external radar from the antenna box. Left-click to toggle control.

Place the cursor on the [CONTROL] box, then left-click. The indication toggles between "M" (Master) and "S" (Slave) to show the level of control you have for the radar you are currently controlling.

The radar numbers for "Own" and "External" radars appear here. The currently controlled radar's number appears to the left.



Click the box to toggle the level of control of the radars. "M": Main (Master); "S": Sub (Slave)

There can be only one Master radar at any time. If the radar in operation is set to Slave and the operator switches to Master, the other radar is automatically changed to Slave.

Depending on your level of control, available operations are as follows:

Radar Functions	Control	Master	Slave
AIS function	Independent	Desired value can be set	Desired value can be set
Brilliance			
Echo trails			
EBL			
Lat/long data			
Presentation mode			
Speed data			
Target alarm			
TT, AIS on/off			
TT, AIS track interval			
Vector mode			
Vector time			
VRM			
Wiper			
Zoom			
TT COLLISION alarm			
Range**			
A/C SEA			
A/C RAIN			
Automatic Clutter Elimination (ACE)			
Gain adjustment			
Echo stretch			
Echo averaging			
Picture setting (Customize echo)			
STBY/TX			
TT/AIS AZ			

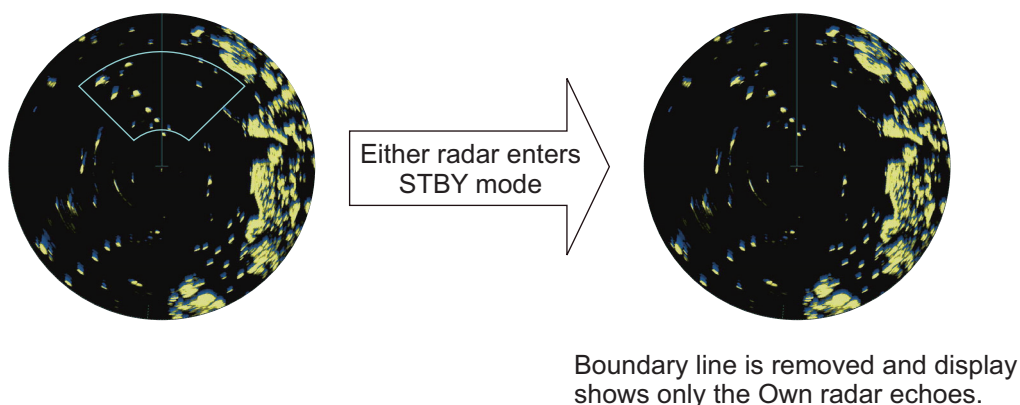
Radar Functions	Control	Master	Slave
IR*	Dependent Control	Desired value can be set	Cannot control
Tuning			
TT LOST warning	Common Control	Item Commonly Controlled	Item Commonly Controlled
TT alerts ACK			
TT acquire			

*: When the connected radar antenna is a magnetron-type, and the radar is assigned as "Slave", the desired value can be set for these functions. For SSD-types, this function cannot be controlled.

**: The desired value can be set when the radar is assigned as "Slave", however the maximum displayable range is dependent on the pulse setting at the "Master" radar.

1.58.2 Operating considerations for the dual radar display

You can toggle each radar between standby and TX in the dual radar display. When switching to standby on either radar, the "ISW: STBY" indication appears and the radar echoes from the radar in standby are not displayed. Further, when switching to standby, all TT targets are removed and tracking stops on the radar which is in standby. However if a TT target is acquired on the radar which is not in standby, the TT information is passed to the radar which is in standby.



Changes made to the following functions are applied to both the own radar echoes and the external echoes, on the display of the radar which made the changes. These settings are not applied to the display of the external radar.

- Off-center display
- CU/TM reset
- Presentation mode
- Range scale
- Electronic chart on/off
- Wiper
- Trail settings
- Echo stretch
- Echo Average
- Color Erase
- TT lost target filter

Notes regarding dual radar operations

- The dual radar function is available between two FAR-2xx8 series radars using the LAN. FAR-2xx7 and FAR-3xx0 series radars are not compatible.
- When a transmission error occurs between two radars in the dual radar mode, the Alert "LOST ISW FUNC" appears and the dual radar function is turned off.

1. OPERATIONAL OVERVIEW

- The dual radar display is not available on external equipment (such as ECDIS, etc) which overlays the main radar image, even though the dual radar is turned on.
- If a TT target passes between the two radars (see page 1-111) while the dual radar function is active, TT data (TTD/TTM) is shared and tracking is continued.
- If the Alert "TT TGT 95%(AUTO)" is released while the dual radar function is active, disable tracking for unnecessary targets until the Alert condition is rectified. Continuing automatic acquisition after this Alert is released and is still active may cause discrepancies between TT targets on the connected radars.

Restrictions during dual radar operations

The following restrictions are applicable when using the dual radar function.

- A REF (reference) mark can be entered on the display of the main radar but not the external radar.
- Targets acquired and/or tracked prior to activating dual radar mode are all released when dual radar mode is activated.
- Targets acquired and/or tracked prior to deactivating dual radar mode are all released when dual radar mode is deactivated.
- If either radar enters standby mode, all TT targets acquired while the Dual Radar function was active are released (removed).
- TT targets can be acquired manually or automatically. TT target data sharing between the radar in dual radar mode is restricted to manually acquired targets. See "TT information" on page 1-111.
- The reference position is fixed at [CCRP] (see section 1.50) when dual radar mode is enabled. Set the same CCRP position between two radars at the time of installation.
- The following functions are not available in the dual radar mode.
 - Performance monitor
 - SART
 - ICE mode
 - Target Analyzer (B-type only)
 - Risk Visualizer™
 - TT simulation mode
 - Icing prevention
 - Interswitch
 - Hatching (B-type only)
- If the distance between the Own radar antenna and the External radar antenna is larger than 125 meters, the dual radar display area and the sweep area are reduced. In this case, if the range is decreased, only the own radar echoes are displayed on the screen. Further, the following occurs when only the own radar is shown under these circumstances:
 - Dual radar boundary line is not shown.
 - Antenna selection is unavailable (on-screen box and menu item are gray and inactive).
 - Trails are all cleared (removed).No alerts is released under these circumstances, however normal dual radar display is restored when the range is increased again.

1.59 Wave Mode

You can output echo data from this radar to a PC with the wave analysis software installed. The wave analysis software calculates incoming waves and gives you an on-screen indication as to wave size, direction and time between waves.

This section covers how to use the wave mode and related functions on your FAR-2xx8 series radar. For details regarding the analysis software and PC indications, see the manual supplied with the software.

1

Preparations and cautions for wave mode

- Wave mode requires the connection of a PC to the same network as the FAR-2xx8 series radar to be used for data input.
 - The connected PC must have the wave analysis software installed. See the software manual for how to install the software.
 - Wave mode may only be active on one radar at any time. If a second radar has wave mode activated, wave mode is disabled on the first radar.
 - One ore radars must set [8 OUTPUT TO WAVE PC] to [ON]. If all radars set [8 OUTPUT TO WAVE PC] to [OFF], the “LOST WAVE UNIT” indication may appear.
 - Wave analysis and the output data are intended for reference purposes only, as an aid to safe navigation. Always confirm conditions, visually and with other methods.
1. Establish a LAN connection with the analysis PC.
 2. Open the menu.
 3. Select [1 ECHO]
 4. Select [0 NEXT] to show the second page of the menu.
 5. Select [7 WAVE MODE].
 6. Select [ON] or [OFF] as appropriate.
Select [ON] to output echo data to analysis PC.
 7. Select [7 WAVE MODE].
 8. Select [ON] or [OFF] as appropriate.
Select [ON] to output navigational data to analysis PC.
 9. Close the menu.

1.60 Doppler Feature (X-band Solid State Radars only)

When activated, the doppler feature can help with clutter reduction, making targets easier to find. This feature is only available with FAR-2228-NXT, FAR-2228-NXT-BB, FAR-2328-NXT, FAR-2028-NXT-MARK-2.

To activate and use the feature, follow the procedure below.

1. Open the menu.
2. Select [1 ECHO].
3. Select [0 NEXT] to show the second page of the menu.
4. Select [9 DOPPLER].
5. Select the required setting, referring to the descriptions below.
 - [0]: Disables the doppler feature.
 - [1]: Reduces noise, making weak targets easier to find.
 - [2]: Reduces clutter from rain, etc., making it easier to find targets previously hidden by clutter.
6. Close the menu.

2. RADAR OBSERVATION

2.1 General

2.1.1 Minimum range

The minimum range is defined by the shortest distance at which, using a scale of 1.5 or 0.75 nm, a target having an echoing area of 10 m² is still shown separate from the point representing the antenna position.

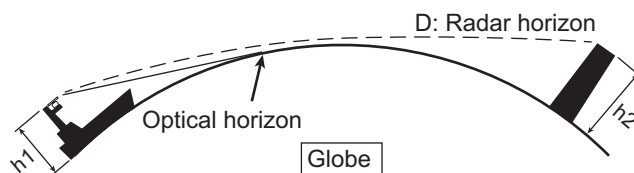
It is mainly dependent on the pulselength, antenna height, and signal processing such as main bang reduction and digital quantization. It is a good practice to use a shorter range scale as far as it gives favorable definition or clarity of picture.

The IMO Resolution MSC.192(79) requires the minimum range to be less than 40 m, respectively. This series of radars satisfy this requirement.

2.1.2 Maximum range

The maximum detecting range of the radar, R_{max}, varies considerably depending on several factors such as the height of the antenna above the waterline, the height of the target above the sea, the size, shape and material of the target, and the atmospheric conditions.

Under normal atmospheric conditions, the maximum range is equal to the radar horizon or a little shorter. The radar horizon is longer than the optical one by about 6% because of the diffraction property of the radar signal. The R_{max} is given in the following equation.



$$D = 2.2 \times (\sqrt{h_1} + \sqrt{h_2})$$

where D: radar horizon (nautical miles)

h₁: antenna height (m)

h₂: target height (m)

For example, if the height of the antenna above the waterline is 9 meters and the height of the target is 16 meters, the maximum radar range is;

$$R_{\max} = 2.2 \times (\sqrt{9} + \sqrt{16}) = 2.2 \times (3 + 4) = 15.4 \text{ nm}$$

It should be noted that the detection range is reduced by precipitation (which absorbs the radar signal).