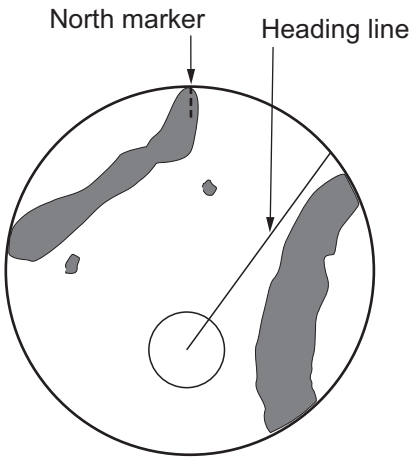
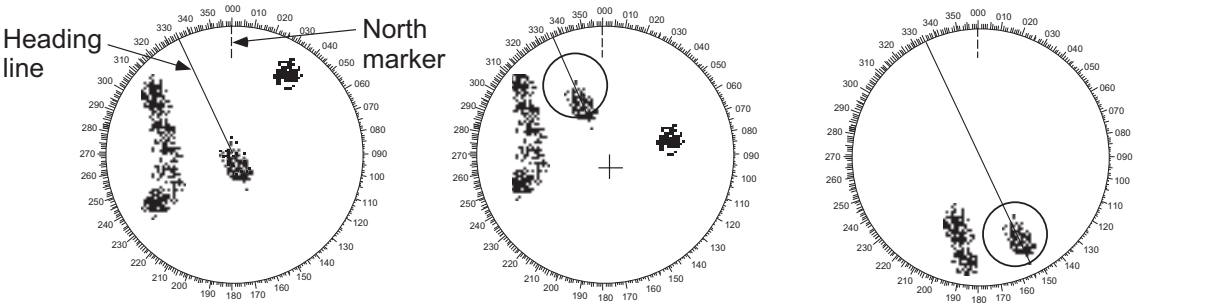
True motion mode



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 75% of the radius of the display, the position is reset. The ship appears at 75% radius opposite to the extension of the heading line on the display center. You can manually reset your ship symbol with the off-center feature.



(a) True motion is selected

(b) Your ship has reached a point 75% of display radius

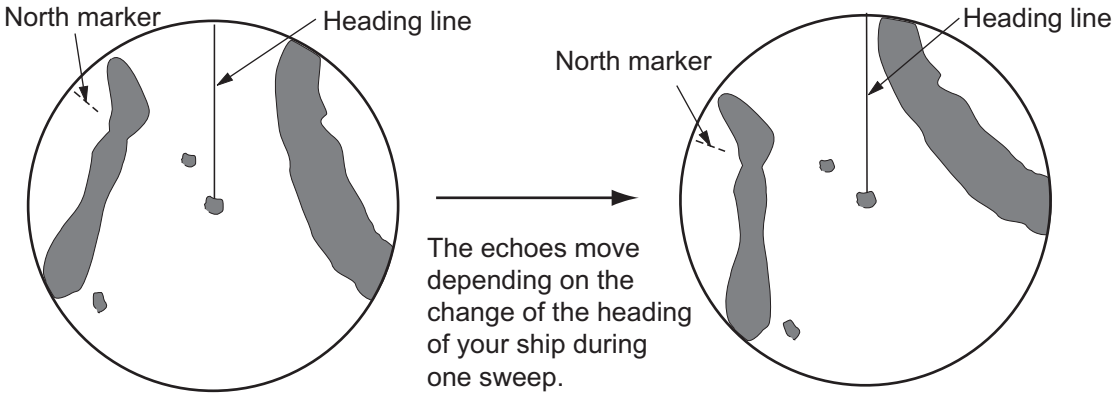
(c) Your ship is automatically reset to 75% of display radius

Automatic reset of your ship marker in true motion mode

True view mode

The echoes move in real time depending on the change of the heading of your ship. Heading line is at the top of the screen. When the heading signal is lost, this function is not available and the display mode automatically changes to the head-up mode. The [Wiper] is not available in this mode.

Note: The wiper feature is inoperative when the true view mode is in use.



5.8 How to Select the Range Scale

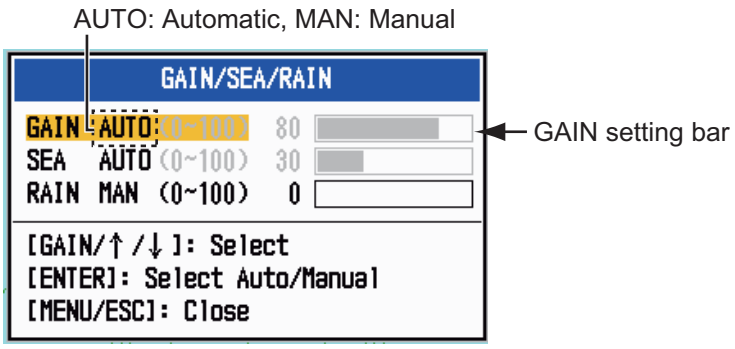
The selected range scale, range ring interval and pulse length are shown at the top left corner on the screen. When an objective target comes closer, reduce the range scale so that a target appears in 50-90% of the display radius.

Rotate the **RANGE** knob to select range, clockwise to increase the range, or counter-clockwise to decrease the range.

5.9 How to Adjust the Gain (sensitivity)

The gain functions to adjust the sensitivity of the receiver for the best reception. The gain can be adjusted automatically or manually.

1. Press the **RANGE** knob to show the [GAIN/SEA/RAIN] window.



GAIN/RAIN/SEA window

2. The cursor is selecting [GAIN]. Press the **ENTER** key to show [GAIN AUTO] or [GAIN MAN] as required. For manual adjustment, see the section below.
3. Press the **MENU/ESC** key to close the window.

Manual adjustment of gain

1. Rotate the **RANGE** knob (or use ◀ or ▶ on the Cursorpad) to adjust the gain so that weak noise appears on all of the screen. If the gain is too low, weak echoes are erased. If the gain is too high, the background noise hides weak targets.
2. Press the **MENU/ESC** key to close the window.

5.10 How to Reduce the Sea Clutter

The reflected echoes from the waves appear around your ship and have the name "sea clutter". The sea clutter extends according to the height of waves and antenna above the water. When the sea clutter hides the targets, use the sea clutter function to reduce the clutter, either manually or automatically.

How to select sea clutter adjustment type

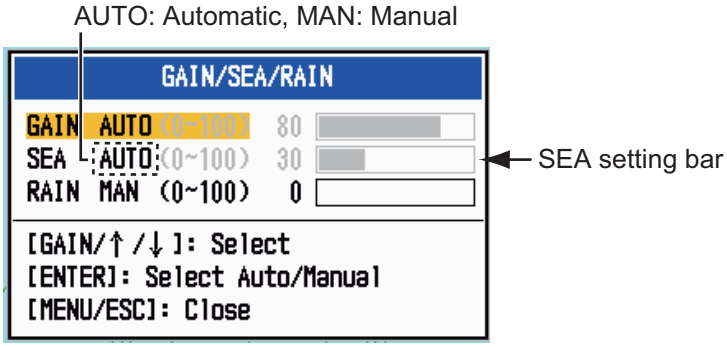
1. Press the **MENU/ESC** key to open the menu.
2. Use the Cursorpad (▲ or ▼) to select [Echo] and press the **ENTER** key.
3. Use the Cursorpad (▲ or ▼) to select [Auto Sea] and press the **ENTER** key.

Auto Sea options

4. Use the Cursorpad (▲ or ▼) to select [Coastal] or [Advanced] then press the **ENTER** key. The window for Gain/Sea/Rain indicator appears for confirmation.
   [Coastal]: Suppress both land and sea clutter. For cruising along a coastline.
   [Advanced]: Automatically discriminate land echoes from sea reflections to suppress only sea reflections. Use this mode for general use.
5. Press the **MENU/ESC** key to close the window.
6. Press the **MENU/ESC** key to close the menu.

How to select the sea clutter adjustment method

1. Press the **RANGE** knob to show the [GAIN/SEA/RAIN] window.

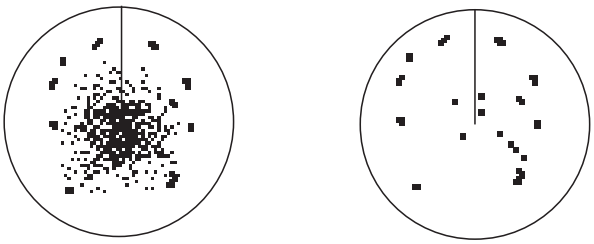


GAIN/RAIN/SEA window

2. Use the Cursorpad to select [SEA]. Press the **ENTER** key to show [SEA AUTO] or [SEA MAN] as required. For manual adjustment, see the section below.
3. Press the **MENU/ESC** key to close the window.

Manual adjustment of sea clutter

1. Rotate the **RANGE** knob (or use ◀ or ▶ on the Cursorpad) to adjust the sea clutter.
   Note: When the sea clutter is properly adjusted, the clutter is broken into small dots, and small targets become identified. If the setting is not enough, targets are hidden in the clutter. If the setting is higher than necessary, both sea clutter and targets disappear from the display. Normally adjust the knob until the clutter has disappeared to leeward, but a small amount of the clutter is visible windward.



Sea clutter at screen center

Sea clutter properly adjusted; sea clutter reduced

Sea clutter

2. Press the **MENU/ESC** key to close the window.

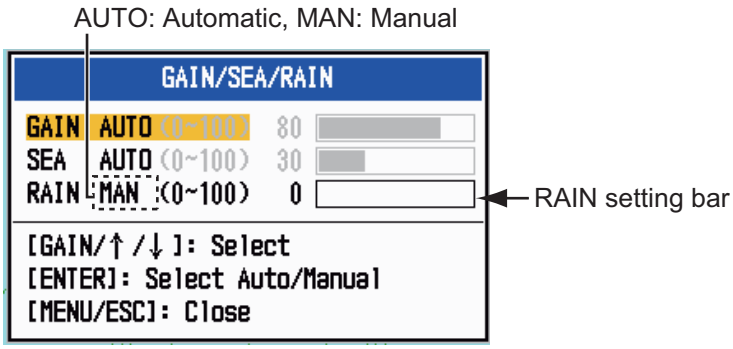
5.11 How to Reduce the Rain Clutter

The reflections from the rain or snow appear on the screen. These reflections have the name "rain clutter". When the rain clutter is strong, targets in the rain clutter are hidden in the clutter. Reflections from the rain clutter are easily identified from true targets by their wool-like appearance.

The rain clutter function works like the sea clutter function, adjusting the receiver sensitivity, but in longer range. If the setting is high, the rain clutter is more reduced. The rain control breaks the continuous display of rain or snow reflections into a random pattern. When the rain clutter hides the targets, adjust the rain clutter (automatic or manual) to reduce the clutter.

How to select the rain clutter adjustment method

1. Press the **RANGE** knob to show the [GAIN/SEA/RAIN] window.



GAIN/RAIN/SEA window

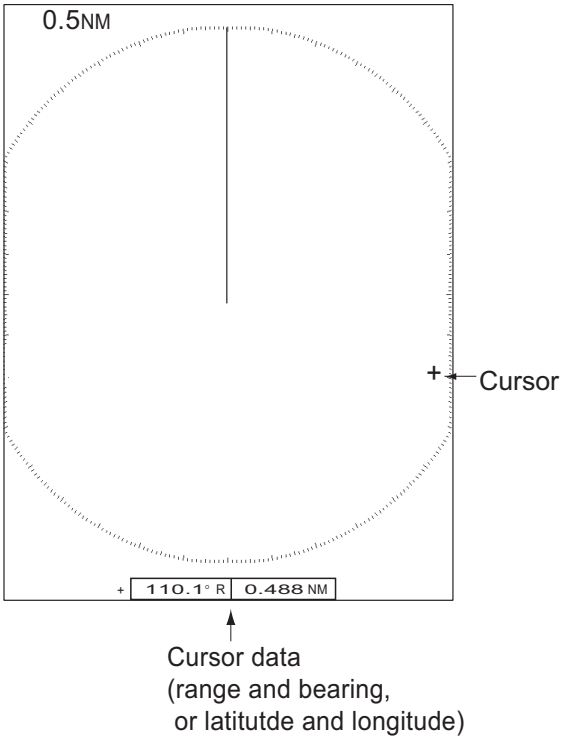
2. Use the Cursorpad to select [RAIN]. Press the **ENTER** key to show [RAIN AUTO] or [RAIN MAN] as required. For manual adjustment, see the section below.
3. Press the **MENU/ESC** key to close the window.

Manual adjustment of rain clutter

1. Rotate the **RANGE** knob (or use ◀ or ▶ on the Cursorpad) to adjust the rain clutter.
2. Press the **MENU/ESC** key to close the window.

5.12 Cursor

The cursor functions to find the range and bearing (default function) to a target or the latitude and longitude position of a target. Use the Cursorpad to position the cursor and read the cursor data at the screen bottom.

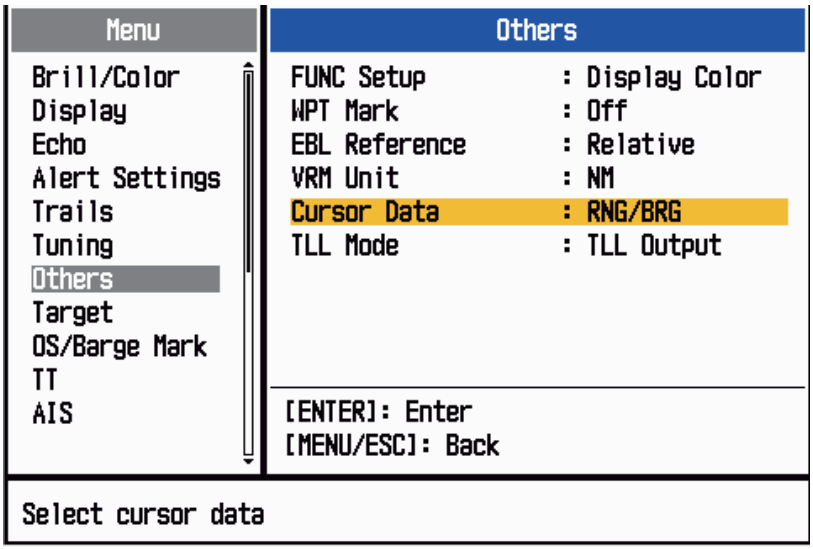


Cursor data

Cursor data

You can show the cursor data as range and bearing (from your ship to the cursor) or latitude and longitude. Position and heading signal are required.

1. Press the **MENU/ESC** key to open the menu.
2. Use the Cursorpad (▲ or ▼) to select [Others] and press the **ENTER** key.



Others menu

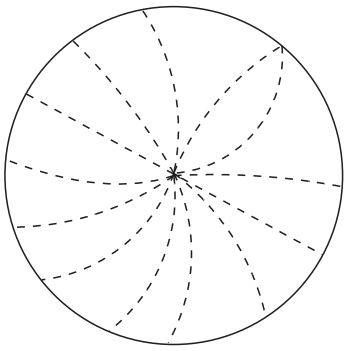
3. Use the Cursorpad (▲ or ▼) to select [Cursor Data] and press the **ENTER** key.

Cursor Position options

4. Use the Cursorpad (▲ or ▼) to select [Rng/Brg] or [Lat/Lon] then press the **ENTER** key. (When the navigation data is displayed, cursor latitude and longitude position cannot be displayed.)
5. Press the **MENU/ESC** key to close the menu.

5.13 Interference Rejector

The radar interference can occur when your ship is near the radar of another ship that operates on the same frequency band with your radar. The interference shows on the screen as many bright dots. The dots can be random or in the shape of dotted lines that run from the center to the edge of the display. You can identify the interference from the normal echoes, because the interference does not appear in the same location at the next antenna rotation. When this feature is turned on, "IR 1", "IR 2" or "IR 3" appears at the lower-right corner.



Interference

1. Press the **MENU/ESC** key to open the menu.
2. Use the Cursorpad (▲ or ▼) to select [Echo] and press the **ENTER** key.
3. Use the Cursorpad (▲ or ▼) to select [Int Rejector] and press the **ENTER** key.

Int Rejector options

4. Use the Cursorpad (▲ or ▼) to select [Off] or [On] then press the **ENTER** key. [3] removes the interference the most.
5. Press the **MENU/ESC** key to close the menu.

Note: When there is no interference, turn off the interference rejector so you do not miss the small targets.

5.14 Noise Rejector

White noise can appear on the screen as random "marks". You can reduce this noise as follows:

1. Press the **MENU/ESC** key to open the menu.
2. Use the Cursorpad (▲ or ▼) to select [Echo] and press the **ENTER** key.
3. Use the Cursorpad (▲ or ▼) to select [Noise Rejector] and press the **ENTER** key.

Noise Rejector options

4. Use the Cursorpad (▲ or ▼) to select [Off] or [On] then press the **ENTER** key.
5. Press the **MENU/ESC** key to close the menu.

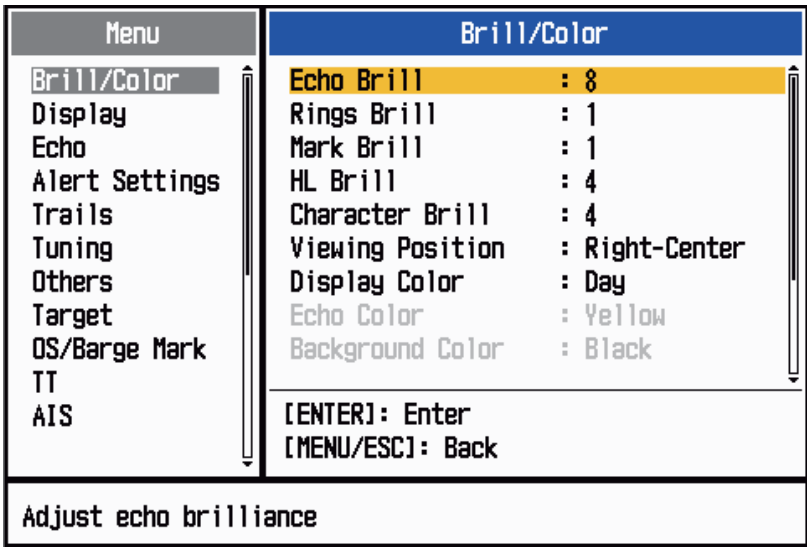
5.15 How to Measure the Range to a Target

You can measure the range to a target in three methods. You can use the fixed range rings, the cursor (if set to measure range and bearing), and the VRM (Variable Range Marker).

Use the fixed range rings to get a rough estimate of the range to a target. The fixed range rings are the concentric solid circles about your ship. The number of rings changes with the selected range scale. The interval of the range ring is displayed at the upper-left corner of the screen. Count the number of rings between the center of the display and the target. Check the range ring interval and measure the distance of the echo from the nearest ring.

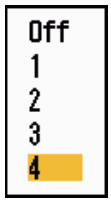
5.15.1 How to adjust range ring brilliance

1. Press the **MENU/ESC** key to open the menu.
2. Use the Cursorpad (▲ or ▼) to select [Brill/Color] and press the **ENTER** key.



Brill/Color menu

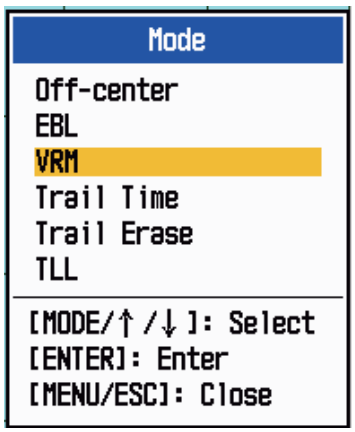
3. Use the Cursorpad (▲ or ▼) to select [Rings Brill] and press the **ENTER** key.
4. Use the Cursorpad (▲ or ▼) to select an option and press the **ENTER** key. [4] is the brightest. [Off] turns off the range rings.
5. Press the **MENU/ESC** key to close the menu.

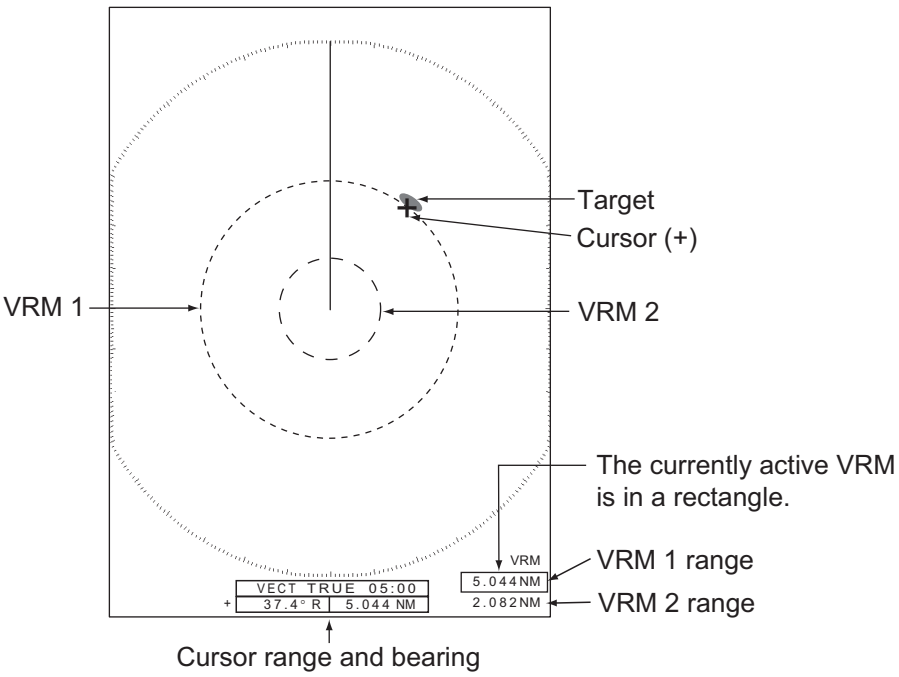


5.15.2 How to measure the range with a VRM

There are two VRMs, No. 1 and No. 2. The VRMs are dashed rings so that you can identify the rings from the fixed range rings. You can identify VRM 1 from VRM 2 by different lengths of dashes. The dashes of the No. 1 VRM are shorter than those of the No. 2 VRM.

1. Press the **MODE** key to show the [Mode] window.
2. Use the Cursorpad to select [VRM] then press the **ENTER** key.
3. Select [VRM 1] or [VRM 2] as required, then press the **ENTER** key. The VRM indication appears at the bottom right corner, inside a rectangle.
4. Use the Cursorpad to align the VRM with the inner edge of the target. Read the distance at the lower-right corner of the screen. The size of the VRM ring changes in proportion to the selected range scale.
5. To anchor the VRM, press the **ENTER** key. To re-activate the VRM, select it from the [Mode] window.
6. To erase a VRM, press the **MODE** key to open the [Mode] window, select [VRM], then select the VRM to erase. Press the **MENU/ESC** key to erase the VRM and its indication. (If a VRM's indication is already in a rectangle, simply press the **MENU/ESC** key to erase the VRM and its indication.)



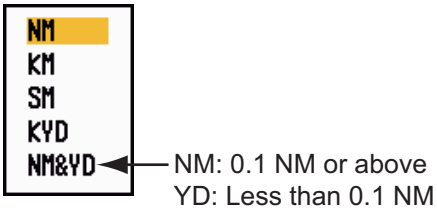


How to measure the range with the VRM

5.15.3 How to select VRM unit

You can select the unit of measurement used by the VRM. The selections are nautical miles (NM), kilometers (KM), statute miles (SM) or kiloyard (KYD). The cursor range unit is also changed when the VRM unit is changed.

1. Press the **MENU/ESC** key to open the menu.
2. Use the Cursorpad (▲ or ▼) to select [Others] and press the **ENTER** key.
3. Use the Cursorpad (▲ or ▼) to select [VRM Unit] and press the **ENTER** key.



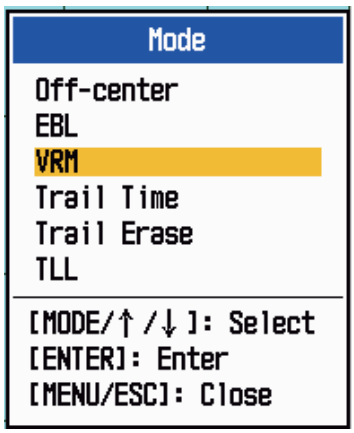
4. Use the Cursorpad (▲ or ▼) to select the unit and press the **ENTER** key.
5. Press the **MENU/ESC** key to close the menu.

5.16 How to Measure the Bearing to a Target

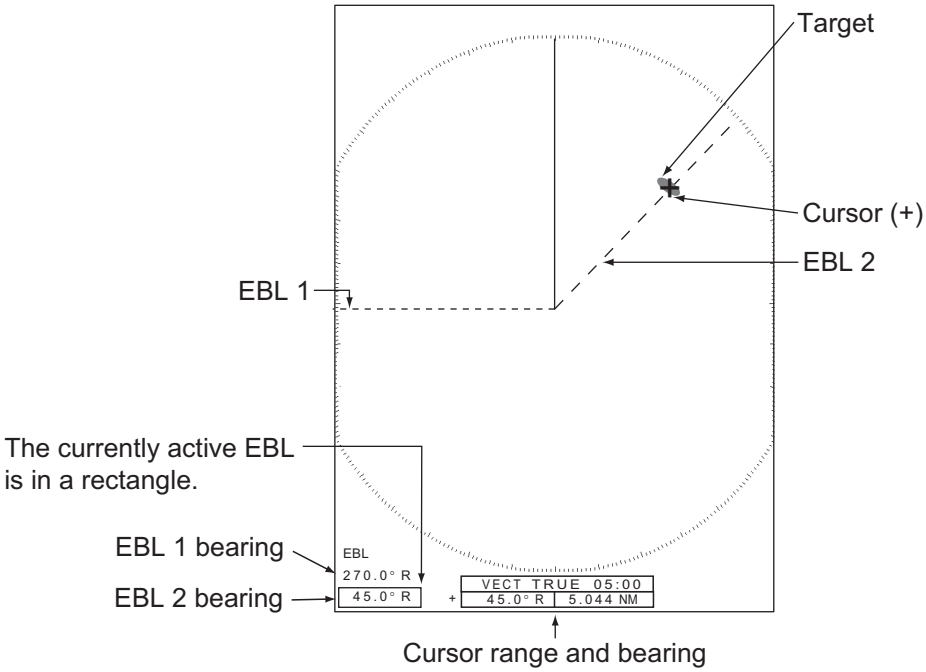
Use the Electronic Bearing Line (EBL) to take a bearing of a target. There are two EBLs, No. 1 and No. 2. Each EBL is a straight dashed line from the center of the screen to the edge. The dashes of the No. 1 EBL are shorter than those of the No. 2 EBL.

5.16.1 How to measure the bearing with an EBL

1. Press the **MODE** key to show the [Mode] window.
2. Use the Cursorpad to select [EBL] then press the **ENTER** key.
3. Select [EBL 1] or [EBL 2] as required, then press the **ENTER** key. The EBL indication appears at the bottom left corner, inside a rectangle.
4. Use the Cursorpad to place the EBL through the center of the target. Read the distance at the bottom left corner of the screen. The cursor on the EBL provides an estimate of the range to a target.
5. To anchor the EBL, press the **ENTER** key. To reactivate the EBL, select it from the [Mode] window.



6. To erase a EBL, press the **MODE** key to open the [Mode] window, select [EBL], then select the EBL to erase. Press the **MENU/ESC** key to erase the EBL and its indication. (If a EBL's indication is already in a rectangle, simply press the **MENU/ESC** key to erase the EBL and its indication.)



5.16.2 EBL reference

"R" (relative) follows the EBL indication if the bearing is relative to the heading of your ship. "T" (true) follows the EBL indication if the bearing is in reference to the north. You can select relative or true in the head-up and true view modes. The bearing indication is true in all other modes. True bearing requires a heading sensor.

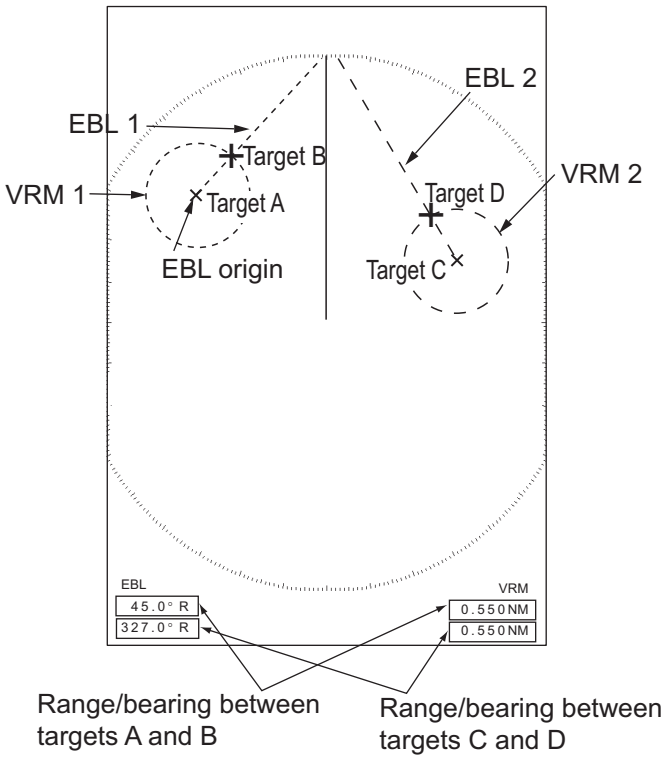
1. Press the **MENU/ESC** key to open the menu.
2. Use the Cursorpad (▲ or ▼) to select [Others] and press the **ENTER** key.
3. Use the Cursorpad (▲ or ▼) to select [EBL Reference] and press the **ENTER** key.

4. Use the Cursorpad (▲ or ▼) to select [Relative] or [True] then press the **ENTER** key.
5. Press the **MENU/ESC** key to close the menu.

5.17 How to Measure the Range and Bearing Between Two Targets

You can move the origin of the EBL to measure the range and bearing between two targets.

1. Press the **MODE** key.
2. Select [EBL], followed by [EBL 1], then press the **ENTER** key.
3. Use the Cursorpad to put the cursor on the center of the target A.
4. Press the **MODE** key, and the origin of the EBL moves to the cursor position.
5. Use the Cursorpad to put the cursor on the center of the target B, then press the **ENTER** key.
6. Press the **MODE** key, select [VRM] followed by [VRM 1], then press the **ENTER** key
7. Use the Cursorpad to set the VRM on the inner edge of the target B.
8. Read the bearing and range indications at the bottom of the screen.



The range and bearing to another target (C and D in the figure above) can be measured using [EBL 2] and [VRM 2].

To cancel the this function, turn off the EBL and VRM.

5.18 Target Alarm

The target alarm looks for targets (ship, landmass, etc.) in the area you set. Audiovisual alarms are released when a target enters (or exits) the alarm area.

⚠ CAUTION

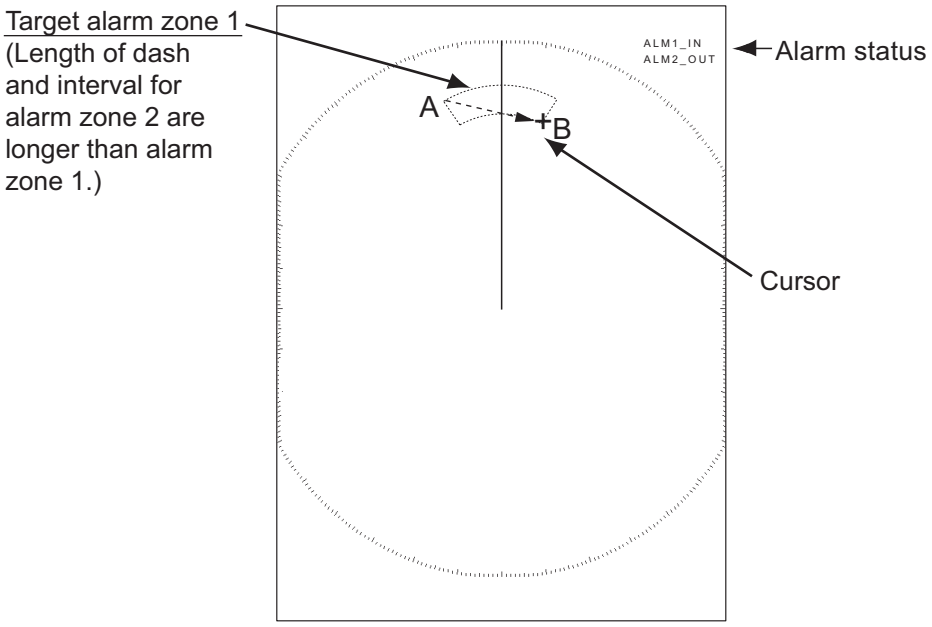
Do not depend on the alarm as the only means to detect possible collision situations.

Adjust the sea clutter, rain clutter and gain correctly so that the alarm system does not miss target echoes.

5.18.1 How to set a target alarm zone

The following procedure shows you how to set a target alarm zone.

1. Press the **ALARM** key to activate ALARM 1 or ALARM 2. Press the **ALARM** key to change the active ALARM between No. 1 and No. 2. The indication of the currently active ALARM is in a rectangle at the upper-right corner of the screen.
2. Use the Cursorpad to move the cursor to the position A and press the **ENTER** key.
3. Move the cursor to the position B and press the **ENTER** key. The rectangle that shows alarm status indication at the upper-right corner of the screen disappears.



How to set a target alarm zone

Note 1: To set a 360-degree guard zone, set the position B in the same bearing as the position A.

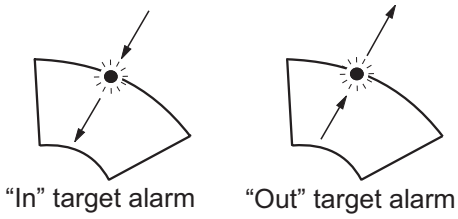
Note 2: When the target alarm zone is not within the range in use, the indication "ALM1(or 2)_RNG" replaces "ALM1(or 2)_IN(or OUT)" in the alarm status area. (When the target alarm zone is within the range of full off-centering, the indication does not change.) Select a range which displays the target alarm zone.

5.18.2 How to stop the audio alarm

When a target enters (or exits) the target alarm zone, the target flashes and the alarm sounds. The alarm message appears at the bottom of the screen. To stop the audio alarm, press any key. When the target enters (or exits) the target alarm zone again, the audio alarm sounds.

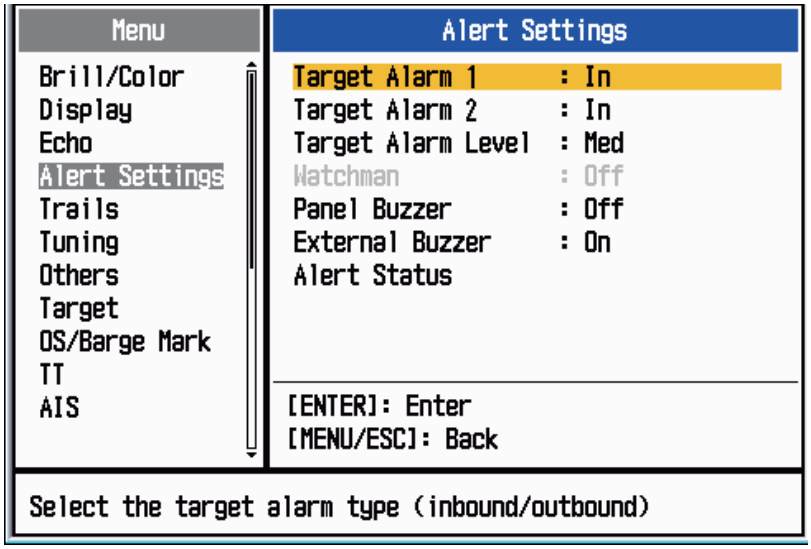
5.18.3 How to select the alarm type

You can set the target alarm to activate against targets entering or exiting the alarm zone.



In and Out target alarms

1. Press the **MENU/ESC** key to open the menu.
2. Use the Cursorpad (▲ or ▼) to select [Alert Settings] and press the **ENTER** key.



Alarm menu

3. Use the Cursorpad (▲ or ▼) to select [Target Alarm 1] or [Target Alarm 2] then press the **ENTER** key.

Target Alarm options

4. Use the Cursorpad (▲ or ▼) to select [In] or [Out].
   [In]: When a target enters a target alarm zone, the alarm sounds.
   [Out]: When a target exits a target alarm zone, the alarm sounds.
5. Press the **ENTER** key followed by the **MENU/ESC** key.

5.18.4 How to sleep a target alarm temporarily

When you do not require a target alarm temporarily, you can sleep the target alarm. The alarm zone remains on the screen, but any targets that enter (or exit) the alarm zone do not trigger the audio and visual alarms.

1. Press the **ALARM** key to select the ALARM 1 or ALARM 2 indication at the upper-right corner on the screen. The selected indication is in a rectangle.
2. Press the **MENU/ESC** key. The alarm indication now shows "ALM1(or 2)_ACK".

To activate a sleeping target alarm zone, press the **ALARM** key to select the ALARM 1 or ALARM 2 and press the **ENTER** key. The alarm indication then changes to "ALM1(or 2)_IN(or OUT)".

5.18.5 How to deactivate a target alarm

1. Press the **ALARM** key to select the ALARM 1 or ALARM 2 indication at the upper-right corner on the screen. The selected indication is in a rectangle.
2. Press the **MENU/ESC** key. The alarm indication now shows "ALM1(or 2)_ACK".
3. Press the **ALARM** key. The alarm indication "ALM1(or 2)_ACK" is shown in a dashed-line rectangle.
4. Press the **MENU/ESC** key. The target alarm zone and the alarm indication are erased from the screen.

5.18.6 How to select the target strength which triggers a target alarm

You can select the target strength which triggers the target alarm as follows:

1. Press the **MENU/ESC** key to open the menu.
2. Use the Cursorpad (▲ or ▼) to select [Alarm] and press the **ENTER** key.
3. Use the Cursorpad (▲ or ▼) to select [Alarm Level] and press the **ENTER** key.

Alarm Level options

4. Use the Cursorpad (▲ or ▼) to select the echo strength level.
5. Press the **ENTER** key followed by the **MENU/ESC** key.

5.18.7 How to turn the buzzer on/off

You can turn on/off the panel buzzer or external buzzer for target alarms. The panel buzzer is for this equipment. The external buzzer is for the optional buzzer, which is connected to this equipment to give the target alarm at a remote location.

1. Press the **MENU/ESC** key to open the menu.
2. Use the Cursorpad (▲ or ▼) to select [Alarm] and press the **ENTER** key.

3. Use the Cursorpad (▲ or ▼) to select [Panel Buzzer] (or [External Buzzer] for optional buzzer) and press the **ENTER** key.

Panel Buzzer and External Buzzer options

4. Use the Cursorpad (▲ or ▼) to select [On] or [Off] then press the **ENTER** key.
5. Press the **MENU/ESC** key to close the menu.

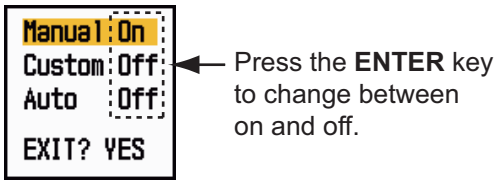
5.19 How to Off-center the Display

You can off-center your ship position to expand the view field without selecting a larger range scale. The display can be off-centered manually, or automatically according to speed of the ship.

Note: Off-centering is not available in the true motion mode.

5.19.1 How to select the off-center mode

1. Press the **MENU/ESC** key to open the menu.
2. Use the Cursorpad (▲ or ▼) to select [Display] and press the **ENTER** key.
3. Use the Cursorpad (▲ or ▼) to select [Off-center mode] and press the **ENTER** key.



4. Use the Cursorpad (▲ or ▼) to select [Manual], [Custom] or [Auto] then press the **ENTER** key. Press the **ENTER** key to change between on and off.
5. After setting all options, use the Cursorpad (▼) to select [EXIT? YES] and press the **ENTER** key.
6. Press the **MENU/ESC** key to close the menu.

5.19.2 Off-center the display

The mode selected from the menu appears at top left corner of the display, when the off-center feature is activated - "OFFCENT(M)" (Manual), "OFFCENT(C)" (Custom) or "OFFCENT(A)" (Auto).

Manual (Indication: "OFFCENT(M)")

You can move your ship position to the current cursor position on all modes except true motion, within 75% of the available display area.

1. Put the cursor on the position where to off-center the display.
2. Press the **MODE** key, select [Off-center], then press the **ENTER** key.

Custom (Indication: "OFFCENT(C)")

You can move your ship position to the position which you preset. Follow the procedure shown below to register the cursor position. Then, the display is off-centered by the amount set here, when you activate the off-center function.

1. Turn off the off-center display.
2. Put the cursor on the position where to off-center the display.
3. Press the **MODE** key, select [Off-center], then press the **ENTER** key.
4. Press the **MENU/ESC** key to open the menu.
5. Use the Cursorpad (▲ or ▼) to select [Display] and press the **ENTER** key.
6. Use the Cursorpad (▲ or ▼) to select [Save Offcenter] and press the **ENTER** key. The message "Complete" appears.
7. Press any key to close the message window.
8. Press the **MENU/ESC** key to close the menu.

Auto (Indication: "OFFCENT(A)")

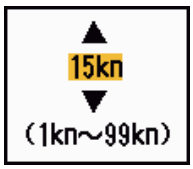
The amount of automatic move is calculated according to speed of the ship. The maximum amount is 75% of the range in use. The formula to calculate automatic shift is shown below.

$$\frac{\text{Speed of ship}}{\text{Offcenter speed setting}} \times 0.75 = \text{Amount of move (\%)}$$

If the offcenter speed setting is 15 knots and the speed of the ship is 10 knots, for example, the amount of move at the stern of your ship will be 50% of the available display area.

How to select offcenter speed

1. Press the **MENU/ESC** key to open the menu.
2. Use the Cursorpad (▲ or ▼) to select [Initial] sub menu in [System] menu and press the **ENTER** key.
3. Use the Cursorpad (▲ or ▼) to select [Offcenter Speed] and press the **ENTER** key.
4. Use the Cursorpad (▲ or ▼) to select the speed to use and press the **ENTER** key.
5. Press the **MENU/ESC** key to close the menu.



5.20 Zoom

The zoom function expands the length and width of a selected target as much as twice its normal size, in the zoom window. You select the target to zoom with the zoom cursor. The selected target is zoomed in the zoom window.

TT and AIS symbols can be displayed in the zoom window, but are not zoomed. You can process TT and AIS targets that are in the zoom window, in the same method as on the normal radar display.

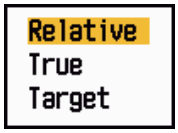
There are three types of zoom.

[Relative]: The zoom cursor is fixed to the range and bearing from your ship.**[True]:** The zoom cursor is fixed to set geographical position.**[Target]:** The zoom cursor is fixed to the zoomed AIS or TT target.

5.20.1 Zoom mode

You can select the zoom mode from [Relative], [True] or [Target].

1. Press the **MENU/ESC** key to open the menu.
2. Use the Cursorpad (▲ or ▼) to select [Display] and press the **ENTER** key.
3. Use the Cursorpad (▲ or ▼) to select [Zoom Reference] and press the **ENTER** key.



Zoom Mode options

4. Use the Cursorpad (▲ or ▼) to select [Relative], [True] or [Target] then press the **ENTER** key.
   Note: True zoom mode requires a heading signal and position data.
5. Press the **MENU/ESC** key to close the menu.

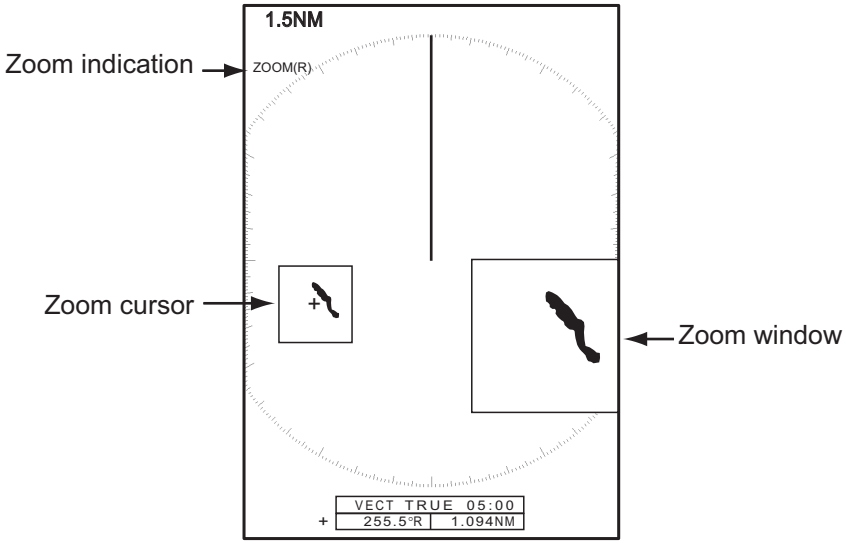
5.20.2 How to zoom

Relative or True zoom mode

1. Use the Cursorpad to put the cursor on the position desired.
2. Press the **MENU/ESC** key to open the menu.
3. Use the Cursorpad (▲ or ▼) to select [Display] and press the **ENTER** key.
4. Use the Cursorpad (▲ or ▼) to select [Zoom] and press the **ENTER** key.

Zoom options

5. Use the Cursorpad (▲ or ▼) to select [On] and press the **ENTER** key.
   The ZOOM indication appears at the upper-left corner on the screen. The zoom window and the zoom cursor also appear (see the illustration on the next page).
   To quit the zoom, select [Off] instead of [On] and press the **ENTER** key.



6. Press the **MENU/ESC** key to close the menu.

Target zoom mode

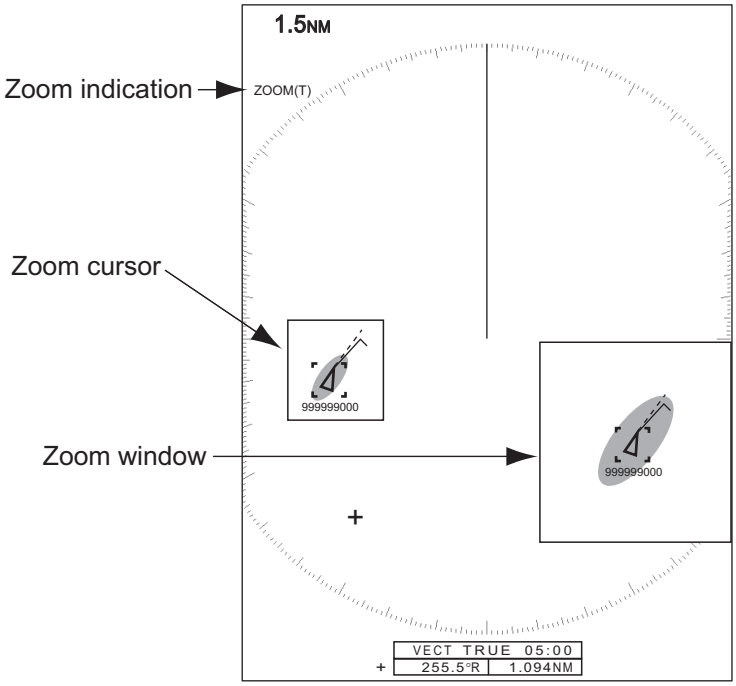
The TT or AIS target as below can be displayed in the zoom window:

TT: The symbol is enlarged twice its normal size. AIS: The symbol is enclosed in a broken square. (The symbol is not enlarged.)

The zoom cursor moves with the TT or AIS target.

Note: If neither TT nor AIS targets are selected, the message "NO TARGET." appears. Press any key to erase the message.

1. Press the **MENU/ESC** key to open the menu.
2. Use the Cursorpad (▲ or ▼) to select [Display] and press the **ENTER** key.
3. Use the Cursorpad (▲ or ▼) to select [Zoom] and press the **ENTER** key.
4. Use the Cursorpad (▲ or ▼) to select [On] and press the **ENTER** key.
   The ZOOM indication appears at the upper-left corner on the screen. The zoom window and the zoom cursor also appear (see the following illustration). To quit the zoom, select [Off] instead of [On] and press the **ENTER** key.



Target zoom mode
(example: AIS)

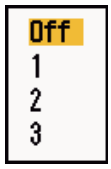
5. Press the **MENU/ESC** key to close the menu.

5.21 Echo Stretch

The echo stretch feature enlarges the targets in the range and bearing directions to make the targets easier to see. This feature is available on any range. There are three levels of echo stretch, [1], [2] and [3]. [3] enlarges the targets the most.

Note: The echo stretch magnifies the targets, sea and rain clutters, and radar interference. Correctly adjust the sea clutter, rain clutter and radar interference before you activate the echo stretch.

1. Press the **MENU/ESC** key to open the menu.
2. Use the Cursorpad (▲ or ▼) to select [Echo] and press the **ENTER** key.
3. Use the Cursorpad (▲ or ▼) to select [Echo Stretch] and press the **ENTER** key.



Echo Stretch options

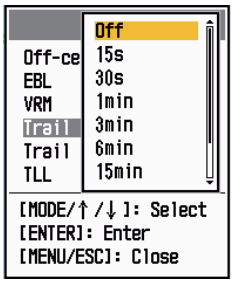
4. Use the Cursorpad (▲ or ▼) to select an echo stretch option and press the **ENTER** key.
5. Press the **MENU/ESC** key to close the menu. When the echo stretch is active, "ES 1 (2, or 3)" appears at the lower-left corner on the display.

5.22 Target Trails

The trails of the radar targets can be shown simulated in afterglow to check target movement. The target trails are selected for either relative or true. True motion trails require a heading signal and position data.

5.22.1 Trail time

1. Press the **MODE** key to open the [Mode] window.
2. Select [Trail Time] and press the **ENTER** key.



Time options

3. Use the Cursorpad (▲ or ▼) to select time and press the **ENTER** key.
4. Press the **MENU/ESC** key to close the menu.

The selected time appears at the top right corner.

5.22.2 Trail mode

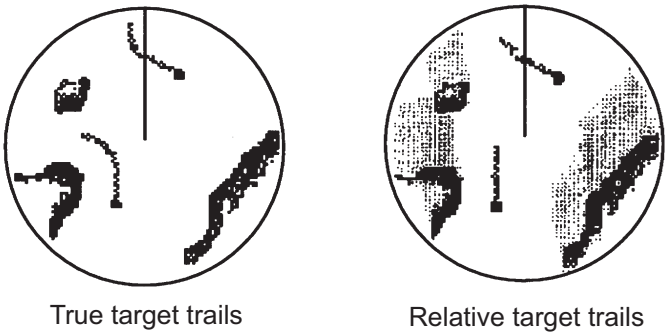
You can display the echo trails in true or relative motion.

True mode

The true trails show true target movements according to their over-the-ground speeds and courses. The stationary targets do not show the trails. The true trails require a heading signal and position data.

Relative mode

The relative trails show other ships' movements relative to your ship. The stationary targets also show the trails.



True trails and relative trails

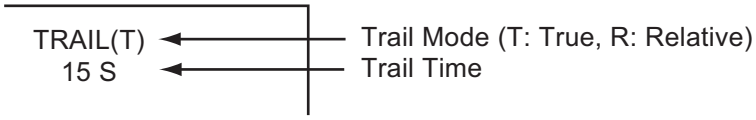
To select the trail mode, do the following:

1. Press the **MENU/ESC** key to open the menu.
2. Use the Cursorpad (▲ or ▼) to select [Target Trails] and press the **ENTER** key.
3. Use the Cursorpad (▲ or ▼) to select [Mode] and press the **ENTER** key.

Mode options

4. Use the Cursorpad (▲ or ▼) to select [Relative] or [True] then press the **ENTER** key.
5. Press the **MENU/ESC** key to close the menu.

The selected trail mode and trail time appear at the top right corner.



Trail indications

5.22.3 Trail gradation

Trails can be shown in single or multiple gradation. Multiple gradation fades the gradation over time.

1. Press the **MENU** key to open the menu.
2. Use the Cursorpad (▲ or ▼) to select [Target Trails] and press the **ENTER** key.
3. Use the Cursorpad (▲ or ▼) to select [Gradation] and press the **ENTER** key.

Gradation options

4. Use the Cursorpad (▲ or ▼) to select [Single] or [Multi] then press the **ENTER** key.

Single
(Monotone shading)

Multiple
(Gradual shading)

Trail gradation

5. Press the **MENU** key to close the menu.

5.22.4 Trail color

You can select the color for trails as follows:

1. Press the **MENU** key to open the menu.
2. Use the Cursorpad (▲ or ▼) to select [Target Trails] and press the **ENTER** key.
3. Use the Cursorpad (▲ or ▼) to select [Color] and press the **ENTER** key.

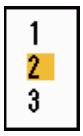
Color options

4. Use the Cursorpad (▲ or ▼) to select a color and press the **ENTER** key.
5. Press the **MENU** key to close the menu.

5.22.5 Trail level

You can select which target strength to display.

1. Press the **MENU/ESC** key to open the menu.
2. Use the Cursorpad (▲ or ▼) to select [Target Trails] and press the **ENTER** key.
3. Use the Cursorpad (▲ or ▼) to select [Level] and press the **ENTER** key.



Level options

4. Use the Cursorpad (▲ or ▼) to select [1], [2] or [3] then press the **ENTER** key.
   [1]: Display the trails for all targets (including weak targets).
   [2]: Display the trails for medium-to-strong level targets.
   [3]: Display the trails for only strong targets.
5. Press the **MENU/ESC** key to close the menu.

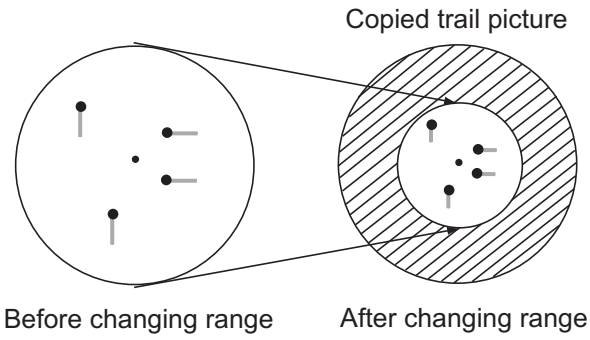
5.22.6 How to restart, stop the trails

When the range is changed while the trail feature is active, trails within the previous range scale can be stopped and restarted.

1. Press the **MENU** key to open the menu.
2. Use the Cursorpad (▲ or ▼) to select [Target Trails] and press the **ENTER** key.
3. Use the Cursorpad (▲ or ▼) to select [Restart] and press the **ENTER** key.

Restart options

4. Use the Cursorpad (▲ or ▼) to select [Off] or [On] then press the **ENTER** key.
   [Off]: The previous trails data are saved when the range is changed. The trails are not restarted and the saved trails are not updated. When you return the range scale to the previous range scale, the saved trails are displayed and updated.
   [On]: The previous trails are zoomed in or out depending on the changed scale and updated.



How trail copy operates

Note: If the newly selected range is less than or equal to 1/4 of the previous range, trails are erased. If the newly selected range is longer than the previous range, the previous trails are left to be displayed.

5. Press the **MENU** key to close the menu.

5.22.7 Narrow trails

You can display the target trails in thin trails. When there are many targets on the screen, you can separate trails close to one another with this function.

1. Press the **MENU/ESC** key to open the menu.
2. Use the Cursorpad (▲ or ▼) to select [Target Trails] and press the **ENTER** key.
3. Use the Cursorpad (▲ or ▼) to select [Narrow] and press the **ENTER** key.

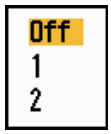
Narrow options

4. Use the Cursorpad (▲ or ▼) to select [Off] or [On] then press the **ENTER** key.
5. Press the **MENU/ESC** key to close the menu.

5.22.8 Your ship trail

You can show the trail of your ship as follows:

1. Press the **MENU/ESC** key to open the menu.
2. Use the Cursorpad (▲ or ▼) to select [Target Trails] and press the **ENTER** key.
3. Use the Cursorpad (▲ or ▼) to select [Own Ship] and press the **ENTER** key.



Own Ship options

4. Use the Cursorpad (▲ or ▼) to select [Off], [1] or [2] then press the **ENTER** key.
   [Off]: Hide the trail of your ship.
   [1]: Show the trail of your ship.
   [2]: Show the trail of your ship, but hide the trail of sea clutter near your ship.
5. Press the **MENU/ESC** key to close the menu.

5.22.9 How to erase all trails

All trails can be erased as follows.

1. Press the **MENU/ESC** key to open the menu.
2. Use the Cursorpad (▲ or ▼) to select [Trails] and press the **ENTER** key.
3. Use the Cursorpad (▲ or ▼) to select [Trail Erase] and press the **ENTER** key.
4. You are asked if you are sure to erase all trails. Press ▲ on the Cursorpad to select [Yes] then press the **ENTER** key.

A beep sounds upon completion of the erasure.

5.23 How to Program the FUNC Key

The **FUNC** key can be programmed to do the function you assign.

Function key operation

Press the **FUNC** key to do the function assigned to the key. Press the key successively to change the setting.

How to change a function key program

1. Press the **MENU/ESC** key to open the menu.
2. Use the Cursorpad (▲ or ▼) to select [Others] and press the **ENTER** key.
3. Use the Cursorpad (▲ or ▼) to select [Func Setup] and press the **ENTER** key.
4. Use the Cursorpad (▲ or ▼) to select a function from the list and press the **ENTER** key. Below are the available functions.

Off	Echo Stretch
TLL	Echo Average
Rings Brill	Int Rejector
Mark Brill	Display-Curve
HL Brill	Watchman
Char.Brill	Trail Time
Viewing Posn.	Trail Erase
Display Color	Trail Grad.
Echo Color	Trail Color
Back. Color	Vector Ref.
Char. Color	TT-Display
Echo Col. Mode	TT-Erase Lost
Display Mode	AIS-Display
Zoom	AIS-Erase Lost
Echo Stretch	

Function list

5. Press the **MENU/ESC** key to close the menu.

5.24 Echo Average

To identify true target echoes from the sea clutter, echoes are averaged over successive picture frames. If an echo is solid and stable, the echo is shown in its normal intensity. The brilliance of sea clutter is reduced to easily identify true targets from the sea clutter.

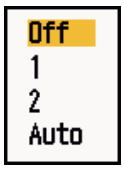
Note 1: Do not use the echo average function under heavy pitching and rolling. You can lose a target.

Note 2: This feature requires a heading signal and position data. When either signal becomes lost, echo average is deactivated.

To correctly use the echo average function, first reduce the sea clutter:

1. Press the **MENU/ESC** key to open the menu.
2. Use the Cursorpad (▲ or ▼) to select [Echo] and press the **ENTER** key.

3. Use the Cursorpad (▲ or ▼) to select [Echo Average] and press the **ENTER** key.



Echo Average options

4. Use the Cursorpad (▲ or ▼) to select an echo averaging option and press the **ENTER** key.
   [Off]: Deactivate the echo average.
   [1]: Identify true targets from the sea clutter and reduce the brilliance of unstable echoes.
   [2]: Identify true targets from the sea clutter that you cannot reduce the brilliance with setting 1.
   [Auto]: Identify true targets from the sea clutter. Detect far and unstable targets.
5. Press the **MENU/ESC** key to close the menu. The selected echo average ("EAV 1", "EAV 2" or "EAV(A)") appears at the lower-left corner of the display.

5.25 Wiper

The wiper feature automatically reduces the brilliance of unwanted weak signals (noise, sea clutter, rain clutter, etc.) and unnecessary signals, like radar interference, to clear the picture of unnecessary echoes. The result of wiper depends on the wiper setting used and whether echo averaging is turned on or off, as described below.

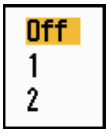
Echo averaging and wiper states and wiper effect

	Wiper 1	Wiper 2
Echo Average Off	Processing content A	
Echo Average On (1, 2, Auto)	Processing content A	Processing content B

Processing content A: The brilliance of unnecessary weak echoes, like noise and radar interference, is reduced to clear the picture. The difference between wiper 1 and 2 is that brilliance is lowered more slowly in 1.
Processing content B: Echo averaging is automatically turned on from off when the wiper feature is turned on. You can see how the picture changes with the echo averaging turned off and turned on.

To activate the wiper feature, do the following:

1. Press the **MENU/ESC** key to open the menu.
2. Use the Cursorpad (▲ or ▼) to select [Echo] and press the **ENTER** key.
3. Use the Cursorpad (▲ or ▼) to select [Wiper] and press the **ENTER** key.



Wiper options

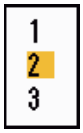
4. Use the Cursorpad (▲ or ▼) to select [1] or [2] then press the **ENTER** key.
5. Press the **MENU/ESC** key to close the menu.

Note: When the [Display Mode] is [True View], this function is not available.

5.26 Characteristics Curve

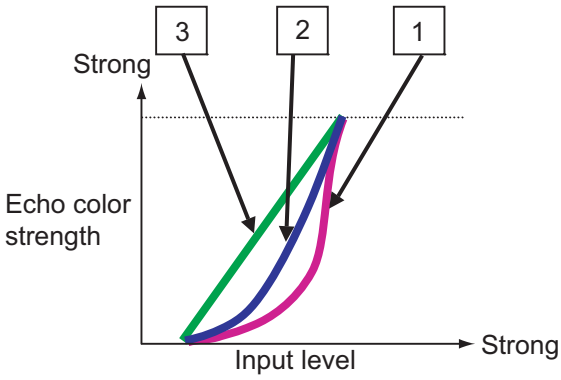
You can change the characteristics curve to reduce unwanted weak echoes (sea reflections, etc.). Select [1], [2] or [3] depending on conditions when unwanted weak echoes hide wanted targets.

1. Press the **MENU/ESC** key to open the menu.
2. Use the Cursorpad (▲ or ▼) to select [Echo] and press the **ENTER** key.
3. Use the Cursorpad (▲ or ▼) to select [Display-Curve] and press the **ENTER** key.



Display-Curve options

4. Use the Cursorpad (▲ or ▼) to select [1], [2] or [3] then press the **ENTER** key.
   [1]: Reduce weak echoes.
   [2]: Normal use
   [3]: Display weaker echoes in stronger color compared to [1].



Display curve

5. Press the **MENU/ESC** key to close the menu.

5.27 Own Ship and Barge Markers

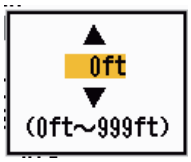
This section shows you how show and set up the own ship and barge markers.

5.27.1 How to show the own ship marker

1. Press the **MENU/ESC** key to open the menu.
2. Use the Cursorpad (▲ or ▼) to select [OS/Barge Mark] and press the **ENTER** key.
3. Use the Cursorpad (▲ or ▼) to select [OS Mark] and press the **ENTER** key.

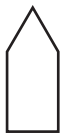
4. Use the Cursorpad (▲ or ▼) to select [On], then press the **ENTER** key.

5. Use the Cursorpad to select [OS Length] then press the **ENTER** key.



6. Use the Cursorpad to set the length of own ship then press the **ENTER** key.
7. Use the Cursorpad to select [OS Width] then press the **ENTER** key.
8. Use the Cursorpad to set the width of own ship then press the **ENTER** key.
9. Press the **MENU/ESC** key to close the menu.

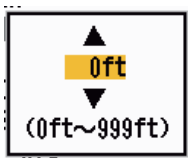
The own ship mark appears on the display, scaled according to the length and width entered here.



5.27.2 How to show the barge marker

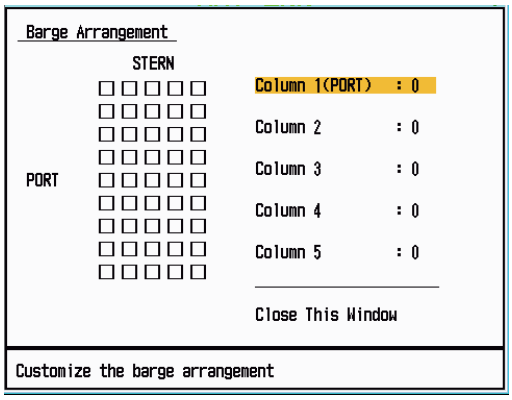
1. Press the **MENU/ESC** key to open the menu.
2. Use the Cursorpad (▲ or ▼) to select [OS/Barge Mark] and press the **ENTER** key.
3. Use the Cursorpad (▲ or ▼) to select [Barge Mark] and press the **ENTER** key.

4. Use the Cursorpad (▲ or ▼) to select [On], then press the **ENTER** key.
5. Use the Cursorpad to select [Barge Position] then press the **ENTER** key.
6. Use the Cursorpad to select [Bow] or [Stern], then press the **ENTER** key.
7. Use the Cursorpad to select [Barge Length] then press the **ENTER** key.

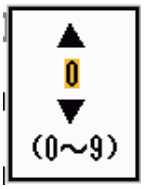


8. Use the Cursorpad to set the length of the barge, then press the **ENTER** key.
9. Use the Cursorpad to select [Barge Beam] then press the **ENTER** key.

10. Use the Cursorpad to select [Barge Arrangement], then press the **ENTER** key.



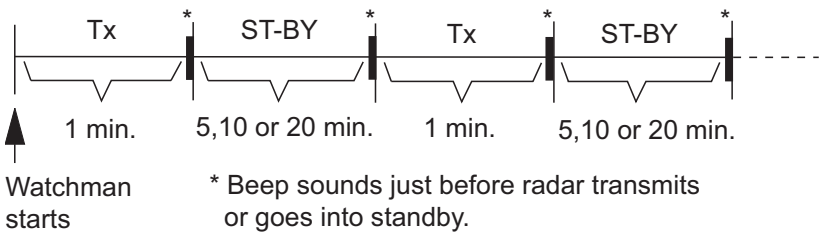
11. The cursor is selecting [Column1(PORT)]. Press the **ENTER** key.



12. Use the Cursorpad to set the number of barges in the port column.
13. Set other columns similar to how you did in steps 11 and 12.
14. After setting all required columns, select [Close This Window], then press the **ENTER** key.
15. Press the **MENU/ESC** key to close the menu.

5.28 Watchman

The Watchman sounds the buzzer to tell the operator to check the radar display. The radar transmits for one minute and then goes into standby for the selected time interval. If the target alarm is active and a target is found in the alarm zone, Watchman is cancelled, and the radar transmits continuously.



How watchman operates

In standby, the timer near the <WATCH> label at the center of the screen counts down the remaining time until the transmission. When the set time interval has passed, the audio alarm sounds, the timer disappears and the radar transmits for one minute. After one minute, the audio alarm sounds and the watch alarm timer again begins the countdown sequence.

If you press the **STBY/TX** key before the set time interval comes, the radar goes into transmission.

Do the following to activate the Watchman:

1. Press the **MENU/ESC** key to open the menu.
2. Use the Cursorpad (▲ or ▼) to select [Alarm] and press the **ENTER** key.
3. Use the Cursorpad (▲ or ▼) to select [Watchman] and press the **ENTER** key.

Watchman options

4. Use the Cursorpad (▲ or ▼) to select [Off] or the time ([5min], [10min] or [20min]) then press the **ENTER** key.
5. Press the **MENU/ESC** key to close the menu.

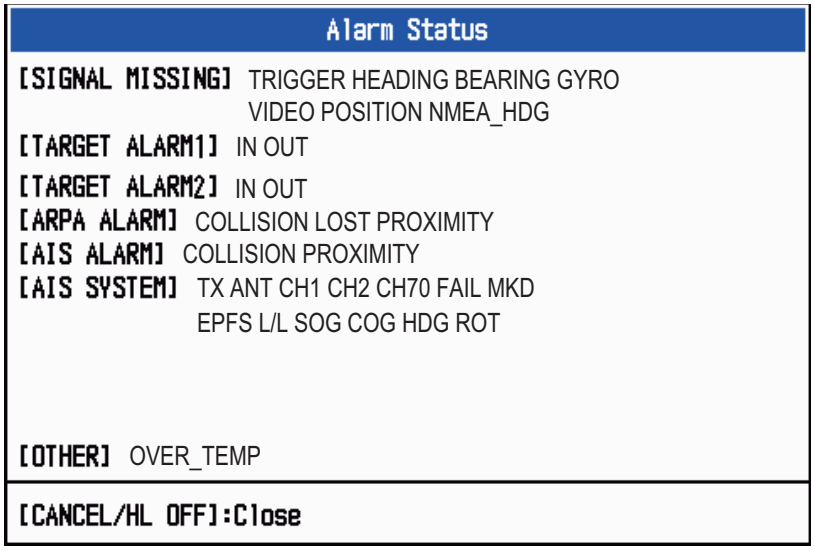
To turn off watchman, select [Off] at step 4.

5.29 Alarm Message

The alarm status window shows all currently violated alarms.

Note: The alarm status window is not automatically displayed when an alarm occurs.

1. Press the **MENU/ESC** key to open the menu.
2. Use the Cursorpad (▲ or ▼) to select [Alarm] and press the **ENTER** key.
3. Use the Cursorpad (▲ or ▼) to select [Alarm Status] and press the **ENTER** key.



Alarm Status display

4. Press the **MENU/ESC** key to close the alarm status display.
5. Press he **MENU/ESC** key to close the menu.

Alarm category	Meaning
SIGNAL MISSING*	
TRIGGER	Trigger signal lost (only for remote display)
HEADING	Heading signal lost
BEARING	Bearing signal lost
GYRO	AD-10 format gyro signal lost
VIDEO	Video signal lost

Alarm category	Meaning
POSITION	NMEA format position data lost
NMEA_HDG	NMEA format heading signal lost
TARGET ALARM1(2)	
IN	An echo has entered a target alarm zone.
OUT	An echo has exited a target alarm zone.
TT ALARM	
COLLISION	CPA and TCPA of an TT target is less than CPA and TCPA alarm settings.
LOST	Acquired TT target becomes lost.
PROXIMITY	The range to an TT target is less than the user-set proximity alarm range.
AIS ALARM	
COLLISION	CPA and TCPA of an AIS target is less than CPA and TCPA alarm settings.
PROXIMITY	The range to an AIS target is less than the user-set proximity alarm range.
AIS SYSTEM*	
TX	TX stopped or TX error
ANT	Antenna VSWR problem
CH1	TDM2 RX1 board problem
CH2	TDM2 RX2 board problem
CH70	RX channel 70 problem
FAIL	System failure
MKD	Minimum input device lost
EPFS	Navigator (GPS, etc.) problem
L/L	Position data lost
SOG	Speed data lost
COG	Course data lost
HDG	Heading data lost
ROT	Rate of turn data lost
OTHER*	
OVER_TEMP	The temperature of the equipment is more than the specified value.

*: Have a qualified technician check the equipment.

5.30 Color Selections

5.30.1 Preset colors

This radar is preset with color combinations that provide best viewing in daytime, nighttime and twilight. Below are the default color settings for each display item and display color setting.

Display item, color design and color

Display item	Day	Night	Twilight	Custom
Characters	Black	Red	Green	Green
Range rings, marks	Green	Red	Green	Green
Echo	Yellow	Green	Green	Yellow
Background	White	Black	Blue	Black

1. Press the **MENU** key to open the menu.
2. Use the Cursorpad (▲ or ▼) to select [Brill/Color] and press the **ENTER** key.
3. Use the Cursorpad (▲ or ▼) to select [Display Color] and press the **ENTER** key.

Display Color options

4. Use the Cursorpad (▲ or ▼) to select the color design and press the **ENTER** key.
5. Press the **MENU** key to close the menu.

5.30.2 Custom colors

The custom color design lets you select preferred echo, background, characters, range rings and marks colors. Select [Custom] in the [Display Color] menu item (see section 1.34.1) to use the user selected echo, background, characters, range rings and marks colors.

1. Press the **MENU/ESC** key to open the menu.
2. Use the Cursorpad (▲ or ▼) to select [Brill/Color] and press the **ENTER** key.
3. Use the Cursorpad (▲ or ▼) to select [Echo Color] and press the **ENTER** key.

Echo Color options

4. Use the Cursorpad (▲ or ▼) to select an echo color and press the **ENTER** key. [Multi] displays echoes in colors of red, yellow and green according to descending echo strength.

5. Use the Cursorpad (▲ or ▼) to select [Background Color] and press the **ENTER** key.

Background Color options

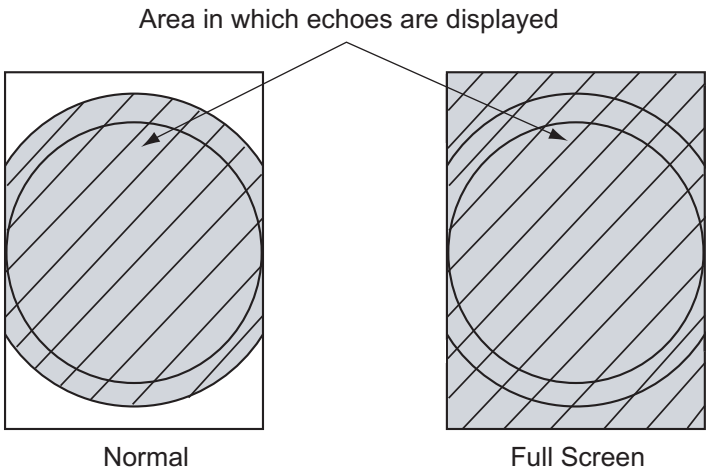
6. Use the Cursorpad (▲ or ▼) to select a background color and press the **ENTER** key.
7. Use the Cursorpad (▲ or ▼) to select [Character Color] and press the **ENTER** key.

Character Color options

8. Use the Cursorpad (▲ or ▼) to select a character color (including range rings and marks) and press the **ENTER** key.
9. Press the **MENU/ESC** key to close the menu.

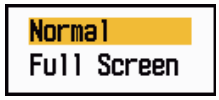
5.31 Echo Area

You can select the display area from [Normal] or [Full Screen].



Echo area

1. Press the **MENU/ESC** key to open the menu.
2. Use the Cursorpad (▲ or ▼) to select [Display] and press the **ENTER** key.
3. Use the Cursorpad (▲ or ▼) to select [Echo Area] and press the **ENTER** key.



Echo Area options

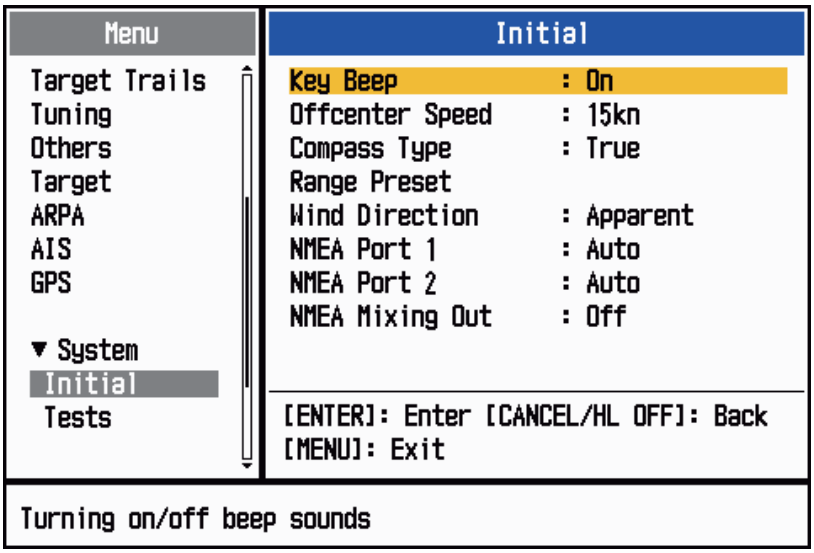
4. Use the Cursorpad (▲ or ▼) to select [Normal] or [Full Screen] then press the **ENTER** key.
5. Press the **MENU/ESC** key to close the menu.

5.32 Initial Sub Menu

The [Initial] sub menu in the [System] menu contains the items which allow you to customize your radar to meet your needs.

5.32.1 How to open the Initial sub menu

1. Press the **MENU** key to open the menu.
2. Use the Cursorpad (▲ or ▼) to select [Initial] and press the **ENTER** key.



Initial sub menu

5.32.2 Description of Initial sub menu

[Key Beep]: When a key is pressed, a beep sounds. You can turn on or off this beep.

[Off-center Speed]: Set the speed of your ship to calculate amount of your ship's off-center. The setting range is 1-99 (kn).

[Compass Type]: Select the type of bearing sensor connected to the radar; [True] (gyrocompass, satellite compass) or [Magnetic] (magnetic compass).

[Range Preset]: You can select the radar ranges. Select a range and press the **ENTER** key to switch on and off. At least two ranges must be turned on. The maximum range available depends on the radar model. 0.0625 is not available in KM (kilometers).

0.0625	On
0.125	On
0.25	On
0.5	On
0.75	On
1	Off
1.5	On
1.6	Off
2	Off
3	On
3.2	Off
4	Off
6	On
8	Off
12	On
16	Off
24	On
32	Off
36	On
48	Off
64	Off
Exit?	Yes

NM (nautical miles)

0.0625	Off
0.125	On
0.25	On
0.5	On
0.75	On
1	Off
1.5	On
1.6	Off
2	Off
3	On
3.2	Off
4	Off
6	On
8	Off
12	On
16	Off
24	On
32	Off
36	On
48	Off
64	Off
Exit?	Yes

KM (kilometers)

0.0625	On
0.125	On
0.25	On
0.5	On
0.75	On
1	Off
1.5	On
1.6	Off
2	Off
3	On
3.2	Off
4	Off
6	On
8	Off
12	On
16	Off
24	On
32	Off
36	On
48	Off
64	Off
Exit?	Yes

SM (statute miles)

[Wind Direction]: Wind direction is shown as [Apparent] or [True].

[NMEA Port 1]: Set the baud rate of the equipment connected to Port 1 ([Auto], [4800], or [38400] (bps)). [Auto] provides automatic detection of baud rate from 4800, 9600, 19200 or 38400 (bps).

[NMEA Port 2]: Same function as Port 1 but for Port 2.

[NMEA Mixing Out]: Data input to Port 1 may be output from Port 2 mixed with data output to Port 2. Select [On] to use this feature.

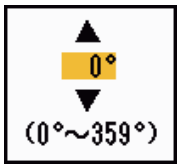
5.33 Sector Blank

You must prevent the transmission in some areas to protect passengers and crew from microwave radiation. Also, if the reflections of echoes from the mast appear on the screen, you must prevent the transmission in that area. You can set two sectors.

1. Press the **MENU/ESC** key to open the menu.
2. Use the Cursorpad (▲ or ▼) to select [Sector Blanks] and press the **ENTER** key.
3. Use the Cursorpad (▲ or ▼) to select [Sect-Blank 1 (or 2) Status] and press the **ENTER** key.

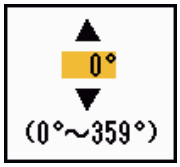
Sect-Blank Status options

4. Use the Cursorpad (▲ or ▼) to select [On] and press the **ENTER** key.
5. Use the Cursorpad (▲ or ▼) to select [Sect-Blank 1 (or 2) Start] and press the **ENTER** key.



Sect-Blank Start setting window

6. Use the Cursorpad (▲ or ▼) to set the start point of the sector and press the **ENTER** key.
7. Use the Cursorpad (▲ or ▼) to select [Sect-Blank 1 (or 2) End] and press the **ENTER** key.



Sect-Blank End setting window

8. Use the Cursorpad (▲ or ▼) to set the end point of the sector and press the **ENTER** key.
   Note 1: You can not set the sector more than 180 degrees.
   Note 2: You can not set the total width of sector 1 and sector 2 more than 270 degrees.
9. Press the **MENU/ESC** key to close the menu.

As shown in the following illustration, dashed lines mark the start and end points of the sector.