

6.5 How to Reduce the Rain Clutter

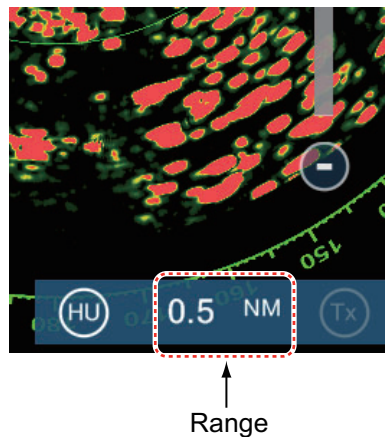
When your ship is in or near rain or snow, the reflections from rain or snow appear on the screen. These reflections have the name “rain clutter”. When the rain clutter is strong, targets in or near the rain clutter are hidden in the clutter. Reflections from the rain clutter are easily identified from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

The rain control breaks the continuous display of rain or snow reflections into a random pattern. The rain control also helps to reduce the target clutter in good weather in busy harbors. When the rain clutter hides targets, adjust the rain control (automatic or manual) to reduce the clutter. After the rain clutter is gone, turn off the rain control to prevent the loss of targets.

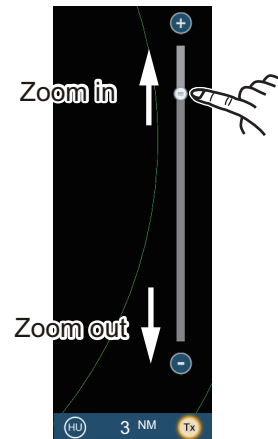
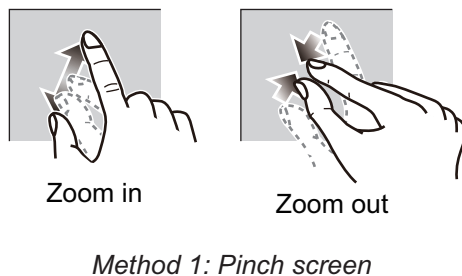
Like with gain, rain clutter can be adjusted from the pop-up menu or data area. See the procedures in section 6.3.

6.6 Range Scale

The range setting controls the size of the area (in nautical miles, kilometers or statute miles) that appears on your screen. The range appears at the bottom right-hand corner of the screen.



How to zoom in or out the range scale



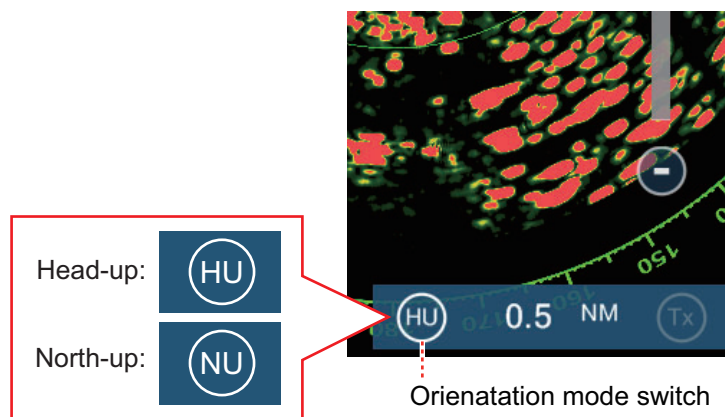
Method 2: Drag slider

6.7 Orientation Mode

The orientation mode controls the relationship between your ship and all the other targets.

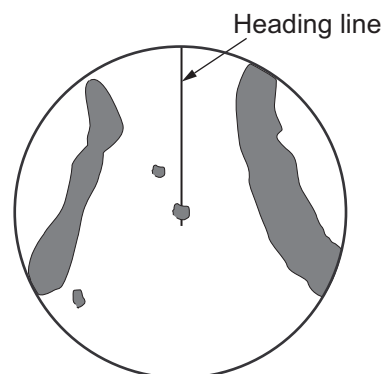
The heading data is required in the north-up mode. When the heading data is lost, the orientation mode automatically goes to head-up. Restore the compass signal to show the heading indication. Select the orientation mode again if necessary.

To select an orientation mode, tap the orientation mode icon [HU] (or [NU], whichever is shown) icon at the bottom right corner of the screen to show [HU] (Head-up) or [NU] (North-up) as required.



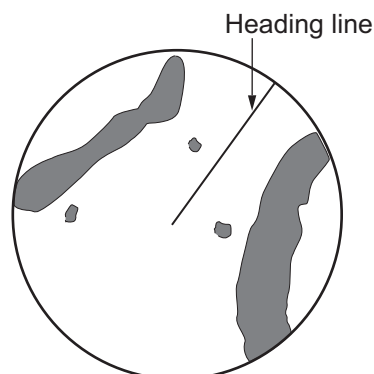
Head-up

A display without azimuth stabilization in which the line that connects the center with the top of the screen indicates your heading. Targets are shown at their measured distances and in their directions relative to your heading.



North-up

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.



6.8 How to Measure the Range and Bearing from Your Ship to a Target

You can measure the range or bearing to a target by the following four methods.

	Range measurement	Bearing measurement
Fixed range rings	Yes	No
Ruler	Yes	Yes
VRM (Variable Range Marker)	Yes	No
EBL (Electronic Bearing Line)	No	Yes

6.8.1 How to display the range rings

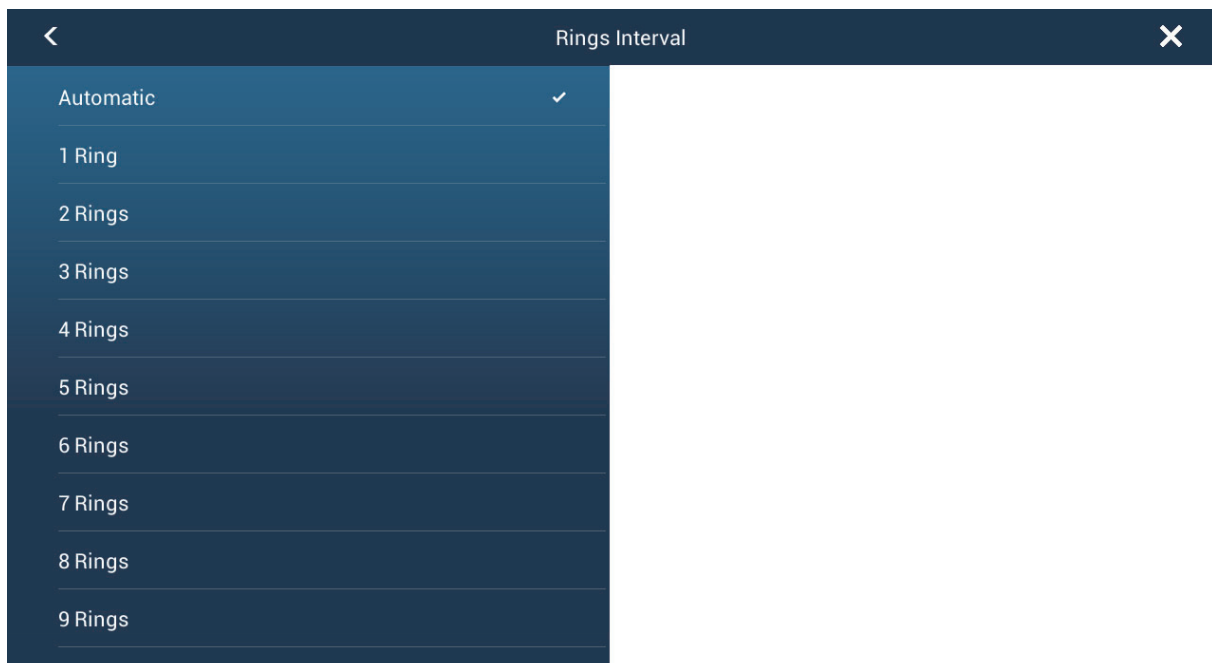
The range rings are the concentric solid circles about your ship. Use the fixed range rings to get a rough estimate of the range to a target.

To show or hide the range rings, open the [Layers] menu then turn [Radar Rings] on or off as required.

To measure the range with the range rings, count the number of rings between the center of the screen and the target. Check the range ring interval and estimate the distance of the echo from the inner edge of the nearest ring.

6.8.2 How to set the number of the range rings to show

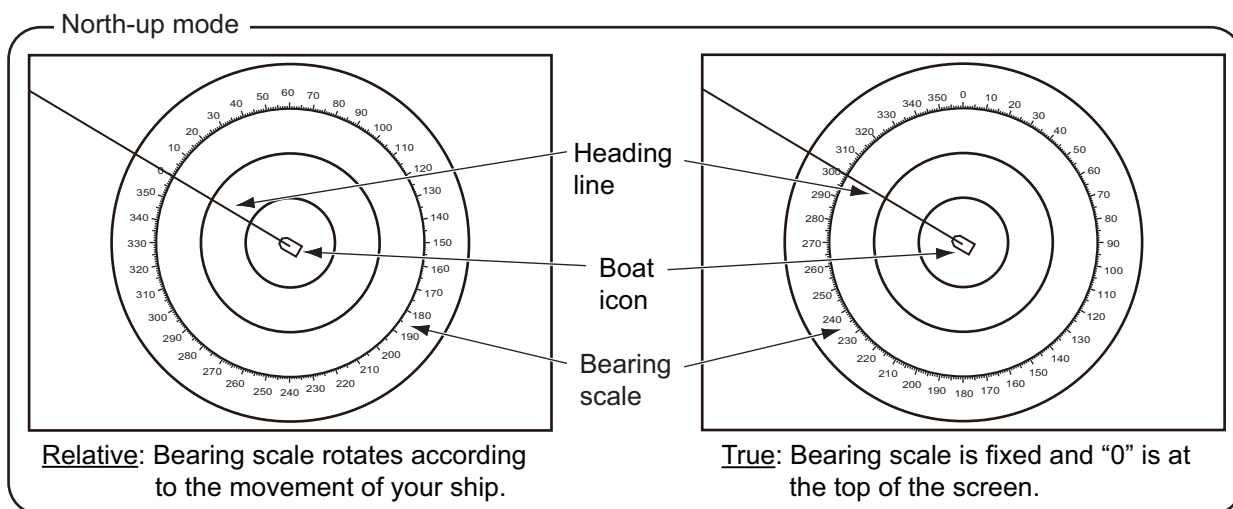
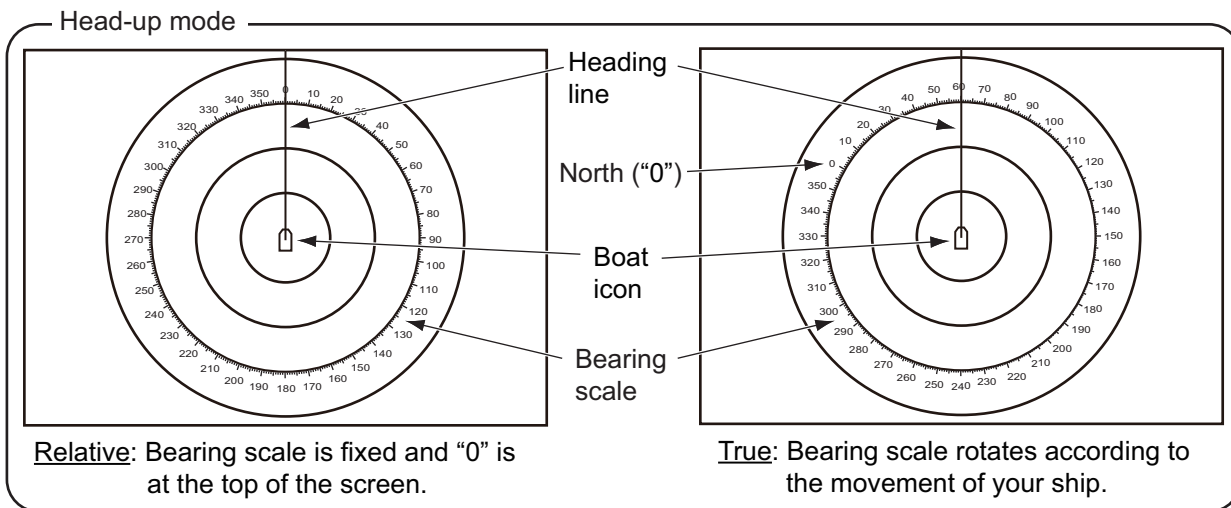
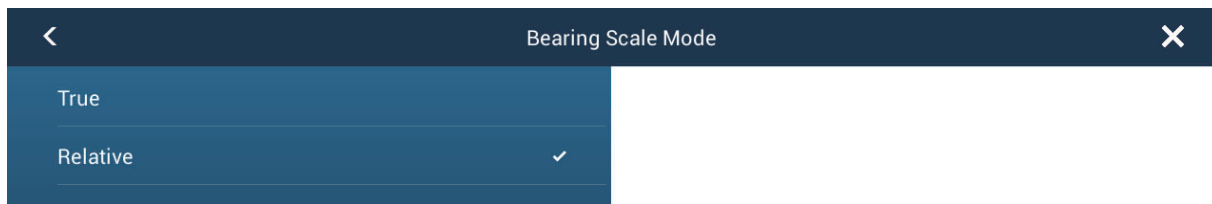
1. Open the home screen, then tap [Settings] - [Radar].
2. Tap [Rings Interval].



3. Tap a number. [Automatic] automatically selects the number of rings according to the range scale.
4. Tap the close button to finish.

6.8.3 How to select the range rings mode

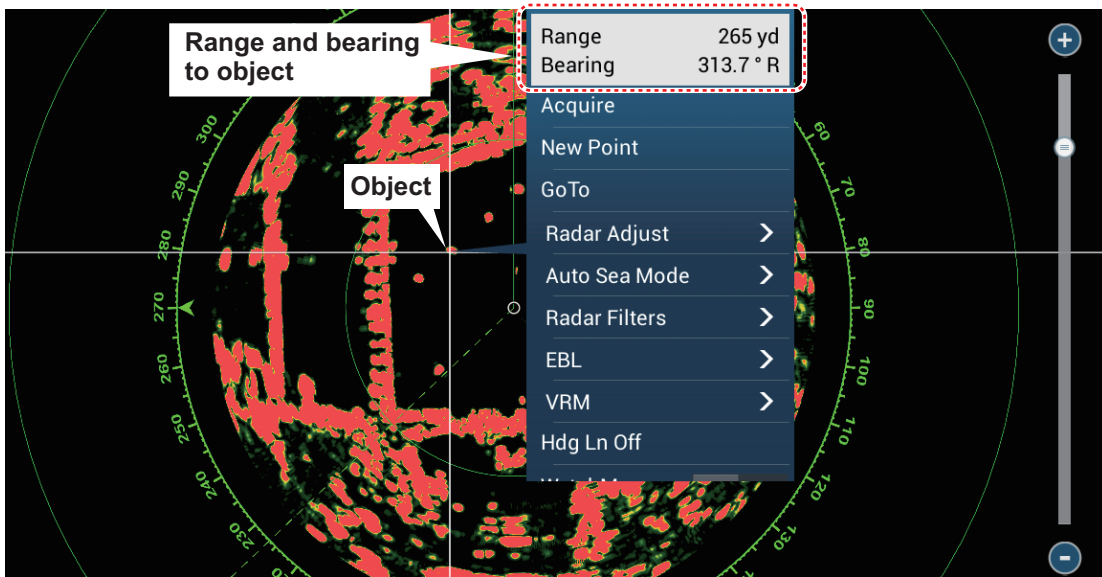
To select the range rings mode, open the home screen, then tap [Settings] - [Radar]. Set [Bearing Scale Mode] and [Relative] or [True].



6. RADAR

6.8.4 How to measure the range and bearing

Tap an object to get the range and bearing. Read the range and bearing in the box.



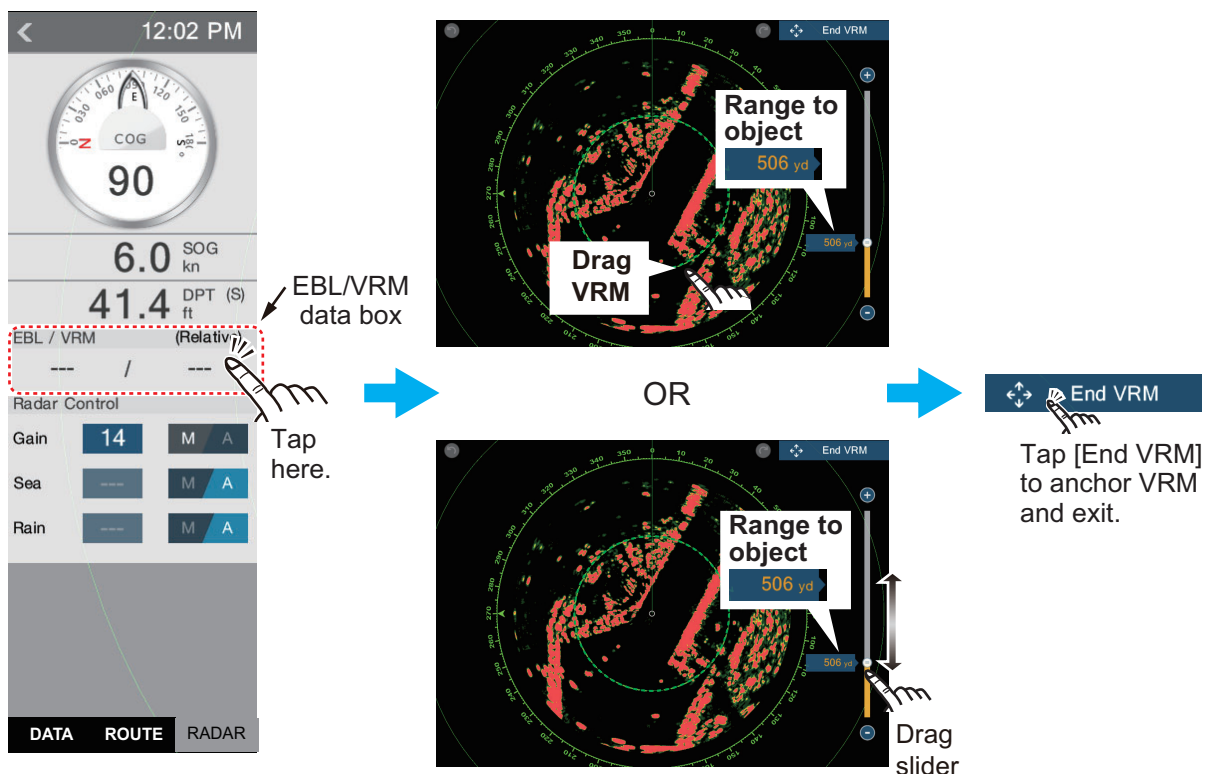
6.8.5 How to measure the range with the VRM

The VRM is a dashed ring so that you can identify the ring from the fixed range rings.

Method 1: From the data area

Open the data area. Tap the VRM indication in the [EBL/VRM] data box. Drag the VRM or slider to set the VRM. Tap [End VRM] to anchor the VRM and finish. The range to the VRM appears to the left of the slider bar and in the [EBL/VRM] data box.

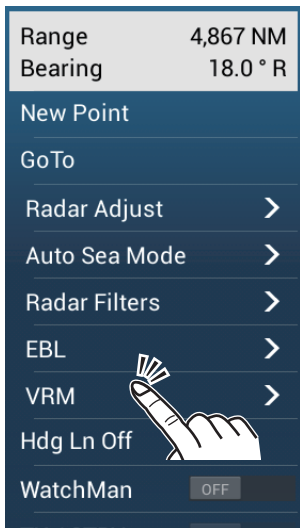
To clear the VRM, open the pop-up menu, the tap [EBL] and [Clear].



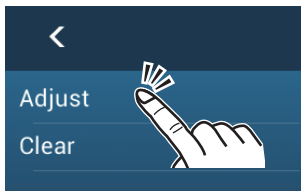
Method 2: From the pop-up menu

Tap the screen to show the pop-up menu, then tap [VRM]. Drag the VRM or slider to set the VRM. Tap [End VRM] to anchor the VRM and finish. The range to the VRM appears to the left of the slider bar.

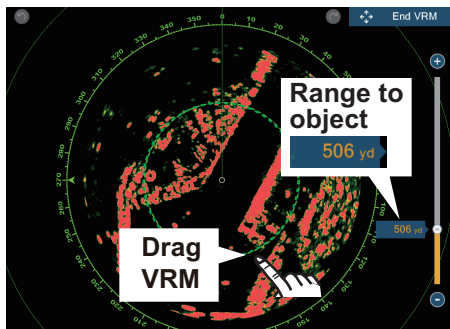
To clear the VRM, open the pop-up menu, the tap [VRM] and [Clear].



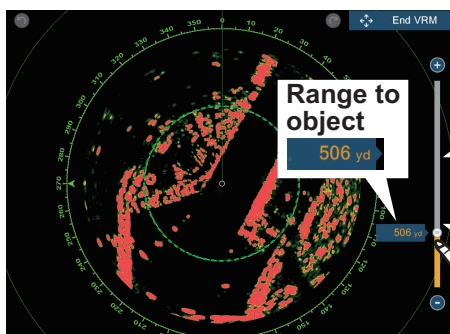
Tap screen to show pop-up menu.
Tap [VRM].



Tap [Adjust].



OR



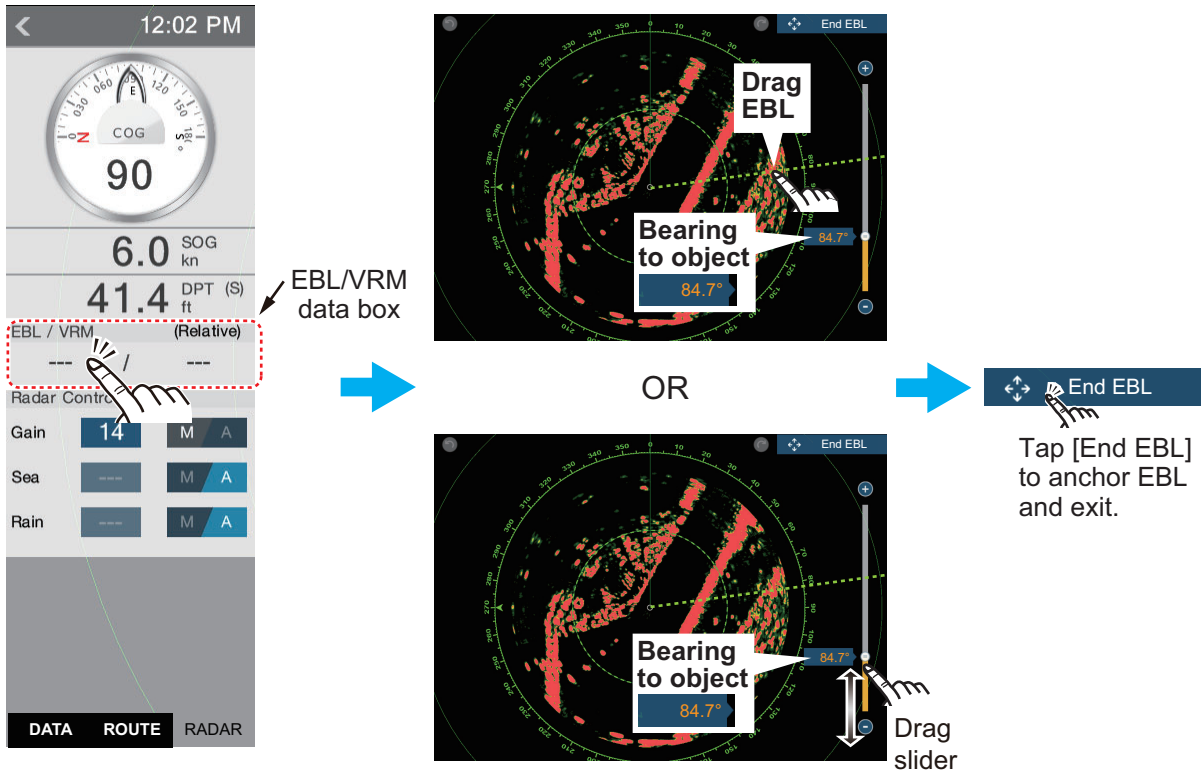
Tap [End VRM] to anchor VRM and exit.

6.8.6 How to measure the bearing with the EBL

Method 1: From the data area

Open the data area. Tap the EBL indication in the [EBL/VRM] data box. Drag the EBL or slider to set the EBL. Tap [End EBL] to anchor the EBL and finish. The range to the VRM appears to the left of the slider bar and in the [EBL/VRM] data box.

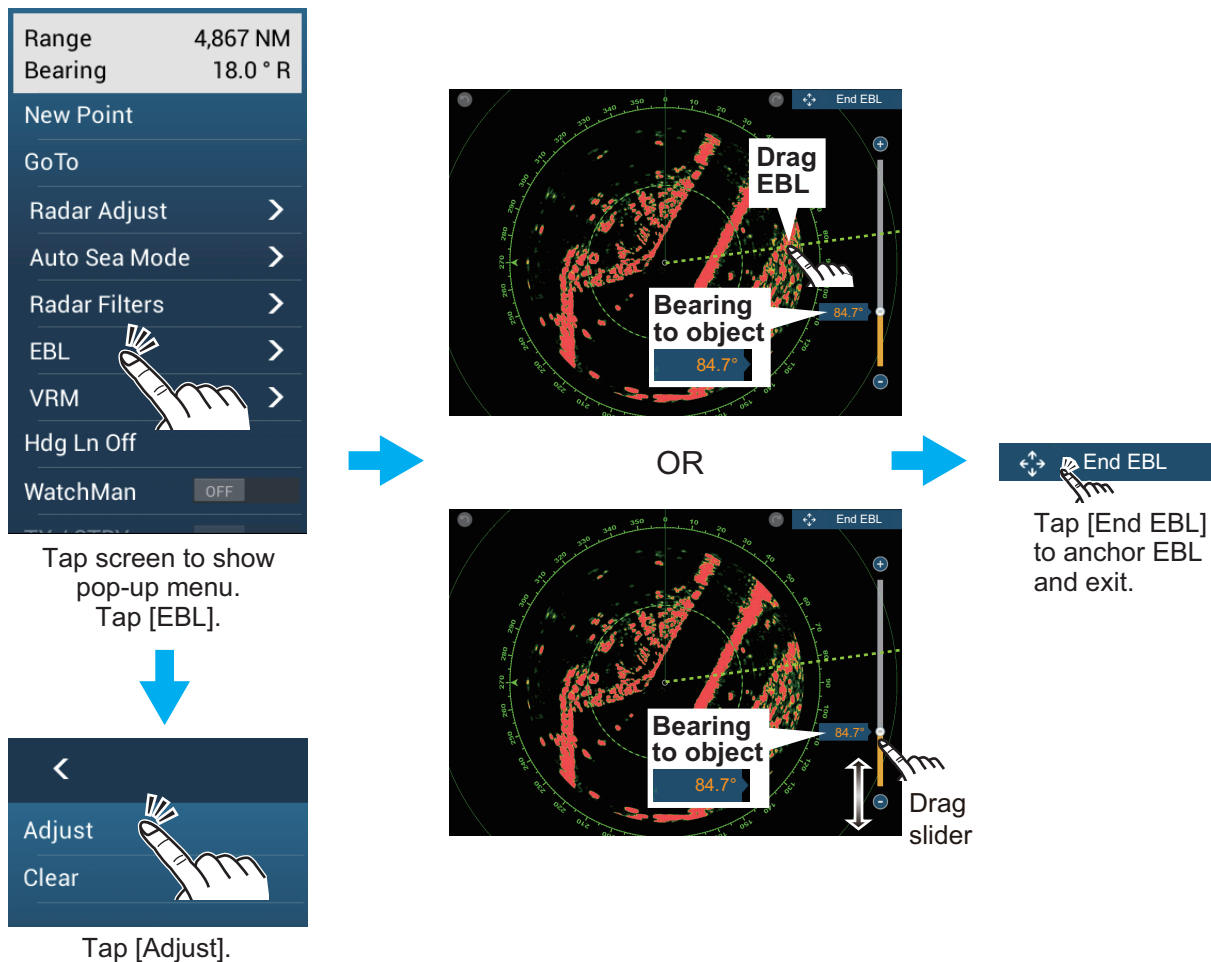
To clear the EBL, open the pop-up menu, then tap [EBL] and [Clear].



Method 2: From the pop-up menu

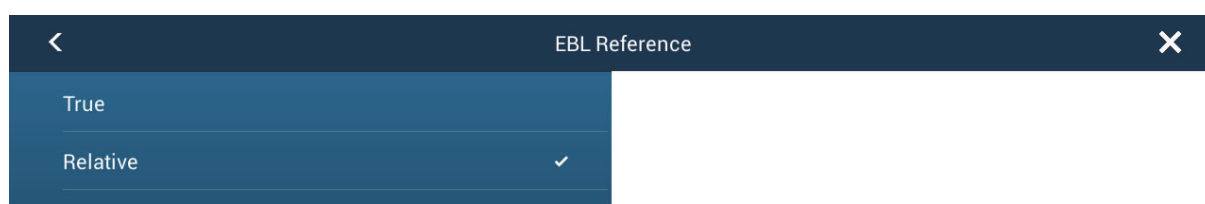
Tap the screen to show the pop-up menu, then tap [EBL]. Drag the EBL or slider to set the EBL. Tap [End EBL] to anchor the EBL and finish. The range to the EBL appears to the left of the slider bar.

To clear the EBL, open the pop-up menu, then tap [EBL] and [Clear].

**6.8.7 How to select the EBL reference**

You can select the EBL reference from [True] or [Relative]. [True] means the bearing is in reference to the north. [Relative] means the bearing is relative to the heading of your ship. True bearing requires a heading sensor.

1. Open the home screen, then tap [Settings] - [Radar].
2. Tap [EBL Reference].

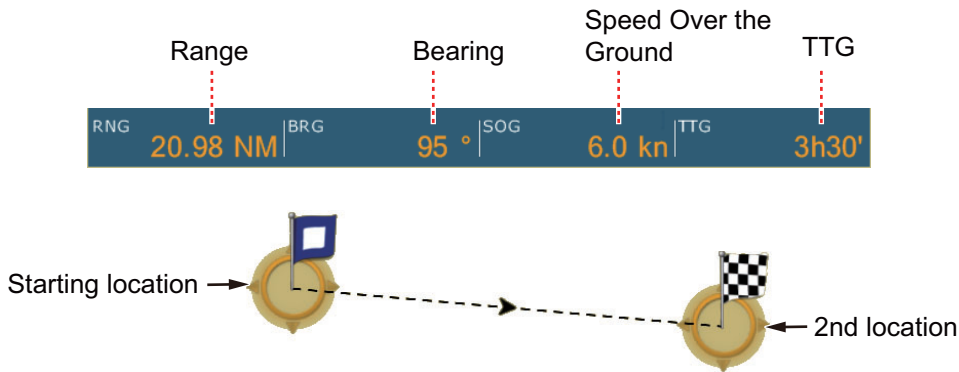


3. Tap [True] or [Relative].
4. Tap the close button to finish.

6.9 How to Measure the Range and Bearing Between Two Targets

You can measure the range and bearing between any two targets with the ruler.

1. Open the slide-out menu then tap [Distance] to display the ruler, which has two drag-gable circles connected with a line.
2. Drag the circles to set them on the objects for the measurement. The range and bearing between the objects, SOG and TTG appear at the top of the screen.

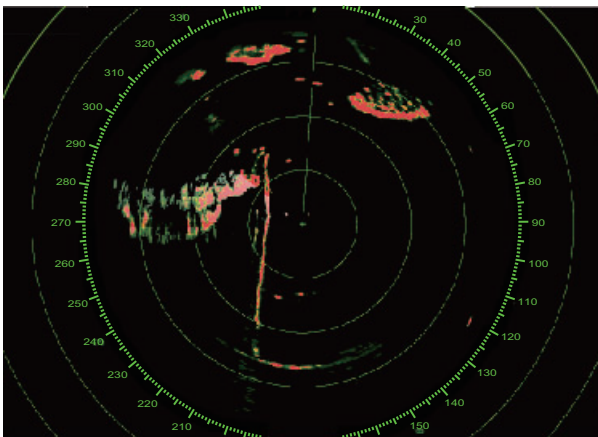


3. Tap [Cancel Ruler] at the top right-hand corner of the screen to erase the ruler and the indication.

6.10 How to Off-center the Picture

You can off-center your position to expand the view field without selecting a larger range scale. The position can be off-centered in the bow, stern, port or starboard direction, but not more than 75% of the range in use.

Pan the radar display by dragging with a finger. To return your ship to the center of the screen, tap [Center Radar] at the top right-hand corner of the screen.



Normal picture



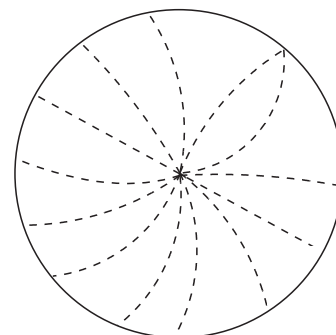
Picture off-centered in stern direction

6.11 Heading Line

The heading line indicates your heading in all orientation modes. This line connects between your position to the outer edge of the radar display. The line is at zero degrees on the bearing scale in the head-up mode. The orientation of the line changes in the north-up mode with the movement of your ship. If it is hard to identify the echoes on the heading line, you can hide the heading line and range rings for a few seconds. Open the pop-up menu then tap [Hdg Ln Off] to show or hide the heading line.

6.12 How to Reduce Radar Interference

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 in 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 screen. You can identify the interference from the normal echoes, because the interference does not appear in the same location at the next rotation of the antenna.



Turn off the interference rejector when there is no interference to prevent the loss of weak targets.

1. Tap the screen then tap [Radar Filters].
2. Turn [Int Reject] on or off as required.

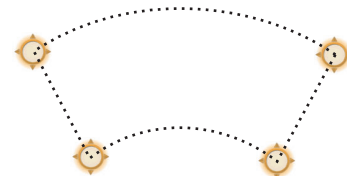
6.13 Guard Zone

The guard zone provides aural and visual alarms against targets (ships, islands, landmasses, etc.) that enter the area you set.

6.13.1 How to set the guard zone

Note: You can not set the guard zone with the MCU-002. Use the touch operation to set the guard zone.

1. Open the [Layers] menu.
2. Turn on [Guard Zone 1] or [Guard Zone 2] as required. A guard zone appears with a circle at each of its four corners.



3. Drag the circles to set the guard zone.

Note: To set a 360-degree guard zone, set the same bearing for all four circles.
4. Tap [Done] at the top right-hand corner of the screen to complete the guard zone and erase the circles.

If you need to readjust a guard zone, tap on a line of the guard zone to show the pop-up menu then tap [Resize]. Drag the circles to adjust the guard zone. Tap [Done] at top right corner to finish.

6.13.2 How to activate or deactivate the guard zone

1. Tap on a line of the guard zone to show the pop-up menu.
2. Turn [Alarm] on or off as required. The alarm is active when the guard zone lines are solid and the lines are dashed when the alarm is deactivated.

When a target enters an active zone, the aural alarm sounds (if active), the target flashes, and the message "TARGET ALARM" flashes in the status bar. Tap the status bar to silence the aural alarm and stop the flashing message. The message remains in the status bar and the target continues to flash until the target leaves the guard zone or the alarm is deactivated.

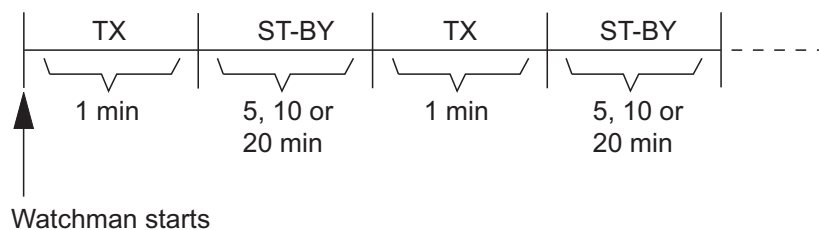
You can mute the audio alarm by turning off [Alarm Sound] in the [Settings] - [Alarm] menu. (see paragraph 2.11.6).

6.13.3 How to hide the guard zone

Open the [Layers] menu and turn [Guard Zone 1] or [Guard Zone 2] off as required. The guard zone is erased from the screen.

6.14 Watchman

The watchman feature transmits the radar for one minute at a specified time interval (5, 10 or 20 minutes) to monitor the guard zone. If a target is found in the guard zone, the watchman is canceled and the radar continues to transmit. This feature helps you watch for targets in the area you set when you do not continuously require the radar.



1. Set a guard zone. See section 6.13. (Watchman does not operate unless a guard zone is active. Set Watchman when the radar is in transmit state.)
2. Open the home screen, then tap [Settings] - [Radar].
3. Tap [Watchman].

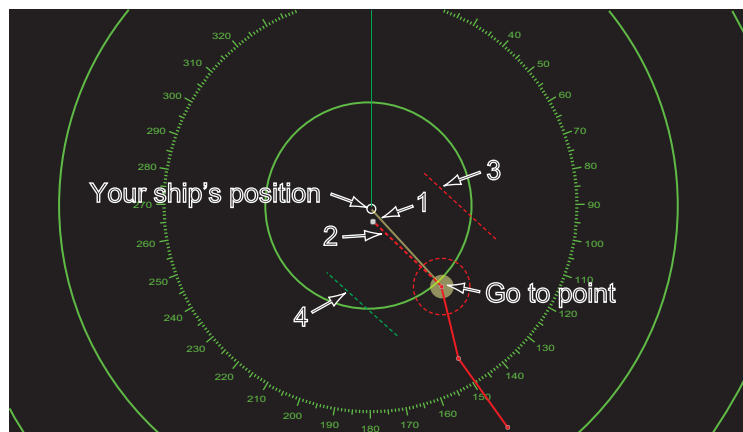


4. Tap a watchman rest interval.
5. Tap the close button to finish.
6. On the radar display, tap the screen to show the pop-up menu. Turn [Watchman] on to activate the watchman function.

6.15 How to Show, Hide or Cancel an Active Route

You can show, hide the active route on the radar display. Open the [Layers] menu then turn [Routes] on or off as required.

To cancel route navigation, tap any part of the route then tap [Stop Nav] on the pop-up menu.



6.16 How to Show or Hide the Own Ship Icon

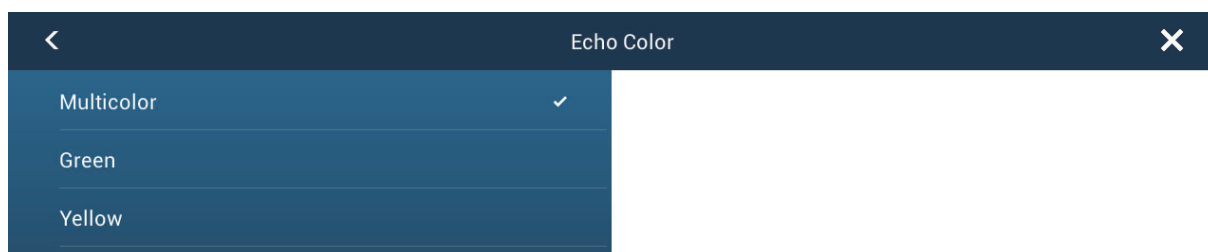
You can show or hide the boat icon on the radar display.

1. Open the home screen, then tap [Settings] - [Radar].
2. Turn [Own Ship Icon] on or off as required.
3. Tap the close button to finish.

6.17 Echo Color

Echo color is available in colors of green, yellow or multicolor.

1. Open the home screen, then tap [Settings] - [Radar].
2. Tap [Echo Color].

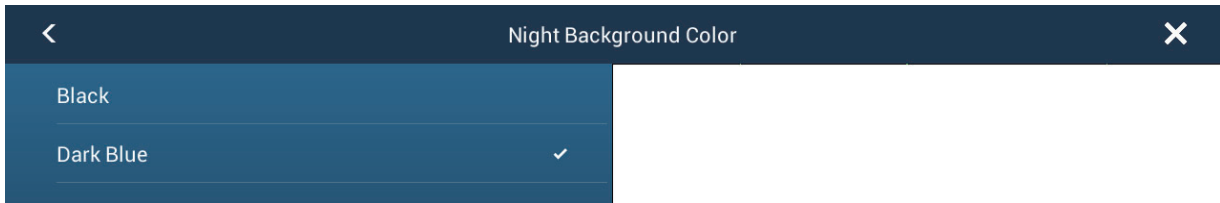
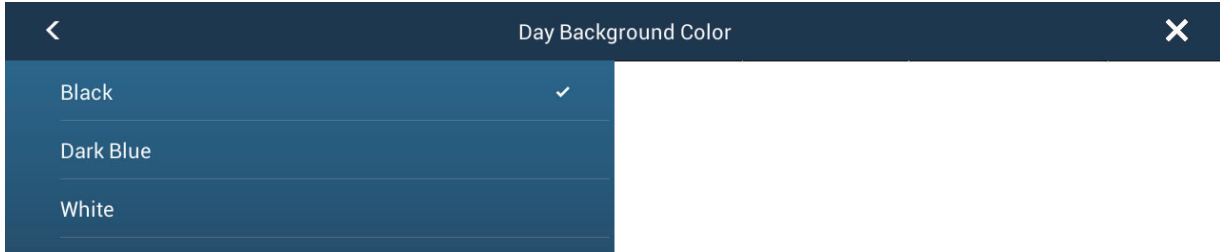


3. Tap a color.
4. Tap the close button to finish.

6.18 Background Color

You can select the background color for daytime and nighttime operations.

1. Open the home screen, then tap [Settings] - [Radar].
2. Tap [Day Background Color] or [Night Background Color] menu.



3. Tap a color.
4. Tap the close button to finish.

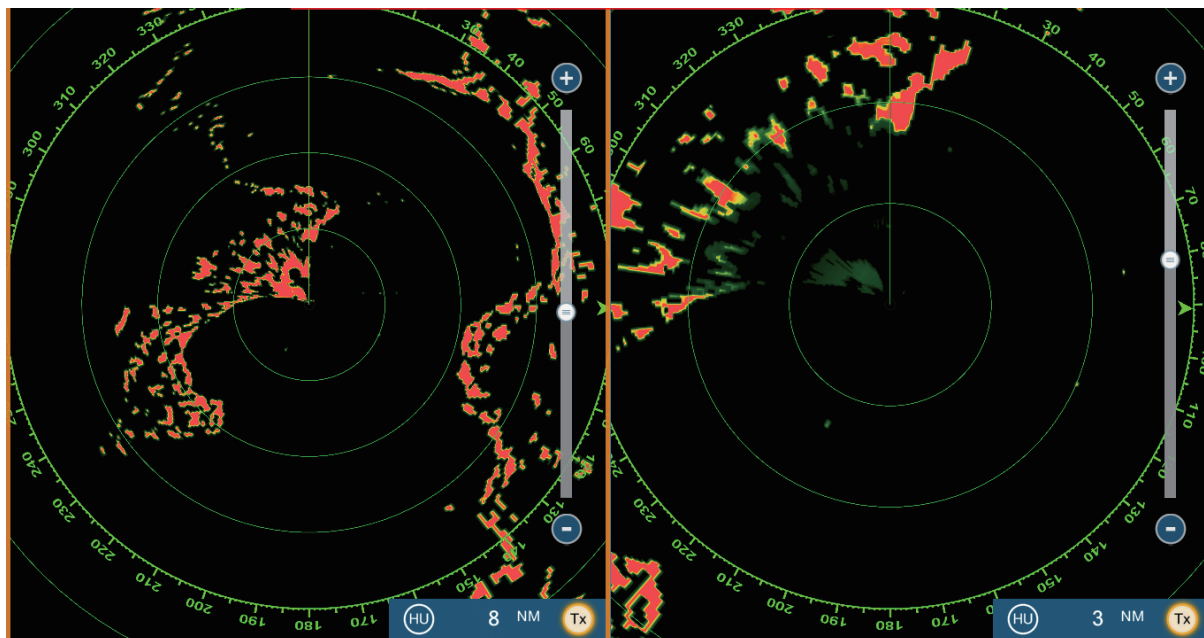
6.19 Radar Overlay Range Link

The radar overlay range link automatically keeps the display range and radar range in sync. This feature helps you understand the relation between the radar and the chart. You can activate or deactivate this feature from the plotter display. See paragraph 3.2.3.[]

Note: The radar picture can look “out of focus” on long ranges when the range link is active. This out of focus appearance does not indicate a problem, because it is a characteristic of the digital zoom.

6.20 Dual-Range Display

The dual-range display scans and displays two different radar ranges at the same time, with a single antenna. There is no time delay between the two pictures and you have separate control of each picture. This feature lets you keep a close watch on close-range targets while watching distant targets.



Long range display

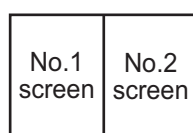
Short range display

To get the dual-range display, set dual-range displays on the home screen. See paragraph 1.7.1 for the procedure. You can put the dual-range displays in the two-way and three-way split screens.

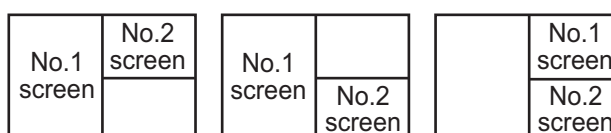
The radar functions that are adjusted separately are as follows:

- Active route (show or hide)
- Rain (rain clutter)
- Heading line and rings (hide temporarily)
- Range
- Orientation mode (head-up or north-up)
- Auto sea mode ([Advanced] or [Coastal])
- Transmission* (Can not set stand-by mode separately)
- Gain
- Sea (sea clutter)
- AIS/DSC (show or hide)
- Range rings (show or hide)
- Trail (clear to restart)
- Interference rejector

*: The no.1 screen is independent of the no.2 screen when the no.2 screen is in stand-by. However, when the no.2 screen goes to transmit state, so does the no.1 screen.



Two-way split



Three-way split

6.21 Radar Menu

This section provides the descriptions for the radar menu items not mentioned earlier.

Radar Initial Setup

[Antenna Rotation]: Starts or stop antenna rotation. For the serviceman. See the installation manual.

[Antenna Heading Align]: Compensates for error in positioning of the antenna unit at installation. See the installation manual for the adjustment procedure.

[Main Bang Suppression]: Reduces main bang, the clutter appearing at the screen center. See the installation manual for the adjustment procedure.

[Enable Sector Blanking]: Sets the area(s) where to prevent transmission. For example, set the area where an interfering object at the rear of the antenna would produce a dead sector (area where no echoes appear) on the display. See the installation manual for the procedure.

[Antenna Position] items ([Longitudinal (from bow)], [Lateral (-Port)]): Set the position of the radar antenna in relation to the bow and port.

Other items

[Antenna Height]: Set the height of the radar antenna above the waterline.

[Auto Tuning]: Activate or deactivate auto tuning.

[Tuning Source]: Selects the radar range for the adjustment, [Range 1] (long range), [Range 2] ((short range).

[Manual Tuning]: Manually tune.

[Radar Monitoring]: Show various voltage levels, and ARPA data. For the serviceman.

[ARPA Advanced Settings]: Sets ARPA parameters. For the installer, serviceman. Do not change the settings.

[Set Hardware to Factory Default]: For the serviceman. No use for the user.

[Reset Default Settings]: Restore default settings for items other than those in the [RADAR INITIAL SETUP] section.

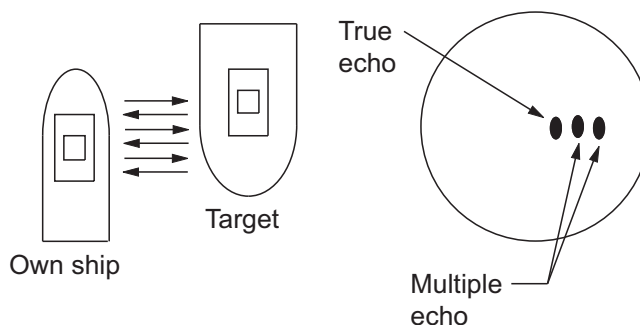
6.22 How to Interpret the Radar Display

6.22.1 False echoes

Echo signals can appear on the screen at positions where there is no target or disappear where there are targets. You can identify false targets when you understand why the false echoes appear. A description of false echoes follows.

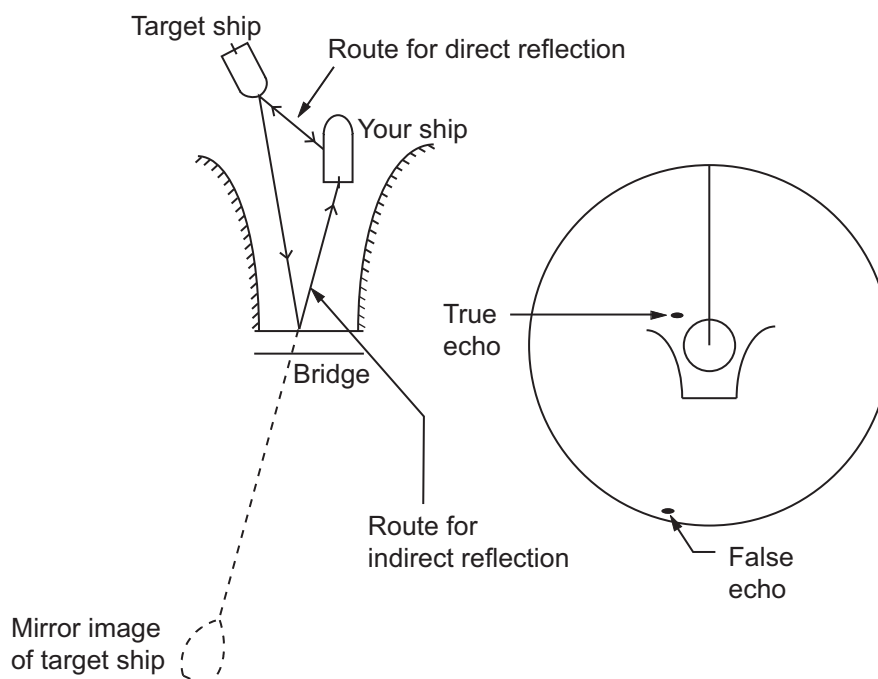
Multiple echoes

Multiple echoes occur when a transmitted pulse returns from a solid object like a large ship, bridge, or breakwater. A second, a third or more echoes can be seen on the screen at two, three or more times the true range of the target as shown below. You can reduce and sometimes remove these multiple echoes if you decrease the gain, or correctly adjust the sea clutter.



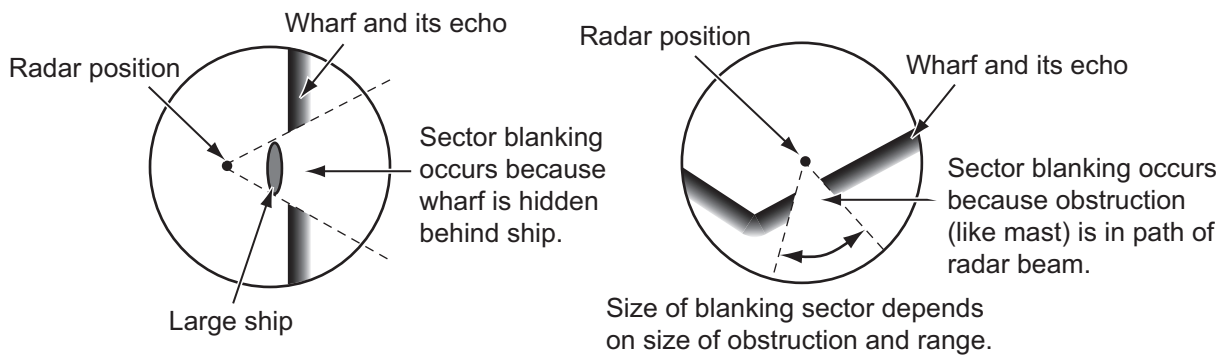
Virtual image

A large target near your ship can show at two positions on the screen. One of the positions is the true echo reflected by the target. The other position is a false echo which is caused by the “mirror effect” of a large object on or near your ship. See the figure shown below for an example of this type of false echo. If your ship gets near a large metal bridge, for example, a false echo appears on the screen. The echo disappears after move some distance from the bridge.



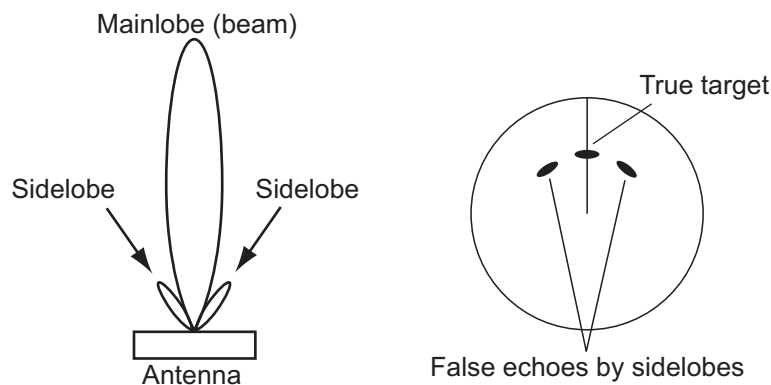
Sector blanking

Funnels, stacks, masts, or derricks in the path of the antenna stop the radar beam. If the angle opposite the antenna is more than one or two degrees, a sector or shadow sector appears on the screen. Targets are not displayed within the sector.



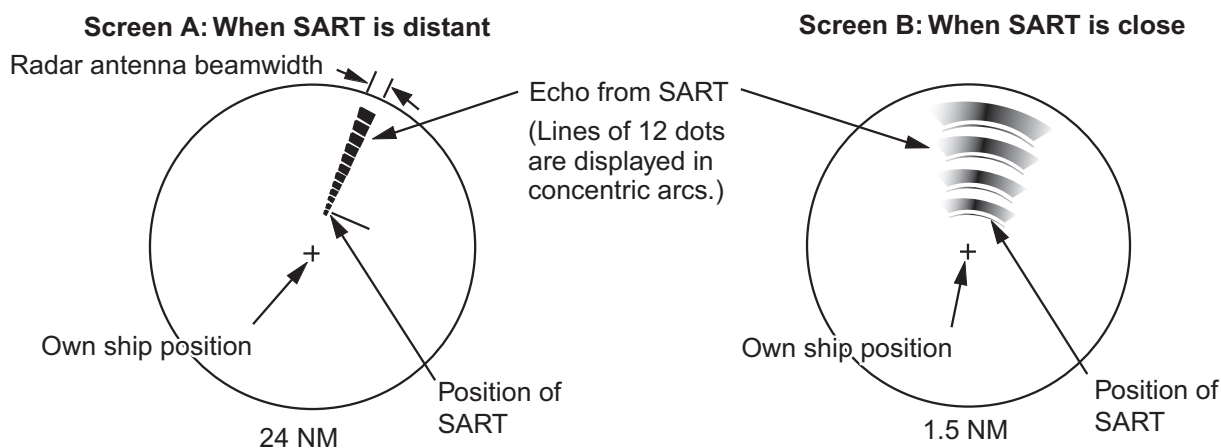
Sidelobe echoes

Each time the radar transmits, some radiation leaves on each side of the beam. This lost energy has the name "sidelobes." If a target is detected by both the sidelobes and the mainlobe, the sidelobe echoes can appear at both sides of the true echo at the same range. Sidelobes normally show only on short ranges and from strong targets. You can reduce sidelobes if you reduce the gain, or correctly adjust the sea clutter.



6.22.2 Search and rescue transponder (SART)

A ship in distress uses a radar-SART to show a series of dots on the radar display of nearby ships to indicate distress. A SART transmits when it receives a radar pulse from any X-Band (3 cm) radar within a range of approximately 8 nm. When a SART receives a radar pulse, the SART transmits a response across all the radar frequency band.



How to detect the SART response

- Use the range scale of 6 or 12 NM. The distance between the SART responses is approximately 0.6 NM (1125 m) to identify the SART.
- Turn off all the automatic clutter filters.
- Turn off the interference rejector.

6.22.3 Racon (Radar Beacon)

A racon is a radar transponder that sends a characteristic signal when the racon receives a radar pulse (normally only the three-centimeter band). If the racon signal is sent on the same frequency as that of the radar, the signal appears on the radar display. The racon signal appears on the radar in one of two methods:


- A line that starts just after the position of the Racon
- A Morse code signal displayed with a line just after the position of the Racon




6.23 ARPA Operation

The ARPA (Automatic Radar Plotting Aid) shows the movement of a maximum of 30 radar targets. The targets can be acquired manually or automatically. All 30 targets can be acquired manually when the ARPA acquisition area is not active. If the ARPA acquisition area is active, that total is equally divided between manual and auto acquisition.

ARPA requires speed and heading data.

 WARNING
<p>No one navigational aid should be relied upon for the safety of vessel and crew. The navigator has the responsibility to check all aids available to confirm position. Electronic aids are not a substitute for basic navigational principles and common sense.</p> <ul style="list-style-type: none"> · This auto plotter automatically tracks an automatically or manually acquired radar target and calculates its course and speed, indicating them by a vector. Since the data generated by the auto plotter are based on what radar targets are selected, the radar must always be optimally tuned for use with the auto plotter, to ensure required targets will not be lost or unwanted targets such as sea returns and noise will not be acquired and tracked. · A target does not always mean a landmass, reef, ships or other surface vessels but can imply returns from sea surface and clutter. As the level of clutter changes with environment, the operator should properly adjust the Sea, Rain and Gain to be sure target echoes are not eliminated from the radar screen.

 CAUTION
<p>The plotting accuracy and response of this auto plotter meets IMO standards. Tracking accuracy is affected by the following:</p> <ul style="list-style-type: none"> · Tracking accuracy is affected by course change. One to two minutes is required to restore vectors to full accuracy after an abrupt course change. (The actual amount depends on gyrocompass specifications.) · The amount of tracking delay is inversely proportional to the relative speed of the target. Delay ranges from 15 - 30 seconds for high relative speed; 30 - 60 seconds for low relative speed.
<p>Display accuracy is affected by the following:</p> <ul style="list-style-type: none"> · Echo intensity · Radar transmission pulsewidth · Radar bearing error · Gyrocompass error · Course change (your ship or target)

6.23.1 How to show or hide the ARPA display

1. Open the [Layers] menu.
2. Turn [ARPA Targets] on or off as required.