

1.19 How to Adjust Sensitivity

The gain control adjusts the sensitivity of the receiver.

The proper setting is such that the background noise is just visible on the screen. If you set up for too little sensitivity, weak echoes may be missed. On the other hand excessive sensitivity yields too much background noise; strong targets may be missed because of the poor contrast between desired echoes and the background noise on the display.

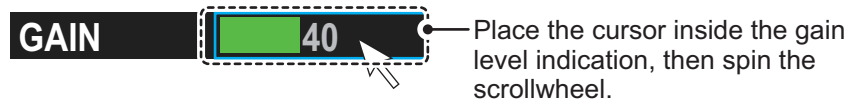
To adjust receiver sensitivity, adjust the gain control so background noise is just visible on the screen.

How to adjust the GAIN from the control unit (RCU-014)

Rotate the **GAIN** knob. Rotate anticlockwise to decrease the gain, or clockwise to increase the gain.

How to adjust the GAIN from the on-screen box

1. Place the cursor in the [GAIN] box at the top of the screen.



2. Spin the scrollwheel to adjust the gain. The setting range is [0] to [100].

1.20 How to Reduce Sea Clutter

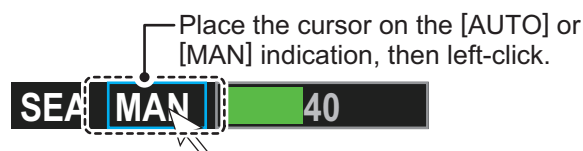
Echoes from waves cover the central part of the display with random signals known as sea clutter. The higher the waves, and the higher the antenna above the water, the further the clutter extends. When sea clutter masks the picture, reduce it with the A/C SEA control, either manually or automatically.

Note 1: When both sea clutter and rain clutter are reduced, the sensitivity is decreased more than when only one is changed. For that reason adjust them carefully.

Note 2: The echo average function (see section 1.24) is useful for reducing reflections from the sea surface. However, high-speed targets are harder to detect than stationary ones when echo average is active.

1.20.1 How to select the method of clutter adjustment

1. Place the cursor in the [SEA AUTO] or [SEA MAN] (whichever is shown) level indication at the top of the display.



2. Left-click to display [SEA AUTO] or [SEA MAN] as appropriate.

1.20.2 How to fine-tune sea clutter reduction

Auto A/C SEA allows for fine tuning of the A/C SEA circuit, within ± 20 dB. Accordingly, with the bar reading set to 50, gain is not lowered to minimum as with manual A/C SEA on close-in ranges. Further, the auto A/C SEA level is low because the average value of the original input echo is low in areas where there are no sea surface reflections. For example, when the ship is alongside a quay and the radar picture shows echoes from both land and sea, you can observe the size of the echoes because the STC curve changes with the size of the echoes.

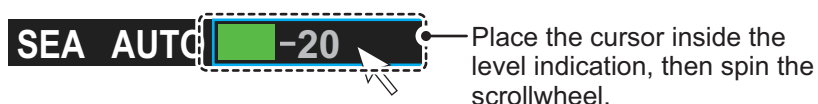
Note: The auto A/C function can erase weak target echoes. Adjust the control carefully, watching the display.

How to fine-tune sea clutter reduction from the control unit (RCU-014)

Rotate the **AC/SEA** knob. Rotate anticlockwise to decrease the AC/SEA, or clockwise to increase the A/C SEA.

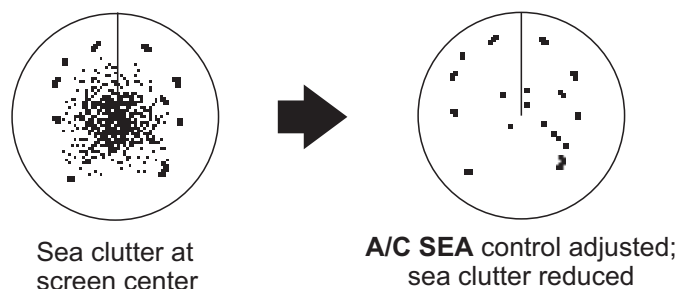
How to fine-tune sea clutter reduction from the on-screen box

1. Select [SEA AUTO], following the procedure in section 1.20.1.
2. Place the arrow on level indicator inside the A/C SEA box at the top of the display.



3. While observing the A/C SEA level indicator, spin the scrollwheel to adjust the clutter reduction. The setting range is [-50] to [50].

1.20.3 How to manually reduce sea clutter



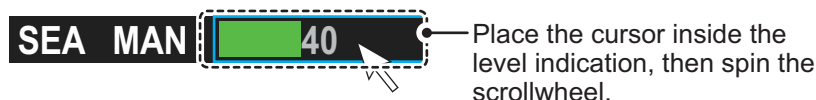
Note: The proper setting of the A/C SEA should be such that the clutter is broken up into small dots, and small targets become distinguishable. If the setting is set too low, targets will be hidden in the clutter, while if the setting is too high, both sea clutter and targets will disappear from the display. In most cases adjust the control until clutter has disappeared to leeward, but a little is still visible windward. Be careful not to remove all sea clutter, because you may erase weak echoes. Further, the possibility of losing weak echoes is greater when you use both A/C SEA and A/C RAIN to reduce clutter.

How to reduce sea clutter manually from the control unit (RCU-014)

Rotate the **AC/SEA** knob. Rotate anticlockwise to decrease the AC/SEA, or clockwise to increase the A/C SEA.

How to reduce sea clutter manually from the on-screen box

1. Select [SEA MAN], following the procedure in section 1.20.1.
2. Place the cursor on the level indicator inside the A/C SEA box at the top of the display.



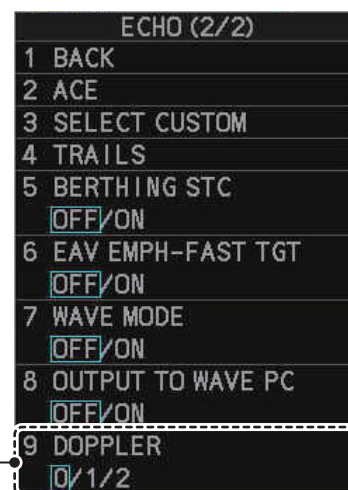
3. While observing the A/C SEA level indicator, spin the scrollwheel to adjust the clutter reduction. The setting range is [0] to [100].

1.20.4 How to use the BERTHING STC function

The [BERTHING STC] function allows you to show the main bang echo, even with the range set at 0.5 NM or less with AUTO SEA at maximum setting. This is particularly useful when attempting to berth, as it gives a clearer view of the berthing area and your ship's location.

To use the [BERTHING STC] function, follow the procedure below.

1. Open the menu.
2. Select [1 ECHO].
3. Select [0 NEXT]. The second page of the [ECHO] menu appears.
4. Select [5 BERTHING STC].
5. Select [ON] to activate, or [OFF] to deactivate, this function.
6. Close the menu.



Shown only for FAR-2228-NXT, FAR-2228-NXT-BB and FAR-2328-NXT.

1.21 How to Reduce Rain Clutter

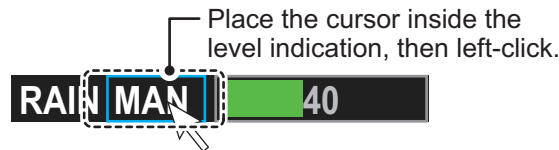
Use the AUTO RAIN and A/C RAIN to reduced rain clutter. AUTO RAIN reduces rain clutter in the picture and A/C RAIN reduces clutter picked up by the antenna.

Note 1: When both sea clutter and rain clutter are reduced, the sensitivity is decreased more than when only one is changed. For that reason adjust them carefully.

Note 2: The echo average function (see section 1.24) is useful for reducing reflections from the sea surface. However, high-speed targets are harder to detect than stationary ones when echo average is active.

1.21.1 How to select the method of rain clutter reduction

1. Place the cursor in the [RAIN AUTO] or [RAIN MAN] (whichever is shown) level indication at the top of the display.

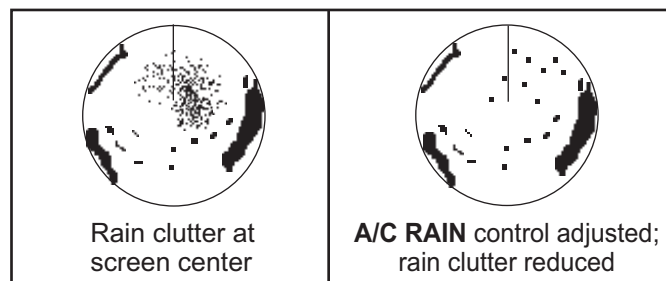


2. Left-click to display [RAIN AUTO] or [RAIN MAN] as appropriate.

Note: Unlike sea clutter reduction, rain clutter cannot be finely adjusted when set to [AUTO].

1.21.2 How to manually reduce the rain clutter

The vertical beam width of the antenna is designed to see surface targets even when the ship is rolling. However, by this design the unit will also detect rain clutter (rain, snow, or hail) in the same manner as normal targets.



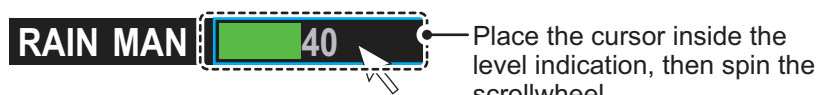
Note: The A/C RAIN control adjusts the receiver sensitivity as the A/C SEA control does but rather in a longer time period (longer range). The higher the setting the greater the anti-clutter effect. When echoes from precipitation mask solid targets, adjust the A/C RAIN control to split up these unwanted echoes into a speckled pattern, making recognition of solid targets easier. Be careful remove all rain clutter, because you can erase weak echoes. Further, the possibility of losing weak echoes is greater when you use both A/C RAIN and A/C SEA to reduce clutter.

How to fine-tune rain clutter reduction from the control unit (RCU-014)

Rotate the **A/C RAIN** knob. Rotate anticlockwise to decrease the A/C RAIN, or clockwise to increase the A/C RAIN.

How to fine-tune rain clutter reduction from the on-screen box

1. Select [RAIN MAN], following the procedure in section 1.21.1.
2. Place the cursor on the level indicator inside the A/C SEA box at the top of the display.

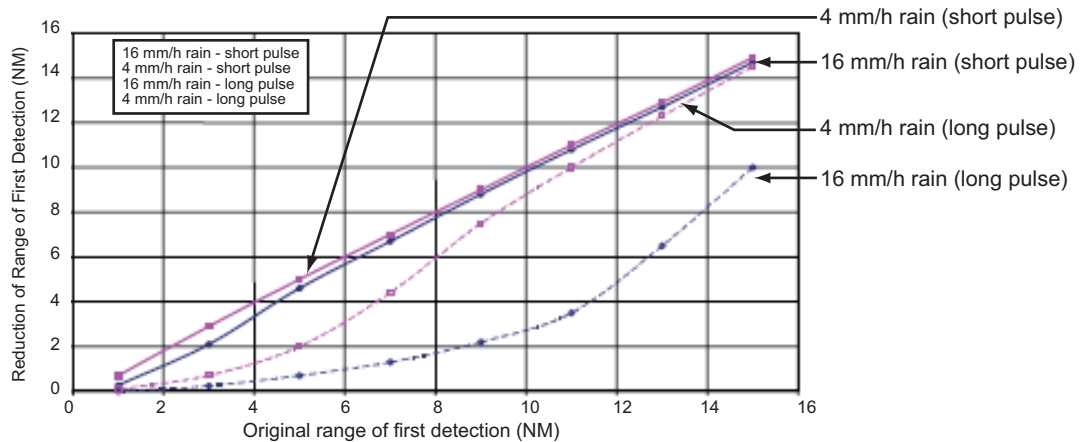


3. While observing the A/C RAIN level indicator, spin the scrollwheel to increase or decrease the level. 100 levels (0-100) are available.

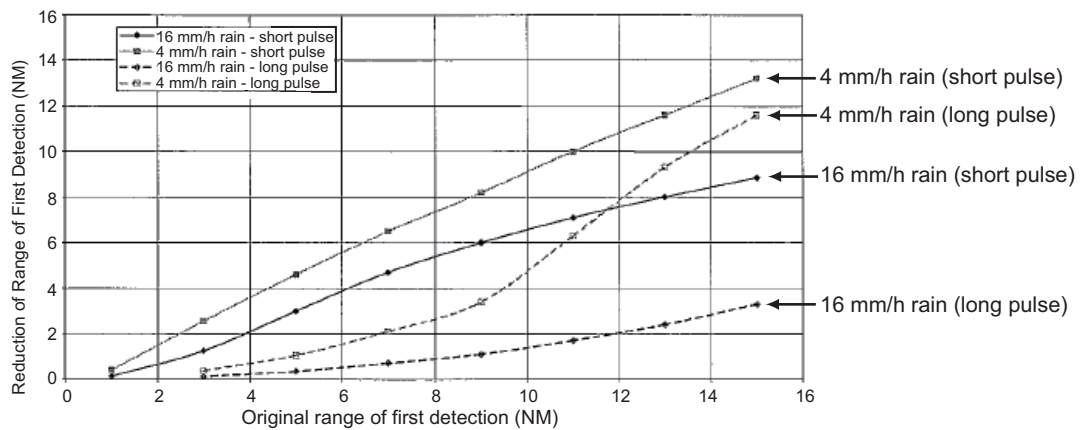
Note: The detection range is reduced when the RAIN is used to show targets in rain. Generally, the amount of rain, TX pulse length and TX frequency are factors in determining how the detection range is affected. The figure below illustrates this.

How to interpret the graph

Using the graph below as an example, a radar target originally detected on the 8 NM range can only be detected in rain at the ranges shown below:



Reduction of rain to first detection due to rain at S-band



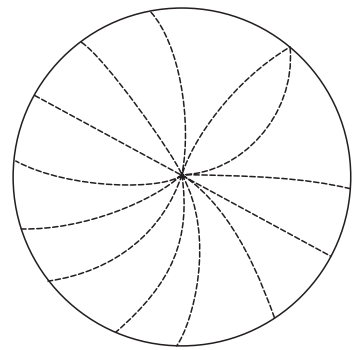
Reduction of rain to first detection due to rain at X-band

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Accordingly, the short pulse may be preferable in rain on ranges less than 10 NM.

1.22 Interference Rejector

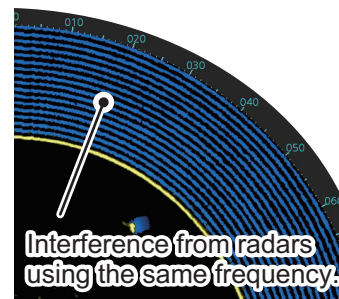
Mutual radar interference can occur in the vicinity of another shipborne radar operating in the same frequency band. It is seen on the screen as a number of bright spikes either in irregular patterns or in the form of usually curved spoke-like dotted lines extending from the center to the edge of the picture. Activating the interference rejector circuit can reduce this type of interference. The interference rejector is a kind of signal correlation circuit. It compares the received signals over successive transmissions and reduces randomly occurring signals. There are three levels of interference rejection depending on the number of transmissions that are correlated.



You can access this feature from the InstantAccess bar™, or from the menu. The available settings are: [OFF], [1], [2] or [3].

Note: When multiple radars using the same frequency are nearby, interference may appear in a similar manner to that shown in the figure to the right. If this kind of interference appears, do one of the following:

- Press the **HL OFF** key, or click the [HL OFF] button on the InstantAccess bar™.
- Change the range.



How to reject interference from the InstantAccess bar™

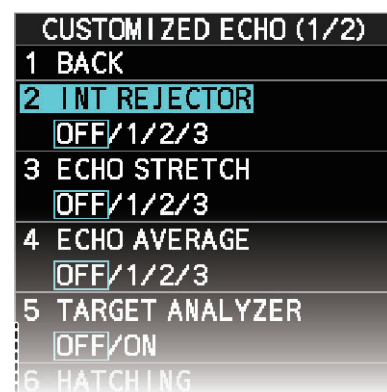
To adjust the interference rejector, select the [IR] button () on the InstantAccess bar™, then left-click to cycle through the rejection levels.

The available settings, in cyclic order, are: [OFF] → [1] → [2] → [3] → [OFF]...

Level [3] provides the highest level of rejection.

How to reject interference from the menu

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 [2 INT REJECTOR].
5. Select the required setting.
6. Close the menu.



1.23 Echo Stretch

The echo stretch feature enlarges targets in the range and bearing directions to make them easier to see, and it is available on any range. There are three types of echo stretch, 1, 2 and 3, and the higher the number the greater the amount of stretch.

Note: The echo stretch magnifies not only small target pips but also returns (clutter) from sea surface, rain and radar interference. For this reason, make sure these types of interference have been sufficiently reduced before activating the echo stretch.

You can access this feature from the InstantAccess bar™, or from the menu. The available options are: [OFF], [1], [2] or [3].

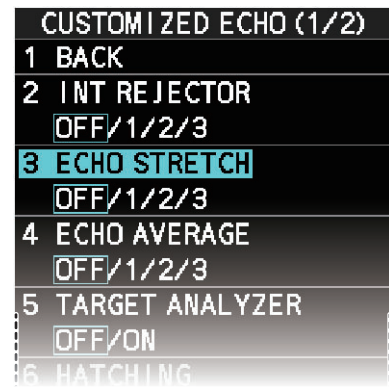
How to use echo stretch from the InstantAccess bar™

To set echo stretch, select the [ES] button () on the InstantAccess bar™, then left-click to cycle through the settings.

The available settings, in cyclic order, are: [OFF] → [1] → [2] → [3] → [OFF]...

How to use echo stretch from the menu

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 [3 ECHO STRETCH].
5. Select the required setting.
6. Close the menu.



1.24 Echo Averaging

The echo averaging feature effectively reduces sea clutter. Echoes received from stable targets such as ships appear on the screen at almost the same position every rotation of the antenna. On the other hand, unstable echoes such as sea clutter appear at random positions.

To distinguish real target echoes from sea clutter, echoes are averaged over successive picture frames. If an echo is solid and stable over successive frames, it is presented in its normal intensity. Sea clutter is averaged over successive scans and its brilliance reduced, making it easier to discriminate real targets from sea clutter.

Echo averaging uses a scan-to-scan signal correlation technique based on the true motion over the ground of each target. Thus, small stationary targets such as buoys will be shown while reducing random echoes such as sea clutter. However, true echo averaging is not effective for picking up small targets running at high speeds over the ground.

Note 1: With echo average active it is harder to detect high-speed targets than stationary ones.

Note 2: Do not use the echo averaging function under heavy pitching and rolling; loss of targets can result.

Note 3: Echo averaging requires heading, position and speed data.

Before using the echo averaging function, reduce sea clutter with the A/C SEA control. Leave a little sea clutter on the screen so as not to erase weak targets. The available settings options are shown in the table below.

Setting (level)	Description
[OFF]	Echo averaging is not enabled
[1], [2]	Detects targets hidden in sea clutter. [2] is more effective than [1] in detecting targets hidden in strong sea clutter. However, [1] is more effective than [2] in displaying high-speed targets. Select the setting best suited to current conditions. For effective monitoring of high-speed craft, you should use [2] together with the Wiper function.
[3]	Stably displays unstable targets; distinguishes high-speed craft.

You can access this feature from the InstantAccess bar™, or from the menu.

How to adjust the echo average function from the InstantAccess bar™

Select the [EAV] button () on the InstantAccess bar™, then left-click to select the desired level of echo averaging.

How to use the echo average function from the menu

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 [4 ECHO AVERAGE].
5. Select the required setting.
6. Close the menu.

How to highlight fast-moving targets

Normally, when echo averaging is in use, fast-moving targets may be displayed weakly, or not at all. The fast target emphasis function highlights fast-moving targets, but can also highlight sea-surface reflections and other noise.

To use the fast target emphasis function, follow the procedure below.

1. Open the menu.
2. Select [1 ECHO].
3. Select [0 NEXT].
4. Select [6 EAV EMPH-FAST TGT].
5. Select [ON] or [OFF] as appropriate.
6. Close the menu.

1.25 Automatic Clutter Elimination (ACE) Function

This radar has the Automatic Clutter Elimination (ACE) function. This function detects sea and rain clutter from received echoes' and automatically reduces sea and rain clutter according to the Automatic Clutter Elimination (ACE) threshold setting.

Note: Use this function with caution. Weak target echoes may disappear from the screen.

1.25.1 How to turn the Automatic Clutter Elimination (ACE) function on/off

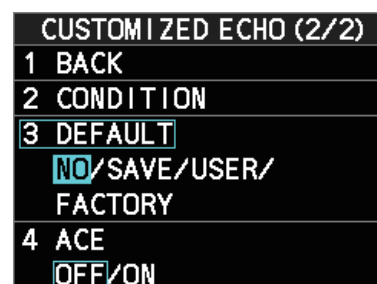
You can activate/deactivate the ACE function with one of the two methods outlined below.

From the InstantAccess bar™

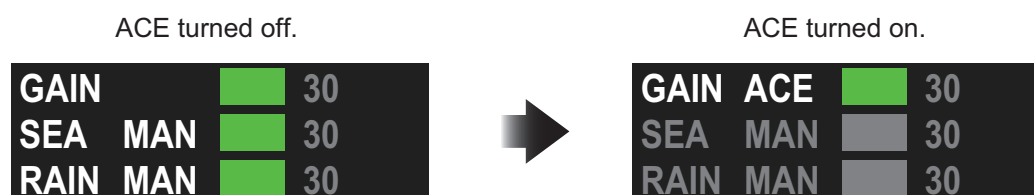
Place the cursor on the [ACE] button, then left-click to toggle between [ON] and [OFF].

From the menu

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 [0 NEXT].
5. Select [4 ACE].
6. Select [ON] or [OFF] as appropriate.
7. Close the menu.



When [ACE] is activated, the [SEA] box and [RAIN] box are gray colored and cannot be adjusted, and the echo averaging function is disabled. The [GAIN] box changes to [GAIN ACE], as shown in the figure below.



Note: When [PERFORMANCE MON] (see section 1.49) or [SART] (see section 2.3) is [ON], [ACE] is disabled and cannot be activated.

1.25.2 How to adjust the gain in Automatic Clutter Elimination (ACE) mode

Rotate the **GAIN** knob to adjust the sensitivity.

ACE can also be adjusted by placing the cursor inside the [GAIN ACE] level indication, then spinning the scrollwheel.

1.25.3 How to get high sensitivity

When the ACE function is [ON], the high sensitivity mode is also available. This requires a function key to be assigned with the [ACE HIGH SENSITIVITY] function (see section 1.9).

To use high sensitivity mode, activate the ACE feature, then press the assigned function key.

You can select the level for the high sensitivity mode as follows:

1. Open the menu.
2. Select [1 ECHO].
3. Select [0 NEXT].
4. Select [2 ACE]. The [ACE] menu appears.
5. Select [2 SIGNAL ENHANCEMENT].
6. Select the level from [1], [2] or [3].
7. Close the menu.

ACE	
1	BACK
2	SIGNAL ENHANCEMENT
	1/2/3
3	SUPPRESS SECTOR
	START : 000 °
	ANGLE : 000 °

1.25.4 How to suppress false echoes

When the ACE function is [ON], the echo signals can appear on the screen at positions where there is no target or disappear when there are targets (see section 2.2). You can suppress these false echoes.

Note: This procedure is only available when the Automatic Clutter Elimination (ACE) function is [ON].

1. Open the menu.
2. Select [1 ECHO].
3. Select [0 NEXT].
4. Select [2 ACE].
5. Select [3 SUPPRESS SECTOR].
6. Spin the scrollwheel, or use the number keys, to set the start angle for sector suppression.

If you use the number keys, the cursor moves from left to right. When all three digits are input, the cursor moves to the [ANGLE] item.

If you use the scrollwheel, left-click when the start angle is set.

To cancel any changes, press the **CANCEL TRAILS** key.
7. Left-click, or press the **ENTER MARK** key to confirm the start angle. The cursor moves to the [ANGLE] item.
8. Spin the scrollwheel, or use the number keys, set the angle range of the sector to be suppressed.

If you use the number keys, the cursor moves from left to right. When all three digits are input, the setting process is complete.

If you use the scrollwheel, left-click when the angle range is set.

To cancel any changes, press the **CANCEL TRAILS** key.
9. Close the menu.

1.26 Noise Rejector

White noise can show itself on the screen as random “speckles” spread over the entire radar image. This equipment reduces the white noise, then improves the on-screen S/N ratio by processing the weighted moving average filter for the received echoes in the range direction.

Note: Use this function with caution. Weak target echoes may disappear from the screen or the range resolution may worsen.

To remove this noise do the following:

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 [7 NOISE REJECTOR].
5. Select [OFF] or [ON] as appropriate. The indication for noise rejection is located at the top-left of the screen.
The indication changes according to the selected setting.

1.27 Wiper

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

	Wiper setting 1	Wiper setting 2
Echo averaging [OFF]	Condition A	Condition A
Echo averaging on ([1], [2] or [3])	Condition A	Condition B

Condition A: The brilliance of unwanted weak echoes, such as noise, sea clutter and rain clutter, is reduced to clear up the picture.

Condition B: Echo averaging is automatically activated when the wiper feature is turned on, allowing you to instantly see how the picture is affected with echo averaging turned off and turned on.

Note: The [WIPER] function requires valid data input for position, speed and heading.

To activate the wiper feature, do the following:

1. Open the menu.
2. Select [1 ECHO].
3. Select [9 WIPER].
4. Select the desired setting.
The options are: [OFF], [1] or [2].
5. Close the menu.

1.28 How to Preset Controls for a Specific Navigation Purpose

Every time your navigating environment or task changes, you must adjust the radar, which can be a nuisance in a busy situation. Instead of changing radar settings case by case, it is possible to assign the function keys to provide optimum settings for often-encountered situations.

The radar's internal computer offers several picture preset options to be assigned to each function key for your specific navigating requirements. For instance, one of the presets is [ROUGH SEA], and is designed to be used in heavy rain.

Three user-programmable presets are also provided (labeled as [CUSTOM1], [CUSTOM2] and [CUSTOM3]), so that you can have the radar automatically set to those conditions which are not covered by the provided setup options.

Below are the preset options provided with this radar.

Preset	Description
[CUSTOM1], [CUSTOM2] and [CUSTOM3]	User-defined custom settings.
[NEAR]	Optimum setting for short range detection using a range scale of 3 NM or less on calm seas.
[FAR]	Optimum setting for long range detection, on a range scale of 6 NM or larger.
[NEAR BUOY]*	Optimum setting for detecting buoys within 3 NM range.
[FAR BUOY]	Optimum setting for detecting buoys on a range scale of 6 NM or larger.
[ROUGH SEA]	Optimum setting for rough weather or heavy rain.
[SHIP]	Optimum setting for detecting other vessels.
[HARBOR]	Optimum setting for harbor berthing.
[BIRD]	Optimum setting for detecting birds.
[ICE]*	Optimum setting for navigating through sea ice.
[COAST]	Optimum setting for coastal travel.

*: [SMALL TARGET] replaces [NEAR BUOY] and [ICE] replaces [BIRD] when Ice Mode is enabled at installation.

Each picture option defines a combination of several radar settings for achieving optimum setup for a particular navigating situation. These include gain, target analyzer, hatching, ACE, ACE gain, interference rejector, echo stretch, echo average, noise rejector, automatic anti-sea and anti-rain clutter, video contrast, pulse length and sea and radar conditions.

Changing these features from the [CUSTOMIZED ECHO] menu changes the original function key settings. To restore the original settings for a particular customize option, it is necessary to select the default setting. For this reason, we recommended that you use the user-programmable presets ([CUSTOM1], [CUSTOM2] or [CUSTOM3]) when frequent adjustment of the radar image is necessary.

The default settings for the custom presets are listed on the following pages.

1. OPERATIONAL OVERVIEW

Default settings

	IR	ES	EA	NR	AUTO SEA	AUTO RAIN	TARGET ANALYZER*	HATCHING*
CUSTOM1	1	1	1	OFF	MAN-30	MAN-0	OFF	OFF
CUSTOM2	1	1	1	OFF	AUTO-30	MAN-0	OFF	OFF
CUSTOM3	1	1	1	OFF	MAN-30	MAN-0	OFF	OFF
NEAR	1	1	1	OFF	MAN-30	MAN-0	OFF	OFF
FAR	1	2	1	OFF	AUTO-40	MAN-0	OFF	OFF
NEAR BOUY	1	1	2	OFF	MAN-30	MAN-0	OFF	OFF
FAR BUOY	1	2	2	OFF	AUTO-30	MAN-0	OFF	OFF
ROUGH SEA	1	OFF	2	OFF	MAN-50	MAN-40	OFF	OFF
SHIP	1	2	1	OFF	MAN-30	MAN-0	OFF	OFF
HARBOR	1	OFF	1	OFF	MAN-30	MAN-0	OFF	OFF
BIRD	1	OFF	1	OFF	MAN-30	MAN-0	OFF	OFF
ICE	2	OFF	OFF	OFF	MAN-30	MAN-0	OFF	OFF
COAST	OFF	OFF	OFF	OFF	MAN-30	MAN-0	OFF	OFF

	STC CURVE	STC RANGE	LOW LEVEL ECHOES	GAIN	ACE	ACE GAIN	VIDEO CONTRAST
CUSTOM1	3	8	0	85	OFF	50	2-B
CUSTOM2	3	8	0	85	OFF	50	2-C
CUSTOM3	3	8	0	85	ON	50	2-B
NEAR	3	8	0	85	OFF	50	1-B
FAR	3	8	0	85	ON	60	4-B
NEAR BOUY	3	8	0	85	OFF	50	1-C
FAR BUOY	3	8	0	85	OFF	50	4-C
ROUGH SEA	3	9	0	85	OFF	35	2-C
SHIP	3	8	0	85	ON	50	2-B
HARBOR	3	8	0	75	ON	50	1-C
BIRD	3	8	0	85	OFF	50	3-C
ICE	3	7	0	80	OFF	50	1-B
COAST	3	8	0	85	OFF	50	2-C

*: Available for B/W-type radars only.

Default settings for [PULSELENGTH]

	0.125 NM to 0.5 NM	0.75 NM	1 NM*	1.5 NM	2 NM*	3 NM
CUSTOM1	S1	S1	S1	S2	S2	M1
CUSTOM2	S1	S1	S1	S2	S2	M1
CUSTOM3	S1	S1	S1	S2	S2	M1
NEAR	S1	S1	S1	S2	S2	M1
FAR	S1	S1	S1	S2	S2	M1
NEAR BOUY	S1	S1	S1	S2	S2	M1
FAR BUOY	S1	S1	S1	S2	S2	M1
ROUGH SEA	S1	S1	S1	S2	S2	M1
SHIP	S1	S1	S1	S2	S2	M1
HARBOR	S1	S1	S1	S2	S2	M1
BIRD	S1	S1	S1	S2	S2	M1
ICE	S1	S1	S1	S1	S1	S2
COAST	S1	S1	S1	S2	S2	M1

	4 NM*	6 NM	8 NM*	12 NM	16 NM*	24 NM
CUSTOM1	M1	M2	M2	L	L	L
CUSTOM2	M1	M2	M2	L	L	L
CUSTOM3	M1	M2	M2	L	L	L
NEAR	M1	M3	M3	M3	M3	L
FAR	M1	M3	M3	L	L	L
NEAR BOUY	M1	M2	M2	M3	M3	L
FAR BUOY	M1	M3	M3	L	L	L
ROUGH SEA	M1	M2	M2	M3	M3	L
SHIP	M1	M2	M2	L	M3	L
HARBOR	M1	M2	M2	M3	M3	L
BIRD	M1	M2	M2	M3	M3	L
ICE	S2	M1	M1	M1	M1	M2
COAST	M1	M2	M2	M3	M3	L

*: These ranges are available for B/W-type radars only.

About the ICE custom setting (optional specification)

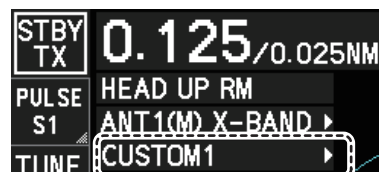
The ICE custom setting sets up the radar to detect areas of ice on the sea surface. With ICE active, the following restrictions or requirements apply:

- For interswitch configurations with a FAR-2xx8 series as the main radar and a FAR-2xx7 series as the sub radar, ice echoes may not appear correctly on the FAR-2xx7 series screen. Avoid using a FAR-2xx7 series radar as the interswitch sub-radar with Ice Mode enabled.
- Ice Mode must be enabled from the [RADAR INSTALLATION] menu. See the Installation Manual for details.
- Dual radar mode must be disabled from the [RADAR INSTALLATION] menu. See the Installation Manual for details.
- Ice Mode replaces Bird Mode. While Ice Mode is in use, Bird Mode-related settings and operations are not available.
- Video Contrast settings are fixed to ICE settings when the performance monitor is activated while Ice Mode is enabled.
- While Ice Mode is enabled, the following functions are not available:
 - Target Analyzer
 - Rain Echo Hatching
 - Video Contrast
 - Automatic Clutter Elimination (ACE)
 - Fast Target Emphasis
 - Trail Hide

1.28.1 How to select a customized echo

Left-click the [CUSTOMIZE ECHO] box at the top left of the screen to cycle through the options and select a customized echo option.

The available options depend on the settings selected for [3 SELECT CUSTOM] in the [ECHO] menu. See section 1.28.5.



1.28.2 How to edit a customized echo

1. Select a customize echo option to edit (see section 1.28.1).
2. Open the menu.
3. Select [1 ECHO].
4. Select [2 CUSTOMIZED ECHO].

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

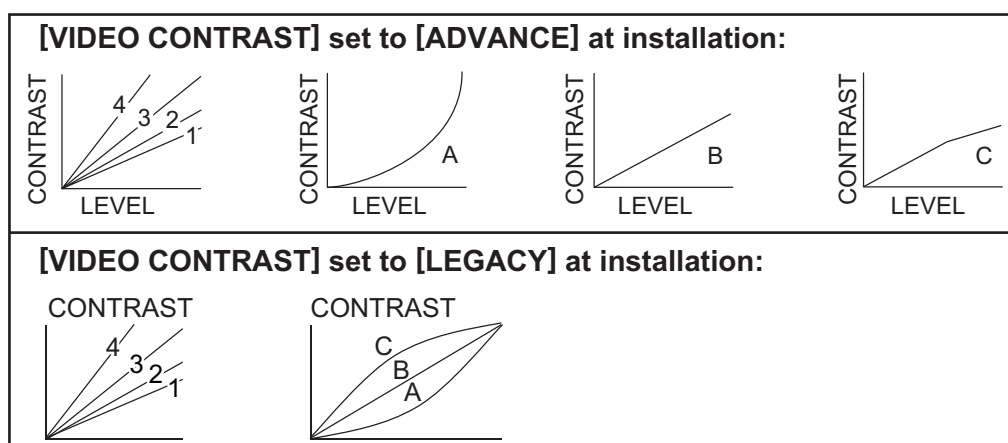
5. Set the items below referring to the sections shown.

- [2 INT REJECTOR] : section 1.22
- [3 ECHO STRETCH] : section 1.23
- [4 ECHO AVERAGE] : section 1.24
- [5 TARGET ANALYZER]* : section 1.38
- [6 HATCHING]* : section 1.38
- [7 NOISE REJECTOR] : section 1.26
- [8 VIDEO CONTRAST TYPE] : described in this section.
- [9 PULSE] : section 1.18
- [2 CONDITION] : described in this section.
- [4 ACE] : section 1.25

*: Available for B/W-type radars only.

Note: To set [2 CONDITION] and [4 ACE], select [0 NEXT] to show the second page of the [CUSTOMIZED ECHO] menu.

6. Select [8 VIDEO CONTRAST TYPE].
7. Select [1], [2], [3] or [4] (Dynamic Range) or [A], [B], [C] (Curve) as appropriate. Video contrast and curve change depending on setting for [VIDEO CONTRAST] (set at installation), as shown in the figure below.



1 to 4: Control dynamic range. 1 provides the widest dynamic range; 4 is the narrowest dynamic range.

A: Low level echo brilliance is reduced and noise and clutter are also reduced.

B: Low and high level echoes are displayed evenly.

C: High level echoes' outer edge has gradation to indicate the echo level, with the higher level echo at the core.

8. Select [0 NEXT] to show the next menu page.
9. Select [2 CONDITION].
10. Select [2 STC CURVE].
11. Select the appropriate setting for the current sea conditions. The available settings are: [2], [2.5], [3], [3.5], [4.2]. A higher setting is recommended for rough weather.
12. Select [3 STC RANGE].
13. Set the distance for STC effectiveness. A higher setting eliminates farther surface reflections.
14. If necessary, select [4 LOW LEVEL ECHO] to reject low level echoes. The setting range is [0] to [8]. The higher the figure, the stronger the low level echo that is erased.
15. Select [1 BACK] to show the second page of the [CUSTOMIZED ECHO] menu.
16. To save custom settings, select [SAVE] from [3 DEFAULT].
17. Close the menu.

1.28.3 How to restore a user customized echo to the saved settings

If you get lost in operation while changing the settings for a user customized echo, you can easily restore the settings for that user customized echo saved at section 1.28.2.

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 [0 NEXT] to show the next menu page.
5. Select [3 DEFAULT].
6. Select [USER].
7. Close the menu.

1.28.4 How to restore a user customized echo to the factory default settings

You can restore customized echo options to their factory default settings (see the tables on page 1-42 for a list of the default settings).

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 [0 NEXT] to show the next menu page.
5. Select [3 DEFAULT].
6. Select [FACTORY].

1.28.5 How to edit the available customized echoes

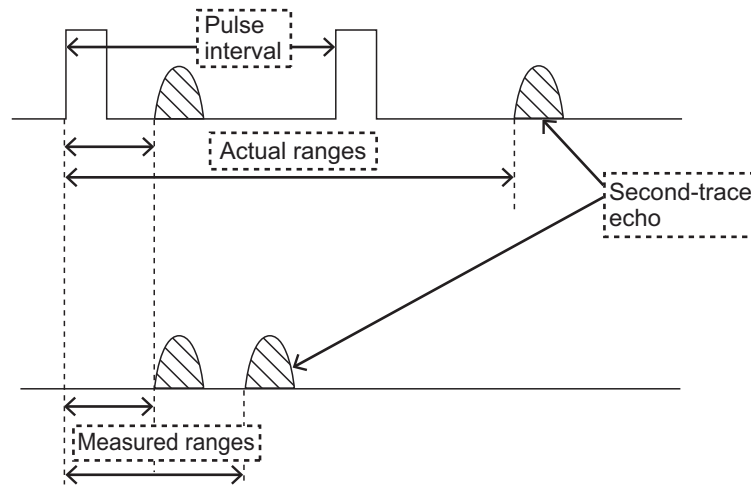
To edit which customizations are available from the [CUSTOMIZE ECHO] box, follow the procedure below.

1. Open the menu.
2. Select [1 ECHO].
3. Select [0 NEXT].
4. Select [3 SELECT CUSTOM]. The [SELECT CUSTOM] menu appears.
5. Select the customization you want to edit.
The customizations are listed over two menu pages. Select [0 NEXT] to see the next page, or select [1 BACK] to return to the previous menu page.
6. Select [ON] to make the customization available from the [CUSTOMIZE ECHO] box, or select [OFF] to hide the customization from the [CUSTOMIZE ECHO] box.
7. Close the menu.



1.29 How to Reject Second-trace Echoes

In certain situations, echoes from very distance targets can appear as false echoes (second-trace echoes) on the screen. This occurs when the return echo is received one transmission cycle later, or after a next radar pulse has been transmitted.



This equipment lengthens the pulse repetition period to reject false echoes.

Note: his function decreases the number of echo hits. Use this function carefully so that the possibility of detecting small targets and high-speed craft does not lessen.

To enable or disable second-trace echo rejection, do the following:

1. Open the menu.
2. Select [1 ECHO].
3. Select [3 2ND ECHO REJ].
4. Select [ON] to enable second-trace echo rejection.
Select [OFF] to disable rejection.
5. Close the menu.

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.



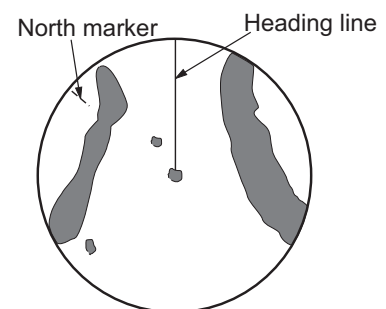
Loss of gyrocompass signal

When the compass signal is lost, "NO GYRO SIGNAL" appears in yellow-orange in the [ALERT] box, the orientation mode automatically becomes HEAD UP, and TT and AIS targets, 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

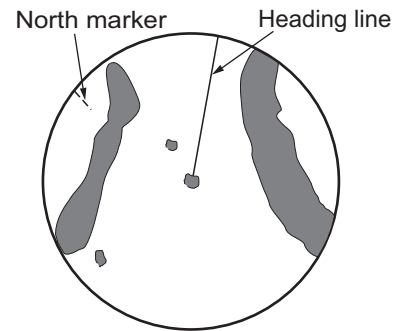
HEAD UP mode

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.

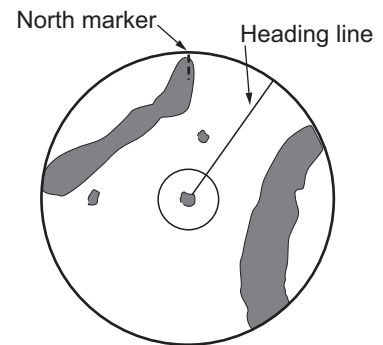


COURSE UP mode

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.

**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.

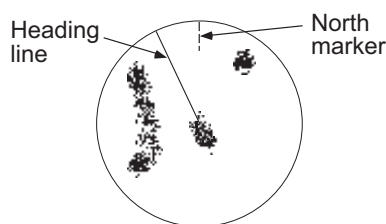
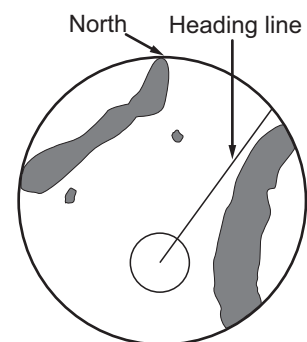
**STAB HEAD UP mode**

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.

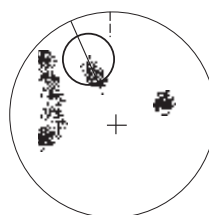
This mode is available when the radar is interfaced with a gyrocompass. If the gyrocompass fails, the bearing scale returns to the state of HEAD UP mode.

True motion mode

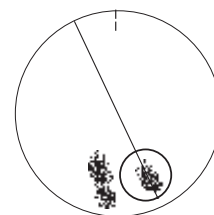
Your ship and other objects in motion move with their true courses and speed. All fixed targets, like landmasses, appear as fixed echoes in ground stabilized TM. When your ship reaches a point that is 50% of the radius of the display, the position is reset. The ship appears at 75% radius opposite to 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

1. OPERATIONAL OVERVIEW

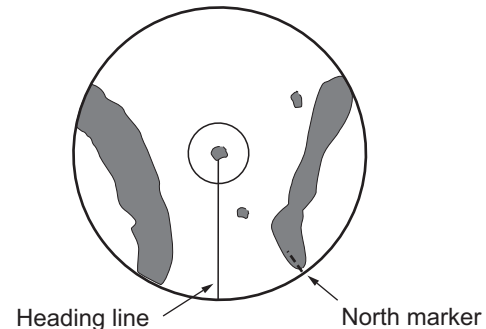
Note: The position of the own ship marker and bearing scale change according to reference position and off-centering.

- [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.

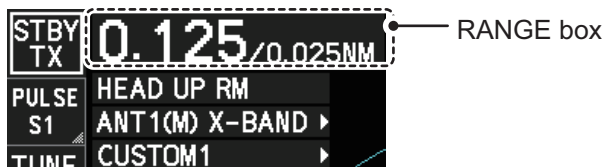
Note: STERN UP mode is only available for A/B/W-types.



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.

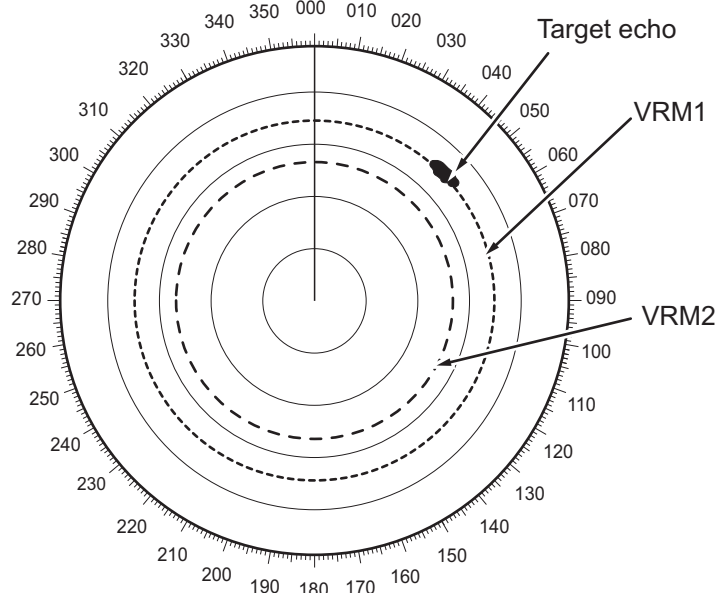
Use the fixed range rings to get an estimate of the range to a target. The rings are the concentric solid circles on the display. The number of rings is automatically set by the current range scale. The distance between the rings is the range ring interval, and the current interval appears at the upper-left 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.

1.32.1 How to show/hide the range rings

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.

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.



1. OPERATIONAL OVERVIEW

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.

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)
- SM (Statute Miles)
- km (Kilometers)
- 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:

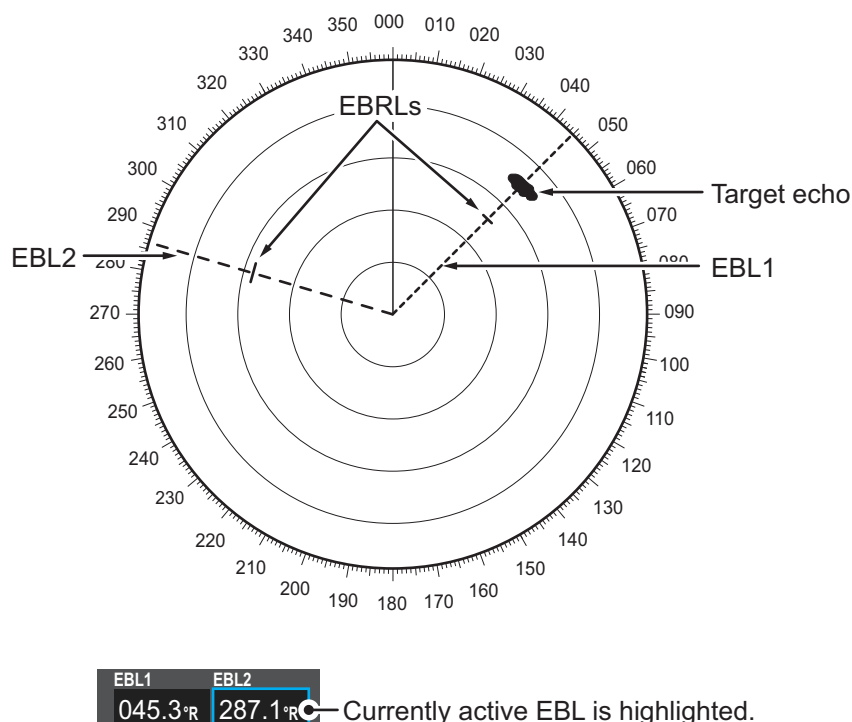
1. Open the menu.
2. Select [3 NAV TOOLS].
3. Select [3 EBL•VRM•CURSOR SET].
4. Select [3 VRM TTG].
5. Select [OFF], [1], [2] or [1&2] as appropriate.
 - [OFF] : No TTG to VRM displayed.
 - [1] : TTG from OS to VRM1 displayed.
 - [2] : TTG from OS to VRM2 displayed.
 - [1and2] : TTG from OS to VRM1 and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

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.

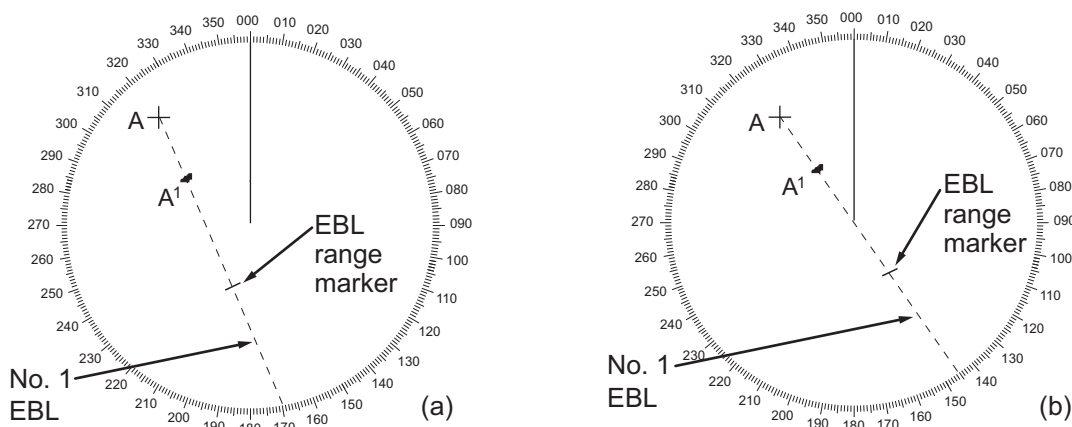
1. Open the menu.
2. Select [3 NAV TOOLS].
3. Select [3 EBL•VRM•CURSOR SET].
4. For IMO/A/R-type radars, select [5 EBL•CURSOR BEARING].
For B-type radars, select [2 EBL1] or [3 EBL2] as appropriate.
5. Select the [REL] or [TRUE] as required, then press the **ENTER MARK** key.
6. Close the menu.

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 (A¹). 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)

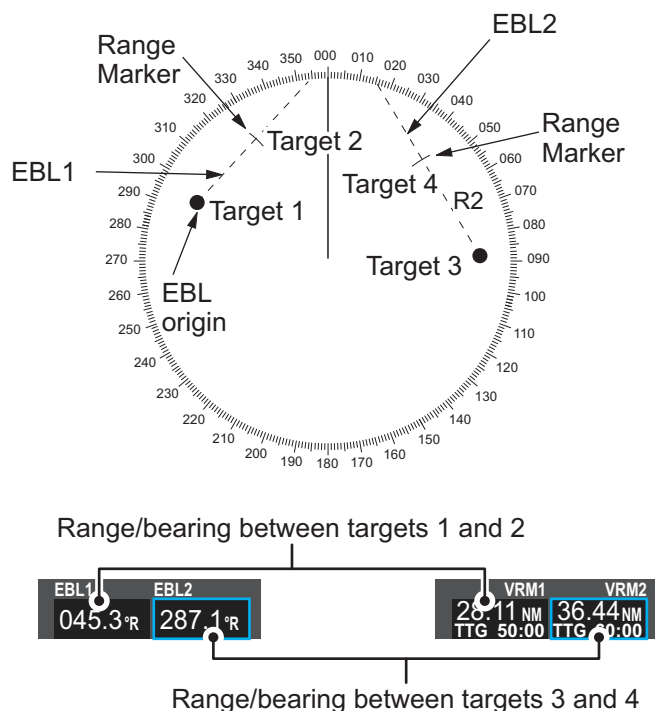
1. Select the operational display area, then right-click. The [CURSOR] context menu appears.
2. Select [EBL OFFSET].
3. Select the operational display area, then left-click. The EBL line is attached to the cursor.
4. Place the offset EBL on the target appearing as threatening, then left-click.
5. After 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 (A^1). 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.

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.

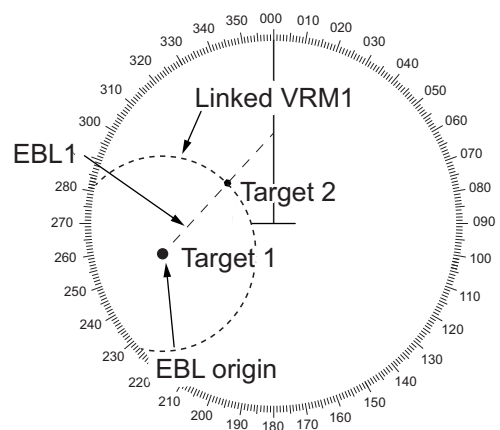
How to reset the EBL origin to the center of the screen

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

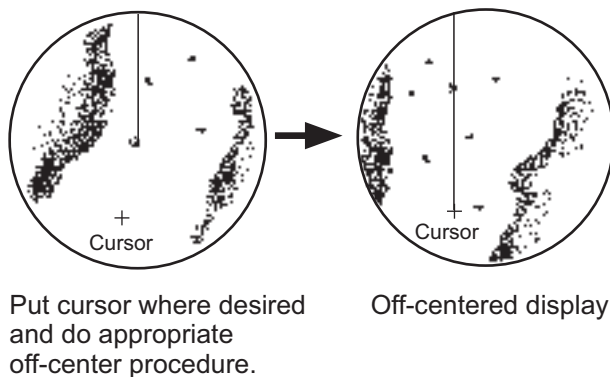
You can link the EBL and VRM offset to show the VRM range ring with one target as the center-point. This may helpful if the range marker on the EBL is difficult to see.

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.

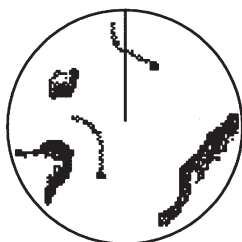
To cancel the off-center in these cases, select a larger range, then cancel the off-center.

1.37 Target Trails

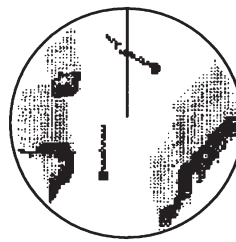
The trails of the radar echoes of targets can be displayed in the form of synthetic afterglow. Target trails are shown either relative or true and can be sea or ground stabilized. True motion trails require a compass signal, and position and speed data. When the range is changed, trails are continued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

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.

Right-click the [TRAIL box] to show the [TRAILS] menu.

TRAILS

1 BACK

2 TRAIL MODE
REL/TRUE

3 TRAIL GRADATION
SINGLE/MULTI

5 TRAIL LEVEL
1/2/3/4

6 OS TRAIL
OFF/ON

7 SUPPRESS AROUND OS
OFF/ON

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.

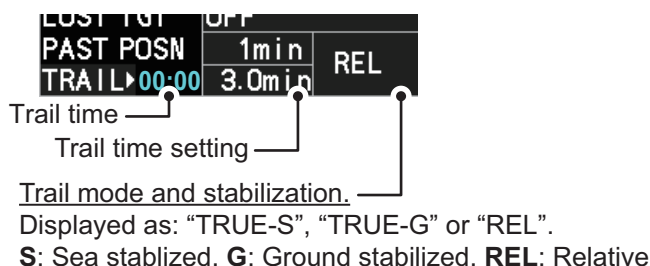
You can also click the trail mode indication to toggle between relative and true trails.

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.

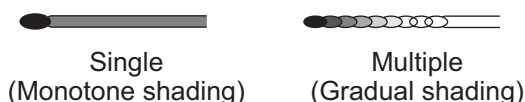
[TRAIL LENGTH] setting	Available options
[NORMAL]	[OFF], [15 sec], [30 sec], [1 min] to [30 min] at 30-seconds intervals, [CONT].
[12H]	[OFF], [00:30] to [12:00] at 30 minute intervals, [CONT].
[24H]	[OFF], [00:30] to [24:00] at one hour intervals, [CONT].
[48H]	[OFF], [00:30] to [48:00] at two hour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

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.

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

1.37.8 How to erase/restart trails

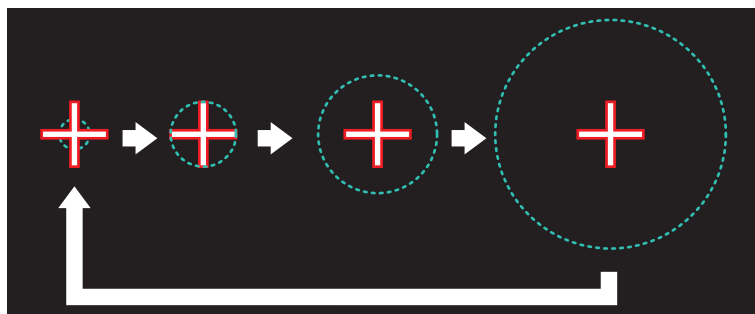
All trails can be erased (including those in the memory) and restarted to start fresh trails. There are three methods you can use to erase trails.

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.

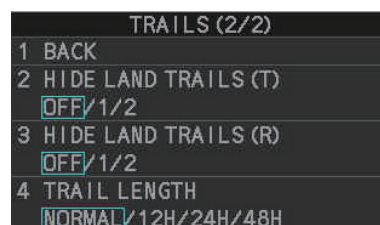
1. Open the menu.
2. Select [1 ECHO].
3. Select [0 NEXT].
4. Select [4 TRAILS]. The [TRAILS] menu appears.
Note: You can also right-click the [TRAIL] box to access this menu.
5. Select [6 OS TRAIL].S
6. Select [OFF] or [ON] as appropriate.
Note: When [6 OS TRAIL] is set to [ON], [7 SUPPRESS AROUND OS] 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.
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.

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 [4 TRAIL LENGTH].
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]

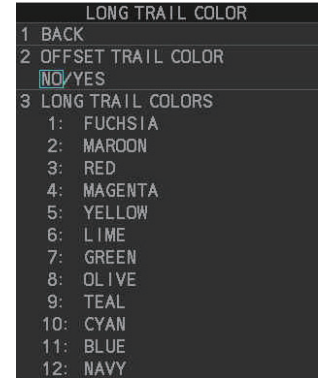
You can assign one of six colors when [4 TRAIL LENGTH] is set to [NORMAL].

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

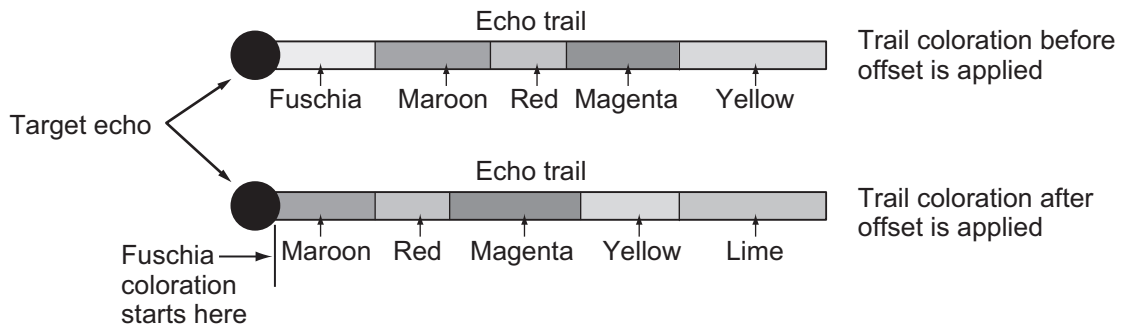
Note: This function is only available when [4 TRAIL LENGTH] is set to other than [NORMAL].

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)

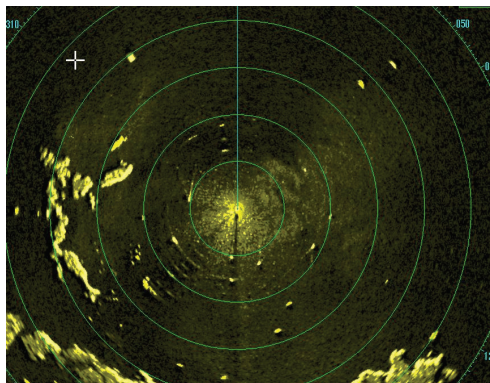
The target analyzer function analyzes echoes and assists the operator to determine dangerous targets. This function is particularly useful under heavy rain/snow or where there is surface reflection, which can cause interference and noise.

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

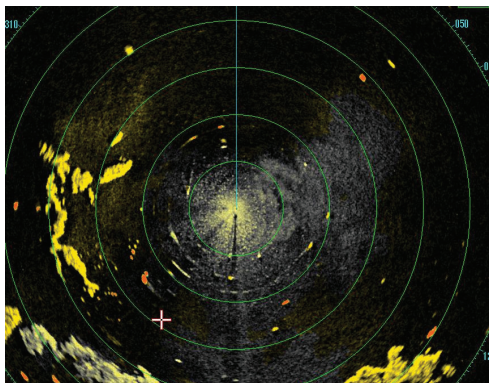
Echoes are displayed in five different colors to assist the operator in identifying targets. The colors and their respective echoes change depending on the echo color selected from the [BRILL] menu (see section 1.45) are shown in the table below.

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

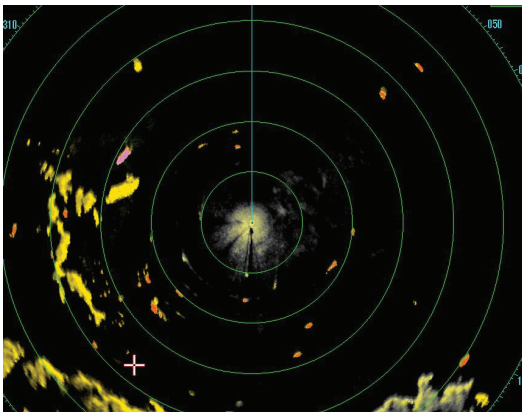
The following example figures show the manner in which this function affects displayed echoes.



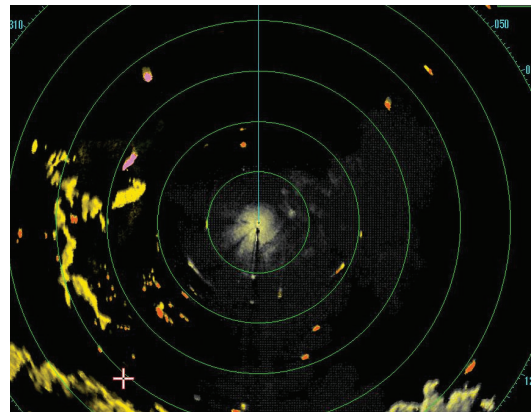
No echo adjustment
(Target analyzer off, EAV off, hatching off)
Rain, moving targets and surface reflections are all displayed with no filtering.



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.

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.

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

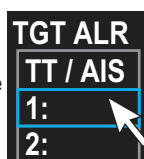
- ♦ The alarm should not be relied upon as the sole means for detecting possible collision situations.
- ♦ A/C SEA, A/C RAIN and GAIN controls should be properly adjusted to be sure the alarm system does not overlook target echoes.

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.

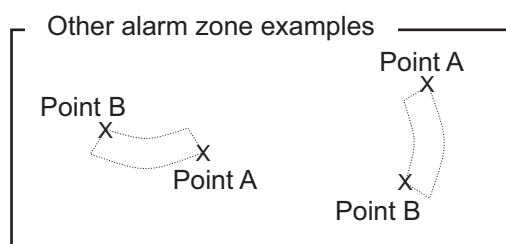
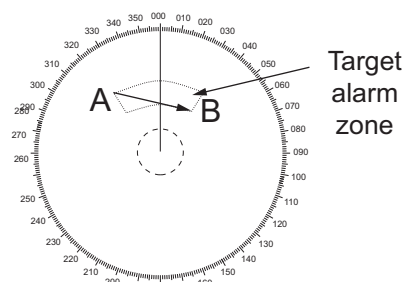
1. Select the appropriate alarm box, then left-click. The cursor jumps into the operational display area and the indication "SET" appears inside the target alarm box selected.

Click the Alarm Zone you want to set.



The indication changes to "SET".

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:

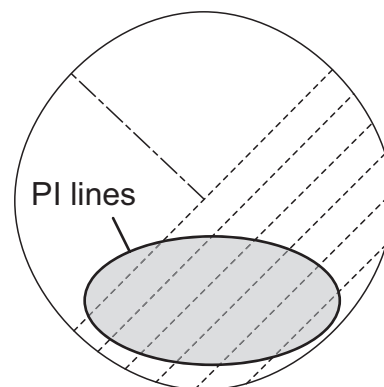
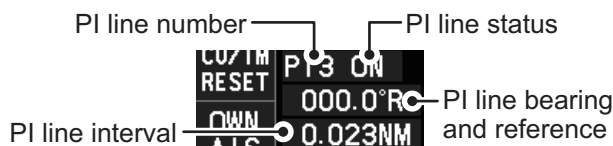
1. Open the menu.
2. Select [4 ALERTS].
3. Select [6 TARGET ALARM].
4. Select [2 ALR1 MODE] or [3 ALR2 MODE] as appropriate.
5. Select [IN] or [OUT] as appropriate.
[IN]: Targets entering the alarm zone trigger the alarm.
[OUT]: Targets leaving the alarm zone trigger the alarm.
6. Select [4 LEVEL].
7. 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.

[PI Line] box



1.40.1 How to show/hide the PI lines

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

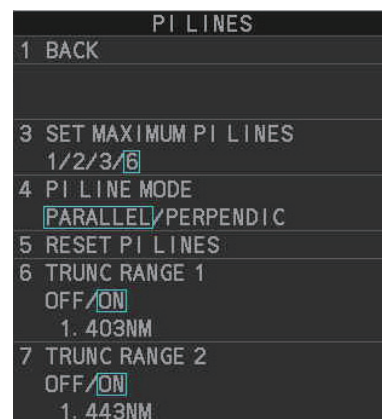
1. Place the cursor on the PI line number or PI line status in the PI line box.
2. Spin the scrollwheel to select the PI line (PI1 to PI6) you want to show or hide.
Note 1: For IMO/A/B/R-types, PI5 and PI6 are only available when [SET MAXIMUM PI LINES] is set to [1].
Note 2: For W-types, PI5 and PI6 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.

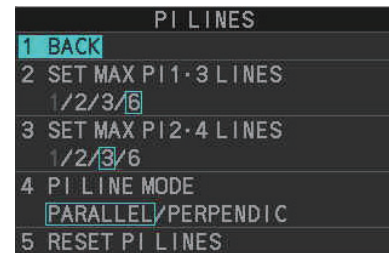
IMO/A/B/R-types

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.



1.40.3 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.

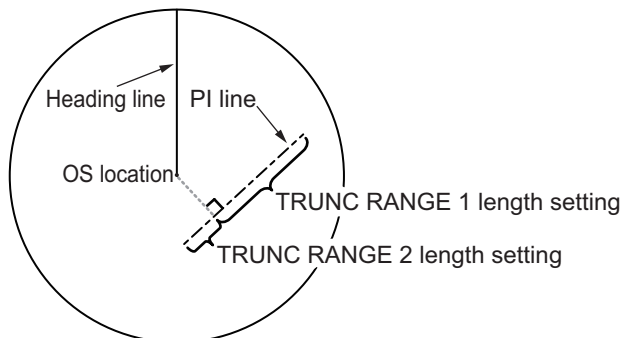
1.40.7 How to change PI line length (IMO/A/B/R-types only)

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].

1. OPERATIONAL OVERVIEW

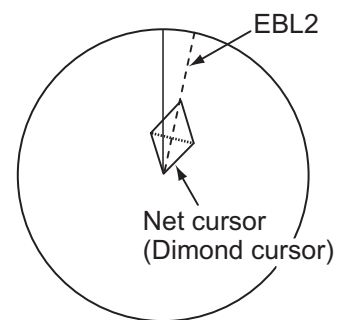
10. Spin the scrollwheel to adjust the front PI line length. The available range is 0.000 NM to 24.000 NM. All PI lines beyond this mark will be hidden.
11. To change the length of other PI lines, activate the line you wish to adjust, then repeat steps 1 through 10.
12. Close the menu.



1.41 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

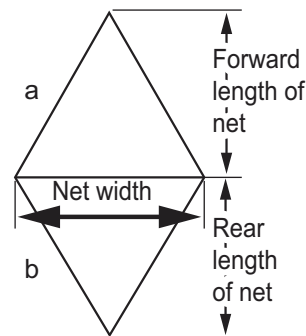
To activate the net cursor, do the following procedure.

- 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.



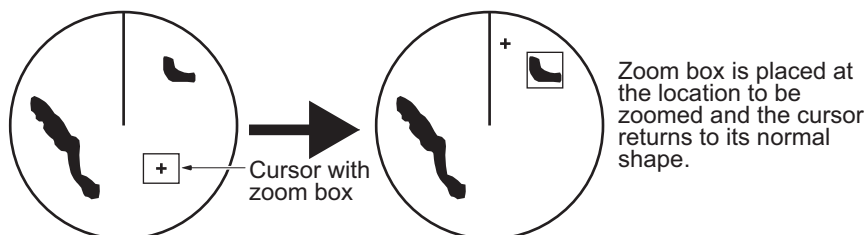
1.42 Zoom

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.