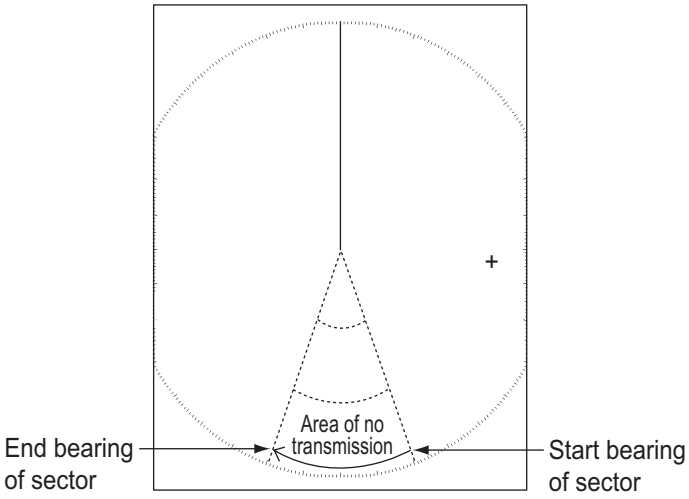


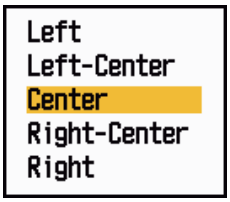
Sector blank

5.34 Other Menu Items

This section describes the menu items not previously described.

5.34.1 Brill/Color menu

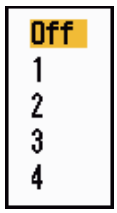
[View Position]: You can select the angle from where you see the screen.



View Position options

[Menu Transparency]: You can select the degree of transparency of the menu window so the menu window does not hide the echo display. [4] is the greatest degree of transparency. [Off] functions to hide the echo display behind the menu window completely.

Note: Alpha blending technology is used for transparency effects.

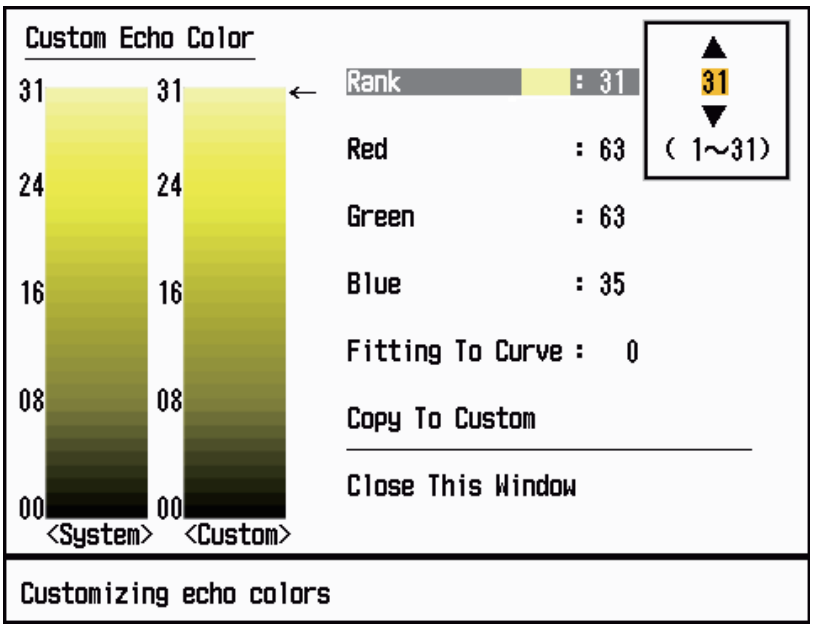


Menu Transparency options

[Echo Color Mode]: You can select the color palette from [System] or [Custom]. [System] is the preset color palette and [Custom] is the color palette you can set yourself. This function is not available in the [IEC] or [Russian-River] mode.

Echo Color Mode options

[Custom Echo Color]: You can customize the echo color with the following two methods. This function is not available in the [IEC] or [Russian-River] mode.



Custom Echo Color setting window

Method 1: 1) Select the echo rank to change on the [Rank] (setting range: 1 - 31).

2) Set the RGB values for selected echo rank on the [Red], [Green] and [Blue] (setting range: 0 - 63).

Method 2: 1) Select 31 on the [Rank].

2) Set the RGB values for 31 echo rank on the [Red], [Green] and [Blue] (setting range: 0 - 63).

3) Interpolate the RGB values between the maximum rank and minimum rank on the [Fitting To Curve] with the following curves (setting range: -20 to 20).

Setting range > 0: Logarithmic curve, useful to emphasize the weak echoes.

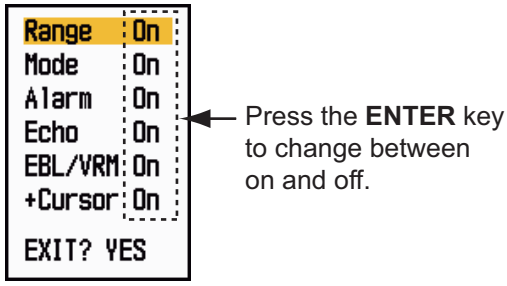
Setting range = 0: Straight line

Setting range < 0: Exponential curve, useful to emphasize the strong echoes.

[Copy To Custom]: Copy the color palette from [System] to [Custom].

5.34.2 Display menu

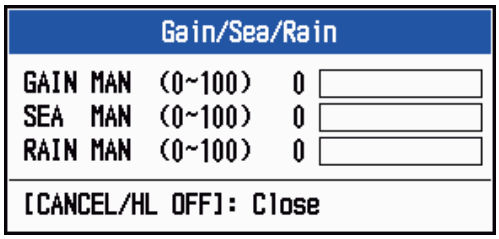
[Base Text Display]: You can select on/off for the text indications of the following items on the display. The settings on this function are used when you set [Echo Area] to [Full Screen] on the [Display] menu. This function is not available in the [IEC] or [Russian-River] mode.



Base Text Display options

The text indications set to off appear when you operate any key. The indications disappear when there is no key operation for 10 seconds.

[Gain/Sea/Rain Bar]: Open the Gain/Sea/Rain indicator. You can check the current settings.



Gain/Sea/Rain Bar

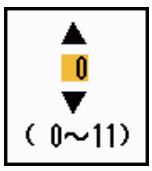
[STBY Display]: Set the function of the standby display.

STBY Display options

[Normal]: Display "ST-BY" at the screen center.
[Nav]: Display navigation data.
[Economy]: Turn off the LCD backlighting. The radar must be switched from TX to ST-BY to activate this mode.

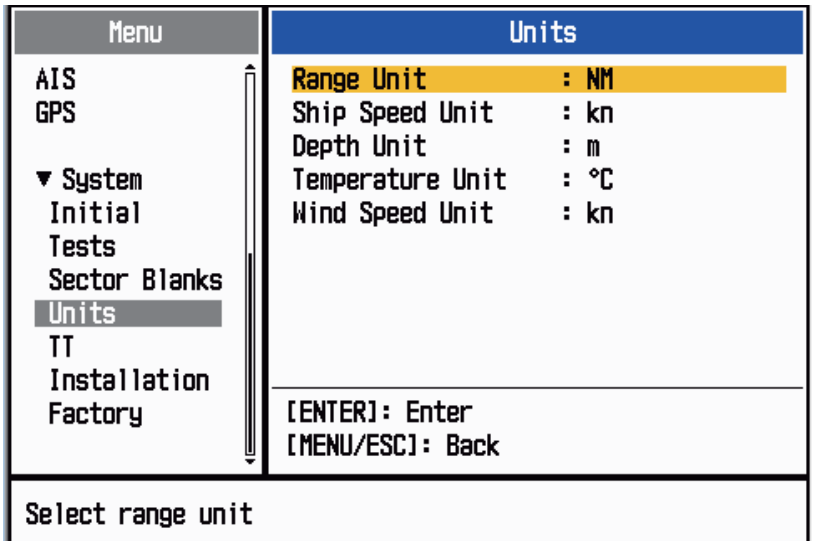
5.34.3 Echo menu

[Color Erase]: Erase the lower echo color whose level is set here. Set a large value to display only the stronger echoes.



5.34.4 Units menu

You can select the unit of measurement for range, ship speed, depth, temperature and wind speed on the [Units] sub menu in the [System] menu. You can not open this sub menu in normal operation. To open this menu, select [Units], hold the **MENU/ESC** key and press the **ALARM** key five times.



Units sub menu

[Range Unit]: NM, KM, SM

[Ship Speed Unit]: kn, km/h, mph

[Depth Unit]: m, ft, fa, pb, HR

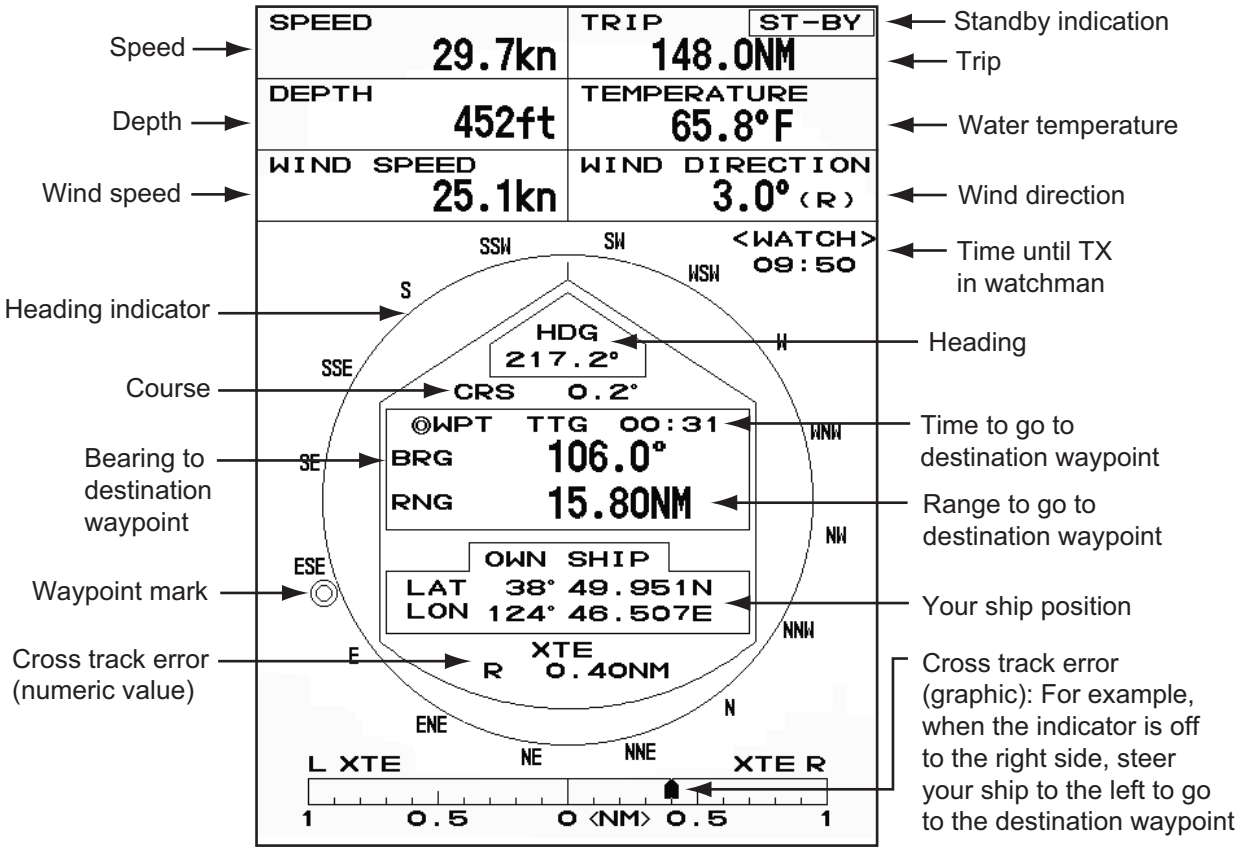
[Temperature Unit]: °C, °F

[Wind Speed Unit]: kn, km/h, mph, m/s

5.35 Navigation Data

5.35.1 Navigation data during standby

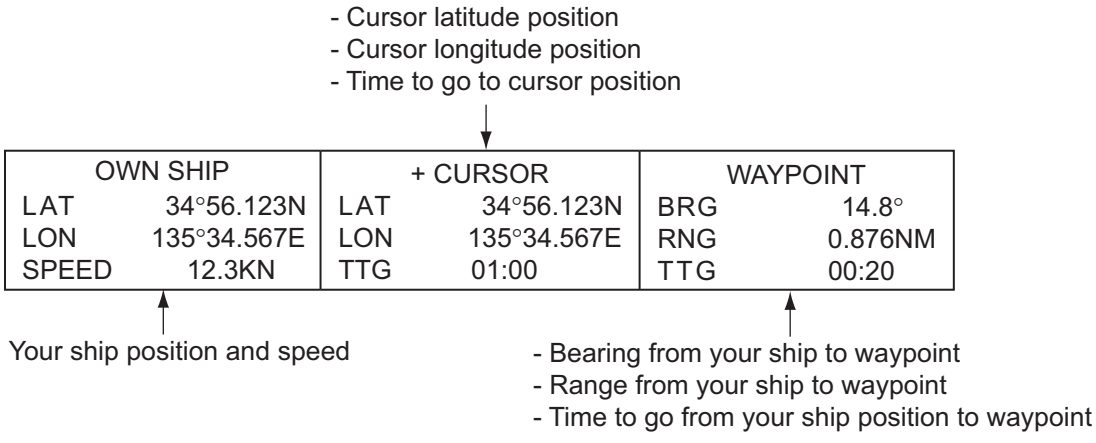
The navigation data is shown in standby when [STBY Display] on the [Display] menu is set to [Nav]. Appropriate sensors are required to display the data.



Navigation data display at standby

5.35.2 Navigation data at the bottom of the screen

The navigation data is displayed at the bottom of the screen.



Navigation data

To show or hide the navigation data at the bottom of the screen, do the following:

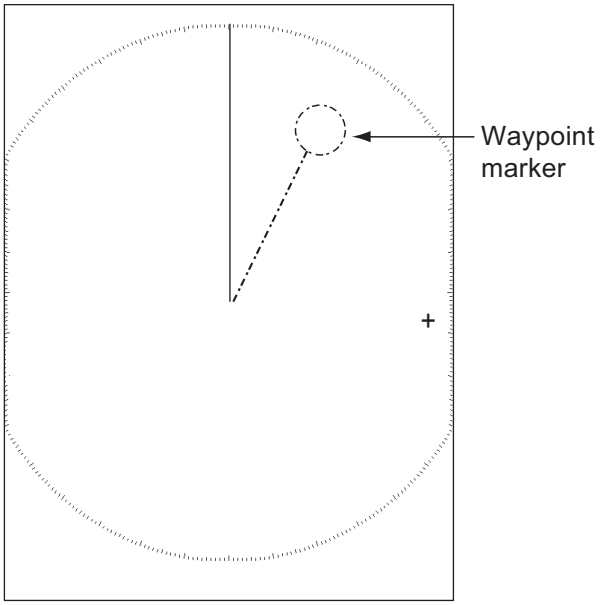
1. Press the **MENU/ESC** key to open the menu.
2. Use the Cursorpad (▲ or ▼) to select [Display] and press the **ENTER** key.
3. Use the Cursorpad (▲ or ▼) to select [Data Box] and press the **ENTER** key.

Data Box options

4. Use the Cursorpad (▲ or ▼) to select an option and press the **ENTER** key.
   [Off]: Turn off the data display.
   [Nav]: Navigation data
   [Target]: TT and AIS target data (See section 3.8 and 4.5.)
   [All]: Navigation data plus TT and AIS target data
5. Press the **MENU/ESC** key to close the menu.

5.36 Waypoint Marker

The waypoint marker shows the location of the destination waypoint set on a navigation plotter. The heading signal or course data are required. You can turn on/off the waypoint marker as follows:



Waypoint marker

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

WPT Mark options

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

5.37 How to Send the Target Position and Enter the Origin Mark

The **TLL** key functions to send the cursor position to a chart plotter and put an origin mark (⊳) at the cursor position on the radar. Use the Cursorpad to put the cursor on a target. Press the **MODE** key to open the [Mode] window, select [TLL] then press the **ENTER** key. You can enter up to 20 origin marks on the radar display. When the capacity for origin marks is reached, the oldest mark is erased to make room for the latest mark, to keep a maximum of 20 marks. To erase a mark, put the cursor on the mark and press the **MENU/ESC** key.

TLL key mode

You can select how to handle TLL position.

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

TLL Key Mode options

4. Use the Cursorpad (▲ or ▼) to select [TLL Output], [Origin Mark] or [Both] then press the **ENTER** key.
   [TLL Output]: Send the latitude and longitude of the cursor position to a chart plotter. (Position and heading signal are required.)
   [Origin Mark]: Enter an origin mark at the cursor position on the radar display. (Position and heading signal are required.)
   [Both]: Send the target position to a chart plotter and enter an origin mark on the radar display.
5. Press the **MENU/ESC** key to close the menu.

Note: All origin marks are deleted and not saved when the power is turned off.

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6. HOW TO INTERPRET THE RADAR DISPLAY

6.1 General

6.1.1 Minimum and maximum ranges

Minimum range

The minimum range is defined by the shortest distance at which, using a scale of 0.0625 or 0.125 nm, a target having an echoing area of 10 m^2 is shown separate from the point representing the antenna position.

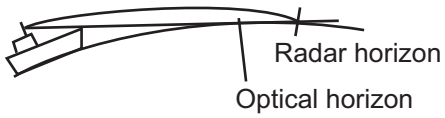
The minimum range depends on the pulse length, antenna height, and signal processing (like main bang suppression and digital quantization). Use a shorter range scale as far as it gives favorable definition or clarity of picture. This MODEL 1835 series meets the requirements of IEC 62252 5.14.1 (Class A).

Maximum range

The maximum detection range, Rmax, varies depending on the height of the antenna, the height of the target above the sea, the size, shape and material of the target, and the atmospheric conditions.

Under normal atmospheric conditions, the maximum range is equal or a little shorter than the optical horizon. The radar horizon is longer than the optical one by approximately 6% because of the diffraction property of the radar signal. The Rmax is shown in the following formula.

$R_{max} = 2.2 \times (\sqrt{h1} + \sqrt{h2})$
where R_{max}: radar horizon (nautical miles)
h1: antenna height (m)
h2: target height (m)



If the height of the antenna is 9 m and the height of the target is 16 m, the maximum radar range is;

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

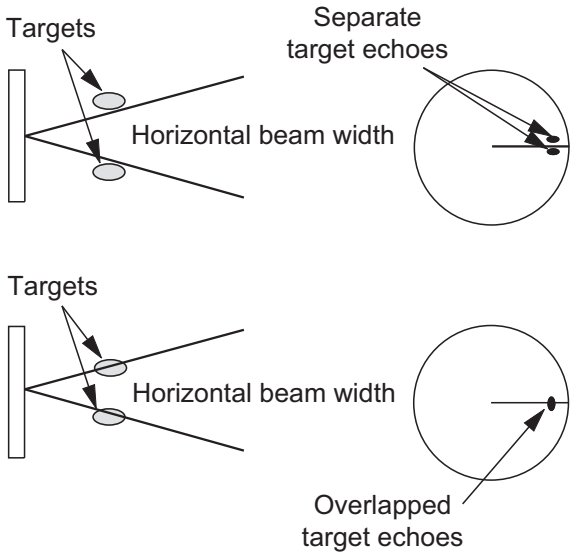
Note: The detection range is reduced by precipitation (which absorbs the radar signal).

6.1.2 Radar resolution

The bearing resolution and range resolution are important in radar resolution.

Bearing resolution

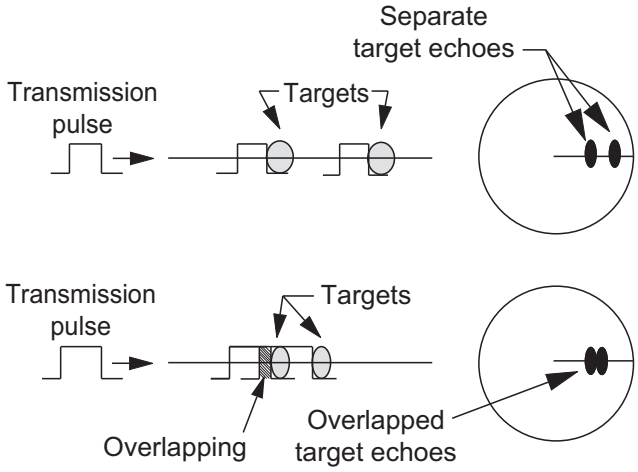
The bearing resolution is the ability of the radar to display the echoes received from two targets at the same range as the separate echoes. The bearing resolution is proportional to the antenna length and the wavelength.



Range resolution

The range resolution is the ability to display the echoes received from two targets on the same bearing as separate echoes. The range resolution is determined by only pulse length.

The test targets used to determine the range and bearing resolution are radar reflectors that have an echoing area of 10 m^2.



6.1.3 Bearing accuracy

One of the most important features of the radar is how accurately the bearing of a target can be measured. The accuracy of bearing measurement depends on the narrowness of the radar beam. The bearing is taken relative to the heading of the ship. Correct adjustment of the heading line at installation is important to get accurate bearings. To minimize the error when you measure the bearing of a target, put the target echo at the extreme position on the screen by selecting a suitable range.

6.1.4 Range measurement

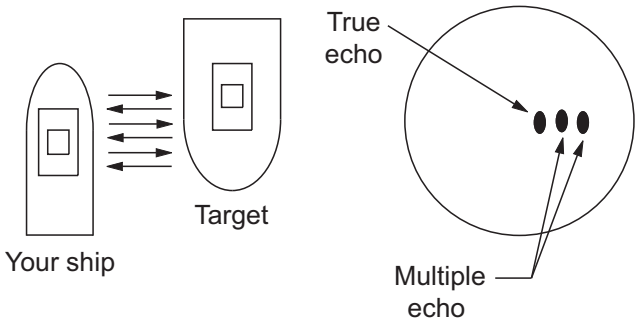
Measurement of the range to a target is important function of the radar. There are three methods of measuring range: the fixed range rings, the Variable Range Marker (VRM), and the cursor (if set to measure range and bearing). The fixed range rings appear on the screen with a given interval and provide a rough estimate of the range to a target. The diameter of VRM is increased or decreased so that the marker touches the inner edge of the target. The VRM is a more accurate range measurement than the fixed range rings.

6.2 False Echoes

The echo signals can appear on the screen at positions where there is no target or disappear when there are targets. These false echoes are shown below.

6.2.1 Multiple echoes

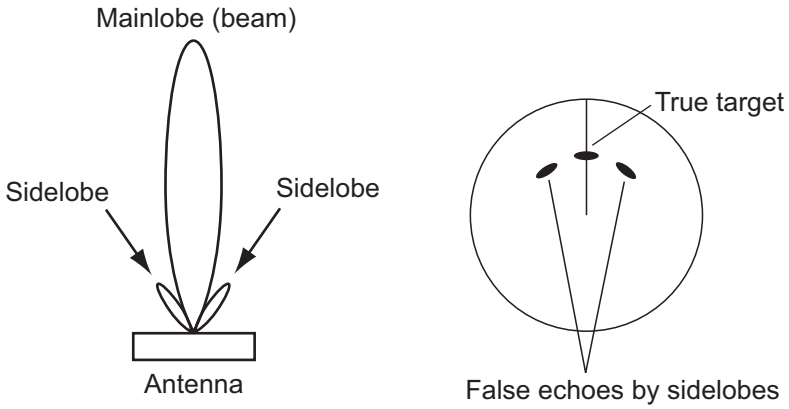
Multiple echoes occur when a transmitted pulse returns from a solid object like a large ship, bridge, or breakwater. A second, a third or more echoes can be seen on the display at double, triple or other multiples of the actual range of the target as shown below. You can reduce and remove the multiple reflection echoes with the sea clutter function.



Multiple echoes

6.2.2 Sidelobe echoes

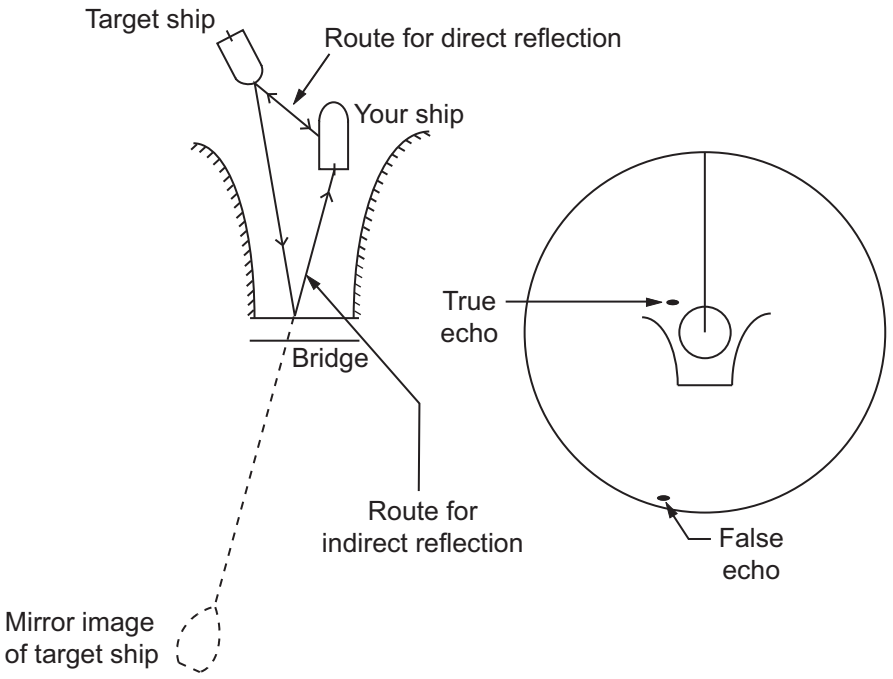
When the radar pulse is transmitted, some radiation escapes on each side of the beam, called "sidelobes". If a target is where a target can be detected by the sidelobes as well as the mainlobe, the side echoes can be shown on both sides of the true echo at the same range. Sidelobes show normally only on short ranges and from strong targets. You can reduce the sidelobes with the sea clutter function.



Sidelobe echoes

6.2.3 Virtual image

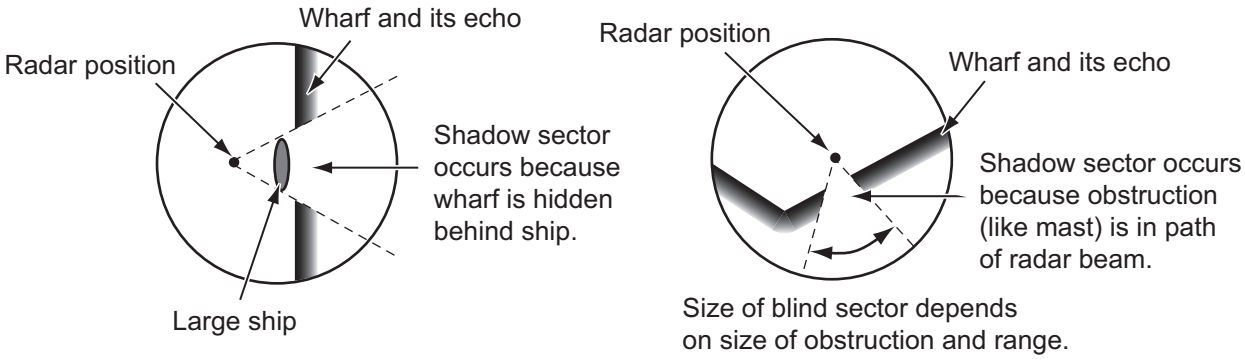
A large target close your ship can appear at two positions on the screen. One of them is the true echo reflected by the target. The other is a false echo which is caused by the mirror effect of a large object on or close your ship as shown in the following figure. If your ship comes close to a large metal bridge, for example, a false echo can temporarily appear on the screen.



Virtual image

6.2.4 Shadow sector

Funnels, stacks, masts, or derricks near the antenna interrupt the radar beam, and a non-detecting sector can occur. Targets can not be detected within this sector.



Shadow sector

6.3 SART (Search and Rescue Transponder)

6.3.1 SART description

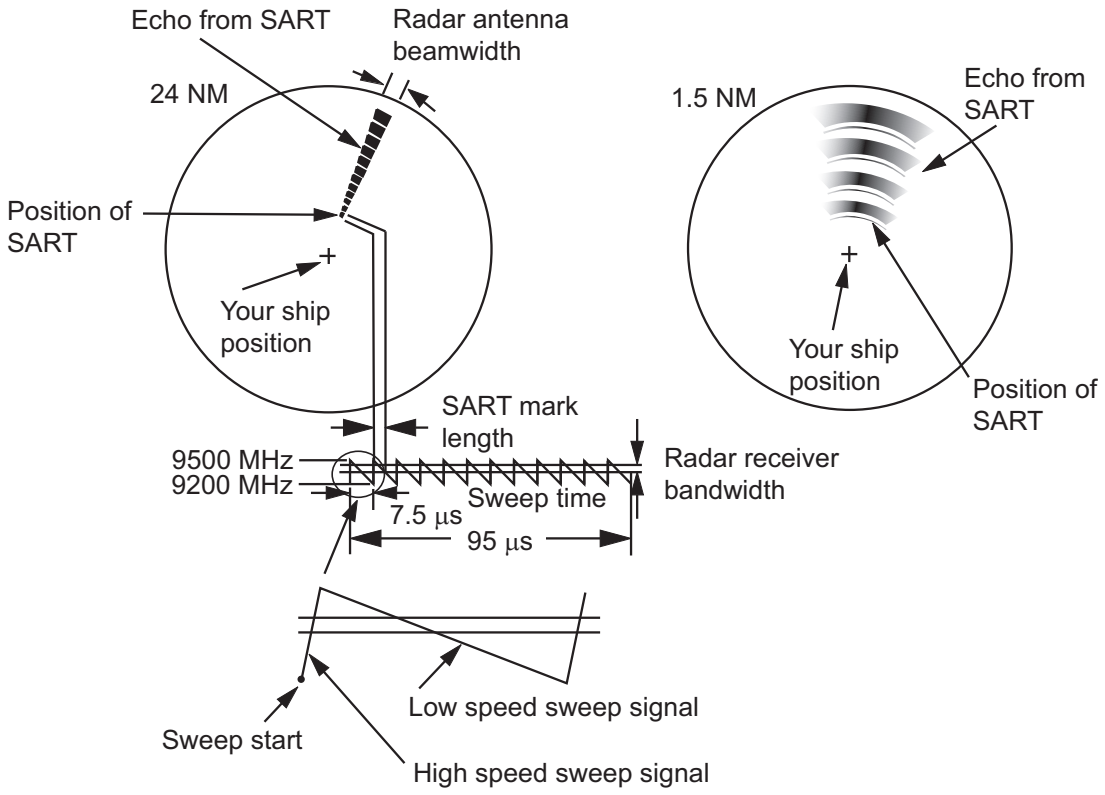
When any X-band radar reaches within a range of approximately 8 nm, a Search and Rescue Transponder (SART) sends a response to the radar signal. The transmitter signal of response is 12-sweeps signal between 9,500 MHz to 9,200 MHz. The time of slow sweep signal is 7.5 μs and the time of fast sweep signal is 0.4 μs. When the radar receives this SART signal, a line of 12 dots appears. When the position of SART is distant, the radar display shows only slow sweep signals like the illustration of screen A.

When the radar reaches the SART within approximately 1 nm, the radar display can also show the 12 responses of fast sweep signals like the illustration of screen B. The position of the SART is the closest position of the radar echoes.

Screen A: When SART is distant

Screen B: When SART is close

Lines of 12 dots are displayed in concentric arcs.



SART echo

6.3.2 General remarks on receiving SART

SART range errors

When the SART is at a range greater than approximately 1 nm, the first dot is displayed at 0.64 nm beyond the true position of the SART. When the range closes so that the fast sweep responses are seen also, the first range echoes are displayed at 150 m beyond the true position.

Range scale

When you find the SART position, do as follows:

1. Use the **RANGE** key to set the range scale to 6 nm or 12 nm.
2. Turn off [Int Rejector].

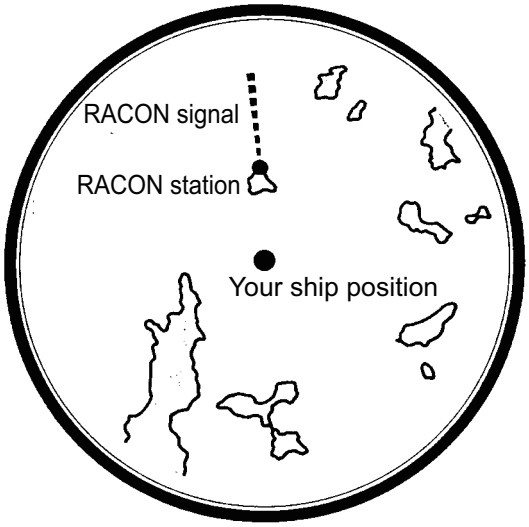
SART display

To display only the SART echo clearly on the radar screen, reduce the tuning on manual mode. The normal radar echoes get weak, however, the SART echoes remain. Your ship comes close to the SART, the arc for the SART display becomes larger. Most of the radar screen becomes fuzzy. Adjust the sea clutter and gain to display the necessary screen.

6.4 RACON

A RACON is a radar beacon which emits radar-receivable signals in the radar frequency spectrum (X- or S-band). There are several signal formats; in general, the RACON signal appears on the radar screen as a rectangular echo originating at a point just beyond the position of the radar beacon. It has a Morse coded pattern. Note that the position on the radar display is not accurate.

Echoes on the radar screen



Echo description

RACON

7. TT OPERATION

The TT (Tracked Target) feature manually or automatically acquires and tracks ten targets. Once a target is acquired, a target is automatically tracked within 0.1 to 16 nm.

7.1 Precautions for Use

⚠ CAUTION

Do not depend on one navigation device for the navigation of the ship. The navigator must check all aids available to confirm position. Electronic aids are not a replacement for basic navigation principles and common sense.

· The TT automatically tracks an automatically or manually acquired radar target and calculates its course and speed, indicating them by a vector. Since the data from the auto plotter depend on the selected radar targets, the radar must be optimally tuned for use with the auto plotter, to ensure required targets will not be lost or unnecessary targets like sea returns and noise will not be acquired and tracked.

· A target is not always a landmass, reef, ship, but can be returns from the sea surface and clutter. As the level of clutter changes with the environment, the operator must correctly adjust the **SEA**, **RAIN** and **GAIN** controls so that the target echoes do not disappear from the radar screen.

⚠ CAUTION

The plotting accuracy and response of this TT meets IMO standards.
The tracking accuracy is affected by the following:

· The tracking accuracy is affected by course change. One to two minutes is required to restore vectors to full accuracy after a sudden course change. (The actual amount depends on gyrocompass specifications.)
· The amount of tracking delay is inversely proportional to the relative speed of the target. Delay is on the order of 15-30 seconds for high relative speed; 30-60 seconds for low relative speed.

The display accuracy is affected by the following:

· Echo intensity
· Pulse width of radar transmission
· Radar bearing error
· Gyrocompass error
· Course change (your ship or target)

7.2 Controls for Use with TT

ENTER: Acquire cursor-selected target. Display data for tracked target (in the data box at the bottom of the screen).

MENU/ESC: (1) Remove data of cursor-selected tracked target from the data box. (2) Stop tracking the cursor-selected target (when its data is not displayed in the data box). (3) Access the [Target] and [TT] menus for TT operations.

Cursorpad: Select a target to acquire (or cancel the tracking). Select a target to show (or remove) target data.

7.3 TT Display On/Off

You can turn the TT display on or off. The system continuously tracks TT regardless of this setting.

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

TT-Display options

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

7.4 How to Acquire and Track the Targets

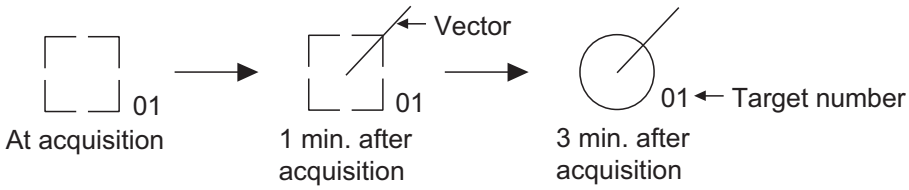
Ten targets are acquired and tracked manually or automatically.

7.4.1 Manual acquisition

You can acquire up to ten TT. When the automatic acquisition ([Auto Acquisition] on the [TT] menu) is set to on, you can manually acquire up to five targets.

1. Use the Cursorpad to put the cursor on the target to acquire.
2. Press the **ENTER** key.

The TT symbol changes over time as below. A vector which indicates the motion direction of the target appears approximately one minute after acquisition.



TT symbol

Target number

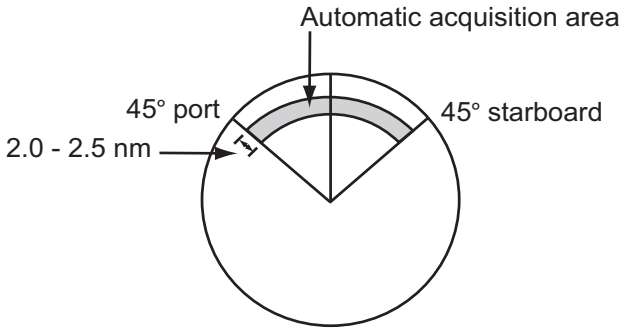
River and Sea (Non-IEC system): An acquired target gets the youngest unused number. When a target is lost and disappears from the number list, the next acquired target takes the number of that lost target (for example, In a 5 target list, if the target 2 is lost, the next acquired target takes the number of target 2).

IEC and Russian-River (IEC system): An acquired target gets the youngest unused number. When a target is lost and disappears from the number list, the next acquired target takes the next sequential number until reaching a maximum 10. If the target number reaches a maximum 10, the next acquired target takes the number of a previously lost target.

7.4.2 Automatic acquisition

When you set an automatic acquisition area, the TT can acquire up to five targets automatically.

The automatic acquisition area is 2.0 to 2.5 nm in range and ±45° on either side of the heading line in bearing. When you change the automatic acquisition to manual acquisition, targets being tracked in automatic acquisition are continuously tracked.



Automatic acquisition area

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

Auto Acquisition options

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

7.5 How to Stop the Tracking of TT

When ten targets have been acquired, no more acquisition occurs unless targets are cancelled. If you acquire additional targets, you must cancel one or more individual targets, or all targets. Use one of the following procedures.

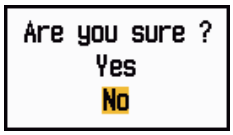
7.5.1 How to stop the tracking of selected targets

1. Use the Cursorpad to put the cursor on the target to cancel the tracking.
2. Press the **MENU/ESC** key to cancel the tracking and erase the TT symbol. The unit beeps twice and the symbol is erased from the screen.

7.5.2 How to stop the tracking of all targets

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

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



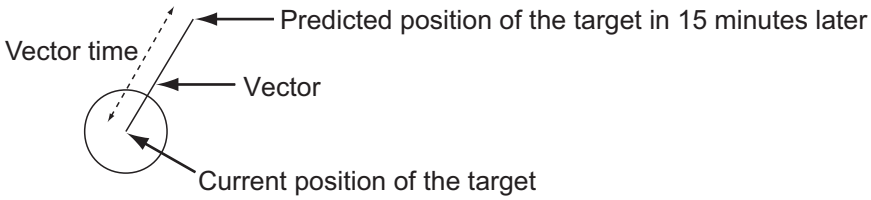
All Cancel options

4. Use the Cursorpad (▲) to select [Yes] and press the **ENTER** key. All symbols are erased from the screen and the long beep sounds.
5. Press the **MENU/ESC** key to close the menu.

7.6 Vector Attributes

7.6.1 What is a vector?

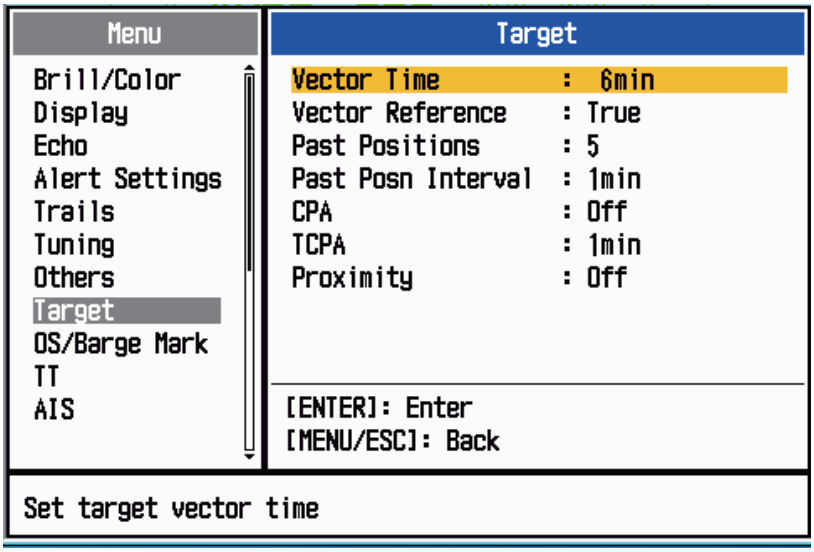
A vector is a line extending from a tracked target. A vector shows speed and course of the target. The top of a vector shows estimated position of the target after the selected vector time elapses. If you extend the vector length (time), you can evaluate the risk of collision with any target.



When vector time is 15 minutes

7.6.2 Vector time and vector reference

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



Target menu

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

Vector Time setting window

4. Use the Cursorpad (▲ or ▼) to select time and press the **ENTER** key.
5. Use the Cursorpad (▲ or ▼) to select [Vector Reference] and press the **ENTER** key.

Vector Reference options

6. Use the Cursorpad (▲ or ▼) to select [Relative] or [True] then press the **ENTER** key. This function is not activate for [IEC] or [Russian-River] purpose. The mode is set to [True].
   [Relative]: Other ships' vectors are displayed relative to your ship. This mode helps find targets on a collision course. If a ship is on a collision course with your ship, the vector of a ship points toward your ship position.
   [True]: Your ship's and other ships' vectors are displayed at their true motions. This mode helps discriminate between moving and stationary targets.
7. Press the **MENU/ESC** key to close the menu.

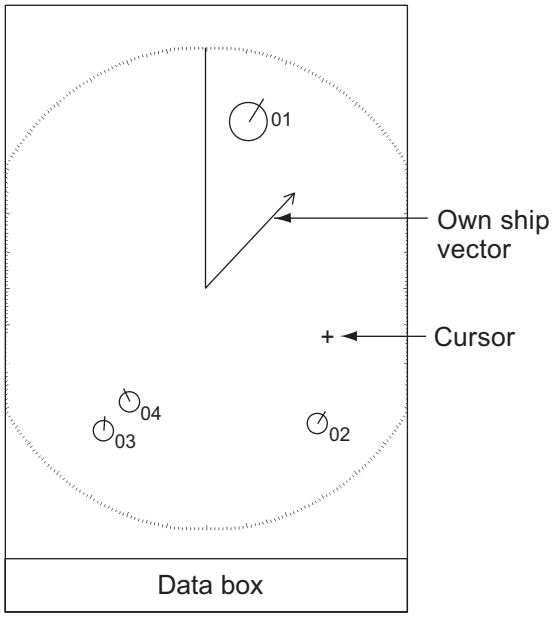
Note: The functions of the [Target] menu are shared by TT and AIS.

7.6.3 Vector of your ship

The vector of your ship is shown as an arrow from your ship position. The vector of your ship is shown on the following conditions:

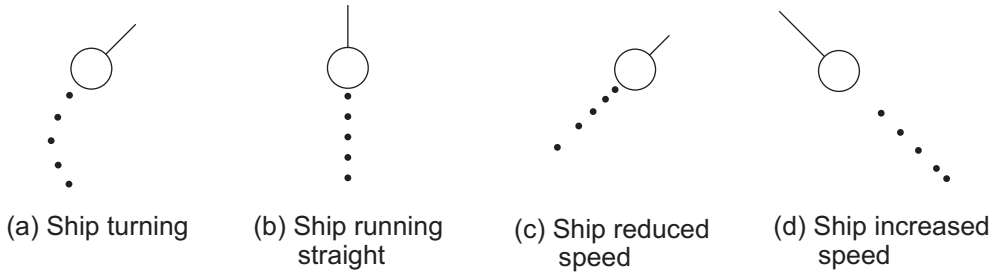
- Select [True] on the menu item [Vector Reference] on the [Target] menu

Note: The vector of your ship is shown in the same color as the TT symbol color.



7.7 Past Position Display (target past position)

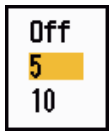
This radar can display time-spaced dots (maximum ten dots) that mark the past positions of any TT. You can evaluate actions of a target by the spacing between dots. Below are examples of dot spacing and target movement.



Target movement and past position display

You can select the number of past position dotes to display and the time interval to display the dots.

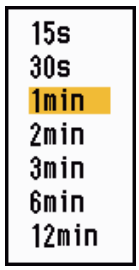
1. Press the **MENU/ESC** key to open the menu.
2. Use the Cursorpad (▲ or ▼) to select [Target] and press the **ENTER** key.
3. Use the Cursorpad (▲ or ▼) to select [Past Positions] and press the **ENTER** key.



Past Positions options

4. Use the Cursorpad (▲ or ▼) to select number of past position dots to display (5 or 10) or select [Off] to turn off the history display.
5. Press the **ENTER** key.

6. Use the Cursorpad (▲ or ▼) to select [Past Posn Interval] and press the **ENTER** key.



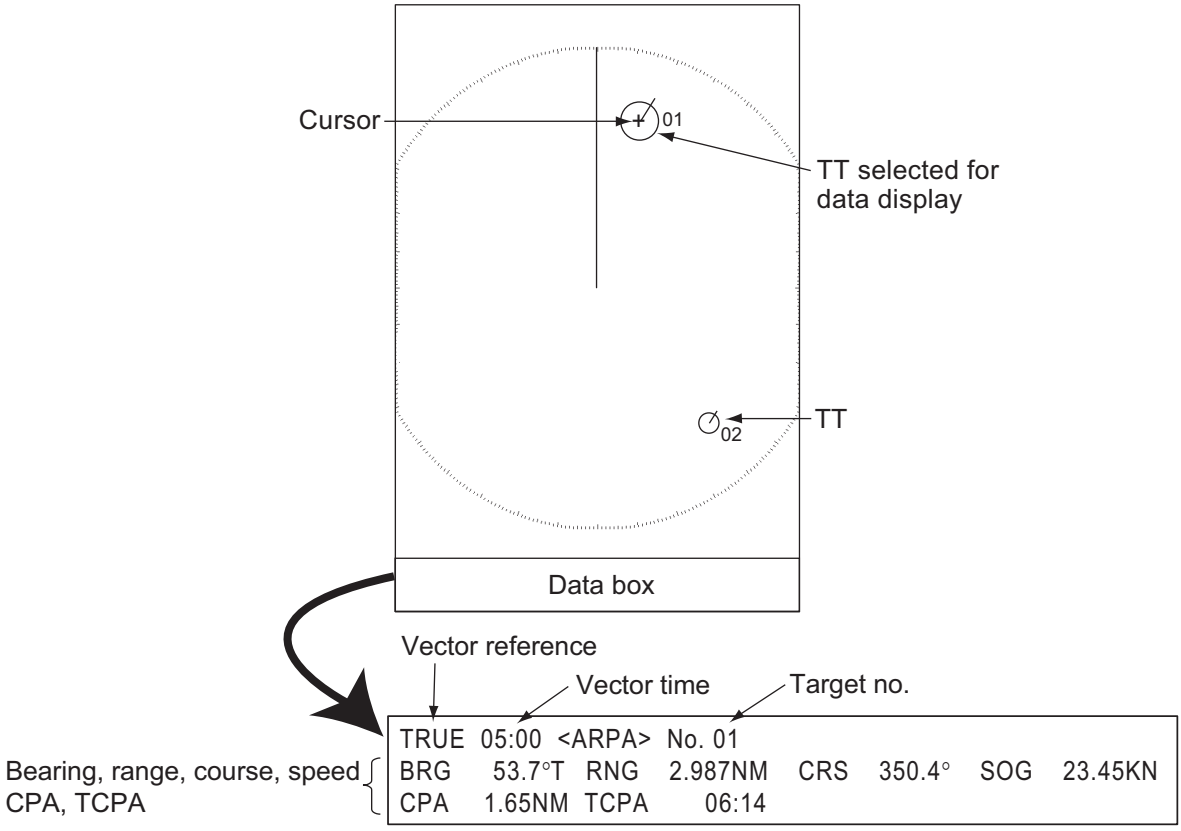
Past position interval options

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

7.8 TT Data

You can show the data or a TT in the data box at the bottom of the screen. To display TT data, the menu item [Display] on the [TT] menu must be set for [On] and the menu item [Data Box] on the [Display] menu must be set for [Target] or [All].

1. Use the Cursorpad to put the cursor on an TT.
2. Press the **ENTER** key to show the data of the target.



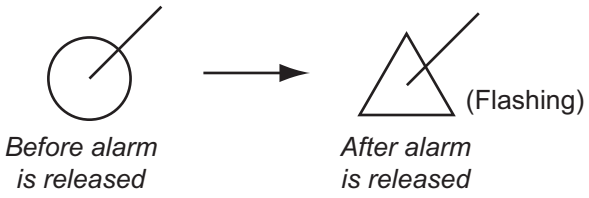
TT data

The symbol for the selected TT is enlarged double to distinguish from other symbols.

To remove the data of a target from a data box, put the cursor on its target symbol and press the **MENU/ESC** key.

7.9 CPA/TCPA Alarm

Set CPA (Closest Point of Approach) alarm range and TCPA (predicted Time to CPA) alarm time to alert you to targets that can be on a collision course. When CPA and TCPA of any TT become less than the preset CPA and TCPA alarm settings, the audio alarm sounds. The alarm message "COLLISION" appears. The target symbol changes to a dangerous target symbol (triangle) and flashes with its vector. You can stop the audio alarm with any key. The flashing of the triangle stops when the tracked TT is not in the CPA and TCPA alarm setting. The TT continuously monitors CPA and TCPA of all TT.



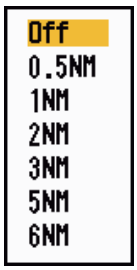
Dangerous target symbol

This feature helps identify targets that can be on a collision course. Correctly adjust the gain, sea clutter and rain clutter.

⚠ CAUTION

Do not depend on the CPA/TCPA alarm as the only method to detect the risk of collision. The navigator is not released of the responsibility to keep visual caution for collision situations, whether or not the radar or other plotting aid is in use.

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



CPA options

4. Use the Cursorpad (▲ or ▼) to select CPA distance and press the **ENTER** key.

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

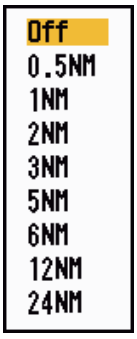
TCPA options

6. Use the Cursorpad (▲ or ▼) to select TCPA and press the **ENTER** key.
7. Press the **MENU/ESC** key to close the menu.

7.10 Proximity Alarm

The proximity alarm alerts you when a TT is within the range you set. The audio alarm sounds and the alarm message "PROXIMITY" appears. The target symbol changes to a dangerous target symbol (triangle, see section 3.9) and flashes with its vector. Press any key to stop the audio alarm. The flashing continues until the target is not within the range set, the alarm range is changed to exclude the target, or the proximity alarm is deactivated.

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

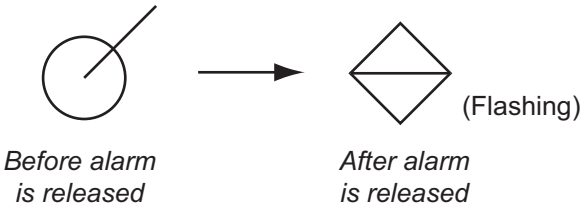


Proximity options

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

7.11 Lost Target

When the system detects a lost TT, the audio alarm sounds and the alarm message "LOST" appears. The target symbol becomes a flashing square like the following illustration. When the system detects the target again, the target symbol becomes a normal symbol.

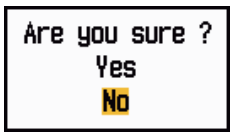


Lost target symbol

To erase a lost TT symbol, put the cursor on the symbol and press the **MENU/ESC** key. If you leave a lost target symbol flashing, the symbol disappears after one minute.

You can remove all lost TT from the screen as follows:

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



Erase Lost Targets confirmation message

4. Use the Cursorpad (▲) to select [Yes] and press the **ENTER** key. All lost targets symbols are erased from the screen and the long beep sounds.
5. Press the **MENU/ESC** key to close the menu.

7.12 Symbol Color

You can select the TT symbol color from Green, Red, Blue, White or Black.

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

Color options

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

Note: Symbols can not be shown in the same color as the background color.

8. AIS OPERATION

Connected to the FURUNO AIS Transponders FA-150, FA-100, FA-50 or the AIS Receiver FA-30, the MODEL 1815 can show the name, position and other navigation data of the nearest 100 AIS transponder-equipped ships.

This radar accepts position data fixed by WGS-84 geodetic datum. Set the datum to WGS-84 on the GPS navigator connected to this radar. If this radar is interfaced with the FURUNO GPS Navigator GP-320B.

Controls for Use with AIS

ENTER: Activate cursor-selected target. Display data for selected active target (in the data box at the bottom of the screen).

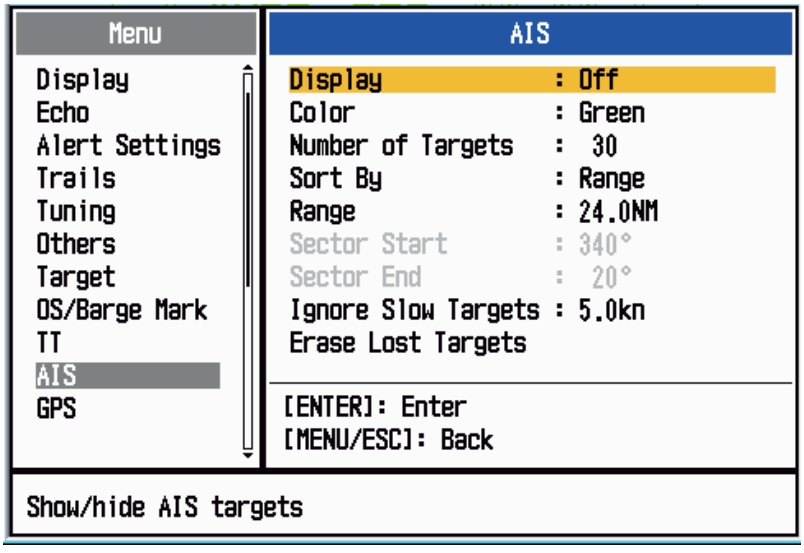
MENU/ESC: Remove data of cursor-selected AIS target from the data box. Sleep cursor-selected target (when its data is not displayed in the data box). Access the [Target] and [AIS] menu.

Cursorpad: Select a target to activate (or sleep). Select a target to show (or remove) target data.

8.1 AIS Display On/Off

You can turn the AIS display on or off. The system continues processing AIS targets regardless of on/off for AIS display when the AIS transponder is turned on.

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



AIS menu

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

AIS-Display options

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

8.2 AIS Symbols

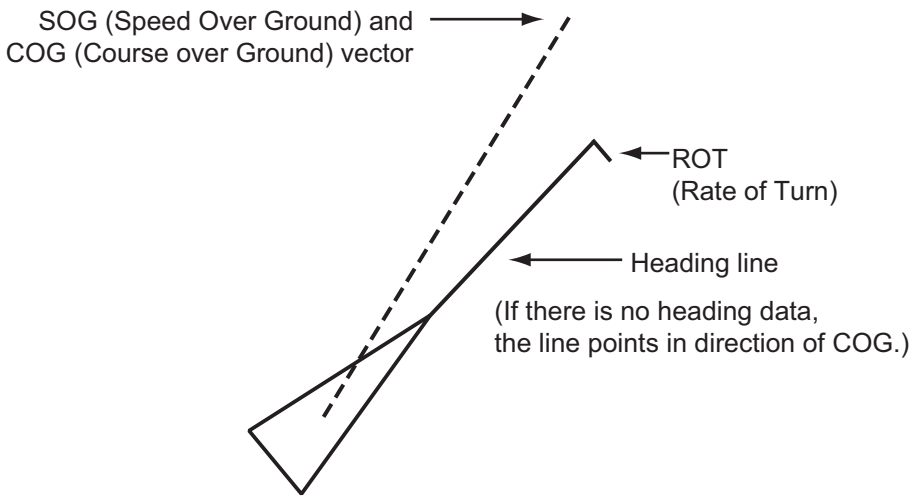
When the AIS is turned on, AIS targets are displayed with AIS symbol as below.

AIS symbols

Note: The AIS symbols are momentarily erased after the screen is redrawn when the heading is changed on the head-up mode.

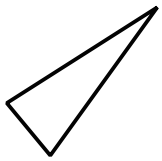
8.3 Activating, Sleeping Targets

When you change a sleeping target to an activated target, a vector shows the course and speed of that target. You can easily judge the target movement by the vector.



Activated target

When there are many activated targets on the screen, you can not easily distinguish the activated targets from the radar images or TT. You can sleep an activated target for easy view of radar images.



Sleeping target

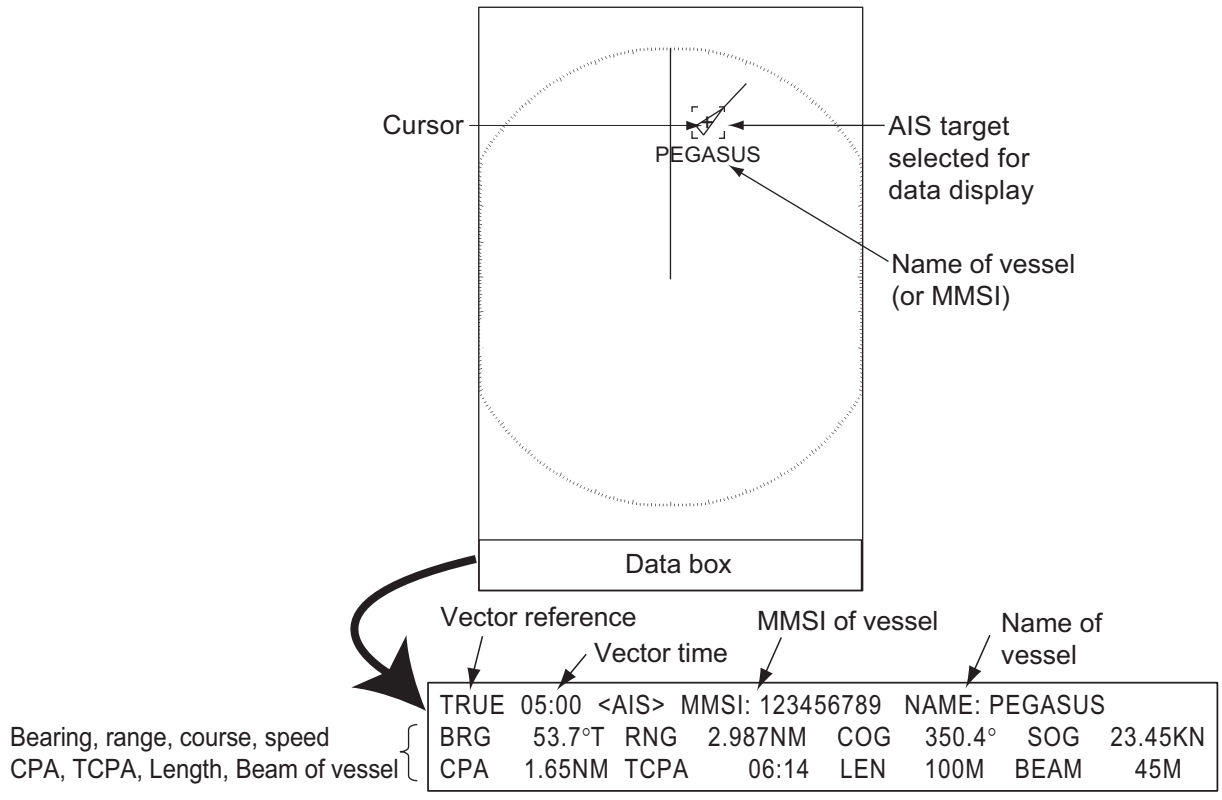
To activate a target: Put the cursor on the target and press the **ENTER** key.

To sleep a target: Put the cursor on the target and press the **MENU/ESC** key.

8.4 AIS Target Data

You can show the AIS target data in the data box at the bottom of the screen. To display AIS target data, the menu item [Display] on the [AIS] menu must be set for [On] and the menu item [Data Box] on the [Display] menu must be set for [Target] or [All].

1. Use the Cursorpad to put the cursor on an activated target.
2. Press the **ENTER** key to show the data of the target.



AIS target data

To remove the target data from a data box, put the cursor on its target symbol and press the **MENU/ESC** key.

8.5 How to Sort Targets

You can sort the AIS targets received from the AIS transponder by range from your ship, by sector, by CPA or TCPA.

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

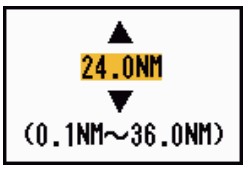
Sort By options

4. Use the Cursorpad (▲ or ▼) to select sorting method and press the **ENTER** key.
   [Range]: Sort targets within the display range set (see section 4.7), from nearest to furthest.
   [Sector]: Sort targets within the display sector set (see section 4.8) and within 24 nm, from nearest to furthest.
   [CPA]: Sort targets within 24 nm by CPA, from closest to furthest.
   [TCPA]: Sort targets within 24 nm by TCPA, from earliest time to latest time.
5. Press the **MENU/ESC** key to close the menu.

8.6 Display Range

You can set the AIS system to show only those AIS targets within the range you set. The setting range is 0.1-36 nm for MODEL 1835, 0.1-48 nm for MODEL 1935, 0.1-64 nm for MODEL 1945. Actual range depends on the AIS Transponder. If the target sorting method is selected to [Range], the target data within the range set here is transmitted to this radar.

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



AIS-Range setting window (for MODEL 1835)

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

Note: The unit of measurement for range is NM.

8.7 How to Display the Targets within a Specific Sector

You can display AIS targets only within a specific sector. If the target sorting method is selected to [Sector], the target data within the sector set here is transmitted to this radar.

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

Sector Start setting window

4. Use the Cursorpad (▲ or ▼) to set the start point for the sector and press the **ENTER** key.
5. Use the Cursorpad (▲ or ▼) to select [Sector End] and press the **ENTER** key.

Sector End setting window

6. Use the Cursorpad (▲ or ▼) to set the end point for the sector and press the **ENTER** key.
7. Press the **MENU/ESC** key to close the menu.

8.8 Number of Targets to Display

You can select the maximum number of AIS targets to display. The setting value is 10 to 100. When the screen becomes cluttered with AIS targets, you can limit the number of AIS targets to show. Targets are selected and displayed according to sort method. (See section 4.6.)

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

Number of Targets setting window

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

8.9 Vector Attributes

8.9.1 What is a vector?

A vector is a line extending from a tracked target. A vector shows speed and course of the target. The top of a vector shows estimated position of the target after the selected vector time elapses. If you extend the vector length (time), you can evaluate the risk of collision with any target.

8.9.2 Vector time and vector reference

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

Vector Time setting window

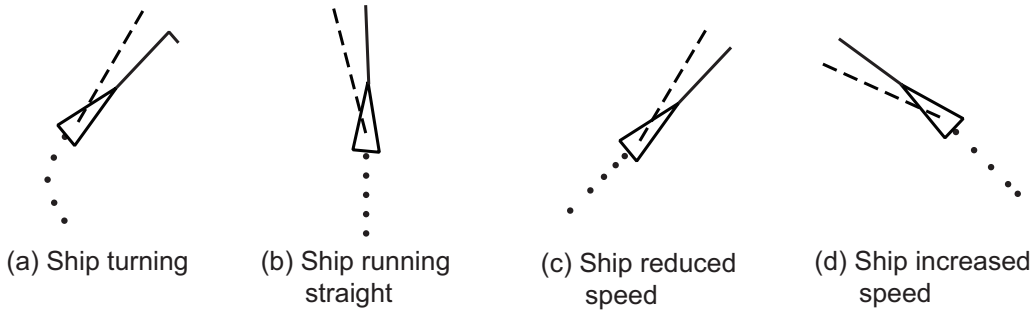
4. Use the Cursorpad (▲ or ▼) to select time and press the **ENTER** key.
5. Use the Cursorpad (▲ or ▼) to select [Vector Reference] and press the **ENTER** key.

Vector Reference options

6. Use the Cursorpad (▲ or ▼) to select [Relative] or [True] then press the **ENTER** key. This function is not activate for [IEC] or [Russian-River] purpose. The mode is set to [True].
   [Relative]: Other ships' vectors are displayed relative to your ship. This mode helps find targets on a collision course. If a ship is on a collision course with your ship, the vector of a ship points toward your ship position.
   [True]: Your ship's and other ships' vectors are displayed at their true motions. This mode helps discriminate between moving and stationary targets.
7. Press the **MENU/ESC** key to close the menu.

8.10 Past Position Display (target past position)

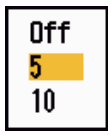
This radar can display time-spaced dots (maximum ten dots) that marks the past positions of any tracked AIS target. You can evaluate actions of a target by the spacing between dots. Below are examples of dot spacing and target movement.



Target movement and past position display

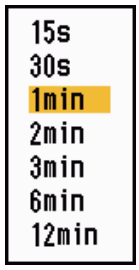
You can select the number of history dots to display and the time interval to display the history dots.

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



Past Positions options

4. Use the Cursorpad (▲ or ▼) to select number of past position dots to display (5 or 10) or select [Off] to turn off the past position display.
5. Press the **ENTER** key.
6. Use the Cursorpad (▲ or ▼) to select [Past Posn Interval] and press the **ENTER** key.



Past Position Interval options

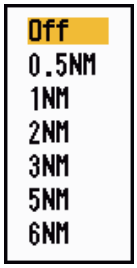
7. Use the Cursorpad (▲ or ▼) to select time interval and press the **ENTER** key.
8. Press the **MENU/ESC** key to close the menu.

8.11 CPA/TCPA Alarm

Set CPA (Closest Point of Approach) alarm range and TCPA (predicted Time to CPA) alarm time to alert you to targets that can be on a collision course. When CPA and TCPA of any AIS target (including a sleeping target) become less than the preset CPA and TCPA alarm settings, the audio alarm sounds. The alarm message "COLLISION" appears. The target symbol changes to a dangerous target symbol (red) and flashes with its vector. You can stop the audio alarm and flashing with any key. The dangerous target symbol is displayed until the AIS target is not in the CPA and TCPA alarm setting. The AIS continuously monitors CPA and TCPA of all AIS targets.

This feature helps identify targets that can be on a collision course.

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



CPA options

4. Use the Cursorpad (▲ or ▼) to select CPA distance and press the **ENTER** key.
5. Use the Cursorpad (▲ or ▼) to select [TCPA] and press the **ENTER** key.

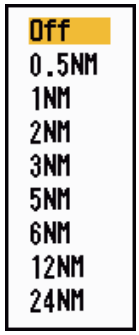
TCPA options

6. Use the Cursorpad (▲ or ▼) to select TCPA and press the **ENTER** key.
7. Press the **MENU/ESC** key to close the menu.

8.12 Proximity Alarm

The proximity alarm alerts you when an AIS target is within the range you set. The audio alarm sounds and the alarm message "PROXIMITY" appears. The target symbol changes to a dangerous target symbol (red) and flashes with its vector. Press any key to stop the audio alarm and flashing. The dangerous target symbol is displayed until the target is not within the range set, the alarm range is changed to exclude the target, or the proximity alarm is deactivated.

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



Proximity options

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

8.13 Lost Target

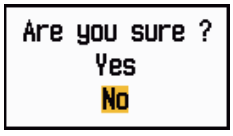
When AIS data is not received from a target at fixed interval (3-5* report intervals), the target symbol changes to the lost target symbol (flashing). No audio or visual alarm is given for a lost target.

Lost target symbol

* The interval at which AIS data is sent depends on speed of the AIS transponder. For detailed information, refer to the Operator's Manual for the AIS transponder.

You can remove all lost AIS targets from the display as follows:

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



Erase Lost Targets confirmation message

4. Use the Cursorpad (▲) to select [Yes] and press the **ENTER** key. All lost targets symbols are erased from the screen and the long beep sounds.
5. Press the **MENU/ESC** key to close the menu.

8.14 Symbol Color

You can select the AIS symbol color among Green, Red (unavailable in the [IEC] or [Russian-River] purpose), Blue, White or Black.

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

Color options

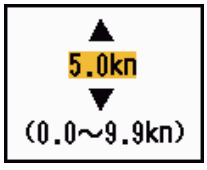
4. Use the Cursorpad (▲ or ▼) to select the color and press the **ENTER** key.
5. Press the **MENU/ESC** key to close the menu.

Note: Symbols can not be shown in the same color as the background color.

8.15 How to Ignore Slow Targets

You can prevent activation of the CPA/TCPA alarm against AIS targets that are traveling at a speed lower than set here. The AIS symbols are not affected by this setting.

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



Ignore Slow Targets setting window

4. Use the Cursorpad (▲ or ▼) to select speed (0.0 - 9.9 kn) and press the **ENTER** key.
5. Press the **MENU/ESC** key to close the menu.